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## **THE IMPACT OF THE BRICS' UNIVERSITIES ON INTERNATIONALIZATION OF SMART CITIES TECHNOLOGIES**

### *Abstract:*

Within the past decade, the increased use of technology in all sectors of society has created a push for cities to integrate the latest and greatest into their city development economically, socially and politically. As cities gain greater control over their development and progression into the 21st century, they face a range of challenges and threats to sustainability in a variety of ways.

At the same time higher education institutions have a unique role in ensuring sustainable and smart development of the regions, since the list of their commitments include promotion of responsible knowledge and practice.

The smart city is a complex and aspirational concept that is quickly shaping how we reimagine urban centers, especially in light of global trends (population growth, urbanization, climate change) and rapid innovation development. We live in an age of tremendous progress and many cities in emerging markets are leapfrogging old technologies and practices to implement faster, cheaper and more sustainable infrastructure and programs.

In this paper we would like to look at smart city initiatives and technologies developed and disseminated by the BRICS countries universities.

We have conducted case study analysis in order to consider several examples of smart city initiatives of HEIs from the sample.

### *Keywords:*

Smart cities, university social responsibility; BRICS; internationalization.

### **Key aspects of the smart city concept**

In the last two decades, the concept of smart city has become more and more popular in academic literature. Firstly, it is important to understand why cities are considered as the keys element in strategic planning. The main reason here, on the one hand, is connected with the main role of cities in the social and

economic life of people all over the world, and, on the other hand, with the huge impact on environmental situation [1].

Moreover, the growing importance of urban areas is a global phenomenon, as evidenced by an increase in the proportion of the world's population living in cities. According to this fact, the most part of the resources are currently being consumed in cities. It refers to the economic and social importance of cities. Nevertheless the rapid development of cities also has a negative impact on the ecological situation.

The revealed trend encourages the development of studies of new ways of meeting the growing needs and solving urgent problems (for example, high level of air pollution, as well as economic risks such as an unemployment). Currently, cities consume 60-80% of energy worldwide and, therefore, they are responsible for a large proportion of emissions and waste. Thus, it is necessary to find new and "smarter" ways to manage current problems.

The concept of "smart city" is far from being limited to technological aspects and, together with the growing relevance of the concept, definitions and meanings change, thereby creating a kind of confusion around the essence of the "smart city".

On the one hand, the city is smart when investments in human and social capital, traditional transport, modern information and communication industries support sustainable economic growth and maintain high quality of life, in balance with reasonable management of natural resources, via involving the government in management process of these issues. At the same time, the concept of the "smartness" is identified with the concept of creativity. Smart city suggests the development of creative economy by investing in projects aimed at improving the quality of life, which, in turn, attracts highly qualified personnel for work and living in these cities [2].

In the literature, there are several key characteristics of "smart cities". They include smart state (government), infrastructure, technology, environment and smart citizens.

The smart state is a system of interaction in which the relevant private and public organizations can effectively operate as a single system. An important feature of the smart government is open (accessible) government data (Open Government Data). [3].

Smart infrastructure refers to support and integration of transport and logistics systems. Smart infrastructure gives priority to clean or green ways of transportation.

Smart technologies primary described as e-business and e-commerce, increased productivity, ICT (Information and Communications Technology)-enabled and advanced manufacturing and delivery of services, ICT-enabled innovation, as well as new products, new services and business models.

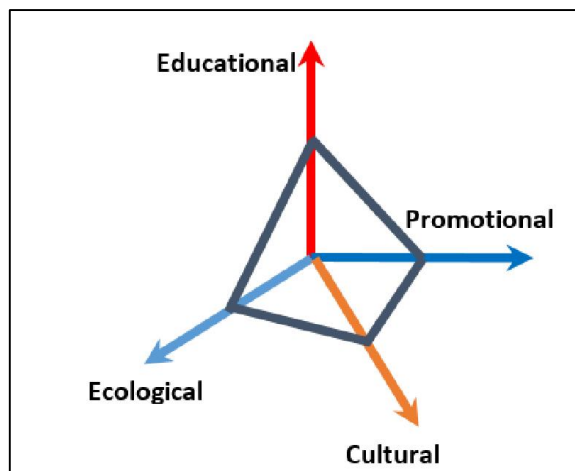
A city's "smartness" in a great extent depends on citizens' involvement in smart city projects, through multiple communication tools (such as a municipality's Web portal, social networks, and smartphone applications). Smart cities need citizens to be continuously connected—in public places, in public transportation, and at home—in order to share their knowledge and experience.

### **The interaction of universities and cities**

There is no questioning the fact that each organization has inevitable impact on its home region. Currently, there are many approaches determining the patterns of interaction of universities and regions, especially concerning the impact of higher education institutions on regional development.

At the most basic level, universities can be the anchor institution in the local economy as a major employer in a wide range of specializations, buyers of local goods and services, and contributors to cultural life and the built environment of cities and towns. Regional investment in university's infrastructure in order to support its core business of research and teaching, therefore, can have a significant impact on regional conditions even if the university is not actively supporting regional development [4].

Nevertheless, considering universities through social responsibility prism, there are the other possible effects on regions. It should be noted that approaches to the determination of universities' impact on regional development might vary, along with the definition of the USR concept.



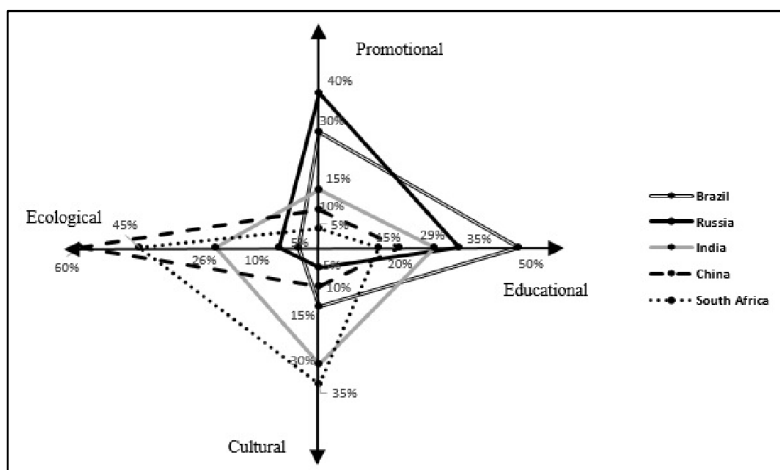
*Fig. 1. Driver-based Model (Belyaeva, 2015)*

In these research we use modified model of social responsibility of higher education institutions [5]. Author of this model suggests grouping university's impacts into 4 key directions: educational (qualificational), promotional, ecological and cultural (Fig.

2). Promoting factors reflect the development of the business environment and brand recognition. Educational factors include alignment of the labor market, relevant programs of teaching, qualified academic staff. Cultural factors summarize the development of intellectual space, as well as dissemination of the cultural, ethical, social and environmental behavior. The environmental part of the model is dedicated to environmentally safe projects and Green Campus technologies.

### Methodology

In our previous research we have carried out content analysis of documents, websites, and schedules and additional information resources of 10 BRICS universities in order to classify all initiatives into 4 main directions of the driver-based model [6].



*Fig. 2. Impact-based USR Model of the BRICS' universities*

Despite of limitation of universities' sample, our findings reflect several facts that can be interpreted as typical features of evolving impact-based model in the BRICS universities (fig. 2).

Following the perceived contextual picture, we can compare extents of implementation of different practices in 10 universities. Moreover, there are some evidence of prioritized directions of model. According to results, it is common to Chinese and South African Universities to have strong ecological impact on regions. Universities in India pay great attention to cultural components of their activities. In addition, there are visible shifts to promotional group of factors in cases of Russian and Brazilian Universities. Considering Indian HEIs, there is a tendency of prevalence of cultural impacts.

The next step here is mapping smart cities characteristics into this 4 directional model. Based on the characteristics of key aspects of smart cities, as well as the description of the directions of the model of interaction between universities and cities, we suggest the following way of considering these classifications in the system (fig. 3).

		Directions of the impacts			
		Educational	Promotional	Cultural	Ecological
Smart City characteristics	Smart technologies	✓			✓
	Smart infrastructure		✓		
	Smart governance		✓		
	Smart people	✓		✓	
	Smart environment		✓		✓

Fig. 3. Smart cities' characteristics in impact-based model of the Universities

For a preliminary assessment of the role of universities in the development of smart initiatives, we have conducted case analysis of 10 BRICS universities. We have found out that 8 out of 10 universities implement projects related to smart cities.

**Discussion**

At this initial stage of our work, we have revealed, BRICS universities participate in the creation, development and dissemination of smart city technologies. We examined the situations in which universities are partners or even initiators of different projects aimed at creating smart cities.

Undoubtedly, among the BRICS countries it is possible to single out a leader in the context of "smart" initiatives manifestation. Now, Chinese universities are the most active (and successful) at implementing various smart city technologies.

Nevertheless, BRICS countries can cooperate with each other and exchange experience for the development of smart cities and other infrastructure. During the conference on smart cities in BRICS held in Jaipur, representatives of countries suggested that innovative methods of urban management implemented in specific countries could be applied in all BRICS member states. Cooperation within the BRICS framework should strengthen communication and improve understanding of culture. Sharing experiences and exchanging smart decisions between

city leaders and representatives of higher education institutions will undoubtedly help to make cities better, safer, more effective and more sustainable.

This work represents an initial stage in the study of the role of universities in the dissemination and development of smart technologies in the BRICS countries. As follow-up plans, we consider the identification of the motives for introduction of smart projects in terms of social and economic conditions. In addition, we are going to analyze the channels for the dissemination of smart technologies in the BRICS.

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