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The socio-technical governance of smart city to scaffold city energy transition policy

Wahyuddin, Yasser^a; Wibowo, Mochamad Agung^b Bave all to author list

^a Department of Geodetic Engineering, Faculty of Engineering, Diponegoro University, Jl. Prof Sudarto Tembalang, Tembalang, Kec. Tembalang, Semarang, Indonesia

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Abstract

The vague concepts of the Smart city have left a significant gap for researchers to amplify the knowledge cavity. This work delved into the implementation of Smart city in The Metropolis of Lyon, France, which strongly involved public and private governance. A project named Smart Electric Lyon (SEL), organized by the Group Electricté de France (EDF), reflects Lyon's urban ecosystem as a test-bed platform to demonstrate Smart meter technology. In return, The Metropolis of Lyon seized the opportunity to promote SEL as a new reference for the local Energy Transition initiatives. This work underlined the governance model of SEL as a Smart city that encompassed a plethora of interests in both public and private. Here, the governance is comprehended in two ways, the first was the role of SEL as a technical setting to satisfy the EDF Smart meter experiments and the second was the Janus of the socio-technical and politics of SEL that compel with the local agenda. This work employed a qualitative method, deploying in-depth semi-structured interviews with dozens of key actors and intense field observations. The findings showcase SEL Smart city project as a co-production of the public and private interests rather than a merely digital innovation process. The approach through the territorial standpoint has allowed depicting a multilevel interest from different stakeholders culminated under the form of a Smart city on the city stage. © 2021 by authors, all rights reserved.

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City Ecosystem; Energy Transition; Governance; Smart City; Socio-technical

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The Socio-Technical Governance of Smart City to Scaffold City Energy Transition Policy

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Abstract The vague concepts of the Smart city have left a significant gap for researchers to amplify the knowledge cavity. This work delved into the implementation of Smart city in The Metropolis of Lyon, France, which strongly involved public and private governance. A project named Smart Electric Lyon (SEL), organized by the Group Electricté de France (EDF), reflects Lyon's urban ecosystem as a test-bed platform to demonstrate Smart meter technology. In return, The Metropolis of Lyon seized the opportunity to promote SEL as a new reference for the local Energy Transition initiatives. This work underlined the governance model of SEL as a Smart city that encompassed a plethora of interests in both public and private. Here, the governance is comprehended in two ways, the first was the role of SEL as a technical setting to satisfy the EDF Smart meter experiments and the second was the Janus of the socio-technical and politics of SEL that compel with the local agenda. This work employed a qualitative method, deploying in-depth semi-structured interviews with dozens of key actors and intense field observations. The findings showcase SEL Smart city project as a co-production of the public and private interests rather than a merely digital innovation process. The approach through the territorial standpoint has allowed depicting a multilevel interest from different stakeholders culminated under the form of a Smart city on the city stage.

Keywords Smart City, City Ecosystem, Governance, Socio-technical, Energy Transition

1. Introduction

Since the first wave of Smart city emerges in early 2000 through the indispensable role of IT industry actors such as IBM, Microsoft, Siemens, and Cisco, cities around the world are tied to transform their city planning into a "smart" one. Inarguably, the Smart city has now become a global prescription of urban development policy in the contemporary era [1]-[3]. This claim was also made publicly by the guru and the senior chief program of IBM Smart city, cities needed to equip themselves with the so-called, fourth infrastructures, integrating networks that could communicate with each other and exchange data at extraordinary speed. Global companies like IBM promised the municipalities around the world would be capable of monitoring any event on every edge of the city on a real-time basis that mimics the system of real-time transport and logistics management [4], [5], which is still one of the core concepts of the Smart city in many regions [6]. It is a regular fact that the Smart city has been advanced as a strategic program for the city government [7]. Despite the absence of a global consensus definition of the Smart city among scholars [8], [9], the global practice framework stretched its definition to the extensive use of ICT embedded in old city infrastructures. ICT devices, real-time connected wired, Internet of things

Lacunarity and the Size of Road Network as Contributors to Spatial Identity: Informal Patterns VS. Vernacular Urban Settlements

Denada Veizaj^{*}, Gjergji Islami, Andrea Maliqari

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Abstract This paper aims to contribute to the debate on the "reading" of urban morphologies through quantitative means. The research objective is the establishment of a numeric method for comparing spatial characteristics of different families of urban morphologies, by considering the degree of fragmentation as a key contributor to their spatial identity. The hypothesis elaborated in this paper is that the fragmentation degree of urban textures can be adequately described through a set of fractal parameters. In addition to the fractal dimension, lacunarity is used in order to complete the analytic model. The intricate relations between morphologic characteristics of the built form and urban mobility are analyzed by referring to the network size and network density of the roads system. The experiment consists of two phases: phase one produces binary images of urban samples belonging to different families of urban morphologies. The focus of the experiment is placed on several informal and vernacular zones in Albania. Over the second phase, the values of fractal indexes, the network size and network density on the binary images of urban samples are measured. The outcome of the experiment purports to establish that the spatial characteristics of different urban morphologies can be adequately expressed in numeric terms. Informal urban patterns are characterized by higher values of lacunarity and lower values of roads network densities compared to vernacular ones, even though they appear to have similar values of fractal dimensions. The

outcome of the experiment opens up new perspectives in relation to urban design practices and planning processes.

Keywords Lacunarity, Spatial Identity, Road Network Density, Informal Patterns, Vernacular Patterns

1. Introduction

The focus on urban morphologies is of a crucial nature for understanding cities and built entities. There is a longstanding preoccupation of academics and professionals for the role that the qualities of the built form have in urban development dynamics [1, 2]. Since the post-modern paradigms, urban facts have been widely seen as complex phenomenon rather than only physical presences [3, 4]. On the other hand, the development of digital technologies and techniques, combined with advanced mathematical and geometric concepts brought to researchers and designers new unexpected tools for "reading" and understanding urban facts, by dealing simultaneously with their complexity [5, 6]. In this perspective, the questions raised in the paper are part of the debate that principally focuses in city's architecture and in its reading. More specifically, the current research work aims to theoretically contribute in the following problem:

Recycled Plastic as an Aggregate in Concrete

Merna Amir Kamal, Rania Rushdy Moussa^{*}, Marianne Nabil Guirguis

Department of Architectural Engineering, The British University in Egypt (BUE), El-Sherouk City, Cairo 11837, Egypt

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Abstract Developing countries are suffering from the negative effect of accumulating local wastes and garbage, in which it increases the level of pollution, affects the public health and increases the percentage of epidemic [4]. Plastic waste often ends up in landfills or oceans for it is non-biodegradable and attempts to destroy it only result in more pollution. Repurposing of plastic waste into the construction industry is a way to decrease the amount of plastic waste, while simultaneously, limiting the over-dredging of sand and other natural materials. This research used experimental method to measure the effect of integrating plastic wastes in construction industry by reusing these plastic wastes and turning it into a useful cheap building material. The partial containment of repurposed plastics as aggregate in concrete mix is tested by experimenting the properties that arise when different percentages of plastic aggregate are used in a concrete mixture. The experimental program replaces cement with plastic at different percentages and the experiment revealed that replacing 10% of cement with plastic presents the better results as stated in this article. The specimens are tested and compared with a control specimen of 0% plastic in terms of compressive strength, unit weight and percentage of cracks. The results show that repurposed plastic aggregate in a certain percentage has no significant difference in the quality of the concrete. Therefore, polices mandating segregation and sorting of wastes for recycling and repurposing intentions should be issued so as to aid the use of these materials in more than one field, thus, saving the ecosystem.

Keywords Repurposed Plastic, Plastic Aggregate, Concrete Mixture, Lightweight Concrete

1. Introduction

Worldwide, the weight of the organic wastes that are produced every year is almost 38 billion metric tons [1, 2]. The dramatic increase in organic waste is due to human consumption rate, population explosion and the human behaviour. In Egypt, Almost 60 million tons of solid wastes are generated annually. According to Elfeki & Tkadlec (2015). The recycled organic waste in Egypt does not surpass 20%, the un-recycled organic waste will affect negatively the residents' public health and environmental so there is an urgent need to manage the rest of organic waste [3, 4, 5, 6]. The improper disposal ways of solid waste in drains, waterways, and opened dump sites have led to the contamination of water supplies and atmosphere which deters Egypt's heritage, natural resources, and the health & wellbeing of its residents [7].

Plastic waste is a huge global problem than can be controlled but not eliminated by the re-use of these plastic products. A study showed that 275 million tons of plastic waste were produced in 192 coastal countries among which 12.7 million tons of these disposed plastics were thrown in oceans resulting in detrimental effects on the environment [8]. If mandatory sorting process of Municipal solid waste (MSW) was applied, it would ease the repurposing or recycling of different waste materials to be used in building materials [4, 5, 9]. According to previous studies in the USA in 2018, plastic comprised about 13% of Municipal solid waste and about 18% of the wastes that were land filled [10,11]. These wasted materials can be used in construction as aggregate substitute [12]. Eventually this will reduce carbon dioxide emissions and reduce the amount of solid waste that will go to land filling. Previous studies discussed the properties of recycled plastic aggregates in concrete such