BEST: International Journal of Management Information Technology and Engineering (BEST: IJMITE)
ISSN (P): 2348-0513, ISSN (E): 2454-471X,
Vol. 6, Issue 2, Feb 2018, 9-20

ACCULTURATION OF SYSTEMS THINKING FOR REQUIREMENTS NEED ANALYSIS FOR SMART ENERGY CITY DEVELOPMENT: A CASE STUDY IN ACCRA

BISMARK APPIAH ADDAE & LING ZHANG

Department of Management Science and Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing, China

ABSTRACT

The acculturation of Systems thinking (ST) for the development of Smart Energy City, (SEC), is crucial for its success. Smart Energy City can be seen as a sustainable component of the whole complex system of Smart City with the core aim of sustaining the energy needs of the city. Smart Energy City is itself a complex system and can be perceived as a Systems of Systems (SoS-SEC) comprising of other sub-systems both internally and externally, all interacting with it. Analyzing SEC from a simple cause and effect point of view similar to reductions is not enough to understand its complex nature. System thinking goes deeper, considering issues such as unintended consequences, circular interrelations between cause and effects, time delays and boundaries of the system, and it is useful in the requirements analysis of Smart Energy City Development.

Again, the successful development of Smart Energy City faces challenges from both technical and non-technical point of view. To fully dissipate its successful development, it's identified challenges that form the basis of its development has to be fully addressed and factored into the system requirement stage of its development. This paper suggests the need for the analysis of the system requirement needs of Smart Energy City development be carried out through the art of systems thinking modelling, taking into consideration the interdependencies not a snapshot of various needs that ought to be addressed in the development. This is so because the various needs of Smart Energy City are not independent but interrelated somehow. System thinking helps to wholly understand the Systems of Systems nature of Smart Energy City.

This paper presents an adapted Systems definition for Smart Energy City Development (SECD) that integrates the general core functions of Smart Energy City (SEC). Also the synergies existing between Systems of Systems and Smart Energy City, SoS-SEC is established and finally, the exploration of the strengths and weakness of systems thinking is also established with emphasis on how and when both can be capitalized in its use. Systems thinking does not only ensure that the right needs are addressed but also can help optimize decision making process through its loops functionality. This concept was applied to a case study of Smart Energy City development in Accra, where systems thinking was adapted during the system requirement stage to analyze the causal hypothesis for smart energy city development.

KEYWORDS: Systems Thinking, Systems of Systems, Smart Energy City, System Requirements & System Interdependencies