

UNIVERSITI TEKNOLOGI MARA

**A SYSTEM DYNAMICS APPROACH
TO SIMULATE SOCIAL RETURN
ON INVESTMENT IN PUBLIC
ACADEMIC BUILDING PROJECTS**

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ABSTRACT

The decline in investments in public sector universities and their physical infrastructure in most low-income countries has negatively impacted their functions. Since the reason for investment disfavour may be the "expected socio-economic benefits," this research aims to structure and simulate a dynamic model of the social return on investment (SROI) formation process to study and propose required policies to improve it. A system dynamics modelling approach was applied to develop and validate the system's "stock-flow" diagram, based on primary data from three case buildings. The model was simulated for different policies on six leverage parameters using VENSIM software. The study identified three policies for improving the SROI and their implementation strategies. Policy 1 minimized the number of unpaid students and their budget. Policy 3 optimized the number of students. Policy 4 maximized the effectiveness of building uses. The limitations in system elements, the type of institution, and data sources constrain the study. It is expected to contribute to the Sustainable Development Goals, the "SROI" and "system dynamics" methodologies, and "engineering economics." The recommended topics for further and future research may address the limitations and improve the subject.

Keywords: impact assessment, outcome monetization, physical infrastructure, policy, public higher education, socioeconomic progress, system dynamics

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Education is the most potent weapon for changing the world (Nelson Mandela) or the best investment (Benjamin Franklin), which supports the basis of every community and the future of every economy (Brad Henry). Higher education institutions have a significant role in economic growth (Baharustani, 2012), satisfying social demands, providing research services (Dziechciarz, 2015b), imparting knowledge, and advancing learning (Okechukwu et al., 2020). The key to the success of the developed nations in the world is the effective higher education provided by universities. Developing countries also make efforts to rebuild and improve their economies by completing, protecting, and effectively utilizing their economic and social infrastructures through the continuing hard work of qualified and committed human resources, which are only produced by effective higher education systems (Roof, 2015).

Successful completion of the higher education mission necessitates adequate human, physical, and financial resources (Muhammad et al., 2014). The resources include the physical infrastructure. This important component is the base of highest standards of university excellence (Aithal & Aithal, 2019), a critical support for high-quality outcomes, and for students' and staffs' productivity (Green, 2019; Leaman et al., 2010).

According to Muravska et al. (2020), while most public higher education institutions in developing countries have been rebuilt and operate very well, many of them remain dysfunctional due to a lack of comprehensive physical infrastructure, particularly academic buildings. A "public academic building" is a physical infrastructure. It facilitates safe and adequate spaces for higher-educational activities like teaching, research, administration, and student services.

The absence of adequate academic buildings prevents many students from learning the required skills. Therefore, such institutions remain unable to produce skilled and dedicated workforces (Baharustani, 2012; Dziechciarz, 2015b; Fujiwara & Dass, 2020; Williams & Swail, 2005).