論　文　要　旨
Thesis Abstract

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主論文題名　（Title）

Development and application of assessment methods for the sustainable management of road projects based on lean principles

内容の要旨　（Abstract）

Sustainable infrastructure development has gained increasing importance as countries strive to balance economic growth, environmental responsibility, and social equity. Road projects, as a fundamental component of infrastructure for sustainable transport, play a vital role in connecting communities, fostering economic development, and enhancing mobility. It plays a major role in sustainable development owing to influence on the natural environment, human life and the economy. The influence can be seen by the economic contribution to the growth rate, by the social contribution in providing security to the people and through employment opportunities, and by environmental contribution through large resource consumption, enormous energy use, and environmental emissions. However, in developing countries, road projects often face significant challenges, including cost overruns, delays, low-quality outcomes, safety risks, and environmental concerns. In urban city like Addis Ababa, urban sprawl is the main causes of challenge of urban road projects (Visagie et al., 2021). Due to urban sprawl, the lack of an appropriate street network coupled with a lack of public services which created transport costs are high in both time and money, access to jobs and services is limited and there is a high reliance on walking in unsafe conditions.

The research plans to take a comprehensive, multi-lens approach to measure road project impacts a long several aspects of sustainability, which include efficiency (the use of resources, and financial and schedule management), Environmental (Climate change, pollution, and risk), and Quality and safety performance (accessibility, equity, traffic injuries and health, and air quality). The concern towards the highlighted challenges, forced re-thinking of construction practices to adopt strategies that address environmental issues while promoting economic and social growth. The need for adopting the triple bottom-line approach (Economical, Social, and Environmental) has promoted to create an alignment of sustainable management with Sustainable Development Goals (SDG). Achieving the overall sustainability is an added challenge to road construction projects that is already under pressure by existing low productivity, revenue risks, cost overrun, project delay, and low quality.

The need for Sustainable management based on lean construction principles become valuable to address those above-mentioned issues. Lean Construction primarily focuses on elimination of wastes, satisfying customer needs, focusing on values and perfection, improving efficiency in project delivery by reducing variability, and improving reliability of construction process (Singh & Kumar, 2020). When applied to road projects, lean construction techniques such as just-in-time delivery, value stream mapping, and continuous improvement can contribute to sustainability by reducing material waste, improving resource utilization, and minimizing project delays.

Despite the proven benefits of lean management in developed nations, its application in road projects in developing countries remains limited due to systemic inefficiencies, lack of policy support, and resistance to change. This research explores the integration of sustainable management and lean construction principles in road projects in developing countries. By leveraging multi-Attribute Utility Theory (MAUT) decision-making techniques, this study aims to assess and benchmark the sustainability performance of road projects.

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