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## Supply chain management strategy for recycled materials to support sustainable construction

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### Abstract

Sustainable construction as a construction method is a beginning to gain traction among Indonesian contractors, but with the dearth of research, knowledge, socialization and strategic support in this field, there are many obstacles towards *en masse* adoption in Indonesia: to be applied “effectively” and to become part of a “strategic method”. The concept of Sustainable Construction primarily emphasizes the wise use of resources (primarily natural resources), thereby systematically guaranteeing the fulfillment of future needs. However, the use of recycled materials is still hampered by the difficulty of field implementation; this is attested by the low scores attained in green building certification. This study will analyze the strategies needed to support sustainable construction in relation to supply chain management for materials, which have not been implemented well in Indonesia, whereas it has the highest impact in contributing to the effectiveness of sustainable construction. The aim of study is to analyze supply chain performance in materials of construction projects. The measurement used is the Supply Chain Operations Reference (SCOR) model with perfect order fulfillment and overall value at risk as a Key Performance Indicator (KPI). The result of the study is the percentage of material that could be used by the management of supply chain. Once the KPI is more fulfilled by perfect order fulfillment, the use of material is more complete to support sustainable construction.

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## 1. Introduction

In order to accelerate the economic growth in various regions, the Government of Indonesia encourage the development of infrastructure with the target of investment is 2.000 trillion rupiah in 2025. Planning of infrastructure development includes the technical and management matters such as cost, quality, time, safety and environment. Along with the development of infrastructure, supply chain has become one of the topic for research in construction management subject [1].

Any construction project always needs resource projects as a component input in the construction process. One of them is material. Material is one of the project resources that were quite dominant in determining the quality of the construction [2]. The construction industry has a great impact on the environment in the form of natural resources that are used as well as the solid waste that is generated, and they could harm the surrounding environment. The previous research states that the sheer number of solid waste generated by the construction is 20-30% of construction projects in Brazil, and 1-10% in Netherlands [3]. To anticipate the issues related to environmental impacts, it is necessary to use waste management as part of the construction project management [4]. Therefore, in this study will analyze the construction supply chain management which is to reduce waste by using Key Performance Indicator (KPI) of Supply Chain Operations Reference (SCOR) and see the cause.

## 2. Literature Study

### 2.1. Sustainable Construction

Sustainable construction is a process whereby, over time, sustainability is achieved. The concept of sustainability must be applied into construction industry to influence the manner in which a project shall be conducted to strike a balance between conserving the environment and maintaining prosperity in development [5]. Environmentally sustainable building construction has experienced significant growth during the past decade [6]. Furthermore, some local governments are adopting green building providing permitting and financial incentives or standards and regulations for sustainable development. In another study, sustainable construction faces economic challenges at different areas [7]. The first is macroeconomic area that the goals of sustainable construction are being implemented in individual countries in which the share of construction output is decreasing. The second is mesoeconomic area that the construction sector depends on the implementation of the goals of sustainable development across the national economy as a whole.

### 2.2. Supply Chain Management

Supply chain management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders [8]. Supply chain management is ultimately about influencing behavior in particular ways and particular directions [9]. There are four specific roles in construction, see Fig. 1.

### 2.3. Supply Chain Operations Reference (SCOR)

Supply Chain Operations Reference (SCOR) model provides a unique framework that connects performance metrics, best practices, processes, and people into a unified structure [11]. The frameworks will supports communication between supply chain partners and enhances the effectiveness of supply chain management, related supply chain improvement activities, and technology. SCOR is a consensus model. SCOR is developed and continues to evolve with the direct input of industry leaders who manage global supply chains and use it daily to analyze and improve the performance of their groups. It features an intentionally broad scope and definitions that can be adapted to the specific supply chain requirements of any application or industry. There are 11 Key Performance Indicators (KPI) in SCOR. These KPI are perfect order fulfillment, order fulfillment cycle time, upside supply chain flexibility, upside supply chain adaptability, downside supply chain adaptability, overall value at risk, supply chain management cost, cost of goods sold, cash to cash cycle time, return on supply chain fixed assets, and return on working capital.

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