

Eco-Design of Construction Industrial Park in China with Selection of Candidate Tenants

Authors : Yang Zhou, Kaijian Li, Guiwen Liu

Abstract : Offsite construction is an innovative alternative to conventional site-based construction, with wide-ranging benefits. It requires building components, elements or modules were prefabricated and pre-assembly before installed into their final locations. To improve efficiency and achieve synergies, in recent years, construction companies were clustered into construction industrial parks (CIPs) in China. A CIP is a community of construction manufacturing and service businesses located together on a common property. Companies involved in industrial clusters can obtain environment and economic benefits by sharing resources and information in a given region. Therefore, the concept of industrial symbiosis (IS) can be applied to the traditional CIP to achieve sustainable industrial development or redevelopment through the implementation of eco-industrial parks (EIP). However, before designing a symbiosis network between companies in a CIP, candidate support tenants need to be selected to complement the existing construction companies. In this study, an access indicator system and a linear programming model are established to select candidate tenants in a CIP while satisfying the degree of connectivity among the enterprises in the CIP, minimizing the environmental impact, and maximizing the annualized profit of the CIP. The access indicator system comprises three primary indicators and fifteen secondary indicators, is proposed from the perspective of park-based level. The fifteen indicators are classified as three primary indicators including industrial symbiosis, environment performance and economic benefit, according to the three dimensions of sustainability (environment, economic and social dimensions) and the three R's of the environment (reduce, reuse and recycle). The linear programming model is a method to assess the satisfactoriness of all the indicators and to make an optimal multi-objective selection among candidate tenants. This method provides a practical tool for planners of a CIP in evaluating which among the candidate tenants would best complement existing anchor construction tenants. The reasonability and validity of the indicator system and the method is worth further study in the future.

Keywords : construction industrial park, China, industrial symbiosis, offsite construction, selection of support tenants

Conference Title : ICECPD 2017 : International Conference on Eco City, Planning and Design

Conference Location : San Francisco, United States

Conference Dates : June 07-08, 2017