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Application of Fuzzy AHP and ELECTRE to China Dry Port Location Selection

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Contents

Abstract

The selection of optimal dry ports construction projects is a process of multi-objective decision making. This paper lists 6 important factors that have influence on dry ports location selection in China according to references: transportation, economic level, infrastructure facilities, trade level, political environmen, cost. And based on these, the paper combines two optimal selection model of dry ports construction projects--Fuzzy-AHP and ELECTRE (Elimination Et Choice Translating Reality) in the New Eurasia Continental Bridges (NECB) of China region. Compared with simple quantitative or qualitative decision- making model of site selection, this model takes the fuzziness and preference of the factors affecting site selection proposals into account , which is much more suitable for decision makers making decisions to the real situation. It provides scientific reference on the reasonable distribution of dry ports, saving cost of logistics and ports construction, avoiding reduplicate port construction, and scientific site selection.

Key words : Dry Ports, Eurasia Continental Bridges, Fuzzy AHP, ELECTRE

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I. Introduction

Currently the NECB has had great impact on the inland transportation in European-Asia areas, and is conductive to the regional economic development. Meanwhile, two-way communication between Asia-Pacific and European areas becomes more and more obvious through land bridge link. But there are also many problems of the NECB. For example, the logistics facilities are undergrown;information fails to be feedbacked in time; the logistics between the east and the west is unbalance. Moreover, the biggest bottleneck is the low speed of customs clearance. However,in recent years, the rapid development of dry ports can solve thoes problems. If dry ports are established along the NECB, the transport line can be fully optimized.

In this paper, the basic concept of dry port is summarized as follows: "dry port" refers to a logistics center established in inland area which has service function of customs declaration, inspection declaration and issurance on bills of lading. Supervisory authorities, including Customs, Animal and Plant Quarantine Bureau, Commodity Inspection Bureau and Health Inspection Authorities, are set up in dry ports to provide services for customs clearance. In other words, it possesses all port functions except loading vessel. [1)]

When we are selecting sites for dry ports, a variety of factors should be taken into consideration. In the process of site selection, we should fully consider the characteristics of dry ports combining quantitative and qualitative decision-making methods. So far, the methodologies for dry port location are DEA[2)], ANP[3)], Fuzzy C-clustering[4)], freight volume based on curve impedance function[5)], genetic fuzzy clustering[6)] etc.

Different from the previous research, after referring to all kinds of research materials, and considering the language fuzziness as well as the preference

1) Dry port definition by United Nations text in 1982: An inland terminal to which shipping companies issue their own import bills of lading for import cargoes assuming full responsibility of costs and conditions and from which shipping companies issue their own bills of lading for export cargoes.
Leveque and Roso(2002): A dry port is an inland intermodal terminal directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardized units as if directly to a seaport. From the perspective of definition, this definition is not elaborate the essence significance of a international dry port, in fact, dry port can also function as a logistics center with integrated functions.

2) Rui YANG(2006).

3) Chun-hui WANG(2008).

4) Zhao-min ZHANG(2008).

5) Qin FANG(2008).

6) Wei-hong ZOU(2009).