A SWOT Analysis of Intelligent Products Enabled Complex Adaptive Logistics Systems

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1. INTRODUCTION

It is increasingly emphasized that effective alliance partnerships and new forms of communication and information technologies for the growing number of distribution logistics issues must be grounded in a non-reductionist paradigm focused on understanding relationships and applying flexible problem-solving. To address these needs, key principles of complex adaptive systems (CAS) theory are being applied to logistic planning and research, called complex adaptive logistics systems (CALS).

The conventional approach to logistics systems has been to treat them as predictable and controllable. However, nowadays, logistics is a complex dynamic network, exhibiting a self-organizing adaptive behavior similar to a CAS. In other words, it is important not to look at logistics as mere dynamic flow networks with a relatively stable structure but as dynamic systems whose structures evolve and change (Surya Dev Pathak, Dilts, & Biswas, 2004). Towards this trend, it should lead to radically different approach to management of logistics systems that places much emphasis on enabling self-organization, learning and adaptation. In the light of the situation, this study has attempted to draw upon insights by using a strength, weakness, opportunity, and threat (SWOT) tool to examine the relevance and usefulness of the concept of CAS as an approach to better understanding views of logistic systems in which new communication and information technologies’ interventions could be introduced and sustained.

The remainder of this article is organized as below. Subsequent to the introduction in Section 1, the background of logistics systems and complex adaptive logistics system is briefed in Section 2. The research methodology employed in this article was explained in Section 3 which is followed by the formulation of research questions in Section 4. Then Section 5 gives the key findings found in this study and the relevant recommendations are also presented at the end of this section. Next, Section 6 highlights the future research directions. Finally, the conclusion drawn in Section 7 closes this article.

2. BACKGROUND

2.1. Logistics Systems

Logistic systems are a complex network with a huge number of interactions and inter-dependencies among different entities including suppliers, customers and business partners, activities and resources. From another perspective it can be viewed as a complex information processing system in which the useful information needs to be stored, processed and transmitted.

2.2. Complex Adaptive Logistics Systems

The logistics systems is highly nonlinear, shows complex multi-scale behavior and evolves self-organizes through a complex interplay of its structure and func-
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In theory, SWOT analysis presents a mechanism for identifying the linkage among company’s internal factors (i.e., strengths and weaknesses), and external factors (i.e., threats and opportunities) in the marketplace. Based on that, four types of strategies, namely SO (strengths-opportunities) strategies, WO (weaknesses-opportunities) strategies, ST (strengths-threats) strategies, and WT (weaknesses-threats) strategies of the business venture or project can be judged. In other words, SWOT matrix transforms weaknesses into strengths and threats into opportunities (Arslan & Er, 2008). For example, the SO strategies use a firm’s internal strengths to take advantage of external opportunities; the WO strategies improve internal weaknesses by taking advantage of external opportunities; the ST strategies use a firm’s strengths to avoid or reduce the impact of external threats; and the WT strategies are defensive tactics directed at reducing internal weaknesses and avoiding environmental threats (Weirich, 1982).

In the literature, there are many successful cases of applying SWOT analysis to the strategic level decision making. For instance, by using SWOT analysis, Halla (2007) conducted a strategic urban development planning based on the case of Dares Salaam city in Tanzania and concluded that the method is stronger than the procedural or master-planning approach in planning cities. Caruana et al. (2010) addressed a strategic development model that focusing on higher education of the healthcare issue by using SWOT methodology. They proposed a two-step process: one first drew a SWOT matrix and then used the identified SWOT results to develop the strategic development model. In a similar vein, the SWOT methodology has been used extensively in other higher education and healthcare domain (Christiansen, 2002a; 2002b; Dyson, 2004). Furthermore, in the discipline of waste...