

Topic and Introduction

Application Of Multi-Agent Systems In Supply Chain Management

Logistics in the modern economy occupy a larger share of the pricing process. Therefore, most companies need to reduce the cost of goods to compete in a dynamic market, which leads to the problem of optimizing the construction of logistics supply chains.

Managers must solve complex situations to build an effective supply chain system. As an integrated network of suppliers, factories, warehouses, distribution centers, and retail outlets, a supply chain management system coordinates processes throughout the logistics chain for faster and more flexible collaboration between companies, customers, and suppliers.

The optimal supply chain is such a coordination of resources and connections of the enterprise that allows you to get the necessary goods on time and at the lowest price. As a result, using supply chain management systems makes the company competitive and optimizes its profits. It would help if used real-time simulation to form an algorithm for building such a system. Technologies can support this process in dynamic circulates with intelligent methods, such as multi-agent systems.

The result of the software created according to this algorithm provides the company with quick adaptation to supply changes, improves the supply system's management, and reduces logistics costs.

Literature review:

In their study guide [1], Thierry Moyaux and Sophie D'Amours, describe the use of agent technologies in various variations to model supply chains. They begin disclosing the topic by presenting the conditions on the global market and note the high price dependence on logistics. The authors determine that at a high level of dynamics in the market, the company that has replaced special expert departments with automated decision support systems built based on simulation models survives. The most effective models include agent or physical models.

The authors indicate that only model agents are able to implement for logistics purposes. And among agent-based ones from the 1990s to 2010, the orientation changed from single-agent, when instead of a group of customers, there is one modeling entity, to multi-agent, in which different types of agents forming groups act. As a result, multi-agent systems (MAS) solve supply management problems, providing automation of this process.

On the other side, Fang Fang and T. N. Wong wrote an article [2] with the opposite point of view. These scientists conducted a study to develop this topic further. They point out that despite significant efforts, the technology of multi-agent systems (MAS) has so far been used exclusively for the automation of supply chain management but began to add a stage of negotiation between buyers and sellers exclusively at the beginning.

Therefore, Fang Fang and T. N. Wong proposed to modernize the model by adding a constant process of exchange of proposals, thus forming a hybrid negotiation model for forecasting activities based on cases. This method creates a database of negotiations, increasing the simulation's reliability. The modeling includes Petri nets. In other words, a multi-agent application becomes more flexible and self-learning. Through negotiations between agents, an optimal option with a certain level of prediction for the supply management system. As a result, it is necessary to automate the parameters of the negotiations, which will indicate the desired optimization results for the application.

1. "Supply Chain Management and Multi-Agent Systems"\

Thierry Moyaux and Sophie D'Amours 2011

2. "Applying hybrid case-based reasoning in agent-based negotiations for supply chain management"\

Fang Fang, T.N. Wong 2015