MODELING OF OPTIMAL DISTRIBUTED RESOURCE OF LOGISTICS SYSTEM

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Abstract: Logistics is being described as the time-related positioning of resources. It is considered as the science of process which incorporates all industry sectors, manages the fruition of project life cycles, supply chains and resultant efficiencies.

This paper shall discuss distributed resource of logistics system in computer science. Logistics can be regarded as a means for getting resources like products, services and people where they are wanted and when they are preferred. It is hard to achieve any marketing or manufacturing success without logistical support. The system involves the integration of information, transportation, inventory, warehousing, material handling and packaging. The working responsibility of logistics is the geographical repositioning of raw materials, work in process and finished inventories where required at the lowest cost possible.

Keywords CRM - Customer Relationship Management, ECR - Efficient Consumer Response, GDP - Gross Domestic Product, QR – Quick Response, SCM – Supply Chain Management.

Concepts of Logistics System:

Goff (2002) describes the concept of logistics to have evolved from the military’s requirement of supplies as they moved from their base to a forward position. In ancient Greek, Roman and Byzantine empires, there were military officers with the title ‘Logistikas’ who were accountable for financial and supply distribution matters. In fact, the Oxford English dictionary defines logistics as ‘the branch of military science having to do with procuring, maintaining and transporting material, personnel and facilities.

As Goff (2002) illustrated, logistics system started only in the 1950s. This was mainly due to the mounting intricacy of supplying one’s business with materials and shipping out products in a progressively more globalize supply chain, calling for experts in the field.

Logistics have either internal focus or external focus discussing the flow from originating supplier to end-user. This is popularly known as Supply Chain Management (SCM). Bayarov (1999) says that logistics managers blend a general knowledge of each of these functions so that there is a coordination of resources in an organization. One form of logistics optimizes a steady flow of material through a network of transport links and storage nodes. The other concept harmonizes a sequence of resources to carry out some project.

The concept of logistics requires the process of planning, implanting and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of consumption for the purpose of conforming to customer requirements.

These days, logistics do not merely involve the main activities of transporting, warehousing, packaging and related activities but have become a specific part of the management’s view and is not a functional company task any more like transport or distribution.

The concepts of logistics system are focused on cooperative logistics concepts like Supply Chain Management, Efficient Consumer Response (ECR) or Quick Response (QR). Ni Wang, Jye-Chyi Lu and Paul Kvam (1997) declared that these concepts are actually discussed in recent logistics publications, were typical descriptions of temporary logistics systems are characterized by notions of push/pull control logic,
postponement/decentralization of stock keeping as alternative or complementary strategic opportunities for the design of logistics networks.

**Problem and Model Distributed Resource**

Between 10% and 13% of a rich country’s gross domestic product (GDP) can be credited to logistics-related costs for the movement of parts, components and finished goods between suppliers, manufacturers, and customers. Today’s globally detached supply chains make having access to logistics data business imperatives. Bayarov (1999) mentioned in his article that a distributed control system is made up of interacting component objects, each of which have persistent local state and one or more threads of control which may come from feedback. Other input messages may come in an uncontrolled fashion from the system’s environment. Output messages called observations can be routed as feedback to other objects. Any communication can experience arbitrary delay.

Theoretically, a simple specification of a distributed control system consists of the descriptions of several components: state, computation, uncontrollable variables, and constraints (including an objective function).

The state of a distributed system is described in terms of its components. In our context, the components are the system’s participating objects, as well as the communication infrastructure itself. The objects can be constant, can communicate with other objects, and can have one or more local threads of control. Each object has access to its own local state. However, no object can openly access the local states of other objects, nor can it directly access the state of the distributed system itself.

The system’s computation is determined by uncontrollable inputs from the environment, and by the system’s own state and control policies which determine its state transitions and the communications between objects. As the system’s designers, we are given constraints and an objective function defining the desired computations.

An example of a problem is that a high-priority appeal is always serviced before a low-priority request for the same set of resources, if both requests are made at the same time and place. An example of an objective function is to minimize the average response time for a request.

The constraints and objective function may be specified informally or formally -- the degree of rigor is not the primary concern of this paper. Indeed, in many cases, the constraints and objective may be implicit rather than explicit. As illustrated in figure 2, our problem as system developers is to design the system’s controls so as to maximize (or minimize) the objective function, subject to the constraints.

A soft state is an approximate representation of the current system state. An object estimates the current state of a distributed system based on information sent earlier by other objects; thus the estimated soft state is based on old information. For instance, if an object B is listening on a multicast port at time t, then we may know with high probability that B will continue to listen for some more time. If at time \( t + r \), object A gets a message from B, time stamped \( t \), stating that B is listening, then A has the “soft” information that B is listening at time \( t + r \); and the softness of the state can be quantified in terms of probability.

An example application using soft state is SCUBA, for controlling bandwidth allocation in synchronous collaborations. The amount of bandwidth taken by a sender depends on the relative interest expressed by multiple listeners. The information that a sender gets about listener interest is old information because of message delays, but since listener interest fluctuates relatively slowly compared to message delays, the old information can be used with satisfactory results.

By contrast, a ”hard” property is a property that holds in the current system state. A hard property follows from an invariant of the system. For instance, suppose an invariant of the system is: If variable \( x \) in object A has value 1,
then variable \( y \) in object \( B \) has value greater than or equal to 1. In this case, if \( x \) in object \( A \) has value 1, then object \( A \) knows that \( y \) in object \( B \) has value at least 1, and this knowledge is hard.

Some distributed control problems allow for the use of soft states exclusively, and algorithms based on soft state usually scale better and are more resilient in the presence of faults. Whether soft states can be used depends on the nature of the problem, the duration of message delays, and the fuzziness of constraints and objective. By contrast, if in an algorithm an application is given high priority for one resource and low priority in another resource, deadlock can arise; for such applications, invariants or hard states must be used.

**Conclusion**

Making a strong business sense is not easy. It can be difficult to exemplify the direct impact, this clearly has some cost implications.

Businesses are more and more servicing global customers and depending on globally dispersed supply partners to supply parts and components used in new product assemblies. Effectively running such distributed operations requires organizations to manage three key flows such as the flow of goods, the flow of finances and the flow of information.

Logistics operations are at the center of all these three flows, giving the significant links between customers, channels, manufacturers, and suppliers. All business entities must attempt to incorporate better logistics-related information into all business processes.

Faced with global competition, increased pricing, time-to-market pressures, and investor demands, “C-level” executives identify key objectives as cutting costs and enhancing operational performance. Many executives are beginning to understand the beneficial impact of logistics in both these areas and are making integration and improvement of logistics operations a key business strategy. Aberdeen views this C-level recognition as an impetus that will drive interest and investment in LRM solutions. LRM investment is also being driven by other applications, such as Customer Relationship Management (CRM) and Supply Chain Management (SCM).

From a marketing perspective, an efficient returns operation can enhance customers’ perceptions of product quality, help reduce the purchase risks, and boost generosity by signifying good corporate citizenship. From a logistics perspective, returned products that are handled promptly and efficiently can be re-entered into the forward supply chain in their current form, as restored or reproduced products, or as repair parts. This, in the long run, can generate additional revenue, reduce operating costs and decrease the opportunity costs of writing off defective or out-of-date products.

**Bibliography**


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