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**Question No.1:**

 **Bull whip effect in supply chain management? What do you mean by supply chain management in equilibrium?**

**Answer:**

**Bull whip effect in supply chain management**:

The bull whip effect can be described as an incident occurring through the supply chain, where orders sent to the manufacturer and supplier make a greater difference to the end customer than the sale. These irregular orders below the supply chain are more obvious in the supply chain. This change can hamper the smooth flow of the supply chain, as each link in the supply chain causes or does not exaggerate the fluctuations in product demand.

Supply chain network model consisting of manufacturers and retailers in which the demands associated with the retail outlets are random. We model the optimizing behavior of the various decision-makers, derive the equilibrium conditions, and establish the finite-dimensional variation inequality formulation. We provide qualitative properties of the equilibrium pattern in terms of existence and uniqueness results and also establish conditions under which the proposed computational procedure is guaranteed to converge. Finally, we illustrate the model through several numerical examples for which the equilibrium prices and product shipments are computed. This is the first supply chain network equilibrium model with random demands for which modeling, qualitative analysis, and computational results have been obtained.

**Customer demand forecast =1 units**

**Information**

**Retailers**

**Distributor's**

**10** units

**Producer's**

**10 units**

 Products & Products & Products &

**Supplier's**

**10 units**

 Services Services Services

 10 Units 10 Units 10 Units

**Cash**

Retailers are selling product at a constant rate and price. Firms along the supply chain are able to set their inventory to meet demand.

**Question No.2:**

 **Explain in detail demand forecasting and its role. Explain the approaches in forecasting.**

**Answer:**

## **Demand Forecasting:**

It is a technique used to predict potential demand for a product or service in the future. In the current market situation, this is based on an analysis of the past demand for the product or service. Demand forecasting should be scientifically estimated and facts and events related to the forecast should be taken into account. So, in simple terms, we can say that after collecting information about various aspects of the market and historical demand, we can try to predict future demand. This concept is called demand forecast.

**Role of demand forecasting:**

* Effective transportation system or supply chain design is based on finding the right information in the modeling process.
* One of the most important inputs are the demands placed on the system.
* In the face of uncertainty, forecasting techniques are used to predict what the demands will be in the future, so that appropriate designs and operating plans can be designed.

### **Qualitative:**

Using qualitative approach the company's valuation is based on discretion and opinion. Grouping under this procedure:

1. Executive opinions
2. Delphi technique
3. Sales force polling
4. Consumer surveys

### **Quantitative:**

Using quantitative approach, a company forecasts based on:

**a. Historical data forecasts –** Grouped under historical data forecasts are the followings:

1. Naive methods
2. Moving average
3. Exponential smoothing
4. Trend analysis
5. Decomposition of time series

**b. Associative (causal) forecasts –** Grouped under the acsociative forecasts are the followings:

1. Simple regression
2. Multiple regression
3. Econometric modeling

**Question No. 3:**

 **Explain the following modes of transportation.**

 **Answer:**

1. **Air**

Airlines are virtually unlimited, but within the North Atlantic, North America and Europe, and much less than in the North Pacific. Air transport barriers are versatile and include this area a commercial airplane requires about 3,300 meters of runway for landing and take off, climate, fog and air currents. Including. Aviation activities are linked to the third and fourth sectors, especially finance and tourism based on the long-distance movement of people. More recently, air transport has been adapting to an increasingly high cost of cargo volume and playing an increasing role in global supply.

1. **Package carrier:**

Package carriers, usually shipping companies that carry small packages. Package carriers use air, truck and rail to transport goods. They also provide other value-added services that allow shippers to keep track of inventory flows and order status, allowing the sender to immediately notify the customer of their packages.

1. **Rail:**

The railway consists of a road on which wheeled vehicles are connected. In light of the latest technological advances, rail transport includes monorails and maglev. They have moderate physical disabilities and need a low slope, especially to transport goods. Heavy industries are traditionally linked to the rail transport system, but containerization has increased flexibility by connecting rail transport by land and sea. The railway is a high-capacity land transport mode where the 23,000 tonnes of fully loaded coal unit train is the heaviest load ever. However, the indicators vary around the world, which often challenges the integration of rail system water.

1. **Pipeline:**

Pipeline routes are almost unlimited, as they can survive on land or under water. Their purpose is to transport long-distance liquids such as petroleum products at low cost. The longest gas pipeline connects Alberta to Sarnia Canada, with a length of 2,911 km. The longest oil pipeline is Transiberia, stretching more than 9,344 km from Russian polar oil fields in eastern Siberia to Western Europe. Physical constraints are minimal and the polar atmosphere includes landscaping and pagelisol. Pipeline construction costs vary by diameter and increase the distance and viscosity ratio of liquids from low viscosity gas to high viscosity oil. The 1,300-kilometer-long Trans-Alaska pipeline was built under harsh conditions, and for most of its route it must be above ground. Pipeline terminals are important because they are compatible with refineries and ports.