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Fruit Supply Chain Network Design

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Frutas & Jugos ARG Co. is one of the fruit companies located in the South West of Argentina which supplies fresh fruits (apples and pears) and concentrated juice to different markets in Europe, North and South America.

The South West of Argentina region, named High Valley of Negro and Neuquén Rivers (HVNNR), has been traditionally one of the world's main fresh fruit and concentrated juice producers. During the 90's, companies made important capital investments on new machinery for efficiency improvement. In the last few years, due to new worldwide competitors from Asia South West, local economic problems and volatile international markets, companies are compelled to improve their competitiveness even more to keep in business.

In this context, the manager of Frutas & Jugos ARG Co. asks PASI students for a study that can help his company to make better decisions in managing the whole supply chain and has provided the following brief description of the problem (detailed description can be found at Argentinean Fruit Industry.doc)

Frutas & Jugos ARG Co. manufactures packed fresh fruits and concentrated juices. The production plants are located at Gral. Roca and Villa Regina, two cities belonging to HVNNR region, 28 miles away each other (45 Km). Both sites have their own Packaging Plant (PP) and Concentrated Juice Plant (CJP). PPs produce two final products: a variety of packed apples and a variety of packed pears. CJs produce apple and pear concentrated juices of 72 degree Brix. As the company doesn't own farms, the raw material is supplied by third party farms located in the same HVNNR area: Cipolletti, Neuquén and Cinco Saltos (see maps attached).

The PP processing stage consists of pre-classification (rejecting those have external faults) washing, manual and automatic classification (by size, color, external aspect, etc.), waxing (if required), and packed in different ways depending on customer preferences. The fruit that does not fulfill quality specifications at the classification stage is transferred to CJP which can also be fed with fruit from supplier's farms or from third party packaging plants (see figure 1 below).

There are 3 different markets for packed fruit: San Antonio Seaport (to Europe and USA), local market, Argentina (Buenos Aires city), Sao Pablo Seaport (Brazil). For concentrate juice, two markets must be considered: Puerto San Antonio (to Europe and USA) and Sao Pablo (Brazil).

The goal of the study is to design the supply chain that maximizes the gross benefit of the company, analyzing several possible scenarios. The study must be based on:

- ✓ Each site has a refrigeration chamber which may storage pre-classified fresh fruit and raw fruit to be processed by concentrated juice plant.
- ✓ Global mass balances of the plants (packaging and concentrate juice plants).
- ✓ The operating cost evaluation involves the complete supply chain, from farms to markets. Furthermore, terms like raw material cost, transportation cost, production cost, etc., must be considered
- ✓ The Plant's production may be split in different ways to satisfy the demands, so it must be considered at the time to evaluate sales.
- ✓ Company benefit is evaluated as a gross benefit (profit), i.e. the difference between sales and operating costs.

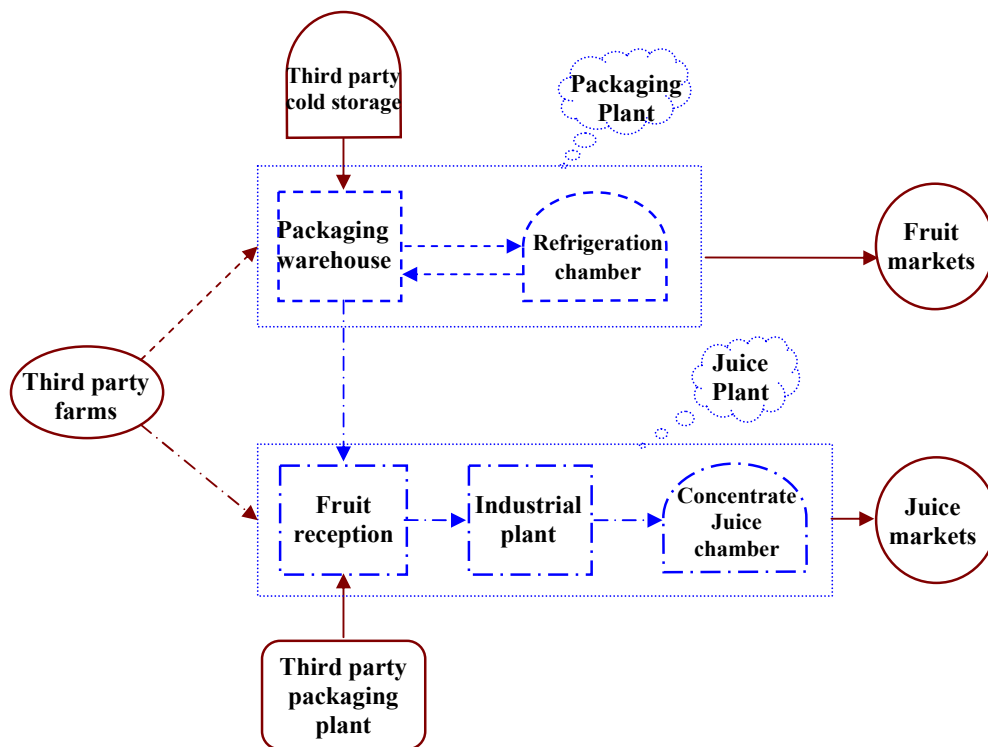


Figure 1 - Fruit Industry Supply Chain Scheme

The study must consider the following possible scenarios:

- 1- To produce packed fresh fruit and/or concentrate juice after crop time to fulfill the unsatisfied demand, using as raw material fruit from refrigeration chambers.
- 2- Analyze the product price uncertainty.