

# Food Logistics

## **Weathering Highs And Lows**

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Almost every industry has some form of seasonal demand. Weather, holidays, special events, and even the time of year like back-to-school or fiscal year-end– all contribute to short-term spikes in demand. Sure turkey and ham producers must deal with demand increases during Thanksgiving and Christmas and snack manufacturers must ramp up for the Super Bowl. But did you know that two-thirds of the demand for a lawn and garden manufacturer's fertilizer and grass seed occurs in the spring, or that almost 80% of calendar shipments happen in the fourth quarter.

It's not just demand patterns that challenge stable efficient supply chains – it's also seasonal supply. Fluctuations in raw material and labor availability can greatly influence production strategies. Demand for food products like strawberry jam is fairly stable, but its supply is harvested in less than 2 months. Strawberries have no shelf life – so they must be converted to finished goods or intermediate products like puree right away. This seasonality of supply is often driven out of agricultural necessity, with the weather dictating the production date. But there are other factors as well. Seasonal labor availability can also challenge manufacturing and distribution strategies: in the US the workforce increases dramatically over the summer as kids take school breaks, but shrinks significantly in Europe when workers take a month-long holiday forcing manufacturers to increase production in anticipation of this hiatus.

Whether it's seasonal supply from agricultural providers or seasonal demand from holiday customers, this variability creates significant challenges for timing inventory builds and creating peak period capacity. Today firms focus their planning efforts tactically – implementing tools for forecasting demand and master production scheduling -- but fail to consider the impacts of seasonality on strategic decision making. While these tactical approaches utilize existing assets and supply chain configurations, they don't consider strategic alternatives such as outsourcing capacity during peak periods, sourcing from regions with offset weather patterns, or developing optimal combinations of temporary and permanent labor. Without factoring all of these alternatives, Bunge, whose wheat supply varies regionally, can't make optimal decisions concerning mill locations or capacity.

To deal with seasonality strategically, firms need to simultaneously trade off fixed and variable capacity costs with inventory carrying costs. Firms like Mattel put more stock in fixed capacity – using production smoothing to evenly produce toys from January through September, when its holiday demand spike hits. While smoothing allows it to use production resources evenly over a 9 month period in preparation for its holiday rush, it causes a large stockpile of inventory the remainder of the year. And if demand for ‘Chicken Dance Elmo’ doesn’t hit, Mattel gets stuck with obsolete inventory. Other firms avoid inventory stockpiles, but build capacity to peak requirements, meaning lots of unused, idle capacity the rest of the year. So some firms choose to deal with seasonality through variable capacity – increasing seasonal labor or diverting production needs to outsourcing partners. Often, these outsourcing services prevent a firm from building large amounts of capacity to meet peak demand, but cost a premium. Choosing which method to use is not simple: if a firm doesn’t figure out the right combination, it will be left with piles of inventory, colossal costs, or an inability to meet production demands.

Today firms effectively deal with seasonality, but they don’t optimize the opportunity or challenge it presents. Many firms use approaches haphazardly to obtain short-term solutions, but fail to consider the right combination that will best match seasonal supply and demand with overall operations. The result is unfilled demand or an overabundant supply that leads to perished inventory and lost sales. Let’s face it, no one wants a 2002 calendar mid way through 2003.

So how can a firm accurately incorporate seasonality into its strategic planning process? By embracing multi-period optimization. Using this approach to effectively factor seasonal supply and demand, one manufacturing firm expects to save over \$25 million annually. Most manufacturers can use this approach to:

1) ***Simultaneously consider infrastructure and tactical decisions.*** Before determining whether to increase capacity, a firm should use strategic approaches to trade off inventory and capacity resources – like extra shifts during the holiday season. By factoring operating variables like inventory risks, overtime costs, and outsourcing premiums into decisions regarding manufacturing and distribution capacity, a firm can create a strategy that defines the optimal network capacity and master plan.

2) ***Model demand and supply monthly – not annually.*** Most applications force firms to aggregate demand into a single period, which is fine for cereal or diapers where demand doesn’t change when it’s Christmas or freezing outside. But a firm whose demand varies significantly from one month to the next must model multiple periods. Through multi-period planning, it can represent each period’s unique demand levels, product mix, and material availability, creating a supply chain that has just the right mix of inventory and capacity at each period.