

Supply Chain Daily Production Volume Prediction

Organization: IBM

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Dec, 2010

Abstract

This paper is about predicting the daily production volume through different periods in a month for IBM x-Series Sever. History data of 4 years was collected to analyze the trend of production volume along a month; a set of Rates was evaluated to describe the trend and was proved to effectively predict the daily production volume. As a reference, manufacturer can arrange the production capacity accordingly in advance, make good use of production resource to satisfy production request.

Key Words

Production, Capacity, Plan, Cost Control

1. Problem Statement

Production capacity occupies highly in the cost of supply chain. As marketing variance, supply variance, sales strategic variance, etc, production request is different every day. It will be waste if capacity is over real production request, and impact customer service quality or even lose revenue if capacity is under real production request. How to make good use of production capacity to support customer order demand becomes a significant topic to control the cost of supply chain.

Different industries may have different daily production volume trend. Fig 1-1 shows a sample month of daily production volume in ISTC, which is one of IBM's WW sources of supply. The production volume varies differently along the month. In order to make good use of production resource, production capacity should be prepared differently in different time along the month.

Unit: K

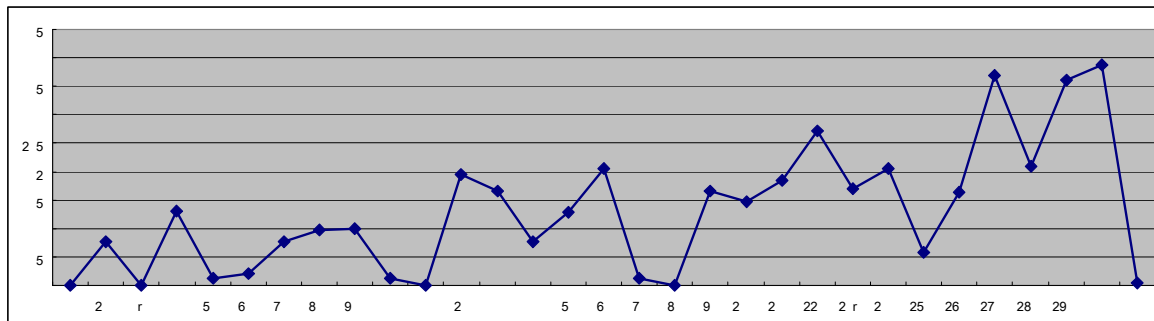


Fig 1-1 Daily Production volume sample

last period of Jan 2010, and average offload Rate 9.39% was used to represent the offload trend in the last period of Jan 2010.

44 sets of such samples were collected from Jan 2007 to Aug 2010.

3.2 Data Analysis

Fig 3-1 and Fig 3-2 shows the distribution of above Representative Rate in month samples. The average Rate of the last period is 5.7%. However, in order to meet the production requirement, a higher Rate needs to use to cover the production requirement.

Standard Deviation (STDEV), a measure of how widely values are dispersed from the average value, was used as a buffer on top of the average value to make production capacity safe enough to ensure customer satisfaction and revenue.

Remark: STDEV is calculated through below formula:

$$\sqrt{\frac{n \sum x^2 - (\sum x)^2}{n(n-1)}}$$

n – Number of samples

x – Average rate in periods of each sample

In this paper, average Rate plus 3 STDEVs was regarded as the Rate for each period.

Dash dotted Curve in Fig 3-1 and Fig3-2 shows the long run sample trend, and shows 99% of long run samples Rates will fall within average Rate plus 3 STDEV, which proved that average Rate plus 3 STDEV is a reliable Rate to avoid actual Rate over capacity, which will cause missing customer satisfactory and revenue.

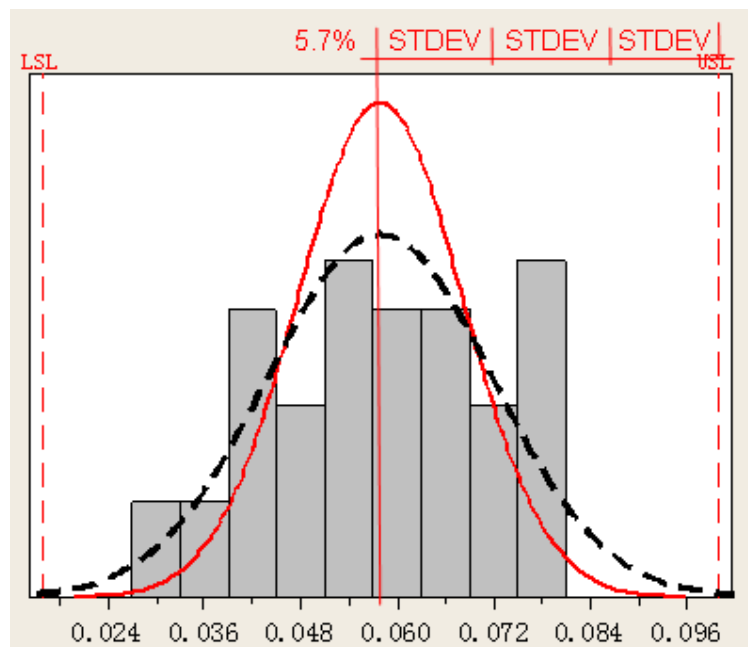


Fig 3-1 Single-Source Rate samples distribution in the last period

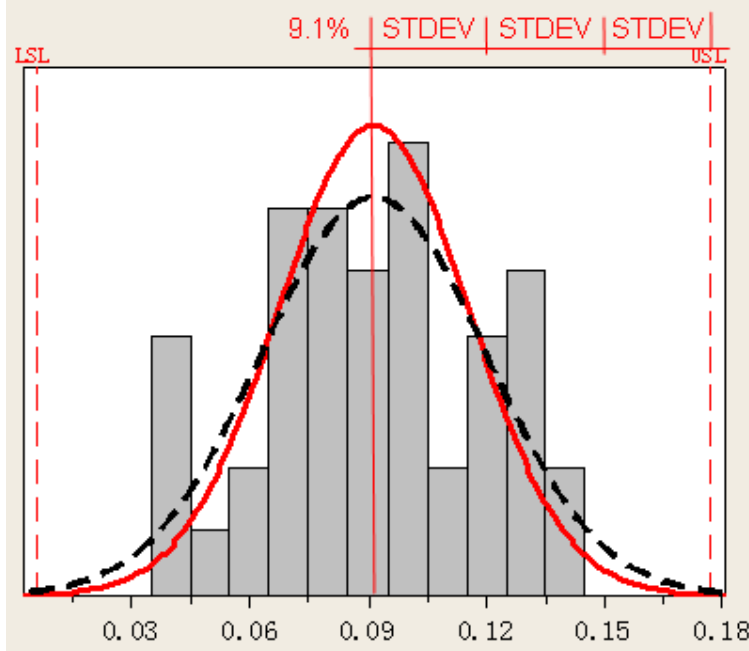


Fig 3-2 Offload Rate samples distribution in the last period

3.3 Evaluation Result

Table 3-2 shows the evaluation result of the last period.

	i	ur e
v * EV		7 7
* EV	2	8 6
EV		2 9
ver e R e	5 8	9

Table 3-2 Statistical data of the last period

Using the same logic, other periods' Rate could be evaluated as shown in table 3-3.

Rate Data