Inventory Segmentation Using a Nine Block Strategy

The Bearded One

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Nine blockers for segmentation

Every inventory analysis should ALWAYS start with segmentation.

What is segmentation?

Nine block segmentation groups parts into logical buckets in order to develop common solutions to sets of parts that have similar attributes and behaviors.

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It looks like this (depending on your tool). This is from the SAP Bolt on tool "MRP Monitor".

Most nine blocks will have a financial valuation axis (ABC), and then a second axis that shows a key attribute, such as variation in usage, or frequency of usage, or some other attribute.

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Classification

	X	Y	Z	Sum	Key figure
	38	57	11	106	Materials
A	18,846,110.80	20,519,675.55	1,608,254.38	40,974,040.73	Sum consum
	1,398,700.02	1,834,648.19	586,263.72	3,869,611.93	Sum invent
	0.9	1.1	3.5	1.3	ø RoC
	30	77	22	129	Materials
B	1,172,116.19	2,808,425.68	801,374.29	4,781,916.16	Sum consum
	179,247.12	418,432.45	286,994.04	884,673.61	Sum invent
	2.0	1.9	4.2	2.3	ø RoC
	129	335	229	693	Materials
C	840,926.05	1,083,348.83	471,790.42	2,396,065.30	Sum consum
	138,670.84	316,978.05	292,698.33	748,347.22	Sum invent
	4.0	10.1	40.3	19.0	ø RoC
	197	469	262	928	Materials
	20,859,153.04	24,411,450.06	2,881,419.09	48,152,022.19	Sum consum
	1,716,617.98	2,620,058.69	1,165,956.09	5,502,632.76	Sum invent
	3.1	7.7	35.7	14.6	ø RoC

Look at the AX Block and CX Block.
AX block has 38 parts, $18.846 million in usage, $1.298 mil in inventory.
CX has 197 parts, $20.859 mil in usage, and $1.716 mil in inventory.
What is different about these segments?

How can we segment our data?

- ABC financial segmentation is the most basic and guides us to treat expensive parts (A Items), like engines, differently than common commodity parts, like fasteners (C items).
- Variation in demand (XYZ) is also a common methods of segmenting, treating low variation demand (X) materials differently than high variation materials (Z).
- Frequency of usage or picks (HIJ), is another method.
- Price can be another method to segment – high price items vs low price items (UVW)
- Lead time by item can be another segmentation – how long it takes to get an item can make a difference in how we buffer and replenish.

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What do we do with segments-ABC

ABC which is the financial segmentation based on your current inventory levels is often used to determine cycle count frequency.

ABC is VERY IMPORTANT and makes up half of all nine block segmentation exercises. It is on every single nine block…Also please note that in the MRP Monitor it is based on usage value, not actual inventory.

Applications…the big one…

Policies may suggest counting our “A” items 4 times a year, our “B” items two times a year, and our “C” items 1 time a year.

- The idea is you count and track your high value “A” items, which are often a smallish number of parts, more frequently than our “C” items which are many and cheap.
- This approach is designed to minimize surprises that will adversely affect the financials. It does not guarantee you won’t shut down a line because of a shortage. It is all about working capital as a financial metric.

What do we do with the segments - XYZ

XYZ is all about variation.

- We choose which data stream to read, backwards looking consumption, or forward-looking forecast.
- Consumption tends to be “lumpier” than forecast, so we should expect more variation if we use consumption.

X is the set of materials with the lowest amount of variation in usage or forecast.

Y is the set with medium or “some” variation.

Z is the set with a lot of variation relative to the other two sets.

To be successful, we need to understand variation, and we need to determine what levels of variation will give us a good segmentation.

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ABC XYZ coefficient of variation

- The Coefficient of Variation is not a hard formula, but if we do not use it very often it can “look” hard.
- The key concepts are what is the average value of a population, and how much variation is in the population.
- Situations with a lower amount of variation, where the values are all close to the populations average value, outcomes are easier to predict than in situations where there is a wider band of variation.

The formula to find the sample mean

$$\mu = \frac{\sum x}{n}$$

Formula to calculate sample standard deviation

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

Formula to calculate **coefficient of variation**

$$CV = \frac{\sigma}{\mu}$$

This looks hard!
Greek letters always spell trouble!

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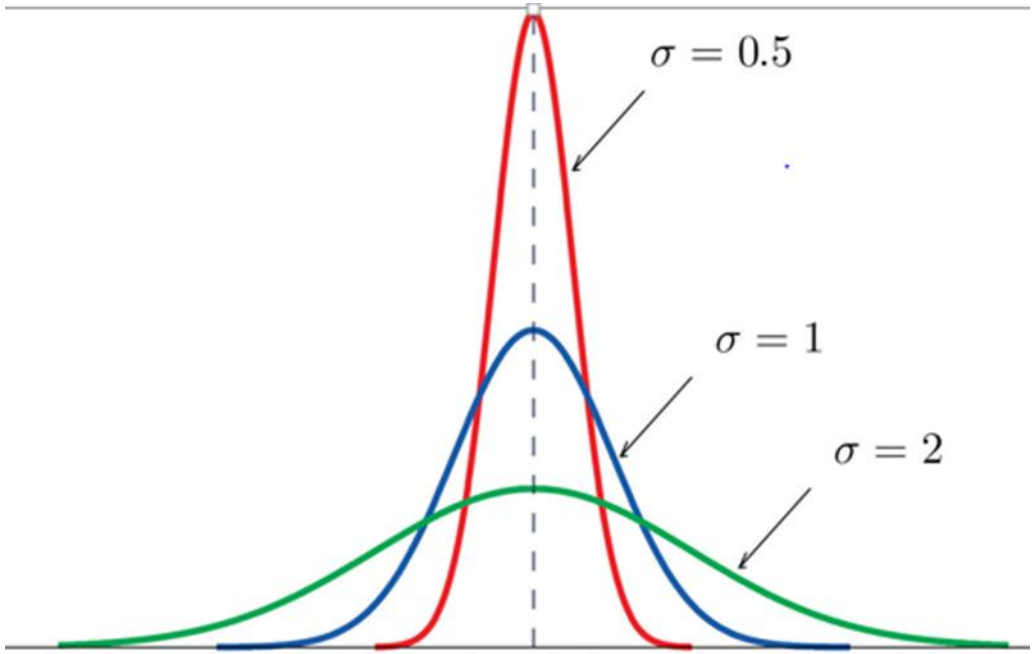
ABC XYZ bell curves

- Bell curves can help illustrate this.
- The Red curve has the smallest variation around the average (let's say the average value is 1). Here we would say the COV is .5/1=.5 COV.
- The Green Curve has a wider distribution. It has more variation, and we see that by observing the curve is flatter than the red curve. With a standard deviation of 2, and an average value of one, we say the COV is 2.0.
- So visually, the more peaked the curve, the less variation, and the "X" like the population. The flatter the curve, the more "Z" like. And in between the two is your set of "Y" parts.



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HIJ Runners repeaters strangers

Before statistics and math and all that jazz was invented, early manufactures still needed a way to do segmentation.

It was centered on the concept of segmenting based on how frequently materials were used. Materials with daily usage might be considered runners, weekly or monthly usages maybe considered repeaters and materials you used once a year would be the strangers.

Key points:

1. The materials in XYZ and HIJ have a lot of overlap. Items you use daily tend to have low variation, and items that you rarely use have high variation.
2. You can manipulate the setting in the MRP Monitor to change the way the segments calculate.
3. XYZ and HIJ can be calculated based on consumption, or forecast, or both.

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What do we do with the segments - HIJ

Runners, Repeaters and Strangers (or Aliens)…

HIJ segmentation is about **frequency of usage**.

- “H” items are frequently used materials, the runners in your inventory mix.
- “I” materials are used semi-frequently and are the repeaters in your mix.
- “J” materials are Strangers, or Aliens, are infrequently used materials.

Is there a difference between stocking out on a part you use 100 times a day, versus a part you use 5 times a year?

- What are the actions we should expect when out of stock on each of these parts?

What do we look for in segmentation?

Frequency of usage tells us a lot about our parts, if we look at the data.

Here is a very typical break down of parts by the number of time used.

What do we see in the data?

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	Number of Part Numbers	# of times used	Average times used per part number
H	751	906,620	1,207
I	1,617	213,053	132
J	2,059	58,340	28

What does the data tell us?

Our favorite cardboar plant has the following list of shortages, grouped by HIJ segment.

We have been collecting data for months on shortages and it always looks like in the first table. The main problem is “J” parts with 64% of the shortages. *Or is it?*

When we weight the data by the number of times used, we get a different view.

- If I focus on “H” parts, we need to work 6% of the shortages to impact 57% of the estimated availability issues.

Board Shop Shortages	1-Feb	7-Feb	21-Mar
H	64	60	45
I	275	286	213
J	494	490	464

Board Shop Shortages	21-Mar	Average usage	Impact	% of Short parts	Impact %
H	45	1,207	54,315	6%	57%
I	213	132	28,116	30%	29%
J	464	28	12,992	64%	14%

NOT ALL PARTS ARE EQUAL!

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Not all parts are the same

In the prior example the following ranges exist.

- “H” Materials – Number of Times used ranged from 401 to 9,700 times a year
- “I” Materials –Number of Times used ranged from 101 to 400 times a year
- “J” Materials – Number of Times used ranged from 1 to 100 times a year.

Do we think an item we use 100 times a year is a stranger/Alien (“J”)?
What does this mean…? What should we do…?

We can always change how we segment….we can also have exceptions as needed (if not everything is an exception).

- Be sure to check our actual data. Does it line up with what we say our strategy is?

Key Points;

- We do need to understand what the segments are.
- We need to own our results.