Nine Block Segmentation (part II)

October 2023

Inventory segmentation

All inventory analytics start with segmentation. If you are working on inventory levels and you are not starting with segmentation STOP.

ALL PARTS ARE NOT EQUAL.

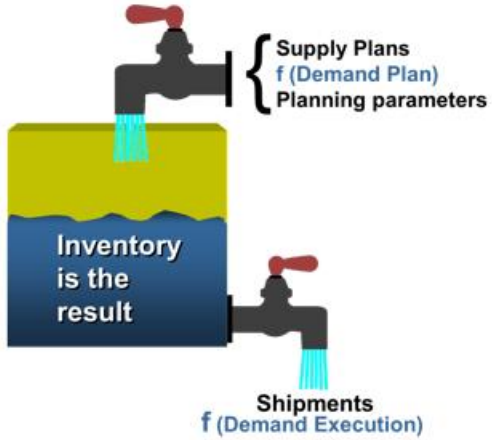
Different businesses require different segmentation strategies.

- Are there strong dependency requirements between parts (assembly example)?
- Does the segmentation chosen support the business needs?
- Does the team understand the segmentation strategy? Avoid complexity if you can.

The segmentation strategy needs to line up with what you do, and you need to check that.

Inventory

Inventory is an Output of a Process.



How can Inventory strategy be used to facilitate achieving a credible Supply Plan?

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Inventory optimization is a function of

1. **Replenishment Strategy**
2. **Lot Size**
3. **Buffer**

- **Buffers are:**

1. **Capacity**
2. **Inventory**
3. **Time**

Inventory Segmentation allows us to develop strategies to manage the expensive few, and the inexpensive many, in different ways.

Replenishment strategy

There are two primary methods of replenishment we currently use.

1. MRP
2. Min Max/ROP (includes consumption-based planning like “VV”)

There are other methods, but they are less accepted in our current state and rarely used (please note this training was built for an assembly shop environment)

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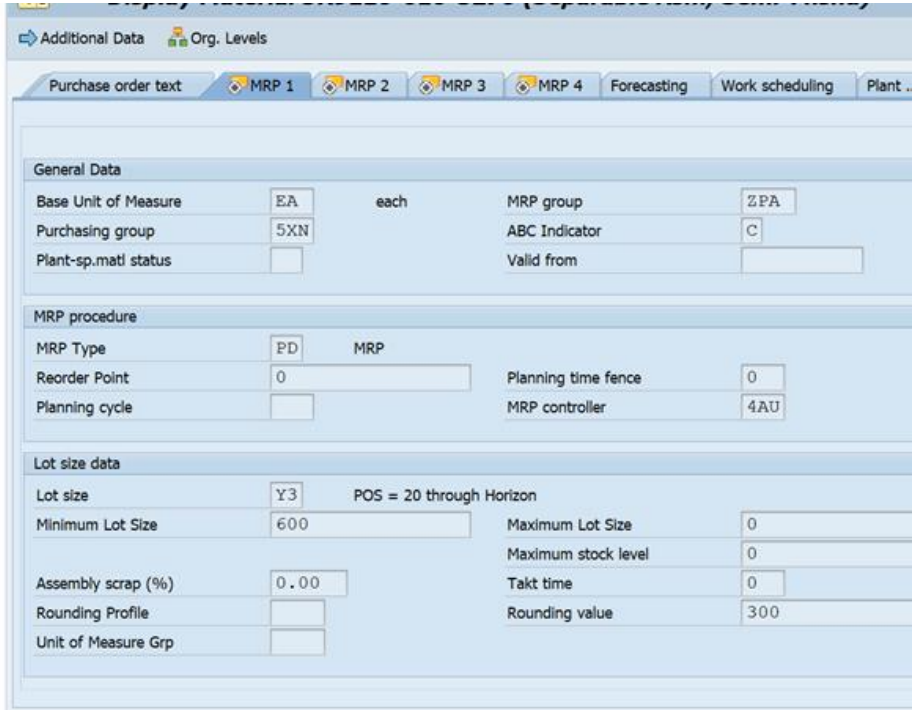
Lot size

SAP has MANY lot sizes, so let's use them all! Or maybe not….

Most lot sizes are determined by the MRP1 screen.

Here we see the lot size field is populated by at time based (periodic) lot size setting where the lot size should = 20 days forecast (period of Supply POS).

We also have the minimum and the rounding value fields populated. The minimum and the rounding value will override the periodic lot size Y3 if the minimum or rounding value is greater than 20 days of forecasted supply. If it is less than 20 days, the order will be the minimum plus how ever many rounding values it takes to satisfy the 20-day POS strategy.



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Secrets of lot sizing

There are other secrets of lot sizing that we will not go into here.

Key points on all lot sizes:

1. Test them to be sure you understand what they are doing. For example, M8 lot size equals 28 days. Question: Is 28 days four weeks, or 5 weeks and 3 days?
2. Lot sizes can interact with other SAP parameters, so you do need to understand the hierarchy, by TESTING.

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Buffers

- Buffering strategies are different based on the segments.
- Buffering strategies can also change based on the dependency relationship between materials in and across segments, and across industries.
- Buffers need to consider the future more than the past.
- Buffers can be an illusion.

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What are the best buffers?

The BEST buffers are:

- Part of an overall strategy that focuses on minimizing variation.
- The strategy should be based on a nine block but not a slave to it.
- Involve some kind of decision tree or check list.
- Documented as standard work.
- Solve a problem rather than cause some problems.
- Simulated so you can see what you are doing.

The three buffers are:

- Capacity
- Inventory
- Time

A hint…HIJ segmentations really matters…way more than XYZ…or I could just be saying this to see if you are listening….but more on buffers later….

Distribution and retail

Distribution and retail companies typically place their highest buffers on:

- AX items are high value items with predictable usage.
- AY items are high value items with some variation in usage.
- BX are medium value items with predictable usages.

By buffering these three segments they buffer their sales.

A key point with this model is that demand for materials is independent of the other items.

The easiest way to think of this is if you go to the grocer with a list of 20 items, and they are out of stock on one, do you buy the other 19 items?

Distribution	X	Y	Z
A	High Buffer	Medium Buffer	
B	Medium Buffer		
C			

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Assembly industries

Assembly industries nine blocks are different that Distribution/Retail nine blocks because a consumption of a single materials is usually dependent on the availability of multiple other materials.

The lack of a “C” item can prevent the consumption of an “A” item, and trap significant amounts of inventory.

Since “C” items typically involve most of the part numbers and of low value, higher buffers are maintained to avoid shutting down lines AND to free up planner/buyer time to more effectively manage higher value materials.

A key factor is the frequency of usage (HIJ). Every time you go to use a part you in effect have an opportunity to be out of that part number. Frequently used parts warrant some extra attention.

AX for industrial assembly

In the AX segment we ha 4% of the part numbers generating 28% of the usages and 40% of the usage value.

We should note while planning has 12,478 parts to manage, we need to manage 450 of them closely to achieve inventory and service objectives.

Row Labels	January 2020 Inv Value	Number of Parts with Classification	Turns	% of classified parts	% of Usages	% of Usage Value
AX	$14,563,453	450	5.07	4%	28.1%	40%
AY	$30,691,676	773	2.40	6%	3.8%	40%
AZ	$ 2,717,612	62	2.32	0.5%	0.07%	3%
BX	$ 1,332,911	297	3.00	2%	11.0%	2.2%
BY	$ 8,629,250	966	1.42	8%	3.6%	7%
BZ	$ 5,801,911	199	0.40	2%	0.1%	1.3%
CX	$ 1,001,711	916	1.71	7%	36.6%	0.9%
CY	$ 7,482,736	5046	0.81	40%	15.4%	3.3%
CZ	$10,001,162	3769	0.25	30%	1.2%	1.4%
Grand Tot	**$82,222,422**	**12,478**	**2.22**		**100.0%**	**100.0%**

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CX and CY for assembly

In the same nine block as the AX example, are in the CX and CY segments. We also see that 52% of the times I used a part, it was in these segments. And we can see that these usages were only about 4.7% of the total value of materials used.

In these segments higher buffer levels can free up planners from chasing many, inexpensive parts to focus on managing the fewer more working capital intensive materials.

Row Labels	January 2020 Inv Value	Number of Parts with Classification	Turns	% of classified parts	% of Usages	% of Usage Value
AX	$ 14,563,453	450	5.07	4%	28%	40%
AY	$ 30,691,676	773	2.40	6%	4%	40%
AZ	$ 2,717,612	62	2.32	0.5%	0%	3%
BX	$ 1,332,911	297	3.00	2%	11%	2.2%
BY	$ 8,629,250	966	1.42	8%	4%	7%
BZ	$ 5,801,911	199	0.40	2%	0%	1.3%
CX	$ 1,001,711	916	1.71	7%	37%	0.9%
CY	$ 7,482,736	5046	0.81	40%	15%	3.3%
CZ	$ 10,001,162	3769	0.25	30%	1%	1.4%
Grand Tot	**$ 82,222,422**	**12,478**	**2.22**		**100.0%**	**100.0%**

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It’s not just about buffers!

Below is a look at how the X segment can be viewed with regards to the number of parts per segment, the value, lot sizing techniques, buffering strategies, and replenishment strategies.

The dependency on the availability of “C” items in order to ship “A” items, combined with the goal of reducing the management of the low value many parts in the “C” category drives decisions in Assembly Plants.

Distribution	X # of part numbers	X Value	X Lot Size	X buffer	X replenishment
A	5 to 10% of the toal X	80% of Usage Value	5 day lot sizes	Lowest Buffer	Pull, Supplier Ship from Stock, etc.
B	5 to 20% of Total X Part numbers	15% of Usage Value	10 day lot sizes	Medium Buffer	
C	80% of Total X Part numbers	5% of Usage Value	20 days lots sizes	Highest Buffer	3rd party replenishment, min max, etc.

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Analysis example - Forecast pivot table

Using the data set we built 2019 to a pivot table to look at forecast accuracy. Here we looked at the January 6, 2019 forecast, and our consumption over 2019. Here we can see we tend to over forecast. Other useful information can be seen as well. Look for the big % numbers and walk through what it is telling you.

All	Count of Material Number	Sum of Jan 6 2019 Future 12 Month Demand $	Sum of 12 Month Usage $	Sum of NoTotUsage	% of Part Numbers	% of Usages	% of 2019 Forecast	% of 2019 Consumption	Forecast Bias
'--	1,882	$ 6,499,374	$ 4,806,606	7,207	30%	1%	2%	2%	74%
AX	401	$ 198,450,001	$ 183,170,262	152,675	6%	19%	72%	74%	92%
AY	63	$ 21,156,203	$ 14,137,653	5,971	1%	1%	8%	6%	67%
AZ	5	$ 424,592	$ 396,684	49	0%	0%	0%	0%	93%
BX	472	$ 25,224,096	$ 22,920,929	142,182	7%	18%	9%	9%	91%
BY	116	$ 5,420,254	$ 4,586,453	8,886	2%	1%	2%	2%	85%
BZ	25	$ 1,535,632	$ 1,531,411	383	0%	0%	1%	1%	100%
CX	1,342	$ 8,718,789	$ 7,799,545	401,760	21%	51%	3%	3%	89%
CY	1,052	$ 4,450,072	$ 4,060,408	65,167	17%	8%	2%	2%	91%
CZ	877	$ 2,999,725	$ 3,474,750	9,953	14%	1%	1%	1%	116%
(blank)	65	$ 15,045	$ 13,349	624	1%	0%	0%	0%	89%
Grand Total	6,300	$ 274,893,782	$ 246,898,051	794,857					90%

30% of the parts have no usage

There are 6,300 parts, how many do you need to manage well?

21% of the parts are CX parts

51% of the time we are using CX parts. Can I cheat here and Just smother them with Inventory?

We are consuming 90% of forecast

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Analysis - Supplier pivot

We can also look performance of forecast individual suppliers. Now start thinking about your nine-block segmentation.

- AX is 6 parts and 69% of the overall volume in $ with this supplier. These parts should be managed closely (there are only 6).
- 40% of the time we go to use a part, it's a CX. They represent 7% of the consumption value. We may decide we can afford higher buffers here so we can manage them less. Seriously just smother them with inventory.

Vendor Name	HYCOMP, INC								
HYCOMP, INC	Count of Material Number	Sum of NoTotUsage	Sum of 12 Month Usage $	Sum of Jan 6 2019 Future 12 Month Demand $	% of Part Numbers	% of Usages	% of 2019 Forecast	% of 2019 Consumption	Forecast Bias
'-'	11	12	$ 32,121	$ 3,740	22%	0%	1%	0%	12%
AX	6	1593	$ 1,930,250	$ 1,850,947	12%	30%	69%	68%	96%
BX	12	1333	$ 589,399	$ 605,039	24%	25%	21%	22%	103%
CX	15	2149	$ 166,637	$ 182,980	29%	40%	6%	7%	110%
CY	5	261	$ 58,516	$ 58,561	10%	5%	2%	2%	100%
CZ	2	7	$ 5,644	$ 18,423	4%	0%	0%	1%	326%
Grand Total	**51**	**$ 5,355**	**$ 2,782,567**	**2,719,689**	**100%**	**100%**	**100%**	**100%**	**98%**

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Important note on cheating

First off, be lazy and cheat whenever you can. But try and do it in a smart way. Smart lazy cheaters are the best!

In general, if you are getting a lot of noise, do the following….

- If you are getting noise on AX parts, look at the history and the forecast. Also look at the HIJ. If a part is AXH in the past and going forward, you can push up buffers and probably help yourself. If you push them too high, you may get feedback on inventory, but you can fix it. It might take a month or two, but you can fix it,
- If you are getting noise on CX parts, look at the history and the forecast. If the forecast looks the same as history, you can usually pump up the buffer for small $. If you push the numbers too high, no one will notice. In general, CY parts can be treated the same way.

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Recommended buffers-do they always make sense?

A fool with a tool is still a fool.
Various tools provide safety stock recommendations.

Below we see on the AZ segment, with less than 1/10th of 1 percent usage value, a consumption-based tool may recommend deploying 5% of our buffer stock to support it. Does that make sense?

You are responsible for what you do with the suggestion.

Row Labels	IE Tool Buffer Value 2020	IE Days Buffer	Turns	% of classified parts	% of Current Inv	% of Usages	% of Usage Value	% of IE Tool Buffer
AX	$ 3,965,318	13	5.1	4%	18%	28.1%	40%	32%
AY	$ 5,569,223	19	2.4	6%	37%	3.8%	40%	45%
AZ	$ 564,425	22	2.3	0.5%	3%	0.07%	3%	5%
BX	$ 167,088	10	3.0	2%	2%	11.0%	2.2%	1.3%
BY	$ 869,756	18	1.4	8%	10%	3.6%	7%	7%
BZ	$ 267,506	29	0.4	2%	7%	0.1%	1.3%	2.2%
CX	$ 80,695	12	1.7	7%	1%	36.6%	0.9%	1%
CY	$ 621,331	26	0.8	40%	9%	15.4%	3.3%	5%
CZ	$ 275,012	27	0.3	30%	12%	1.2%	1.4%	2.2%
Grand Tol	**$12,380,355**	**17.0**	**2.22**		**100%**	**100.0%**	**100.0%**	**100%**

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Turns pivot

When we look at our 12-month usage value and our current inventory we can build out a turns by segment. With this we can start to see where opportunity is or isn't?

When we look at BY, BZ, CY, and CZ we dee they are the lowest turning segments, and account for 40% of our current inventory value.

What can we infer about lot sizes in these segments?

Row Labels	January 2020 Inv Value	Total Usage Value	Turns	% of classified parts	% of Current Inv	% of Usage Value
AX	$14,563,453	$ 73,834,829	5.1	4%	18%	40%
AY	$30,691,676	$ 73,597,124	2.4	6%	37%	40%
AZ	$ 2,717,612	$ 6,298,148	2.3	0.5%	3%	3%
BX	$ 1,332,911	$ 4,000,571	3.0	2%	2%	2.2%
BY	$ 8,629,250	$ 12,276,493	1.4	8%	10%	7%
BZ	$ 5,801,911	$ 2,297,291	0.4	2%	7%	1.3%
CX	$ 1,001,711	$ 1,709,923	1.7	7%	1%	0.9%
CY	$ 7,482,736	$ 6,042,373	0.8	40%	9%	3.3%
CZ	$10,001,162	$ 2,536,051	0.3	30%	12%	1.4%
Grand Tot	**$82,222,422**	**$ 182,592,802**	**2.22**		**100%**	**100.0%**

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Using pivots to get at details

When I run a pivot I can build a little analysis down below. With this supplier, 69% of the value is on 6 parts.

If I go back to the active pivot, and click on the number six next to the AX, I can get to the detail spreadsheet for that set.

Vendor Name	HYCOMP, IN

Row Labels	Count of Mate	Sum of 12 Month U	Sum of 12 month	Sum of NoTot	Sum of IE Suggested SS $
'-'-	11	32120.7	0	12	4149.6
AX	6	1930250.49	2166116.12	1593	83407.39
BX	12	589399.1144	698109.26	1333	31131.8612
CX	15	166636.76	167806.614	2149	9738.0084
CY	5	58515.86	80909.19	261	5002.22
CZ	2	5644.08	8197.2	7	972
Grand Total	**51**	**2782567.004**	**3121138.384**	**5355**	**134401.0796**

Vendor Name	HYCOMP, INC

Row Labels	Count of Material Number	Sum of 12 Month Usage $	Sum of 12 month FC Value	Sum of NoTotUsage	Sum of IE Suggested SS $	% of Materials	%of Usage	% of FC Value	% of Total Usages	% of Buffers
'-'-	11	$ 32,121	$ -	12	$ 4,149.60	22%	1%	0%	0%	3%
AX	6	$ 1,930,250	$ 2,166,116	1,593	$ 83,407	12%	69%	69%	30%	62%
BX	12	$ 589,399	$ 698,109	1,333	$ 31,132	24%	21%	22%	25%	23%
CX	15	$ 166,637	$ 167,807	2,149	$ 9,738	29%	6%	5%	40%	7%
CY	5	$ 58,516	$ 80,909	261	$ 5,002	10%	2%	3%	5%	4%
CZ	2	$ 5,644	$ 8,197	7	$ 972	4%	0%	0%	0%	1%
Grand Total	51	$ 2,782,567	$ 3,121,138	5,355	$ 134,401	100%	100%	100%	100%	100%

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XYZ or HIJ?

Often it does not matter weather you use XYZ or HIJ because they overlap quite a bit.

But sometimes the segments don’t overlap, and you may decide to use one or the other or change your calculation for the segments.

All Vendors	% of Material Number	% of NoTotUsage	% of Tot. usage val.
	28%	0%	0%
'-'-	13%	0%	0%
AH	1%	25%	15%
AI	2%	5%	35%
AJ	3%	2%	34%
BH	1%	11%	1%
BI	1%	4%	2%
BJ	5%	2%	7%
CH	1%	30%	0%
CI	5%	13%	1%
CJ	39%	8%	4%
Grand Total	100%	100%	100%

Row Labels	% of Material Number	% of NoTotUsage	% of Tot. usage val.
	28%	0%	0%
'-'-	13%	0%	0%
AX	2%	27%	35%
AY	4%	5%	46%
AZ	0%	0%	4%
BX	1%	13%	2%
BY	5%	4%	7%
BZ	1%	0%	1%
CX	4%	35%	1%
CY	24%	15%	3%
CZ	18%	1%	1%
Grand Total	100%	100%	100%

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Warning

A Fool with a Tool is still a fool

One size does NOT fit all.

- You are the subject matter experts and understand your business better than I do.

Understand the intent

- why/how are we making our segments?
- Do they make sense?
- Do they help us in our analysis?
- Does the data “look” correct?
- Can you explain why we did the segmentation in the first place?

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The magic nine-blocks

We saw a lot of stuff, but where do these magic nine-blockers come from? How do we grow our knowledge…?

Can we have some more?

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