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(19th ICPR) Production planning model with simultaneous production of spare parts

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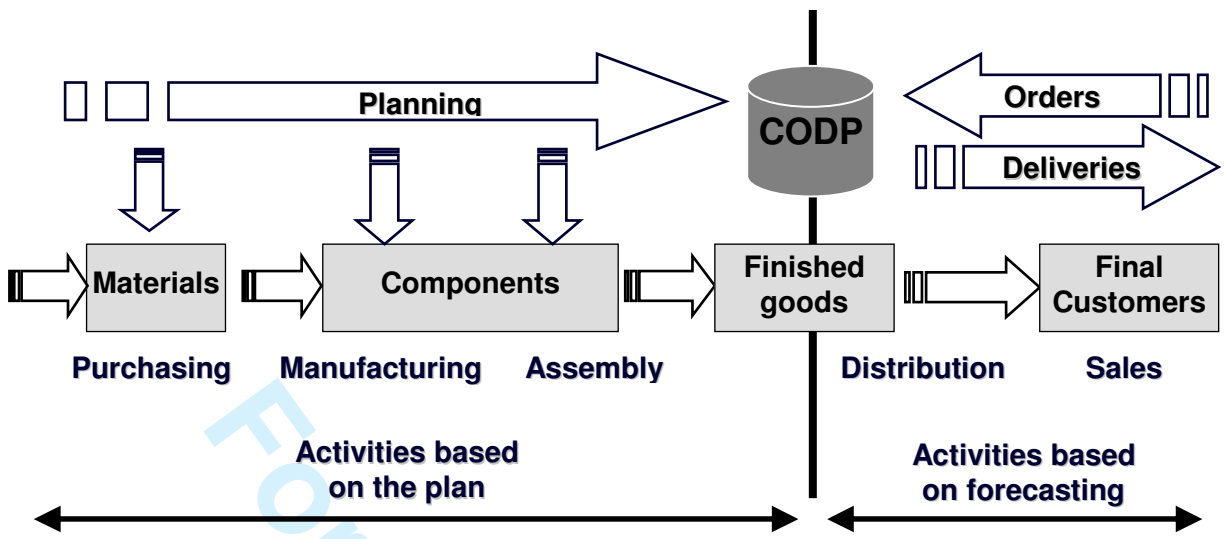
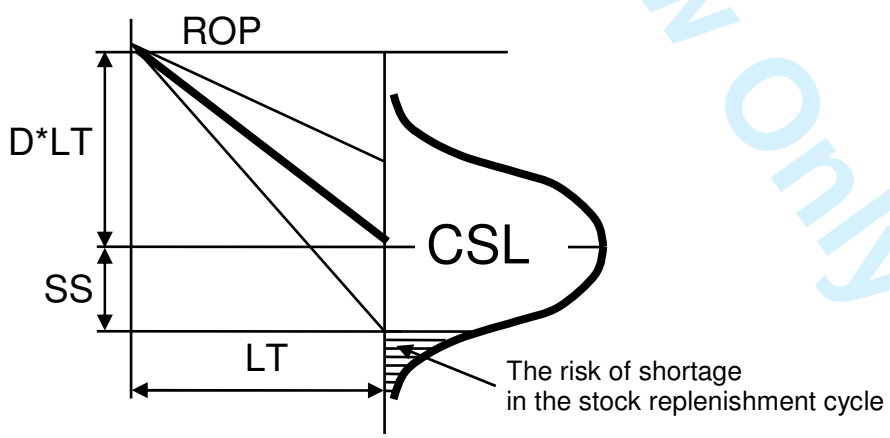


Figure 1. An example of CODP location



D – demand,
 LT – replenishment lead time,
 ROP – the level of re-order point,
 SS – safety stock.
 CSL – Cycle-Service Level.

Figure 2. Graphic presentation of Cycle-Service Level.

Table 1. Suggested x_1 and x_2 parameters value in 1-2-3 analysis.

Group	Scope	
Group 1	below x_1	
Group 2	from x_1 to x_2	
Group 3	more than x_2	
Parameter	Suggested parameter value for low frequency issues.	Suggested parameter value for high frequency issues.
x_1	1- 4	1-7
x_2	1- 3	1- 4

Table 2. Methods of covering the requirement for spare parts assigned to particular categories according to ABC, 123 and CVA analyses

CVA /ABC+123	VIP	IP	MIP	LIP
A1	"re-order point"	"re-order point"	"re-order point"	"re-order point"
A2	"re-order point"	"re-order point"	"re-order point"	"re-order point"
A3	"lot for lot"	"lot for lot"	"to order"	"to order"
B1	"re-order point"	"re-order point"	"cycle review"	"cycle review"
B2	"re-order point"	"cycle review"	"cycle review"	"cycle review"
B3	"lot for lot"	"lot for lot"	"to order"	"to order"
C1	"re-order point"	"re-order point"	"cycle review"	"cycle review"
C2	"lot for lot"	"cycle review"	"cycle review"	"cycle review"
C3	"lot for lot"	"lot for lot"	"to order"	"to order"
D	"lot for lot"	"lot for lot"	"to order"	"to order"

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Table 3. The method of the best covering the requirement for spare parts assigned to particular categories according to ABC, 123 and CVA analyses – table for the Expert

Covering the requirement / Spare parts classification	"re-order point"	"cycle review"	"lot for lot"	"to order"
A1/VIP	X			
A1/IP	X			
A1/MIP	X			
A1/LIP	X			
...

Table 4. Results of experts' opinions research (inventory management managers) for all groups

Covering the requirement / Spare parts classification	"re-order point"	"cycle review"	"lot for lot"	"to order"
A1/VIP	18*	1	1	0
A1/IP	19	0	1	0
A1/MIP	17	1	1	1
A1/LIP	17	0	2	1
A2/VIP	18	2	0	0
A2/IP	17	1	1	1
A2/MIP	17	2	1	0
A2/LIP	17	2	1	0
A3/VIP	2	0	16	2
A3/IP	1	0	17	2
A3/MIP	2	1	1	16
A3/LIP	1	1	0	18
B1/VIP	19	0	1	0
B1/IP	17	1	1	1
B1/MIP	2	16	1	1
B1/LIP	2	15	2	1
B2/VIP	17	1	1	1
B2/IP	1	16	2	1
B2/MIP	2	15	2	1
B2/LIP	2	15	1	2
B3/VIP	1	1	16	2
B3/IP	1	1	17	1
B3/MIP	2	1	1	16
B3/LIP	1	1	1	17
C1/VIP	18	1	1	0
C1/IP	17	1	1	1
C1/MIP	1	17	1	1
C1/LIP	1	16	2	1
C2/VIP	1	1	16	2
C2/IP	1	17	1	1
C2/MIP	2	16	1	1
C2/LIP	1	16	2	1
C3/VIP	1	0	17	2
C3/IP	1	1	16	2
C3/MIP	0	0	4	16
C3/LIP	0	0	2	18
D/VIP	1	0	18	1

* The numbers in above table mean the quantity of answers given by experts for particular categories.

Table 5. Relative classification dispersion rates for individual groups ABC/123/CVA

CVA /ABC+123	VIP	IP	MIP	LIP
A1	0,247	0,127	0,360	0,353
A2	0,240	0,360	0,353	0,353
A3	0,453	0,353	0,460	0,247
B1	0,127	0,360	0,460	0,553
B2	0,360	0,460	0,553	0,553
B3	0,460	0,360	0,460	0,360
C1	0,247	0,360	0,360	0,460
C2	0,460	0,360	0,460	0,460
C3	0,353	0,460	0,427	0,240
D	0,247	0,353	0,340	0,240

Table 6: Suggested values of customer service level (Cycle-Service Level) in terms of probability for spare parts assigned to particular categories according to CVA and ABC analyses

CVA /ABC	VIP	IP	MIP	LIP
A	90%- 99,99%	75%- 98%	75%- 98%	75%- 98%
B	90%- 99,99%	75%- 98%	60%- 80%	50%- 65%
C	90%- 99,99%	75%- 98%	60%- 80%	50%
D	90%- 99,99%	60%- 80%	50%	50%