

# “Effective Management of organizations Using PEMS Model”

Hasnain Haider, Dr. Chitriki Thotappa, 3 Khalandar Azad,

*Senior Engineer, Oil & Gas Sector, Kuwait, pems1512@gmail.com*

*Professor & M.Tech Co-ordinator, Dept f, Mechanical Engineering, , RYM Engineering College. Ballari,  
 Lecturer Gpt Ballari & M.Tech. student,(Production Mgmt),Department of MechanicalEngineering RYMEC,  
 Ballari,*

*Corresponding author: Hasnain Haider*

Date of Submission: 15-09-2020

Date of Acceptance: 24-09-2020

## I. INTRODUCTION

All the existing business prevalent today is either product based or service based. When we consider product based business, the process through which the product undergoes determines the quality .So improving the process effectively, improves the quality and it follows the principle that “Whatever is seen can be measured and whatever is measured can be improved “

In this study, the PEMS [Process effectiveness & Measurement system] Model is used for improving the performance of the staff and the organization as a whole. With this model, the management and staff will get better control the way production is done and also every department will get an opportunity to perform better.

In this system, measurement of production performance is carried out with continuous

monitoring and later by applying PEMS, the performance is re-valuated, which may show positive results.

## II. IMPACT OF PEMS MODEL AT DM SWAAD SWEETS

### 2.1 Fixing Focus areas:-

Concerning to the organization DM Swaad Sweets, the focus areas can be as listed below.

- (i) Procurement of raw material
- (ii) Production
- (iii) Marketing

Each focus area will have different criteria and targets. Relating to the first focus area i.e procurement we can devise a table of targets as below

### 2.2 Setting criteria and Target.

**Table 2.0** Desired characteristics clubbed together(for first trial)

Desired Characteristics clubbed together			
Sl No	Focus areas	Criteria	Target
1	Procurement of Raw Material	Criteria #1 Cost	t1= least in Market
2		Criteria #2 Quality	t2=high std
3		Criteria #3 Available market	t3= range of 10 Km
4	Production	Criteria #4 No of batches in a day	t4 ≥ present number or 17
5		Criteria #5 taste of product	t5 = good/bad/ok
6		Criteria #6 chemical Analysis	t6=within range(Y/N)
7		Criteria #7 idle time	t7= 0 or minimum or Zero
8		Criteria #8 Remixing or Rework	t8= upto 1 time/day
9		Criteria #9 Wastages	t9= 0
10		Criteria #10 Packing	t10= Good/Bad
11	Marketing	Criteria #11 Market study	t11= Reach the interior market Yes/No
		Criteria #12 Transaction type	t12 ≥ 80% cash trasaction

		Criteria #13 Back orders	$t_{13} \leq 20\%$ of sold products
		Criteria #14 Suggestion of New products	$t_{14} =$ at least 1 new product every month

When procurement is done, a thorough market study has to be made regarding the material to be purchased. A comparative statement has to be made from different vendors and finally choose the one who is least in value but at the same time, there should be no compromise in the quality of the material. The purchases should be done within a range of 10 kms to avoid extra cost of transportation. When the production is started care should be taken to see that there is very little or no idle time for the machine and to the labour. If this is taken care then the number of runs (batches) per day increases which ultimately increases the profit. After every batch of the product is taken, it is tested for the quality, its softness, its chemical composition. A preservative called benzoic acid is used in the process to improve the shelf life of the products, it has to be tested periodically to ensure that it is within the range specified or safe levels. For this an additional staff is appointed to have a check in the lab and report.

Care must be taken to remove wastages if any and avoid rework because of bad taste or excessive addition of the preservatives. If all these are improved or taken care then, it means effectiveness is improved. Also during packing, care is taken because the filling of jars is done by ladies who are not educated. These jars are filled by counting the number of pieces. There should be a random check of the jars to weigh it. If the weight is excess, it means that the number of pieces are wrongly put and hence it leads to rework. This has to be avoided as it may cause loss to the company.

After the jars are ready for dispatch, the marketing team should see that the right product is reaching the right retailer based on the previous data. But in this company the previous data is not their hence it is the responsibility of the marketing team to give the right product in right Quantities to the retailers only after a preliminary study of the retailers. Since the target customers are generally of rural areas, Cash transactions have to be advocated. If any credit is given then proper record is to be maintained at both the ends to have transparency. Do not over dose the retailers than their capacity because the shelf life of the product is less & the products may get perished. This leads to back orders. If in adverse conditions back orders persists, there should be strategy to take back the products at a lesser rate than it was sold. This will avoid over stocking of products by the retailer and will have a compromise in the profits whenever, the marketing team goes to the market, it has to study the new products that are trending and bring it to the notice of the management.

**2.3 First trial of observations:**

All the data required to fill the above tables are collected based on the PFD for sweet products on page Numbers 35 to 46. The same Process flow diagram is followed to fill the tables in terms of actual values and then converting it into binary values, by using these binary values the process effectiveness is measured in terms of numbers which shows the health of the organization.

**Table 2.1** Recording of actual observations(for first trial)

Recording of actual observations							
Sl No	Focus Area	Criteria	Target	Product 1	Product 2	Product 3	Product 4
1	Procurement of Raw material	1 Cost	Least	Least	Least	No	No
2		2 Quality	High	High	Low	High	High
3		3 Available Market	<10 Kms	Yes	Yes	Yes	Yes
4	Production	4 No of batches/day	17	15	15	15	15
5		5 Taste	Good	Good	Good	Not Good	Not Good
6		6 Chemical Analysis	Range	Within	Within	Exceeds	Exceeds
7		7 Idle time	0-10 Mins	15 Mins	10 Mins	15 mins	15 mins
8		8 Remixing or Rework	up to 1time	1	0	2	3

9		9 Wastages	2 Kgs	3 Kg	2 Kg	1 Kg	1 Kg
10		10 Packing	Range of acceptance	Good	Good	Good	Bad
11	Marketing	11 Market study	Interior Marketing	Yes	Yes	Yes	Yes
12		12 Transaction type	By Cash	50%	50%	80%	80%
13		13 Back order	<20% of Sold product	10%	10%	10%	20%

**Table 2.2** converting of actual observations into binary values(for first trial)

converting into binary values							
Sl No	Focus Area	Criteria	Target	Product 1	Product 2	Product 3	Product 4
1	Procurement of Raw material	1 Cost	Least	1	1	0	0
2		2 Quality	High	1	0	0	1
3		3 Available Market	<10 Kms	1	1	1	1
4	Production	4 No of batches/day	17	0	0	0	0
5		5 Taste	Good	1	1	0	0
6		6 Chemical Analysis (preservative added)	Range	0	0	0	0
7		7 Idle time	0-10 Mins	0	1	0	0
8		8 Remixing or Rework	up to 1time	1	0	0	0
9		9 Wastages	2 Kgs	0	0	0	0
10		10 Packing	Range of acceptance	0	0	1	1
11	Marketing	11 Market study	Interior Marketing	1	1	1	1
12		12 Transaction type	By 80 % Cash	0	0	1	1
13		13 Back order	<20% of Sold product	0	0	0	0

Process Effectiveness on Criteria is calculated as follows:

Process Effectiveness on Criteria #1=  $((\sum \{a1pn\})/pn) * 100\% = ((1+1+0+0)/4) * 100\% = 50\%$

Process Effectiveness on Criteria#2 =  $((\sum \{a2pn\})/pn) * 100\% = ((1+0+0+1)/4) * 100\% = 50\%$

Process Effectiveness on Criteria#3=  $((\sum \{a3pn\})/pn) * 100\% = ((1+1+1+1)/4) * 100\% = 100\%$

Process Effectiveness on Criteria#4=  $((\sum \{a4pn\})/pn) * 100\% = ((0+0+0+0)/4) * 100\% = 0\%$

Process Effectiveness on Criteria#x=  $((\sum \{axpn\})/pn) * 100\%$

Where 'x' denotes number of criteria and pn

denotes 'n' number of outputs.

If all the criteria carry equal weightage i.e. all are equally important in defining the outputs

then average of all the Process Effectivenesses will give for whole business operation

**Table 2.3** Record the improvement initiatives.

Actual Process Effectiveness for organization as a whole= $(\sum \text{Process Effectiveness on all the criteria})/\text{No. of criteria}$				
Sl. No.	Criteria#	Target Process Effectiveness	Actual Process Effectiveness	Process Improvement Initiatives
1	Criteria#1	100%	$(\sum \{a1_{pn}\})/pn=50\%$	1. Add preservative to increase the life of products.
2	Criteria#2	100%	$(\sum \{a2_{pn}\})/pn=50\%$	
3	Criteria#3	100%	$(\sum \{a3_{pn}\})/pn=100\%$	2. Decrease the idle time of labors and machines
4	Criteria#4	100%	$(\sum \{a4_{pn}\})/pn=0\%$	
5	Criteria#5	100%	$(\sum \{a5_{pn}\})/pn=50\%$	3. Reduce taking back orders.
6	Criteria#6	100%	$(\sum \{a6_{pn}\})/pn=0\%$	
7	Criteria#7	100%	$(\sum \{a7_{pn}\})/pn=25\%$	4. Hire more experience labors
8	Criteria#8	100%	$(\sum \{a8_{pn}\})/pn=25\%$	
9	Criteria#9	100%	$(\sum \{a9_{pn}\})/pn=0\%$	
10	Criteria#10	100%	$(\sum \{a10_{pn}\})/pn=50\%$	
11	Criteria#11	100%	$(\sum \{a11_{pn}\})/pn=100\%$	
12	Criteria#12	100%	$(\sum \{a12_{pn}\})/pn=50\%$	
13	Criteria#13	100%	$(\sum \{a13_{pn}\})/pn=0\%$	
Process Effectiveness for organization as a whole		100%	Avg=500/13=38.46%	

After the first trial the process effectiveness is calculated as **38.46%** only

**III. IMPROVED OR REVISED PFD FOR PRODUCTS AT SWAAD USING PEMS:**

The PFD for different products are figured out in the earlier chapter. This PFD existed before the implementation of PEMS. But when we apply PEMS, the PFD is adjusted based on the correction needed and initiatives taken to improve the processes so the corrections were made as follows.

- i) Increase the shelf life of the product by adding a preservative in minimum quantities.
- ii) Quality department check the quality after each batch is produced and if it found unsatisfactory, then it is recycled or reworked to get the desired quality.

- iii) Chemical Analysis is done on each batch
  - iv) Since all the products need to be dried by cooling, Basin Barfi gave very good results when it was cooled in air conditioned area.
  - v) To increase the profits of the organization the number of runs or batches of a product has to be increased, this is possible by decreasing the idle time.
  - vi) Look for the new products that is trending in the market
  - vii) Hire experienced personnel
- The refined PFD for all sweets are as follows which is similar to the previous PFD.

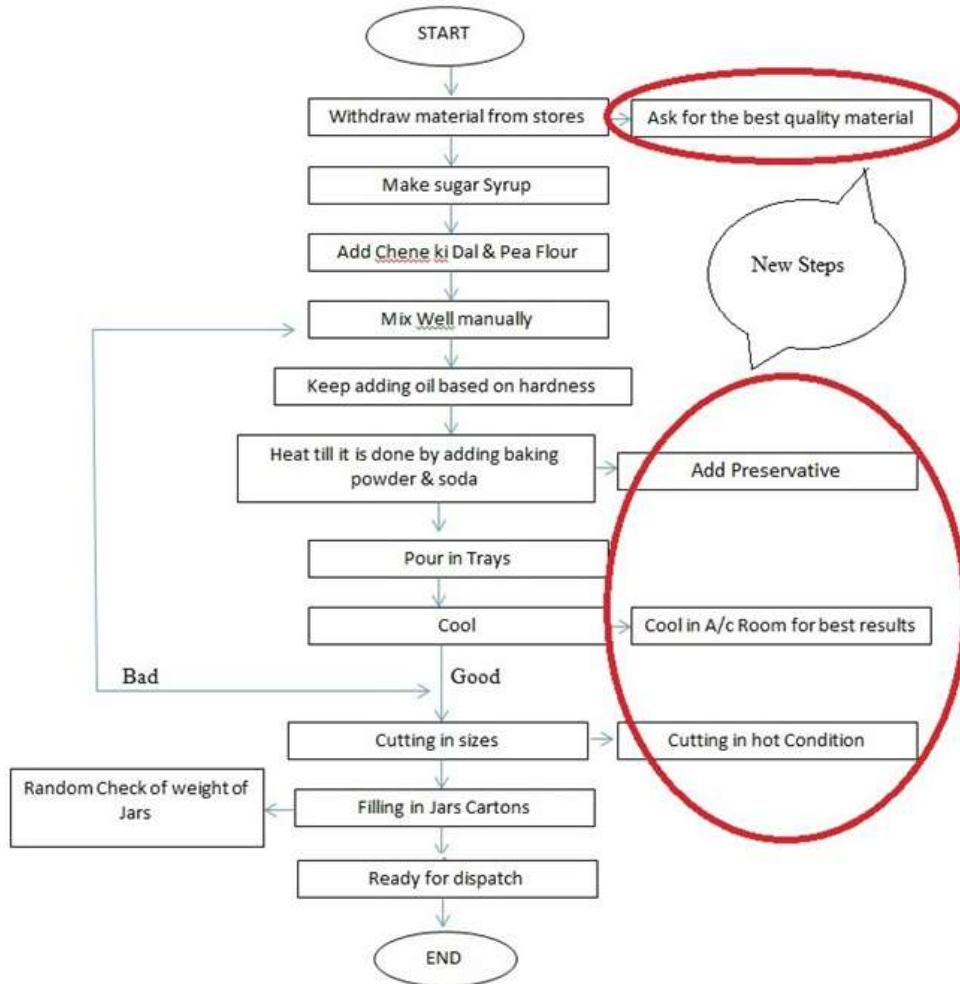


Fig 3.0 Reviewed PFD for all sweet products

### 3.1 Second Trial of Observations:-

In the easy part of the chapter for every reference all the tables are clubbed together as in the table below.

Table 3.1 Desired Characteristics clubbed together for second trial

Desired Characteristics clubbed together			
SI No	Focus areas	Criteria	Target
1	Procurement of Raw Material	Criteria #1 Cost	t1= least in Market
2		Criteria #2 Quality	t2=high std
3		Criteria #3 Available market	t3= range of 10 Km
4	Production	Criteria #4 No of batches in a day	t4≥more than present or 17 batches
5		Criteria #5 taste of product	t5 = good/bad/ok
6		Criteria #6 chemical Analysis	t6=with in range(Y/N)
7		Criteria #7 idle time	t7= 0 or minimum
8		Criteria #8 Remixing or Rework	t8= upto 1 times/day
9		Criteria #9 Wastages	t9= 0

10		Criteria #10 Packing	t10= good to bad
11	<b>Marketing</b>	Criteria #11 Market study	t11= reach the interior mark Yes/No
		Criteria #12 Transaction type	t12 ≥ 80% cash
		Criteria #13 Back orders	t13 ≤ 20% of sold products

**Table 3.2** Recording of actual observations during the second trial

Recording of actual observations							
Sl No	Focus Area	Criteria	Target	Product 1	Product 2	Product 3	Product 4
1	<b>Procurement of Raw material</b>	1 Cost	Least	Least	Least	No	No
2		2 Quality	High	High	Low	High	High
3		3 Available Market	<10 Kms	Yes	Yes	Yes	Yes
4	<b>Production</b>	4 No of batches/day	17	17	16	15	15
5		5 Taste	Good	Good	Good	Not Good	Not Good
6		6 Chemical Analysis	Range	Within	Within	Exceeds	Exceeds
7		7 Idle time	0-10 Mins	10 Mins	12 Mins	15 mins	15 mins
8		8 Remixing or Rework	up to 1time	1	0	2	3
9		9 Wastages	2 Kgs	3 Kg	3 Kg	3 Kg	1 Kg
10		10 Packing	Range of acceptance	Good	Good	bad	Bad
11	<b>Marketing</b>	11 Market study	Interior Marketing	Yes	Yes	No	Yes
12		12 Transaction type	By 80% Cash	50%	50%	60%	80%
13		13 Back order	<20% of Sold product	30%	30%	10%	20%

Now since the actual recordings are made, all the values are converted into binary values to get the process effectiveness. This is done in the following table.

**Table 3.3** converting of actual observations into binary values during the second trial

converting into binary values							
Sl No	Focus Area	Criteria	Target	Product 1	Product 2	Product 3	Product 4
1	Procurement of Raw material	1 Cost	Least	1	1	0	0
2		2 Quality	High	1	0	1	1
3		3 Available Market	<10 Kms	1	1	1	1
4	Production	4 No of batches/day	17	1	0	0	0
5		5 Taste	Good	1	1	0	0
6		6 Chemical Analysis (preservative added)	Range	1	1	0	0
7		7 Idle time	0-10 Mins	1	0	0	0
8		8 Remixing or Rework	up to 1time	1	1	0	0
9		9 Wastages	2 Kgs	0	0	0	1
10		10 Packing	Range of acceptance	0	0	0	1
11	Marketing	11 Market study	Interior Marketing	1	1	0	1
12		12 Transaction type	By 80 % Cash	0	0	0	1
13		13 Back order	<20% of Sold product	0	1	0	1

Now all the recorded values are converted into binary. With these values it is easy to calculate the Process effectiveness.

ProcessEffectivenessonCriteria is calculated as follows:

$$\text{ProcessEffectivenessonCriteria\#1} = \left( \frac{\sum \{a_{1pn}\}}{pn} \right) * 100\% = \left( \frac{1+1+0+0}{4} \right) * 100\% = 50\%$$

$$\text{ProcessEffectivenessonCriteria\#2} = \left( \frac{\sum \{a_{2pn}\}}{pn} \right) * 100\% = \left( \frac{1+0+1+1}{4} \right) * 100\% = 75\%$$

$$\text{ProcessEffectivenessonCriteria\#3} = \left( \frac{\sum \{a_{3pn}\}}{pn} \right) * 100\% = \left( \frac{1+1+1+1}{4} \right) * 100\% = 100\%$$

$$\text{ProcessEffectivenessonCriteria\#4} = \left( \frac{\sum \{a_{4pn}\}}{pn} \right) * 100\% = \left( \frac{1+0+1+0}{4} \right) * 100\% = 25\%$$

$$\text{ProcessEffectivenessonCriteria\#5} = \left( \frac{\sum \{a_{1pn}\}}{pn} \right) * 100\% = \left( \frac{1+1+0+0}{4} \right) * 100\% = 50\%$$

$$\text{ProcessEffectivenessonCriteria\#x} = \left( \frac{\sum \{a_{xpn}\}}{pn} \right) * 100\%$$

Where 'x' denotes number of criteria and pn denotes 'n' number of outputs.

If all the criteria carry equal weightage i.e. all are equally important in defining the outputs then average of all the Process Effectivenesses will give for whole business operation

**Actual Process Effectiveness for organization as a whole=**  

$$\left( \frac{\sum \text{Process Effectiveness on all the criteria}}{\text{No. of criteria}} \right)$$



**Table 3.4** Record the initiatives after second trial.

Sl. No.	Criteria#	Target Process Effectiveness	Actual Process Effectiveness	Process Improvement Initiatives
1	Criteria#1	90%	$(\sum \{a1_{pn}\})/pn=50\%$	1. Decrease the idle time of labors and machines  2. Reduce taking back orders.  3. Hire more experience labors  4. Introduce e Business in the system
2	Criteria#2	90%	$(\sum \{a2_{pn}\})/pn=75\%$	
3	Criteria#3	90%	$(\sum \{a3_{pn}\})/pn=100\%$	
4	Criteria#4	90%	$(\sum \{a4_{pn}\})/pn=25\%$	
5	Criteria#5	90%	$(\sum \{a5_{pn}\})/pn=50\%$	
6	Criteria#6	90%	$(\sum \{a6_{pn}\})/pn=50\%$	
7	Criteria#7	90%	$(\sum \{a7_{pn}\})/pn=25\%$	
8	Criteria#8	90%	$(\sum \{a8_{pn}\})/pn=50\%$	
9	Criteria#9	90%	$(\sum \{a9_{pn}\})/pn=25\%$	
10	Criteria#10	90%	$(\sum \{a10_{pn}\})/pn=25\%$	
11	Criteria#11	90%	$(\sum \{a11_{pn}\})/pn=75\%$	
12	Criteria#12	90%	$(\sum \{a12_{pn}\})/pn=25\%$	
13	Criteria#13	90%	$(\sum \{a13_{pn}\})/pn=50\%$	
Process Effectiveness for organization as a whole		90%	Avg=625/13=48%	

After the second trial, the process effectiveness is calculated as **48%** only

From the above results, it is seen that the process effectiveness is increased for the second trial. Similarly as we did after the second trial, all the stakeholders will have a brain storming session and think over the improving the effectiveness. Initiatives will be taken and the actual values are

recorded in the third trial and see the difference. In the first trial the effectiveness was 38% when the targeted effectiveness was 100% and in the second trial, the actual process effectiveness was 48% for the targeted effectiveness of 90%. In the third trial again the process is repeated till we get the desired process effectiveness

**IV. RESULT OF THE STUDY:**

The increase in the effectiveness was only possible because of the active involvement of all stakeholders and the effectiveness of the processes is recorded in the table below

Trial	Trial No.1	Trial No. 2	Trial No. 3
Process Effectiveness	<b>38%</b>	<b>48%</b>	<b>64%</b>

**Table 4.0** process effectiveness for different trials

Thus we can see from the table that by implementing the PEMS Model, the process effectiveness can be continuously improved over period of time.



### V. CONCLUSION

After successful implementing the PEMS Model in business organization[Manufacturing Sector],the following conclusions are made.

- i)Achieving in-house implementation.
- ii)No New Structure is needed.
- iii) It's a crystal clear tool fro the management.
- iv) Professional growth of all stake holders.
- v) Similar to ISO/Kaizen/Six sigma.
- vi) Induces the spirit of working in teams.

### REFERENCES:

- [1]. A practical guide for “**process effectiveness and measurement system**” by Mr. Hasnain Haider., Senoir engineer Kuwait Oil company. Kuwait.