PEDESTALLING FCI: A 'PELLUCID OPERATIONAL REVAMPING'!

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Abstract

The review study provides a tunneled insight into the warehousing domain of food grains as per the major recommendations of the renowned Shanta Kumar Committee on restructuring the FCI (Food Corporation of India). Warehouses are scientific means of foodgrain storage. The FCI has the largest agricultural warehousing systems providing over 357.89 lakh tons of storage capacity with 1451 strategically located go downs across India as per the mathematical models employed in Management Sciences. The total storage capacity available with FCI and other agencies significantly augmented during 2011- 16 by 34.15 per cent as of 607.42 lakh tons in 2011 to 814.84 lakh tons in the year 2016. The present review explains the warehousing in light of Operations Management theoretically. The effective implementation of the same can help attain the broad categories of desirous outcomes in a step-by- step approach.

Introduction:

India has the potential and capacity to increase and feed everyone under the National Food Security Act, 2013 if food losses due to huge wastages that are considerably minimized and the Food Corporation of India (FCI) is enabled to execute its mandated food management policies efficiently comprising of food procurement, storage, transportation and distribution. Presently FCI has the largest agricultural warehousing systems providing over 357.89 lakh tons of storage capacity. However the Central Government has now emphasized upon the State Government to create intermediate storage capacities at Block level to store foodgrains collected from FCI depots for distribution to fair price shops (Patel,2017) . The paper unfolds the philosophy of let's get it right the first time' explains the effort to design a product and process that's capable and robust to meet the business and customer requirements. It is an integration of right ideas, innovation and solutions to the new process. It calls for a good initial investment of time, effort and labour but helps in building an efficient product, process and hence system with faster turnarounds, improved quality and reduced wastage. It is an approach that heads rightly towards an operational implementation of recommendations as suggested by renowned **Shanta Kumar Committee** (Patel,2017).

Delineated approach to 'How' of a 'Robust Designed Silo' – Taguchi Approach

Genichi Taguchi in his approach identified three key features of:

1) Process Design,
2) Robust Design &
3) Quality loss function.

These can directly be applied on how to devise mechanized silos. Silos are preferred as they occupy 1/3rd of the land space.

1) Fabrics of Process Design:

* Customer requirements/ CTQs: It stresses upon the need to identify the customer needs. At this stage itself one needs to develop the customer requirements and understand as to what it means for the product and hence process. In the present situation the customers would be delighted with superior quality of grains.

* Business Requirements/CTQs: The requirement of the Government of India in the

present scenario is to control the ever wasted quantities of grain unutilized while ensuring adherence to the First- In First- Out (FIFO) policy with respect to crop year as well as within crop year during which the stocks are accepted. The next in line objective of Indian food security is also to execute its mandated food management policies, as supported by earlier literature review. *Functional Requirements /CTQs: The process design will ensure translating the customer and business requirements to controllable functional parameters encompassing temperature, humidity, moisture, rodents, pests and unutilized grains. Thus process design ensures that the mechanized steel silos in PPP mode functions efficiently under varied conditions thereby emphasizing upon a well managed Food Supply Chain Management System (Kalkoti, 2017). Instead, in states of Haryana, Punjab, Uttar Pradesh etc the intermediate storage capacities at Block level by developing underground steel silos in PPP mode over conventional warehouse system must be adopted where the underground water table levels are deeply bedded. Transfer Function: Further a quantified relation needs to be established between the output i.e. the robust design of block level underground steel silos with strictly controllable inputs of rodents, temperature, humidity, pests, moisture and unutilized grains. Further the variance of the controllable factors are to be reduced together with minimizing the effect of variance of noise factors i.e the uncontrollable environmental factors of changing customer demand pattern. The mechanized silos are designed with these quantified factors at their optimum and the reliability in performance would flow back to customers and the main food warehousing body, Food Corporation of India (FCI).
2) Robust Design: A product is considered robust if it efficiently functions to attain the output under varied conditions in a dynamic environment (Stevenson, 2009).
3) Quality loss function: As per Taguchi 'Quality Loss' is when the process output is at the target, as any deviation from mean standard is bound to quality losses.

Taguchi's Quality Loss function is given as:

$L(Y) = M/D (Y- t)^2$

where: M is Monetary loss to Government when process does not meet the specifications.
D is Customer defined tolerance
t is Target for the process/CTQ and
Y is Process mean/value

Taguchi's design aims at modeling considering together the controllable and uncontrollable factors

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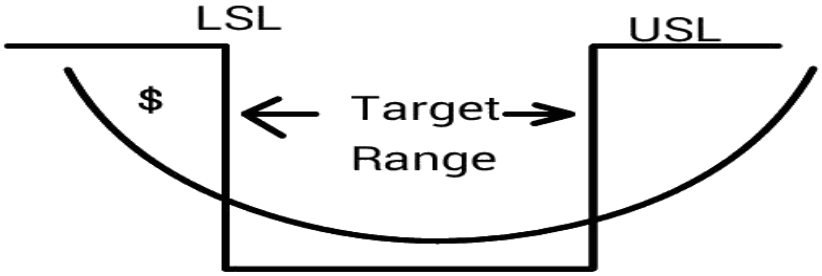

Quality Loss Curve

- Since the loss is not just due to the deviation from target but also due to variance in control factors, the formula for quality loss per unit of the product in a sample is as:

$$Qa = \frac{M}{D} [\mu - t)^2 + \sigma^2]$$

where, Q_a = average quality loss per unit of the product in a sample that follows a distribution with mean μ and standard deviation sigma and t is the time. This leads to a robust design centered at the target, reduces variation in output and controllable factors and minimizes the uncontrollable factors.

When to Use Taguchi's Design? : Taguchi's design uses orthogonal arrays to reach the optimum with minimum trials at minimum cost. Orthogonality is represented as: $\sum xi.xj = 0$ where i and j represent high and low levels. Orthogonal arrays are used to represent

both controllable and noise factors in a robust design. In orthogonal array each factor has equal weights and hence a Balanced Design. The advantage of this orthogonality is that each factor can be evaluated independent of other factors (Videa,2009). Taguchi represents an orthogonal array as:

L_n (S^k)

where: S is number of levels of each factor,
k is maximum number of factors whose effects can be estimated without any interaction and
N is the total number of trials during experimentation.

The next nucleated domain would be the Lean operations in service of supplying the food grains from the robustly designed block level steel silos to the ration shops with emphasis laid upon high quality of food grains, speedy availability of food grains and close vendor relations (i.e. the block level workers) and reduced time of delivery. This Toyota approach discussed further should be applied only once the Taguchi's approach is put to practice. Toyota approach is a lean operation that stresses upon identifying and reducing the wastage, increased flexibility, eliminating the disruptions and improved efficiency. The burden of ensuring quality inturn would rest with the vendor. This should be given due consideration as one of the reasons for the wastage of food grains is that grains are not moved out of the warehouses in time and distributed. Waste and inefficiency can be minimized by the following

Following Toyota approach : It is only when once the robust silos are well established that the Block level warehouses implement such lean operations strategy for packaging the demanded quantities of foodgrains in standardized bags. The food grade plastic silos can also be transported together with the demanded foodgrain quantities to the fair price shops when an advanced stock in/inventory needs to be forwarded to the beneficiaries in case of fresh hefty foodgrain procurements. The Japanese terminologies and associated concepts of Toyota approach are discussed below that need to be roped in for mechanical packaging of grains at the block level warehouse. 'Muda'- It refers to the waste and inefficiency that can be minimized by using the following tactics (Stevenson,2009).

1.Kanban: It is a manual system used for controlling the movement of foodgrains that responds to signals of the need. It is card that provides the signal to the workers for replenishing the inventory for carrying the process of food grain packaging once the container is emptied.

2. Pull system: It suggests that only the demanded quantities of foodgrains are to be transported to the requisite shops and the remaining amounts to be stored in steel silos of 'to be' Block warehouses, as proposed above.

3. Heijunka: It is the workload leveling as variations in production volume lead to waste.

4. Team concept: It involves use of small teams of workers for process improvement.

5. Kaizen: It is the continuous improvement of the system.

6. Jidoka: It is maintaining quality through workers.

7. Poka – yoke: This is to maintain the quality by minimizing the errors.

Finally the records of quantities packaged and stored as in house inventory, foodgrains packaged, dispatched from block warehouses with in- built silos to fair price shops, foodgrains distributed in advance to beneficiaries can all be recorded by designing various datamarts. To conclude the detailed warehousing and delivery aspects of foodgrains discussed in detail above can all be linked via Computer Integrated Manufacturing (CIM) to establish a database that can further be utilized as Business Anaytics helping attain digitalization.

Conclusion:

The review as conducted above together with broad recommendations given by the Genichi Taguchi approach can be applied to have an in-place robust design. Taguchi proposed that

it is easy to design and control a product or process that is insensitive to environmental conditions than to controlling the environmental factors. Under the framework of the study the prime objective of following a Taguchian approach is that foodgrains are a natural resource that should be prevented from being wasted by making them resistible to environmental factors and released as per the demand needs. The underground silos should be built in Block areas where the water table level is deeply bedded ensuring that these warehouses are located within the radius of fair price shops. This would help attain double utilization of space where the on surface warehouse land could be used to hold inventory of plastic silos to be distributed to people and for mechanically packaging and finally dispatching the bags of foodgrains to the fair price shops with varied range of demanded quantities. It thus requires two tiers of effort and implementation: Taguchian approach that inturn is a fragment of lean operations and once implemented a complete transition to lean operations using Toyota approach.

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