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A STUDY ON AWARENESS OF THE COST REDUCTION AND ELIMINATION OF WASTE IN TEXTILE MANUFACTURING INDUSTRIES

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ABSTRACT

The manufacturing sector plays a pivotal role in the global economy, driving industrial growth and economic prosperity. However, its operations often generate substantial waste, posing significant environmental challenges. To address this concern and enhance manufacturing sustainability, understanding the awareness and adoption of cost reduction and waste elimination practices is crucial. This study delves into this critical topic, examining the current practices, awareness levels, and barriers to adoption in manufacturing industries. Every manufacturing industry generates waste during the process of manufacturing. These wastes are Bio - degradable and non-Bio – degradable some are Hazardous and others are Non – Hazardous. This waste should be classified and segregated by the industry in order to reduce the environmental pollution. Industries should aim at reducing the waste by following waste management strategies

The waste produced during the process of manufacturing should be converted into another useful product this helps to reduce the cost of production of goods and it will help for the industrial growth.

Keywords: Cost Reduction, Waste Elimination, Manufacturing Industries, Awareness, Adoption, Barriers

1. INTRODUCTION

In the dynamic landscape of contemporary manufacturing industries, where economic pressures, global competition, and sustainability concerns converge, the imperative to optimize operational efficiency through cost reduction and waste elimination has become increasingly paramount. This comprehensive study delves into the awareness levels within manufacturing sectors regarding the critical significance of implementing strategies to curtail costs and eradicate wasteful practices. With the manufacturing sector acting as a linchpin for economic growth, this study aims to scrutinize the prevailing awareness, challenges, and successful approaches related to cost reduction and waste elimination, shedding light on avenues for improvement and innovation.

As manufacturing enterprises grapple with the intricate challenges posed by fluctuating market conditions and evolving consumer expectations, the study seeks to provide a nuanced understanding of the multifaceted dimensions of cost management. By examining the awareness levels and current practices within manufacturing industries, this research endeavors to offer insights that are not only academically enriching but also practically applicable. Ultimately, the study aspires to empower manufacturing stakeholders with the knowledge needed to navigate the complexities of cost reduction and waste elimination, fostering resilience, sustainability, and competitive advantage in an ever-evolving industrial landscape.

1.1 OBJECTIVE OF THE STUDY

- To reduce the cost of production in textile industry.
- To reduce the manufacturing waste.
- Conversion of waste into useful goods.
- To make more sustainable production.
- To prevent environmental pollution.
- To maximize profit through elimination of waste.
- Promotion of circular economy

1.2 SCOPE OF THE STUDY

- Reduces the cost of the finished goods, it will maximize the profit.
- Planning will be done perfectly in order to achieve the goal of cost reduction.
- Every resource will be utilized to its maximum level during the process of production.
- Waste will be converted into money through waste management strategies.
- Industry will be aware of the environmental pollution and steps will be taken to control it.

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2. COST

Cost is the value of economic resources used as a result of producing or doing the thing costed. It is the total of all expenses incurred during the process of manufacturing. Manufacturing in the textile industry involves various process which involves cost in it.

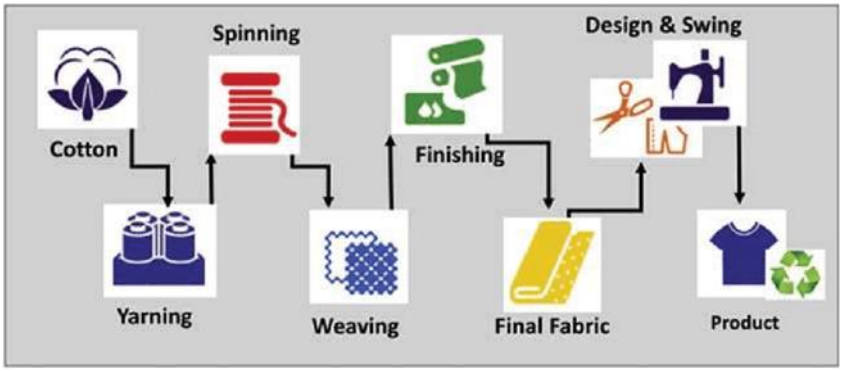

FIGURE 1: Cost Incurred In Manufacturing

2.1 CLASSIFICATION OF COST

- **Standard cost:**

  Standard cost is the cost of producing the requested product at the requested quantity detailed to the consumed component level of both materials and cost elements such as labor, energy etc.

  This can be achieved by calculation of the cost per machine hour, broken down to the smallest measurable element.

- **Proactive costing:**

  Knowing the cost and margin of each order line before acceptance allows decision makers to confirm or reject an order price by actually knowing the accurate margin of that order before production, this leads to rejecting lines far under the variable cost, avoiding rejection of prices above variable cost but under "full average" cost and prioritizing orders by maximizing contribution per scarce resource hour.

2.2 COSTING

Costing is the system of computing cost of production or of running a business, by allocating expenditure to various stages of production or to different operations of a firm. Costing is the deciding factor of the prices and the important thing to be followed in all important stages like purchase, production, marketing, sales, etc. The cost calculation in the textile industry is still almost exclusively based on the production cost data. Very good knowledge and experience are very much essential for doing successful marketing and sales. Also, update knowledge about everything related to textiles, is essential to make perfect costing.

2.3 METHODS OF COSTIING

- **Job Order Costing:**

  Description: Job order costing is suitable for textile manufacturers producing custom or limited-run products. It involves assigning costs to specific production orders, enabling a detailed breakdown of costs associated with each job.

  Application: This method is often used for specialty or customized textile products where each order has unique specifications. It allows for precise tracking of materials, labor, and overhead costs associated with a particular job.

- **Process Costing:**

  Description: Process costing is well-suited for continuous and standardized textile production, where products pass through multiple stages with similar production costs.

  Application: In the textile industry, where production is often continuous and standardized (e.g., spinning, weaving), process costing helps average out costs across units. It is beneficial for mass production scenarios, providing a cost per unit for each manufacturing stage.

- **Activity-Based Costing (ABC):**

  Description: ABC allocates costs based on the activities that drive them, providing a more accurate reflection of resource consumption. Application: In textile manufacturing, ABC can be applied to identify the costs associated with specific activities, such as dyeing, finishing, or quality control. This method enhances cost accuracy and helps in identifying areas for cost reduction.

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- **Variable and Absorption Costing:**

  Description: Variable costing considers only variable production costs as the cost of goods sold, while absorption costing includes both variable and fixed manufacturing costs.

  Application: Both costing methods are relevant in textile manufacturing, with variable costing providing insights into the contribution margin for each unit produced, and absorption costing helping to allocate fixed overhead costs.

3. COST REDUCTION

Cost reduction is the process through which the company identifies the areas where they need to reduce cost in order to reduce the cost of production which will lead to profit maximization. Through cost reduction the company can reduce the waste that is been incurred during the process of production. Maximum utilization of the available resource can be done through the cost reduction process and profits of the company can be increased which is the ultimate goal of an organization.

3.1 METHODOLOGY

- **Mass production:**

  When goods are produced at mass numbers, they require a lot of raw materials when raw materials are purchased in bulk quantity the price of raw materials will be reduced which will lead to reduction in the cost of production and automatically increases the profit.

  FIFO:

  First In First Out can be used as some raw materials get damaged with time so FIFO helps to maintain raw material and there will be no wastage if this method is followed.

- **Activity Based Costing:**

  Activity-based costing (ABC) is mostly used in the manufacturing industry since it enhances the reliability of cost data, hence producing nearly true costs and better classifying the costs incurred by the company during its production process.

  This costing system is used in target costing, product costing, product line profitability analysis, customer profitability analysis, and service pricing. Activity-based costing is used to get a better grasp on costs, allowing companies to form a more appropriate pricing strategy.

  When there is good pricing strategy the company will know the expenses that are incurred in each stage by this they will draft a proper plan to reduce the production cost.

- **Poka - Yoke:**

  The poka-yoke technique originates from Japan. Poka-yoke means mistake-proofing, or sometimes described as fool proofing. In this technique, the engineers anticipate the kind of mistakes or defects that may occur in the manufacturing process as well as during the product's use and install preventive measures into the process/product to prevent them altogether. Poka-yoke is a type of quality control with the aim to ensure that all parts function properly. This technique is used to reduce the humane errors that are caused by mistake or even due to negligence. Poka-yoke is an important part of the lean manufacturing system, whose main purpose is waste elimination, continuous improvement and adding value. The goal is to solve customer problems while reducing manufacturers' costs, and lean concepts like poka-yoke are simple tools that are easy to implement. Manufacturers employ poka-yoke techniques to improve product design and product manufacturing processes. The continuous improvement process helps eliminate human and mechanical errors, gets the products right the first time, and reduces the cost of trial-and-error. Because poka-yoke is flexible, it's a cost-effective lean manufacturing technique for manufacturers to use as part of their mistake-proofing activities Manufacturers can prevent process errors at little cost, while increasing the quality and reliability of their products because there are no defects.

- **Production optimisation:**

  Normally, a profit maximizing firm is interested to know what combination of factors of production (input) would minimize its cost of production for a given output.

  This can be known by combining the firm's production and cost function, namely isoquant and iso – cost.

- **Isoquant:**

  Isoquant or product indifferent curve shows all those combinations of Different factors of production which gives the same output to the producer.

  Iso – cost:

  Iso – cost lines show various combinations of two factors which the firm can buy with given expenditure or outlay. By combining Isoquant and Iso – cost line, a producer can find out the combination of factor of production which is optimum that is the combination of factors of production which would minimize his cost of production.

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For producing a given output, the tangency points of the relevant isoquant with an iso - cost line represents the least combination of factors.

- **Process costing:**
  In process costing the production is continuous, product is homogenous, output is anticipation of demand.
  Here in each process of production the cost is ascertained and the cost of production is transferred till the final output is obtained.

Work - In – Progress is always there because production is continuous.

Control of cost is easier, less paper work is involved.

By this way cost can be identified and the company can take measures to reduce the cost of production and reduce the waste incurred during the manufacturing process.

4. IMPLEMENTATION

- **Solar Energy:**
  To run a plant the company needs immense amount of electricity which plays a major part in the manufacturing concern. Therefore, by implementing renewable energy resources like solar energy to run plant instead of electricity will reduce the cost of production and also helps to achieve circular economy. Example: Pratibha Syntex has come into agreement with Good Fashion Fund to installed new spinning equipment, solar panels, a continuous tumble dryer, and made enhancements to effluent treatment. The new spinning equipment (card chute, comber, ringrame, autoconer) operates significantly more efficiently than the legacy machinery, both in terms of energy usage and waste generated. Investment in solar panels is ongoing but already more than 30%[1] of usage is met by renewable energy and additional installations are planned aimed at increasing that share to 50 per cent. The continuous tumble dryer has replaced several pieces of equipment used for treating fabrics and has fully eliminated the need for water and has significantly reduced power usage in this process.
- **Technology Upgradation:**
  Previously in textile industry handlooms were used to manufacture for weaving later Power looms were introduced which was an advanced technology of handloom.
  Now there is Air jet loom which is an advanced technology when compared to power loom. Air jet loom produces more output than hand, power loom and also consumes less electricity when compared.
  Therefore, implementation of latest technologies will reduce the cost of production.
- **Machinery:**
  The machinery used should be of good quality, it should be maintained regularly, avoid using second hand machinery.
  Purchase a machinery with good compressor quality. When calculate for a long run the expenses incurred for the second-hand machine will cost high therefore make wise investment in good quality compressor machine

5. WASTE MANAGEMENT

Waste in manufacturing is defined all activities in production that does not add value to the final product. Waste is very commonly found in the production process, but unfortunately sometimes not realized by the workers in production that they do waste. For that waste in a company needs serious handling, in an organized and sustainable. Textile waste is the material that is discarded throughout the production process. This waste can be produced throughout each stage of product development, from spinning, weaving, dyeing, finishing, and even after it's made.

5.1 METHODS OF WASTE ELIMINATION

- **Lean manufacturing:**
  Lean manufacturing is a management philosophy that focuses on continuously eliminating any possible waste in the production process. This manual shed the light on the points that increase the company capabilities to control a number of resources e.g., labour, overproduction, space, defects, unnecessary human motion, inventory and transportation
- **Detailed study of current state of the company**
  A product undergoes various value-added and non-value-added actions or processes or steps before being delivered to the customer. All these value-added and non-value-added processes put together comes under value stream or value flow or work flow. Value Stream Mapping is a lean tool to visualize an entire production process, representing information and material flow, to improve production process by identifying waste and its resources. VSM is of two types namely, current VSM and future VSM. Current VSM gathers the complete work flow, information and data within a plant, whereas future VSM starts off from where current VSM ends. Latter improvises the current VSM by identifying waste and its sources and eliminating them with necessary tools.

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- **Measures taken to improve the leanness of the company:**

  After identifying various bottlenecks of the company, the next step is to select proper lean tools to eliminate these bottlenecks. Five lean tools were identified to counter these problems. These tools are 5S,kaizen, poka yoke, quality circle, and kanban. Apart from these, few suggestions for human resources developments were also considered

5.2 8 Types of waste management under Lean Manufacturing:

When there are no physical or chemical changes in the product then it is known as waste in lean manufacturing.

- Transportation - creating an outlet so the product flows automatically from one place to another without any time waste.
- Inventory – Raw materials and finished goods can be stocked according to requirement but work - in – progress should be seen and the work must continue.
- Motion – People's movement for searching tool, moving materials, bending, climbing is considered as waste in lean manufacturing.
- Waiting – Men waiting for material or material waiting for men [WIP] or machine waiting for material [shortage of material] should be avoided as it will affect the production.
- Over production – Producing more than the customer's requirement will result in wastage that includes internal and external customers. cycle time will not be balanced in line.
- Over processing – Sometimes over processing in a manufacturing industry will causes wastage for instance multiple counting, redundant documentation, multiple inspection led to extra cost on the product which is waste.
- Defects – Product produced with defect will lead to waste and rework takes time and effort.
- Unused potentials: The employee may be skilled one. But the current job does not require his skill and he is not using the skills that he possesses then that will result no maximum utilization of the resources.
- Lack of encouragement for the employees to use their skills and there is no motivation to work.
- These are the 8 types of manufacturing waste that we see in lean manufacturing.

5.3 WASTE MANAGEMENT METHODS IN TEXTILE INDUSTRY

Textile recycling is beneficial for environmental and economic conditions, reducing demand for textile chemicals, requirement of landfill space is reduced, consumption of less energy and reducing of water wastage.

- **Textiles with technical applications:**

  In past, textiles were first manufactured and then tested for their appropriateness for an end use; if superior, they were converted into the required product for a purpose. In contrast, the fiber selection, yarn qualities, and functional finishing are selected and implemented depending on the properties necessary in the ultimate product. Nowadays recycled fabrics are used for filtering purpose. Recycled fibers are also been used in automotive interiors, agro textiles, geotextile reinforcement, acoustics, building construction textiles, upholstery, package textiles, and food packing materials.

- **Composting:**

  From last few years, because of increased awareness of the negative impacts of non-biodegradable synthetics has accelerated enormous opportunity for manufacturers to consider degradable/compostable textiles. Nappy pads, wipes, agro-textile mulching sheets, and car interiors are now designed in such a way that, it has to be returned to nature at the end of their life cycle. Nonwovens and disposals are the order of the day. This method can be used to process both natural and regenerated fibers. When discarded in a landfill, this kind fabric is compostable/degradable. Various studies are being conducted to convert chemical-free post-industrial waste into composts and apply it to plants as bio-manure. Effective microorganisms can be used to fortify and enrich the medium, making it more nourishing to the soil, plants, and water bodies.

- **Source Reduction:**

  To reduce the waste generation, the first stage in an integrated waste management system should be source reduction. For example: one should try fir avoiding waste formation, internal waste reuse, reuse in other products, and so on. One can follow incineration, a method of recovering thermal energy by burning solid waste.

  For example, PP has the same heat value as gasoline. Textile waste, such as short, shredded, or loose fibers, can also be recycled into palatable fuel.

- **Regeneration:**

  One can use recycled fibres, for cleansing cloth, yarns untwisted and re-spun into new yarn varieties, mattresses, and wadding. Another process is regeneration, where the fibre is regenerated from a natural source using heat and chemicals.

Tencel, Lyocell, and Seacell are a few prominent brands that produce textile fibers from wood.

The trees are felled, and the wood is chopped into minute particles that, after being treated with chemicals and subjected to high temperatures and pressure, are spun into a textile thread.

These are used to create fabrics with long-lasting qualities.

- **Sale of manufacturing waste:**

  FabScrap is a company which gather all the fabric waste from manufacturers and sell it to designers and quilters, are enhancing the systems of fabric shopping.

  This helps small designers to experiment with less fabric quantities and in return the bigger textile manufacturers are able to get rid of their excess fabrics. So excess fabric and manufacturing waste can we sold to this type of companies through which waste will be converted into money and the thus reduces the cost of production and increases profit.

6. RESULT

The study found that there is a moderate level of awareness of cost reduction and waste elimination practices among manufacturing industries in India. However, there is also a significant gap between awareness and adoption. The study also identified a number of barriers to adoption, including lack of knowledge, lack of resources, and lack of management commitment.

7. KEY FINDINGS

Cost reduction and waste elimination practices: There are a variety of cost reduction and waste elimination practices that are being used by manufacturing industries in India. These practices include lean manufacturing, energy efficiency measures, and waste recycling. Awareness levels: There is a moderate level of awareness of cost reduction and waste elimination practices among manufacturing industries in India. However, there is a significant gap between awareness and adoption. Barriers to adoption: There are a number of barriers to the adoption of cost reduction and waste elimination practices by manufacturing industries in India. These barriers include lack of knowledge, lack of resources, and lack of management commitment.

8. CONCLUSION

The study aims to shed light on the awareness and adoption of cost reduction and waste elimination practices in manufacturing industries in India. The findings will provide valuable insights into the current state of affairs, identify areas for improvement, and inform the development of effective strategies to enhance sustainability and resource efficiency in the manufacturing sector. By promoting cost reduction and waste elimination, we can foster a more environmentally conscious and economically sustainable manufacturing industry, ensuring a brighter future for both industry and society.

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