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Commerce of Waste Elimination: A Buffer for Indian Sme'S

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Abstract
Waste elimination has benefited many industries in realising wealth creation by plugging undesired costs in operation and manufacturing excellence. Under the scenario of global competitiveness and dictative customer centric markets Indian SME's which are backbone to Indian GDP, especially, automobile industries are striving hard for survival. These industries are slow in adopting and practising performance and efficiency based derives. In this context, waste elimination derives related to man, material, machine and method have been studied for providing a competitive advantage and adding fuel in enriching the bottomline of Indian SME's.Fifty companies were surveyed by questionnaire and personal contact. Main findings of this article comprises of highlighting the present status of understanding the essence of subject matter, assessing the inadequacy of initiative taken by various companies and evaluating the hurdles in implementing waste management.Furthermore, findings lead to conclusion that imbueding the culture of waste elimination as a building block, organisations not only create revenue but also create value for the customers and end-users. It has been suggested that involvement of top management to push waste elimination derives at multi-levels in organisation will act as a catalyst in recuperating competitiveness and pulling off substantial wealth creation. Use of Information technology will excel the speed of such derives.
Keywords : Waste Elimination; SME's; Bottom-line; Operations; competitiveness

I. POINT OF DEPARTURE

SME in Indian automotive industry have been playing a pivotal role in generating employment and contributes significantly to national growth. World War II, ended up with an acute shortage of resources linked to raw material, finance and human in Japan. This gave a birth to an alternative remedy popularized as Lean manufacturing. Any type of unwanted wastage was considered as a loss of currency and assigned to the lacunae of any manufacturing process. Over a passage of time, an evolutionary process lean production was adapted for exploration and exploitation of opportunities as the most relevant manufacturing practice re-conceptualizing the value created to the customer by eliminating undesired resources. The key idea is to increase value to customers while reducing the number of resources consumed and cycle times by applying waste elimination techniques. Seven types of wastes have been predominantly recognized in any type of manufacturing industry. The acronym TIMWOOD standing for the types of wastages like Transportation, Movement, Waiting Time, Over-Production, Over-processing and Defects is popularly recognized in industry. Toyota Production System opined wastes as 3M's: Muri (Unreasonable Work), Mura (variation and inconsistency) and Muda (activities reducing customer value) which can be taken care by 3R's (Reduce, Recover and Reuse)

Waste elimination and process improvement techniques, not so popularly adopted by Indian SME's,especially Auto Component Industry, are important parameters of a lean manufacturing process in pursuit of perfection. In this context, Spector R. (2006) highlighted that the Lean Six Sigma is the most effective in process improvement, is widely implemented in the top performing organizations. Waste elimination which is an implicit function of Lean Manufacturing can be treated as business transformation technique for creating efficiencies. It can double the productivity, half the conversion cost and decrease cycle time multifariously. Waste costs to excessive production resources excessive workforce, excessive wait time, excessive facilities, excessive inventories, undesired transportation, unnecessary capital investment, on confirming production, facility depreciations and overhead cost while effectiveness is the result of the integration of Man, Method, Material, Machine at the worksite.

Though many scholars have explored the possibility of using waste elimination as an evolutionary concept for manufacturing industry yet lot of transferring concepts across discipline are expected to be focus of attention especially in the domain of Indian Auto Component Industry contributing major share in Indian GDP. This research work intends to articulate a specific form of evolutionary approach suitable for Indian SME's especially in the domain of Indian automotive industry.

II. REVIEW OF LITURATURE

Over last two decades, Indian manufacturers are facing the challenges of the most economic manufacturing. Waste elimination is a major component of lean manufacturing which is a symbol of improved efficiency and optimal performance mainly due to its association with the automotive industry and Toyota. To achieve these,

the lean production philosophy uses several concepts such as one-piece flow, kaizen, JIT, cellular manufacturing, synchronous manufacturing, inventory management, pokayoke, standardized work, work place organization, and scrap reduction to reduce manufacturing waste.

McDuffie (1995) analyzed that the operational changes alone do not yield expected benefits without a "bundle" which includes structural, managerial and cultural changes. Structural changes have further supported by Lim and Hoffmann (1997) highlighted the essence of improved layout of the workplace/shop floor contributes for increasing productivity of the workers, through more economical use of hand movements by conducting an experiment on hacksaws assembly. It has been shown to outperform the traditional production model of large batches on several occasions (Boyer et al. 1997; Nakamura et al. 1998) and just in time (JIT) supply has is being practiced in manufacturing industries. While being studying various derives at Toyota, Krafcik, (1998) describes the Japanese-style manufacturing process pioneered by Toyota, which uses a wide range of methodologies including just-in-time inventory systems, continuous improvement, and quality circles. Czarnecki and Loyd (1998) recognized waste as non value added activities which can be eliminated through continuous improvement by at the pull making the customer in pursuit of perfection. Garnett et al. (1998) suggested that lean is not simply a method that can be applied in any industry and bring the benefits at par with Toyota. The common mistake made by organizations is focusing wholly on their operations while being unable to have a wider perspective and capability to position them in the whole value chain. Furthermore, the study of Russell and Taylor (1999) exhibits that the major purposes of using lean production is to increase productivity, improve product quality and manufacturing cycle time, reduce inventory, reduce lead time and eliminate manufacturing waste. A study of employee's reaction to change into self-managed work teams showed employees' expectations were critical for their satisfaction and commitment, Shapiro & Kirkman (1999). Commenting on lean manufacturing, Yeung and Chan (1999) suggested that the manufacturers are becoming increasingly aware of the importance of modern management philosophy in providing them with a competitive advantage in a free market system.

Green (2000) highlighted about the combined effect of waste elimination, SCM and continuous improvement can bounce back the positive changes in the bottom-line of an organization.(Meyers and Stewart, 2002) arrived at a conclusion that leans manufacturing is a concept whereby all production employees' work together to eliminate waste. While (Poppendieck, 2002) stressed upon seven wastes: overproduction, waiting, transportation, processing, inventory, movement, making defective products. Shah and Ward (2003) empirically validated four "bundles" of inter-related and internally consistent practices; these are just-in-time (JIT), total quality management (TQM), total preventive maintenance (TPM), and human resource management and investigated their effects on operational performance. During twenty-first century, expectation of end user moved towards higher quality at lower prices as a requisite for purchase. Some manufacturers got eliminated while others began to look diligently for better ways to compete (Hobbs, 2004).

Ya-Mashita (2004) concluded that the superior quality products with less resources and capital are achieved by implementing lean manufacturing which in turn helps eliminating unwanted scrap, rework, customer returns and saves unproductive resources. Browning and Heath (2009) suggested a framework that re-conceptualizes the effect of lean on production costs and used it to develop eleven propositions to direct further research and illuminated how operations managers might control key variables to draw greater benefits from implementation of waste elimination through lean manufacturing. (Minggu, 2009) described lean management is about operating the most productive, efficient and effective organization possible, with zero base cost and feathered away waste.

Thus, Lean manufacturing has been the buzzword in the area of manufacturing for past few years especially in Japan followed by many countries across this world. The word production technology has been replaced by manufacturing technology. Today's customers are asking products on percent value of raw material used. High quality, low prices and timeless deliveries are best selling product features. Thus, each element of waste elimination needs to be uniquely adapted for its role in the exploration and exploitation of opportunities, and for the industry in which it operates.

III. NEED OF THE RESEARCH

Organization health is a barometer for measuring efficiency and economic prosperity of any business entity. There is lack of consensus among evolutionary scholars regarding the roadmap of lean-manufacturing and waste elimination while using the various approaches to for implementing it in small and medium businesses under Indian condition. Profit maximization is not clearly understood by Indian companies as the process of identifying the most efficient manner of obtaining the highest rate of return from its production model. SME's which are focusing more on value additive activities and showing the neglect to non-value addition activities like waste-elimination are failing miserably on this front, has boosted my moral towards finding a real solution.

IV. OBJECTIVES OF RESEARCH

Progressive bottomline strengthens and broadens the capital and assets base of business and ensure its future growth, and for enhancing its ability to absorb shocks and set-backs common in business.The purpose of this

paper is to provide new insights to the Indian SME's (especially for the companies in automobile industry) in the domain of creation and sustaining profits by redefining operation-technology under the umbrella of lean manufacturing and waste elimination suitably workable under the Indian conditions.

V. RESEARCH DESIGN

This study is based on surveying fifty engineering industries mostly in the area of auto component manufacturers. The geographical domain comprised of the companies lying within the periphery of NCR-Delhi. Five companies was large scale industry and forty five companies belong to Small and Medium Industry sector. Two questionnaires were developed, first questionnaire was asked to be filled by respondent organization as well data were collected through correspondence, the personal contact with employees at managerial level. However second questionnaire was based purely on interviewing the senior workers/operators for cross-verification of concept of waste elimination. The design of questionnaires focused the understanding waste-elimination from different viewpoints- lean practitioner, lean under the implementation stage and no lean implementer. Out of fifty companies, four companies denied responding and five companies did not respond at all. The data collected were segregated and put in tabular form for its analysis.Table-1 put emphasis on the sample size of this present study.

TABLE-1: SAMPLE SIZE OF COMPANIES

S.No	Type of Company	Large scale	Medium Scale	Small Scale
1	Auto Component Forging Unit	2	4	4
2	Auto Component Casting Unit	3	8	6
3	Auto Component Machining	0	3	4
4	General Engineering	0	4	3
5	Rubber Component Unit	0	2	1
6	Sheet Metal Unit	2	2	2
	TOTAL (50)	7	23	20

VI. ANALYSIS AND INTERPRETATION

Status of discerning waste elimination by Indian SME's

SME's in this study are mostly automotive component manufacturing companies and all the companies are accredited to ISO certification. Responses from the front management team who are managers and shift in charges were taken on various relevant parameters.Table-2 exhibits that the process owners/shift in charge strongly dis-agrees that customers pay the cost of rejections/wastes and lean manufacturing is the popular practice while producing customers' goods. They confirm that mostly management provide all necessary inputs in time yet production is not overwritten by productivity and inventory holding stores are yet a part of organizational layout. Forty four percent Indian manufacturing units do not have process based layouts. It was revealed that only nineteen percent Indian companies has its supply and quality rating exceeding ninety percent. Sixty three percent respondents strongly agree that manufacturing companies have rejection areas on shop floor and there is a culture of not producing as per customer schedule. Twelve percent respondents spoke affirmative about automated processes.

Table-2 RESPONSE OF MANAGERS/SHIFT INCHARGE ON WASTE ELIMINATION

S No	Description of Parameter	SA	A	N	DA	SDA
1	Your customer consider rejection cost	2(5)	5(12)	2(5)	2(5)	30(73)
2	Do you target rejection as(%) or ppm	21(51)	9(22)	0(0)	1(2)	10(24)
3	Do you have regular kaizen activity	11(3)	8(19)	3(7)	9(22)	10(24)
4	Company have training programs	22(53)	9(22)	1(2)	4(10)	5(12)
5	Process automated for movements	12(3)	6(14)	3(7)	5(12)	15(36)
6	Production is popular than productivity	24(58)	6(14)	0(0)	6(14)	5(12)
7	Company has inventory store	24(58)	6(14)	0(0)	6(14)	5(12)
8	Do you have a rejection/rework area	26(63)	**7(17)**	**0(0)**	2(5)	6(14)
9	Do you use information technology aids	6(14)	2(5)	0(0)	6(14)	27(66)
10	You carry out lean practices	6(14)	2(5)	0(0)	6(14)	27(66)
11	Do you keep buffer stocks	26(63)	7(17)	0(0)	4(10)	3(7)
12	Company has a process based layout	8(19)	5(12)	1(2)	8(19)	18(44)
13	Company layout is as per process	19(46)	10(24)	0(0)	4(10)	8(19)
14	Performance prizes are regular feature	11(28)	4(10)	2(5)	12(29)	11(26)
15	You have customer appreciations	14(34)	8(19)	0(0)	12(29)	9(22)
16	You produce as per Customer schedules	3(7)	5(12)	0(0)	14(34)	19(46)
17	Company has Supplier Rating is > 90 %	8(19)	4(10)	9(22)	12(29)	8(19)
18	Quality Rating is always>96%	8(19)	4(10)	9(22)	12(29)	8(19)
19	Management provide you resources	21(51)	5(12)	0(0)	7(17)	8(19)
	SD	8.15	2.25	2.8	3.9	8.2
	MEAN	14.4	6	1.7	6.7	12.2

(SA-Strongly Agree, A-Agree-Neutral, A-Disagree, SDA- Strongly Disagree. Bracket figures are percentages)

Table-3, highlights that sixty six percent operators strongly feel that frequent moments during work make them tired as well process rejection increase the production targets. Majority of operators have shown dis-satisfaction on internal as well as external training for skill enhancement. Most of workers believe that improvements are often not celebrated. More than sixty percent operators confirmed that companies' layout and reward system is not supportive. Fifty three percent admits that company has cost reduction programs but suggestion scheme has low impact due to internal constraints of its implementation. Presence of inventory store in companies is a symbol of not following lean manufacturing practices. Cost of wastages are well understood by seventy eight percent population and eighty five percent believes that downtime effect the productivity. Fifty eight percent of respondent have confirmed a periodical auditing system in place in the company. Frontline production team including operators, skilled workers and helpers agree to the fact that they do work on rework of products produced by faulty processes, material baskets are occupied is evidence of high inventory levels, down-times affects production targets and such wastages are always a part of production system. There exists a big gap in implementing lean manufacturing rather than manufacturing.

Status of initiatives in use for execution of waste elimination by Indian SME's

SME's in Indian Automotive Industry has taken several measures on waste elimination.Table-4 enumerates the status of such derives based on relevant parameters.

TABLE-4 INITIATIVES TAKEN BY COMPANIES FOR WASTE ELIMINATION

S.No	PARAMETERS FOR WASTE ELIMINATION	YES	NO
1	Adoption of Kaizen	26	15
2	Imparting Effective Implant Training	18	23
3	Efforts for implementing TPM	4	37
4	Presence of un-necessary movements	11	30
5	Adequacy of defining KRA and KPI	9	32
6	Premium freight is being duly analyzed	11	30
7	Adopting Cluster Programs	6	35
8	QA is preferred over QC	25	16
9	Low cost Automation	31	10
10	360*Performance appraisal	8	33
11	Adherence to 5-S	24	17
12	Implementation of JIT(Just-in-Time)	8	33
13	Understanding of TQM and TPM	21	20
14	Training and audits by customers	28	13
15	Cross verification of incoming material	23	18
16	Presence of Quality Gate	24	17
17	Production, processing and test manuals	21	20
18	Up gradation of technology	14	27
19	Zero base budgeting	8	33
20	Preventive and Predictive maintenance	16	25
21	Budgeting, ERP's and usage of IT	18	23
22	Maintenance of COPQ Records	24	17
23	Possession of Criteria for supplier	23	18
24	Usages of SQC	18	23
	Arithmetic Mean	17	24
	σd=[Square Root{(σ1)2/n1+(σ2)2/n2}]	2.4	2.9
	Percent (Average), Table value of one way "t" at □=0.05	42	58
	VALUE OF T-TEST, t-test value=Mean(Yes)+Mean(No)/σd	2.7 (SIGNIFICANT)	

Investigation was made further to understand the various methods and strategies adopted by the companies for curtailing cost and waste elimination.Table-4 exhibits that forty two percent responses are in favorable towards implementation of waste elimination parameters while fifty eight percent of medium and small scale companies do not exercise it to a desired extent. The data was tested for t-test and the calculated value was found more than the table value, and difference is significant.

Furthermore, investigations were made for preferences in assigning value to various factors related to waste elimination by hierarchy in organization. Data has been summarized in Table-6.Views of all hierarchy of employees were taken for the various factors related to man, material, machine and method to assess the overall scenario of waste elimination being perceived at different levels in the organization. The data collected were tested for ANNOVA

TABLE-6: SEQUENCE OF PREFERENCES ASSIGNED BY ORGANISATIONAL HIERACHY

S. No	ORDER OF HIERARCHY	PREFERRENCES ASSIGNED TO FACTORS RELATED TO			
		MAN	MATERIAL	MACHINE	METHOD
1	Senior Management	1 (40)	4(10)	3(20)	2(30)
2	Managers	1 (40)	3(20)	4(10)	2(30)
3	Shift In Charge	1 (40)	4(10)	3(20)	2(30)
4	Operators	4 (10)	3(20)	1(40)	2(30)
5	Inspectors	3 (20)	1(40)	4(10)	2(30)
6	Skilled Workers	4 (10)	3(20)	1(40)	2(30)
7	Un-skilled Worker	4 (10)	3(20)	1(40)	2(30)
8	Helpers	4 (10)	3(20)	1(40)	2(30)
	Mean	22.5	20	27.5	30
	TOTAL POINTS	180	160	220	240
	Percentage(within group)	56	50	68	75
	STANDARD DEVIATION	14.88	9.23	13.88	0
	ANNOVA TEST VALUE	F=1,P=0.413,df=3			

(Rank "1" 40 scores; Rank "2" 30 scores; Rank "3" 20 scores and rank "4"means 10 scores)

Views of team members below hierarchy was taken on assigning the priorities of various wastages and arranged in Table-5.It has been interesting to note that all members of organization team strongly feel that wastages linked to the Method or process comes at first sequence followed by Machine or implant-technology, Man at third place and material at the end. The wastages linked to Man have been assigned as top priority by Senior and middle management while workmen have given top rank to the wastages linked to machine. Inspectors who are mostly auditors have ranked wastages linked to material at number one. Data were tested for ANOVA and there is significant difference in assigning weightage to the factors related to Man, Material and Machine but all resemble in case of factors related to method.

Furthermore, management understand that wastage linked man-factor affects the performance most while workmen assign parameters linked to inefficient Machine brings about the impact of waste at the maximum. Material related wastages mostly fall in category three. Material factor has been considered on top by quality assurance staff. There is difference of opinion in assigning priority value by management and workers to various factors affecting wastages.

Types of hurdles in implementing waste elimination derive

Companies were tested against twelve main factors responsible for creating hurdles in implementing waste elimination which has been summarized in Table-5.Simple arithmetic mean was used to assess the various hurdles in implementing waste elimination.

Table- 5 ASSESSSMENT OF BARRIERS IN IMPLEMENTING WASTE ELIMINATION

S. No.	TYPE OF BARRIER	VIEWS OF FRONTLINE EMPLOYEES ON WASTE ELIMINATION		
		MANAGERS	SUPERVISORS	INSPECTORS
1	Top Management-Not steadfast	33	28	32
2	Poor Leadership at top	26	28	32
3	Insufficient Training	32	28	28
4	Lack of Awareness	22	22	24
5	Lack of Resources	28	31	36
6	Inadequacy in Team Building	26	22	24
7	Inadequate process control	22	24	21
8	Resistance to change management	28	31	21
9	Layout Hurdles	26	22	24
10	Presence of Internal resistance	32	28	26
11	Cultural Barriers in Organization	32	28	26
12	Absence of technological up gradation	22	24	21
	ARITHMATIC MEAN	27	26	26
	PERCENTAGE	66	63	63

Table-5 reveals that majority of managers; supervisors and inspectors do feel that SME's management is not steadfast in implementing waste elimination programs. Training, awareness and lack of resources are coming in the way. Presence of inadequate Process control, layout, internal resistance and cultural barriers are big

inhibitors to it.Entrepeneures are not spending much on technological up gradations. Thus, there is a great miss at preparatory ground for implementing waste management.

VII. CONCLUSION

The originality of the paper lies in conducting an implicit study on the waste management practices in manufacturing SMEs in India for enriching the commerce of business. This was among very few studies that compared the various factors playing crucial role in elimination of waste related to man, material, method and machine. The study draws valuable attention for the academics, consultants, researchers and industry of challenges of implementing various initiatives in the area of waste management in Indian SME's.

This exploratory research had made some significant contributions to the theory and practice in drawing attention of Indian SME's towards the assessment, understanding and implementing waste elimination as far as Indian Automotive Components manufacturers are concerned. Though SME's are aware of the significance of waste elimination yet there is a miss in implementing the requisite derives right from top management till the operators who are really a process owner. Indian SME's need to put exhaustive efforts for synchronizing the essence of implementing waste management at all level of organization, including security personnel at factory premises so as to improve the commerce of waste elimination. Specialized expert and consultants' aid will add fuel to this derives of becoming competitive industry at par with global excellence. Practising waste elimination by SME's as a multi-level struggle in organization for generating wealth can provide companies with a set of evolutionary heuristics of waste elimination under lean manufacturing. Usage of various apps of Information Technology will facilitate the implementation process.

This was purely unaided study and keeping author's financial aspects, the study was limited to NCR-Delhi and auto component manufacturing units. A nationwide sample size covering all types of SME's will definitely impact the organization wealth of Indian SMEs.

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