Review of MIWA Auto Component Cluster for Benchmarking and Modelling the AHP Problem

Anoop Pandey
Research Scholar
Department of Mechanical Engineering
Rajsthan Technical University Kota
Rajasthan, India
anooppandeyeck@gmail.com

Dr. Rohitashwa Shringi
Professor in Mechanical Engineering
Rajsthan Technical University Kota
Rajasthan, India
rshringi@rtu.ac.in

Anoop Pandey is a PhD research scholar at Rajasthan Technical University, Rajasthan, India. He is currently working on studying an auto component cluster located in Manesar, Haryana, India for its performance improvement with the help of benchmarking. He has an overall experience of sixteen years out of which he has dedicated four years working with different industry sectors of steel, HVAC and fashion, He has dedicated his last twelve years to academic wherein he has substantially worked in research direction related metal cutting, welding and industrial engineering. He has also mentored a study on benchmarking of premier educational institute located in Ghaziabad, India.

Dr. Rohitashwa Shrigi, is a Professor in the Department of Mechanical Engineering of Rajasthan Technical University, Rajasthan, India. During his vast experience spanning across four decades, he has worked in vital capacities of Director – University, HoD – ME Dept, Dear Research, Dean Student Welfare and Head – Research Committee. He has guided numerous Under and Post Graduate students in the filed of Manufacturing and Industrial Engineering along with PhD scholars. Being an editorial board member of prestigious journals, His area of interest lies in the field of CNC/CAM, Optimization, Operation Management and Production Engineering,

Abstract

Enhancing the profit of an organization is the ultimate objective for which its entire ecosystem collectively works. The profit can definitely be increased by increased revenue and sales, also it can be improved by bringing down the wastes. Reducing wastes becomes an even bigger responsibility of an organization if it is part of a privileged industrial cluster having subsidized facilities from the Government. Thus the clusters should continuously thrive for improving their performance through Lean Performance Management (LPM). Benchmarking the cluster organizations for LPM can help the continuous improvement voyage of the cluster. In this work, an introduction to this avenue by describing benchmarking, clusters, the LPM, and an auto component cluster has been provided. In the later part of the paper, a methodology has been suggested. A brief survey of the cluster and the problem areas of the cluster organizations were identified through interactions that have been presented here. The quantitative indices that are affected by the identified problem areas have also been defined and at the end, Analytical Hierarchy Problem (AHP) modeling of the problem has been developed.

Keywords

Auto Component Cluster, Lean Performance Management, Benchmarking, Analytical Hierarchy Process, Continuous Improvement

Introduction

Benchmarking is the procedure of connecting one's own link with its higher class globally to identify and acquire from finest exercise. It is one of the several methods of Total Quality Management that relates with copying the legacy and lessons of best in class. It is one of the method that helps in assessment of quality of a company's programs, policies, strategies, products, etc. and their evaluation with typical dimensions, or alike dimensions of its peers. Benchmarking is also documented as most extensively accepted business improvement tool and organizational improvement (Adebanjo, Abbas and Mann, 2011).

As defined by United Nations Industrial Development Organization –UNIDO, a cluster is a sectoral and geographical focus of interconnected companies, specialized suppliers, service providers, firms in related industries and associated in a particular field and associated institutions in specific fields that compete and compare, like Small and Medium Enterprises (SMEs) in particular, facing common opportunities and threats. A cluster contains an arrangement of linked industries and other units important for competition. It can also be referred as geographical correlation of companies. Thus clusters are also defined as groups of similar and related firms in a defined geographical area thaat share common markets, technologies, worker skill needs, and which are often linked by buyer-seller relationship. It can be a group that has been deliberately developed by the Government to harness the wealth and potential of a geographical area or it may have been evolved pertaining to natural business and socio economic needs. Such clusters play vital role in the development of any economy. A cluster approach can be represented conceptually with the help of the figure 1. While Ministry of Micro Small & Medium Enterprises – MSME, GoI, defines a cluster as a group of enterprises located within an identifiable and as far as practicable, contiguous area and producing same/similar products/services. It is observed that MSME promotes formation of a cluster broadly on the basis of supply chain and UNIDO advocates its formation moreover similar to Special Economic Zone – SEZ.

As per the Cluster Observatory – Compendium of cluster resources for undertaking cluster initiative, a non – Government, not – for – profit registered trust formed on the suggestion of Ministry of Small Scale Industries (SSI), GoI, and Fourth All India Census of MSME, an industrial cluster should have at least 100 enterprises or a minimum turnover of Rs. 100 million or 10 Crores (Ministry of Micro Small and Medium Enterprises GoI, 2015).

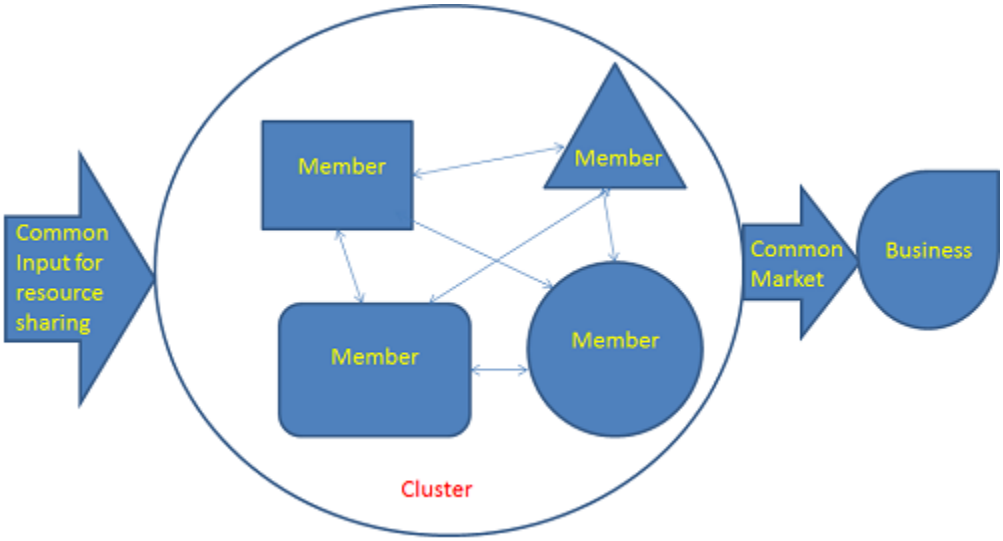

Figure 1. Conceptual Representation of Cluster Approach

Lean Performance Management

Lean Performance is referred to the working culture of an organization with minimum defects. An organization can pave its way to success if methods that can assist them in reducing the waste and enhancing the value are deployed in their organizations. Lean Cultural Clusters emerging on the basis of operations and change for improvement have been identified in a study performed with purpose to increase the understanding (Dorval and Jobin, 2019).

Implementation of the Lean Practices has proved to be worthy and sustainable in Aiema Technology Center – Lean Manufacturing Cluster (Bhaskaran, 2016). The manufacturing practices have been proven to be vital in the development and growth of Chennai Automotive Cluster (Bhaskaran, 2012). These literatures have already established 'Lean' as a potent toll for improving the performance of a cluster. The other criteria for benchmarking clusters can be target markets, research & innovation activities, collaboration models, important stakeholders (Karlson et al., 2013), cluster age, number of enterprises in a cluster, number of implemented projects (Plawgo, 2014), Quantitative, Technology, Procurement, Production and Market Interrelationship (Bhaskaran, 2016). Performance indicators like productivity, percent revenue, human resource, knowledge resources & financial resources, and Process indicators like competitive situation, development & dissemination of knowledge, collective learning and international contacts (T Andersen, Bjerre and Hansson, 2006) are also used for cluster benchmarking.

The Manesar Industrial Welfare Association Cluster – MIWA Cluster, Gurgaon, NCR

In the Industrial Model Township located in Manesar of Gurgaon District, India most of the industries are associated with three major OEM groups - Maruti, Honda & Hero. These industries are tier 1, tier 2 & tier 3 suppliers in categories of Small, Medium and Micro Enterprises. These industries are regularly facing issues related to high inventories, high internal and external rejections, poor & inconsistent operational performance like low labor and capital productivity, poor 5S in plant and layout. Moreover awareness of such practices is very low in these industries. Development Commissioner Ministry of Micro, Small & Medium Enterprises –DC (MSME) coming under the prerogative of MSME, GoI, recognized - MIWA cluster (DCMSME -GoI, 2015) and assigned it to Quality Council of India for conducting awareness programme, and targeted these SMEs for process improvement. http://www.dcmsme.gov.in/schemes/Delhi-NCR-Status_of_Clusters.pdf

Out of the 25 different clusters identified by DC (MSME) in Norther Capital Region, India there are 11 clusters related to Automobile. The MIWA cluster has 9 auto-component industries in it. Table 1 show the turnover and product type of these companies. The revenue data is collected form https://www.zoominfo.com/.

Table 1. Industries in MIWA

S. No	Name of the Industry	Product Type	Revenue (Rs.)
1.	Climax Overseas Pvt. Ltd.	Rubber Products	36 Crores
2.	Hilux Auto Electric Pvt. Ltd.	Automotive Lighting	29 Crores
3.	AVM Engineering Pvt. Ltd.	Steel CNC Turned Components	
4.	Harinder Industries Pvt. Ltd.	Switches, Wire Harness & Cables, Lamps, Fuse Box, etc.	29 Crores
5.	Ishman Auto Electric Pvt. Ltd.	Wire Harness	Data Not Available
6.	AV Engineering	CNC Machined Turned Components, Jigs and Fixtures, etc.	Data Not Available
7.	Gallops Engineering Pvt. Ltd.	Bike Gears, Four Wheeler Gears	Data Not Available
8.	Auto Engineering	Jigs, Fixtures, Cutting tools, Gauges, Forgings dies, etc.	Data Not Available
9.	SBS International Pvt. Ltd.	LED Light Frames and Die Castings	29 Crores

It is evident that these units are located in the close vicinity of Manesar Industrial Area 4000 acres (16.2 km). In the year 2010, the automotive Industry collectively had a turnover of Rs 3,10,000 Crore (Chauhan, 2011). As seen from the table 1, the MIWA auto cluster had a turnover (Revenue) of more than Rs. 120 Crores, thus satisfies the definition of an industrial cluster suggested by MSME, GoI.

Need of Benchmarking of a Cluster

The Industrial Clusters have a direct impact on the economy and development of the nation thus a need to improve their performance has always persisted. Despite the rise of a universal economy, local and statewide economic wits based on industry clustering have taken hold, substantiating the significance of place (cluster) as a prompt for

strengthening economic development and business success. Attempts are being made for analyzing the performances of clusters and benchmarking has been said to be an effective tool for this purpose.
Benchmarking clusters can help with fulfilment of following objectives: (Torsten Andersen, Bjerre and Hansson, 2006)

- Benchmark cluster performance. (External Benchmarking)
- Examine the relationship between cluster performance and cluster-specific framework conditions.
- Identify successful cluster policies and enable systematic peer reviews of cluster specific framework conditions.

Cluster Benchmarking initiatives can help in generating endogenous competitive advantage by improving company's operational efficiency, foster innovation and tacit knowledge diffusion, stimulate new companies creations especially through spin offs and accelerate social capital formation (Pezzi, 2011). The need has been conceptually elaborated diagrammatically in the figure 2.

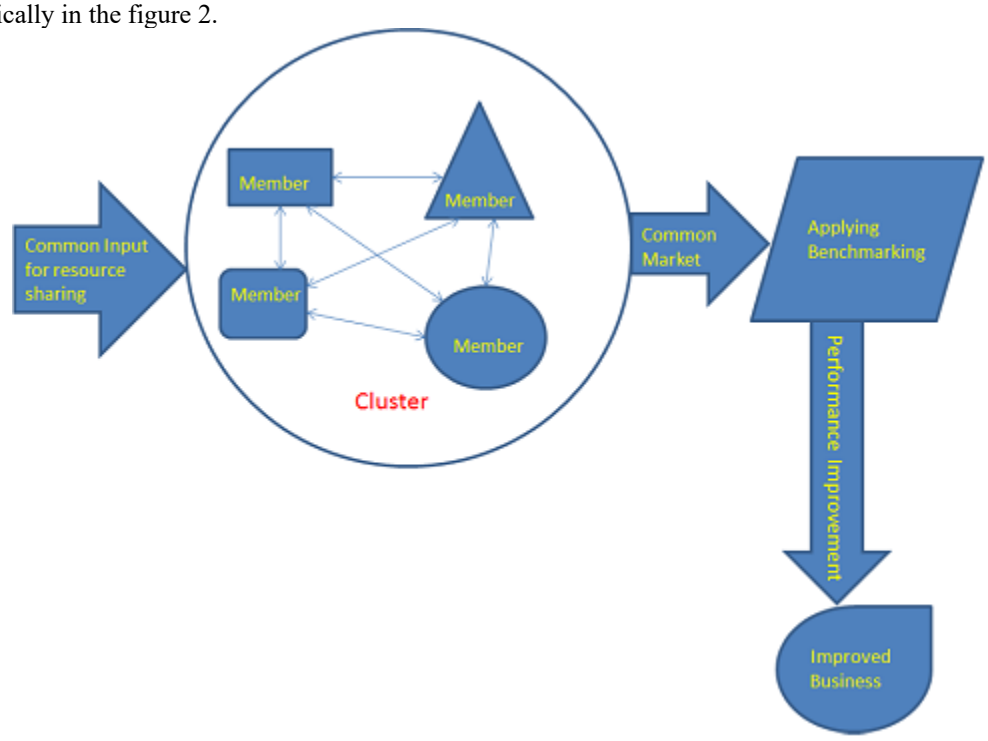

Figure 2: Conceptual Elaboration of Need of Benchmarking a Cluster

Methodology and Roadmap- IC DARE CAV BM

The broad objectives of the piece of work are to be accomplished in 4 phases:

Phase I:

- Identifying the cluster – The MIWA Cluster
- Searching the suitable Criteria for benchmarking the cluster – Lean Performance

Phase II:

- Defining the problem areas – The Lean attributes: Through surveys, interaction and data collection
- Analyzing the problem through the data collected
- Reporting the solutions by suggesting the projects to be undertaken and there indices through Diagnostic Study Report (DSR)
- Engaging to implement the project

Phase III:

To ascertain the effect of engagement, the CAV methodology of data Collection, Analysis and Validation will be followed.

Phase IV:

- Once the results are validated, Benchmarking using AHP/MCDM/MOORA/MAUT will be performed.
- After benchmarking, the Modelling of the parameters through regression analysis of the benchmark will be done.

Comparison Parameters

On holding the interactions with key members of all the nine organizations, pain areas in terms of wastes are observed and recorded as shown in the table 2.

Table 2. Identified Problem Areas in Terms of Wastes

S. No	Name of the Industry	Wastes Observed
1.	Climax Overseas Pvt. Ltd. (COPL)	High Inventory Levels, High rejection Parts Per Million (PPM) & Cost of Poor Quality (COPQ), Over Processing, Excess Transportation
2.	Hilux Auto Electric Pvt. Ltd. (HAEPL)	High Rejection PPM & COPQ, Waiting , Over Production due to high tool change over time
3.	AVM Engineering Pvt. Ltd. (AVMEPL)	High Rejection PPM & COPQ
4.	Harinder Industries Pvt. Ltd. (HIPL)	High Rejection PPM & COPQ
5.	Ishman Auto Electric Pvt. Ltd. (IAEPL)	High Rejection PPM & COPQ
6.	AV Engineering (AVE)	High Inventory Levels, Haphazard Layout
7.	Gallops Engineering Pvt. Ltd. (GEPL)	Haphazard Layout, Over Production
8.	Auto Engineering Pvt. Ltd. (AE)	High Rejection PPM & COPQ
9.	SBS International Pvt. Ltd. (SBSIPL)	High Rejection PPM & COPQ, High Inventory Levels

The summary of the wastes observed in all the nine units of the cluster are generated and recorded in the table 3.

Table 3. Suggested projects for mitigating the observed defects

S. No.	Observed Waste	Frequency	Projects to mitigate the problem
1.	High Inventory	3	Inventory Reduction, Standard Operating Procedure (SOP), Kaizen, Lean Training, Store Management (First in First Out -FIFO) and Visual Stream Mapping
2.	High rejection PPM & COPQ	7	Quality Improvement through reduction in COPQ, 5S, SOP, Kaizen, Lean Training, Inventory Reduction, Store Management (FIFO), Overall Equipment Effectiveness (OEE), Single Minute Exchange of Dies (SMED) and Visual Stream Mapping (VSM)
3.	Over Processing	1	Kaizen and Lean Training
4.	Excess Transportation	1	5S, Kaizen and Lean Training
5.	Waiting	1	Kaizen, Lean Training, Inventory Reduction, Store Management (FIFO) and SMED
6.	Over Production	2	5S, SOP, Kaizen and Lean Training
7.	Haphazard Layout	1	5S, Kaizen, Lean Training and VSM
8.	Excess Movement	2	5S

Quantitative Indices for all the wastes recorded in the table 3 are suggested and they become the comparison parameters for the problem. These indices are recorded in the table 4.

Table 4. The indices affected by the particular waste

S. No.	Observed Waste (Example)	Indices Affected
1.	High Inventory	Capital Productivity (CP), Inventory Turnover Ratio (ITR)
2.	High rejection PPM & COPQ	OEE, COPQ
3.	Over Processing	COPQ, OEE
4.	Excess Transportation	CP, Labor Productivity (LP)
5.	Waiting	LP, OEE
6.	Over Production	ITR, LP
7.	Haphazard Layout	OEE
8.	Excess Movement	OEE

Table 5 shows the description of some such indices.

Table 5. Quantitative Index for Measuring Wastes and their Description

S. No.	Index	Description	Unit
1.	Labor Productivity (LP)	Output (In Rs)/ Labor Cost (In Rs)	Ratio
2.	Capital Productivity (CP)	Output (In Rs)/ Capital Investment in Machines and Technology (In Rs)	Ratio
3.	Quality Performance (COPQ)	% Reduction in Rejection/Re work (COPQ)	PPM
4.	Inventory Turnover Ratio (ITR)	Total Sales Value/Average Inventory	Rupees/Unit Inventory
5.	Number of Kaizen	Kaizen Implemented	Number
6.	HR Development	People Trained	Number of Persons
7.	Throughput Yield	% of Material Used in Finished Goods (Material Weight in Finished Goods/ Total Raw Material)	Percentage
8.	Equipment Availability	% of Machines run for Production/ Total Time Available	Percentage
9.	OEE	Availability*Performance*Quality	Percentage

AHP Modelling

Benchmarking of the nine units coming under the MIWA Auto-Cluster based on Qualitative indices shown in the table 4 can be carried out. These indices can become the criteria in benchmarking problem. AHP model will be used for Benchmarking as shown in the figure 3. Regression analysis of the Benchmark to study and model the effect of the criteria on Lean Performance Management of the cluster will be carried out.

It is assumed that financial parameters like turnover, equity share, profit and loss, etc. responsible for the performance of the cluster are the outcome of the results of implementing the lean practices. Only the nine units which are registered under the MIWA Auto cluster are considered for study

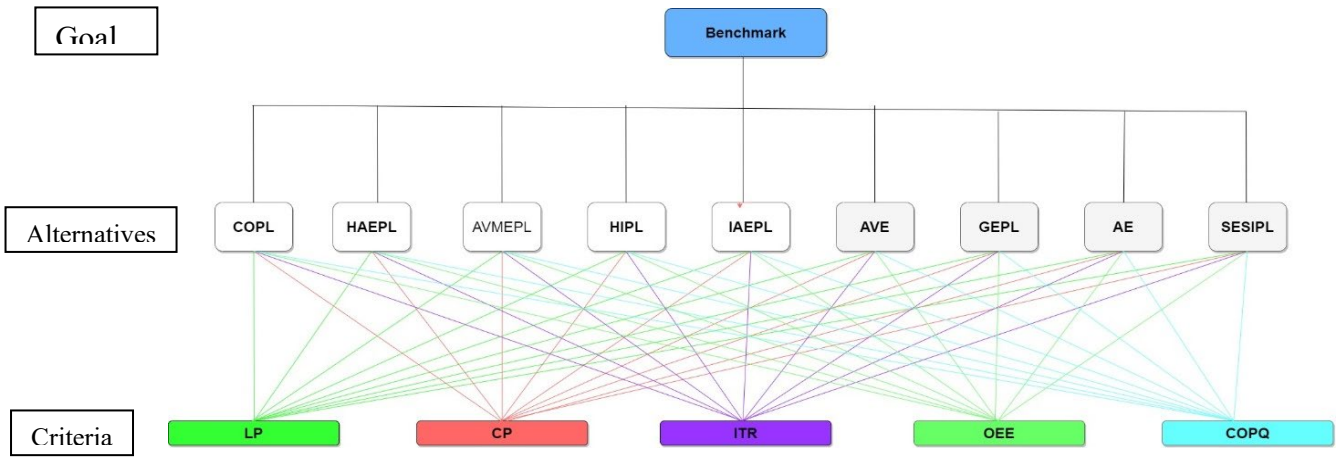

Figure 2. AHP Modelling

Conclusion

Internal benchmarking of a cluster's performance can help a cluster in evolving for the overall business growth. The Lean Performance of a cluster has direct association with its financial performance like turnover, sales equity share, etc. because if the lean performance of an organization improves, the wastages reduce and this brings savings and profit for the organization. Benchmarking is a good tool that can help the organizations of a cluster to compete healthily and improve. Benchmarking of lean performance of such organizations falling in a cluster necessarily helps in reducing the wastage and further provokes the organizations to compete to excel in the chart for individual profit

making objective. The MIWA cluster is a good subject for the study as it meets the criteria of cluster making projects of MSME and UNIDO both and has optimum number of organizations which can be analyzed for establishing benchmarking through AHP.

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