

Review of Research Literature- “Key Elements of Manufacturing Excellence - with Special Focus on Indian Auto Component MSMEs/SMEs”

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Article Info

Volume 82

Page Number: 11043 - 11055

Publication Issue:

January-February 2020

Abstract:

In the last two decades, “Manufacturing Excellence” (ME) has emerged as a concrete platform for Manufacturing Transformation in Indian Automobile Industry. Various models for Business and Manufacturing Excellence have not only been developed but also published by different Authorities, Institutes and Individuals like Malcolm Baldrige National Quality Award, European Foundation for Quality Management Excellence, Deming Prize, Toyota Production Systems, Shigeo Shingo Model for Operational excellence, Tata Business Excellence Model and Modern Approaches to “Manufacturing Excellence” (ME). Every model has captured various business and manufacturing processes and defined the requirement as a standard element. This research work aims to conduct a comparative analysis of Major ME models and identify the commonly addressed major ME elements. In addition to it, it tries to identify the applicable ME elements to Auto Component MSMEs through a survey done with Industry experts.

Large scale companies have adopted suitable ME models by deploying the required resources either as their initiative or as required by their customers. The deployment of ME elements requires the presence of systems, resources, infrastructure, and expertise on the understanding of element requirements and its execution.

This research focuses on mapping the presence of all the key pillars, key elements, and sub-elements of ME in all major ME models under study. In this study, further analysis is done to identify the coverage of all key and sub-element in each model on a priority matrix. The outcome of this study has resulted in identifying 12 elements (out of 14 key and 53 sub-elements), which are addressed as significant in all ME models. Out of these 12 elements, which are the important elements for Indian auto component MSMEs, a survey was conducted with the Industry experts to capture its ranking. Out of this study, it was found that there are seven key processes/elements which contribute majorly in achieving manufacturing excellence in Indian Auto Component MSMEs/SMEs.

Keywords: Manufacturing Excellence, Auto Component, MSME/SME, Continuous Improvement.

Article History

Article Received: 18 May 2019

Revised: 14 July 2019

Accepted: 22 December 2019

Publication: 20 February 2020

I. Introduction

The auto component industry is considered as the backbone of the Auto Industry in India. The Auto component industry in India has grown up to 7% CAGR with turnover of 29,2184 Crores INR (43.5 Bil USD) in 2016-17 and to sustain this growth rat Auto component Industry had to play an important role. The auto componenet Industry contribution to India's GDP was 2.3%. ACMA: The Indian Auto Component Performance Review (2016-17) Media Briefing (31st Aug-2017) [1].

To handle this growth of 7% CAGR, along with increasing customer expectations and globally competitive environment, Industry is looking for the Processes and Platforms for the transformation in Manufacturing Processes through Manufacturing Excellence. Since the last decade, Auto and Auto component Industries are going through a transformation phase, and all this is possibly done by achieving various improvements by practicing ME.

The unfavorable Economic conditions, internationally as well as in Domestic Market, led to an atmosphere of volatility, uncertainty, High Inflation, growing input costs, fluctuating exchange rates & relatively high-interest rates that severely daunted the Automotive Industry Performance in India. In this backdrop, the Auto mobile sector in India witnessed a 2% reduction in total turnover in 2013-14. Harish Lakshman, in the President's Message, gave brief information in ACMA Annual Report (2013-14) [2].

By looking at the market along with the economic situation & overall trend of sluggish/negative growth of the automotive sector, the survival of Auto component SMEs is becoming even more challenging. When the situation outside is not encouraging, then there is no option left for SMEs to increase their focus on internal efficiency improvement, which can be further optimized by reducing cost and becoming more competitive to sustain their profitability and survival. Internal

efficiency improvement can be achieved by deploying strategies like Manufacturing Excellence. This is the primary reason for which in the last decade, the need & focus on ME has increased.

There are many frameworks available for ME; different Industries follow different models/frameworks for their transformations. In India, in the last ten years, the major Auto Industries like Tata Motors has adopted business excellence models as the "Tata Business Excellence Model," which is based on Malcolm Baldrige's Business Excellence model. Other multinational OEMs have adopted their global excellence models.

The Major auto OEM industries have felt the need to involve their suppliers, SMEs in this improvement drive because typically, OEMs are in the assembly process, and all the components are being supplied by SMEs. The OEMs like Maruti Suzuki, Tata Motors, Toyota, Hyundai, and Honda have started their supplier clusters. Through these clusters, the manufacturing excellence concepts, models have been penetrated in SMEs.

Looking at the last ten years' overall performance, it is observed that OEMs (Original Equipment Manufacturers) were able to establish the required organization & infrastructure to implement the ME framework and have started using the same for driving improvements.

Though there are improvements seen in Quality, Delivery , and customer service by OEMs through ME practices, however, the OEMs still could not get a competitive edge in their performance, due to inadequate support from SMES & MSMEs. When we look at MSMEs from OEMs lenses, the general impression is MSMEs have not met the QCD (Quality, Cost, Delivery) expectations. This is interesting to know that the level of implementation and results of ME at MSMEs are not as same as that of OEMs. The OEMs and MSMEs have attempted to implement ME

practices, but the result and effectiveness are not visible and evident yet. Also, there is no evidence for a structured approach to the development of a strategy for ME development and deployment at MSMEs in India. This work aims to conduct a comparative analysis of Major ME models and identify the commonly addressed major ME elements. In addition to it, it tries to identify the applicable ME elements to Auto Component MSMEs through a survey done by Industry experts.

II. REVIEW OF RESEARCH LITERATURE

The systematic literature review was done as shown in flow diagram in Figure-1, and accordingly, the information was processed. In the initial phase of the literature review, the focus was on identifying the challenges faced by SMEs and MSMEs.

Further, the global business and manufacturing excellence models were reviewed, which was fine-tuned by concentrating on SMEs.

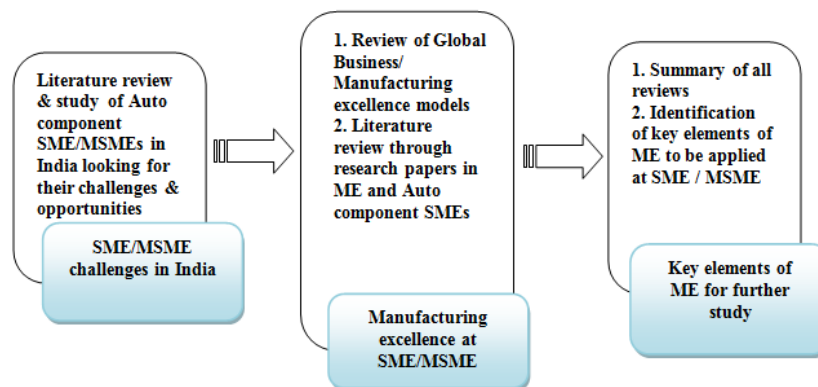


Fig 1: Literature Review process flow

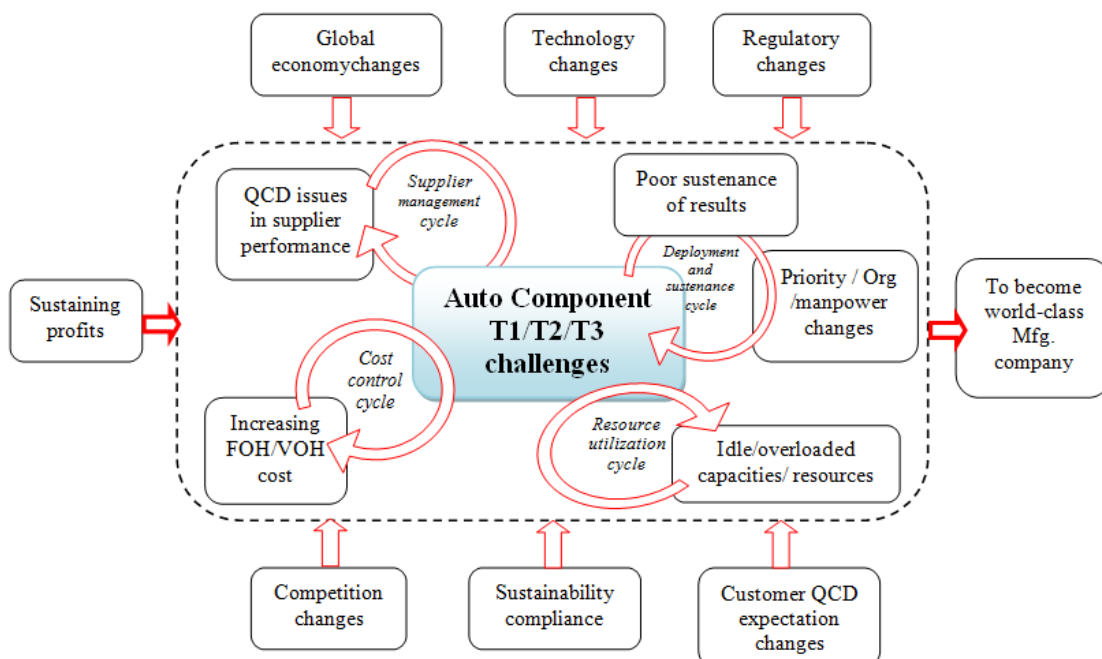


Fig 2: System dynamic model

Identification of key elements and deciding the significance of each element of ME in priority order was the core of the overall literature survey, which was summarized at the end.

II.I. Auto Component Industry, Indian ME/MSME Challenges – Opportunities:

The Indian auto component industry has not only established itself as a robust sector serving the domestic market but also a preferred global supply base.

We are now entering the next phase of development for the industry, where one is witnessing several regulatory initiatives that promote lower levels of vehicular emissions, higher safety standards, and environment protection. Rattan Kapur(2016-17). President's Message. ACMA Annual Report 2016-17 [3].

Along with handling challenges of meeting QCD expectations, the industry is also getting impacted due to strict regulatory controls on emission norms, safety, and sustainability.

While SMEs/ MSMEs business models are getting more and more complex with these external environment challenges, it also brings on table lot of opportunities for new business, exports, and creating best manufacturing set up by complying with these standards. The need for robust manufacturing excellence practices and the adoption of new technology is becoming a must requirement for SME/MSMEs for their survival.

Historically, the auto component industry has always adapted well to the changing environment and customer needs. However, to keep pace with external dynamics, Indian auto component manufacturers will be required to develop capabilities for in-house design, harness frugal engineering, and create product differentiation through Innovation at an even faster pace. Also, the industry will be required to focus on Quality and Innovation more than before to graduate from being a 'build to print' industry to one that is "art to part." It was according to Vinnie Mehta-Director General's (2016-17) Message in ACMA Annual Report 2016-17[4].

In addition to the survey of 50 + Tier 2/Tier 3 Auto component and Auto OEMs companies, my own 17 years of working experience in the Tier 1 Auto Component Industry became useful to understand the expectations of such industries. Through this, the auto component Industry challenges were studied, and efforts were made to map the same as given in the system dynamic model shown in Figure-2.

All the challenges mapped above were being faced by almost all Auto Component SMEs/ MSMEs with varying intensity depending on the nature of their business. To handle these challenges, SMEs / MSMEs were adopting a piece-meal approach sometimes enforced by their customers, or sometimes on their own. However, the sustenance of results was not observed, which in turn created further business challenges for SMEs. Due to these reasons, the need for a robust platform or systems was felt, which would be the base of manufacturing excellence so that SMEs can handle these challenges in a very systematic way.

II.II. Global Business Excellence Models:

A systematic Literature Review Done for following Business / Manufacturing Excellence Models:

1. Malcolm Baldrige National Quality Award Excellence Model (MBEM)
2. European Foundation for Quality Management - Excellence Model (EFQM)
3. Deming Prize
4. Toyota Production System (TPS)
5. Shigeo Shingo
6. Modern Approaches to ME
7. TBEM

These all business/manufacturing excellence models have their framework, which is a combination of Enablers and Results. The deployment guidelines of these models explain the need of key elements including Strategic aspects (Vision, Mission, Leadership Approach),

Operational aspects (Product, Process development, QMS, People Involvement) and Results (Business Results and Operational Results). Baldrige Performance Excellence Program NIST, from the Department of Commerce, United States Presented an Overview and Structure of a set of 9-Criteria for Performance Excellence (Jan 2015)[5]. The Model is based on core values and concepts & integrates two major arms, one focused on leadership and others on results through operations and workforce. Foundation of the overall organizational profile is set according to measurement, analysis, and knowledge management.

One of the well-accepted and deployed frameworks is the European Foundation for Quality Management. They proposed this framework [6] shown in Figure-3 specifically for innovation agencies.

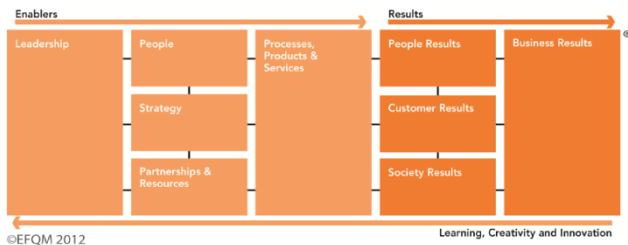


Fig-3: EFQM (2012)-Framework For Innovation Agencies

While the elements of the framework in EFQM are similar to that of MBEM, the emphasis on slitting the enablers and results is more evident in EFQM. In the research paper by Prof. Sandeep G. Kudtarkar, [7] the list of key focus areas by the companies who implemented Total Quality Management (TQM) in their journey of Deming Award is mentioned as below :

1. Customer Focus and Customer Satisfaction.
2. New Product Development (NPD)
3. Strategic Aspects and Policy Management

4. Human Resource – Total Employee Engagement (TEE), Quality Control Circle (QCC)
5. Total Productive Maintenance (TPM)
6. Supply Chain Management (SCM)
7. Process Control

In the Article “Decoding The DNA of The Toyota Production System” by Steven Spear and H Kent Bowen [8], there are four rules as the essence of TPS, listed as below :

1. How People work
2. How People Connect
3. How Production Line is Constructed
4. How to Improve

If the above rules are carefully examined, it reflects the deployment of building improvement focused culture through employee involvement, which is the basis of Manufacturing Excellence.

In the book “Excellence in Manufacturing –New Approaches” by Sabyasachi Chatterjee[9] the approaches to manufacturing leading to excellence are also covering the aspects like Effective Production Management, Factory of the Future –An Overview of Computer Integrated Manufacturing, Digital Engineering, Approaches to Production Planning and Control, Examining Lean Manufacturing Promise, Mass Customisation, E-Supply Chain Management, Six Sigma: Effective Handling of Deep Rooted Quality Problems, TPM concept. We can see that the core manufacturing excellence elements are valid in modern or new approaches, also with the flavors of digitalization and computer integrated systems.

Another globally accepted excellence models are Shigeo Shingo Model for Operational Excellence, developed by Dr. Shingo. It is built on four guiding principles as Cultural Enablers, Continuous Process Improvement, and Enterprise Alignment & Results.[10]

II.III. : Review of Research Papers in Manufacturing Excellence at SME/MSMEs:

Research Papers from various management journals have been studied for the scope and application of ME in various industries.

Rajesh Kumar Singhet al., in their work, reviewed the Strategy development by SMEs for competitiveness, which identifies the need for a holistic approach for driving improvement strategy for SMEs, in general, and my experience about auto component SME/MSMEs is not different[11].Sha’riMohdYusof and the team developed a Conceptual Framework for TQM implementation for SMEs that concluded the need for TQM implementation with different methods suitable to SMEs[12].Prakash D. etal. worked on the implementation of Lean Manufacturing Principles in Auto Industry, which suggests having models, methods & techniques for driving improvement initiatives like Lean[13].The study for six auto component SMEs for SCM practice done by Jitesh Thakkar and the team also concludes that SMEs lack in technology and required the organization to implement SCM practices. [14]

In addition to this, there are researches done on competitive priorities for the Indian manufacturing industry with a special focus on the automotive industry. According to YugalNauhria et al., “The Limited manufacturing flexibility of Indian Automotive manufacturers and the sustainability constraints are going to be the important considerations for Indian automotive manufacturers shortly. Hence, specific manufacturing strategies can be formulated for use by Indian automotive manufacturers to meet the objectives of competitive systems to get their rightful place in the global automotive industry during the next decade 2011-2020.[15]

Specific research done by Rajesh Jagdish Dhake [16],through a case study of the deployment of the Lean- TPM approach in the auto component cluster in India, elaborates on the importance of an integrated approach of

improvement initiatives to drive excellence in Auto component companies. The author says, “Integrated Lean-TPM have helped case studied organization, to optimize available resource and produce world-class products as per changing market demand. Such a route map helps to co-ordinate the application of Lean Thinking and TPM tools and techniques to secure continuous improvement in business performance in terms of quality, cost, and delivery.”

According to Rajeshkumar U. Sambhe[17], financial and human resources are the two major constraints in Six Sigma (SS) implementation in small and medium scale enterprises. The top management commitment is the most critical success factor in SS methodology implementation since it shows the highest rank from most of the previous researches.

In the case study by K.N. Krishnaswamy et al, the authors mentioned some aspects related to SMEs, as mentioned next. It is the dynamic and innovative SMEs that succeed in terms of profitability and growth. Therefore SMEs play a unique and complicated economic role as far as technological innovation is concerned. However, their innovative capacity and ability to develop new and innovative products, processes and services vary significantly depending on the sector,size, focus, resources, and the business environment inwhich they operate[18].

Indian SMEs are required to build their capability in respect of knowledge of global products, and global quality and technical standards. In order to enhance the quality of the output of this sector on par with world-class organizations, there is a need to use continuous improvement strategies such as Six Sigma[19]. Implementation of strategies like Six Sigma may demand an investment, dedication of the best resources, training to employees, etc. which many SMEs may not be able to afford. Yet, there still exists a need for the Indian SME sector to look for this breakthrough business

improvement strategy for survival and growth.- On some aspects of developing a useful model for the implementation of Six Sigma concept in small and medium-sized manufacturing enterprises in India N. L. Hiregoudar¹, Bhimasen Soragaon, ISSN 1750-9653, England, UK International Journal of Management Science and Engineering Management, 6(1): 42-48, 2011

While presenting the issues related to SMEs in India concerning the times of globalization, Keshab Das says that the SMEs all over the world have been undergoing crucial changes in response to the different imperatives of globalization. The potential of neo-localism having been much emphasized, the SMEs in developing countries have often been split between national strategies and objectives of promoting this vital and most promising sector and the demands of a globalizing business environment. In India, the historical role of SMEs in creating ample opportunities for employment for the teeming millions has come to occupy secondary status in the face of novel strategies to ensure external orientation, achieving manufacturing competitiveness and emerge notable global players.[20]

Implementing a Functional ISO 9001 Quality Management System in Small and Medium-Sized Enterprises, according to Sousa-Poza et al, [21] Some of the representative challenges SMEs may face include a lack of financial and human resources, inadequate technical knowledge of quality management, a lack of knowledge of formalized systems, and a lack of experience in internal auditing. Although the heterogeneous nature of SMEs makes it challenging to generalize, managers and employees in SMEs are typically well focused on core activities such as production, sales, and customer service. However, they are generally not knowledgeable about QMS requirements or on how to improve processes.

II.IV.: Summary of Literature Review:

It is interesting to know that the level of implementation and results of ME at MSMEs is not the same as with OEMs. The OEMs and MSMEs have attempted to implement ME practices, but the results and effectiveness are not visible and evident.

The available literature on ME shows the framework, elements, relationship of these elements, and to some extent, the border guidelines for implementation of the same. However, the literature does not focus much on what are the challenges for implementing ME practices and achieving the ME results. The literature also does not reflect much on measures of implementation of ME at SMEs.

The literature shows that the various elements of manufacturing excellence have been deployed as an individual, but not as a consolidated attempt of ME as a whole.

Due to this, the impact of manufacturing excellence on organizational performance has become the issue of debate and further research. In some of the case studies, there are signs of improvement in the performance. However, the extent of implementation of overall organizational performance is yet to be quantified.

Several Qualitative & Quantitative models have been developed earlier to assist companies in the process of vendor base reduction, but the applicability of these models is to be known in the Indian context only. These research papers focus on developing a framework with the erstwhile developed models as the base and tailoring them to the Indian auto component MSMEs context.

The information on general awareness of manufacturing excellence as a concept to MSMEs is not very much evident in the research studied so far. Even the challenges faced by industry for the implementation of developed models were not identified. Moreover, the authors have only proposed it for implementation without putting much focus on practical difficulties in implementing the same for SMEs.

In India, across major auto hubs, there is no evidence of development and deployment of the structured approach of ME strategy for MSMEs.

In some of the researches, the study has been conducted based on information collected from procurement managers. However, the actual supplier capabilities and willingness verification are not even evident. On the vendor site, capability verification only reflects the vendor's ability to handle the challenges, but the reflection on his willingness to grow & improve is missing. The models were developed on the bases of the information collected, which may have built-in perceptions, which may differ from ground reality.

III. DATA COLLECTION AND THE RESEARCH

The research was done through a detailed overview of ME models through an extensive literature review. It is observed that 12 key ME elements are commonly addressed by all ME models and are important for manufacturing performance improvements.

A questionnaire was prepared to cover these 12 key ME elements and was circulated to 20 Industry experts to get their ranking on the importance of these elements for Auto component SMEs in India. The industry experts are chosen based on seniority/experience and from Indian, multinational auto OEMs, Auto components Industry, and consultants. Based on experts ranking, top 7, important ME elements have been identified as most critical for Indian Auto component Industry. 7 Major Business/Manufacturing Excellence Models are studied and analyzed for the scope of application addressing the key elements and sub-elements in each category. Table-1 shows the summary of data collection

Table-1: Summary of data collection

Number of Models Studied	7
Manufacturing Excellence Pillars Identified	9
Key Elements Identified	14
Sub Elements Identified	53

The following seven ME models have been taken for study, and Table-2 gives the detailed list of basic ME pillars, key elements, and respective sub-elements.

1. Malcolm Baldrige National Quality Award (1987)
2. European Foundation for Quality Management - Excellence Model (1991)
3. Deming Prize (1951): in 1985 released for rest of world
4. Toyota Production System (1980)
5. Shigeo Shingo
6. Modern Approaches to ME (2005 onwards)
7. TBEM

IV. ANALYSIS

A rigorous analysis of feedbacks received from various Industry experts resulted in the priority list of key factors contributing to Manufacturing excellence. A sample set of feedbacks is shown in Table-3. The columns R1 to R15 indicate the representatives from different Industry experts.

As a result of this analysis, seven factors are found more appropriate to be considered for deployment of ME at auto-component MSMEs.

V. CONCLUSION

The literature review outcome shows that 12 contributing elements identified for ME, which are majorly addressed in 7 ME models under study. These 12 elements are covered with specific relevance for the significance of ME in all the ME models.

These 12 elements are referred to the Industry experts to understand what is more significant to MSME/SME through a formal survey based on a questionnaire. The experts'

rating shows that, from these 12 key elements, seven are more important and relevant for MSME/SME. This does not undermine the importance of other elements of ME. However, the focus of the survey was to know what is more relevant for MSME/SME, so the industry experts rate seven elements, which are a must for ME deployment. MSME/SME, with its business scope, available resources, and limitations of sustenance, it becomes difficult to deploy all the aspects of ME. So it was very important to know the minimum essential aspects which could be effectively deployed at SME. Eventually, they can achieve better performance levels and results. The below mentioned seven elements are rated more significant by experts:

1. Presence of Visionary Leadership, Vision/Mission
2. Focus on Customer Satisfaction
3. Presence of Robust New Product - Process Development
4. Focus on Employee Training and Involvement
5. Presence and focus on Quality Management Systems, Quality Culture
6. Presence of CIP Structure - culture across all functions
7. Focus on Lean Initiative - Elimination of waste across the value chain

If the above seven elements are scrutinized, it is seen that these are significant enablers, which will deliver the better results. The seven elements cover the leadership focus, customer service, and new product delivery, focusing on employee involvement, training through the deployment of lean principles. It also insists on the importance of quality management

systems deployment and creating improvement focused culture through CIP.

From the research conducted, it is evident that the above seven factors are important key contributors for the deployment of Manufacturing Excellence at Indian Auto component SMEs/MSMEs.

VI. LIMITATIONS

The research is based on the literature review of 7 ME models. The other ME models being used globally are not covered in the study. So there may be some other elements of ME referred to in these models which are not covered in the research.

The research has limitations of the small sample size for expert's survey. Here the experts are from auto OEMs, Auto components, consultants who have worked with MSME/SME, and they have shared the ranking based on their experience and expertise. The feedback of the expert may vary depending on their experience of handling and dealing with SME/ MSME.

The results of such a study may vary based on scope and various ME models under study and also with a larger sample size. However, the attempt in this research is to cover the critical mass who can represent the Industry and covering the globally accepted major ME models.

Table-2: ME pillars, key elements, and sub-elements.

ME Pillar	Key Element	Sub element	Coverage in ME models out of 7
Leadership & Strategic Planning	Leadership	Key element coverage→	7
		Visionary Leadership	7
		Ethical and Legal Governance	3
	Strategic Planning	Key element coverage→	7
		Innovation Strategy	5
		Long Term Focus	6
		Vision, Mission	7
Customers	Customer Focus	Key element coverage→	7
		Customer Satisfaction	7
		Customer Relations	4
		Customer Results	7
Core Process and Product Management	Measurement, Analysis and Knowledge Management	Key element coverage→	7
		Data Collection and Management	2
		Performance Measurement -Review Mechanisms	7
		Learning through Knowledge Sharing	6
	Process / Product Technology Management - Stable and Standardised Processes - Build in Quality	Key element coverage→	7
		Production Process Development	7
		Production Process Controls	7
		Support Functions Process Management	6
		Robust New Product - Process Development	7
		Preventive Maintenance planning	7
		TPM - Imitative	7
		Zero Defect processes	4
		Robust Occurrence and Detection controls	7
Support Processes Management	Supply Chain Management	Key element coverage→	3
		Supplier Development	2
		Supplier Integration and Consolidation	2
		Supplier Partnership and Relations	2
	Product & Process Quality Management	Key element coverage→	7
		Internal / External Rejection & Scrap reduction - COPQ	7
		Customer PPM reduction	7
	Cost Reduction	Key element coverage→	7
		RMC reduction	7
		Manufacturing Cost Reduction	7
	IT integration	Key element coverage→	1
		Computer Integrated Manufacturing	1
		E- Supply Chain	1
CIP	Continuous Improvement Process - CIP	Key element coverage→	7
		CIP Structure – culture	7
		CIP - Tools - Initiatives	7

		CIP – Organisation	7
		Innovation - Product / Process / Methods	4
		SPC & Six Sigma Approach for Problem-solving	5
Lean Approach	Lean Manufacturing	Key element coverage→	2
		Heijunka - Levelled Production- Pull System	2
		Inventory Optimisation	2
		Flexible manufacturing	2
		Just In Time - JIT - Delivery Performance	3
		Focus on Flow	2
QMS	Quality Management Systems , Quality Culture	Key element coverage→	7
		ISO-TS 16949	7
		ISO -14001 , OHSAS – 18000	7
		Visualization, 5S & Safety	4
		WI and Standard Operating Procedures	4
		Change Management System	3
		Culture of First Time Right-FTR	4
HR	HR Focus	Key element coverage→	7
		Employee Involvement - Cross-functional teams	7
		Training and Education for skill building	7
		People Development	7
		Employee empowerment	4
Results	Results	Key element coverage→	7
		Business Results - Topline & Bottom line, Profitability	7
		People -Human Productivity	7
		Customer Results - Customer Satisfaction Index	7
		Environment Protection Practices – Sustainability	7
		Society results	4

Table-3: Data and feedback analysis

Sr. No.	Key Factors Contributing to Manufacturing Excellence	Reviews															Max people rated for	% of people giving this rating
		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15		
1	Presence of Visionary Leadership , Vision / Mission	1	1	1	1	1	1	1	1	1	1	1	11	1	1	4	1	86.66
2	Focus on Customer Satisfaction	2	11	2	10	2	3	3	2	4	2	2	10	2	2	3	2	46.66
3	Presence of system for Performance Measurement - Review Mechanisms	11	8	10	3	12	2	8	8	5	12	5	9	11	3	11	8	20

4	Presence of Robust New Product - Process Development	5	3	3	7	4	6	9	9	2	8	8	1	4	4	6	4	20
5	Implementation of TPM - Initiative	8	9	4	11	11	9	10	5	3	6	9	2	12	5	12	9	20
6	Focus on Supplier Development	12	7	11	2	7	11	11	10	11	9	10	8	7	7	8	11	26.66
7	Focus on COPQ reduction	10	4	9	9	9	12	6	12	10	10	11	7	8	6	1	10	20
8	Focus on Manufacturing Cost Reduction	9	12	12	12	8	10	7	11	12	11	12	12	9	8	2	12	33.33
9	Focus on Lean Initiative - Elimination of waste across value chain	3	6	5	5	10	4	5	7	8	5	6	3	10	9	10	5	26.66
10	Presence of CIP Structure - culture across all functions	4	10	6	8	6	7	4	6	6	7	3	5	5	10	9	6	20
11	Presence and focus on Quality Management Systems , Quality Culture	7	2	7	4	5	8	12	4	9	3	7	4	6	11	5	7	20
12	Focus on Employee Training and Involvement	6	5	8	6	3	5	2	3	7	4	4	6	3	12	7	3	20

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