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The Technical Efficiency on Zero Effect and Zero-Defect in Chennai Automotive Components Cluster

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Abstract- The study on Zero Defect and Zero Effect for MSMEs leads to getting bronze, silver and gold certification. The objective is to study on 20 ZED parameters performance for 40 Automotive Components Manufacturing Enterprises at Tirumudivakkam. The methodology adopted is getting 5-point scale data and analysing using business analytics / artificial intelligence techniques like descriptive analysis, correlation analysis, predictive analysis and decision analysis using Difference in Difference method and Technical Efficiency where Traditional is considered as Control Variable and AI + Robotics implementation is considered as Treated Variable. To conclude technical efficiency of traditional and AI + Robotics are calculated and found that the Technical Efficiency of AI + Robotics implemented is greater than Technical Efficiency of Traditional one. It is also found that Measurement and Analysis is ranked as No.1, Risk Management is ranked as No.2, Human Resource Management is ranked as No.3, Product Quality & Safety is ranked no. 4, Quality Management is ranked no. 5, waste management and Technology Upgradation is ranked no. 6 , Occupational Safety is ranked no. 7, Timely delivery, Daily works management and Material Management is ranked no. 8, Natural Resource Conservation is ranked no. 9 and Leadership, Planned Maintenance & Calibration, Environment Management and Supply Chain Management is ranked no.10. The remaining 3 parameters like the swach work place ranked no. 11, Process Control ranked no. 12 and Energy Management ranked no. 13 needs improvement in DID score so that the overall performance of Automotive Components will improve and also all will get 3 certifications like bronze, silver and gold.

Keywords – Technical Efficiency, Difference in Difference, Zero Defect, Zero Effect, Chennai Automotive Cluster.

I. INTRODUCTION

India's Micro, Small, and Medium Enterprises (MSMEs) play a vital role in the nation's growth and development. To empower them to produce world-class goods with "Zero Defect" in quality and "Zero Effect" on the environment, the Government of India has laid out a vision: MSMEs must manufacture products that meet the highest quality standards—ensuring that exported goods are never returned—and adopt environmentally sustainable practices that minimize negative impacts.

To realize this vision, the Ministry of Micro, Small & Medium Enterprises (MSME) has launched the MSME Sustainable (ZED) Scheme, aimed at promoting quality and sustainability across the sector. The Quality Council of India (QCI) has been appointed as the Implementing Agency for this initiative.

The primary goal of government support for ZED Certification is to help MSMEs improve product quality while reducing environmental impact. This initiative is expected to generate wide-ranging benefits, including workforce training, knowledge creation, productivity improvements, and the adoption of advanced production methods and equipment. Moreover, it will enhance the trust and confidence of global buyers and investors in Indian-made goods and services.

As the backbone of the Indian economy, MSMEs are crucial for driving innovation, employment, and inclusive growth. Strengthening the MSME ecosystem is essential for maintaining and enhancing their competitiveness. The Zero Defect Zero Effect (ZED) initiative is a strategic move by the Government of India to support MSMEs in becoming both national and international champions—contributing significantly to the vision of an Atmanirbhar Bharat (self-reliant India).

II. REVIEW OF LITERATURE

The ZED Certification Model, as outlined in this document, has been specifically developed for the manufacturing sector. It integrates global best practices into a comprehensive and holistic framework, enabling MSMEs to systematically implement quality and sustainability measures. The model supports MSMEs in adopting structured systems that improve operational efficiency, enhance competitiveness, and promote sustainable growth as they progress on their ZED journey.

MSMEs can apply for certification under one of the following three levels based on their maturity and readiness:

1. Certification Level 1: BRONZE – Assessed on 5 Parameters

2. Certification Level 2: SILVER – Assessed on 14 Parameters

3. Certification Level 3: GOLD – Assessed on 20 Parameters

Organizations seeking certification at any of these levels—Bronze, Silver, or Gold—under the MSME Sustainable (ZED) Scheme will be evaluated based on the relevant parameters applicable to the respective level. The traditional and AI and Robotics implemented ZED parameters are given below.

Leadership:
Traditional: Top-down hierarchical leadership; reactive decision-making.
AI + Robotics: Data-driven leadership using dashboards and predictive analytics.AI-enabled leadership improves strategic foresight and factory responsiveness by 35%. (Company, 2020)

Swachh Workplace :
Traditional: Manual housekeeping, periodic inspections.
AI + Robotics: Autonomous cleaning robots, visual inspection via cameras, hygiene scoring using IoT sensors.(Dutta, 2021)

Occupational Safety:
Traditional: Manual hazard checklists, compliance audits.
AI + Robotics: Real-time monitoring via computer vision, predictive maintenance for avoiding accidents. ILO reports AI reduced workplace incidents by 50% in pilot plants. (Reports, 2022)

Timely Delivery
Traditional: Spreadsheet tracking, manual follow-ups.
AI + Robotics: Real-time scheduling, autonomous logistics, and AI-based delay prediction. BCG found 40% improvement in OTIF (On-Time In-Full) metrics using smart scheduling AI. (BCG, 2019)

Quality Management:
Traditional: End-of-line inspection, SPC techniques.
AI + Robotics: Machine learning models detect quality deviations early; robotics-enabled precision reduces defects. AI in Indian Manufacturing, cite a 60% reduction in defects. (Anand, 2020)

Human Resource Management
Traditional: Manual skill tracking, paper-based records.
AI + Robotics: AI-based skill gap analytics, adaptive training using VR/AR and robotics simulators. PETC Skill Audit Report shows 3x training effectiveness using AI tools. (PETC, 2023)

Daily Work Management
Traditional: Manual checklists, logbooks.
AI + Robotics: Digital work instructions, voice-assisted task completion, error-proofing via cobots. MIT Automation Survey, reports 45% reduction in daily operational errors with AI bots. (Lab, 2022)

Maintenance & Calibration
Traditional: Preventive/manual schedules.
AI + Robotics: Predictive maintenance using AI, robotic auto-calibration of CMMs and sensors. GE Smart Maintenance Study reveals, 25–30% increase in machine uptime using AI. (Digital, 2021)

Process Control
Traditional: Operator-led monitoring, feedback-based corrections.
AI + Robotics: Closed-loop process optimization, AI tuning based on sensor data. Siemens notes 22% higher process efficiency via AI-based SPC. (AG., 2021)

Product Quality & Safety
Traditional: Manual product checks and basic compliance.
AI + Robotics: Automated vision systems, real-time compliance checks, .NITI Aayog, indicates 70% more consistency in product quality with robotics. (Aayog, 2020)

Material Management
Traditional: ERP/manual stock records, reorder-point based systems.
AI + Robotics: AI-based inventory forecasting, autonomous AGVs for in-plant logistics. Harvard Business Review found 40% reduction in material shortage incidents. (Review, 2021)

Energy Management
Traditional: Periodic metering and manual shutdowns.
AI + Robotics: IoT-enabled energy dashboards, AI-controlled energy load balancing. TERI AI-led factories save 10–20% more energy. (TERI, 2022)

Environment Management
Traditional: Compliance-based waste audits, manual emission tracking.
AI + Robotics: Real-time pollution control monitoring, AI for carbon footprint prediction. UNEP India Case Study notes 35% improvement in environmental compliance using AI. (Programme, 2023)

Measurement & Analysis
Traditional: Manual data logging, statistical tools like Excel/SPC.
AI + Robotics: Cloud-based analytics platforms, anomaly detection, real-time dashboards. .Bosch India White Paper reports 4x faster insight generation using AI. (India, 2021)

Supply Chain Management
Traditional: Linear procurement, poor traceability.
AI + Robotics: Dynamic supply-demand matching, AI-based supplier scoring. Accenture adaptive AI improved supplier reliability by 30%. (Accenture, 2020)

Waste Management (3M: Muda, Mura, Muri) 4. Waste Management (3M) (Wm)
Traditional: Periodic audits, lean practices.
AI + Robotics: Continuous waste detection via sensors, robotic segregation. Toyota Production System (TPS) studies show 50% Muda elimination with AI-driven systems. (Corporation., 2022)

Risk Management
Traditional: Risk matrices and manual checklists.
AI + Robotics: AI-based risk scoring, scenario simulations. Deloitte reveals AI predicted 3x more risk scenarios vs. manual methods. (Deloitte, 2021)

Technology Selection & Upgradation
Traditional: Budget-driven decisions, reactive adoption.
AI + Robotics: AI-based ROI simulation models, proactive upgrades. PETC Innovation Report showed 2x faster tech adoption cycle with AI. (PETC, Skill audit and digital transformation readiness of automotive SMEs at Tirumudivakkam, 2023)

Natural Resource Conservation(Nrc)
Traditional: Manual water/electricity tracking.
AI + Robotics: Smart sensors, AI for usage optimization. CII Green Co, AI reduced water wastage by 35% in automotive SMEs. (CII, 2021.)

Corporate Social Responsibility (Csr)
Traditional: One-time outreach, manual CSR tracking.
AI + Robotics: Impact analytics for CSR, AI-driven community feedback systems. CSR Journal India exposes AI-enhanced CSR transparency increased stakeholder trust. (Journal, 2022)

The Conceptual Frame work is given in table 1 with input and output variables for 20 ZED Parameters with reference to Automotive Components Product Design, Product Development and Product Testing and is given in table 1

Table 1: Conceptual Framework

Inputs (Enablers/Resources)	Outputs (Performance/Results)
1. Leadership (Ls)	
(Pde, Pd, Pt)	
2. Swachh Workplace(Swp) (Pd)	
3. Occupational Safety(Os) (Pd)	
4. Quality Management(Qm)	
(Pde, Pd, Pt)	
5. Human Resource Management(Hrm)	1. Timely Delivery (Td)
(Pde, Pd, Pt)	(Pd)
6. Daily Works Management (Dwm)	2. Product Quality & Safety (Pqs)
(Pd)	(Pt)
7. Maintenance & Calibration (Mc)	3. Environment Management (Evm)
(Pd)	(Pd)
8. Process Control (Pc)	4. Waste Management (3M) (Wm)
(Pd)	(Pd)
9. Material Management(Mm)	5. Natural Resource Conservation (Nrc)
(Pd)	(Pde, Pd)
10. Energy Management (Eem)	6. Corporate Social Responsibility (Csr)
(Pd)	(Pde, Pd, Pt)
11. Measurement & Analysis (Ma)	
(Pt)	
12. Supply Chain Management(Scm)	
(Pd)	
13. Risk Management (Rm) (Pde, Pd, Pt)	
14. Technology Selection & Upgradation (Tsu)	
(Pde)	

(where Pde is product design, Pd is product development and Pt is product testing of automotive components)

Objectives of the Study:
- To evaluate the transformation and benefits in adopting AI and Robotics over traditional methods for achieving

excellence in 20 ZED parameters, focusing on zero defects (quality) and zero effects (sustainability).

- The objective is to investigate and analyze the management techniques necessary for the effective integration of artificial intelligence (AI) and robotics to optimize production processes in automotive components industrial clusters in Chennai using ZED Parameters.
- To study on obtaining Zero Defect (products produced with zero defect) and Zero Effect (products produced without affecting the environment) (ZED) sustainable certification consisting of 20 parameters for all 40 Precision Engineering Cluster PEC enterprises before and after Cluster Development Approach.
- 4. To analyze the Artificial Intelligence techniques / business analytics like description analysis, correlation analysis, regression / predictive / trend analysis, prescriptive analysis and decision analytics / difference in difference on ZED parameters for 40 automotive components manufacturing enterprises at Tirumudivakkam.

III. MATERIALS AND METHODS

The methodology adopted is collection of primary data from 40 Auto Components Manufacturers from Tirumudivakkam by collecting qualitative variables (5-point scale). The qualitative data are analyzed using the Artificial Intelligence techniques / business analytics like description analysis, correlation analysis, regression / predictive / trend analysis, prescriptive analysis and Difference in Difference (DID) / decision analytics on ZED parameters for 40 automotive components manufacturing enterprises at Tirumudivakkam.

IV. RESULTS AND DISCUSSION

The sub parameter for each and every ZED parameter and Technical Efficiency for Traditional and AI + Robotics Implemented is found and placed with reference to Automotive Components Product Design, Product Development and Product Testing and is given in table 2.

Table 2: ZED Sub Parameter				
ZED No.	**Category**	**Sub-Parameter**	**Traditional Technical Efficiency**	**AI + Robotics Technical Efficiency**
01	Leadership	1.1 Roles & Responsibilities	0.78	0.94
01	Leadership	1.2 Organogram	0.81	0.96
01	Leadership	1.3 Performance & Compliance Review	0.75	0.93
02	Swachh Workplace	2.1 SOPs for Cleaning & Hygiene	0.7	0.92
02	Swachh Workplace	2.2 Clean Tools & Areas	0.68	0.91
02	Swachh Workplace	2.3 Cleanliness Culture	0.72	0.95
02	Swachh Workplace	2.4 Cleaning Audit Mechanism	0.69	0.9
02	Swachh Workplace	2.5 Audit Result Review	0.73	0.94
03	Occupational Safety	3.1 Formal Safety Policy	0.79	0.93
03	Occupational Safety	3.2 Safety Training & Systems	0.75	0.94
03	Occupational Safety	3.3 Safety in KPIs	0.73	0.9
03	Occupational Safety	3.4 Safety Implementation + RCA	0.76	0.95
03	Occupational Safety	3.5 Management Safety Review	0.72	0.91
04	Timely Delivery	4.1 Delivery Adherence Monitoring	0.74	0.92

04	Timely Delivery	4.2 Management Review of Delivery	0.7	0.89
05	Quality Management	5.1 Quality Policy	0.77	0.94
05	Quality Management	5.2 Quality Requirements	0.75	0.91
05	Quality Management	5.3 Training for Quality	0.72	0.9
05	Quality Management	5.4 Quality Audits	0.74	0.93
05	Quality Management	5.5 RCA & CAPA for Quality	0.71	0.92
05	Quality Management	5.6 Management Review of QMS	0.76	0.95
06	Human Resource Management	6.1 HR Processes	0.74	0.91
06	Human Resource Management	6.2 People Development Plans	0.7	0.93
06	Human Resource Management	6.3 Skill Mapping & Training	0.73	0.95
06	Human Resource Management	6.4 Review of People Development	0.72	0.91
07	Daily Works Management	7.1 QCD Target Process	0.69	0.89
07	Daily Works Management	7.2 QCD Daily Display	0.67	0.9
07	Daily Works Management	7.3 QCD Electronic Sharing	0.65	0.94
07	Daily Works Management	7.4 RCA & CAPA for QCD	0.7	0.93
07	Daily Works Management	7.5 Review of Daily Works	0.68	0.91
08	Planned Maintenance & Calibration	8.1 Maintenance & Calibration Plan	0.72	0.94
08	Planned Maintenance & Calibration	8.2 Execution of Maintenance	0.7	0.91
08	Planned Maintenance & Calibration	8.3 RCA & CAPA for Maintenance	0.68	0.92
08	Planned Maintenance & Calibration	8.4 MTTR & MTBF Review	0.69	0.9
09	Process Control	9.1 Process Control Planning	0.75	0.93
09	Process Control	9.2 SOPs for Process Control	0.74	0.94

09	Process Control	9.3 Monitoring of Critical Processes	0.71	0.92
09	Process Control	9.4 RCA, CAPA & Review of Processes	0.7	0.91
10	Product Quality & Safety	10.1 Identify Quality & Safety Requirements	0.74	0.92
10	Product Quality & Safety	10.2 Testing & Certification	0.73	0.95
10	Product Quality & Safety	10.3 RCA & CAPA for Product Issues	0.7	0.93
10	Product Quality & Safety	10.4 Management Review of Product Quality	0.71	0.94
11	Material Management	11.1 Material Planning	0.73	0.92
11	Material Management	11.2 Inventory Optimization	0.72	0.91
11	Material Management	11.3 Inventory Control	0.7	0.9
11	Material Management	11.4 SOPs for Handling Materials	0.69	0.93
11	Material Management	11.5 RCA & CAPA for Materials	0.68	0.92
11	Material Management	11.6 Material Mgmt Review	0.7	0.94
12	Energy Management	12.1 Energy Targets & Sources	0.69	0.9
12	Energy Management	12.2 Measurement & Correction	0.7	0.91
12	Energy Management	12.3 Energy Training	0.68	0.92
12	Energy Management	12.4 Energy Audits	0.67	0.9
12	Energy Management	12.5 RCA & CAPA for Energy	0.69	0.91
13	Environment Management	13.1 Environmental Systems	0.71	0.92
13	Environment Management	13.2 Environmental Audits	0.69	0.93
13	Environment Management	13.3 RCA & CAPA for Environment	0.68	0.91
13	Environment Management	13.4 Environment Training	0.67	0.9
13	Environment Management	13.5 Management Environment Review	0.7	0.94
14	Measurement & Analysis	14.1 Defect/Rework/Cost/Satisfaction Metrics	0.73	0.91

14	Measurement & Analysis	14.2 RCA & CAPA for Metrics	0.72	0.92
15	Supply Chain Management	15.1 Vendor Selection & Evaluation	0.75	0.92
15	Supply Chain Management	15.2 Sustainability in Supply Chain	0.72	0.91
15	Supply Chain Management	15.3 Supply Chain Performance Review	0.74	0.93
16	Risk Management	16.1 Comprehensive Risk Plan	0.7	0.92
16	Risk Management	16.2 Risk Mitigation	0.71	0.91
16	Risk Management	16.3 Management Risk Review	0.72	0.9
17	Waste Management	17.1 Waste Reduction Plan	0.7	0.93
17	Waste Management	17.2 Waste Reduction Targets	0.69	0.91
17	Waste Management	17.3 Waste Training	0.67	0.89
17	Waste Management	17.4 Waste Review & Monitoring	0.68	0.92
18	Technology Upgradation	18.1 Technology Planning	0.71	0.93
18	Technology Upgradation	18.2 Smart Tech Adoption	0.72	0.95
19	Natural Resource Conservation	19.1 Resource Review System	0.7	0.92
19	Natural Resource Conservation	19.2 Resource Targets	0.69	0.93
19	Natural Resource Conservation	19.3 Resource Training	0.67	0.9
19	Natural Resource Conservation	19.4 Management Review for Resources	0.71	0.94
20	Corporate Social Responsibility	20.1 CSR Policy	0.73	0.93
20	Corporate Social Responsibility	20.2 CSR Practices Defined	0.71	0.91
20	Corporate Social Responsibility	20.3 CSR Practice Review	0.72	0.94
		Technical Efficiency	**0.71**	**0.92**

Source: Computed data

Nrc	T	57.5	3.54	9.09		
	A1	77.5	24.75	58.33	30	9
Csr	T	50	7.07	22.22		
	A1	72.5	24.75	63.64	25	10

The descriptive analysis is given in table 3.

Table 3: Descriptive Analysis

Zed	Group	Mean	SD	Growth in %	DID	Rank
Ls	T	55	7.07	20.00		
	A1	77.5	24.75	58.33	25	10
Swp	T	52.5	3.54	10.00		
	A1	67	16.97	43.64	19	11
Os	T	45	7.07	25.00		
	A1	75	35.36	100.00	40	7
Td	T	57.5	3.54	9.09		
	A1	80	28.28	66.67	35	8
Qm	T	47.5	3.54	11.11		
	A1	80	42.43	120.00	55	5
Hrm	T	35	7.07	33.33		
	A1	80	56.57	200.00	70	3
Dwm	T	50	7.07	22.22		
	A1	77.5	31.82	81.82	35	8
Mc	T	57.5	3.54	9.09		
	A1	75	21.21	50.00	25	10
Pc	T	62.5	3.54	8.33		
	A1	76	15.56	33.85	17	12
Pqs	T	47.5	3.54	11.11		
	A1	85	49.50	140.00	65	4
Mm	T	57.5	3.54	9.09		
	A1	80	28.28	66.67	35	8
Em	T	60	7.07	18.18		
	A1	72.5	10.61	23.08	5	13

Env	T	55	7.07	20.00		
	A1	77.5	24.75	58.33	25	10
Ma	T	47.5	3.54	11.11		
	A1	100	70.71	200.00	95	1
Scm	T	52.5	3.54	10.00		
	A1	70	21.21	54.55	25	10
Wm	T	47.5	3.54	11.11		
	A1	75	35.36	100.00	45	6
Rm	T	57.5	3.54	9.09		
	A1	100	56.57	133.33	75	2
Tus	T	47.5	3.54	11.11		
	A1	75	35.36	100.00	45	6
	T	52.5	3.54	10.00		
	A1	67	16.97	43.64		

Source: Computed data

From the table 3 it is found that Measurement and Analysis is ranked as No.1, Risk Management is ranked as No.2, Human Resource Management is ranked as No.3, Product Quality & Safety is ranked no. 4, Quality Management is ranked no. 5, waste management and Technology Upgradation is ranked no. 6, Occupational Safety is ranked no. 7, Timely delivery, Daily works management and Material Management is ranked no. 8, Natural Resource Conservation is ranked no. 9 and Leadership, Planned Maintenance & Calibration, Environment Management and Supply Chain Management is ranked no.10. The swach work place ranked no. 11, Process Control ranked no. 12 and Energy Management ranked no. 13 needs improvement.

Predictive Analysis /Regression Analysis

The regression equations for all 20 ZED parameters are given in equations [1] to [20] with Difference in Difference Value of Traditional Vs AI + Robotics.

Ls = 50 + 10 T1+ 10 t1 + 25 T1 t1 ....[1]

Swp = 50+ 5T2 + 5 t2 + 19 T2 t2........[2]

Os= 40+ 10 T3 + 10 t3 + 40 T3 t3........[3]

Td = 55+ 5 T4 + 5 t4 + 35 T4 t4........[4]

Qm = 45 + 5 T5 + 5 t5 + 55 T5 t5........[5]

Hrm = 30 + 10 T6 + 10 t 6 + 70 T6 t6........[6]

Dwm = 45 + 10 T7 + 10 t7 + 35 T7 t7........[7]

Mc = 55 + 5 T8 + 5 t8 + 25 T8 t8........[8]

Pc = 60 + 5 T9 + 5 t9 + 17 T9 t9........[9]

Pqs = 45 + 5 T10 + 5 t10 + 65 T10 t10........[10]

Mm = 55 + 5 T11 + t 11 + 35 T11 t11........[11]

Em = 55 + 10 T12 + 10 t2 + 5 T12 t12........[12]

Env = 50 + 10 T13 + 10 t13 + 25 T13 t13.....[13]

Ma = 45 + 5 T14 + 5 t14 + 95 T14 t14.....[14]

Scm = 50 + 5 T15 + 5 t15 + 25 T15 t15.....[15]

Wm = 45 +5 T16 + 5 t16 + 45 T16 t16. .....[16]

Rm = 55 + 5 T17 + t17+ 75 T17t17.....[17]

Tus = 45 + 5T18 + 5 t18 + 45 T18 t18.....[18]

Nsc = 55 + 5 T19 + 5 t19 + 30 T19t19.....[19]
Csr = 45 + 10 T20 + 10 t20 + 25 T20 t20.....[20]

The overall regression equation is given in equation [21]
ZED = 48.75 + 6.75 T + 6.75 t + 39.55 T t .....[21]

[p = 0.00, R2 = 0.803]

The overall Technical Efficiency = Output / Input =(Ls+Swp+Os+Qm+Hrm+Dwm+Mc+Pc+Mm+Em+Ma+Scm+Rm+Tus) / (Td+Pqs+Env+Wm+Nrc+ Csr) = 92.76

Traditional vs AI + Robotics for 20 ZED Parameters

Table 4: Summary Table			
	Inputs (Enablers/Resources)	**Outputs (Performance/Results)**	
Ls	35% faster decision-making, improved responsiveness		
Swp	24/7 cleanliness, consistent hygiene scores		
Os	50% reduction in incidents		
Qm	60% defect reduction		
Hrm	3x training effectiveness	Td	40% improvement in OTIF (On Time in Full)
Dwm	45% reduction in daily task errors	Pqs	70% product consistency
Mc	30% increase in uptime	Env	35% improvement in compliance
Pc	22% process efficiency gain	Wm	50% reduction in waste (Muda)
Mm	40% reduction in stockouts	Nrc	35% water and energy savings
Em	15–20% energy savings	Csr	Enhanced transparency and trust
Ma	4x faster decision-making		
Scm	30% higher supply reliability		
Rm	3x more proactive risk identification		
Tus	2x faster tech adoption		

Source: Computed data

VI. CONCLUSION

Based on Difference in Difference (DID) study where Traditional is control variable and AI + Robotics implementation is treated variables, AI + Robotics implementation significantly enhances efficiency, safety, quality, delivery, and sustainability across ZED parameters. Traditional approaches, while cost-effective, are often reactive, manual, and inconsistent in execution. For PETC Tirumudivakkam's ecosystem, transitioning to smart technologies can help MSMEs achieve ZED Bronze/Silver/Gold levels faster. To conclude technical efficiency of traditional and AI + Robotics are calculated and found that the Technical Efficiency of AI + Robotics implemented is greater than Technical Efficiency of Traditional one. It is also found that Measurement and Analysis is ranked as No.1, Risk Management is ranked as No.2, Human Resource Management is ranked as No.3, Product Quality & Safety is ranked no. 4, Quality Management is ranked no. 5, waste management and Technology Upgradation is ranked no. 6 , Occupational Safety is ranked no. 7, Timely delivery, Daily works management and Material Management is ranked no. 8, Natural Resource Conservation is ranked no. 9 and Leadership, Planned Maintenance & Calibration, Environment Management and Supply Chain Management is ranked no.10. The remaining 3 parameters like the swach work place ranked no. 11, Process Control ranked no. 12 and Energy Management ranked no. 13 needs improvement in DID score so that the overall performance of Automotive Components will improve and also all will get 3 certifications like bronze, silver and gold.

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