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Month - **December 2024** Issue - 15

ROAD TO VIKSIT BHARAT

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Editor's Note

Welcome to the fifteenth issue of NSDC Connect! As we approach the end of the calendar year 2024 and celebrate the seasonal transitions and holiday spirit in many parts of the country, it is imperative to reflect on the nation's aspirations for a sustainable and prosperous future. India's journey towards becoming a Viksit Bharat is inextricably linked to the growth and development of its Mobility Sector. As the nation strives to modernize its transportation infrastructure and adopt sustainable practices, the demand for skilled professionals in the automotive and allied industries is soaring.

The mobility sector, a cornerstone of India's economic growth, is undergoing a rapid transformation. From traditional automobiles to electric vehicles, from urban transportation to rural connectivity, the landscape is evolving at an unprecedented pace. To harness this potential, skilling and training play a pivotal role.

In this issue of Connect, we delve into the world of mobility, exploring the critical role of skilling and training in driving India's progress. We are delighted and grateful to feature insightful articles from industry experts, including Mr. Arindam Lahiri, CEO, Automotive Skills Development Council, who provides a comprehensive overview of the automotive sector, and Amitosh Gautam, and Ashwini Hinge, from WRI India share their views on 'Empowering MSMEs Workers: Rapid Upskilling towards a Green Future'.

Our exclusive interview with Ms. Madhumita Agarwal, the visionary founder of Oben Electric, offers valuable insights into the future of electric mobility in India. She discusses the importance of skilling and training in driving the adoption of electric vehicles and shares her vision for a sustainable and electrified future.

Through these pages, we focus on the Electric vehicles (EVs) landscape in India and its potential to support green growth by examining the global EV sector, India's progress, and the policy considerations required to accelerate adoption and establish India as a global EV hub.

Going further, the issue also explores Mobility as a Service (MaaS) as an innovative approach to transportation that integrates various transportation services under a single platform for users to plan, book, and pay for their travel seamlessly. Here, the government, private sector, and educational institutions must work together to create and scale skilling programs that align with the needs of this emerging industry. By investing in skilling initiatives today, India can ensure that its workforce is not only equipped to support MaaS but is also poised to lead in the global transition toward smart, sustainable, and digital mobility solutions.

As always, the issue also features News Bytes and NSDC Highlights to spotlight some of the key developments in the skilling ecosystem outside and within our organization.

As India continues to accelerate its journey towards a sustainable and mobile future, skilling and training will play a pivotal role. By equipping individuals with the necessary skills and knowledge, we can empower them to contribute to the nation's progress and create a prosperous and inclusive society. Let us embrace the opportunities presented by the mobility sector and work together to build a skilled India, ready to drive the nation's growth and development.

Warm regards,

Jai Hind!

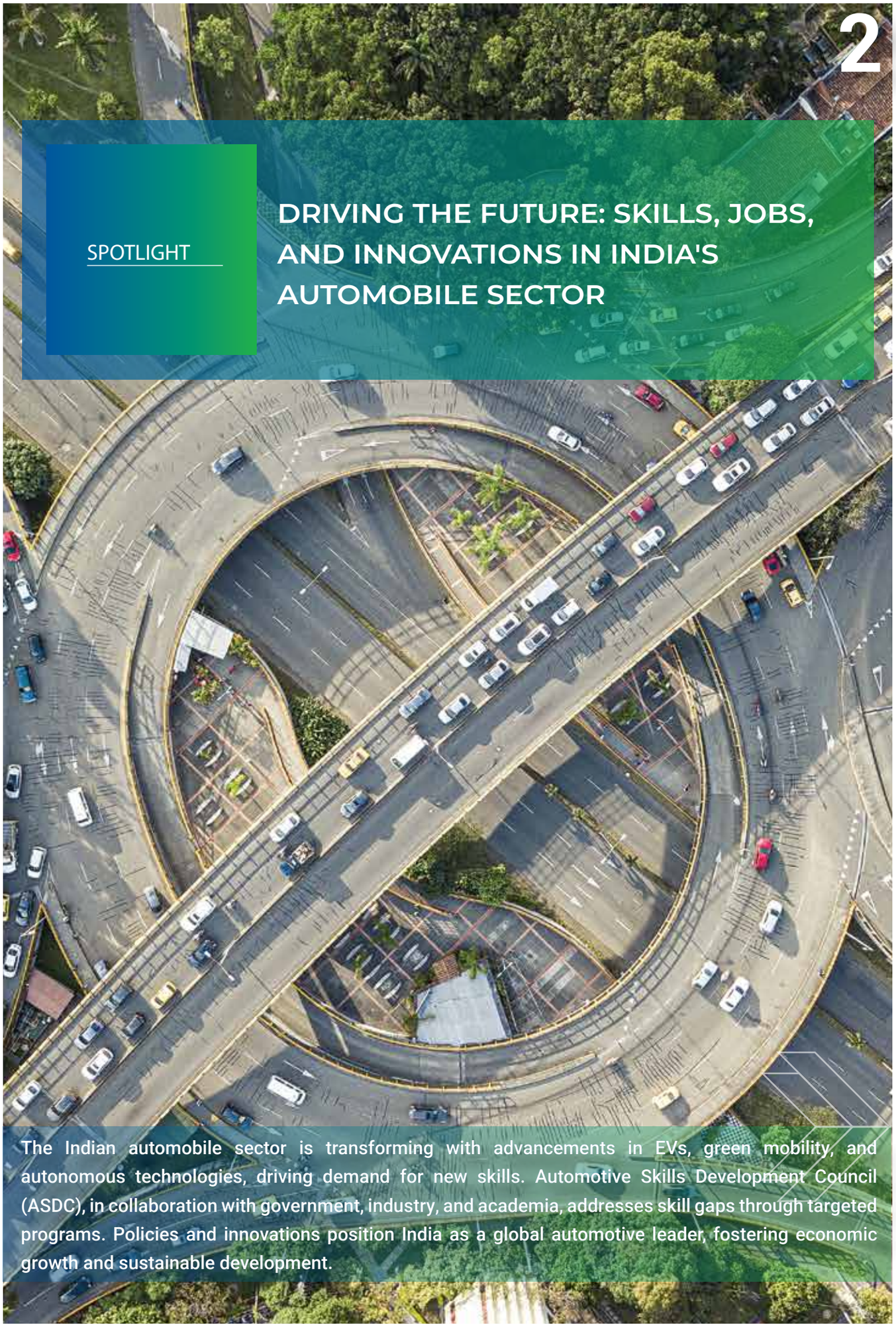
Ved Mani Tiwari - CEO, NSDC

NSDC Connect embodies NSDC's values: Integrity, Innovation, Inclusion, and Impact. We aim to provide trustworthy, innovative, and inclusive content that aims to make a positive impact on education and skill development. Join us in reimagining a better future.

RE IMAGINE FUTURE

SPOTLIGHT

DRIVING THE FUTURE: SKILLS, JOBS, AND INNOVATIONS IN INDIA'S AUTOMOBILE SECTOR



The Indian automobile sector is transforming with advancements in EVs, green mobility, and autonomous technologies, driving demand for new skills. Automotive Skills Development Council (ASDC), in collaboration with government, industry, and academia, addresses skill gaps through targeted programs. Policies and innovations position India as a global automotive leader, fostering economic growth and sustainable development.

Arindam Lahiri
CEO, Automotive Skills Development Council

Mr. Lahiri is a passionate professional with career spanning more than 3 decades across manufacturing, education and training sector. He started his career with Maruti Udyog, received global exposure at Honeywell Inc. (USA) and had an entrepreneurial stint as Director & Co-founder at Career Launcher India (now known as CL Educate). His last assignment was with education division of HT Media Ltd. He also is currently on the advisory board for startups, educational institutions and policy review committees of state and central government ministries. Mr. Lahiri has done his Bachelor's in Mechanical Engineering from Jadavpur University and completed his Post Graduate Diploma in Marketing and Operations from IIM, Lucknow.

Introduction

The Indian automobile industry, a cornerstone of the country's economic growth, is undergoing a seismic transformation. With the global shift toward sustainable practices, electric vehicles (EVs), autonomous driving technologies, and digital integration, the sector faces a dual challenge: embracing innovation while equipping its workforce with the requisite skills. As one of India's largest employment generators, the automotive sector stands at a critical juncture of opportunity and transformation, where skilling initiatives and policy reforms will play a pivotal role in shaping its trajectory.

This article explores the status of jobs and skills in the sector, its impact on the Indian economy, skill gaps, policy interventions, and how industry-academia-government collaborations are building a future-ready workforce.

Jobs and Skills Landscape in the Automotive Sector

The Indian automobile sector is undergoing a significant transformation driven by shifts towards electric vehicles (EVs), autonomous technologies, and green mobility. As of January 2024, India had already sold over 13,25,112 EVs FY 23-24 (IBEF). This transition has led to a rising demand for new-age skills in battery technology, EV design, autonomous systems, and software integration, alongside traditional manufacturing expertise. While the sector remains a major employment generator with a jobs creation potential of over 5 crores by 2030 (IBEF), challenges persist, including skill mismatches, an insufficiently trained workforce for emerging technologies, and regional disparities in job availability. To meet these needs, the Ministry of Skill Development and Entrepreneurship is supporting targeted training in the emerging technology areas. These initiatives aim to build a workforce that can handle emerging technologies and position India as a competitive global leader in mobility and automotive innovation.

Economic Significance of the Mobility Sector

The mobility sector is vital to India's economic health, contributing around 7.1% to GDP, according to NITI Aayog. As the automotive sector expands, they stimulate growth in related industries, generate substantial employment, and drive manufacturing output. It is a major source of employment, generating millions of direct and indirect jobs across manufacturing, and services . The sector also boosts allied industries like steel, rubber, electronics, and plastics, enhancing its economic multiplier effect. Additionally, it plays a vital role in exports, supporting India's global trade footprint.

Automotive Skills Development Council (ASDC) plays a key role by aligning skill development programs with evolving industry needs, helping to maintain high standards that match global benchmarks.

Skill Gaps and Challenges

Despite growth, significant skill gaps exist. The Indian automobile sector faces skill gaps in emerging technologies such as electric vehicles (EVs), battery systems, autonomous driving, and software integration. There is a mismatch between academic curricula and industry needs, along with a lack of practical training and regional disparities in skilling opportunities. Limited industry-academia collaboration and resistance to upskilling among existing workers further the problem. Skilled talent in these high-demand areas, especially outside urban centres.

ASDC addresses these gaps with a dual focus on upskilling and accessibility. Programs like the EV Academy aim to train individuals on advanced topics such as battery management and IoT based diagnostics. ASDC also partners with regional institutions to ensure even semi-urban workers can access these training resources. The access to online learning platform also increases the reach of the impact.

Growth, Advancements, and Innovations in the Sector

The Indian automobile sector is witnessing growth and innovation in areas such as electric vehicles (EVs), with advancements in battery technology, charging infrastructure, and localized EV manufacturing. Autonomous and connected vehicle technologies are gaining traction, supported by developments in artificial intelligence, IoT, and telematics. Green mobility initiatives are driving innovations in hydrogen fuel cells and alternative fuels. Additionally, smart manufacturing practices like Industry 4.0, 3D printing, and robotics are enhancing efficiency and quality, while the adoption of digital platforms is transforming customer experience and supply chain management. These trends position India as a hub for sustainable and technology-driven automotive solutions.

To support this, ASDC has launched certification in EV battery technology, connected vehicle technology, and smart manufacturing. These initiatives ensure that India's workforce remains competitive and adaptable to emerging global standards in mobility.

Policy Landscape: Strengthening Skill Demand and Supply

The policy landscape for addressing skill demand and supply in the Indian automobile sector is shaped by initiatives like the **Automotive Mission Plan 2026**, which aims to make India a global hub for automotive manufacturing and skill development. The **PLI (Production Linked Incentive)** Scheme promotes investment in advanced automotive technologies, including EVs and components. Automotive Skills Development Council (ASDC) focuses on skilling programs aligned with industry needs, while government schemes like **Skill India and PMKVY (Pradhan Mantri Kaushal Vikas Yojana)** enhance workforce readiness. Additionally, state-specific policies and collaborations between academia, industry, and government are fostering regional skilling ecosystems to meet future demands.

ASDC collaborates with industry and government stakeholders' certifications with policy objectives. Through targeted training, ASDC equips the workforce is equipped for roles in EV servicing, autonomous vehicle support, and AI-driven diagnostics, addressing both current and future industry needs.

Collaborative Efforts: Government, Industry, and Academia

Government policy sets a supportive framework, industry provides practical expertise, and academia offers foundational training. ASDC acts as a bridge, collaborating with stakeholders to co-create programs aligned with evolving sector needs. For instance, ASDC has partnered with leading universities to launch specializations in EV engineering and mechatronics, ensuring graduates have industry-ready skills in high-demand fields. Industry collaborations, such as those with Hero MotoCorp and Maruti Suzuki, also allow ASDC to offer on-the-job training, equipping students with practical, hands-on experience that academic courses alone cannot provide. The industry, government, and academia play a collaborative role in driving skill development in the Indian automobile sector.

ASDC Leading the Way

ASDC addresses the skill gap through targeted interventions and partnerships with leading automotive companies. For example, ASDC collaborated with Toyota Kirloskar Motors to develop an advanced curriculum on hybrid vehicle technology. This partnership produced a case study that highlights how ASDC and Toyota equipped over 2,000 trainees with specialized skills in HEV diagnostics, battery management, and sustainable vehicle maintenance. The project demonstrated a successful model of bridging the skill gap through real-world applications and high-quality vocational training that aligns with industry demand.

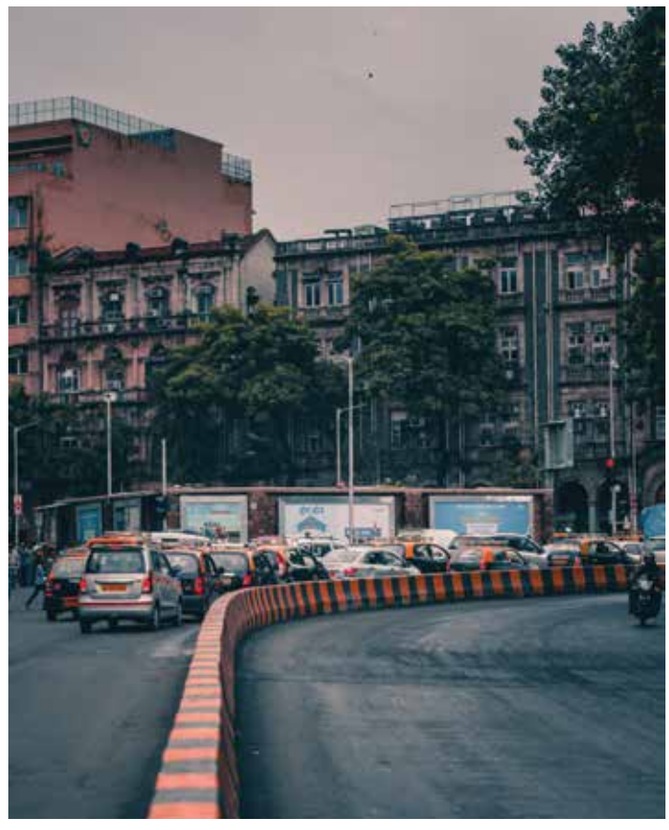
Impact of Technological Change and Future Projections
Technological changes in the Indian automobile sector, such as the shift to electric vehicles (EVs), autonomous systems, and smart manufacturing, are transforming traditional roles and creating demand for new skills in battery technology, AI, IoT, and robotics. These advancements are expected to generate high-value jobs in R&D, software integration, and green mobility while disrupting low-skill manufacturing roles. Future projections indicate a rise in hybrid skill sets, combining mechanical expertise with digital and data proficiency. To safeguard livelihoods, upskilling and reskilling initiatives, supported by industry-academia-government collaboration, will be critical to preparing the workforce for this technological evolution.

ASDC is preparing for this future by continuously updating its programs to focus on these areas, thereby equipping the workforce for sustainable livelihoods in smart and great initiatives position ASDC to support India's growth as a global leader in sustainable automotive solutions.

Conclusion

The Indian automobile sector stands on the cusp of a transformative era, characterized by technological advancements, sustainability initiatives, and a focus on green mobility. To fully harness this potential, bridging the skill gap is imperative. Organizations like ASDC, in collaboration with the government, industry, and academia, are laying the groundwork for a future-ready workforce.

By aligning training programs with emerging trends, fostering regional skilling ecosystems, and leveraging policy support, India is positioning itself as a global leader in automotive innovation. The road ahead may be challenging, but with concerted efforts, the Indian automobile sector is poised to drive sustainable growth, economic progress, and technological leadership.



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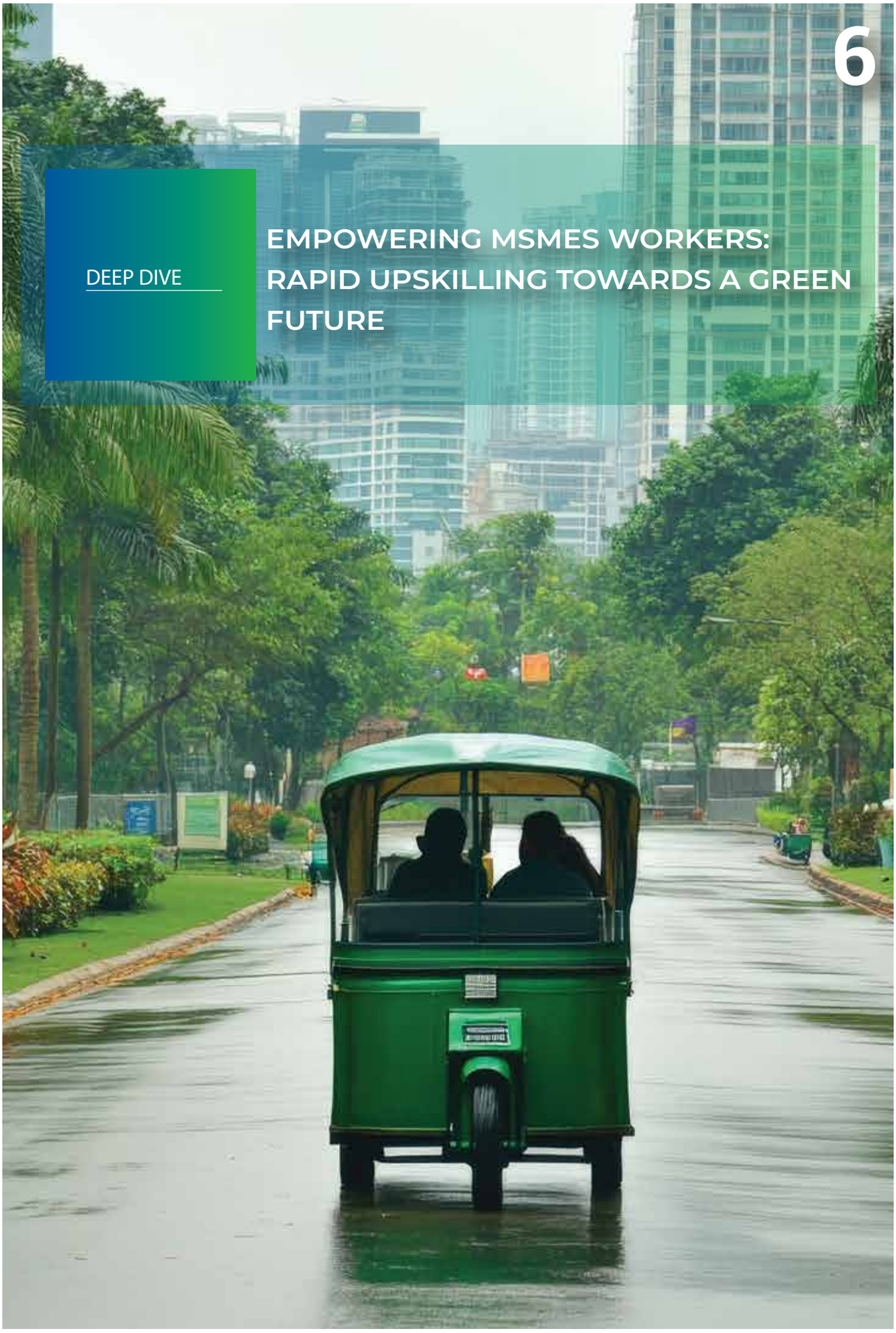
DEEP DIVE

EMPOWERING MSMES WORKERS: RAPID UPSKILLING TOWARDS A GREEN FUTURE



Amitosh Gautam

Senior Manager, Climate, Economics and Finance Program, WRI India

Amitosh works on green skills development in MSMEs where he focuses on decarbonization and just transition for MSME workers. With experience in energy conservation and management, he previously served as Deputy Director at the National Productivity Council. Amitosh holds degrees in mechanical engineering, a post graduate degree in public policy, and a certificate in energy management, with training from the International Energy Agency and Malaysia Productivity Centre. His co-authored research works have been published in the Journal of Cleaner Production.

Ashwini Hingne

Associate Director,, Climate, Economics and Finance Program, WRI India

Ashwini leads the Just Transitions and Equity work in the climate program. With over a decade of experience in climate change mitigation, she focuses on energy economy modelling, sectoral analysis, and policy support. Her work includes assessing India's climate goals, their impacts, and exploring equitable low-carbon transitions. Previously, she worked at Sustainalytics and EY, advising on energy, carbon management, and sustainability strategies. Ashwini holds a Master's in Public and Economic Policy from LSE and a Bachelor's in Chemical Engineering.

Introduction

Climate change presents a significant threat to global economic development demanding urgent action. To counter its adverse effects, governments worldwide have launched various initiatives, including the promotion of low-carbon transition across diverse economic sectors. In India, the manufacturing sector, a major contributor to greenhouse gas emissions, will need to embrace low-carbon strategies, integrate sustainability practices, and cultivate green skills among its workforce, to enable this necessary transition.

Micro, Small, and Medium Enterprises (MSMEs), which contribute 30 per cent to the overall business value added and 62 per cent to employment[1], will need to play a crucial role in this low-carbon industrial transition. These enterprises face significant vulnerabilities from climate change, and the escalating demands for sustainability will only heighten these challenges. Therefore, it is imperative for MSMEs to lower their greenhouse gas emissions, adopt sustainability reporting standards, and invest in upskilling and reskilling their workforce with future green skills.

With limited resources at their disposal, MSMEs will need substantial support to effectively navigate this low-carbon transition. By doing so, they can ensure business continuity and safeguard the well-being of their workforce, ultimately contributing to a just and equitable transition.

Navigating the Low Carbon Transition in India's Automotive Sector

To understand how the transition will affect MSMEs and to support them, WRI India has been engaging with clusters across India[2]. Our engagement with key auto component manufacturing hubs of Tamil Nadu and Maharashtra reveals that Original Equipment Manufacturers (OEMs) in the automotive industry are increasingly committing to sustainable sourcing in response to regulatory changes, such as the Securities and Exchange Board of India's (SEBI) Business Responsibility and Sustainability Reporting (BRSR Core) framework[3] .

To comply with these regulations and mitigate risks from external trade restrictions like the Carbon Border Adjustment Mechanism (CBAM)[4], OEMs are prioritizing the reduction of Scope 3 emissions throughout their value chains. This has translated into heightened expectations for Tier 1 and Tier 2 suppliers, including MSMEs, to embrace resource-efficient practices and transparently report their environmental, social, and governance (ESG) performance. Prominent auto manufacturers like Ashok Leyland are leading the way in greening their supply chains. Their initiatives, such as ESG awards, recognize suppliers, including MSMEs, who make substantial contributions to their annual procurement. Likewise, Mahindra & Mahindra's green procurement policy[5] encourages suppliers to adopt responsible practices. These initiatives not only promote resource-efficient

actions like energy management, material conservation, water efficiency, and waste reduction but also provide MSMEs with the dual advantage of lowering their carbon footprints while becoming cost competitive and reaping financial benefits.

As the physical and transition risks associated with climate change grow, the urgency for suppliers to engage in sustainability reporting will escalate. By prioritizing sustainable practices now, MSMEs can ensure their long-term business continuity with OEMs. They must be made ready in meeting future sustainability-oriented requirements introduced by their buyers and help them position as valuable and responsible partners in this evolving landscape.

Overcoming Challenges and Seizing Opportunities

To stay competitive, MSMEs must embrace technology upgrades and undertake workforce skill enhancement. During our discussions with MSME owners in Tamil Nadu, we uncovered several pressing challenges that must be addressed to ensure that the transition to a low-carbon economy does not deepen existing inequalities. The initial priority for MSMEs is to decarbonize their unit operations through energy efficiency and boost productivity and quality to meet low carbon manufacturing demands from buyers. Achieving this requires that MSME owners are equipped with knowledge about the latest technologies and that they have access to affordable financing options for acquiring or retrofitting energy-efficient equipment. Heightened awareness and uptake of government support schemes, like Manufacturing competitiveness lean scheme (enterprise productivity enhancement), Zero Effect and Zero Defect Scheme (MSME competitiveness), Tamil Nadu's Promotion of Energy Audit and Conservation of Energy (PEACE scheme)[6], can play a crucial role, offering vital subsidies for energy audits and energy-efficient investments.

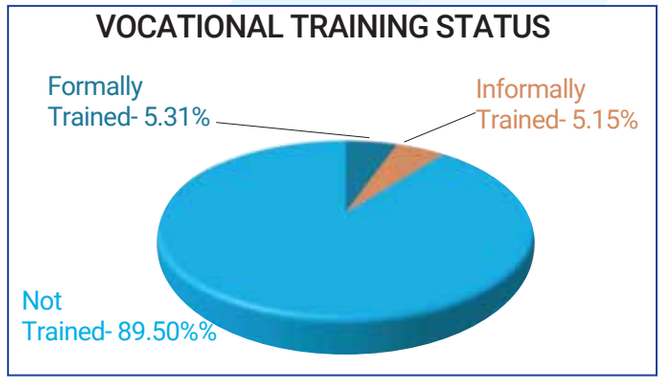
Despite these opportunities, significant hurdles remain, particularly in training the current workforce to effectively utilize energy efficient equipment. Owners in the auto sector have voiced serious concerns about the scarcity of skilled workforce and difficulties with worker retention. As technology advances, this skill gap is poised to expand further, notably in the auto industry, which is shifting from internal combustion engines to electric vehicles (EVs). For instance, MSMEs engaged in foundry work may face declining demand for ferrous castings as the market pivots towards EV, potentially leading to job losses for many workers[7]. To navigate this evolving landscape, these MSMEs may need to pivot to aluminium casting or explore diversification into other markets. No matter what direction they take, the imperative for sustainability necessitates comprehensive upskilling and reskilling of the existing workforce to ensure ongoing employability.

Therefore, to protect the livelihoods of shop floor workers, immediate action is essential to equip them with the green skills. By embracing this, MSMEs can enhance sustainability measures, and build resilience against economic shocks and changing market demands.

Bridging the Skill Divide

Our field research highlights another critical issue that the shop floor workers in automotive component manufacturing MSMEs lack formal credentials obtained through vocational training. This is corroborated by the vocational training status data from the Periodic Labour Force Survey (PLFS)[8] for the Chennai and Coimbatore clusters, revealing that only 5.31% of workers have undergone formal training. Addressing this training gap is essential for enhancing necessary skill levels and industry competitiveness.

Figure 1: Data on vocational training status in the Chennai Cluster



Source: Based on the PLFS 2019-20 survey

Focussed discussions with workers and stakeholders have revealed a pressing need for tailored skill training programs that effectively bridge specific skill gaps and enhance operational expertise, to facilitate the critical transition within the sector. Many MSME owners report that their shopfloor workers typically obtain only 3-5 days of on-the-job training from supervisors. These trainings focus primarily on production processes and fails to equip the workers with the essential green skills needed for a successful low-carbon transition. Furthermore, MSME owners are often hesitant to invest in training due to high attrition rates, fearing that well-trained workers may leave for better paid opportunities with their competitors.

It is important to understand that many of these workers, often migrants from nearby states, are reluctant to pursue formal training. Their reluctance is primarily due to the transient nature of their job, and the significant opportunity cost of attending training instead of earning a daily wage. Moreover, in most cases, they see little to no increase in pay after completing such training, which diminishes their motivation to engage in the process. Workers are frequently hired through private labour contractors, and therefore lack formal employment contracts, a situation corroborated by a research study[9] highlighting that a significant portion of non-agricultural workers in India do not have formal employment contracts.

Additionally, vocational training agencies seldom focus on learning needs of MSME workers, contributing to lesser adoption. Lengthy training programs along with requirements for pre-qualifications (often a Class 8 pass), deter workers participation. Considering the diverse

educational backgrounds of MSME employees, it is essential to implement and evaluate new approaches for enhancing their skills. Training programs should focus on upskilling the existing workforce through experiential learning to enable them to take advantage of new opportunities presented by transition. While Recognition of Prior Learning programs are available, they may require updating and additional training to sufficiently address the specific transition needs of the industry.

As the shift toward Electric Vehicles (EVs) unfolds, new skill gaps in precision manufacturing, knowledge of material science, and the adoption of international standards are rapidly emerging. To bridge these gaps and empower workers with the necessary skills, targeted and short-term bridge courses are essential. Therefore, it is essential to invest in training program upgradation, to not only benefit individual workers but also strengthen the overall sector during this critical transition.

A Roadmap of Green Skilling for MSMEs

To effectively tackle the significant skill gaps that MSMEs will face in their low-carbon transition, a flexible capacity-building approach is not just beneficial but essential. Programs delivery must be planned to take into consideration, that it minimizes the disruptions to MSME operations while providing necessary workforce training, to ensure maximum participation and engagement among workers. Using innovative tools like virtual reality and digital twins can revolutionize learning experiences, catering to diverse learning styles and needs.

To truly customize training programs for MSME clusters, we must engage key stakeholders, including industrial associations, technical experts, supply chain leaders, OEMs, and government agencies. This collaborative model not only improves the relevance and quality of training content but also simplifies certification and credential assessment processes, ultimately empowering the entire ecosystem.

Collaborating with technical experts to develop these course modules with a case study-based approach using bite-sized video modules is vital to foster learning. This approach will fit seamlessly into the working schedules of the MSME workforce, ensuring they develop the skills through an interactive learning environment. Implementing Training-of-Trainer (ToT) programs will also be a key step for cultivating local trainers who will champion the success and sustainability of these training initiatives in long run.

Original Equipment Manufacturers (OEMs) also possess a unique opportunity to lead the charge in the low-carbon transition by empowering MSMEs with impactful green procurement policies. By prioritizing sustainable sourcing, OEMs can inspire these smaller businesses to adopt eco-friendly practices. Furthermore, investing in workforce training through their supplier development programs and corporate social responsibility initiative is essential without which sustainable sourcing and procurement policies will fail to achieve their purpose. By showcasing inspiring success stories at supplier summits and vendor development meets, OEMs can motivate others to pursue these initiatives, illustrating the concrete benefits of taking decisive action.

Conclusion

In conclusion, while MSMEs often grapple with resource limitations, it is imperative to tackle the specific challenges faced by various MSME to ensure a successful shift towards low-carbon practices. The strategy must be all-encompassing, incorporating research to identify emerging needs, evaluating existing skill gaps, and designing tailored training programs with strong mentoring and support. By concentrating on these key areas, MSMEs can be empowered to strengthen their climate resilience, and foster sustainable growth. This initiative will not only unlock exciting new market opportunities for MSMEs but will also ensure a fair and just transition for their most vulnerable workers.

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Views expressed by the authors in this opinion piece are personal and do not reflect the views of NSDC or WRI

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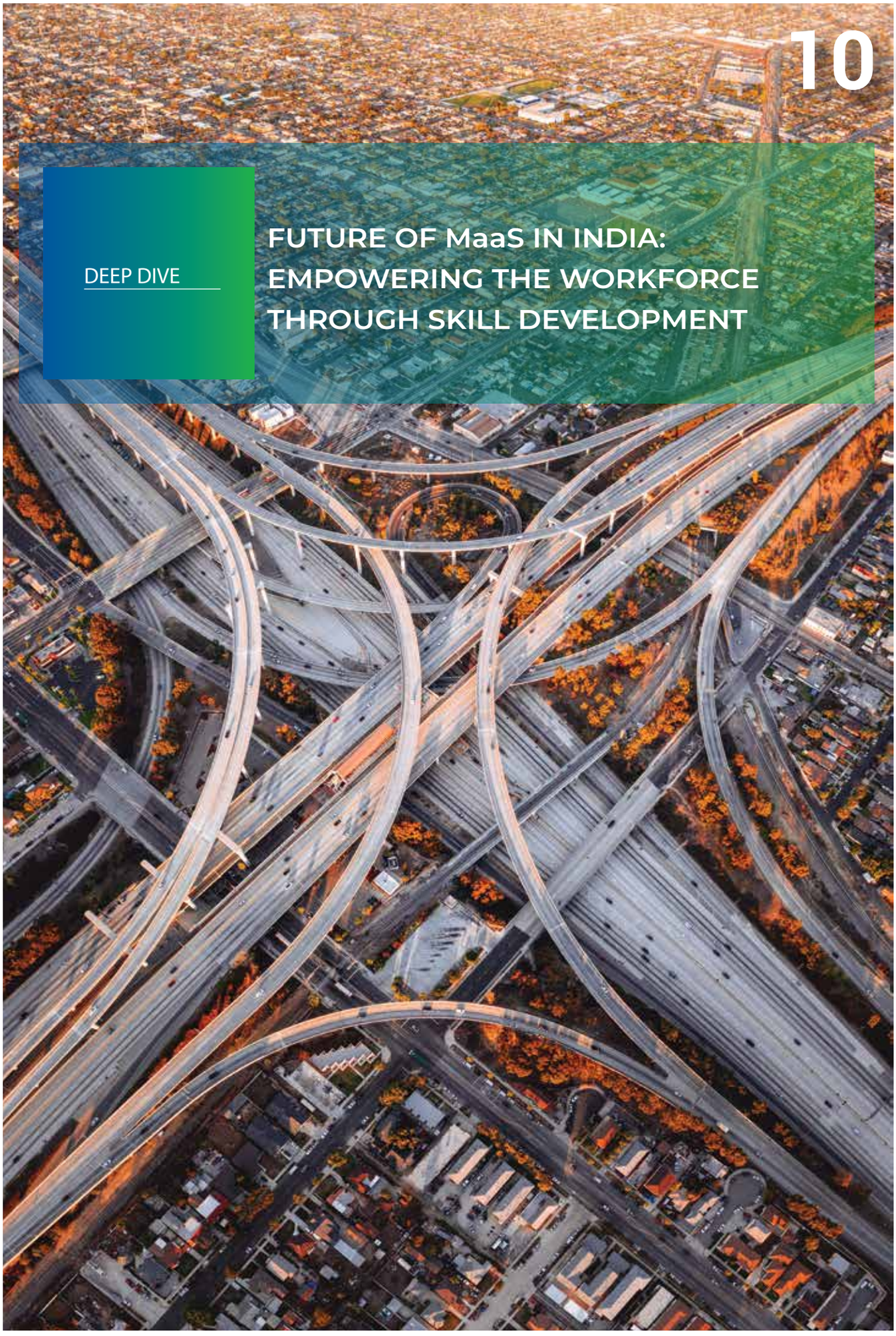
DEEP DIVE

FUTURE OF MaaS IN INDIA: EMPOWERING THE WORKFORCE THROUGH SKILL DEVELOPMENT



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Iwin is a communications professional with over 15 years of experience with semiconductor, technology, transportation, aviation, education, startup, and AI & IoT. By collaborating closely with leadership, she formulates brand messaging that resonates with target audiences, develops effective communication strategies, and builds strong media relationships, ultimately boosting corporate visibility and reputation. She holds MS Communications from Manipal Institute of Communication, Manipal.

Introduction

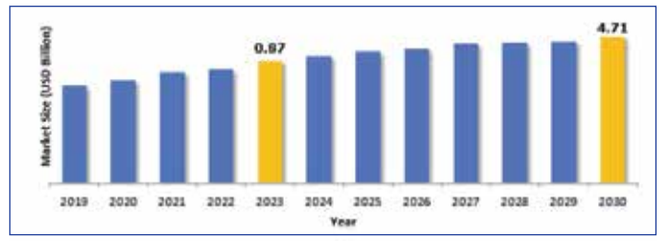
Mobility as a Service (MaaS) is an innovative approach to transportation that integrates various transportation services (buses, trains, taxis, car rentals, bike-sharing, etc.) into a single platform for users to plan, book, and pay for their travel seamlessly. India's Mobility as a Service (MaaS) Market size was estimated at US$ 870 million in 2023[1]. India's rapid urbanisation has required effective means of mobility and transportation management to prevent congestion, pollution, and traffic-related urban problems. Here MaaS could revolutionize how people move within cities. Led by the emergence of mega-trends (electrification and connectivity), India is undergoing a massive transformation in mobility. Enabled through disruptive technologies, new business models/solutions have started to emerge across automotive value chain—opening ample opportunities to explore in Mobility as a Service (MaaS). As MaaS systems evolve, there is a growing need to equip a new workforce with the skills required to support this transformation.

The State of Mobility in India

India's urban mobility landscape is grappling with a range of complex challenges that hinder efficient transportation and contribute to growing concerns over environmental sustainability. Public transport systems, especially in megacities like Delhi, Mumbai, and Bengaluru, are severely overburdened, with overcrowding and delays becoming daily frustrations for millions. Traffic congestion is a pervasive issue, leading to longer commute times, increased fuel consumption, and more pollution. Additionally, air pollution has reached alarming levels in many cities, contributing to a public health crisis. The need for better transportation is pushing government and authorities to develop sustainable solutions, such as the Smart Cities Scheme or Atal Mission for Rejuvenation and Urban Transformation (AMRUT), which lay heavy focus on improving urban mobility and public transport systems. To meet these objectives, the government has invested heavily in mass transportation schemes such as metro rail, bus rapid transit system (BRTS) and mass rapid transit (MRT). However, such schemes keep operating independently and seldom integrate with each other.

Amid these challenges, India has seen a surge in the adoption of digital mobility solutions. Mobile apps have become central to the daily commute, with ride-hailing services like Ola, Uber, Rapido, BlueSmart, etc., transforming urban transport.

Figure 1: India Mobility as a Service (MaaS) Market Size by Value (US$ Billion), 2019-2030



Source: BlueWeave Consulting

With the introduction of unified metropolitan transport authorities (UMTAs) in various cities in India will help to link the metro rails with last mile connectivity. UMTAs – like equivalents in Singapore, Paris, and Vancouver – can streamline, coordinate, and plan urban transport projects and integrate management across transport modes. In 2006, Indian government asked 53 cities with populations over 1 million to set up UMTAs. In 2019, these were established in 15 cities[2].

Connect Bharat: What is MaaS?

Mobility as a Service (MaaS) is a comprehensive, user-centric transportation model that integrates various transportation options into a single digital platform. Through a mobile app, users can plan, book, and pay for different modes of transport—such as buses, trains, ride-hailing services, bike-sharing, car rentals, and even electric vehicles—seamlessly. The MaaS platform aggregates these services, offering travellers a convenient and flexible alternative to traditional car ownership, while promoting multi-modal mobility.

Figure 2: Future of Mobility – 7Cs Vision and Modes of Transport

Source: India Smart Mobility Ecosystem Researchgate[3]

Internationally, MaaS has gained traction in countries like Finland, where the Whim app allows users to access various transport modes on a pay-per-use basis, including taxis, buses, and bikes. Similarly, Singapore's integrated transport systems link various modes of public and private transport to create a unified, efficient mobility solution for its residents. These examples highlight how MaaS can streamline travel, reduce congestion, and offer affordable, sustainable alternatives.

The urban transport system in London[4] exemplifies integration across all three pillars—service, physical, and fare. Transport for London (TfL) is the governing authority that oversees comprehensive urban transport planning and operations. The system integrates fixed infrastructure and operations by linking interchange stations, which are physically connected and designed to handle high passenger volumes efficiently while accommodating multiple transport modes. Features such as island platforms and dedicated passages facilitate smooth transfers between lines. Fare integration is achieved using Oyster cards, which are valid across all urban transport modes under a unified fare system.

In the Indian context, MaaS can help integrate existing transport networks—such as metro and bus services—with newer solutions[5] like ride-hailing, car-sharing, and electric vehicles. By creating a unified platform, MaaS could make urban mobility more convenient, cost-effective, and environmentally sustainable. It could reduce dependency on private cars, alleviate traffic congestion, and lower carbon emissions, all while improving access to affordable transportation for people across income groups.

> Kochi is India's first city to implement Mobility as a Service (MaaS), integrating traditional transport modes like water ferries, auto-rickshaws, and city buses with the newly operational Kochi Metro Rail into a unified system[6].

A key imperative for India's mobility future is building **Safe, Adequate, and Holistic Infrastructure (SAHI)** for all citizens, including women, the elderly, and Persons with Disability (PwD). This infrastructure should address all connectivity needs **urban-to-urban**, **urban-to-rural**, and **rural-to-rural**. Existing schemes like Pradhan Mantri Gram Sadak Yojana (PMGSY) and Ude Desh ka Aam Naagrik (UDAN) are steps in the right direction, but continued focus is needed. Key priorities include:

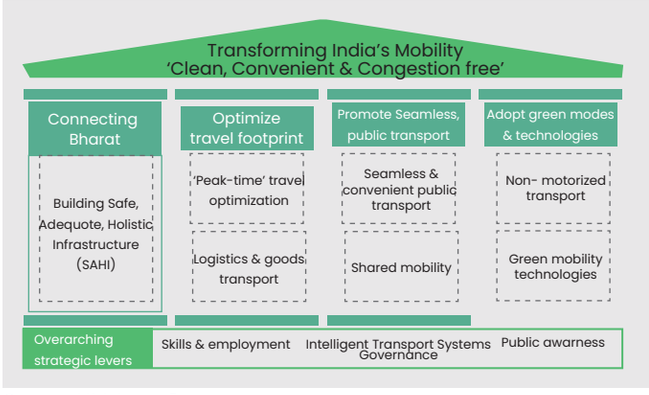
- Enhanced safety and accessibility
- Integrating multiple transport modes (road, rail, waterways, regional airports, etc.)
- Greater use of data for comprehensive mobility solutions.

Transforming India's Mobility: Path to the Future

The magnitude and complexity of our mobility challenges requires a comprehensive framework that addresses the issue holistically. The high population density growth, coupled with our economic growth aspirations warrants a tailored approach, unique to our context. It is worth noting that both the central and local Governments have come out with various initiatives like National Urban Transport Policy, the Auto Fuel and Vision Policy & the National Electric Mobility Mission Plan 2020. There are also

multiple examples (highlighted later) of local Governments experimenting and, often succeeding, with localized solutions. Learning from these past efforts as well as global best practices, a multi-pronged approach is proposed, as detailed in figure 3. The framework proposes imperatives around four key pillars, (a) Connect Bharat (b) Optimize travel footprint, (c) Promote seamless, co-operative transport, and (d) Adopt green modes and technologies. These pillars must be well supported by a common set of enablers – Skills & Employment, Intelligent Transport Systems, Public Awareness, Governance & Financing.

Figure 3: Transforming India's Mobility—Clean, Convenient, & Congestion Free



Source: Niti Aayog[7]

Skilling in the Context of MaaS

As Mobility as a Service (MaaS) continues to evolve, it will not only reshape the way people move but also create a host of new job opportunities. This transformation will require significant upskilling of both the existing workforce and the new talent entering the mobility ecosystem. MaaS will require skilled professionals across a range of sectors, creating demand for a wide variety of skill sets in both the public and private sectors.

Key Skills for MaaS

MaaS relies heavily on advanced software platforms, app development, data analytics, and cloud-based solutions. Professionals with expertise in software development, artificial intelligence (AI), machine learning, and data science will be in high demand to design, implement, and maintain the platforms that power MaaS solutions.

As MaaS integrates various transportation services, individuals skilled in transportation management, fleet operations, and logistics will be crucial. The ability to manage large, connected systems that combine public and private transport, including electric vehicles, will require specialized training.

With MaaS platforms increasingly promoting electric vehicles and shared mobility, there will be a growing need for professionals skilled in EV maintenance, charging infrastructure, and green technologies to ensure sustainable operations.

MaaS requires a focus on customer-centric services. Professionals with soft skills in customer support, driver management, and user experience design will be essential to ensure that MaaS platforms are user-friendly, reliable, and responsive to customer needs.

Additionally, for MaaS to thrive in India, it is essential to address the digital divide. A sizeable portion of Indian population still lacks basic digital literacy. For MaaS platforms to be effective, there must be a concerted effort to equip people with the skills necessary to navigate and utilize these digital platforms effectively. Training programs aimed at improving basic digital skills will be key in enabling broader participation in MaaS systems, ensuring that the technology is accessible to all, including those in rural and underserved areas.

The Role of Government, Education, and Private Sector

The Indian government plays[8] a pivotal role in fostering the growth of MaaS by implementing policies and initiatives that encourage sustainable and integrated mobility solutions. Programs like the NEMMP (National Electric Mobility Mission Plan) and the FAME India Scheme (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) are designed to boost the adoption of electric vehicles, a key component of MaaS systems. Through the Smart Cities Mission, the government is also investing in urban infrastructure and digital solutions that could seamlessly integrate various transportation modes, laying the groundwork for MaaS adoption. Furthermore, the government is providing financial support[9] for the development of EV charging infrastructure, digital payment systems, and integrated transport platforms, all of which are crucial for MaaS to function efficiently.

In terms of skilling, government programs such as Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and the Skill India Mission are essential for preparing the workforce for the emerging MaaS ecosystem. These initiatives focus on providing training in areas like digital literacy, EV maintenance, and software development, helping bridge the skills gap in this fast-evolving sector.

The private sector, particularly companies like Ola[10] , Uber, and Bounce is already driving MaaS innovation in India. These companies are not only shaping the MaaS landscape but also creating employment and training opportunities in areas like app development, data analytics, and fleet management. Public-private partnerships (PPP) can further accelerate the development of training centres and workforce skilling programs, ensuring a steady supply of talent for the MaaS ecosystem.

Educational institutions also play a critical role by adapting curricula to include courses on sustainable transport, smart city technologies, and mobility solutions. Collaborations between universities, private companies, and government bodies can help create specialized training programs in MaaS technologies, ensuring that students and professionals are equipped with the right skills to meet the demands of this growing sector.

India is seeing growing investment in mobility infrastructure, with significant foreign capital flowing into the sector. Smart transport systems are attracting global investors, thanks to India's open investment policies. For example, in 2019, Roadis (a Canadian pension fund subsidiary) and the National Investment and Infrastructure Fund committed up to US$ 2 billion for road projects. Similarly, Macquarie Infrastructure pledged US$ 1.45 billion for 650 km of roads. These investments highlight the growing opportunity in India's evolving mobility landscape.

By 2036, India will need to invest $840 billion in infrastructure - an average of $55 billion or 1.2 percent of GDP per annum[11]. Government smart cities project would potentially spend US$10 billion only on transportation. The government, transport operators and service providers should all work together towards a sharing ecosystem. MaaS is one such mechanism that will allow utilization of all modes keeping passenger in the centre of things.

India's rapid growth in population and wealth over last few decades has led to considerable strain in its transport infrastructure. Since 1980, the country's population has nearly doubled (~90% growth). In the same period, its Gross Domestic Product (GDP) per capita grew by more than 5 times, with most of the growth recorded in the period post 2000. Based on research examining the relationship between transport demand, population and wealth – transport demand has increased by almost 8 times since 1980. As seen in figure 4, this growth in unprecedented and much higher relative to any other Asian economy. This large growth, in the absence of a widespread public transport system, has caused a rapid increase of private car ownership in India. The number of registered motor vehicles has gone up from 5.4 million in 1981, to 210 million in 2015, a 40-fold increase. Urban areas have seen rapid growth. However, due to lack of integrated mobility planning, it has resulted in making our cities amongst the most polluted & congested. This is a key challenge which has to be addressed.

Figure 4: Indexed Estimated Growth in Travel Demand (1980=100)

Source: World Bank, OECD, National Centre for Sustainable Transportation, BCG Analysis

Challenges and Opportunities in MaaS Skilling

One of the key challenges in MaaS skilling is scalability. The rapid growth of the MaaS sector demands a vast workforce, yet the current skilling infrastructure in India is still growing. Preparing millions of people for roles in MaaS-related fields, such as app development, electric vehicle maintenance, and mobility operations, is a huge task. Additionally, access to training is an issue, especially in remote rural areas and growing smaller cities, where formal skilling programs on MaaS technologies and

digital tools are limited. Furthermore, as MaaS intersects with emerging technologies like electric vehicles, AI, IoT, and big data, there is a significant skills gap. The demand for specialized expertise in these fields may outstrip the availability of qualified professionals, hindering the growth of the MaaS ecosystem.

NSDC, as the driving force behind India's skill development landscape, plays a crucial role in the Mobility as a Service (MaaS) sector. By fostering partnerships with industry leaders, educational institutions, and government agencies, NSDC is actively working to bridge the skill gap and create a skilled workforce to support the growth of MaaS. NSDC's efforts in skilling and training for the MaaS sector include developing industry-relevant curricula, accrediting training providers, and facilitating job placements for skilled professionals. By equipping individuals with the necessary skills in areas such as electric vehicle technology, autonomous vehicle systems, and digital mobility solutions, NSDC is empowering them to contribute to the transformation of India's transportation landscape.

Despite these challenges, MaaS presents significant opportunities for India. The sector is poised to create new job roles across various domains, including drivers, data analysts, tech support, and infrastructure managers. MaaS can also stimulate innovation and entrepreneurship, encouraging startups that focus on niche areas like last-mile connectivity, sustainable transport, and smart traffic management. Most importantly, by aligning skilling programs with the needs of the MaaS industry, India can create a future-ready workforce, positioning the country as a leader in the global shift towards smart, sustainable mobility.

Conclusion

In summary, Mobility as a Service (MaaS) offers a transformative solution to India's urban mobility challenges, including traffic congestion, pollution, and inefficient transport systems. By integrating various transportation modes into a single, user-friendly platform, MaaS has the potential to revolutionize how people travel in Indian cities, making mobility more convenient, cost-effective, and sustainable. However, its success depends on the skilling of the workforce to meet the technological and operational demands of this new mobility ecosystem.

To fully unlock the potential of MaaS in India, a collaborative approach is required. The government, private sector, and educational institutions must work together to create and scale skilling programs that align with the needs of this emerging industry. By investing in skilling initiatives today, India can ensure that its workforce is not only equipped to support MaaS but is also poised to lead in the global transition toward smart, sustainable, and digital mobility solutions. It is important to build financially sustainable & commercially attractive solutions for urban India, and this new phase of mobility will continue to provide opportunities to develop solutions.

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DEEP DIVE

THE EV SECTOR IN INDIA: PIONEERING A SUSTAINABLE FUTURE

S Rahul

Consultant, Research & Impact, NSDC

Rahul is a consultant with a diverse background spanning business development, entrepreneurship, and content creation. Having honed his skills in corporate, startup, and freelance environments, he aims to bring his unique perspective to the skilling sector. His passion for social impact, sustainable development, and policy research helped him transition to this domain.

Introduction

Electric Vehicles (EVs) have emerged as a pivotal element in the global pursuit of sustainable mobility. India, with its ambitious vision for green growth, is uniquely positioned to lead this transition. While the global EV sector continues to evolve with technological advancements and policy interventions, India is making significant strides in affordability, infrastructure, and innovation. This article examines the global EV landscape, India's progress, and the policy measures required to accelerate adoption and establish India as a global EV hub.

The Global Electric Vehicle Landscape

The global EV market has grown at an unprecedented rate, driven by a combination of favourable policies, rising environmental awareness, and technological advancements. According to the IEA (International Energy Agency) Global EV Outlook 2024 report, in 2023, global EV sales surpassed 14 million units, accounting for 18% of all new car sales. By 2024, this figure is expected to rise to 17 million units.

However, the global transition to EVs has not been without challenges. Dependence on raw materials like lithium and cobalt, limited charging infrastructure, and high upfront costs continue to impede progress in many regions. In response, global players have focused on software innovations and battery efficiency to mitigate these obstacles, providing valuable lessons for emerging markets like India so that the aspirational goal set at COP26 Summit to achieve at least 30% electric vehicles in the private automobile segment by 2030 is fulfilled successfully.

India's Electric Vehicle Ecosystem

India's automotive industry plays a vital role in its economy and is central to the transition to electric mobility. India is the world's largest producer of two- and three-wheelers, the second-largest manufacturer of buses, and the leader in tractors. These strengths position the country as a key player in the global EV market.

Contributing 7.1% to GDP and 49% of manufacturing GDP, the automotive sector has a total market valuation of $222 billion. The EV market, valued at $2 billion in 2023, is projected to grow to $7.09 billion by 2025, with 10 million annual sales by 2030, growing at a CAGR of 49%. The industry also accounts for 8% of India's total exports and 40% of R&D spending, reflecting its focus on innovation[1,2].

The sector employs 37 million people, with plans to create 50 million jobs by 2030, driven by EV growth and supporting industries. With over 1.39 million EVs on the road as of August 2022, this number is expected to reach 45–50 million by 2030, solidifying India's position as a global EV leader[3].

India is steadily transforming its mobility sector with robust policies, expanding infrastructure, and strong

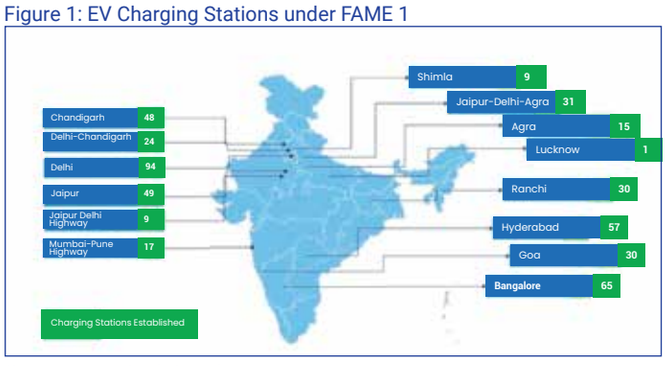
industry participation.

India's Policy Framework & Comparative Advantage

1. **Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME)** scheme has been pivotal in promoting EV adoption.

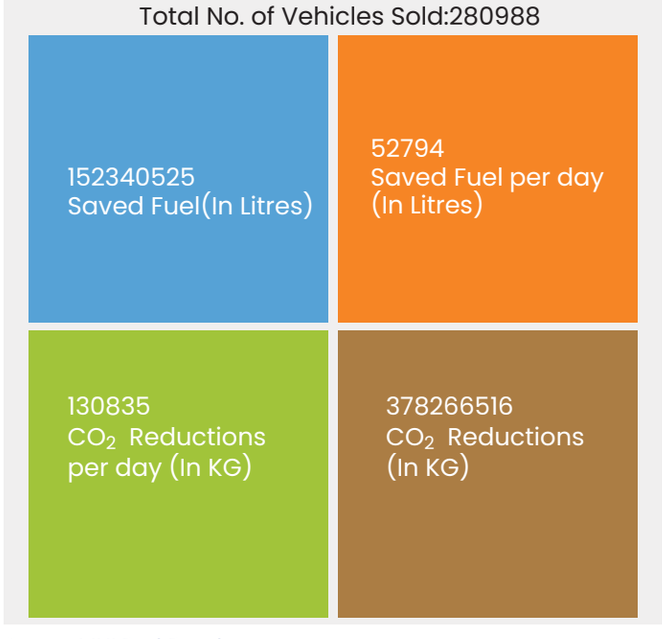
    - **FAME Phase I (2015–2019)**: This phase focused on four areas—demand creation, technology platforms, pilot projects, and charging infrastructure. Subsidies were provided to reduce purchase prices, enhancing consumer interest.

Figure 1: EV Charging Stations under FAME 1



Source: MHI DashBoard

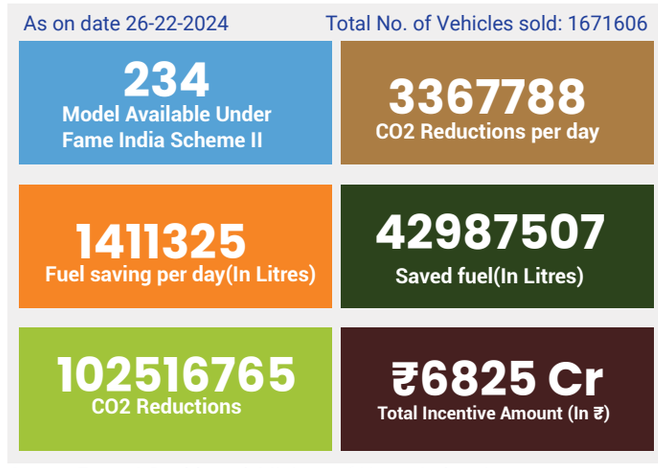
Figure 2: Achievements under FAME 1



Source: MHI DashBoard

    - **FAME Phase II (2019–present)**: With an outlay of USD 1.36 billion, this phase emphasizes public and shared transportation. It provides subsidies for 7,000 e-buses, 500,000 e-three-wheelers, 55,000 e-four-wheelers, and 1 million e-two-wheelers. Charging infrastructure is also a key focus, with the scheme supporting its development across the country. Amendments in 2021 extended the scheme till March 2024, increased subsidies for electric two-wheelers, and allowed discounts of up to 40% of the vehicle cost.

Figure 3: Achievements under Fame 2 (a)



Source:Fame 2 Dashboard, Ministry of Heavy Industries (as on 26.11.2024)

Figure 4: Achievements under Fame 2 (b))

Wheeler Type	Total No. of Vehicles
2 wheeler	1469343
3 wheeler	178952
4 wheeler	23311

Source:Fame 2 Dashboard, Ministry of Heavy Industries (as on 26.11.2024)

2. **Production Linked Incentive (PLI) Scheme:**

    - **Production Linked Incentive (PLI) Scheme** for Advanced Chemistry Cell (ACC) battery manufacturing was launched with an outlay of ₹18,100 crore (approximately $2.4 billion). It aims to establish a 50 GWh battery manufacturing capacity in India. This capacity is critical for reducing reliance on imports, which currently meet 80% of India's battery demand. [4,5]

    - Additionally, the PLI Scheme for the automotive sector, with an outlay of ₹25,938 crore (approximately $3.5 billion), has received 115 proposals from industry players. This initiative is expected to attract investments worth ₹42,500 crore, generate employment for over 750,000 people, and catalyze the production of 5 million EVs annually by 2026. These figures highlight the PLI Scheme's transformative impact on India's EV ecosystem. [6,7]

India's EV sector has distinct strengths but also faces Building a Skilled Workforce for EVs

Comparative Advantages

Affordable Models:

According to IEA's Global EV outlook 2024 report, India leads globally, with two- and three-wheelers comprising 80% of EV sales in the country. These segments offer affordable mobility solutions, with prices starting as low as ₹60,000 ($750) for electric two-wheelers.

Localized Supply Chains:

Due to enhanced investment in the sector, companies like Reliance Industries, Ola Electric, and Hyundai are setting up giga factories, with projected investments exceeding ₹42,500 crore ($5.3 billion) in the EV ecosystem.

Skill-Driven Ecosystem:

- **Employment Impact:** India's automotive sector currently employs 37 million people, with the potential to generate 50 million direct and indirect jobs by 2030 due to EV growth.
- **Green Skilling:** Under initiatives like PMKVY 4.0 and SANKALP, the government has launched EV-specific training programs, skilling over 1.9 lakh apprentices in FY 2023–24 alone.
- **Inclusivity:** Programs like Project Shakti and Project Jeevika focus on training women and rural workers in EV maintenance and driving, broadening workforce participation[8].

Infrastructure Expansion

India has established over 12,000 public charging stations as of 2024, with plans to scale up significantly by 2030.Projects like battery swapping stations and renewable-powered chargers aim to enhance accessibility in semi-urban and rural areas.

Building a Skilled Workforce for EVs

India's green job landscape is crucial for the success of its EV sector, integrating inclusive skilling initiatives to meet market demands.

Key Skilling Programs

1. Electric Vehicle Service Technician Training:
   - Provides hands-on training in diagnostics, maintenance, and safety protocols.
2. High Voltage EV Fire Safety Training:
   - Addresses emergency handling and fleet safety management.
3. Grassroots Engagement:
   - Programs like Kaushal Rath train informal workers like mechanics to transition into EV servicing.
4. Certifications aligned with ISO and ILO standards ensure Indian EV professionals meet global benchmarks, opening opportunities for international employment.

Policy Considerations for India's EV Sector

To accelerate the adoption of electric vehicles (EVs) and establish India as a global hub for sustainable mobility, focused and adaptive policies are required. These policy interventions should address challenges in affordability, accessibility, and infrastructure while fostering innovation and inclusivity. Based on the critical focus areas, here are the key policy considerations using the Bain analysis[9] :

1. Support for Affordable Products

To make EVs accessible to mass-market consumers, particularly in rural and semi-urban areas, certain measures could be explored:

- Extending subsidies for entry-level models beyond premium categories, ensuring pricing parity with popular Internal Combustion Engine (ICE) vehicles.
- Encouraging the development of vehicles that balance cost with acceptable performance and range, particularly for rural and semi-urban consumers.
- Promoting Research and Development (R&D) incentives for cost-efficient battery technologies and lightweight vehicle designs.

2. Expanding EV Accessibility Beyond Metro Cities

Expanding EV adoption in Tier 2 and Tier 3 cities could involve:

- Incentivize the establishment of lean, cost-efficient dealership models that cater to smaller cities.
- Launch widespread awareness campaigns highlighting the total cost of ownership (TCO) benefits of EVs, especially for rural consumers.
- Provide financial support to EV dealerships to offset lower service revenue compared to ICE models.

3. Prioritizing Fleet Electrification

Electrifying fleet and business segments could help create immediate momentum for EV adoption. Possible interventions include:

- Offering tax breaks or lower interest rates for

businesses transitioning their fleets to EVs.

- Facilitating long-term partnerships between manufacturers and fleet operators through policy-backed agreements.

- Supporting infrastructure development for fleet-specific needs, such as dedicated charging zones for logistics hubs and fleet depots.

4. Incentivizing Software Innovation

Software innovation can play a transformative role in improving EV performance and profitability. Measures to foster this include:

- Establish funds or tax incentives for EV manufacturers investing in software R&D, especially for battery management and safety systems.

- Promote open standards for software integration to enhance interoperability across EV brands, charging stations, and other digital ecosystems.

- Encourage collaboration between the automotive and technology sectors to develop advanced, customer-friendly software features.

5. Scaling Charging Infrastructure

The development of charging infrastructure is critical to supporting EV adoption. Potential measures to address this include:

- Subsidizing the installation of both slow and fast chargers in public and private spaces, prioritizing underserved areas.

- Introducing incentives for battery swapping stations catering to commercial use cases like delivery fleets and auto-rickshaws.

- Mandating EV-ready infrastructure in new residential, commercial, and public developments, ensuring charging accessibility for all.

Conclusion: A Roadmap for Success

India's electric vehicle sector stands at a critical juncture, with the potential to reshape the country's transportation landscape and contribute significantly to its green economy. While existing policies like FAME and PLI have laid a solid foundation, the integration of nuanced interventions is essential for addressing gaps in affordability, accessibility, and infrastructure.

By focusing on customer-centric designs, expanding distribution networks, prioritizing fleet electrification, driving software innovation, and scaling charging infrastructure, India can unlock the full potential of its EV ecosystem. These measures, coupled with robust skilling initiatives and public-private partnerships, will not only accelerate EV adoption but also establish India as a global leader in sustainable mobility. The journey ahead is challenging, but with strategic foresight and targeted policies, India can drive towards a cleaner, greener, and more inclusive future.

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IN CONVERSATION

ENTREPRENEURSHIP IN EV: MAKING IN INDIA, DESIGNING FOR THE WORLD

Madhumita Agarwal

Founder & CEO Oben Electric

Team NSDC Connect in conversation with Ms. Madhumita Agarwal. Ms. Agarwal is the founder of Oben Electric, an electric two-wheeler startup based in Bengaluru. With over 7 years in the EV sector, she has led the development of a high-performance, made-in-India electric motorcycle. Under her leadership, Oben Electric raised over INR 120 Crores. Madhumita has received multiple awards, including 'BW Auto World 40 under 40' and 'EMobilityPlus 40 under 40'. She holds degrees in BioTech Engineering, Law, and an MBA from IIM Bengaluru.

Ragini: Hello Madhumita! Thanks for taking the time to interact with team Connect. Can you tell us about your career journey and what inspired you to launch Oben?

Madhumita: Thank you for having me! I am excited to share my journey on a platform like NSDC Connect, which focuses on skilling and livelihoods. After graduating from IIT Kharagpur and IIM Bengaluru, I worked in corporate roles before venturing into entrepreneurship. My first business in tech and IP consulting grew into a 100-person team with a global presence. This experience deepened my understanding of R&D and innovation. It was also during this time that I discovered the EV sector, handling numerous projects, which led to my "Eureka" moment. In 2020, I founded Oben Electric, combining my entrepreneurial drive with expertise in EVs.

Ragini: What was your vision behind starting Oben Electric?

Madhumita: My vision was to tackle the challenges of our technology-driven world while contributing to the rapidly evolving EV industry. With six to seven years of experience in the sector, I saw an opportunity to make a real impact. The goal was to create a company that combines technical expertise with a focus on high-quality, well-designed, and accessible products. One of our biggest hurdles initially was hiring the right talent, as the EV sector was still emerging, and skilled professionals were scarce—a challenge that persists today and requires innovative solutions.

Ragini: How has your entrepreneurial journey been, and what drives you?

Madhumita: My journey has been a mix of challenges and exhilaration. Building something from scratch is deeply fulfilling. Whether it was my first venture or Oben Electric, I have always been driven by the thrill of solving problems. Running a business, especially in an emerging sector like EVs, demands an all-in approach—there are no weekends or fixed schedules. But for me, it is exciting. There is a constant push to innovate, adapt, and grow. It is about putting your heart into what you do and enjoying the process of finding solutions.

Ragini: How has your background shaped your approach to business?

Madhumita: My background in technology consulting taught me the value of R&D, innovation, and building strong teams. At Oben Electric, these principles drive our focus on pushing boundaries and fostering growth. The Indian EV industry is still emerging, with significant potential. Our goal is to address challenges, innovate, and nurture a skilled workforce for long-term impact, making Oben Electric a platform for change and entrepreneurship in the EV space.

Ragini: In your role as Founder and CEO of Oben Electric, how do you approach the issue of skill development in

Madhumita: Skill development is a multi-faceted challenge, especially in a startup environment. Startups require a very different mindset and set of skills compared to more traditional workplaces. It is not just about technical or non-technical knowledge acquired through education; it is about adapting to a dynamic, fast-paced setting where problem-solving and initiative are critical.

One of the most essential skills we look for is the attitude to solve problems. This mindset—to embrace challenges, think critically, and figure out solutions independently—is invaluable in a startup. Unfortunately, this is not something taught in classrooms or covered by existing courses. It is developed through experience, hands-on learning, and a willingness to ask tough questions.

In startups, the ability to adapt and problem-solve is just as important as formal qualifications like being an engineer or having expertise in a specific domain. We have noticed this gap in the current education system, where students often rely on structured guidance rather than cultivating a proactive mindset. Addressing this at the foundational level—in schools and colleges—is crucial to equipping the workforce for industries like EVs.

Ragini: Could you elaborate on how you address these challenges in your company?

Madhumita: Based on our experience, the skill development needs of the EV sector can be categorized into three distinct layers:

1. R&D and Innovation Teams

This group includes fresh graduates or young professionals with engineering backgrounds. To equip them for real-world challenges, colleges should emphasize hands-on training through internships and field projects, similar to my experience at IIT. This approach will foster the problem-solving mindset needed in R&D roles.

2. Senior-Level Management and Industry Experts

The EV sector in India is new, even for seasoned professionals from traditional automotive backgrounds. There is a significant gap in upskilling senior management to understand EV technology. Establishing continuous learning and knowledge-sharing ecosystems for leadership will bridge this gap and strengthen the entire industry.

3. Blue-Collar Workforce

The blue-collar workforce in EV manufacturing is vital for scaling production. However, there is a shortage of skilled workers for EV-specific processes. Tailored on-the-job training programs are crucial to upskill this segment and meet the growing demand for EV production.

At Oben, we have faced challenges across all three layers. To bridge these gaps, we have relied heavily on internal training programs, rigorous learning sessions, and self-driven initiatives. While this has helped us address our immediate needs, a more formalized ecosystem for skill development would accelerate progress for startups like ours.

Ragini: How do you see this evolving as India advances in EV manufacturing?

Madhumita: India's push for self-reliance highlights the urgent need for a shift in skill development, starting in schools and colleges. We must create tailored frameworks for R&D teams, senior professionals, and blue-collar workers. For the EV sector, this means upskilling existing talent and preparing the next generation for the industry's challenges. By building a skilled workforce, companies like Oben Electric can focus on innovation and growth. The EV sector's transformation presents both challenges and opportunities, and I am excited to contribute to shaping its future while advancing workforce development in India.

Ragini: You have identified skill development and talent readiness as key challenges and opportunities in the EV space. How does Oben Electric contribute to skill development, and what role do you see for policy and government in addressing this?

Madhumita: As a growing company, we are still scaling and do not yet have the capacity to engage with institutions on a broader level as large corporations like Bajaj or Hero might. However, we are deeply committed to skilling in the EV sector, despite the constraints of being a startup with limited resources.

One of the key challenges—and opportunities—we face is the nature of the EV industry itself. It is fundamentally different from the traditional internal combustion engine

(IC) domain. This means that training and skilling must focus on the next generation of technologies, particularly hardware, which is at the core of the automotive sector. EV development demands a deep, hands-on understanding of advanced technology, far beyond bookish knowledge or online tutorials.

Ragini: What specific steps do you think are needed to bridge this skill gap?

Madhumita: To address the skill gap, institutions, organizations like the National Skill Development Corporation (NSDC), and the government must collaborate to establish practical, hands-on training centres. These centres should not just be about classroom learning—they need to offer real tools, equipment, and access to facilities where individuals can physically work on projects. For example, something as simple as designing a component like a screw can teach invaluable lessons about hardware development.

There is a major gap today in providing access to such facilities that goes beyond desks and chairs. A real hardware workspace requires the right instruments and infrastructure for development and experimentation. This is particularly critical in Tier 2 and Tier 3 cities, where there's immense hunger and untapped potential. Students from these regions often have a different mindset, marked by resourcefulness and creativity, but they lack the infrastructure to turn their ideas into reality.

Ragini: How can larger organizations and the government help address these challenges?

Madhumita: Big organizations can play a pivotal role by integrating skilling initiatives into their corporate social responsibility (CSR) efforts. For example:

1. Providing Access to Specialized Tools and Software

Automotive and EV industries rely on sophisticated software and tools that are often inaccessible to students in smaller towns or lesser-known colleges. Large companies could provide these software solutions or training programs, making them mandatory for those interested in automotive or EV careers.

2. Creating Practical Training Opportunities

It's not enough to deliver lectures or host workshops. Training must include hands-on projects where participants design, build, and test something within a limited timeframe—say, two weeks. This approach ensures that learners gain practical problem-solving experience.

3. Expanding Competitions and Initiatives

Many large organizations already host competitions and hackathons, but these are often limited to Tier 1 institutions. Extending these initiatives to Tier 2 and Tier 3 cities would democratize access to tools, training, and opportunities for students who might otherwise be excluded.

4. Building Hardware-Focused Ecosystems

By collaborating with the government, NSDC, and academic institutions, big companies can help establish ecosystems where students and young professionals can access cutting-edge hardware, resources, and mentorship. This would enable them to develop solutions for real-world problems in EV manufacturing and beyond.

Ragini: What role do smaller startups like Oben play in this ecosystem?

Madhumita: Startups like ours may not have the extensive resources of larger corporations, but we can contribute by offering niche, targeted training programs and sharing our expertise. For instance, we have hosted internal training sessions and collaborative learning opportunities to upskill our team. With additional support from the government and industry leaders, we could amplify these efforts and create a more robust skilling ecosystem.

At Oben, we strongly believe that addressing the skill gap requires an active and collaborative effort from all

stakeholders—startups, corporations, academic institutions, and policymakers. Together, we can create a skilled workforce equipped to meet the unique demands of the EV sector. India's transition to EVs is both a challenge and an opportunity. The success of this shift depends on a skilled workforce capable of driving innovation and tackling real-world problems. It is incredibly fulfilling to contribute to this journey and to see how our collective efforts can shape the future of the industry and the country.

> *My key message is simple: this is your moment. EVs and other future technologies offer a lifetime of opportunities and a growth potential unlike any other sector. The industry is new, and there are countless complex problems waiting to be solved. Each of these challenges is an opportunity to innovate, grow, and make an impact. This transition is about more than just EVs; it is about shaping the future of Indian manufacturing, design, and sustainability transition. The opportunity to be part of this movement should excite and inspire every aspiring professional.*

Ragini: As a founder and leader in the EV space, what would you say to the youth who are making career decisions? What are the exciting and aspirational aspects of pursuing a career in EVs?

Madhumita: The automotive industry is the second most complex in the world, after aerospace, making it an exciting field filled with challenging problems. Electric vehicles (EVs) are the future, and anyone looking to build a career should focus on emerging technologies like EVs and AI. The EV industry offers a rare, transformative opportunity—something the automotive sector has not seen in 40 years. It is a chance for young professionals to shape a rapidly evolving industry and make a lasting impact.

Ragini: What makes this opportunity so unique for today's generation?

Madhumita: EVs represent a once-in-a-lifetime opportunity. They are at the heart of a new industry brimming with potential. The challenges of EVs—from battery technology to vehicle design—are not just problems; they are gateways to innovation. By preparing for and engaging with these challenges, young professionals can position themselves as pioneers in a rapidly growing and evolving field.

Additionally, India is undergoing a massive industrial transition. This moment is comparable to the dot-com wave, but instead of being about software and internet, this is a manufacturing wave. It is not just about EVs, it is about semiconductors, batteries, motors, and other critical hardware. For decades, India has been involved in manufacturing but primarily as a production hub, not as a centre for innovation and design.

Ragini: What does this transition mean for aspiring professionals?

Madhumita: The current shift is revolutionary. For the first time, India is moving beyond being a manufacturing base to becoming a design and innovation hub. In the past, automotive technology primarily came from outside—especially from countries like Japan. Indian companies collaborated with foreign firms but did not develop the core technology themselves.

Today, that mindset is changing. Indian companies are now designing and building their own batteries, motors, bikes, and scooters. This transition signals a profound shift in how we approach manufacturing and innovation.

For young professionals, this means they have an unprecedented opportunity to be part of this transformation. By embracing this wave, they can actively participate in creating technology that is not only made in India but also designed and developed in India.

Ragini: Beyond skill sets, what kind of mindset do the youth need to grow and prosper in the Industry 4.0 world?

Madhumita: Building world-class products requires time, patience, and persistence—a mindset young professionals must cultivate. India must move beyond jugaad (quick fixes) and adopt a design-first approach that delivers long-term value. While jugaad worked in the past, the future lies in solving problems through deep understanding and innovation. Young professionals should focus on creating solutions that add meaningful value and aim for excellence, not just adequacy. This shift is key to positioning India as a leader in Industry 4.0.

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PM Modi Inaugurates Global Cooperative Conference 2024, Launches UN's International Year of Cooperatives 2025

Prime Minister Shri Narendra Modi inaugurated the Global Cooperative Conference 2024 at Bharat Mandapam, New Delhi, and launched the United Nations' International Year of Cooperatives 2025, unveiling a commemorative postal stamp. Key dignitaries, including Union Home Minister Shri Amit Shah, the Prime Minister of Bhutan, and the Deputy Prime Minister of Fiji, attended. Shri Amit Shah ji highlighted India's cooperative revival under "Sahkar Se Samriddhi," announcing plans for 2 lakhs modern PACS, ensuring every village panchayat in India is covered by a cooperative society within three years.

Union Minister Jayant Chaudhary Launches Visa-THSC Recognition of Prior Learning (RPL) Project in Bharatpur

Union Minister Jayant Chaudhary inaugurated the Visa-THSC Recognition of Prior Learning (RPL) Project in Bharatpur, Rajasthan, on November 19, 2024. The initiative aims to recognize, certify, and upskill over 20,000 individuals across India's tourism and hospitality sectors over three years. In its first year, the project targets the certification of 7,000 individuals, focusing on roles like tour guides and customer service executives. With Bharatpur's Keoladeo National Park as a backdrop, the program seeks to empower local communities and boost service standards.

MSDE Launches 'Karmayogi Pratibimb' to Showcase Capacity Building Initiatives

Shri Atul Kumar Tiwari, Secretary, MSDE, launched the 1st edition of Karmayogi Pratibimb, a quarterly newsletter highlighting the ministry's capacity-building interventions under Mission Karmayogi. In an evolving ecosystem, MSDE drives continuous learning across all levels, focusing on data-driven decision-making, strategic management, digital fluency, and public communication. The newsletter celebrates progress and honours exemplary Aadarsh Karmayogis. Inspired by Hon'ble PM Modi's vision, this initiative underscores MSDE's commitment to a skilled, agile civil service for a Viksit Bharat.

Union Ministers Launch World Bank Report 'Jobs at Your Doorstep' for Youth Employment

Union Minister Dharmendra Pradhan, along with Labour Minister Mansukh Mandaviya, unveiled the World Bank report 'Jobs at Your Doorstep: A Jobs Diagnostics for Young People.' The report, covering six STARS states—Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Odisha, and Rajasthan—analyses skill gaps and aligns education with job market needs. Pradhan emphasized embedding skilling in schools under NEP 2020 to achieve PM Modi's vision of a global skills hub. Secretaries Sanjay Kumar and Atul Kumar Tiwari, and World Bank's Auguste Tano Kouame attended.

India Witnesses Surge in Workforce Formalization: EPFO Adds Nearly 7 Crore Members

The Ministry of Labour & Employment highlights India's transformative shift toward workforce formalization, enhancing job security and social benefits. The Employee's Provident Fund Organisation (EPFO) plays a pivotal role, managing savings and social security for salaried workers. Since September 2017, over 6.91 crore members have joined EPFO, reflecting this trend. In FY 2022-23 alone, 1.38 crore new members were added. By July 2024, monthly registrations reached 20 lakhs, highlighting India's commitment to formalizing its workforce for greater economic stability.

TNSDC Leverages Hackathons to Foster Innovation and Skill Development

The Tamil Nadu Skill Development Corporation (TNSDC) has made hackathons mandatory for all courses under the Naan Mudhalvan scheme, fostering critical thinking and problem-solving skills among students. Over 1.6 lakh students participated in hackathons across 802 colleges, with winners gaining access to premium skill-development courses and internships instead of cash prizes. TNSDC is exploring recruitment-focused hackathons with industry partners and plans to extend the initiative to engineering colleges. Additionally, the Google AI program, set to launch in January 2025, will benefit 10,000 government engineering students with Google certification.

India's Media and Entertainment Sector Gets a Boost with Skill Development Initiatives

Union Minister Jayant Chaudhary and MSDE Secretary Shri Atul Kumar Tiwari held a high-impact meeting with the Governing Council of the Media and Entertainment Skills Council (MESC) under the theme "Skill India to Build India." Chaudhary emphasized MESC's pivotal role in aligning skill initiatives with industry advancements, especially in Animation, Visual Effects, Gaming, and Comics (AVGC).

The council, led by Padma Shri Dr. Shankar Mahadevan, is committed to equipping youth with world-class skills, supported by the government's AVGC policy. Industry leaders, including Dr. Resul Pookutty and Saameer Mody, praised the collaborative efforts, highlighting the government's vision of positioning India as a global media talent hub. This initiative reflects a transformative shift, ensuring India's workforce is ready to meet the challenges of a dynamic, globalized industry.

India Game Developer Conference 2024 Begins in Hyderabad

The 16th India Game Developer Conference (IGDC) opened at HICC, Hyderabad, attracting 6,000+ attendees, including global gaming leaders. Organized by the Game Developer Association of India (GDAI), the three-day event showcases 100+ developers and focuses on industry growth.

Sanjay Jaju, Secretary, Ministry of Information and Broadcasting, emphasized skill development and the role of the Indian Institute of Creative Technology in boosting India's gaming landscape. The conference launched GDAI, aiming to unify India's $10,000-crore gaming industry. Key panels covered generative AI and strategic investments, spotlighting India's potential as a global leader in gaming innovation.

Government of India to Develop PPP Hospitals in Odisha for Affordable Healthcare

The Indian government is launching a public-private partnership (PPP) model to establish speciality hospitals in Angul, Barbil, Bhadrak, and Jharsuguda, Odisha, backed by viability gap funding (VGF). These 100- and 200-bed facilities, operating under the DBFOT model, aim to provide affordable healthcare by December 2026. The ₹3.54 billion project will be managed by private concessionaires for 32 years. Supported by NITI Aayog and the Department of Economic Affairs, this initiative addresses India's critical hospital bed shortages and may expand to other districts.

Punjab to Establish Training Centre in Pathankot for Police and Armed Forces Careers

The Punjab government, chaired by Minister Aman Arora, has approved a new Centre for Training and Employment of Punjab Youth (C-PYTE) in Pathankot to prepare youth for jobs in police, armed forces, and CAPFs. Set on 5.5 acres in Tango Shah, the facility joins 14 existing C-PYTE camps, which have trained 2,57,595 youth and placed 1,14,861 in employment. The syllabus will now include NSDC-certified security guard training, with placements facilitated through PESCO, enhancing job opportunities for trainees.

Arunachal SDE Department and Toyota Partner to Train ITI Trainees for Employability

The Arunachal Pradesh Department of Skill Development & Entrepreneurship (SDE) signed an MoU with Toyota Kirloskar Motor (TKM) to train Motor Mechanic Vehicle (MMV) trainees at ITI Roing under Toyota's CSR initiative, the Toyota Technical Education Programme (T-TEP).

Over two years, 45 trainees will receive high-end training, mentorship, and internships at Camdir Toyota, Leki, enhancing employability within the state. Toyota will provide instructors, study materials, and training equipment. Secretary Bullo Mamu emphasized this collaboration as a significant step towards creating skilled, employable youth within Arunachal and plans to involve more private companies.

Himachal Pradesh Strengthens Worker Welfare and Employment Initiatives

Under Chief Minister Thakur Sukhvinder Singh Sukhu's leadership, Himachal Pradesh has prioritized worker welfare, increasing minimum wages to ₹400/day. In two years, 75,485 workers received ₹89.02 crore under the Skill Development Allowance Scheme, while 23,186 received ₹44.54 crore through the Unemployment Allowance Scheme. Employment fairs and campus interviews have secured private-sector jobs for 13,637 youth since 2023.

The EEMIS portal, launched in August 2023, streamlines online employment registration. Additionally, ₹40.56 crore has supported 10,182 workers through welfare schemes. The state also introduced a housing scheme for widows, destitute, and Divyang women workers, providing up to ₹4 lakh assistance.

Hon'ble Minister Shri Jayant Chaudhary Felicitates WorldSkills 2024 Winners

On October 24, 2024, Shri Jayant Chaudhary, Hon'ble Minister of State (I/C), Ministry of Skill Development and Entrepreneurship (MSDE), and Minister of State, Ministry of Education, felicitated the winners of WorldSkills 2024 competition which was recently held in Lyon, France. He also honoured eight paralympic winners (Praveen Kumar, Ajeet Singh Yadav, Sharad Kumar, Pranav Soorma, Simran Sharma, Rubina Francis, Rakesh Kumar, Preethi Pal), who graced the facilitation ceremony of 19 WorldSkills winners, who faced toughest of global parameters to emerge victorious. India achieved remarkable success in Lyon, France, winning four bronze medals in Patisserie and Confectionery, Industry 4.0, Hotel Reception, and Renewable Energy. The winners were Ashwitha Police, Dhrumilkumar Dhirendrakumar Gandhi, Sathyajith Balakrishnan, Joethir Adithya Krishnapriya Ravikumar, and Amaresh Kumar Sahu. In addition to these victories, India earned 12 Medallions of Excellence, showcasing the country's skill and innovation across various trades. Competing against over seventy countries, the Indian delegation's success is a testament to their training and strong industry support.

NSDC and AIF Launch $3M Skill India Initiative for Over 80,000 Beneficiaries

On 26th November 2024, the National Skill Development Corporation (NSDC) partnered with the American India Foundation (AIF), a not-for-profit organization based in the USA, to launch a transformative impact project. Under this initiative, NSDC will establish 13 Skill India Centres (SICs) across select urban locations to empower the urban poor.

With a budget outlay of $3 million, the project aims to benefit over 80,000 individuals over three years, focusing on key target groups such as street vendors, waste pickers, and construction workers.

What makes this initiative unique is its holistic approach to improving household incomes. The 13 SICs will deliver domain-specific skill training, soft skills development, entrepreneurship support, digital literacy, financial linkages, access to social entitlements, career counselling, and apprenticeship opportunities.

Over 2400 Youth Secure Jobs at Bharatpur Kaushal Mahotsav

National Skill Development Corporation (NSDC) concluded the Bharatpur Kaushal Mahotsav, where over 2,400 youth received job offers from employers across sectors. Hon'ble Minister Shri Jayant Chaudhary led the event, handing job letters to candidates. More than seventy companies, including Flipkart, Zepto, and Burger King, participated, offering over 20,000 job opportunities with salaries ranging from ₹19,000 to ₹35,000 per month. The event followed a five-day job readiness program, training 3,500 youth in soft skills and role-specific capabilities. The initiative aligns with the government's goal of creating employment pathways and promoting lifelong learning. The Kaushal Mahotsav connects local talent with employers and supports economic growth in Bharatpur. This initiative demonstrates NSDC's role in preparing youth for job markets and promoting regional development.

Union Minister Giriraj Singh Unveils State-of-the-Art Training Centre Empowering Rural Women in Textiles

In a first-of-its-kind initiative, Hon'ble Union Minister of Textiles, Shri Giriraj Singh, inaugurated a Jeevika Didi Training Cum Production Centre for Skill Training and Production on November 23, 2024, in Begusarai, Bihar. This state-of-the-art facility empowers village women to transform raw fabric into globally marketable products, bridging traditional artisanry with modern design and marketing techniques. The centre, developed in partnership with the National Skill Development Corporation (NSDC), and its five Sector Skill Councils (SSCs), and NIFT Patna, aims to uplift women-led Self-Help Groups (SHGs) by providing them with key skills, tools, and resources to thrive as successful entrepreneurs in the apparel, and textile sectors. The centre is designed to be both a training hub and a production facility, covering an area of 10,000 square feet, with an additional 1,000 sq. ft. of open space.

Sharing his vision, Shri Ved Mani Tiwari, CEO of NSDC said, "The Jeevika Didi Training Centre marks a significant milestone in empowering rural women and advancing India's vision of inclusive growth. Under the visionary leadership of the Honourable Prime Minister, India became the first nation to establish a dedicated Ministry of Skill Development, reflecting a forward-thinking approach to ground-level transformation."

NSDC, IIFT and Orion Dutch collaborated to launch Joint Certification Program on Import & Export

NSDC (National Skill Development Corporation), IIFT (Indian Institute of Foreign Trade), and Orion Dutch have joined forces to launch a comprehensive Joint Certification Program in Import & Export. This collaborative initiative is designed to enhance industry-specific skills and provide participants with in-depth knowledge of global trade dynamics. By offering expert training, the program aims to empower individuals with the practical expertise required to thrive in international commerce, while addressing skill gaps and fostering the growth of India's export and import capabilities.

NSDC, TCS iON Forge Partnership to Bridge the Employability Gap Across India

National Skill Development Corporation (NSDC) and TCS iON have signed an MoU to launch the National Proficiency Tests (NPTs) and provide industry recognized certifications to enhance skills and boost youth employability across India. NPTs are nationwide assessments that enable students, job seekers and professionals to validate their skills and earn recognition in specific areas of expertise through Skill India Digital Hub. The collaboration combines the strengths of two of India's most trusted organizations and initially focuses on sectors such as IT, BFSI, Manufacturing, Healthcare along with domains including HR, Finance, Sales & Marketing, and many more to follow. The NPTs, powered by TCS iON, will be conducted once every month, and can be taken from cities across the country, with no bar on number of attempts. It will serve as a nationwide assessment platform for job seekers aiming to validate their skills and for professionals to get their skills recognized in specific areas of expertise through NSDC's Skill India Digital Hub (SIDH).

Expressing optimism about the collaboration, Shri Ved Mani Tiwari, CEO of NSDC said, "This partnership is a significant step toward bridging the employability gap in our country. By aligning skill assessments with industry requirements, we can ensure that our youth are not only job-ready but also equipped to excel in their chosen fields. Empowering youth with relevant skills and certifications is essential for fostering a robust economy."


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