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STUDY ON WHETHER SKILLING CENTRES IN INDIAN SMART CITIES COULD ENHANCE SKILLS AND THUS EMPLOYABILITY?

March 2025

SAAR- Sameeksha Series — Impact Assessment Studies of Smart Cities Mission

National Council of Applied Economic Research

STUDY ON WHETHER SKILLING CENTRES IN CITIES COULD ENHANCE SKILLS AND THUS EMPLOYABILITY?

Authors
Project Lead: Charu Jain (Fellow)
Senior Advisor: Bornali Bhandari (Professor)
Research Team: Karan Raj (Research Analyst), Falak Naz (Research Analyst), and Viha Dwivedi (Intern)

Secretarial support
Poonam Dhawan

Technical support
Praveen Sachdeva

Data Support from Ministry Team, Smart Cities Mission
Joint Secretary and Mission Director: Roopa Mishra
Directors: Sanjay Gupta, Manoj Kumar Sharvar
Deputy Secretary: Sanjay Kumar Mishra
Under Secretaries: Sabak Lal Prasad, Priyaranjan Verma, Yogesh Kumar

Smart Cities Mission Management Unit (SCMMU)
Vikash Chandra, Dinesh Harode, Rupesh Chopra, Vishnu Pandey, Chaitanya Singh, Siddharth Barpanda, Amit Sharma, Dipyaman Sinha, Rashi Mathur Mayank Saravagi, Ishita Singh, Jaipal Daksh

Acknowledgements

The successful completion of the study has been possible only due to the support received from a host of well-wishers who also helped with the exercise! The most important task in the study was to interact with the skill development centres in the selected smart cities. Our heartfelt thanks to all state nodal officers who helped us in arranging these interactions and centre heads and their teams who interacted with us and provided valuable insights. We would like to thank: Mr Dinesh Virkar, Mr Ashlash Raina, and Mr Anil Misale from Pune Smart City Development Corporation Ltd; Mr Alok Chandra Saxena from Micro-Skill Development Centre under Agra Smart City Ltd; and Mr Chandramouli and Mr Balaji Thakur from Tirupati Smart City Corporation Ltd. We are also thankful to all the key concerned persons responsible for city level interventions and skill beneficiaries and trainers who participated in our FGDs and individual interactions.

The successful completion of the work would have not been possible without the invaluable support of Prof. Bornali Bhandari, Senior Advisor, who guided us at various stages of our work. Her constant advice has added immense value to the report. We are particularly grateful to Dr Poonam Gupta, Director-General, and Dr Anil Kumar Sharma, Professor and Secretary, for their continued support and encouragement at various stages of the study.

Our heartfelt thanks to Poonam Dhawan and Praveen Sachdeva for the secretarial and technical support and for efficiently managing the project activities. We are thankful to Ms Mini Narayanan for copy editing the report. Last but not the least, sincere thanks to the entire study team, including Karan Raj, Falak Naz, and Viha Dwivedi, for their collective efforts without which it would not have been possible to bring the report in its present stage. We take full responsibility for all the mistakes that may remain in the report, and all those who assisted us are in no way responsible for these.

Charu Jain

Fellow, NCAER

List of Abbreviations

ABDs	Area Based Developments
AGCL	Agra Smart City Limited
AICTE	All India Council for Technical Education
ATIs	Advanced Training Institutes
AVTS	Advanced Vocational Training Scheme
BPO	Business Process Outsourcing
CCTV	Closed Circuit Television
CEOs	Chief Executive Officers
CITS	Crafts Instructor Training Scheme
CNC	Computerized Numerical Control
CSSM	Centrally Sponsored Centrally Managed
CTS	Craftsmen Training Scheme
DES	Digital Education System
DGET	Director General of Employment & Training
DGT	Directorate General of Training
ERP	Enterprise Resource Planning
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
GIZ	German Development Institute
HMIS	Health Management Information System
IBM	International Business Machines Corporation
ICCC	Integrated Command and Control Centres
IISCs	India International Skill Centres
ISAC	Smart Cities Awards Contest
ITCs	Industrial Training Centres
ITI	Industrial Training Institute
ITOT	Institute for Training of Trainers
JSS	Jan Shiksha Sansthan
KEPSA	Kenya Private Sector Alliance
MICDE	Ministry of Information, Communication, and Digital Economy
MoHUA	Ministry of Housing and Urban Affairs
MSCL	Mangaluru Smart City Ltd.
MSDE	Ministry of Skill Development and Entrepreneurship
MTCs	Model Training Centres
NAPS	National Apprenticeship Promotion Scheme
NCAER	National Council of Applied Economic Research
NCVT	National Council for Vocational Training

NDMC	New Delhi Municipal Corporation
NGOs	Non-Governmental Organizations
NIUA	National Institute of Urban Affairs
NSDC	National Skill Development Council
NSQF	National Skill Qualification Framework
NSTI	National Skill Training Institutes
PCs	Personal Computers
PDOT	Pre-Departure Orientation Training
PLFS	Periodic Labour Force Survey
PMC	Program Management Consultant
PMC	Pune Municipal Corporation
PMKK	Pradhan Mantri Kaushal Kendra
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PSCDCL	Pune Smart City Development Corporation Limited
PSF	Private Sector Federation
P-TECH	Pathways in Technology Early College High School
RPL	Recognition of Prior Learning
SAAR	Smart cities and Academic towards Action and Research
SCM	Smart City Mission
SDCs	Skill Development Centres
SEWA	Self Employed Women's Association
SHGs	Self-Help Groups
SP	Special Project
SPV	Special Purpose Vehicle
SSC	Sector Skill Council
SSDMs	State Skill Development Missions
SSP	Swayam Shikshan Prayog
STT	Short Term Training
SUDA	State Urban Development Authority
UGC	University Grant Commission
UTs	Union Territories

Executive Summary

India's urban population has surged significantly in recent years, reaching 28.1 per cent in 2021–22 as per Periodic Labour Force Survey (PLFS), and is estimated to reach 40 per cent by 2030 (United Nations Population Division, World Urbanization Prospects, 2018 Revision). This demographic shift has brought about a range of challenges, including urban unemployment. As India moves more and more towards the Knowledge economy, it becomes increasingly important for it to focus on advancement of the skills and these skills have to be relevant to the emerging economic environment. For transforming its demographic dividend, an efficient skill development system is the need of the hour.

In this direction, the Ministry of Housing and Urban Affairs (MoHUA) has launched "Smart cities and Academia towards Action & Research (SAAR)" program, a joint initiative of MoHUA, National Institute of Urban Affairs (NIUA) and leading Indian academic institutions of the country. This initiative aims to enhance skill development opportunities in urban areas, aligning with the overarching goals of the Smart City Mission (SCM).

Skill centres play a vital role in the SCM by providing training and education programs to the local population, equipping them with the skills needed to participate in the workforce and contribute to the development of smart cities. These initiatives aim to provide training and educational opportunities tailored to meet the demands of the labour market and ensures that the workforce is equipped with the necessary skills. These skill centres offer various courses and programs tailored to the needs of the local economy and industry sectors. Approximately, Rs 250 crores have been spend on implementation of these projects and therefore it becomes imperative to evaluate whether these projects are fulfilling the targets.

In this regard, MoHUA entrusted NCAER the task of conducting an evaluation study for these skill development interventions under SCM. Broadly, the study aims to analyze whether skill centres in smart cities serve as key nodes for skill development and how these centres provide training and educational opportunities that are aligned with the labour market needs. The study also aims to provide the recommendation and policy directions towards successful implementation of the skills program.

The analysis in the study is carried out using both primary and secondary data sources. The primary data was collected in the form of online and face-to-face interviews and focus group discussions (FGDs) from various stakeholders including CEOs of all smart cities where skill development projects have been implemented under the SCM, head of skill development projects, trainers at skill development centres and trainees/ beneficiaries. For the collection of primary data, three smart cities, i.e., Agra, Tirupati, and Pune, are covered as suggested by MoHUA. In addition to this, online interactions with the concerned authorities of Mangaluru and Varanasi smart cities were conducted. Based on the interactions with various stakeholders, a qualitative assessment has been carried out in the present study.

The findings in the report presents the status and progress of skill interventions implemented under SCM in the cities of Agra, Pune, and Tirupati, where different set of skills are being delivered to the different sections of the society. While Agra represents traditional skills of zardosi embroidery, marble inlay, carpet making, etc., Pune has been analysed for its digital skill initiatives in the form of e-learning programs in smart schools and Health Management Information System (HMIS) in smart hospitals and clinics. Tirupati on the other hand, is known

for its design art studio for digital e-printing technology and skills. Under all of these interventions, it has been observed that over the past five years, artisans/ trainees connected with the project have witnessed substantial benefits—ranging from increased work, productivity, and income to easier access to government schemes and loans. The program has helped them in upskilling themselves with new designs and techniques. Through these programs efforts have been made to nurture entrepreneurs, with designers playing a pivotal role in connecting artisans to broader markets and equipping them with essential communication and business skills. Also in case of traditional crafts, these programs have provided opportunities for reskilling and upskilling artisans that has helped them in creating products for international markets.

Despite the successes, challenges loom large—ranging from a lack of local industry linkages with the skill centres, limited formal education and lack of marketing and entrepreneurship skills, absence of valid certification of the courses, technical, hardware and infrastructural glitches, etc. The project, therefore, stands at a point, seeking an extension to continue its mission of making artisans truly self-sustainable while overcoming these hurdles. Despite these critiques, the initiative's achievements—reducing migration, enhancing artisan incomes, and facilitating access to government schemes—cannot be understated.

To achieve its ambitious skilling target, it is imperative to have holistic solutions of the challenges that require strategic planning, innovation, and collaboration to overcome. By honing their skills, diversifying their product offerings, and embracing opportunities in both local and international market, artisans can position themselves for success in an increasingly competitive and dynamic global marketplace. On the whole, skill development is a vital tool to empower people, to safeguard their future and can lead to industrial advancement, economic diversification, innovation, technological evolution, and overall development of the country.

Keywords: Smart City Mission, Urban Planning, Sustainable Development, Skill Development, Employability Skills

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1. Introduction

1.1 Background

India's urban population has surged significantly in recent years, and has reached 28.1 per cent in 2021–22 as per Periodic Labour Force Survey (PLFS), slightly less than one-third of the total population. Further, the projections suggest that this trend will continue in the coming decades and is estimated to reach 40 per cent by 2030 (United Nations Population Division, World Urbanization Prospects, 2018 Revision[1]), meaning more people will migrate from rural areas to find work and make a living in the cities. This demographic shift has brought about a range of challenges, including urban unemployment. The recent PLFS data also indicates that the urban unemployment rate (15+ aged) has reached to 6.3 per cent in 2021–22. One of the reasons behind urban unemployment is a disparity between the skills possessed by the workforce and the skills demanded by industries. The education system does not align with the needs of the job market, leading to educated unemployment. Further, rapid technological advancements and changes in the economy have led to the decline of traditional industries, resulting in job losses for many urban workers who lack the necessary skills for the emerging sectors.

On similar lines, the NCAER (2018) report titled "Skilling India: No Time to Lose"[2] also gives evidences that the education and skilling eco-system was mismatched to the needs of the industry. Imparting appropriate technical and vocational skills is a typically demand-driven exercise. Further, with technology rapidly changing, it is hard for the supply-side to keep pace. While the Government of India has scaled up the supply-side eco-system, it has yet to match the demand-side. Particularly, in the rapidly changing world of work, this requires continuous monitoring of global and local economic and job market trends to identify emerging industries, evolving job roles, and new skill requirements. In other words, there is need for regular upskilling and reskilling of workers.

To address these pressing issues, the Ministry of Housing & Urban Affairs (MoHUA) has launched "Smart cities and Academia towards Action & Research (SAAR)" program, a joint initiative of MoHUA, National Institute of Urban Affairs (NIUA) and leading Indian academic institutions of the country. This initiative aims to enhance skill development opportunities in urban areas, aligning with the overarching goals of the Smart City Mission (SCM) (MoHUA, n.d.). There have been many skills centre projects which are implemented under SCM, catering to the needs of the local communities and helping in upgrading the lives in them. Skill Development Centres (SDCs) offer technical training and educational programs and provide various services such as self-help group formation, livelihood resource mapping, community mobilization, and market networking opportunities. Under SCM, 18 skill development centres have been established in various cities like Agra, Aurangabad, Gwalior, Indore, Lucknow, Shivamogga, Tirupati, and Varanasi. These centres have benefitted more than 10,000 individuals. Approximately, Rs 250 crores have been spend on implementation of these projects and therefore it becomes imperative to evaluate whether these projects are fulfilling the targets.

[1] https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS

[2] https://www.ncaer.org/publication/skilling-india-no-time-to-lose. New Delhi.

1.2 Need and Objectives of the Study

Since huge investments have been made on the implementation of the skill development projects, it becomes imperative to evaluate on how these projects are fulfilling the targets. In this regard, MoHUA has entrusted NCAER the task of conducting an evaluation study for the skill development interventions under SCM. Broadly, the study aims to analyse whether the skill centres in smart cities serve as key nodes for skill development and how these centres provide training and educational opportunities that are in line with the labour market needs. Specifically, it will explore following objectives in the specific context of the nature of the intervention:

1. What is the nature and need of the intervention? What are the city industrial patterns?
2. What is the status of the skills project in the smart city in terms of types of courses run, course duration, students trained, infrastructure facilities, etc.?
3. Whether the designing and up-gradation of their curriculum, books, teachers training, teaching methods, etc. are in line with the industry needs?
4. Whether beneficiaries' have access to industry infrastructure and have they benefitted from it on a real time basis? What is the ratio of theory versus practical exposure in these courses? Do they encourage on-the-job training?
5. Whether these centres have access to latest equipment and if they are upgraded from time to time on the recommendation of the local industries?
6. To understand whether the skill development centres have industry partnerships, if, yes what kind of partnerships, whether they are located in industry clusters, is there interaction with industry, apprenticeships/internships in industry, their placement scenario, job roles offered, expected and actual salary structure students get when placed? What are the challenges faced and gaps, if any?
7. Whether these centres have also enhanced the entrepreneurship opportunities? If yes, what kind of opportunities and how? What are the challenges faced and gaps, if any?
8. What is the procedure of trainer recruitment, their work tenures, quality and frequency of trainer's training, skill upgradation and contacts/interactions with the industries?
9. How can the working of the skill project be improved? What changes/initiatives are suggested that can be brought about to improve the quality of skill centres, the skills imparted and linkages with industries?
10. Is there any impact on gender or weaker socio-economic groups?

2. Literature Review

2.1. Skill Development in India

In India, the skill development ecosystem is complex, large, and diverse, providing varied levels of skills across an extremely heterogeneous population. Skill development in India can be broadly segmented into education and vocational training. The Ministry of Human Resource Development governs elementary, secondary, and higher education, while engineering education, polytechnics, etc. fall under technical education.

Skills in India are acquired through both formal and informal channels. Formal vocational training is imparted in both public and private sector. Some of the major channels of formal vocation training include the government-run Industrial Training Institutes (ITIs), privately operated Industrial Training Centres (ITCs), vocational schools, specialized institutes for technical training, and apprenticeship training by the industry. Lately the private sector participation in this area has been on a rise, but the segment continues to be dominated by the public sector. Informal training, on the other hand, refers to experiential skills acquired on the job. At the central level, the nodal institution for vocational training is the Director General of Employment & Training (DGET) under the Ministry of Labour and Employment. The DGET is responsible for formulating policies, establishing standards, granting affiliation, trade testing and certification, and matters connected to vocational training and providing employment services. The National Skill Development Council (NSDC) — now a part of the newly created Ministry of Skill Development and Entrepreneurship — was initially set up under the Ministry of Finance to provide viability gap funding and promote private skill initiatives.

India has a literacy rate of around 70 per cent, which is less than some of the least developed countries, and when it comes to employability, only 20 per cent of them are employable. Literacy is not just restricted to education but even broadens to the concept of skills, which comprises technical expertise, vocational skills, transferrable skills, digital skills, and other such knowledge and abilities required for employment and livelihood. According to the India Skills Report 2015, of all the students applying for roles in the labour market, a mere 33 per cent had the appropriate skills to match the requirement of the employers. Skills intensify the productiveness and quality of work for more significant results. According to the World Trade Organization (WTO), the GDP level can increase up to 3–5 per cent in 2035, if India focuses on skill development and training. The lack of proper education and training restricts people from opportunities for self-advancement by limiting their access to well-paid employment. Eventually, this prevents such individuals from making an influential contribution to economic growth. Thus, adequate education quality and training are recognised as fundamental ways of breaking down the eco-system of poverty.

2.2 Government Initiatives towards Skill Development

The government has listed skill development as one of its priorities and aims to enhance participation of youth, seek greater inclusion of women, disabled and other disadvantaged sections into the workforce, and improve the capability of the present system, making it flexible to adapt to technological changes and demands emanating from the labour market.

In this direction, a Ministry of Skills Development, Entrepreneurship, Youth and Sports was created in mid-2014. The Ministry of Skill Development and Entrepreneurship (MSDE) is accountable for coordinating skill development activities in India. It has supported various organizations like National Skill Development Corporation (NSDC), which aims to promote skill development in the country by establishing institutes across the country and National Skill Development Agency (NSDA), which seeks to coordinate the efforts of the government and the private sector and aid in skill development. Hon'ble Prime Minister Shri Narendra Modi launched the Skill India Mission, under the Ministry of Skill Development and Entrepreneurship on 15 July 2015, which aimed to train over 40 crore people in India in different skills by 2022. The mission seeks to vocational training and certification of Indian youth for a better livelihood and respect in the society. Various initiatives undertaken by government towards skill development in the country are discussed here in brief as follows:

2.2.1. Pradhan Mantri Kaushal Vikas Yojana (PMKVY): The Pradhan Mantri Kaushal Vikas Yojana (PMKVY) was launched in 2015 to encourage and promote skill development in the country by providing free short duration skill training and incentivizing this by providing monetary rewards to youth for skill certification. After the successful implementation of pilot PMKVY (2015–16), PMKVY 2016–20 was launched by scaling up both in terms of Sector and Geography and by greater alignment with other missions of Government of India like Make in India, Digital India, Swachh Bharat, etc. The Scheme was aligned to Common Cost Norms and had a total budgetary outlay of Rs 12,000 Crores. The scheme was implemented through two key components: Centrally Sponsored Centrally Managed (CSCM) implemented by National Skill Development Corporation (NSDC) by allocating 75 per cent PMKVY 2016–20 funds; and Centrally Sponsored State Managed (CSSM) implemented by State Governments through State Skill Development Missions (SSDMs) having 25 per cent of the PMKVY 2016–20 funds. The third phase of its flagship scheme — Pradhan Mantri Kaushal Vikas Yojana (PMKVY 3.0) was launched on 15 January 2021. The scheme aims to benefit over eight lakh candidates in FY 2020–2021 with a budget of Rs 948.9 crores while targeting the youth under the age group of 15–45 years. Skill training is being imparted under three categories, pan-India: Short Term Training (STT); Recognition of Prior Learning (RPL); and Special Project (SP). In the wake of disruption caused by COVID-19 and resultant impact on livelihood, the scheme (PMKVY 3.0) focused on upskilling/reskilling with a focus on future skills (industry 4.0) courses to increase productivity of existing workforce and provide online/digital mode of training for wider coverage.

2.2.2. Pradhan Mantri Kaushal Kendra (PMKK): With the intent to make vocational training aspirational to transform India into the skill capital of the world, the MSDE has embarked on establishing visible and aspirational Model Training Centres (MTCs) in every district of the country. NSDC is the implementation agency for the project. The model training centres envisage to i) create benchmark institutions that demonstrate aspirational value for competency-based skill development training; ii) focus on elements of quality, sustainability, and connection with stakeholders in skills delivery process; and iii) transform from a mandate-driven footloose model to a sustainable institutional model. These training centres are intended to be state-of-the-art Model Training Centres, called as Pradhan Mantri Kaushal Kendra (PMKK).

2.2.3. India International Skill Centres (IISC): The Government of India is keen to bridge the global shortage of labour force in the coming years by reaping the demographic dividend of young Indian labour force. To meet this objective, India International Skill Centre (IISC) have

been set up under Skill India mission program of government to provide skill training and certification benchmarked to international standards. In the pilot phase, IISCs were set up through the National Skill Development Corporation (NSDC) to implement two schemes namely Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and Pravasi Kaushal Vikas Yojana (PKVY) for youth seeking global mobility for jobs. As part of IISC Program, both domain skill training on international standards and Pre-Departure Orientation Training (PDOT) are being imparted to candidates. The Pilot phase was executed and successfully completed on 2 July, 2018.

2.2.4. Jan Shikshan Sansthan (JSS) Scheme: The main target of the JSS is to impart vocational skills to the non-literates, neo-literates and the persons having rudimentary level of education and school dropouts up to 12th standard in the age group of 15–45 years, with due age relaxation in case of "Divyangjan" and other deserving cases. Priority is given to women, SC, ST, OBC, and Minorities in the rural areas and urban low-income areas.

2.2.5. Craftsmen Training Scheme (CTS): The Craftsmen Training Scheme (CTS) was initiated, in 1950 by establishing about 50 Industrial Training Institutes (ITIs) for imparting skills in various vocational trades to meet the skilled manpower requirement for industrial growth of the country. Presently, training courses under Craftsmen Training Scheme are being offered through a network of 14930 ITIs (Govt 3227 + Private 11702) located all over the country with total seating capacity 26.58 lakhs (in the trades of 1-year and 2-year course durations) on National Council for Vocational Training (NCVT) MIS portal. The objective is to provide skilled work force to the industry in 150 National Skills Qualifications Framework (NSQF) compliant trades.

2.2.6. Crafts Instructor Training Scheme (CITS): Training of Craft Instructors is the mandated responsibility of Directorate General of Training (DGT) and it is operational since the inception of the Craftsmen Training Scheme (CTS). Comprehensive training both in skills and training methodology is imparted to the instructor trainees to make them conversant with techniques of transferring hands-on skills, to train skilled manpower for the industry. NCVT has mandated that all trainers in ITIs need to be CITS trained. Present capacity in National Skill Training Institutes (NSTIs) for training of trainers is 8,125 per annum with total seating capacity being 12,765 (including of Government and private Institute for training of trainers, ITOTs 4,640). During academic year August 2021, a total of 8,133 candidates have taken admission (63% seats filled) in NSTIs.

2.2.7. National Apprenticeship Promotion Scheme (NAPS): This Scheme is for promoting apprenticeship training and increasing the engagement of apprentices by providing financial support to industrial establishments undertaking apprenticeship programme under the Apprentices Act, 1961. Training consists of basic training and on-the-job training / practical training at workplace in the industry. Under this scheme, about 42,453 establishments have engaged the apprentices across the country.

2.2.8. Advanced Vocational Training Scheme (AVTS): In order to upgrade and update the skills of serving industrial workers, the AVTS is in operation since 1977. The scheme was launched by erstwhile DGE&T, Ministry of Labour (now Directorate General of Training (DGT), Ministry of Skill Development & Entrepreneurship) in collaboration with UNDP/ILO in 1977 at the then 6 Advanced Training Institutes (ATIs) under DGE&T and 16 ITIs of the 15 State Governments. Under the scheme, training in selected skill areas is being imparted through short-term modular courses of one to six weeks' duration. Tailor-made courses suited to the

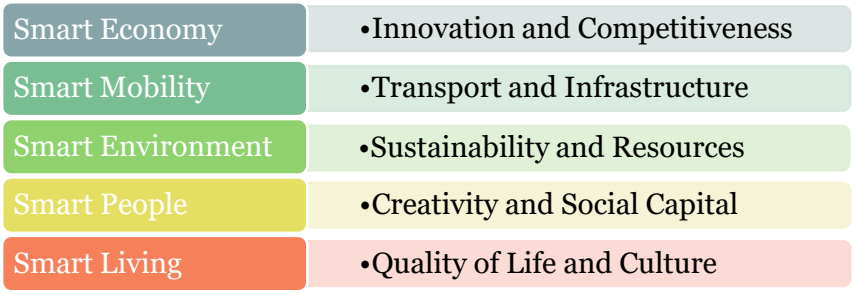
specific requirements of industrial establishments are also offered. Over 3.5 lakh industrial workers / technicians have made use of the training facilities at the NSTIs (erstwhile ATIs) since Sept, 2007. With financial assistance from World Bank, training facilities in additional areas were created at ATIs and the existing training facilities were also strengthened.

In addition to these initiatives, under the purview of the Smart City Mission, multitudes of skill development centres have been established across smart cities in India to address the needs of local communities and uplift their livelihoods, the details of which are discussed in the next chapter.

2.3 Smart Cities and Need for Skill Development: A Review of Literature

The Smart City Mission (SCM), initiated by the Ministry of Housing and Urban Affairs (MoHUA) in India, is a testament to the government's commitment to addressing the complex challenges posed by rapid urbanization (Hall, 2000). By integrating comprehensive infrastructure development and technological advancements, the SCM aims to transform urban areas into more sustainable and live-able spaces. SCM stands as a visionary initiative initiated by the MoHUA in India, with the overarching goal of metamorphosing urban centres into technologically advanced and sustainable hubs of economic vitality (Papa et al., 2013). Integral to this holistic approach is the emphasis placed on skill development initiatives, designed to empower the urban workforce and bridge the gap between industry demands and available skill sets. Within the framework of the SCM, cities are encouraged to prioritize the enhancement of four pivotal pillars of development: institutional, physical, social, and economic infrastructure (Tiwari & Jain, 2014). As articulated by Giffinger et al. (2007), smart cities can be outlined along five primary dimensions given in Figure 2.1.

Figure 2.1. Dimensions of smart cities



Source: Paper by Giffinger et al. (2007)

The genesis of the Smart City Mission (SCM) stems from the burgeoning urbanization phenomenon witnessed in India, marked by a surge in population growth and escalating strains on existing urban infrastructure (Tiwari & Jain, 2014). This rapid urban expansion amplifies challenges such as congestion, pollution, resource scarcity, and deficient service delivery, underscoring the urgent need for innovative solutions to ensure the long-term sustainability of urban centres (Papa et al., 2013). Moreover, the SCM is intricately aligned with global trends towards knowledge-based economic development, wherein cities strive to attract investment and talent by fostering a culture of innovation and creativity (Carrillo et

al., 2014). With rapid technological advancements and dynamic shifts in the economy, there arises a pressing need for a responsive and agile skill ecosystem to ensure the employability and competitiveness of the urban workforce (NCAER, 2018).

In response to this need, the SCM prioritizes investments in skill development centres and vocational training programs, aiming to equip individuals with the requisite technical and vocational skills essential for success in emerging sectors and industries (MoHUA, n.d.). Noteworthy achievements of the SCM encompass the successful deployment of smart infrastructure projects, including smart transportation systems, energy-efficient buildings, and digital governance platforms (Papa et al., 2013). However, persistent challenges remain in achieving equitable access to smart services, addressing cybersecurity threats, and fostering inclusive growth across urban communities (Tiwari & Jain, 2014). In short, the Smart City Mission of the Ministry of Housing and Urban Affairs (MoHUA) represents a proactive response to the multifaceted urban challenges facing India, driven by a vision of inclusive and sustainable development underpinned by technology and innovation (Hall, 2000).

3. National and International Case Studies

This chapter presents discussion on some of the national and international best practices related to different type of skill interventions implemented thereof.

3.1 National Case Studies

1. **Maharashtra, India:** ANARDE foundation[3] was established in 1979, with a belief in building self-sustaining village communities with an objective of uplifting and empowering rural India. Their vision was that village water, youth and wealth should remain in village itself. Skill development was one of their initiatives under this project under which the women, youth, and farmers were the key focus. Women inherently possess a flair for handicrafts in rural Gujarat and Maharashtra and therefore a training program that matches their talent and allows them to hone their craft was organized. SHGs has a become part of a structure of institutions in the villages. Women come together to register as SHGs and they are trained to become financially literate. Marginalized women in groups of 10 often form clusters, the number has now gone up to 1,000 plus. For youth, technical skills are taught so that youngsters are able to take up gainful work immediately upon completion. The work generated is tied to other programs and employment schemes offered by the Government of India. For farmers, skill development programs were organized that brought technology and knowhow to them, the topics include best practices and new methods of farming. As a demonstration of the skills imparted, they implemented irrigation and sprinkler systems with farmers in the villages.

2. **Maharashtra and Bihar, India:** Clean Energy Entrepreneurship Model initiated by the organization Swayam Shikshan Prayog (SSP),[4] has its intervention in around 3000 villages of Maharashtra and Bihar. The project aimed at the empowerment of women by engaging them in economic opportunities and entrepreneurial ventures related to better access to clean energy. In addition to the technical training on clean energy education and marketing, the initiative empowers women with a leadership development thrust for which regular workshops are being conducted. The Sakhi identification approach includes directly approaching pre-existing small- scale women entrepreneurs, locating high performers from SHGs, seeking references from Gram Panchayats and Sarpanches and references from existing Women Energy Entrepreneurs. The selection of villages is done in terms of households. For a village of 300 households, only one Sakhi is selected. The products sold under this initiative are uniquely sold through women only and no commercial houses or shops aimed at profit-making are included. The financial process involves purchase of clean energy products from the organization by Sakhis who sell it in local weekly markets or home-based sale to needy consumers. The intervention has benefitted rural communities to enhance their access to the latest green energy instruments such as solar lights and smoke-free stove. As rural green technology providers, the Sakhis have benefitted in terms of additional income generation with a recognisable contribution to the cause of green energy. The stakeholder groups of Sakhis in rural community have 1010 women clean energy entrepreneurs and 1,010,000

[3] https://www.anardeindia.org/our-focus/income-generation-and-enhancement/
[4] http://nirdpr.org.in/nird_docs/sagy/Good-Practices-in-Rural-Development-Sector.pdf

people/202,000 households. The corporate partners could scale up their supply chain with the help of Sakhis and leveraged sale of solar lamps and smoke-free stoves in challenging rural markets. The entrepreneurial skills, training, and the capacity building of women for leadership are other unique features of this intervention.

3. **Various States, India:** SEWA Bharat's skill development program[5] is especially designed for the women in the states of Bihar, Jharkhand, Uttarakhand, Delhi, and Haryana. It starts from identifying the hot-spot areas that need women-centric skill initiatives to improve their life. After baseline surveys, training programs are designed, which can cater to the needs of women and can provide relevant opportunities in their area. Some examples are: The Goat Project: Livestock rearing that encourages effective and sustainable goat rearing practices in Jharkhand and Bihar. The program provides training and support to women identified as goat rearers, known as pashu sakhis, helping them earn an income by way of preparing and selling goat feed supplements and treatment of goats. Around 100 pashu sakhis have been trained, impacting over 1,120 goat rearers so far. Second successful project is Pragati: Training in Retail Management that has been implemented after COVID-19 which has changed working situations as many sectors faced layoffs or changed their work approach to online platforms. Against this backdrop, the program trained 180 women in Delhi and Haryana, connecting marginalized women to the formal workforce and support in generating income. Around 70 women got placed in different warehouses & in tele-calling roles in companies such as Amazon, Myntra, Value & Variety, Vijay Mart, etc. The third project is Vahini: E-rickshaw driving aims at opening up the mobility sector as a livelihood opportunity for women living in Jahangirpuri, New Delhi. Auto-driving is a male-dominated profession. So, becoming an e-rickshaw driver is not only a personal feat but also a powerful challenge to social norms. Until now, seven women have been on-boarded as e-rickshaw drivers (Vahinis) in Jahangirpuri. Rickshaw purchase was supported by flexible financing through Delhi Credit Cooperative.

3.2 International Case Studies

1. Kenya: Kenya's Ministry of Information, Communication, and Digital Economy (MICDE) has established digital skills training under the Ajira Digital Program[6] with an aim of providing digital skills training to youth in order to enhance their employability and enable them to access online job opportunities. The Ajira Digital Program has equipped the youth with digital skills such as digital marketing, graphic design, and coding, and have enabled them to access online job opportunities and freelance work. Many success stories have been achieved with this program so far. Ajira Digital Program through its implementing partner, Kenya Private Sector Alliance (KEPSA), and in collaboration with Konza Technopolis and a local Business Process Outsourcing (BPO), Oasis Outsourcing, engaged 100 video annotators to provide services to different clients across the globe. In addition to technical skills, the young digital work participants were trained on soft skills and industry exposure to best practices, which are needed skills to thrive in the field of video annotation. These soft skills training mainly focused on communication, teamwork, problem-solving, and time management. Enactment of these holistic skills development was made possible through the blend of interactive sessions, experiential learning activities, and group projects, as well as ongoing mentorship

[5] https://sewabharat.org/what-we-do/skills-development/
[6] https://ajiradigital.go.ke/#/index 2

and guidance opportunities. Ajira Digital Program has been seeking to help bridge the gap between youth unemployment and industry demand while fostering socioeconomic development and digital inclusion. This is a fine demonstration of how BPOs and digital labour platforms are providing solutions to organizations and businesses in their digital transformation journey.

2**. Germany:** WeCode is a programming training initiative for women run by the Rwandan Private Sector Federation (PSF) – ICT Chamber and funded by the German Development Institute (GIZ).[7] Moringa School was selected as the WeCode implementation partner from 2019–2021. Three intakes were conducted enrolling 136 women into their Software Development Course. About 83 per cent of the women who graduated from the program and were job seeking during the enrollment were able to find employment as junior developers within 12 months of their graduation.

3. South Africa: CapaCiTi[8] is a skills development initiative that offers training in various digital skills, including software development, data science, and business analysis, to unemployed youth in South Africa. The initiative fostered innovation and entrepreneurship in the country by equipping young people with the skills to start their own businesses and create job opportunities. Under this program more than 3500 unemployed youth were trained with digital and career critical skills, about 6500 employment opportunities were created for South African youth, and 47 per cent female candidates were employed.

4. Lagos, Nigeria: CodeLagos is an initiative launched by the Lagos State Government to teach coding and digital skills to one million residents of Lagos State by 2023.[9] CodeLagos has empowered residents of Lagos State with digital skills, enhancing their employability and opening up job opportunities in the technology sector. CodeLagos initiative, which has set the goal of teaching one million Lagos residents basic coding skills, was initiated in 2016. By 2018, over 15,000 individuals had been trained and the programme was set to roll out across 5,000 primary and secondary schools, as well as 50 out-of-school centres.

5. United States: Many US Smart City initiatives address the challenge of developing a highly educated workforce and creating more jobs. For example, the IBM Smarter Cities Challenge grant the City of Chicago10 with an integrated career and technical education building pipeline from high school to college to employment, creating the roadmap for career and technical education from grade ninth onwards in 14 schools. This innovative model was implemented at newly established Pathways in Technology Early College High School (P-TECH) model school in a Public-Private Partnership collaboration (Schroeder, 2012).

[7] https://moringaschool.com/stories/wecode-project-kigali-rwanda-2019-2021/ 3)
[8] https://uvuafrica.com/capaciti/ 4)
[9] https://www.nigeriacommunicationsweek.com.ng/lagos-approves-next-phase-of-codelagos-initiati ve-with-15000-trained/ 5
[10] https://hub.hku.hk/bitstream/10722/229580/1/Content.pdf?accept=1

4. Observations

This chapter discusses some of the trends at the national and city levels for skill inititiaves and the gaps in India. The chapter also discusses the discrepancies in the funding pattern of the States/ Cities under Smart City Mission for skill development initiatives.

4.1 Skill Development Intervention: Background and Objectives

Skill centres play a vital role in the Smart City Mission by providing training and education programs to the local population, equipping them with the skills needed to participate in the workforce and contribute to the development of smart cities. With approximate investments of Rs 250 crores, these initiatives aim to provide training and educational opportunities tailored to meet the demands of the labour market. It ensures that the workforce is equipped with the necessary skills to support the development and maintenance of smart infrastructure and services. These skill centres offer various courses and programs tailored to the needs of the local economy and industry sectors, including areas such as information technology, construction, healthcare, hospitality, entrepreneurship, community development and more. These centres serve as hubs where skilled individuals can come together to collaborate and contribute to the development of advanced solutions. By fostering knowledge exchange and creative ideas, these interventions aim to cultivate a skilled workforce capable of driving innovation and maximizing economic returns in smart city projects (Smart City Mission, A Compendium of Best Practices, 2020).

Broadly, the skill centre intervention aims to fulfil the objectives such as: a) fostering technology-enabled infrastructure to enhance citizens' quality of life and ensure a sustainable environment; b) providing equal economic development opportunities; c) promoting sustained, inclusive, and sustainable economic growth; d) ensuring full and productive employment and decent work for all; e) supporting development-oriented policies that encourage productive activities, job creation, entrepreneurship, creativity, and innovation; and f) encouraging the formalization and growth of micro, small, and medium-sized enterprises (MSMEs).

4.2 Coverage of Skill Centre Interventions and Performance Evaluation

The major key interventions in skill sector includes development of Incubation Centres, Skill Development Centre, Smart Classroom & School, Digital Library, and Rojgar Training Centre. As per data from MoHUA, interventions related to skill centres have been introduced in 11 States covering about 21 cities as part of SCM. These initiatives aim to enhance learning, attendance, and skill development among students and artisans, fostering an environment conducive to entrepreneurship, innovation, and co-creation. The skill projects implemented in various cities under skill development centres initiatives are given in Annexure Table A1.

To evaluate the performance of smart cities under the project and to incentivize them, the India Smart Cities Awards Contest (ISAC) was launched to recognize cities, projects, and innovative ideas driving smart development across India. ISAC serves as a valuable platform for gaining insights into the initiatives undertaken by India's smart cities. There were five award categories, with winners selected through a two-stage submission process.

- Stage-I cities need to undergo an overall assessment based on criteria: project implementation, fund utilization, governance, and stakeholder engagement.
- Stage II cities need to submit their nominations for three award categories: Project Award, Innovation Award, and City Award for overall performance.

The different categories of the awards for which cities can nominate themselves are given here as follows:

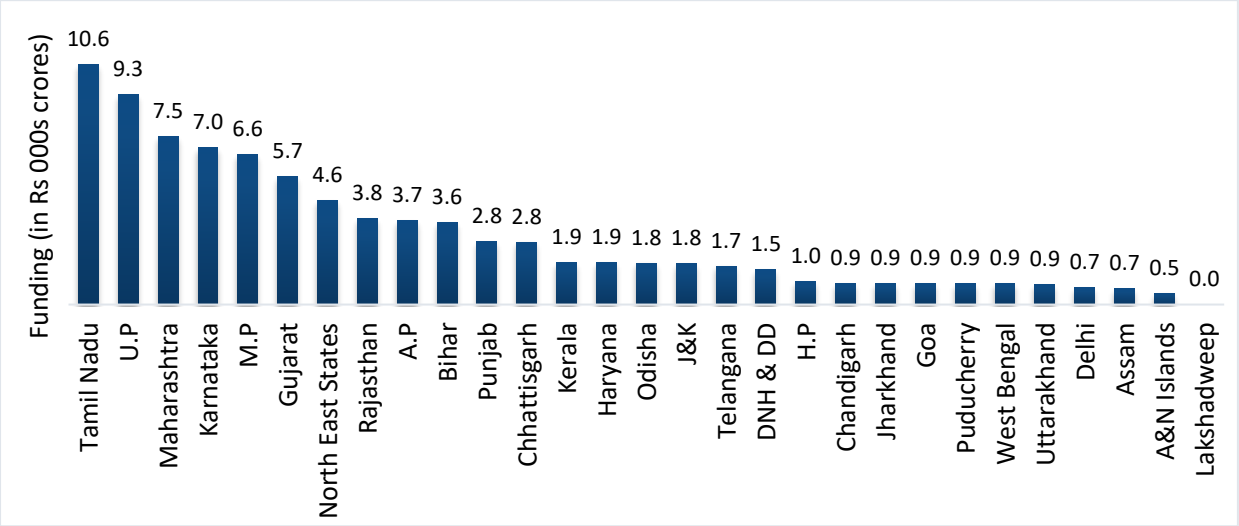
- Award Category-1: Project Award across ten urban themes: governance, built environment, social aspects, culture, economy, urban environment, mobility, sanitation, water, and sustainable business model for Integrated Command and Control Centre (ICCC).
- Award Category-2: Innovation Award to recognize excellence in innovation in terms of COVID-19 response or other outstanding innovation.
- Award Category-3: City Award for overall city performance.
- Award Category-4: Best State/UT Award, to recognize overall performance and the enabling role played by States/UTs in implementing various Smart Cities initiatives.
- Award Category-5: Smart City Leadership Award, to honour cities for exemplary leadership and contributions towards making other smart cities smarter.

Based on above screening process and awards category, the ISAC culminates with an Apex Committee meeting to finalize the winners, showcasing the commitment to promoting smart development and innovation in India's urban landscape. Some of the best-awarded projects and cities under skill development initiatives are given in Annexure Table A2 of this report.

4.3 Funding Pattern under Smart City Mission

The available data from MoHUA highlights significant disparities in funding allocations across states, with some states receiving substantially higher funding compared to others (Fig. 4.1). While, Tamil Nadu has been allocated highest SCM funding among all states, with a total budget of Rs 10.6 thousand crores, followed by Uttar Pradesh and Maharashtra with Rs 9.31 thousand crores and Rs 7.46 thousand crores respectively, states like Assam, Delhi, Uttarakhand, West Bengal, Jharkhand, and Goa, on the other hand, recorded lowest funding of less than one thousand crores. The significant differences in funding patterns across States reflects variations in developmental priorities, economic activity, population size, or infrastructure needs across different regions of the country. While states with higher SCM funding are likely to have greater resources available for implementing infrastructure projects, promoting economic growth, and improving living standards for residents, conversely, states with lower funding allocations may face challenges in meeting their developmental objectives and addressing infrastructure gaps.

Figure 4.1. State funding under SCM (in Rs 000s crores)



Source: MoHUA

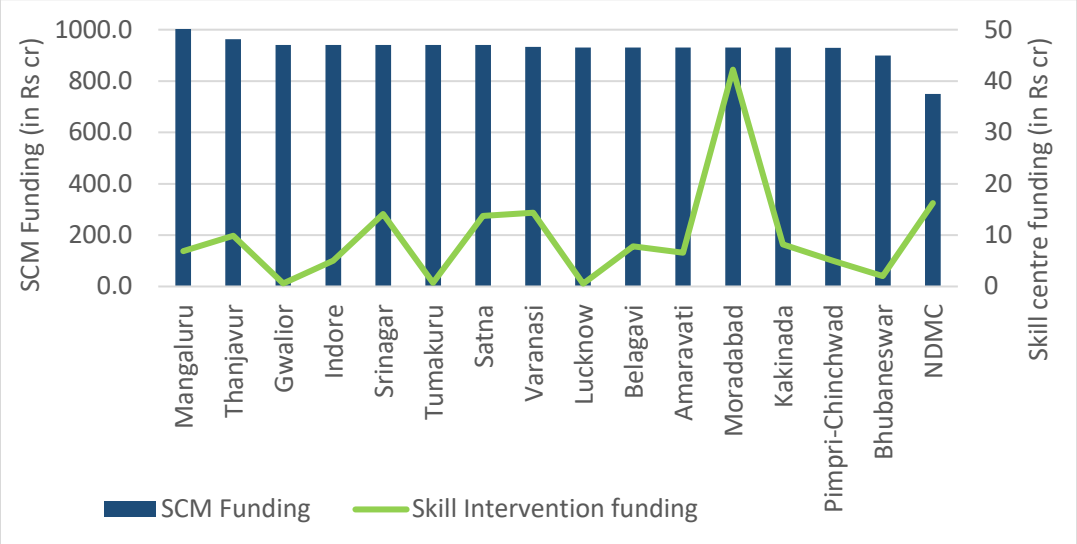
4.4 Funding Under SCM for Skill Interventions: Comparative Assessment

While Section 4.3 provides a snapshot of SCM funding across states, further analysis is needed to understand the specific projects and initiatives funded within each state. The available data from MoHUA shows that at city level the highest SCM funding is observed in Mangaluru reporting Rs 1011.6 crores directed towards the "Skill Development and Safety Training Centre", reflecting a focus on boosting local identity and the economy, along with improving health and education services. The lowest SCM funding is allotted to New Delhi Municipal Corporation (NDMC) at Rs 749.7 crores, dispersed across various projects, including the "Smart Skill Development Centres" and "Skill Centre Moti Bagh".

As far as funding for skill development interventions is concerned, Moradabad has the highest percentage of funding allocated to skill centres out of the total SCM funding. This city received Rs 42.2 crores for the "Strengthening Metal Handicraft Service Centre for Brass Research Skill Development Centre", emphasizing economic development through enhanced skill development initiatives. Conversely, NDMC despite receiving the lower funding amount across all listed smart cities, allocates a significant portion of its funding (Rs 16.01 crores) for skill centre development recording second position after Moradabad, clearly indicating their focus on enhancing skill-based education and training. In addition to NDMC, other cities that have allocated significant shares of SCM funding in skill initiatives are Varanasi, Satna, and Srinagar, whereas in other cities lower percentage shares have been allocated for skill interventions.

Figure 4.2 presents a clear comparison of the funding allocations across different cities, highlighting disparities in funding amounts and proportions allocated to skill interventions. For details of total city wise funding on SCM and skill interventions refer to Annexure Table A3.

Figure 4.2: Comparative assessment of funding under SCM vs skill development intervention



Source: MoHUA

5. Methodology

This chapter discusses the conceptual framework that has been developed for the assessment of the skill intervention implemented under Smart City Mission, followed by the research design and methods that has been adopted to fit the framework and fulfilling the objectives of the study.

5.1. Conceptual Framework

The assessment framework has been developed to have an overall understanding of the skill development program under the Smart City Mission from the stage of its implementation to the impact or outcomes that it is intended to improve (Table 5.1). Based on the objectives of the study, the assessment framework in this study includes six dimensions: relevance, coherence, effectiveness, efficiency, impact, and sustainability. Further, a set of indicators are identified against each of the criteria that has been covered in this study.

Table 5.1. Impact assessment framework for skill intervention

Criteria	Issue Addressed	Indicators
Relevance	Is the intervention doing the right things?	Types of skills; access to learning material; teaching experience & methods; industry linkages; career guidance; digital learning; inclusiveness
Coherence	How well does the intervention fit?	Curriculum design; teaching methods; industry linkage; intervention management
Effectiveness	Is the intervention achieving its objectives?	Basic theoretical knowledge; practical skills & application; usage of latest technology; increased productivity; ability to handle individual/ group projects; problem solving skills; industry exposure; motivation for start-ups; confidence to enter industry
Efficiency	How well are resources being used?	Trainer's quality; curriculum design and updation; Trainees feedback; usage of latest equipment/ technology; infrastructure facilities; timings/ shifts
Impact	What difference does the intervention make?	Interactions with industry; skills development; job placement; entrepreneurship motivation; integration of skills and technology; skills alignment with industry; satisfaction with skills/technology/methods
Sustainability	Will the benefit last?	Continuing skills developing; new skills to be introduced; best teaching practices; professional development of trainees; trainer's development

Source: NCAER study team conceptualisation

5.2 Research Design and Approach

This section of the chapter briefly discusses the research methodology and approach adopted in the study covering the research design, sample coverage, research approach, data collection techniques, sources and key indicators covered.

5.2.1. Sample Coverage

For collection of primary data, three smart cities, i.e., Agra, Tirupati, and Pune are covered as suggested by MoHUA. Initially, a maximum of two skill development programs/centres from each of these sample cities were taken but considering differences in the nature of skills imparted in these cities, a combination of skill projects was covered in the study to get the wider perspective. The list of selected skill development centres/projects in the sample cities are given here in Table 5.2.

Table 5.2. Sample of skill centres/ projects coverage

S. No.	City/ State	Project Name	Sample Centres
1	Agra, Uttar Pradesh	Micro Skill Development centres	4 Skill Centres
2	Pune, Maharashtra	Low income skill development and healthcare	2 Hospitals
		Low income skill development and healthcare — Digital learning school	2 Schools
3	Tirupati, Andhra Pradesh	Digital 3D e-Printing	1 Art design studio
Total centres covered in 3 cities			**9**

Source: NCAER study team conceptualisation

5.2.2 Data Collection Techniques and Sources

The analysis in the study is carried out using both primary and secondary data sources.

5.2.2.1 Primary Data Collection: The primary data was collected in the form of online and face-to-face interviews and Focus Group Discussions (FGDs) with various stakeholders at the selected skill development centres in the sample cities (refer Annexure Table A4 for samples covered). The various stakeholders includes:

1. ***Key Informant Interviews (KIIs)*** were carried out with the CEOs of all smart cities where skill development projects have been implemented under the Smart City Mission. This exercise was facilitated by the MoHUA. A set of critical questions related to the study were shared with MoHUA, which were further circulated by MoHUA to the CEOs of the smart city and the responses from the respective CEOs were shared. Based on this exercise, the responses received from 18 smart city CEOs have been analyzed in this study, where skill development initiatives has been implemented.
2. ***Head of skill development projects*** were interviewed face to face during the field visits in the three sample cities. Overall, six heads were interviewed to seek the information related to skill projects in their respective cities. In addition to this, efforts were made to interact with few project heads in other than selected cities for skill interventions. For

this online questionnaire were shared with centre heads, but online meetings were conducted with two cities project heads only, namely, Mangaluru and Varanasi. In total, skill intervention project heads from eight cities were interviewed in the study.

3. ***Trainers at skill development centres*** were interviewed face-to-face based on their availability during the field visit in the city. Efforts were made to cover at least one trainer to understand their perspective on skill development initiatives under smart city mission. Overall, four trainers (2 each) were interviewed in the study from Agra and Tirupati. In Pune city, the training of the software was conducted only in case of hospital and that too long back, therefore no trainer was available as such.
4. ***Trainees*** were interviewed face-to-face only in case of Agra Skill Development centres. From four centres, nearly 30 trainees, both male and female, were interviewed for different set of skills. In case of Pune, since the intervention was in the form of online software in schools and hospitals, which were implemented in just one school and hospital, therefore decision was made to conduct FGDs with few available teachers and students in the school itself who were the actual beneficiaries of the software. In school where the software was not implemented yet, interactions were also conducted with few teachers on their expectations from the software on the overall student's learning process. In case of one hospital, where the software was implemented, the project head was himself the doctor in-practice, who was using the software, therefore the same doctor was interviewed as the user as well. In Tirupati, no trainees were available for the interviews/ interactions.

5.2.2.2 Secondary Data Collection: In addition to the primary survey and FGDs, the analysis was supported using the secondary data that was collected through following sources.

1. ***Literature Review:*** A short literature review for each type of intervention was carried out in the respective cities on indicators like, type of skills given, funding pattern, etc.
2. ***Secondary Data Collection:*** In addition to this, various central government websites were referred for the relevant data.

5.2.3 Survey Method

The project team visited the selected sample cities for the interviews with various stakeholders in the month of March 2024. The interviews were conducted using a mixed approach, i.e., both face-to-face in-depth interviews, online survey/ discussions and FGDs/ group interactions. For face-to-face/ online interviews, well-administered structured questionnaires were developed separately for head of the skill development centres, trainers and trainees. For online interactions and FGDs, a structured set of pre-defined questions were listed out. The sample trainers and trainees were selected randomly based on the availability, with prior consent, to participate in the interviews/ FGDs. For covering the details of the skill implementation in smart cities other than three sample cities covered in the primary survey, a short online questionnaire was developed and shared with the centre heads and provisions were made for either online responses or having online interactions with the study team.

5.2.4 Research Approach

The interactions with above stakeholders provided a better understanding on the kind and duration of courses, curriculums in the skill centres, whether skills align with the local/national industry demand, ratios of theory versus practical exposure, qualifications/ skills/ experience of the trainers, teaching methods and equipment, placement/ entrepreneurship opportunities for trainees, etc. Using this data, a qualitative assessment has been carried out in the present study. The findings are presented in the form of separate case studies for each of the cities visited in-person.

5.3 Sample Cities: Brief Discussion

The details of types of skills imparted in each of these three sample smart cities has been briefly discussed in this section of the chapter.

5.3.1 Agra Smart City

Agra Smart City, is situated in the North Indian state of Uttar Pradesh, nestled along the banks of the river Yamuna. In September 2016, Agra was designated as a Smart City during the third round of the Smart Cities Challenge. A Special Purpose Vehicle (SPV) called Agra Smart City Limited (ASCL) was subsequently established under the Companies Act. The Divisional Commissioner of Agra district serves as the Chairperson of the SPV, while the Municipal Commissioner of Agra acts as the CEO. Various city and district administration personnel from multiple departments contribute as stakeholders in ASCL. This team collaborates closely with the CEO of the SPV and the Program Management Consultant (PMC) team to manage and ensure the smart city's design, development, and implementation efforts. Agra's Smart City project entails core redevelopment initiatives totaling Rs 2,133 crore, covering an area of 2,250 acres, including zones around prominent landmarks such as the Taj Mahal, Agra Fort, and other parts of the city.

The vision for Agra Smart City focuses on enhancing social equity, infrastructure, heritage and cultural tourism, and tourism infrastructure. It aims to revitalize green spaces and foster sustainable livelihoods, thereby improving residents' quality of life and visitors' experiences. The key flagship projects under the Smart City initiative in Agra encompass Integrated Command & Control Centre, Micro-Skill Development Centres, Automated Self-Cleaning Toilets, Smart Health Centres, and Smart Classes.

The skill initiative project in Agra Smart city strengthen the economic condition of Tajganj area through skill development of Self-Help Groups (SHGs) and their sustainable linkages by establishing micro-skill centres. The project involves development of four micro-skill development centres to impart traditional skills such as zardosi embroidery and stone inlay and few modern skills to residents. The project is focused on women empowerment and their socio-economic growth. Major objectives of the project includes: to support micro skill initiatives to form a platform for the women group of the Tajganj area; to provide skill development trainings to targeted SHGs; to establish micro skill centres in Tajganj; to promote traditional art, product development for SHGs, value chain analysis of Produce/services; and to establish linkage and other concern activities. This Smart City houses one of the largest micro skill development centres, having trained over 1,500 individuals.

5.3.2 Pune Smart City

Pune, the seventh-most populous city in India and the second largest in Maharashtra, is renowned for its vibrant manufacturing and automobile sectors, alongside being a hub for government and private sector research institutes specializing in information technology (IT) education, management, and training. This diverse landscape attracts migrants, students, and professionals from across India and South East Asia. The city's ambition to emerge as India's most livable city capitalizes on its rich cultural and natural heritage, robust human capital, and thriving business environment. In pursuit of this vision, the Pune Smart City Development Corporation Limited (PSCDCL), an SPV established by the Pune Municipal Corporation (PMC), is dedicated to implementing Smart City Projects.

Among its initiatives, the Smart Cities Mission prioritizes enhancing the quality of life, particularly for economically disadvantaged segments. The Smart Clinics project, under the ambit of the health sector within the Smart City Mission, seeks to provide improved and affordable healthcare facilities for all strata of society. Presently, Pune faces a shortfall in hospital beds and primary healthcare centres, disproportionately affecting the urban poor. The Smart Clinics initiative aims to address these disparities by establishing comprehensive healthcare systems across the city. Through the operation of Smart Clinics at 100 locations, citizens will access primary healthcare services, including free health check-ups, diagnostic tests, sample collection, and medications for common ailments. Employing the Health Management Information System (HMIS), these clinics will maintain comprehensive patient records, facilitating online consultations and ensuring seamless access to healthcare resources through a centralized online platform. On similar grounds, Digital Education System (DES) has been implemented for enhancing the learning outcomes in smart schools. The key flagship projects under Smart city initiative in Pune is given is Table 5.3.

Table 5.3. Key flagship projects under the smart city initiative in Pune

Projects	Cost (in Rs Cr.)
Low income skill development and healthcare	20.00
Low income skill development and healthcare - Maternity Hospital	9.79
Low income skill development and healthcare - Smart schools	9.90
Low income skill development and healthcare - Digital learning school	21.00

Source: MoHUA

5.3.3 Tirupati

Tirupati, renowned for its rich cultural heritage, is celebrated for its local crafts, which encompass intricate woodwork, exquisite terracotta sculptures, and vibrant kalamkari artwork. The city boasts a community of over five thousand skilled craftsmen, each contributing to its artistic legacy. Tirupati Smart City has pioneered India's inaugural digital handicraft incubation centre. This innovative platform bridges the geographical gap between art and craft by facilitating seamless collaboration between artists and craftsmen. Through the digital studio, craftsmen gain access to master patterns of new designs, revitalizing their craft while preserving traditional manufacturing methods. This strategic intervention not only empowers artists to digitize their skills, ensuring their relevance in contemporary markets,

but also safeguards the livelihoods of craftsmen. Moreover, the Design Studio fosters employment opportunities for craftsmen by connecting them with architects, interior designers, and previously inaccessible markets. In essence, Tirupati's digital handicraft incubation centre embodies a forward-thinking approach to revitalizing the local handicraft industry, fostering innovation, preserving tradition, and bolstering economic prosperity for the city's artisans.

6. Impact Assessment Inferences

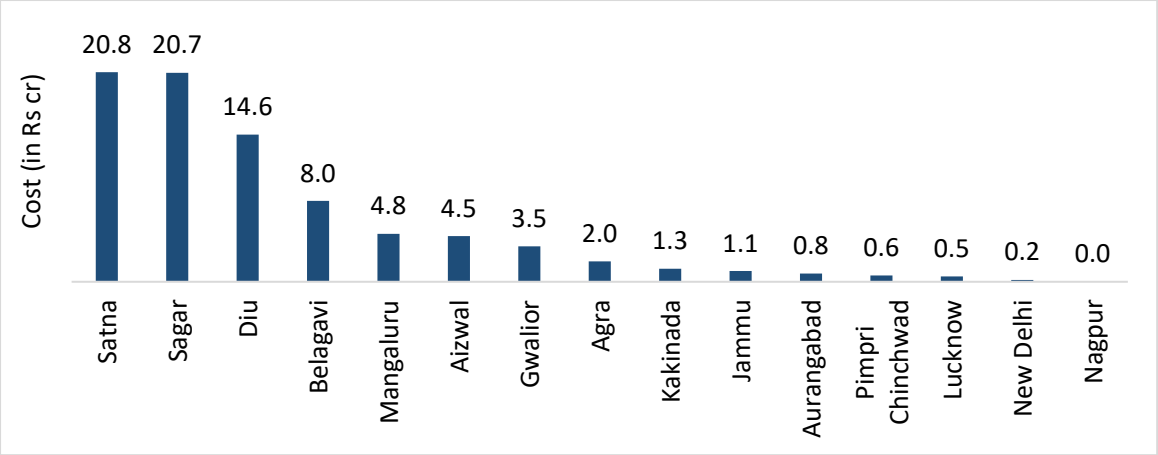
6.1 National Level Theme-based Impact Assessment

This section analyses the data received from CEOs of 100 smart cities. The set of questions specific to the study were shared with CEOs on which responses were received. Based on the databank shared by MoHUA and CEOs data, it has been analysed that there are 28 cities where skill intervention programs have been implemented under SCM. Of these, in five cities no skill centre exists as responded by CEOs, whereas for another five cities no data has been received. Therefore, in total, out of 28 smart cities with skill interventions, data for 18 cities has been analysed in this section of the chapter. The city-wise details can be referred in Annexure Tables A5.1, A5.2 and A5.3.

6.1.1 Impact of Skill Intervention at National Level

Based on the responses received, it is found that among all 18 cities, those ranking highest on their cost of skill projects are Satna and Sagar with more than Rs 20 crores of the investments in such projects, whereas 5 cities show lowest ranking on the cost of skill projects with less than Rs 1 crore of the investments (Fig. 6.1).

Figure 6.1. City-wise total cost of skilling centre project (in Rs crores)



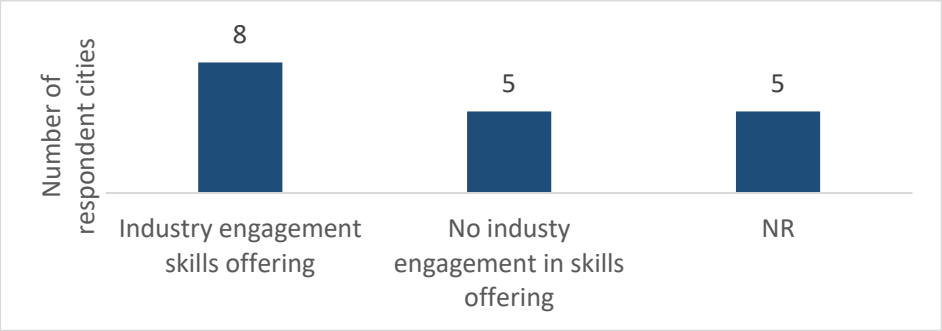
Notes: For Varanasi city, the project cost is included in total project cost of Macchodari Smart School project, whereas for Thiruvananthapuram city, the total project cost is part of Integrated Command and Control Centre (ICCC), which is yet to be implemented.
Source: MoHUA

When asked about how the cities determined which skill interventions to be prioritized for implementation, majority of the smart city CEOs (10 out of 18) mentioned opinion surveys, market survey, and stakeholder interviews, as the key factors/ sources. Few cities (5 out of 18) also mentioned collaborations with NGOs, city-level employment studies and consultations with external agencies as the key sources that help in determining the skill interventions required in the city.

Out of 18 cities, eight cities agreed on their engagement with industry stakeholders prior to offering specific skills, while another 5 cities did not consider any such stakeholder engagements in designing courses (Fig. 6.2). The cities who engage industry stakeholders for

required skills are Aizwal, Aurangabad, Belagavi, Gwalior, Kakinada, Mangaluru, Sagar, and Varanasi.

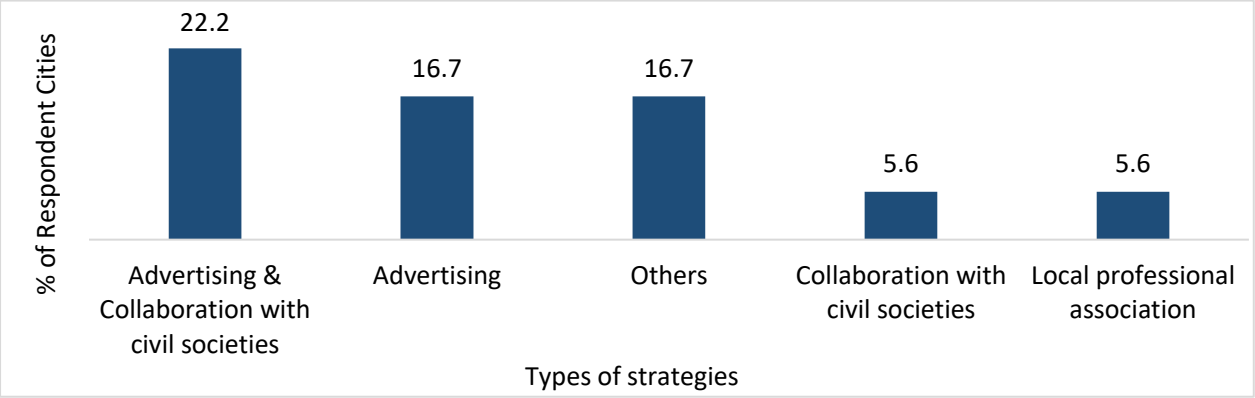
Figure 6.2. Number of cities engaging with industry stakeholders prior to offering specific skills



Note: NR- No Response
Source: MoHUA

Once the type of courses are identified by the respective cities, the major challenge is how to attract the participants for such skill programs. In this regard, about 22 per cent of the respondent CEOs mentioned employing Advertising & Collaboration with civil societies as their major mode of attracting participants in skill programs (Fig. 6.3). This is followed by the cities where advertising is the only mode of attracting participants, whereas another 11 per cent collaborate with civil societies or local professional associations for attracting participants for such skill programs in their respective cities.

Figure 6.3. Percentage distribution of city responses by type of strategies employed to attract participants in skill programs

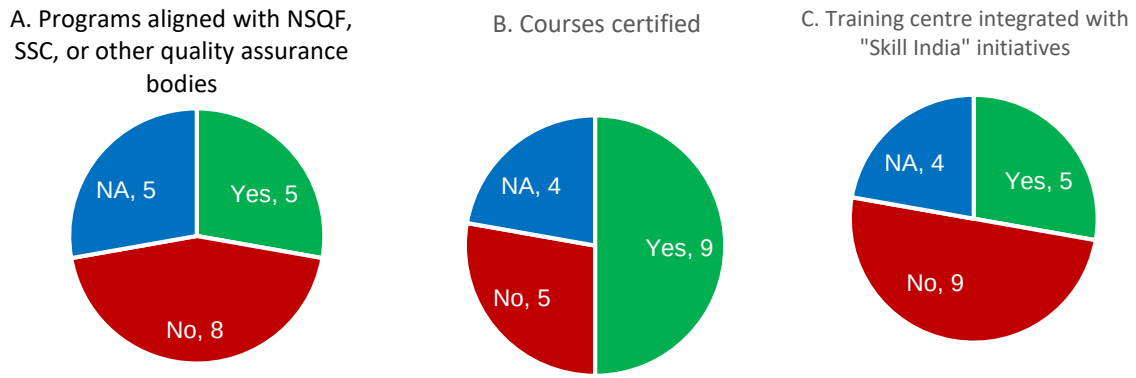


Note: 33.3 per cent of the respondent CEOs did not responded.
Source: MoHUA

With respect to the affiliation of the skill programs as introduced by these cities under smart city mission, it is reported that in only 5 out of 18 cities (Aizwal, Aurangabad, Belagavi, Kakinada, and Lucknow) the programs are aligned with National Skills Qualification Framework, Sector Skills Councils and/or other quality assurance bodies, whereas CEOs of 8

cities have clearly mentioned that the programs are not aligned with any such bodies (Fig. 6.4A). Among the remaining 5 cities where these courses are aligned with bodies like SSC/ NSQF, etc., except in Lucknow, in the other four cities along with New Delhi, the training centres are integrated with "Skill India" initiative (Fig. 6.4C). Further, 9 cities reported that their courses are certified as well (Fig. 6.4B).

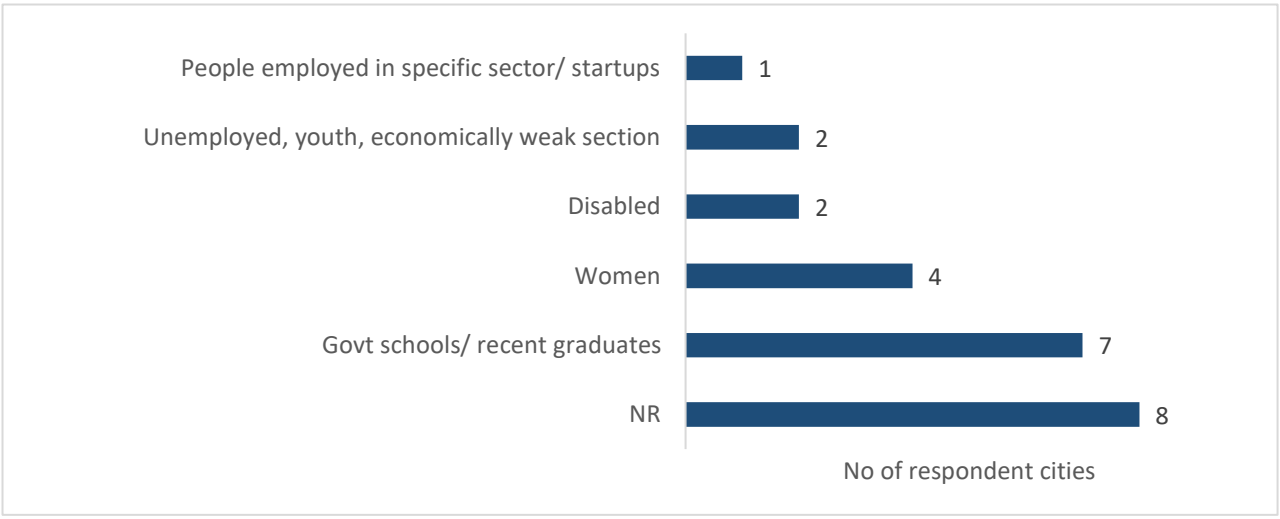
Figure 6.4. Details of affiliation/ certification of skill programs (by number of respondent cities)



Note: NA-Not Applicable
Source: MoHUA

While the courses introduced in the respective cities are aligned with their local industry needs (refer Annexure Table A5.2 for details on types of skills), in most of the cases the target groups have been the government school students or recent graduates. Four cities, i.e., Agra, Aizwal, Aurangabad, and Lucknow responded that their skill programs are mainly targeting upliftment of women (Fig. 6.5). In addition to this, few of them are running skill programs towards disabled group of people, economically weaker section, youth, or startups.

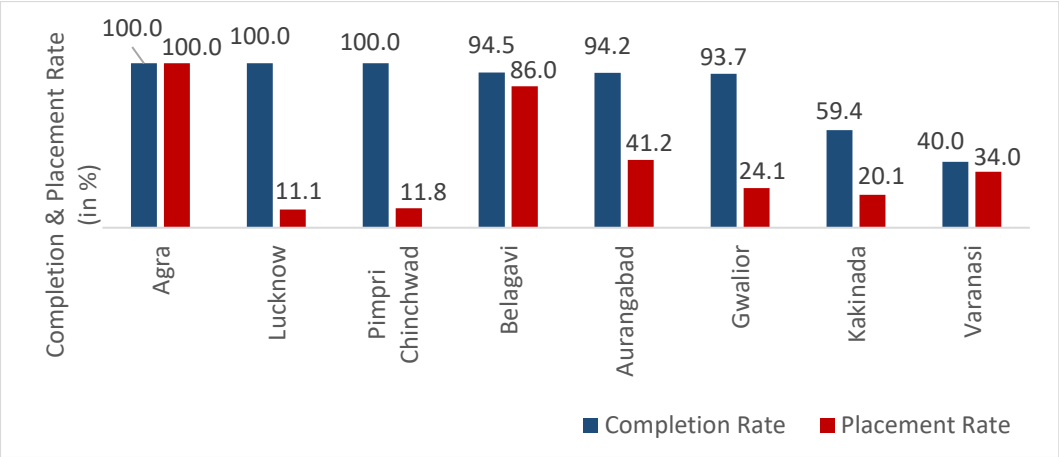
Figure 6.5. Target group for skill programs



Source: MoHUA

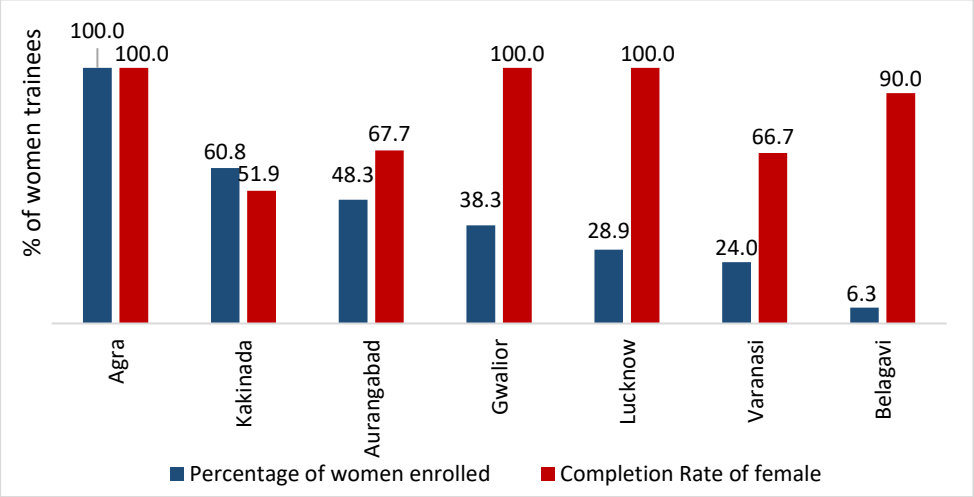
Out of 18 cities, 10 have provided the details related to trainees' enrolment in skill centres, completion rates, women enrolment, etc. The responses show that the total number of trainees that are enrolled in the courses varies from city to city from as high as 5000 trainees in Varanasi, to 1000–2000 in (Aurangabad, Belagavi, and Agra) to up to 50 trainees in cities like Lucknow, Mangaluru, and Pimpri Chinchwad (for details refer to Annexure Table A5.3). As far as completion rates are concerned, three cities (Agra, Lucknow, and Pimpri-Chinchwad) tops the list with 100 per cent, followed by Aurangabad, Belagavi, and Gwalior with more than 93 per cent of completion rates (Fig. 6.6). While in Agra, all trainees enrolled for skill courses at centres are women, this proportion varies from as low as 6 per cent in Belagavi to 61 per cent in Kakinada (Fig 6.7).

Figure 6.6. Completion rate & placement rate of the student enrolled in the course



Source: MoHUA

Figure 6.7. Percentage of women enrolled and completed in skill courses



Source: MoHUA

6.1.2 Success Stories

6.1.2.1. Mangaluru Smart City— Best Precedent

The city of Mangaluru is an ideal example of a successful smart city plan implementation. A proud participant in the second round of the Smart City Challenge, Mangaluru city secured sixth position in the overall list and first position in the state. Through intensive focus on honing smart education as well as training and skill development for fishermen, it was able to translate the vision, i.e., the broad components across both 'area-based' and 'pan-city' heads identified in the Smart City proposal into reality. The salient features of the two main components of the skill implementation drive in Mangaluru are discussed here in detail.

E-Smart School: One goal of the Mangaluru Smart City Mission was to transform the existing government schools in the ABD area into smart schools. The total project cost was estimated at 16 crores and accordingly a comprehensive smart school system across 13 Government schools and 2 Government PU Colleges in Mangalore, benefiting 1,930 students was established. This system integrated various technologies including KYAN for content dissemination, UPS for uninterrupted power supply, Chromebook for interactive learning, Chrome Carts for charging, and 2-Seater bench desks for infrastructure improvement.

Mangaluru Smart City Ltd. (MSCL) spearheaded this effort to enhance educational delivery in alignment with state and national syllabi. Standardized implementation was ensured by taking into account hardware and infrastructure details for each school. In total 35 E-smart classes were established. Training sessions for teachers and monitoring mechanisms were established, with feedback channels for continuous improvement. The benefits included enhanced learning experiences, curriculum alignment, improved accessibility, and increased admissions.

The success of this program can be enhanced by maintaining continuity and sustainability. Additionally, while this strategy was implemented in only eight ABDs, the experience gained could benefit in developing all sixty ABDs in the city by expanding the initiative.

Fishery Skill Development Centre: At the Fisheries College Technical wing, Hoigebazar Campus, the Skill Development and Safety Training Centre has been established in accordance with a memorandum of understanding between the College of Fisheries and MSCL.

The project targets fishermen, fisherwomen, unemployed youth, and school dropouts, providing training and demonstrations related to Fisheries and Harbour subjects. The courses offered include aquarium fabrication, aquaponics/ hydroponics integration, fish product value addition, fish preservation, fish waste utilization, SCUBA diving, boat modernization, and manual fish net making.

The total cost of the project was estimated at 4.75 crores, with 2.40 crores allocated for the construction of the Skill Development Centre and 2.35 crores for training-related expenses. Eight training programs were conducted, each lasting 30 days and accommodating 30 students per training. A total of 12 trainings were conducted over two years, after which the centre was handed over to the College of Fisheries to continue running the courses.

6.1.2.2. Varanasi Smart City— Best Progress

Varanasi, renowned as one of the seven sacred cities of Ancient India, is seamlessly merging its rich heritage with modern advancements by its transformation into a smart city. Among its initiatives, the Macchodari Smart Senior Secondary School and Skill Development Centre stands out as a prime example of this progression.

Once famed primarily for its Banarasi silk sarees and handicrafts, Varanasi now works towards skill implementation through this state-of-the-art institution. The Smart City initiative has crafted a brand-new infrastructure, expanding the school's capacity from a mere 150 students to an impressive 1200. A dedicated floor and classrooms cater exclusively to skill development courses.

Beyond academic pursuits, the centre prioritizes the upskilling and empowerment of girls from nearby slum areas. Offering training in diverse disciplines such as cuisine, fashion designing, kota painting, silk painting, tailoring, and crocheting, it equips them with practical expertise. Upon completion and clearing of a written and practical exam, students receive PMKVY-affiliated certificates. Remarkably, this initiative has already empowered around 3000 to 4000 girls, facilitating their integration into local silk industry and enabling them to contribute meaningfully while earning a livelihood.

Despite initial challenges, including identifying the target group in densely populated slum areas and changing orthodox mindsets, the centre's perseverance resulted in success. Later the facility was handed over to the Department of Basic Education, UP which is a very competitive authority for ensuring continued success as well as giving a permanence to the program.

This example of Varanasi which bagged the first position among 100 smart cities of the country in project implementation offers valuable insights. Firstly, it underscores the importance of seamless implementation and integration with relevant departments to ensure long-term sustainability. Secondly, by aligning skill development with Varanasi's cultural heritage, such as the art of silk saree making, the program resonates deeply with the local

communities. Lastly, its emphasis on gender inclusivity and empowerment shows the transformative potential of imparting skills to marginalized communities.

6.2 City Visits and Detailed Primary Assessment

This section presents the findings based on the discussions held with three sample cities in this study.

6.2.1 Case Study for Agra Skill Intervention

In September 2016, Agra was distinguished as one of the select cities in the second round of the Smart Cities Challenge, marking a pivotal moment in its urban development narrative. This recognition led to the establishment of Agra Smart City Ltd, an SPV constituted under the Companies Act, dedicated to spearheading the transformation of Agra into a smart city. Under the stewardship of the Municipal Commissioner of Agra Municipal Corporation, who also serves as the Chief Executive Officer of Agra Smart City Ltd, the mission extends beyond mere infrastructure development. The endeavour aims to preserve and enhance the rich and heritage art of Agra with the advancements of modern technology, thereby realizing a future where tradition and technology promises a smarter Agra for generations to come.

6.2.1.1. Skill Centres: Background and Approach of Functioning

The Adarsh Seva Samiti, a venerable non-governmental organization with a 45-year legacy, spearheads a transformative initiative under the auspices of the Smart City project. The project extends its roots across approx. 23 mohallas, incorporating 5 area level federations, and offers a spectrum of 7 skills through 4 dedicated micro skill centres in Tajganj (Teela Saeed Nagar, Nala Shaikh Bulaki, Kolhai, Chowk Chaindara) in Tajganj area (ABD area). The skills ranges from the traditional—such as zardozi embroidery, marble inlay, and Agra carpet weaving—to modern crafts including brass brush polishing, stitching, flower decoration, and the creation of decorative handicrafts. Notably, the traditional crafts have captivated an international audience, particularly benefiting from the patronage of the tourism department and achieving remarkable sales figures, with Agra's carpets finding special favour in Switzerland and Iceland.

Approach: The ambition of the Smart City project is further supported by the Adarsh Samiti and the Samooh (community-based Self-Help Groups). The aim is to empower artisans to thrive independently and reducing long-term reliance on central support. To embark on this journey, artisans are invited to join the Samooh by paying a minimal amount as a nominal registration fee. Once enrolled, artisans are not only nurtured with tailored skills training but are also seamlessly connected to a vibrant marketplace. Through the collaborative efforts of both the Samooh and the Samiti, artisans receive ongoing orders to craft diverse products, ensuring they have continuous opportunities to apply their newfound skills.

Pricing model: The pricing model adheres to a thoughtful framework established by the State Urban Development Authority (SUDA) ensuring a fair distribution of profits, wherein 10 per cent is allocated to the supporting bodies including Adarsh Samiti, while remaining 90 per cent, directly benefits the artisans. The 10 per cent contribution is further subdivided among the key supporting bodies: 5 per cent is designated for the City-level Federation, 2.5 per cent

for the Area-level Federation, and the remaining 2.5 per cent supports the Self-Help Groups (SHGs). So far items costing about Rs 60 lakhs have been sold by the artisans.

6.2.1.2. Skill Dissemination: Impact, Challenges and Future Prospects

A noteworthy aspect of this project is its inclusivity and community-specific skill dissemination, with certain crafts predominantly practiced by specific communities. Recognizing that the artisans are already familiar with their craft since childhood, the program focuses more on refining and updating the skills ensuring that they align with contemporary standards and demands. This approach not only honours their existing expertise but also equips them with the tools and techniques needed to excel and innovate in a modern marketplace. The various types of skill disseminated at the skill centres along with the benefits and challenges are discussed here in detail.

A. Zardosi Embroidery

The zardosi craft's heritage is deeply embedded in India's rich tapestry of cultural and artistic traditions, tracing back to the Mughal era of the 14th and 15th centuries. A resurgence in demand for zardosi work, particularly in Indian metropolitan cities and overseas, marked the late 19th century, integrating it into the fabric of Indian bridal couture. While traditionally a male-dominated field, today's zardosi industry sees an increasing participation of women, largely due to rehabilitation and livelihood initiatives by various NGOs, signifying a progressive shift towards inclusivity. The skill centre helps in pioneering a movement where the age-old zardosi embroidery is not just preserved but invigorated with techniques and designs from a multitude of cultures. By weaving together diverse stitching styles, they are crafting a unique tapestry of art that appeals to a global audience, particularly targeting markets in Europe. The goal is not just to preserve heritage but also to make it vibrant and relevant in today's world.

The intricate web of relationships that defines the zardosi industry hinges significantly on the connections between artisans, contractors, shopkeepers, and exporters. The skill centre serves as the crucial link, bridging artisans with the broader market, in both domestic and international realms. The skill centre heads and trainers often play dual roles as both intermediaries and artisans, navigate the market's complexities by directly interacting with shop owners and exporters to manage orders and supplies. This cyclical interaction ensures a steady workflow, with the skill centre trainers visiting market traders weekly to reconcile accounts and secure new orders of raw materials. The skill centre provides orders for the production in the skill centres by the workers, whereas the skill centre participants make finish goods with the guidance and instructions of the trainers. The skill centre trainers instructs the designs and the techniques as per the market demands and takes initiatives to link the skill centre with the market.

The skilling model is segmented into three parts to accommodate varying levels of expertise: beginner, intermediate, and master. This structure ensures personalized growth, with women advancing through levels as their skills refine, culminating in the opportunity for master

trainees to mentor newcomers. This cyclical learning model not only enhances skill transmission but also fosters a sense of community and continuity within the craft.

Challenges and Solutions: Despite the progress, the program faces notable challenges.

- A lack of collaboration with the local industry and the absence of a certification system restrict the women's ability to display their skills in formal sector, limiting their mobility and recognition. To bridge this gap, formal certification and industry partnerships are imperative to validate the craftsmen's proficiency, enabling them to thrive in diverse environments.
- Another challenge was convincing the families of women, predominantly from the Muslim community to allow them to partake in zardosi embroidery at skill centres. Here Aadrash Samiti and Samooh members played a major role. This helped women in opening doors to new worlds and as a result, gaining self-reliance and societal engagement.
- The aspiration for better compensation and more consistent engagement underscores the need for closer ties with the fashion and home décor industries. Regular, structured classes and a direct linkage to the market can significantly enhance both skill application and financial independence.

Towards a Self-Sustaining Future: Looking ahead, fostering a sense of autonomy among trainees is crucial. Beyond teaching them the art of embroidery, there's a pressing need to equip them with the tools for self-reliance—from design inception to market sale, either independently or in collaboration with private entities. Establishing a direct link to the market is not just about enhancing income; it's about affirming the value and relevance of their craft in the modern world. In sum, the vision should extend beyond preserving a craft; it's about enriching it with new dimensions, elevating the craftsmen to global artisans, and embedding them in a sustainable economic framework that values tradition as much as innovation.

B. Marble In-lay

Marble inlay work, also known as *Parchin Kari*, is a defining feature of Mughal architecture in India, reaching its pinnacle of beauty and intricacy in the majestic Taj Mahal of Agra. Agra's legacy of marble inlay artistry has been zealously safeguarded and nurtured by generations of skilled artisans. These custodians of an age-old tradition have succeeded in keeping the craft alive, extending its application from monumental edifices to exquisite decorative objects such as tabletops, vases, and intricately designed jewellery boxes. These items, cherished by tourists and art connoisseurs alike, serve as a testament to the enduring appeal and cultural significance of marble inlay work. The art of marble inlay has been handed down from one generation to the next, often within families. Skills are taught through an apprenticeship model, where young artisans learn from experienced masters, not only the techniques but also the cultural significance and historical context of their craft. In places like Agra, where marble inlay work is synonymous with the city's identity, preserving these skills is also about maintaining a cultural legacy.

There is a consistent demand for intricately designed marble inlay items such as tabletops, coasters, vases, and wall pieces, both within India and internationally. Further, there is a need for skilled artisans in the restoration of historical buildings and artifacts that ensures there is demand for these specialized skills. Further, the high-end interior design and bespoke architectural projects often seek the unique beauty of handcrafted marble inlay, catering to a niche but lucrative market.

For this type of art, a special set of skills are required ranging from a high level of precision in cutting and fitting tiny pieces of stone into marble, to understanding design, color theory, and historical motifs. Artisans must be able to interpret traditional patterns and potentially create new designs that appeal to contemporary tastes. Artisans must possess dexterity in handling specialized tools such as chisels, hammers, and precision cutting instruments to carve delicate designs into marble surfaces. Additionally, a thorough understanding of various materials, including precious stones and metals, is essential for creating exquisite patterns and achieving desired aesthetics. Familiarity with traditional and modern machinery, such as water jet cutters and CNC routers, is also advantageous for enhancing efficiency and precision in the inlay process. Further, for those looking to sustain and grow their craft in the modern world, understanding market trends, online commerce, and customer preferences can be as important as the craft itself. As appreciation for handmade and artisanal goods grows globally, there is a promising future for artisans who can navigate these waters while staying true to the heritage of their craft.

The skill centre does not focus on teaching the artisans the basics of their craft, considering they come with over a decade of experience. Instead, their role is to refresh the art form by infusing modern design elements and broadening its appeal to a wider audience. The introduction of contemporary designs not only preserves the traditional essence but also expands the art's application to a variety of modern products, enhancing its accessibility and relevance in today's market. Further, the skill centre has played a pivotal role in aiding craftsmen navigate the market's new landscape and rejuvenate their operations in the aftermath of the pandemic. By facilitating connections between the craftsmen and broader industry networks, the skill centre has not only provided a lifeline during challenging times but also opened up new avenues for growth and recovery.

Challenges: Despite the demand, this art form is also going through a number of challenges:

- The inclusion of traditional skills primarily by certain community hints at an undercurrent of occupational segregation that could limit broader community engagement and economic diversification.
- With its extensive and health-hazardous processes, it epitomizes the critical need for addressing occupational health and safety of the workers, a situation that is overlooked in its current framework.
- Even if the skill centre provides them with safety equipment and knowledge, the craftsmen are not too fond of following the safety regulations. Despite access to safety gear and training, adherence to safety protocols remains a challenge among artisans.
- The younger generation shows a dwindling interest in adopting this craft, largely due to tedious, time consuming and health hazardous process and the limited financial returns it offers. This disinterest places the art form at risk of fading into obscurity. The loss of

this skill for even a single generation could render its revival exponentially more challenging and expensive than its preservation and encouragement.

- Most of this generation's craftsmen are in their 40s or older, indicating a looming gap in passing down the craft to future generations. The aging workforce exacerbates the risk of skill loss, as experienced artisans retire without sufficient successors to carry on the tradition.

Future Prospects: The global appeal of marble inlay works, especially those that emulate or draw inspiration from pieces found in the Taj Mahal, ensures a steady demand from tourists and international buyers. Artisans and the skill centre are tapping into online markets to reach global customers. Beyond traditional artifacts, marble inlay is finding its way into contemporary interior design and luxury architecture, broadening the market. There is a potential for growth by integrating modern design with traditional techniques, which is being taught currently at the skill centre where with traditional skills modern designs are being incorporated. Workshops, demonstrations, and educational tours offer another avenue for artisans to sustain their craft. By sharing their skills with visitors, artisans not only earn income but also raise awareness about the art form. To ensure the survival and flourishing of this art, expanding its market through international collaboration and exports is crucial. There is a potential yet untapped demand for marble inlay work abroad that could significantly benefit artisans, making the craft not only viable but also lucrative. Encouraging such global connections could play a pivotal role in rekindling interest among the new generation to keep this age-old art form vibrant and alive. Government initiatives should provide substantial financial support to artisans, enabling them to establish their own workshops. By offering financial assistance for workshop setup and equipment procurement, artisans can gain autonomy and sustainability in their craft. This investment not only empowers artisans to preserve and further develop their skills but also contributes to the overall economic growth of the community.

C. Brass Brush Making for Cleaning Silver Items

In the realm of brass brush production, a unique opportunity unfolds as artisans seek to polish silver ornaments and utensils with finesse and precision. However, challenges persist, particularly concerning compensation and market demand. Despite these obstacles, there exists immense potential to transform brush making into a lucrative venture, with aspirations to export these exquisite brushes to cities and countries beyond their current scope.

Skills Required: Artisans must possess exceptional craftsmanship skills to produce brass brushes of superior quality. Precision, attention to detail, and mastery of traditional techniques are essential for crafting brushes that meet international standards. Further, understanding market trends, consumer preferences, and competition is crucial for successful export-oriented brush making. Artisans must be informed about market dynamics and adapt their production and marketing strategies accordingly to capitalize on opportunities and mitigate risks. Skill centres can help artisans possess knowledge of export regulations, pricing strategies, and negotiation skills to

effectively manage export operations and maximize profitability. Most of the production is still handmade, so not much innovation is done in the technological aspect of the product. Embracing innovation and adopting modern techniques are essential for enhancing product competitiveness and meeting evolving customer demands. This is an area where skill centres can play a great role.

Benefits to artisans: The brush making skills brings about a number of benefits for the artisans. By expanding brush production and tapping into new markets, artisans have the potential to enhance their income, thereby achieving greater financial stability and prosperity. Each brass brush crafted with precision serves as a cultural ambassador, showcasing the rich heritage and craftsmanship of the artisans to a global audience. Therefore, exporting brass brushes to other cities and countries introduces artisans to a broader customer base, unlocking opportunities for growth and expansion. Access to new markets enhances market resilience and reduces dependency on local demand fluctuations. However, engaging in export-oriented brush making requires artisans to refine their skills and adopt innovative techniques to meet international quality standards. This requires continuous skill development to enhance artisans' expertise and prepares them to compete effectively in the global marketplace.

Challenges: Some of the challenges faced are as follows:

- Low Compensation: Addressing the issue of inadequate compensation for brush production poses a significant challenge. New strategies need to be explored to ensure fair wages for brass brush workers to incentivize greater participation and commitment.
- Limited Demand: The low demand for brass brushes presents a challenge in scaling up production and expanding into new markets. The skill centre must help in developing targeted marketing strategies to create demand for their products and stimulate growth.
- Market Penetration: Establishing a presence in new cities and countries requires overcoming barriers such as competition and regulatory requirements. The skill centre must develop effective market entry strategies and establish partnerships with distributors to penetrate new markets successfully.

In conclusion, the transformation of brass brush production into an export-oriented venture represents a promising opportunity for artisans to enhance their livelihoods and promote their cultural heritage on a global scale. While challenges exist, with the right skills, strategies, and determination, artisans can overcome obstacles and establish themselves as leading exporters of high-quality brass brushes, enriching both their lives and the cultural legacy of their communities.

D. Carpet making

In the heartlands of carpet weaving, the skill centres in Agra are spearheading a transformative initiative aimed at exporting high-quality carpets adorned with modern designs to European countries, where there is a burgeoning demand for exquisite floor coverings and home décor items, particularly in regions like Iceland and Switzerland.

Skills Required: Artisans must possess proficiency in traditional and modern designs and techniques essential for translating creative ideas into tangible products based on international demand. Artisans must demonstrate precision, attention to detail, and mastery of traditional weaving techniques to ensure producing high-quality carpets that meet European quality expectations. Further, understanding international market dynamics, consumer behaviour, and industry trends is crucial for successful export ventures. Artisans must possess business acumen to develop market strategies, negotiate contracts, and establish partnerships with international buyers and distributors. Adapting to evolving market trends and consumer preferences requires flexibility and agility. Artisans must be open to learning new techniques, incorporating feedback, and embracing innovation to stay competitive in the dynamic global marketplace. The skill centre will play a pivotal role in making artisans self-sufficient in this domain.

Benefits to artisans: By focusing on exporting to European countries, artisans gain access to a market with a high demand for premium-quality carpets. This strategic shift enables them to capitalize on lucrative opportunities and expand their customer base beyond domestic boundaries. Through guidance and support from the skill centre, trainees are equipped with the necessary knowledge and skills to navigate the complexities of international markets. They are trained in modern designs tailored to international industry trends, ensuring their products resonate with discerning international consumers. Dealing in international markets, helps them reducing dependency on the domestic market and enhances income potential, leading to greater financial stability and prosperity. It also facilitates cultural exchange and promotes the rich heritage of Indian craftsmanship on a global stage.

Challenges:

1. Quality Standards: Ensuring that carpets adhere to international quality benchmarks requires meticulous attention to detail and adherence to rigorous quality control measures.
2. Design Innovation: Keeping pace with evolving design trends in the international carpet industry necessitates continuous innovation and creativity.
3. Logistics and Supply Chain Management: Exporting carpets to European countries entails navigating complex logistics and supply chain challenges, including transportation, customs clearance, and delivery logistics. Efficient supply chain management is essential to ensure timely delivery and customer satisfaction.
4. Market Penetration: Establishing a foothold in competitive European markets requires strategic marketing and branding efforts. Artisans must develop effective marketing

strategies to showcase their unique selling propositions and differentiate themselves from competitors.

In summary, the modernization of carpet making and its expansion into European markets represent a promising opportunity for Indian artisans to showcase their talent, creativity, and craftsmanship on a global stage. While challenges abound, with the right skills, perseverance, and strategic approach, artisans can capitalize on this opportunity as leading exporters of high-quality carpets, enriching their livelihoods and India's cultural legacy in the process.

E. Garland and Bouquet Design

Amidst the age-old tradition of crafting garlands, the skill centres have emerged as a beacon of innovation, breathing new life into the art by introducing the craft of bouquet making. This transformative endeavour not only preserves the essence of tradition offering a plethora of benefits, while also grappling with its fair share of challenges.

By venturing into bouquet making, artisans broaden their skill set, allowing for greater versatility and adaptability in the market. This expansion opens doors to new opportunities and revenue streams beyond traditional garland making. They can cater to a broader clientele, including events, weddings, and corporate functions, thereby enhancing their market reach. The incorporation of bouquet making enhances artisans' earning potential by tapping into higher-value markets. With modern designs and techniques, they can command premium prices for their creations, thereby improving their economic well-being. While embracing modernity, the skill centre ensures the preservation of cultural heritage by infusing traditional elements into bouquet designs.

Challenges: Embracing bouquet making requires artisans to familiarize themselves with modern tools and equipment. Introducing bouquet designs into the market entails navigating stiff competition and establishing a foothold amidst established players. Effective marketing strategies and branding efforts are essential to carve out a niche and capture consumer attention. Limited access to quality raw materials and supplies can hinder the production process, impacting product quality and consistency. Addressing this challenge requires establishing robust supply chains and sourcing networks to ensure a steady flow of materials. Further, effective communication and sensitization efforts are essential. Artisans often face the challenge of low compensation for their craftsmanship in this profession. The transition to contemporary forms of floral arrangement may not always translate into commensurate financial rewards, posing a hurdle to the sustainability of their livelihoods.

Skills Required: Artisans must possess creative thinking and a sense of aesthetics, which are paramount in crafting visually appealing designs. Proficiency in various techniques such as flower arrangement, colour coordination, and floral design is essential for creating visually stunning bouquets. Artisans must undergo training to hone their technical skills and master the nuances of bouquet making. They must be able to adapt new designs to evolve with changing market dynamics. They must be trained to understand market trends, pricing

strategies, and customer preferences essential for successful entrepreneurship in bouquet making and flower decoration.

In conclusion, the modernization of garland making through bouquet design heralds a new chapter in Agra's rich legacy of craftsmanship. With the right skills artisans can embark on this transformative journey, preserving tradition while embracing innovation. The skill centre ought to reassess its decision to offer bouquet-making classes, as there appears to be little demand for this skill in Agra. Given that the city is not primarily known as a religious centre, such training may not be relevant to its residents. Furthermore, pursuing this profession may prove unsustainable in the long run.

F. Crochet and Stitching

Historically, crochet was primarily practiced by women in rural communities as a means of producing functional and decorative items for their households. These items ranged from clothing and accessories to household décor, such as doilies, tablecloths, and bedspreads. Crochet techniques were passed down through generations, often within families or close-knit communities, fostering a sense of tradition and continuity. In more recent decades, crochet has experienced a resurgence in popularity, both domestically and internationally. Modern Indian designers and artisans have infused traditional crochet techniques with contemporary designs and materials, appealing to a new generation of consumers. Additionally, the advent of online platforms and social media has provided a global platform for Indian crochet artists to showcase their work and connect with enthusiasts worldwide.

In the skill centres, crochet and stitching classes are facilitated by an independent instructor, whose involvement in the Smart City project comes through a recommendation from the municipal corporation. The classes are exclusively conducted by women, although the lack of a consistent schedule stems from transportation challenges faced by participants. Procuring raw materials, conceptualizing designs based on market trends, and imparting stitching techniques all fall under the purview of the instructor, who lacks formal certification in the field but approaches it as a passionate hobby, subsequently marketing and selling them through online platforms like Amazon.

Skills Required: Artisans requires proficiency in crochet and stitches, such as chain stitch, single crochet, double crochet, and beyond, is fundamental to creating intricate and varied designs. These techniques are being taught at the skill centre depending on the needs of the designs. A keen understanding of colour theory and an eye for harmonious colour combinations are given for producing visually appealing crochet pieces. The ability to read and interpret crochet/stitching patterns is crucial for executing complex designs accurately and efficiently. Creative flair and innovation allow artisans to experiment with new techniques, designs, and applications, keeping their work fresh and engaging.

Challenges: Limited awareness, preferences for mass-produced goods, and price sensitivity among consumers pose major barriers to the crochet market expansion. One significant challenge facing crochet artisans, is low compensation as low as Rs 500 per kilogram of goods produced, lies in the undervaluation of their intricate craftsmanship. Crochet work, with its detailed and time-intensive nature, demands not only a high level of skill but also a considerable investment of time to produce even a small quantity of goods. When artisans are paid such minimal amounts, it underscores a critical issue of fair compensation, reflecting

a broader industry challenge where the financial rewards do not align with the labour and skill invested. This discrepancy not only affects the artisans' livelihoods but also risks diminishing the appeal of pursuing and preserving this traditional craft. Another pivotal challenge is the irregularity of training sessions at the skill centre, which in turn leads to inconsistency in work availability, as the assignments artisans receive are directly tied to their class participation and progress. This sporadic scheduling can severely hinder skill advancement and income stability for the workers. Regular, structured training is essential for skill enhancement and ensures a steady workflow.

Future Prospects: The growing popularity of handmade and artisanal products presents significant opportunities for the expansion of the crochet market. As consumers increasingly seek unique and sustainable alternatives to mass-produced goods, there is potential for crochet to capture a larger share of the market. Through diversification of products, crochet artisans can explore new product categories and applications, such as fashion accessories, home décor items, and eco-friendly alternatives to plastic products, to cater to evolving consumer preferences and market demands. With the rise of e-commerce platforms and global marketplaces, Indian crochet artisans have unprecedented access to international markets. By leveraging online channels and strategic marketing efforts, they can showcase their craftsmanship to a worldwide audience and capitalize on growing demand for handmade and ethically sourced products.

In conclusion, while crochet making in India holds immense potential for growth and development, it also faces various challenges that require strategic planning, innovation, and collaboration to overcome. By honing their skills, diversifying their product offerings, and embracing opportunities in both local and international markets, Indian crochet artisans can position themselves for success in an increasingly competitive and dynamic global marketplace.

Summary and Conclusions

Among the skill centres assessed in Agra, one stands out with its modern facilities and convenience, while the others fall short in comparison. One centre lacked basic amenities, such as furniture, electricity, water, and sanitation, indicating prolonged closure suggested by the rat infestation witnessed. Although situated close to trainees' residences, this centre operated irregularly. The remaining centres had some facilities but lacked equipment and infrastructure compared to the main centre, highlighting uneven resource distribution within the smart city initiative.

The absence of foundational formal education poses a significant barrier to effective skill acquisition and knowledge dissemination leading to encountering difficulties in grasping complex techniques, interpreting market dynamics, and strategizing for business success. Moreover, the inability to articulate ideas and communicate effectively hinders their ability to network, negotiate contracts, and market their products or services. By integrating formal education alongside skill training, skill centres can bridge this gap. Furthermore, digital infrastructure is lacking in three out of four centres, with only one having projector facilities.

Training deficiencies extend to communication and design, leaving trainees dependent on the skill centre for new ideas and market insight. Lack of industry integration means trainees rely solely on the centre for orders, highlighting the need for market integration to bridge

supply-demand gaps. Despite challenges, trainers actively engage trainees with market opportunities, particularly in lucrative sectors like zardozi, facilitating international trade participation and exposure to potential buyers. This proactive approach empowers trainees with self-sufficiency, indicating progress towards sustainable livelihoods.

To summarise, over the past five years, artisans connected with the project have witnessed substantial benefits—ranging from increased work, productivity, and income to easier access to government schemes and loans. The project's ambition does not stop at skilling; it aims to nurture entrepreneurs, with designers playing a pivotal role in connecting artisans to broader markets and equipping them with essential communication and business skills.

Despite the successes, challenges loom large—ranging from a lack of local industry initiative to a gap between the skills taught and industry needs, compounded by the artisans' limited formal education and market knowledge. The project, therefore, stands at a critical juncture, seeking an extension to continue its mission of making artisans truly self-sustainable while overcoming these hurdles. Despite these critiques, the initiative's achievements—reducing migration, enhancing artisan incomes, and facilitating access to government schemes—cannot be understated.

6.2.2 Case Study for Pune Skill Intervention

Pune, the seventh-most populous city in India and the second largest in Maharashtra, emerges as India's most liveable city capitalizes on its rich cultural and natural heritage, robust human capital, and thriving business environment. In pursuit of this vision, the Pune Smart City Development Corporation Limited (PSCDCL), an SPV established by the Pune Municipal Corporation (PMC), is dedicated to implementing Smart City Projects. Among its initiatives, the SCM prioritizes enhancing the quality of life, particularly for economically disadvantaged segments. Currently, under skill intervention, Pune smart city is running two projects on health and educational fronts. On educational front, Digital Education System (DES) has been implemented for enhancing the learning outcomes in smart schools. On the other hand, the Smart Clinics project, under the ambit of the health sector within the SCM, seeks to provide improved and affordable healthcare facilities for all strata of society. Employing the Health Management Information System (HMIS), these clinics will maintain comprehensive patient records, facilitating online consultations and ensuring seamless access to healthcare resources through a centralized online platform. The status of these two projects along with its challenges and future prospects are discussed here in detail.

A. About Digital Education System (DES)

The Smart Schools project, under the ambit of the education sector within the SCM, seeks to provide improved and affordable education facilities for all strata of society. The Smart Schools initiative aims to establish comprehensive education systems across the city, thereby underscores the urgent need to bolster education facilities, particularly in underserved areas of Pune. Leveraging government schemes and the Digital Education System (DES), Pune Municipal Schools (PMC) will maintain detailed academic records and facilitate online learning through a centralized platform, ensuring seamless access to educational resources.

Digital Education System (DES) is an 'e-learning' software developed by Pune Smart City for the facilitation of learning and teaching through technology and digital systems. Teachers and students will benefit from this modern and u p-to-date system. E-learning courses from 1st to 10th standards have been prepared according to the format decided by Balbharati and Vidya Parishad and it will be implemented in all schools of Pune Municipal Corporation. Textbook subjects, lessons, etc. in this system have been certified by Balbharati and online education is being given to students with the help of virtual classrooms. Under this system the work of training the teachers in all the schools in 'e-learning' course is going on.

This project endeavours to revolutionize the educational experience by prioritizing innovative and personalized learning methods. The idea of using this software is to encourage experiential, personalized, forward-thinking, and corrective learning, with a particular emphasis on improving conceptual understanding, reading comprehension, and overall learning journeys. The primary aim is to enrich the educational journey for students and to enhance the teaching experience for educators.

Present Status of DES in PMC Schools: A software was developed for Digital Education System (DES), which operates in both online and offline modes. This initiative was implemented within the Pune Municipal Corporation (PMC) School system, catering to a diverse linguistic population including English, Marathi, Kannada, and Urdu speakers. However, the software was initially designed only in English and Marathi. Presently, there are about 276 PMC schools, of which the software was already installed in 236 PMC Schools, aiming to facilitate virtual education for students from Class 1 to 10.

To realize the DES project, a third-party vendor was engaged for software development. The vendor was contracted to fulfil specific terms and conditions, including providing training to teachers for the software's operation and usability. Additionally, 15 engineers were appointed to assess the hardware and software compatibility of 2750 personal computers (PCs). Of these, 1200 PCs were found to be compatible and are currently undergoing software installation.

E-learning courses from Class 1 to 10 were developed in accordance with prescribed formats by educational bodies such as Bal Bharati and Vidya Parishad Bal. Initial assessments indicate that the software aids teachers and students in visualizing and comprehending concepts effectively. Plans for future enhancements include providing parental access to the platform.

The vendor's contract includes a 5-year annual maintenance charge. Originally intended for both public and private schools, the DES software has, for now, been implemented exclusively in PMC Schools. However, hardware provisions from the SCM were provided to few schools, albeit with some issues such as non-functional Smart TVs and lack of supervision.

Benefits of the Digital Education System (DES)

- *Streamline administrative processes and enhances efficiency:* Offers significant improvements in school management by providing all necessary reports and information at the click of a button.
- *Enhances quality education:* Enhances accessibility to educational resources and accelerates the teaching–learning process and ensures timely coverage of curriculum objectives.
- *Regular testing of students and teachers* can be conducted to assess learning outcomes and teaching effectiveness. This ensures continuous improvement in educational quality.
- *Comprehensive Reporting:* DES provides all necessary reports required by the State Government and Municipal Corporation in real-time. This ensures transparency and accountability in educational operations.
- *Scalability:* The system can accommodate over 300 schools and thousands of students concurrently, facilitating widespread access to online education.
- *Integrated Staff Management:* Information related to teaching and non-teaching staff, including salaries, leave, promotions, etc., is conveniently managed within the DES.
- *Online Admission Process:* The system allows for online admission processes, simplifying the enrolment procedure for students and parents.
- *Visitor Management:* From the reception hall of the school, DES enables efficient management of visitor information, call records, and overall attendance tracking.
- *Accounting Department Support:* DES facilitates various accounting tasks within the school, streamlining financial management processes.
- *Library Integration:* The system can be effectively utilized in school and college libraries, improving resource management and accessibility.
- *Environmental Benefits:* By digitizing various processes, DES contributes to environmental conservation by reducing paper usage and minimizing the need for physical school stationery and materials.

Budget Utilization: Allocation of budget towards various initiatives includes: software development, provision of new infrastructure like colourful benches and cupboards for teacher' storage, as well as upgrading existing benches, six Smart TVs with learning pen drive, wall paintings as per the curriculum of the student age group, school corridor painting for the beautification, housekeeping with material for the session 2018–2022, panel board and installation of 12 CCTV cameras, Pune Wifi Zone. However, it is noteworthy that these endeavours were only implemented in a limited number of PMC schools (specifically 2–3 schools out of 276 schools), highlighting the necessity for their extension to all PMC schools. Additionally, it is essential to ensure that wall painting in the classroom, executed under the Smart City Mission, adhere to the curriculum standards of respective classes, emphasizing the need for supervision from the SCM authorities during or after implementation of the mission.

Challenges: Following challenges need to be addressed:

- Prior to the implementation of the DES project, no baseline survey was conducted through PSCDCL to assess the hardware requirement necessary for the software implementation. As a result, there is a significant shortage of hardware and other essential infrastructure needed to support the implementation of the DES project effectively on ground.
- Even in some PMC schools which are fortunate enough to receive hardware provisions, mismanagement reigns supreme. Smart TVs, intended to be beacons of knowledge, languish behind classroom walls, their potential remain untapped.
- The access to online education is affected significantly by unreliable internet connections.
- There is a discrepancy between the visual graphics and drawings adorning classroom walls and the curriculum standards of the respective classes. For example, in Class 8 classrooms, illustrations depicting the alphabet from A to Z are showcased, despite not aligning with the curriculum content expected for students at that grade level.
- There is lack of supervision from the Smart City authorities. While the development of the software has been outsourced to a third party, there is a noticeable oversight regarding the necessary hardware, implementation strategies, and ongoing maintenance. This dearth of supervision hinders the effective implementation.
- Lack of coordination between the Pune Municipal Corporation (PMC) and the Smart City authorities. For instance, while PMC possesses hardware resources, there is a failure to identify and utilize them effectively to support the software developed by the Smart City program. This disconnect impedes the seamless integration of hardware and software components, hindering the optimal functioning of Smart City initiatives.
- Within the project framework, no provisions for ongoing maintenance of the software are in place, leaving it susceptible to potential issues without adequate support.
- The provision of pen drive access for only a restricted period of two years renders the software inaccessible thereafter, indicating a lack of long-term sustainability planning.
- The software's functionality has limited lifespan, which terminates upon the completion of the project, emphasizing the need for continuity planning beyond project timelines.
- Insufficient infrastructure, such as projectors, speakers, and smart boards to support the software's operation, highlights a gap in the necessary resources for effective utilization.

Following suggestions are recommended for effective implementation of the program.

- Recognizing the urgency of the hardware shortfall, the PSCDCL can take initiative to repurpose and refurbish existing PCs in PMC Schools and can install software through which classrooms can be transformed into hubs of digital learning.
- For connectivity inconsistencies issues, the PSCDCL can expand the scope of work in its vendor agreement to include software repair and offline functionality.
- To tackle the scourge of unreliable internet connections, the PSCDCL can collaborate with Airtel (most prominent there) to provide rental connections to PMC Schools. This can foster seamless access to online education.
- With administrative inefficiencies threatening to derail the Smart Schools initiative, the PSCDCL may integrate Enterprise Resource Planning (ERP) features into the DES. This innovative approach can streamline administrative processes, enhance accountability, and lay foundation for future growth.
- The PSCDCL should work in joint collaboration with the PMC to establish robust project oversight mechanisms, that can bring shared responsibilities, transparency, and the Smart Schools initiative can gain momentum.
- Rather than solely relying on PMC as a stakeholder, the Smart City initiative could involve non-governmental organizations (NGOs) or private players like the DiMart Foundation in project implementation. Collaborating with such players can enhance project effectiveness and ensure broader community engagement.
- Improving the quality of content during software development is crucial. Ensuring that the educational content is accurate, comprehensive, and aligned with curriculum standards will enhance the effectiveness and relevance of the software in facilitating learning outcomes.
- The efforts can be taken to make program on offline mode in case network connectivity is an issue in some areas. For this, it is important that entire content is made available in pen drives and these pen drives may be issued to schools for different class levels. Using pen drives, the e-learning process can be managed in both PCs and smart TVs.
- The teachers training for using such software need to be organized at regular intervals to make them aware and updated about the usage of this program.

Best Practice: DiMart Foundation

In one of the visited PMC School where DES software could not be implemented due to hardware glitches, adopting an integrated approach involving a collaboration between PMC school and private players such as DiMart Foundation proved beneficial. Under this approach, two classrooms were dedicated to this intervention. In one of the classrooms, DiMart Foundation established their computer lab by installing 15–20 PCs within PMC Schools. This step ensures that hardware requirements are met, laying the foundation for effective digital education delivery. The foundation supplied their own teachers to assist students in their learning journey. These dedicated educators play a pivotal role in nurturing student growth and facilitating a conducive learning environment. DiMart Foundation took measures to decorate classrooms to aid visualization and conceptualization, thereby optimizing the learning experience for students. Creating visually stimulating environments fosters

engagement and comprehension among students. Another noteworthy initiative by the foundation involved establishing a dedicated reading classroom. This space is designed to promote literacy skills and comprehension among students, further enriching their educational experience. From furniture to educational materials to maintenance of hardware and softwares, DiMart Foundation provided holistic support to PMC Schools, ensuring that all aspects of the learning environment are optimized for student success.

The intervention by DiMart Foundation highlights the importance of comprehensive support and supervision in digital education initiatives. Therefore, for the Smart City Mission to succeed in enhancing digital learning outcomes, it is imperative to: a) Ensure adequate provision of infrastructure and resources, including hardware and educational materials; b) Deploy qualified trainers/teachers for digital content to provide personalized support and guidance to students; and c) Prioritize continuous support and supervision to ensure the sustainable implementation and success of digital education initiatives. By adopting these best practices and emphasizing comprehensive support and supervision, the Smart City Mission can effectively bridge the digital divide and pave the way for a brighter future for creating smart schools.

B. About Health Management Information System (HMIS)

On health front, the smart clinic initiative is poised to transform Pune's healthcare landscape, ensuring equitable access to essential services for its residents. By leveraging various government schemes, the proliferation of Smart Clinics promises to enhance the city's healthcare infrastructure, offering crucial services at no cost to the targeted populace. Employing the Health Management Information System (HMIS), these clinics will maintain comprehensive patient records, facilitating online consultations, and ensuring seamless access to healthcare resources through a centralized online platform.

Health Management Information System (HMIS) is a comprehensive software solution utilized for collecting, storing, analyzing, and evaluating health-related data from health facilities at various administrative levels. It aims to improve decision-making and management of healthcare services by providing evidence-based information. HMIS facilitates the digitization of various hospital operations, including medical, administrative, finance, and legal aspects. It enhances patient care, streamlines workflows, enables data-driven decision-making, and improves communication among healthcare professionals. Additionally, it optimizes resource management, reduces paperwork, and contributes to better patient outcomes. The following initiatives constitute the scope of this project: deployment of hardware (IT hardware, clinical instruments, network, and power arrangements); deployment of HMIS software along with integration with existing and newly added hardware is covered under the scope of this RFP; easy scheduling of appointments; remote clinical documentation of disease and the diagnosis in line with COVID protocol of no contact; and quick/ self-registration, visit notes/summary for further consultation.

In the HMIS software, 19 modules are there which was developed by OASIS which includes patient management, appointment module, doctors' modules, accident & emergency module, pharmacy module, E.H.R. module, lab module, inventory module, admission, discharge, transfer module, blood bank module, payment, claims, and billing module, end to end workflow management, tele-health module, administration & reporting at central level,

grievances module, OT module, radiology module, performance module, integration module, and HR module.

In Pune, the implementation of Hospital Management Information System (HMIS) was planned for two major hospitals, namely Kamla Nehru Hospital and Rajiv Gandhi Maternity Hospital, along with 18 maternity homes, 50 dispensaries, and 9 Public Private Projects. The infrastructure required for the HMIS required is not meeting its demand. The utilization has been limited, primarily due to various challenges faced by hospital staff including the absence of hardware provision, limiting the software's use within the hospitals.

The Pune Smart City Development Corporation Limited (PSCDCL) awarded the contract to a third-party vendor, OASIS, for software development and on-ground implementation. Initially, the requirements for software usage remained underestimated, resulting in a shortage of hardware when implemented. Although the Smart City purchased tablets for the project, they were not effectively distributed to doctors, further hindering utilization. Additionally, inadequate maintenance of the purchased tablets has led to depreciation, posing further obstacles to successful HMIS implementation.

Challenges in implementing HMIS Project

- There is lack of necessary hardware and networking infrastructure in the hospitals and dispensaries.
- Lack of coordination between PMC and PSCDCL is hindering successful project implementation on the ground. Further, insufficient supervision from PSCDCL during project implementation contributes to challenges and obstacles.
- Due to insufficient procurement and distribution of tablets by the PSCDCL, there remains a shortage of hardware for utilizing HMIS effectively. The non-maintenance and non-distribution of tablets has further led to depreciation over time, resulting in dis-functionality and non-reliability of the hardware.
- The discrepancy between the initially stated requirements for HMIS usage and the actual number of doctors and staff members needing access to the software leads to inadequate hardware provision and impedes effective utilization.
- Discrepancy between patient load and available doctors increases the time required for data entry into the software, affecting efficiency, and highlighting the need for increased manpower allocation.
- Lack of guidance and instructions from PSCDCL and PMC regarding software development, installation, and hardware provision creates confusion and impedes progress.
- Failure to conduct a survey to assess hardware requirements before HMIS implementation leads to inadequate infrastructure provisioning.
- Registration desk staff lack digital skills necessary for effective HMIS implementation, emphasizing the need for comprehensive training programs for the staff of the hospital.
- Insufficient provision for internet connectivity hampers the smooth operation of HMIS application, impacting its usability and functionality.
- Previous training sessions for HMIS software lacked effectiveness, as they focused solely on demonstrating software functionality without ensuring skill acquisition and application.

Suggestions: To overcome these challenges following suggestions may be considered:

- Better coordination required between PMC, PSCDCL, and other relevant stakeholders involved in HMIS implementation. Establish clear communication channels and regular meetings to address challenges and ensure smooth project execution.
- Allocate additional resources and manpower to facilitate data entry and software utilization by healthcare professionals. Offer training and support to staff members to enhance their proficiency in using HMIS effectively.
- Enhance supervision and regular quality checks and evaluations from PSCDCL to ensure adherence to project timelines and objectives.
- Develop a structured distribution plan for tablets among doctors and staff members, ensuring equitable access and utilization. Establish protocols for tablet maintenance and repairs to prevent depreciation and ensure long-term functionality.
- Conduct thorough prior surveys and assessments to accurately determine hardware requirements and identify potential challenges before HMIS implementation.
- Collaborations with private stakeholders, in addition to government entities like the Health Department for bringing specialized expertise, resources, and efficiency to ensure the sustainability and effectiveness of the project.
- Implementing a three-tiered training program for HMIS, tailored to the specific roles within the organization such as administration, nursing, and medical staff, with varying durations for each level.
- Coordinate with PMC to ensure the availability of hardware and network connectivity at all 79 facilities as per specified requirements. Address any gaps in infrastructure provisioning to facilitate seamless operation of the HMIS across healthcare facilities.
- PMC should establish training centres and develop schedules for comprehensive training programs on HMIS. Training sessions should cover both technical aspects of the software and operational procedures to equip staff with the necessary skills.
- Senior officials or PSCDCL officials should conduct detailed weekly reviews of HMIS implementation progress.
- Foster a collaborative approach among all stakeholders to address issues promptly and optimize project outcomes.
- Conduct sensitization programs to educate both clinical and non-clinical staff on the importance and benefits of HMIS. Promote 100% utilization of HMIS by raising awareness about its relevance to improving healthcare delivery and patient outcomes.

By implementing these suggestions, stakeholders can overcome the challenges faced in HMIS implementation and realize the full potential of the system to improve healthcare delivery and management in Pune.

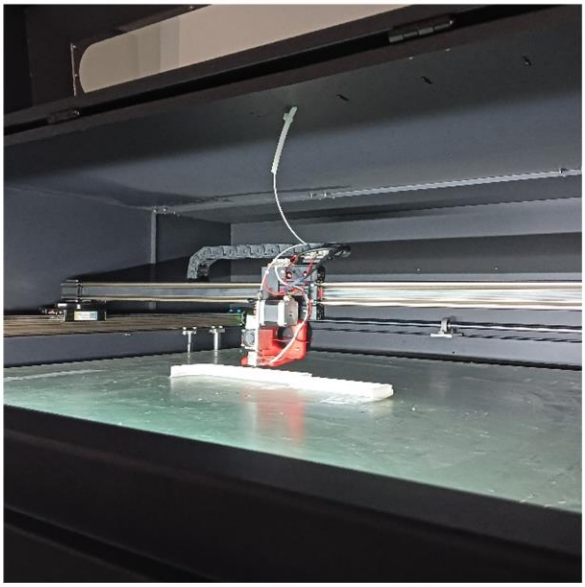
6.2.3 Case Study for Tirupati Skill Intervention

Tirupati city is located in Chittoor district in the state of Andhra Pradesh with a population of 3.7 lakhs according to 2011 census. The Municipal Corporation Tirupati (MCT) spread is around 27.4 square kilometres and includes 50 wards. Tirupati is referred to as the "Spiritual Capital of Andhra Pradesh" and was named the "Best Heritage City" for the year 2012–13 by Ministry of Tourism. As part of the India Smart Cities Mission, Tirupati, was selected amongst 67 cities during Round 2 Cities Challenge (ranked number 4th). The Smart City Plan for Tirupati revolves around the vision of establishing Tirupati as "a 21st century pilgrimage city that promotes arts, innovation, and sustainable growth." To implement the projects proposed under the Smart City Plan (SCP), an SPV was incorporated with the name "Tirupati Smart City Corporation Limited" (TSCCL) on 28th November 2016. Aligning with the Smart City Vision, Tirupati focuses on integration of local arts and crafts by celebrating cultural, spiritual, and social values.

The objectives of the Smart City Plan for Tirupati includes: a) Improving the experiences of the pilgrims in Tirupati; b) Become a hoarding free city by 2020, replacing billboards by digital boards), cell towers integrated into smart poles at designated locations, and providing dedicated hawkers zones or on-street parking; c) Easy and convenient access to basic amenities like clean drinking water, ATMs, public toilets, digital information kiosks; d) Ease of movement for citizens and visitors by providing clearly defined directional and wayfinding signage, convenient access to mobility options; e) Capitalizing on its natural heritage (Seshachalam Biosphere Reserve) for tourism potential; f) Encouraging various art forms—fine arts, performing arts, literature, culinary arts, and provide public spaces to demonstrate local talent (multi-purpose facility including arts district/exhibition centre); and g) City App that would provide relevant information to citizens and visitors at the press of a button.

The project under smart city mission in Tirupati is envisioned to provide a platform for demonstrating arts and craft and function as a centre of excellence by having a skill development centre that allows technology to enhance design and production capabilities of local craftsman. Inculcating technology-based learning amongst school going students is another objective of this project.

Skill development intervention



Tirupati, renowned for its rich cultural heritage, is celebrated for its local crafts, which encompass intricate woodwork, exquisite terracotta sculptures, and vibrant kalamkari artwork. The city boasts a community of over five thousand skilled craftsmen, each contributing to its artistic legacy. Under smart city mission, the three projects located in one complex behind the Tirupati Urban Development Authority (TUDA) office were undertaken and were completed at the cost of Rs 40 crore. These three projects include art studio, design studio, and auditorium. In the pilgrim city, there was no municipal or government modern auditorium with all facilities for conducting various programmes including social, cultural, political, and religious activities. Against this backdrop, the Municipal Corporation of Tirupati (MCT) constructed a large auditorium with all modern facilities and an art studio, a design studio and command control room constructed under the Smart City project. The 600-seat capacity modern auditorium with all amenities including conference halls, boosts various socio-cultural and other gatherings. The design and art studio on the other hand, provides the innovative platform that bridges the geographical gap between art and craft by facilitating seamless collaboration between artists and craftsmen.

Design Art Studio: This centre is a digital platform for artists to share designs with craftspeople thus removing the geographical barrier that exists between art and craft. The studio enables craftsmen gain access to master patterns of new designs and digitally manufacture them, thereby revitalizing their craft while preserving traditional manufacturing methods. In the design art studio, various models of handicrafts have been displayed and the artisans are given training for production of handicrafts and 3D facility is also made available for developing various types of handicrafts. Tirupati's design art studio embodies a forward-thinking approach to revitalizing the local handicraft industry, fostering innovation, preserving tradition, and bolstering economic prosperity for the city's artisans.

Objectives of Design Art Studio: The studio aims to address the following objectives:

- To establish the most advanced design studio for handicrafts to cater to local, regional, and national crafts.
- To build a production capacity that manufactures new designs rapidly.
- To act as a one-stop shop for solution provider for technology consulting, skill training; downstream work for craftsman and mobilization to the handicraft clusters of Chittoor.
- To upgrade the skill of local artisans in various fields of handicraft manufacturing processes to a degree of self-reliance.

- To inculcate 3D printing knowledge and skill sets in Tirupati schools to empower MCT students with necessary skills to compete in global economy.

Types of Skills offered: The design studio offers solutions converting ideas to digital models using 3D modelling tools and converting the digital models to physical master patterns using special purpose machines to reduce time taken for design and production by craftsmen. Overall, Tirupati design studio provides skills in five type of crafts:

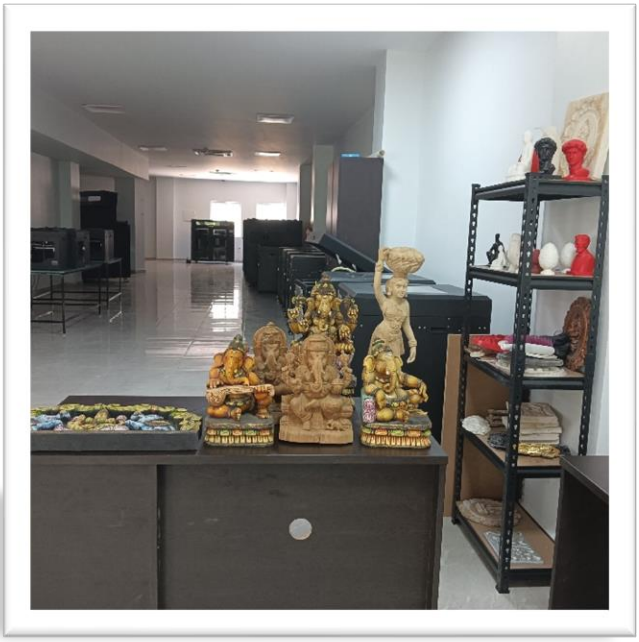
a. Kalamkari: This includes digitization of hand drawn sketches; low cost manufacturing of blocks for immediate consumption; simple post-processing for making blocks ready for end use; and reducing cost of design customization etc.

b. Metalware: This includes making reusable and durable moulds out of master patterns; post-processing of cast metal items; and teaching safety practices for handling molten metal, etc.

c. Terracotta: This art form includes making hard and absorbent moulds for clay impressions; using advanced machinery for clay processing; post processing; and painting of items etc.

d. Wood Carving: This includes enabling craftsmen in the use of automated machinery to aid creation of new design prototypes and to create a variety of new designs in wood, etc.

e. Introducing Stone Casting: This includes enabling craftsmen in the use of automated machinery to aid creation of new design prototypes and to carve a variety of new designs on stone.



Target group: Through advanced manufacturing technologies, the design studio shall provide infrastructure (hardware/software/skilled resources, etc.) for rapidly converting digital designs into physical models. The design studio targets following three groups:

1. *Craftsmen/Artisans:* The studio provides training and skills development for converting physical models into moulds/ blocks. It helps craftsmen integrate traditional methods with new technologies and gives them exposure for better and faster techniques of manufacturing. With these technologies, the craftsmen can create new designs in a short time frame, with better varieties, and enhances production volumes.
2. *Self Help Groups/ NGOs:* The studio gets involved with the self-help groups/ NGOs who help in reaching out to artisans/ craftsmen in villages/ remote locations and works closely with them. Through NGOs, the studio works with craftsmen/ artisans and helps create a resource rich ecosystem of learning, sharing, and disseminating information for

eliminating the problems affecting traditional craft forms. The focus is to help them in upgrading their manufacturing processes in a short span of time.

3. *MCT Schools:* The design studio also facilitates 3D printing course modules for high school students to give them exposure to 3D printing technology as they learn about the different forms, usage and functionality, and real-world applications of 3D printing. They have trained 150 students from classes 7th to 10th so far.

The studio has already provided the training and skill development to at least 500 people in a span of five years in different craft forms.

Benefits of the program: In the heart of pilgrim city. the design studio will boost handicrafts besides enhancing the livelihood of artisans in Tirupati district. This strategic intervention not only empowers artists to digitize their skills, ensuring their relevance in contemporary markets, but also safeguards the livelihoods of craftsmen. The various benefits accruing to this project are discussed here:

- While artisans have designs but do not have skills to produce it, the craftsmen have skills to produce handicrafts but don't have designs. Therefore, the studio serves as a link between artisans and craftsmen.
- The program has helped the artisans/ craftsmen in local and remote areas to get the livelihood and enhance their income by producing mass products.
- This technology has made manufacturing of handcrafts faster, with low cost and reduced storage. Now able to produce quality products with better texture, finishing, and consistent dimensions.
- It has facilitated the conducting of trainings at craftsmen's local areas only as these machines / technologies can be installed off-site as well.
- The supply of artisans is very low, whereas demand is high, due to which the cost of hiring artisans is quite high. Further, these artisans are not available in same geographical clusters most of time that causes delays in production and increases the cost. The digital designs help craftsmen in producing products timely, in mass numbers, and at lower cost.
- The Design Studio generates employment for craftspeople/ artisans by providing access to architects, interior designers and markets they did not have access to earlier. The purpose of handicrafts is to beautify the space and, therefore, using this technology and the networks, artisans get opportunities to work directly with interior designers/ architects.
- The centre facilitates generating virtual training content, which can be used on-site for training artisans/non-artisans at remote locations/ villages without the need for master trainers to be present everywhere.
- Helps in creating awareness among young minds to consider these art forms as new career prospects and opportunities, thereby focusing on sustainability of this craft and culture.

Challenges and Solutions:

- The only source of avenues for handicrafts products are sales in exhibitions/ showrooms, etc. New markets should be explored for craftsmen / artisans where they can sell their products. Online platform for selling products can also be explored.
- Even when market is there, the marketing skills among artisans/ craftsmen are lacking. It is important to train them in basic and foundational marketing skills so that craftsmen can become independent.
- The traditional designs are outdated and generating new designs by artisans not only costs higher but is also a time-consuming process. Further, due to lack of intellectual property rights on designs, artisans hesitate to provide new designs or collaborate with the project. There is a need to provide intellectual property rights for artisans to prevent theft/ copy of their designs. This can help more artisans to connect with this project with new designs that can digitized.
- There is a lack of trainers for the digital e-printing technology and need for institutional learning through the system. Need people with dynamic mindset with the ability to use technology and implement new designs to take up trainer's profession.
- There are gaps between artisans/ craftsmen and interior designers/ decorators and architects. The studio and trainers through their network should take more initiatives in linking interior designing industries with these craftsmen/ artisans through collaborative efforts involving SHGs/ NGOs.
- No certificate is given for those who get training from the design studio. It adversely affects the future employability prospects for craftsmen/ artisans in the handicraft industry. Efforts should be made to provide proper valid certificate on course completion.

Future prospects: The project is presently in Capex stage, which is still on going, although Opex operations have also started from January 2024. The smart city mission program has facilitated the entire infrastructure. The operation and maintenance cost of printing is free of cost as of now and will be free for another five years. After this period, the plan is to make it a revenue-based model for its sustainability in the long run. Within various art forms, the market for stone carving art has not flourished much and suffers from mobilization problem. Among all forms of crafts, this is the one where women workers are not involved at all. Therefore, the design studio has in its plan to introduce skills training for stone casting art, which is more sustainable looking at future needs. Further, there are more than 500 Common Facility Centres (CFCs) in India on which huge amount has been spend. Most of these are sick centres that are not much in use. Therefore, possible ways should be sought out to reconvert these sick CFCs into the service centres so that they can be used by artisans/ craftsmen for training and other productive purposes.

7 Study Outcome and Conclusions

Skill development is critical for achieving faster, sustainable, and inclusive growth on the one hand and for providing decent employment or entrepreneurship opportunities to the growing young population on the other. In Indian scenario, it has been observed that there is a serious mismatch between the education and skills that the youth attain and what the labour market demands. Therefore, in order to create a people-centric approach for skill development, it is required that the skill development initiatives coordinated with demand and supply scenarios across geographies, industries, and labour markets so that new skills required by industry or changes in supply of labour are speedily adjusted with adequate and efficient training programs.

To ensure that the workforce retains its competitive edge and the gap between talent and unemployment is reduced, various initiatives have been taken up by Government of India so far. One of these initiatives has been the Skill development initiative under Smart City Mission of MoHUA. Since huge investments have been made in successful implementation of these initiatives by SCM, it, therefore, becomes imperative to evaluate its impact at the ground level. Through this study an effort has been made to evaluate the impact of the skill intervention program under SCM. Based on the field visits to three cities of Agra, Pune, and Tirupati and online interactions with two cities of Mangaluru and Varanasi, the chapter presents critical challenges faced in the implementation at ground level, the best practices that may be replicable by other cities and policy directions.

7.1 Critical Challenges

Based on the interactions with five smart cities where skill interventions have been implemented, following challenges have been observed and accordingly suggestions have been provided herein. Although city specific challenges have been highlighted in Chapter 5, this section of the chapter presents the challenges that need to be addressed at broader level for overall successful implementation of skill interventions under SCM.

- Lack of foundational skills, soft skills, financial and marketing skills among the trainees is the major roadblock in transforming the acquired skills into profession or entrepreneur endeavours. It is therefore important that in addition to the technical skills/ crafts, initiatives should be taken to introduce modules for basic foundational skills to develop the capability and confidence of interacting in the market and dealing with the clients.
- The absence of a certification system restricts the trainees' to display their skills in the formal sector, limiting their mobility and recognition. To bridge this gap, formal certification is imperative to validate the craftsmen's proficiency to get entry into the industry.
- A lack of collaboration with the local industry is observed across skill centres that restricts the artisans/ craftsmen to directly get orders from the industry and enhance their income. Efforts should be made either through skill centres or trainers using their own networks to provide a channel/ links to these trainees with the industry groups, thereby enabling them to thrive in diverse environments. In addition to this, the skill centre must

develop effective market entry strategies and establish partnerships with distributors to penetrate new markets successfully.

- In certain crafts like brass brush making, garland making or flower decorations, etc., the compensation and work orders received by trainees is very low. Regular, structured classes and a direct linkage to the market can significantly enhance both skill application and financial independence. New strategies need to be explored to ensure fair wages to incentivize greater participation and commitment.
- It is found that in crafts like marble in-lay, the younger generation show a dwindling interest in adopting this craft, largely due to the tedious, time consuming, and health hazardous process and limited financial returns it offers. This disinterest places the art form at risk of fading into obscurity. Efforts should be made to preserve the tradition while reviving these art forms by innovative ideas and making it more financially viable for youth. The skill centre must help in developing targeted marketing strategies to create demand for their products and stimulate growth.
- In cases where the skill intervention initiatives are in the form of e-learning or online management information software, it is important that prior baseline survey may be conducted to understand the hardware or technical requirements of the smart schools/ smart clinics, etc. Without sufficient hardware and network provisions installed prior to the implementation of software, the potential at ground level remain untapped. Presently, within the project framework, no provisions for ongoing maintenance of the software are in place. Therefore, provisions for maintenance should also be made as a part of the contract in the project. Also, such software should be made in dual language and sufficient trainings should be organized on regular intervals for wider usage of the application.
- Presently, there are more than 500 Common Facility Centres (CFCs) in India on which a huge amount has been spend. Most of these are sick centres that are not much in use. Therefore, possible ways should be sought by the smart cities in collaboration with local municipal departments to reconvert these sick CFCs into the service centres so that they can be used by artisans/ craftsmen for training and other productive purposes.

7.2 Replicable Best Practices

This section presents some of the best practices that can effectively be replicable by the Smart City Mission to bridge the technical, infrastructural and resource gaps and pave the way for a brighter future for the smart cities. Some of these replicable practices are discussed here as follows:

a. Mangaluru city is an ideal example of collaborating with the already existing government schools and colleges and transforming them into smart schools and fishery skill development centre. So far 35 e-smart classes have already been established benefitting around 1,930 students, the plan is to expand it to all sixty ABDs in the city. The benefits included enhanced learning experiences, curriculum alignment, improved accessibility, and increased admissions. Further, the Skill Development and Safety Training Centre has been established in accordance with a memorandum of understanding between the College of Fisheries and Mangaluru Smart City Ltd. (MSCL) targeting fishermen,

fisherwomen, unemployed youth, and school dropouts, providing training and demonstrations related to Fisheries and Harbour subjects.

b. Varanasi smart city stands out as a prime example by operating the Skill Development Centre parallel to the Macchodari Smart Senior Secondary School. Due to this initiative, not just student's strength has gone up from mere 150 students to an impressive 1200, but has also played a great role in the upskilling and empowerment of girls from nearby slum areas. The best part of this program is that upon completion and clearing of a written and practical exam, students receive PMKVY-affiliated certificates. Remarkably, this initiative has already empowered around 3000 to 4000 girls, facilitating their integration into local silk industries and enabling them to contribute meaningfully while earning a livelihood.

c. Pune Municipal Corporation (PMC) smart schools' initiative of collaborating with private players such as DiMart Foundation proves highly beneficial for implementing e-learning programs in schools. With two dedicated classrooms, DiMart Foundation provided holistic support to PMC Schools, from furniture to educational materials to maintenance of hardware and software, teachers, trainers, etc., ensuring that all aspects of the learning environment are optimized for student success. This is best model for those schools that are suffering from hardware glitches, network issues, and lack of efficient trainers for digital learning.

d. For successful implementation of Health Management Information System (HMIS), one of the best practices as followed by the state of Tamil Nadu can be replicated wherein the implementing department has successfully collaborated with National Health Mission rather than local Municipal Corporation. Further, in areas where there is shortage of medical staff and it is not possible for doctors to enter the patient details in the online software as it is time consuming, the practice adopted by Kerala can be taken into consideration wherein OT notes need not be written/ entered by doctors in the program, rather there is provision for voice to text audio recording in the program that saves the time used in typing the notes.

7.3 Recommendations a Policy Directives

For successful project implementation of skill intervention projects at the ground level, it is very important that there is a strong coordination between Smart city authorities and various stakeholders and regular supervision and monitoring of the projects by SCM. Strong policy measures and operational linkages are needed to bring together the public and private sectors to improve the quality and relevance of training. Moreover, effective collaborations may be made with local NGOs/ SHGs to reach out to the craftsmen/ artisans in remote villages/ locations or to convince, particularly women, to get out of their homes and get involved with such skill centres for their livelihood as done in case of Agra smart city. The study has highlighted a noticeable lack of oversight regarding the necessary hardware, implementation strategies, and ongoing maintenance. This dearth of supervision hinders the effective implementation and contributes to challenges and obstacles. Through prior surveys, efforts need to be made to understand if similar kind of projects are already running in the city so that efficient collaboration can be made with the respective implementing authorities to avoid any form of overlapping or obstacles.

For certain kind of crafts / skills provided under the program, the only source of avenues are sales in exhibitions/ showrooms, etc. Policies should be made to explore new markets for craftsmen / artisans where they can sell their products. Efforts need to be made for exploring online platforms for selling products as well. Another suggestion in this direction is policy formulations for extending necessary support to the local artisans/ craftsmen in exploring opportunities for availing credits for owning shops/ workshops in the local markets from where they can not only sell their products but can also generate employment.

It has been observed during the study that the functionality of the software implemented in smart schools or smart clinics under SCM skill initiatives have limited lifespan, which terminate upon the completion of the project, emphasizing the need for planning the policies for its continuity beyond project timelines to make the skills sustainable. There is a lack of trainers for the digital e-printing technology and hence it calls for a need for institutional learning through the system. The courses for digital e-printing may be introduced in ITIs, TVET institutes, etc., so that students can take up this skill as a profession. People with dynamic mindset to take up this as trainer's profession with ability to use technology and implement new designs are also needed. The training of trainer (TOT) is another important aspect of the skill development framework, the absence or inefficiency of the same would result in serious bottleneck in the implementation of skill development projects. The Government and its participating agencies therefore should focus on the provision for regular training and up-gradation the trainers/ teachers, otherwise this mismatch between demand and supply of trainers could impede the success rate of the whole skill and training framework. Further, it is suggested that the course content prepared for smart classes for digital e-learning should be done jointly by the industry and the educational planners to make it aligned with the on-going curriculums in the respective cities and should be available in dual languages and should be regularly updated.

To summarize, the skill intervention initiative undertaken by SCM holds huge benefits for the local artisans/ craftsmen, and in providing employment to the underprivileged people, women, and youth and in enhancing their income and work productivity. However, at the same time one cannot deny the challenges that it brings along that are causing the roadblocks in tapping the full potential of these projects. Hence, if sufficient timely efforts can be made in addressing these challenges and formulating clear policy directions, it can bring significant differences in the achieving its targets.

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Appendices

Annexure Table A1. List of skill projects under SCM

S.No.	State	City	Project Name	Cost (Rs. cr.)
1	Andhra Pradesh	Amaravati	Skill Development Centre– Phase 2	6.56
2		Kakinada	Construction of Compound Wall at Victoria Water Works, Municipal Service Building and Development of Ghat at Warf Road, District Fisheries Office building in Boat Building Yard, Skill Development Centre at Jagannaickpur	8.19
3	Delhi	NDMC	Smart Skill Development Centres, Mandir Marg and Dharam Marg	0.19
4			Skill Centre, Moti Bagh	16.01
5	Gujarat	Surat	Providing Project Management Consultancy, PMC services by providing skilled personal, Re-use and development of Surat castle	0.49
6	Himachal Pradesh	Dharamshala	Skill development and start up incubation centre, tourist guides, smart city technicians, vocational training, including City Livelihood Centre	30.40
7	Jammu and Kashmir	Srinagar	Capacity Building and Skill Development for Housing and Tourism	1.98
8	Karnataka	Belagavi	Skill Development Centre	7.82
9		Mangaluru	Skill Development and Safety Training Centre	2.40
10			Skill Development and Safety Training Centre — Training Part	2.35
11		Tumakuru	Skill Development Centre for NCC Cadets	0.42
12			Skill on Wheels	0.31
13	Madhya Pradesh	Gwalior	Renovation and Rejuvenation of Skill Development Centre at Regional Art and Craft Design Centre	0.56
14		Indore	Incubation Centre Skill Development Centre-2	5.00
15		Satna	Learning Skill Management	13.74
16	Maharashtra	Pimpri-Chinchwad	Skill Development Centres	5.00
17		Pune	Low income skill development and healthcare	20.00
18			Low income skill development and healthcare — Maternity Hospital	9.79
19			Low income skill development and healthcare — Smart Schools	9.90
20			Low income skill development and healthcare — Digital learning school	21.00
21	Odisha	Bhubaneswar	Skill Development Centre	2.00
22	Tamil Nadu		Skill Development Centre	7.81

S.No.	State	City	Project Name	Cost (Rs. cr.)
23		Thanjavur	Construction of Skywalk to the Skill Development Centre from the New Corporation office	2.04
24			Supply and Installation of Smart Components to Skill Development Centre (2 Packages)	1.06
25		Agra	Micro Skill Development Centre	2.01
26		Lucknow	Program for skilling and livelihoods of youth from urban disadvantaged communities	0.54
27		Moradabad	Strengthening Metal Handicraft Service Centre for `Brass Research Skill Development Centre' with brass industry infrastructure at MHSC, Peetal Nagri	42.22
28			Redevelopment & construction of Macchodari Smart Senior Secondary School and Skill Development Centre	14.35
29	Uttar Pradesh	Varanasi	Development of Street Vending Zone at Durga Kund and entrepreneur skill development for Street Vendors under Street Vendors Act 2014	15.18

Source: MoHUA

Annexure A2. Best-awarded projects and cities for skill interventions

Table A2.1. Agra: In 2023 (Compendium of Winning Award), ISAC Award 2022

Project Name	**Micro-skill Development Centre**
Type of Award	City Award
Rank	3
Location	Agra
Project Cost (Rs. crore)	2
Online Sales (Rs. lakh)	> 14
Orders Processed (in lakh)	25.98
Digital Literacy Enhancement	Yes (Connected 274 SHG members)
Entrepreneurship Training Provided	Yes (1,230 women)
Formation of Self-Help Groups	Yes (120 SHGs with bank accounts)
Impact on Economy	Significant contribution
Gender Equality Promotion	Yes
Holistic Community Benefit	Yes (Holistic economic growth, women's empowerment, digital literacy promotion)

Source: Smart Cities Mission, Compendium of Best Practices 2023

Table A2.2. Varanasi: In 2023 (Compendium of Winning Award), ISAC Award 2022

Project Name	**Redevelopment of Smart Schools & Skill Development Centre**
Type of Award	Zonal Award
Rank	3
Location	Varanasi
Description	Transforming three government schools located at Macchodari, Rajghat, and Mahmoorganj, into smart schools integrating technology-enabled education and improved infrastructure. Includes modern facilities, CCTV surveillance, and smart classroom equipment. Also features a Skill Development Centre providing vocational training to students, enhancing their employability. Emphasis on universal accessibility, benefitting differently-abled children.
Outputs & Outcomes	- Over 5000 students enrolled post-redevelopment, primarily from marginalized and economically weaker sections, benefitting from modern education. - Nearly 10,000 students trained in Skill Development Centres, acquiring employable skills.

Source: Smart Cities Mission, Compendium of Best Practices 2023

Table A2.3. Tirupati: ISAC Award 2020 (Compendium of Winning Award)

Project Name	**Digital Handicraft Incubation Centre**
Type of Award	Project Award under the theme of Economy
Location	Tirupati
Objective	To revitalize the declining local handicrafts industry by facilitating collaboration between artists and craftspeople, enabling digital manufacturing of master patterns for new designs
Interventions	-Establishment of a digital handicraft incubation centre -Integration of a digital platform for artists to share designs with craftspeople -Digitization of traditional manufacturing processes -Provision of access to new markets and employment opportunities for craftspeople
Key Outputs	-Training 500 individuals in various craft forms -Introduction of 3D printing technology to municipal school students -Reduction of production time for crafts by almost 90% - Direct orders for craftspeople from architects and interior designers, mitigating the impact of COVID-19
Key Impacts	-Significant reductions in production time for various craft forms -Redesign of public infrastructure elements, promoting city's traditional culture and heritage -Empowerment of women by providing manufacturing skills and facilitating inclusion in the formal workforce
Replicability/ Scalability	-Targetting the transformation of rural artisans into digital micro-entrepreneurs -Plans to empower women and promote social inclusion in the non-agricultural rural economy -Modular design for easy implementation in different parts of the country
Sustainability	-Plans to make the Design Studio self-sustaining within a year of operation -Ensuring fair royalties for artists, perpetual employment for craftspeople, and access to customized crafts for architects and interior designers -Fostering a symbiotic relationship among stakeholders

Source: Smart Cities Mission, Compendium of Best Practices 2020

Table A2.4. Jabalpur Incubation Centre: In 2023 (Compendium of Winning Award), ISAC Award 2022

Project Name	**Jabalpur Incubation Centre**
Type of Award	Project Award under the theme of Economy
Rank	1
Location	Jabalpur
Description	Operated by Jabalpur Smart City Limited, this initiative aims to foster entrepreneurship education and build a thriving start-up ecosystem. The incubation centre serves as a hub for various stakeholders including start-ups, government, corporate, academic, and research sectors. Activities include Start-up Pathshala, Entrepreneurship Bootcamp, Start-up Summits, mentoring sessions, and technical sessions. Significant partnerships with AWS, Google, NASCOM 10,000 start-ups, and over 30 educational institutions.
Outputs & Outcomes	- Partnership with more than 30 educational institutions.

Source: Smart Cities Mission, Compendium of Best Practices 2023

Table A2.5. Rojgar Training Centre project at Lucknow Smart City, Uttar Pradesh: In 2023 (Compendium of Winning Award), ISAC Award 2022

Project Name	**Rojgar Training Centre**
Type of Award	Project Award under the theme of Economy
Rank	3
Location	Lucknow
Description	Collaborative effort between Lucknow Smart City Limited and the Institute of Entrepreneurship Development Uttar Pradesh. It aims to provide training to 5,000 migrants, youth, and urban poor individuals, creating opportunities for livelihood through skilled training and fostering self-employment and micro-enterprise development. The project's objectives focus on enhancing the skill development and entrepreneurship ecosystem to meet national and international standards. Industry participation has been substantial, leading to the development of frameworks for standards, curriculum, and quality assurance.
Outputs & Outcomes	- Participants benefitted by gaining competitive pay scales and acquiring necessary knowledge, skills, and competency in emerging technologies and business models. Opportunity for incubating and growing sustainable businesses provided - Facilitated various classroom and on-site job training programs for youths and women, contributing to skill development and entrepreneurship advancement.

Source: Smart Cities Mission, Compendium of Best Practices 2023

Annexure Table A3. Funding under SCM and skill intervention

S. No	City	SCM Funding (in Rs 000s Crore)	Skill Intervention Funding (in Rs Crore)	% Share
1	Mangaluru	1011.6	6.9	0.7
2	Thanjavur	963.0	9.9	1.0
3	Gwalior	940.0	0.6	0.1
4	Indore	940.0	5.0	0.5
5	Srinagar	940.0	14.1	1.5
6	Tumakuru	940.0	0.7	0.1
7	Satna	939.9	13.7	1.5
8	Varanasi	932.8	14.4	1.5
9	Lucknow	930.5	0.5	0.1
10	Belagavi	930.4	7.8	0.8
11	Amaravati	930.0	6.6	0.7
12	Moradabad	930.0	42.2	4.5
13	Kakinada	929.9	8.2	0.9
14	Pimpri-Chinchwad	929.5	5.0	0.5
15	Bhubaneswar	898.8	2.0	0.2
16	NDMC	749.8	16.2	2.2

Source: Smart City Mission, MoHUA

Annexure Table A4. Sample interviews/ FGDs conducted

S. No.	City/ State	Sample Centres	Centre Details	Heads	Trainers	Trainees/ Beneficiaries
Primary Survey through in-person visit to three sample cities						
1	Agra, Uttar Pradesh	4 Skill Centres	SDC- Teela Saeed Nagar	1	2	30
2			SDC- Nala Shaikh Bulaki			
3			SDC- Kolhai			
4			SDC- Chowk Chaindara			
5	Pune, Maharashtra	2 Hospitals	Kamla Nehru Hospital	1	-	1
6			Rajiv Gandhi Maternity Hospital	1	Not implemented	
7		2 Schools	Indira Gandhi Aundh Model School	1	-	Interactions with 6–7 students & teachers of the classes visited
8			PMC school	1		
9	Tirupati, Andhra Pradesh	1 Skill Centre	Digital E-Printing Art Design Studio	1	2	-
Primary Survey through online discussions						
10	Mangaluru	Skilldevelopment in school and college	E-smart School and Fishery Skill Development Centre	1	-	
11	Varanasi	Skill development in school	Macchodari Smart Senior Secondary School	1	-	
			Total	**8**	**4**	**40**

Annexure Table A5.1. City wise details of CEOs responses—Identification and Affiliations of Skills

S. No	Cities	Ways of determining skill interventions for implementation in the city	Programs aligned with NSQF, SSCs or other quality assurance bodies	Certification of courses	Integration of training centre with any "Skill India" initiative
1	Agra	Survey	No	No	No
2	Aizwal	N/A	Yes	Yes, Mizoram University	Yes
3	Aurangabad	External agencies, NGOs	Yes	Yes	Yes
4	Bareilly	N/A	N/A	N/A	N/A
5	Belagavi	GTTC College	Yes	Yes	Yes
6	Diu	N/A	N/A	N/A	N/A
7	Gwalior	Stakeholder interviews, collaborations with NGOs, city-level employment studies, consultations with external agencies, and opinion surveys.	No	No	No
8	Jammu	Collaboration with social welfare society	No	No	No
9	Kakinada	Market surveys by APSSDC	Yes	Yes, NSDC certified courses	Yes
10	Lucknow	Opinion survey, stake holder interview, collaborations with NGOs, VOs, civil society, external agencies, city level employment studies, etc.	Yes	Yes	No
11	Mangaluru	Stakeholder consultation	N/A	Yes, Fisheries university	No
12	Nagpur	NR	NR	NR	NR
13	New Delhi	N/A	N/A	Yes	Yes
14	Pimpri Chinchwad	1. Opinion by survey 2. Stakeholder interviews	No	Yes	No
15	Sagar	Surveys & Questionnaires, Labour Market analysis, Engaging Stakeholders.	No	NO	No
16	Satna	Opinion surveys, stakeholder interviews, external agencies	No	No	No
17	Thiruvananthapuram	As per recommendations from experts	NR	NR	NR
18	Varanasi	Stakeholder Interview	No	Yes	No

Source: Smart City Mission, MoHUA

Annexure Table A5.2. City wise details of CEOs responses about the projects

S. No	Cities	Total cost of skilling centre project (in Rs Crore)	Engagement with industry stakeholders prior to offering specific skills	Types of strategies employed to attract participants for skill programs	Type of skilling courses being organized under skilling centre	Target group
1	Agra	2.0	No	Local professional associations	Carpet making, marble inlay, zardozi, flower pot making	Women
2	Aizwal	4.5	Yes	Advertising, collaboration with civil societies, local professional associations	IT, marketing, software based, self-help groups, entrepreneur training	Women, people with disabilities, people employed in specific sector, recent graduates, start-ups
3	Aurangabad	0.8	Yes	Advertising, collaboration with civil societies	Computer application, IT, marketing, English , Montessori, tailoring, beautician course	Women, economically weak sections, youths
4	Bareilly	170.9	N/a	N/a	N/a	N/a
5	Belagavi	8.0	Yes	Advertisement	Mechanical. Tool and diya making, etc.	Govt. school students
6	Diu	14.6	N/a	N/a	N/a	N/a
7	Gwalior	3.5	Yes	Advertising, collaborations with civil societies and professional associations, scholarships, information sessions, and alumni engagement.	IT	Govt. School
8	Jammu	1.1	No	Na	Na	Na
9	Kakinada	1.3	Yes	Advertising in all media	IT, communication, electrical, health care, apparel	Unemployed youth of 18 - 35 age group

S. No	Cities	Total cost of skilling centre project (in Rs Crore)	Engagement with industry stakeholders prior to offering specific skills	Types of strategies employed to attract participants for skill programs	Type of skilling courses being organized under skilling centre	Target group
10	Lucknow	0.5	No	Pamphlet distribution, community meetings, collaboration with civil societies	Office executive	Women, people with disabilities, recent graduates
11	Mangaluru	4.8	Yes	Paper notification	Fisheries related, net making, aquarium making boat repair	School dropouts
12	Nagpur	NR	NR	NR	N/a	N/a
13	New Delhi	0.2	N/a	N/a	N/a	N/a
14	Pimpri chinchwad	0.6	No	By paying fee	AutoCAD, LINEX, SAP MM, SMP, Microsoft cloud	Technical graduation
15	Sagar	20.7	Yes	*advertising, collaboration with civil societies, local professional associations, scholarships	N/a	N/a
16	Satna	20.8	No	Advertising, collaboration with civil societies, local professional associations, boot camps	N/a	N/a
17	Thiruvananthapuram	As part of ICCC-to be implemented	NR	NR	NR	NR
18	Varanasi	Included in total project cost of Macchodari smart school	Yes	Craftsmanship employment opportunities	Computer application, handicraft, traditional arts, cooking and stitching	Government school students

Source: Smart City Mission, MoHUA

Annexure Table A5.3. City wise details of CEO's responses on enrolment and placement rates

City	Total number of students that enrolled in the courses	Total number of students that completed the courses	Total number of female students that enrolled in the courses	Total number of female students completed the courses	Total students got jobs or started their business
	Number	***Number***	***Number***	***Number***	***Number***
Agra	1060	1060	1060	1060	1060
Aizwal	350	On-going	30	0n-going, 50 seats	Aspiring entrepreneurs and micro enterprise owners
Aurangabad	1780	1676	860	582	690
Belagavi	800	756	50	45	650
Gwalior	1480	1387	567	567	334
Kakinada	855	508	520	270	102
Lucknow	45	45	13	13	5
Mangaluru	30	0	0	0	0
Pimpri Chinchwad	34	34	NA	NA	4
Varanasi	5000	2000	1200	800	1700

Source: Smart City Mission, MoHUA

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11 Indraprastha Estate, New Delhi 110002. INDIA.
Tel: +91-11-2345 2698, 6120 2698 www.ncaer.org