

Independent Terminal Evaluation

Development and adoption of appropriate technologies for enhancing productivity in the cement sector

UNIDO Project No.: 150267



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

**INDEPENDENT EVALUATION DIVISION
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT**

Independent Terminal Evaluation

India

**Development and adoption of appropriate
technologies for enhancing productivity in the
cement sector**

UNIDO Project No.: 150267



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna, 2018

Distr. GENERAL
ODG/EIO/IED/18/R.7

October 2018

Original: English

This evaluation was managed by the responsible UNIDO Project Manager with quality assurance by the Independent Evaluation Division

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of company names and commercial products does not imply the endorsement of UNIDO.

The views and opinions of the team do not necessarily reflect the views of the Governments and of UNIDO.

This document has not been formally edited.

Contents

Acknowledgements	iv
Abbreviations and acronyms	v
Glossary of evaluation-related terms.....	vi
Executive summary	vii
1. Introduction.....	1
2. Context.....	1
3. Overview of the project.....	5
4. Methodology.....	8
5. Evaluation findings	11
5.1. Relevance.....	11
5.2. Effectiveness.....	12
5.3. Efficiency.....	15
5.4. Impact	16
5.5. Sustainability.....	19
6. Project management and crosscutting issues	22
7. Conclusions and recommendations.....	23
7.1. Conclusions	23
7.2. Recommendations	26
Annex 1. Six-point rating scale	28
Annex 2. List of documents reviewed.....	29
Annex 3. List of people interviewed	30
Annex 4. Evaluation checklist	31
Annex 5. Terms of Reference.....	34
List of Tables	
Table 1 : Breakdown of budget by budget line	6
Table 2: Progress on outputs.....	12
Table 3: Achievement of indicators for Indian cement sector to achieve a strengthened global competitive position	18
Table 4: Project assessment summary with rationale	23
Table 5: Summary of ratings by evaluation criteria	24
List of Figures	
Figure 1 Cement Production in India	3
Figure 2 Reconstructed Theory of Change	10

Acknowledgements

The Evaluation Team would like to express their gratitude to all persons met and contributed to this evaluation. Special thanks go to Ms. Thuy Thu Le of UNIDO's Independent Evaluation Division, for her valuable guidance and support provided in preparing and conducting this evaluation.

The Evaluation Team hopes that the findings, conclusions and recommendations will contribute to the successful completion of the Project and to the continuous improvement of similar projects in other countries.

Evaluation team:

Ms. Dorothy Lucks, Independent Senior Evaluator, Team Leader

Mr. Hemant Verma, National Consultant

Abbreviations and acronyms

Acronym	Meaning
AF	Alternative Fuel
BIS	Bureau of Indian Standards
C&D	Construction and demolition
CDR	Centre of Construction Development Research
CME	Centre for Mining, Environment, Plant Engineering and Operation
CQC	Centre for Quality Management, Standards and Calibration Services
DIPP	Department of Industrial Policy and Promotion
GDP	Gross domestic product
GNI	Gross National Income
GoI	Government of India
IC-ISID	International Centre for Inclusive and Sustainable Industrial Development
IDF	India Development Foundation
IMF	International Monetary Fund
KPI	Key performance indicator
MSMEs	Micro, Small and Medium Enterprises
Mt/year	Metric Tonne per year
NCCBM	National Council for Cement and Building Materials
SRMs	Standard Reference Materials
TE	Terminal Evaluation
USGS	United States Geological Survey

Glossary of evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change due directly or indirectly to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impact	Positive and negative, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.
Logframe (logical framework approach)	Management tool used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcome, impact) and their causal relationships, indicators, and assumptions that may affect success or failure. Based on RBM (results-based management) principles.
Outcome	The likely or achieved (short-term and/or medium-term) effects of an intervention's outputs.
Outputs	The products, capital goods and services which result from an intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Relevance	The extent to which the objectives of an intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	The specific individuals or organizations for whose benefit an intervention is undertaken.

Executive summary

Background

This report documents the terminal evaluation of the project “*Development and adoption of appropriate technologies for enhancing productivity in the cement sector*” (UNIDO project ID 150267). This project was formulated in 2015 in line with a direct request from and consultation with the Department of Industrial Policy and Promotion (DIPP), Government of India (GoI), as well as the National Council for Cement and Building Materials (NCCBM). Under the auspices of UNIDO IC-ISID, New Delhi, the cement project aimed to support the Indian cement sector by strengthening the capacity and capability of the nodal technical institution for the sector, the National Council for Cement and Building Materials (NCCBM), to provide management and technical support to the cement industry.

The independent terminal evaluation (TE) has covered the entire duration of the project from the starting time in December 2015 to the estimated completion date in 31 March 2018. The evaluation was implemented in four phases: (1) desk review and data analysis, (2) interviews and field visits, (3) data analysis, and (4) report writing. The project was assessed against the internationally recognised evaluation criteria of relevance, effectiveness, efficiency, sustainability and impact.

KEY FINDINGS

Relevance

The evaluation found the overall relevance of the project to be satisfactory. The project is aligned with the development priorities of the country and the needs of the sector. The project’s focus on strengthening NCCBM through a series of activities, to upgrade skills and technical capacity were relevant to the achievement of a higher level of capacity within NCCBM itself. Management support activities in the design included a review of global best practices on management of the cement sector; an analysis of gaps in management best practices faced by NCCBM; and a range of internal training, study tours and senior fellowships. These activities designed as an integrated package, were relevant to create a significant shift in institutional capacity to better support the cement industry in technological and practice improvements. Overall, the project design was valid. However, the high-level objectives were ambitious given the short time frame of the project. More emphasis on tracking of results would have provided stronger evidence of outcomes achieved.

Effectiveness

The evaluation found the effectiveness of the project to be satisfactory and highly satisfactory in some activities. There is clear evidence that the project has met all of its outputs in a timely manner and that each activity has led to positive results. The industry diagnostic was instrumental in identifying key areas for industry development. These findings have been incorporated in institutional planning and change management. Key Performance Indicators (KPIs) have led to a shift in some

training material to assist middle management staff to consider in more detail how to address KPIs within the functional areas of safety, finance, accounting and other areas. The development of an action plan for NCCBM led to minor structural changes within the organisation, particularly in giving stronger precedence to modern training, KPIs and improved industry communications. The skills and technical capacity of NCCBM was improved by activities that encouraged direct transference of technological knowledge in identified technology areas: such as the usage of Alternative Fuels (AF); the optimisation of primary measures for NO_x/SO_x emissions control/management; technical training for the production of new types of cement; and, the optimisation of the production process. The transfer of knowledge occurred during six technical workshops, international study tours and fellowship training. Immediate results included the development of improved curricula for skills development, piloting of primary measures (for NO_x and SO_x emission control) and the optimisation of the production process (clinker and kiln) as well as the development of new standards for the cement sector in conjunction with the Bureau of Indian Standards.

Efficiency

The majority of outputs were achieved within the overall timeframe, with the final report underway. Slight delays resulted from issues that were outside of the control of project management. Delays did not cause any significant deviations from the intended outputs of the project and resulted in a higher level of training for participants. The project progressed in line with the work-plan and adhered to the allocated timelines. The project took measures towards ensuring efficiency, such as, conducting regular reviews of implementation progress through a structured reporting system of project activities. The project utilised various resources efficiently to produce the intended outputs in a cost-effective manner.

Impact

The project has produced a number of positive results which will likely produce long-term benefits for the cement sector. There are already indications that the knowledge gained through the project is being applied by NCCBM directly in industry contexts. These include pilot activities in the use of liquid/hazardous materials; solid fuels; rubber tyres as alternate fuels in cement kilns, as well as the use of slag in the manufacturing of cement. These activities are now being replicated within the industry with reducing international expert assistance as the skill of NCCBM staff increases. The project has contributed towards improved competitiveness from the introduction of two new industry standards and from positive environmental outcomes. However, there is currently insufficient data to confirm whether these have directly resulted in improved competitiveness or productivity as targeted in the project objectives.

Sustainability

Various steps have been taken to ensure the sustainability of the project. The creation of new curricula, further training for internally based staff on the learning from the project and the transfer of skills and knowledge from NCCBM to the industry, have all

contributed to the sustainability of the project and the cement industry by building capacity and capability. The creation of two new industry standards also ensures greater sustainability as they allow the project benefits to be mainstreamed and adopted by the broader cement industry in India. A number of environmental measures, such as energy management, pollution control and waste re-use technologies mean that the project has greater environmental sustainability as well.

Management and Cross Cutting Issues

This project was implemented in collaboration with the International Centre for Inclusive and Sustainable Development (IC-ISID). Close coordination between IC-ISID and NCCBM resulted in the successful completion of project activities. DIPP, as key partner to this project, was kept up to date on the progress of the project through regular meetings attended by the key stakeholders in IC-ISID projects and/or periodic reporting. NCCBM was actively engaged throughout the project. As a result of this collaboration NCCBM has maintained the momentum created by the project and is continuing to manage work arising from the project.

The inclusion of both genders was addressed in the outline of the project phases in the project document. It was envisaged that there would be discussions with both male and female owners and managers as part of the diagnostic study and that sex-aggregated data would be collected in order to address possible gender issues. Even though it was envisaged that there would be both male and female participants in the international study tours, all of the participants were men. One female was identified but was unable to travel. However, the training in-country did include women staff and this was well appreciated by the women interviewed. NCCBM is increasingly employing women as they attain the qualifications required so there are prospects for the future. However, there was little more that the project could have done to increase participation of women.

CONCLUSIONS

The project has been assessed as satisfactory overall. It was found that the project is aligned with the GOI's development priorities, with NCCBM's need for strengthened capability and capacity to support the sector as a whole. In particular, the institutional diagnostic was very well received and provided a foundation for future development of the institution. Through involvement in study tours and visiting technical experts, the staff at NCCBM has gained knowledge/expertise related to advanced, emerging technologies. Learning from the project has been integrated into broader institutional processes by means of consultancy, pilot demonstrations at cluster level and through training provided by NCCBM. It was found that the project made efficient use of resources with activity achievement being exceeded in some cases. NCCBM's capacity to disseminate new skills and technologies has been strengthened; however, further efforts are needed to widen the impact from the project investment.

RECOMMENDATIONS

Four key recommendations arose from the terminal evaluation findings:

Recommendation	Action suggested
<p>1. NCCBM to continue to promote and expand the work with industry on energy audits and other initiatives related to improved technologies.</p>	<ul style="list-style-type: none"> • Development of an improved promotion, marketing and communication system that will allow NCCBM to communicate new approaches and technologies to cluster units and individual SMEs; • Continued training of cluster units and individual SMEs in new technologies, with strengthened assessment processes for training courses to track adoption levels from training; • The implementation of a feedback system that will allow cluster units, individual SMEs and other NCCBM customers to provide feedback to NCCBM.
<p>2. Develop internal capacity in NCCBM's viability assessment of technological options for industry and tailored problem solving to accelerate uptake of advanced technologies.</p>	<ul style="list-style-type: none"> • Additional training of selected NCCBM staff in the assessment of viability for application of technical theory to the industry; • Continued provision of technical workshops and technology demonstrations for industry partners; • More specific collaboration with industry to collect viability data on the costs and benefits of installed technologies and improved practices to build real case studies; • Development of simple communication briefs on the promoted technologies and potential cost-benefits.
<p>3. Increase NCCBM's capacity for social marketing of their training and consultancy services to support industry in environmental improvements.</p>	<ul style="list-style-type: none"> • Stronger promotion of NCCBM training courses in relation to good environmental practices; • Increase on-site technology demonstrations where possible, e.g. by making videos of installed equipment (de-identified to avoid competition concerns); • Training of NCCBM scientists as industry consultants; with improved ability to communicate with industry in operational matters rather than only scientific terms.
<p>4. Maintain momentum in keeping up (and ahead) with new technologies in order to increase competitiveness in global market.</p>	<ul style="list-style-type: none"> • Building coalitions with best practice industry leaders; • Investing in a comprehensive R&D strategy; • Support engagement in industry conferences.

1. Introduction

This report documents the terminal evaluation of the project “*Development and adoption of appropriate technologies for enhancing productivity in the cement sector*” (Project ID 150267). The report commences with an overview of the context of the project followed by the evaluation methodology. The findings of the evaluation are presented according to the evaluation criteria followed by an overall assessment. The report concludes with conclusions and recommendations.

2. Context

Overview of the Country Context: India is classified as a lower middle-income country. The per capita Gross National Income (GNI) reached USD2,200 in 2016 yet still 21.2% of population (280 million) living under the international poverty line (USD1.90/day). India has one of the fastest growing economies globally, with Gross Domestic Product (GDP) successive annual growth of 3.9% (2008), 8.5% (2009), 10.3% (2010), 5.5% (2011), 5.6% (2012), 6.6% (2013), 7.2% (2014), 7.6% (2015) and 7.1% (2016), with the most recent 12 month rolling growth figure of 5.1% (August 2017). The industry sector represents 29% of value addition to GDP and the contribution of the manufacturing sector has remained relatively constant at 16-17% of GDP, a level well below other lower middle-income countries in the Asia Pacific region. Manufacturing is dominated in terms of enterprise numbers and employment by micro, small, and medium enterprises (MSMEs)¹

Overview of the Cement Industry in India: India is the second largest cement producing country in the world, only trailing China in terms of quantity and technology; producing about 7% of the global production. India's cement industry is a vital part of its economy, providing employment to more than a million people, directly or indirectly. According to the Global Cement Directory 2015 and independent research, in 2014 India had 174 integrated cement plants, 155 of which were active, with production capacity in excess of 301Mt/yr. There were also 91 grinding plants with more than 109 Metric Tonne per year (MT/yr) of production capacity. The capacities of several integrated and grinding plants remain unknown. Of the integrated cement plants, capacity was localised in the west and south of the country. Andhra Pradesh, Rajasthan and Tamil Nadu all had capacities greater than 30Mt/yr. Plans for 13 new integrated plants were announced in 2014, mainly in Andhra Pradesh and Karnataka. The housing sector is the main driver of domestic demand for cement manufacturing, as over 67% of the production is directed to housing construction.² Another 13% are used in the commercial construction and 11% in infrastructure projects, with approximately 9% of the cement used in industrial construction.

¹ In India, MSME's are classified on basis of the registered investment in plant and machinery, for the manufacturing sector, respectively: micro if <2.5 million INR (~38,000USD) invested, small if <50 million INR (~760,000) invested and medium if < 100 million INR (~1.52 million USD) invested.

² India Brand Equity Foundation, 2018. Cement industry in India. <https://www.ibef.org/industry/cement-india.aspx> [Accessed 21 February 2018].

Cement sector is not yet operating at capacity: India is experiencing a situation where the production is much greater than its domestic demand therefore the industry is not working to its full capacity. According to the United States Geological Survey (USGS), in 2014 India produced 280Mt of cement and had 280Mt/yr of clinker production capacity, unchanged from 2013. The per capita cement consumption is relatively low at 180 kg, much below the global average of 450 kg, although India is the second largest cement producer worldwide.

Production exceeds domestic demand: Production exceeding domestic demand has resulted in India looking outwards to other markets to export the excess, with the realization that there is a need to be cost competitive and be able to export. The production capacity reached approximately 240mn tonnes in the financial year 2012, while capacity utilisation was down to 75%, suggesting a mismatch between supply and demand. The cement demand is projected to touch 550 to 600 MTPA by 2025 due to fast urbanisation. The considerable capacity addition efforts to match the projected demand would, in turn, present challenges in terms of resource scarcity.³

While the initiative to export excess initially positioned India among the world's top ten exporters of cement, both in value and volume terms, the country has not been able to maintain the performance and in 2012 it saw a significantly reduced market share when the country's exports accounted for only 1.5% of the global trade and is yet to compete with countries such as Turkey, China, Pakistan, Vietnam, Japan and the USA. This is a strong indication that Indian cement producers need to invest in their competitiveness, which to a large extent boils down to increasing their productivity, efficiency and in ensuring that their processes are modern and environmentally sensitive.

Cement production in India is fragmented: The cement sector in India has more than 500 firms; yet, the sector is rather oligopolistic in nature, as the top 10 producers control about 70% of the domestic market. Holcim, Lafarge, Heidelberg Cement and Vicat all have a presence in the country; however, India's domestic producers hold the most sway, including UltraTech Cement, Chettinad Cement, JK Cement, Dalmia Group and the India Cements, among others. Since cement is a cyclical commodity, the dynamics of production are highly dependent on the overall economic activity in India. Thus, if India experiences a downturn in the construction sector, demand for cement also declines. These fluctuations particularly affect SMEs.

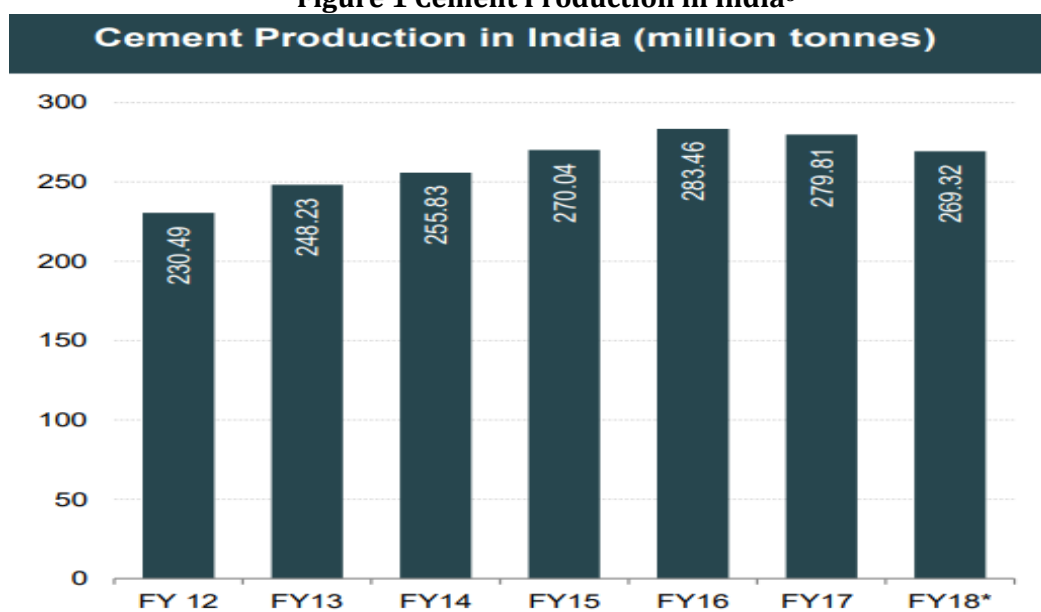
There has been gradual industry growth and there is potential for further growth Recently the cement industry has shown steady growth from 2012-2016, with a slight decline in 2017 (See Figure 1). Though the cement industry has been in existence since 1914, appreciable growth in the cement production sector has been witnessed only after the introduction of partial decontrol in 1982 culminating in total decontrol in 1989 and de-licensing in 1991.⁴ The industry received massive

³ Cement Industry (B): The demand – supply dynamics. [https://www.xub.edu.in/jcr/cases/Cement%20Industry\(B\)-The%20demand-supply-dynamics.pdf](https://www.xub.edu.in/jcr/cases/Cement%20Industry(B)-The%20demand-supply-dynamics.pdf) [Accessed 3 July 2018].

⁴ India Cement Review, 2012. <http://www.indiacementreview.com/News.aspx?nId=3Eu6Z0tx/25Iz M6ruCDnjg> [Accessed 21 February 2018].

investment after being deregulated, both from Indian as well as foreign investors⁵, so that it is now the second largest in the world, and accounting for about 7% of the global production. In the next 10 years, India could become the main exporter of clinker and gray cement to the Middle East, Africa, and other developing nations of the world. Cement plants near the ports, for instance the plants in Gujarat and Visakhapatnam, will have an added advantage for exports.

Figure 1 Cement Production in India⁶



Source: Cement Sector Report India Brand Equity Foundation, April 2018.

There has been worldwide technology advancement in the cement industry. In the past 15 years, over USD1 billion has been invested in new, technologically advanced facilities and processes. Large industry players such as Lafarge-Holcim, Heidelberg Cement, and Vicat have been addressing key considerations for the cement industry in recent years. Changes to cement manufacturing have included:

- recycling of other industry waste while conserving natural materials in the manufacturing process;
- managing utilised waste to the end of its life-cycle;
- reducing emissions from the cement-manufacturing process, including greenhouse gases, landfill, dust, and oxides of nitrogen;
- increasing efficiency in manufacturing—requiring less power and fuel rehabilitating quarries and sites—returning the land to a better-than-before or equivalent condition;
- creating superior construction materials for a wider range of uses;
- improving the durability of concrete through cement quality;
- improvement in electrical efficiency that leads to a reduction in power demand.

⁵ India Brand Equity Foundation, 2018. Cement industry in India. <https://www.ibef.org/industry/cement-india.aspx> [Accessed 21 February 2018].

⁶ India Brand Equity Foundation, 2018. Cement industry in India. <https://www.ibef.org/industry/cement-india.aspx> [Accessed 21 February 2018].

Technology advancement has also been occurring rapidly in India: With the adoption of massive modernisation and assimilation of state-of-the-art technology, Indian cement plants are today the most energy-efficient and environmentally-friendly, and are comparable to the best in the world. This is in all respects; whether it is kiln size, technology, energy consumption or environment-friendliness. Worldwide, the majority of the industry uses fuel-efficient pre-calciner kiln technology, considered to be the most advanced commercial technology for making cement clinker. Industry has progressively reduced its energy consumption from 800-900 kwh/tonne clinker in the 1980s to 650-750 kwh/tonne clinker by 2010. Similarly, power consumption registered an improvement from 105-115 kwh/tonne cement to 70-90 kwh/tonne cement during the same period.⁷ The cement industry in India has now been making efforts to utilise waste heat recovery in the plants.

⁷ India Cement Review, 2012.

<http://www.indiacementreview.com/News.aspx?nId=3Eu6Z0tx/25IzM6ruCDnjg>=== [Accessed 21 February 2018].

3. Overview of the project

Project Rationale: To address issues raised in the section above, this project entitled ‘Development and adoption of appropriate technologies for enhancing productivity in the cement sector’ was formulated in 2015 in line with the direct request from and in consultation with the Department of Industrial Policy and Promotion (DIPP), Government of India (GoI), and NCCBM. The project design was prepared under the auspices of UNIDO IC-ISID.

Project Objectives: The cement project aimed to support the Indian cement sector by strengthening the capacity and capability of the nodal technical institution for the sector, the NCCBM, to provide management and technical support to the cement industry. The project targeted to build the capacity and capability of NCCBM and to ultimately strengthen the global competitiveness of the Indian cement sector.⁸

Project Approach: The modalities of implementation included the transfer of technical know-how; facilitation of state-of-the-art technologies to the Indian cement sector; a wide range of technical capacity-building and knowledge sharing activities such as technical workshops, international study tours, fellowship training programmes, on-site training, twinning with international organisations and facilitating the development of standards for the sector. Some of the key focus areas for these activities were waste-derived fuels, CO₂ emissions, patents and intellectual property rights (IPRs) and green technologies.⁹

The expected impact and results of this project were threefold:¹⁰

1. Facilitation of the efficient usage of resources, adoption of latest technologies and implementation of global best practices in the Indian cement sector;
2. Strengthened capacity and capability of NCCBM;
3. Improved global competitiveness of the Indian cement sector.

Project design: The project consisted of 7 different outputs, 4 in the inception phase, 1 in the implementation phase (covering the various activities towards capacity building) and 2 in the post-implementation phase. The following were the key outputs envisaged for the project:¹¹

- Undertaking analysis and drafting a report of the cement sector to develop an accurate baseline scenario;
- Conducting a diagnostic study, first to assess the gaps in technology and skills in NCCBM and, secondly, to gain an in-depth understanding of and global best practices;
- Developing KPIs to analyse the performance of the cement sector;
- An action plan for capacity building for NCCBM;
- Upgrading of skills and capacity through mechanisms of technology transfer (transfer, adaptation, and implementation), structured and focused expert

⁸ UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the cement sector, p.2

⁹ Ibid.

¹⁰ UNIDO, 2017. Annual Report 2016. UNIDO Operations in India.

¹¹ UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the cement sector, p.9.

- dialogues and technical workshops, international study tours, twinning programmes and mechanisms of training and learning-by-doing;
- Drafting and presentation of the final report and;
 - A terminal evaluation report of the project.

Structure of NCCBM as target organisation: The NCCBM falls under the administrative control of DIPP, GoI, and is governed by a Board of Directors and managed by a number of committees. Government funding (USD2.24M) represents approximately 35% of its budget which results in a greater focus on sponsored projects in relation to fundamental research funded by the government.

The NCCBM offers several services to the cement and construction industry. There are two Centres that operate in collaboration with a laboratory facility to provide analytical services to customers for both research and independent testing. The Centre for Mining, Environment, Plant Engineering and Operation (CME) provides support to the cement industry on topics relating to mining, environment, quality, process and kiln operation. The Centre for Construction Development Research (CDR) is structured on the lines of a civil engineering laboratory that specialises in concrete research, testing, durability and third-party quality assurance. The Centre for Quality Management, Standards and Calibration Services (CQC) - a specialist Centre, supplies the cement industry with Standard Reference Materials (SRMs) offers proficiency testing schemes and calibration services. In addition to the mentioned centres, NCCBM has an information centre as well as a training centre.¹²

Issues in NCCBM to be addressed by the project: Whilst NCCBM was connected to some national organisations within India, it did not have many links to international networks. Research topics and ‘new technologies’ were not state-of-art when compared to other world-class organisations. Benchmarking showed that research programmes should target the main challenges of the sector for the subsequent benefit of the whole sector although the development of new products is realised more by internal resources of cement companies. The findings also suggested that NCCBM should be restructured to facilitate more efficient project execution, more extensive research and better administrative functioning. This would allow the organisation to be structured in a similar fashion as similar organisations worldwide. It was further found that, for NCCBM to become recognised as a leading and world class organisation in the Indian Sub-continent, further capacity building in key areas was important.¹³

Budget allocation emphasised capacity development: The project budget was spread across the proposed activities, with 14% invested in sector diagnostics and development of industry KPIs. A further 12% was designed to support NCCBM to generate and mobilise an action plan based on the diagnostic findings. The majority of the funds (64%) were invested into the range of training and capacity development activities. The remaining 10% were allocated to reporting. The project was also supported through the project management activities of the IC-ISID.

Table 1 : Breakdown of budget by budget line

¹² UNIDO, 2017. Diagnostic Report. Enhancing Productivity in the India Cement Sector, p. 9.

¹³ Ibid.

Project outputs/components	Total (USD)	% of Total
Reports of the cement sector	60,000	5%
Diagnostic studies of NCCBM	70,000	6%
Development of KPIs	30,000	3%
Action plan for NCCBM	135,000	12%
Skills and technical capacity and capability of NCCBM upgraded	725,000	64%
Final report (lessons learned, implications, advocacy)	74,500	7%
Evaluation report	30,000	3%
Total	1,124,500	100%

Source: UNIDO Open data, data for March 31, 2018, accessed May 10, 2018.

4. Methodology

Evaluation purpose: The objectives of the independent terminal evaluation (evaluation) were to:

- Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact;
- Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO;
- Assess the partnership between UNIDO-IC-ISID to feed into the Evaluation of the UNIDO Country Programme in India, which is conducted in tandem with the two project evaluations.

The evaluation utilized a six-point rating system, where six is the highest score (highly satisfactory) and one is the lowest (highly unsatisfactory). See Annex 1 for the six-point scale used in the evaluation.

Evaluation scope: The evaluation covered the entire duration of the project from the starting time in December 2015 to the completion date in 31 March 2018. The original completion date of September 2017 was extended to 31 March 2018. During this extension period several additional activities were implemented. The evaluation covered all technical activities plus project management activities.

Evaluation Methodology: The evaluation was implemented in four phases which are not strictly sequential, but in many cases iterative, conducted in parallel and partly overlapping:

- Desk review and data analysis;
- Interviews and field visit;
- Data analysis; and
- Report writing.

During the inception stage, the evaluation team reviewed relevant and available documentation. (See Annex 2 for list of documents reviewed) Interviews were conducted with UNIDO's Project Manager in Vienna. The field trip was conducted from February-March 2018 and included a visit to New Delhi. In New Delhi, joint meetings were held with officials from NCCBM and Dalmia Bharat Cement (See

Annex 3 for people interviewed). In addition, the evaluation team toured the NCCBM site and interacted with approximately twenty staff that had participated in a range of the skills development activities to gain their views on the quality and usefulness of training. At the end of the field mission, a presentation was made to the stakeholders involved in this project on the preliminary findings.

Key evaluation questions: The evaluation was guided by four key evaluation questions:

1. What are the key drivers and barriers to achieve the long-term objectives? To what extent has the project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long-term objectives?
2. How well has the project performed? Has the project done the right things? Has the project done things right, with good value for money?
3. What have been the project's key results (outputs, outcome and impact, if possible)? To what extent have the expected results been achieved or are likely to be achieved against the project design? To what extent the achieved results will sustain after the completion of the project?
4. What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the project?

Guided by these questions, the project was assessed against the internationally recognised evaluation criteria of relevance, effectiveness, efficiency, sustainability and impact. Data was analysed and processed against the evaluation criteria (See Annex 4 for Evaluation Checklist) and key evaluation questions. The project was assessed against a six-point standard rating scale, defined within the UNIDO Evaluation Manual, 2017 (see Annex 1). Ratings were based on all information gathered, including documentary data, key informant interviews and field visits.

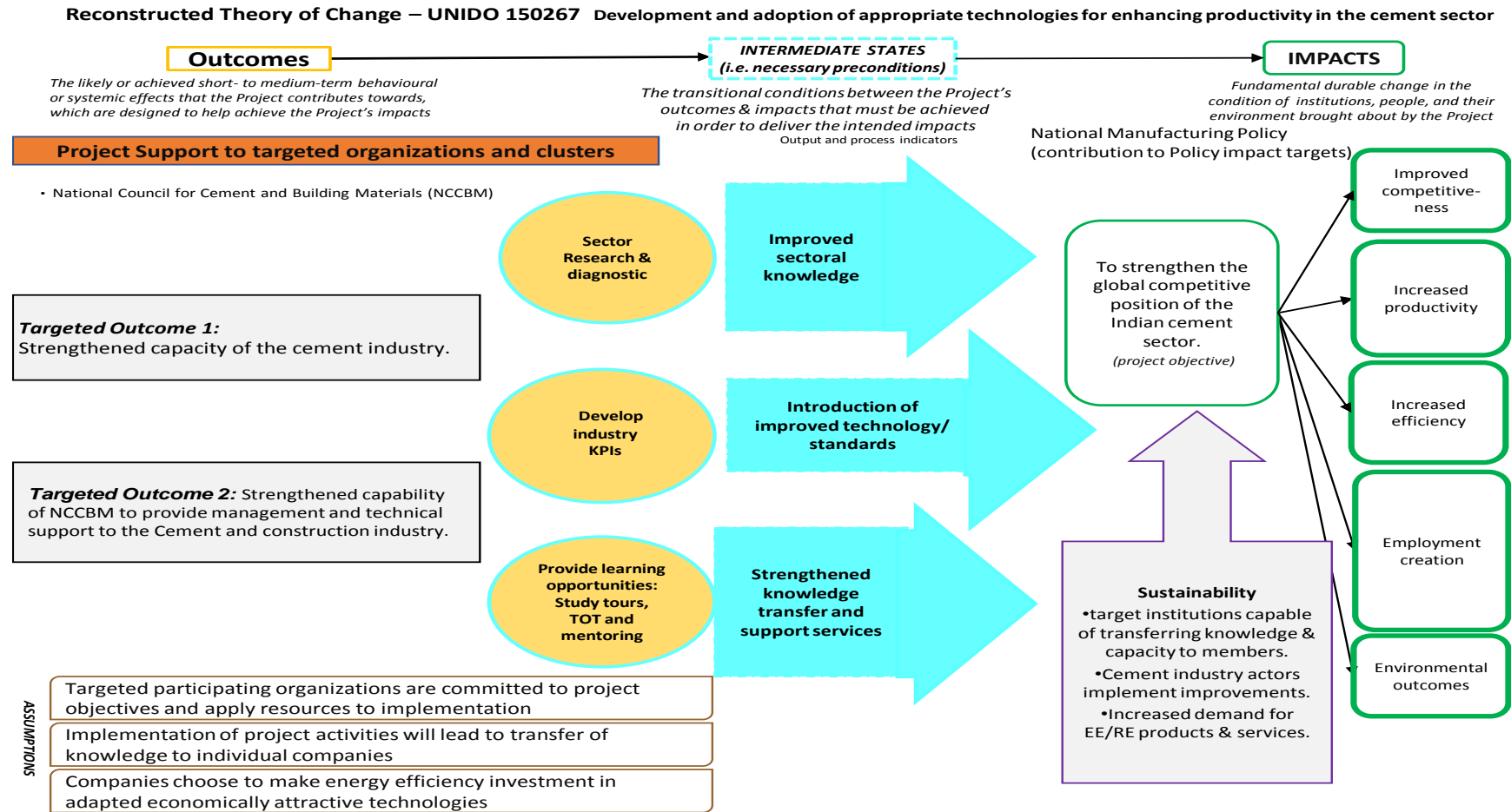
Theory of Change

The evaluation used a theory of change (TOC) approach and mixed methods to collect data and information from a range of sources and informants. It paid particular attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning. A TOC has been developed to clarify causal and transformational pathways from the project outputs to outcomes and longer-term impacts, and drivers as well as barriers to achieve them. (See Figure 2)

Limitations of the evaluation

A major limitation to the evaluation was the inability of the evaluation team to visit project sites and achieve an in-depth immersion in the context due to the geographical disparity of sites and the extensive time it would have required for travel. This limitation was addressed to some extent by interviewing several key stakeholders at project sites via teleconference.

Figure 2 Reconstructed Theory of Change



5. Evaluation findings

5.1. Relevance

The evaluation found the overall relevance of the project to be Satisfactory at the national industry and institutional level. The project is aligned with the development priorities of the country and the needs of the sector. The project's focus on strengthening NCCBM through a series of activities, including the upgrading of skills and technical capacity are relevant to the achievement of the project outcome.

Strategic relevance: The project has been formulated in line with the direct request from and consultation with the Department of Industrial Policy and Promotion (DIPP), Government of India and NCCBM. Cement production and ancillary businesses are a major industry in India, providing employment to more than a million people. Increasing competitiveness in the cement industry would contribute to economic gain for the country. The GoI is strongly focused on infrastructure development to boost economic growth with an aim to build 100 smart cities which will see an increase in investment of USD 1 Trillion in the 12 Five-year plan (2012 – 17)¹⁴, making this project relevant to the strategic context. The project is in line with the GoI's National Manufacturing Policy (2011) which states that technological development and upgrading is critical.¹⁵ The envisaged aim of bolstering the capacity and capability of a technical institution such as the NCCBM to enable them to better support clusters and individual SMEs in their efforts to enhance productivity and enter export markets are relevant to the sector as well as to India.¹⁶

Relevance at sector level: The project illustrated positive relevance to the cement sector as it aimed to strengthen the capacity and capability of NCCBM in order to increase the sector's productivity, performance and entry into export markets. This was achieved through the inclusion of project activities in the design document such as the transfer of relatively advanced technologies, skills development of staff, enhanced management practices, building knowledge for increased resource efficiency and emission reduction. Introduction of new technologies, for example technologies on energy use reduction and waste re-use, alternate concrete mixes, advanced manufacturing practices and new product standards. The project consultation with the Bureau of Indian Standards (BIS) to develop two standards for the cement sector further strengthened its relevance at strategic level.

Relevance to industry level: Relevance to industry level can be inferred from the expected outcome of the project as the strengthening of NCCBM's management and technical support to the Indian sector will (probably) benefit institutions in the industry. The project provides a technically adequate solution to accelerate transfer of advanced technologies and skill development of technical staff to support sustainable growth and market leadership for Indian cement industry sector.

¹⁴ UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the cement sector, p.8.

¹⁵ Ibid.

¹⁶ Ibid, p.2

Coherence of project design: The project utilised a phased design in which the project outputs were divided into 3 phases: the inception phase, implementation and post-implementation phase. Project outputs were linked to activities that were relevant to both the associated output and expected outcome of the project. The project objectives were pertinent towards providing affordable advanced level technical support, up to date solutions & cleaner production practices.

5.2. Effectiveness

The evaluation found the project to be effective with some aspects of the project being assessed as highly effective. All outputs were completed as planned and the achieved results were accomplished. In addition, there were efforts by NCCBM to build on the project inputs and integrate the learning from the project into broader institutional processes.

The project has completed the identified outputs and associated project activities as illustrated in **Error! Reference source not found.**

Table 2: Progress on outputs

Output	Progress	Summary of effectiveness
Output-1: Reports of the cement sector	Completed	Effective as a basis for output 2.
Output 2: Diagnostic studies of NCCBM	Completed	Highly effective. This was a unique activity for NCCBM and is actively being used to guide NCCBM advancement.
Output 3: List of KPIs	Completed	Moderately effective – generated from workshops and being integrated into training but not yet being used as an industry-wide approach as envisaged.
Output 4: Action plan for NCCBM	Completed	Effective – included as a result of the diagnostic and led to some structural and operational changes.
Output 5: Skills and technical capacity and capability of NCCBM upgraded	Completed	Highly effective – the wide range of skills building activities was strongly praised by the participants as being effective in introducing them to new and improved industry practices and in transferring those skills into the Indian industry.
Output 6 & 7: Final report	Mar 2018	In progress

Source: Based on UNIDO Project Design document, 2015 (adapted by evaluation team).

Key objectives and strategies are output-focused. The project has a focus on outputs and associated activities. The project provided good evidence that outputs were achieved.

Output 1: Reports of the cement sector: The benchmarking assessment has been completed and a global benchmarking report has been prepared by a team of 5 international experts, led by Dr. Daniel Lemarchand. A mission of

international experts to India visited in March 2016. The mission of experts also included a visit to one unit (Vikram Cement). Three technical workshops were conducted on relevant topics. This included awareness raising on global competitiveness, the importance of enhanced environmental standards for the industry and on technological and process improvements possible.

Output 2: Diagnostic study of NCCBM: Detailed diagnostic sessions with NCCBM were arranged during the first phase of the mission of international experts to India (13-20 March 2016). The diagnostic sessions included insights on key aspects such as the vision and mission, organisation structure, research and development infrastructure, challenges faced in servicing the members, gaps faced, as well as the requirements of international and technical support network. Further diagnostic sessions with NCCBM staff, two cement companies and the Cement Manufacturer's Association were conducted during the second phase of the diagnostic study (01-05 August 2016). In addition, an online survey was designed and commenced to seek feedback from industry units as well as other clients regarding their perception about NCCBM. The findings of the diagnostic study were presented to DIPP and NCCBM in a document during the Action Plan meeting on 27 October 2016. NCCBM stakeholders reported that the diagnostic report was extremely pertinent and useful. There was evidence presented to the evaluators that NCCBM management has actioned some of the key findings of the diagnostic study and that progress has been satisfactory.

Output 3: List of Key Performance Indicators: Detailed sessions were conducted by international experts with NCCBM to assess the KPIs that were used at the time. A KPI workshop was held at NCCBM on 28-29 July 2016. The workshop was attended by 12 scientists and engineers from NCCBM along with representatives of the senior management of NCCBM. A template of KPIs was shared with NCCBM for preparation of draft KPIs and subsequent fine-tuning by the international experts. The participants of the workshop submitted a draft list of KPIs in August 2016. A report called "Technical Report - Key Performance Indicators - Enhancing productivity in the Indian Cement Sector" was submitted to DIPP and NCCBM by a team of UNIDO technical experts in 2017. However, feedback from some stakeholders during the mission was that the KPIs are not in a format that is possible for them to be directly applied to industry. In addition, some of the technical staff noted that the KPI work has led to a shift in some training material to assist middle management to consider in more detail how to address specific KPIs within, for example, the functional areas of safety, finance, accounting, human resources, maintenance, and equipment. Therefore, this output was considered as moderately satisfactory.

Output 4: Action plan for NCCBM: An action plan was prepared for NCCBM based on the findings of the diagnostic study, which was conducted in two phases (Phase 1: 13-20 Mar 2016 and Phase 2: 01-05 Aug 2016) as well as on findings from the first study tour visit (Germany and Austria, 05-09 Sep 2016). The action plan was presented to DIPP and NCCBM during the action plan meeting conducted on 27 October 2016.

The diagnostic did provide some analysis on potential management actions. The action plan included further activities aimed to strengthen the capacity and capability of NCCBM to provide management and technical support to the Indian cement sector. A training module on marketing for Research and Development institutions had been initiated with the Indian Institute of Management, Ahmedabad (IIM-A) but could not be completed. This training would have addressed various broad areas of management. The implementation of this

training did not fall under the auspices of this project, but demonstrated progression of actions from the Action Plan. The action plan also led to minor structural changes with NCCBM, particularly in giving stronger precedence to modern training and KPIs and also to improved industry communications. Therefore, this output was considered satisfactory.

Output 5: Skills and technical capacity and capability of NCCBM female and male staff upgraded: The skills and technical capability of NCCBM was upgraded by means of the following activities: transference of technologies to NCCBM; the development of curricula for NCCBM skills development; six technical workshops; skills development of NCCBM staff; training of trainers to create self-sufficiency, sustainability and upscaling; international study tours; international fellowship tours; and coordination with the Bureau of Indian Standards for the development of new standards for the cement sector. Therefore, this output was considered satisfactory and indeed, highly satisfactory in some areas.

Transfer of technologies to NCCBM: A number of interventions were completed to facilitate knowledge transfer in the area of Alternative Fuels (AF) and Alternative Raw Materials (ARM). Interventions included a technical workshop conducted on the 'usage of AF and ARM'; a visit during the study tours to dedicated preparation units for AF as well as to cement plants using AF; a technical report on AF was prepared and two technical workshops conducted: (i) for training and creation of an AF audit tool box, and (ii) on AF project management. Additional capacity building was facilitated through the inclusion of AF as topic during the fellowship training (18-29 Sep 2017) and through the introduction of a learning by doing component focused on how to conduct AF audit in a cement plant (6-7 September 2017). Areas for fellowship training of NCCBM staff were identified and topics and curricula for the technical workshops were finalised. Six technical workshops were conducted on energy usage and energy efficient solutions; Waste derived fuels; CO₂ emissions and green technologies; Patents and IPRs; Global best practices; and overview of other up-to-date technologies.

Skills development of NCCBM staff: Training and skills development (based on findings of the diagnostic assessment) were facilitated through the technical workshops, international fellowship training, training of trainers and the international study tours. In addition, a component on learning by doing (on-site audit training for NCCBM staff) was completed. A team of 8 scientists from NCCBM were trained in conducting AF audits in a cement plant at My Home Industries in Mellacheruvu, Telangana. An audit team was trained over two days (6-7 Sep 2017) by international experts. This was preceded by two workshops on 'CO₂ audit' (28-29 June 2017) and 'AF project management and audit' (2-3 August 2017) in preparation of the audit training. Following this, a team of four scientists from NCCBM were trained by an international expert in conducting CO₂ audits (31 October & 01 Nov 2017). A component on training of the trainers was included in the fellowship training programme for NCCBM scientists. Participants interviewed affirmed that the skills development activities were beneficial and that hands-on training in workshops, international study and fellowship tours contributed to a sense of cohesion as well as to knowledge transfer.

International study tours: A study tour to Germany and Austria focused towards a management perspective, was undertaken during 5-9 September 2016 and included five officials from NCCBM and one official from DIPP. The

study tour covered relevant institutions in Germany (VDZ & ECRA), a preparation unit for AF including the cement plant in Austria (Lafarge) and the industry association (VOZ, Smartmineral) in Austria. A second study tour, focused towards a technical perspective, was undertaken during 18-26 Oct 2016 for four officials from NCCBM. It included visits to Belgium (CBR Lixhe, Recyfuel and the Wallonia-Brussels Economic Representation), Germany (SCHWENK Zement KG) and Poland (Lafarge Cement, Novago Alternative Fuel preparation site and the Polish Cement Association).

International fellowship tours: Areas for training of NCCBM staff were prepared based on diagnostic assessments and study tours. A tender process was instigated in an attempt to engage a training institute. Two attempts proved to be unsuccessful resulting in discussions with international training institutes to explore the possibility of getting staff of NCCBM trained in the standard training programmes of those institutes. The discussions were initiated with suitable institutions like FLSmidth, VDZ and Sintef. Proposals for training were received (From VDZ and FLSmidth) and FLSmidth was selected for imparting the fellowship training for 8 scientists (18-29 Sep 2017). The training for two engineers of NCCBM at the Concrete Institute, South Africa was conducted from 17- 26 July 2017, covering topics such as concrete technology, properties of concrete, and the durability of concrete with an additional international fellowship tour conducted at VDZ, Germany from 4 – 15 December 2017.

Coordination with Bureau of Indian Standards (BIS) for the development of new standards for the cement sector: Consultation with BIS on the development of two new standards continued throughout the project and led to the approval of the two standards for: (i) composite cement and (ii) construction and demolition wastes (C&D) resulted in a new standard issued for cement (IS16415) and the inclusion of C&D wastes in standard IS383.

5.3. Efficiency

The efficiency of the project was assessed against the overall project expenditure compared to budget as well as against whether the project activities were completed within the given timeframe. The evaluation found that the project did operate efficiently. However, some delays in receipt of cash for expenditure occurred. This led to delays in conduct of some activities and resulted in some funds being unable to be expended prior to project completion. Yet, all targeted activities were completed within the project time frame with good value for money achieved.

Project activities completed with minimal delays: The project commenced in December 2015 with a planned project duration of 22 months. The majority of outputs were achieved within the timeframe. There was a slight delay in the conduct of the international training due to the schedule of the international institutions that were hosting the fellowship activities. However, this was beyond the control of the project. Furthermore, the delay ultimately improved the results of the training because it allowed the schedule for in-country training to be advanced. Conducting the in-country training earlier in the project process than planned actually increased the awareness and readiness of the fellowship participants to engage more fully in the international experiences.

Delays in financial flow: The project experienced some slight delays in flow of funding in terms of receipt of budget allocations from DIPP. These factors were beyond the control of the project management. Overall, these delays did not

cause any significant deviations from the intended outputs but did create challenges in planning and scheduling of activities. Measures were taken to ensure that the project stayed on schedule, such as, the regular review of implementation progress through a structured reporting system of project activities and a schedule of project steering committee meetings. The IC-ISID worked with NCCBM to re-work schedules so that all activities could still be addressed. These measures helped to achieve efficiency within the project. However, it did result in a residual unspent budget by project completion. Based on the budget of USD 1,124,500, the expenditure was USD946,406 (84%) as of 31 March 2018. There was an underspent budget of USD178,094 (16% of total budget) which will, upon financial closure of the project be returned to the India Development Foundation (IDF). This amount is currently retained within the IC-ISID budget and may be reallocated to other portfolio activities.

Efficient use of Consultants: The project made efficient use of international experts and consultants. Project engaged the external consultancy services in a timely manner and achieved intended outputs within the permissible time frame. An expert team made up of Dr. D. Lemarchand, Dr. P. du Toit, Ms. L. Harda, Ms. Cornelia Bauer (and Dr. H Schöfmann on two assessments) contributed to four of the seven outputs, i.e. Reports on the cement sector, Diagnostic study of NCCBM, List of KPI's and an Action plan for NCCBM. Dr. Lemarchand and Ms. Cornelia Bauer were also involved in the international study tours.

Increased efficiency of the sector: The upgrading of NCCBM staff knowledge and skills has resulted in a change in the use of technology. An increased understanding of more productive and efficient ways to use technology has the potential to result in a reduction of production costs. Training of the trainers that formed a part of the international fellowship and study tours is expected to have a secondary impact on the efficiency of the sector as NCCBM is responsible for the support of clusters and individual SMEs and training by NCCBM will therefore contribute to processes used in the sector.

5.4. Impact

The intermediate outcomes (identified through the theory of change - see section 4) provide a means to assess whether progress was achieved towards the long-term objectives of the project. Based on this analysis, substantial progress has been made towards impact. There has been improved knowledge within NCCBM, introduction of improved technology and standards that are demonstrating aspects, such as reduced production cost, enhanced product diversity and greater compliance to international standards that will improve long term competitiveness of the Indian Cement Industry.

Improved sectoral knowledge: The various activities supported through the project have led to improved sectoral knowledge within NCCBM in different ways. The process of conducting the diagnostic acted as a self-assessment for the industry to understand where it is competing well and where there are needs for capacity development. The stakeholders met during the evaluation strongly appreciated the diagnostic process and the resultant report. The combination of study tours, fellowships and in-country skills transfer was an approach that assisted in broadening knowledge of the current global status and opportunities of the cement industry. NCCBM already has good international connections through its regular conference and training activities, but this project provided a more advanced and prolonged exposure to new knowledge

that would not have been possible without the project resources and the approach developed. This means that NCCBM would not have been able to re-position and develop its sectoral capacity as readily without the project.

Introduction of improved technology/standards: The scientific and technical capacity of NCCBM was substantially improved by the direct training conducted by the international expert team and the fellowship tours. Participants interviewed noted increased knowledge. However, for some of the staff, more consultation on the topics to be covered as part of the planning would have been beneficial. Some found that the fellowship trip covered topics that they were already familiar with and had sufficient knowledge; although it was useful to see different applications of known technologies. Nonetheless; there were other topics that may have been more useful if covered in depth; particularly more practical, hands-on sessions.

In particular, training participants mentioned the value of having access to the expert team in order to ask questions about training material provided, to present specific industry issues and receive direct guidance and suggestions for practical solutions. The participatory nature of the training delivery helped in this regard. Furthermore, participants in the fellowship trips mentioned that when they returned to India, they made presentations to their colleagues and adapted materials into their own work procedures, training their younger staff on the information that they had learned. The senior technical and management stakeholders noted that the level of technical support was excellent and that it made a substantial difference that many members across the organisation received skills upgrading initiatives simultaneously. This created a momentum of knowledge change that would not have been possible in the same way if NCCBM had relied on gradual capacity development activities.

Strengthened knowledge transfer and support processes: The scope of the project deliberately focussed on NCCBM as the entry point to industry capacity development due to its role and influence within the industry. NCCBM is already a strong channel of services and training for the industry through its training centre and testing and certification activities. There was an expectation that building the capacity of NCCBM would lead to change across the whole industry beyond the project period through knowledge transfer and service provision. At the time of the evaluation the project was just concluded, but already there were several examples of NCCBM reaching out to the wider industry with improved services. These included improvements to training modules conducted for industry employees. This has included expanding the training curriculum and upgrading the materials delivered using information received through the international training opportunities.

The initial pilot with My Home Industries led to the company investing its own funds in improved equipment, sourced locally; and there are positive reports of energy savings and an expectation of further benefits. NCCBM, with its strengthened capabilities, has commenced several industry-funded technical assignments to support cement industry units. In addition to the work with BIS for product diversification, NCCBM has commenced external consultancy services in the use of hazardous waste and municipal solid waste (MSW) as alternate fuel, improving Thermal Substitution Rate (TSR) from <1% 3yrs back to >4% presently. This includes an international contract with Oman and several local companies for assessing the feasibility and suitability of consulted cement plants in using alternate raw materials and fuels.

However, the dissemination of knowledge is still at an early stage and there is a need for NCCBM to continue to build on the knowledge gathered to understand and action broader knowledge flow to the industry. The training courses delivered by NCCBM are a prime mechanism for transferring knowledge to industry, there is also a need to find practical and affordable means to adapt the knowledge to the Indian context and ensure rapid uptake of improved technologies.

Strengthened global competitive position of Indian cement sector: The project’s overall aim was to ultimately strengthen the global competitiveness of the Indian cement sector.¹⁷ The logframe targets a range of indicators in relation to achieving strengthened global competitive position of the Indian cement sector. The project did not include a monitoring system that could track these indicators and no formal project data is available to assess whether the project has achieved technology transfer agreements; an increase in production values; an increase in productivity and exports; as well the lodgement of any patent IPR. However, during the evaluation, information was provided that indicates that progress in some indicators as shown in Table 3.

Table 3: Achievement of indicators for Indian cement sector to achieve a strengthened global competitive position

Indicator	Achievement
Technology transfer agreements	<ul style="list-style-type: none"> • No monitoring data available. • Four technology-based consultancy processes were carried out.
Production values	<ul style="list-style-type: none"> • No monitoring data available. • No qualitative evidence of reported change in production.
Productivity	<ul style="list-style-type: none"> • No monitoring data available. • The creation of new curricula and training materials for NCCBM has contributed to the productivity of its training section. Participants interviewed reported that the project has impacted on the cohesion of staff contributing to a strengthened training component at NCCBM. • New technologies are, however, yet to be applied to the commercial market. Participants acknowledged a perceived lack of expertise in transferring theoretical knowledge on new technologies to the commercial sector to be the reason for this. • It was envisaged that the strengthening of the global competitive position of the Indian cement sector will create employment. There is, however, insufficient evidence to confirm whether this has occurred as a result of project activities.
Exports	<ul style="list-style-type: none"> • No monitoring data available.
Energy usage	<ul style="list-style-type: none"> • A global view of Energy usage and energy efficient solutions was provided in benchmark assessment;

¹⁷ UNIDO, 2017. Technical Report – Alternative Fuels and Alternative Raw Materials, p.9

Indicator	Achievement
	<ul style="list-style-type: none"> no follow up data was collected. A technical workshop on energy usage and energy efficient solutions conducted. No follow up of workshop effectiveness was conducted.
Patents IPR	<ul style="list-style-type: none"> No monitoring data available. Brief examples of work on IPR were provided by training participants but no data was tracked for the project.
Waste derived fuels	<ul style="list-style-type: none"> A global view of Waste Derived Fuels was provided in benchmark assessment; no follow-up data collection occurred. Technical workshop on Waste Derived Fuels conducted. No evaluation of workshop uptake of information.
CO2emissions	<ul style="list-style-type: none"> Technical workshop on CO² management conducted; no evaluation of uptake carried out. CO² Audit training conducted. Follow-up on-site application occurred and staff is expected to be able to independently apply training in future.

Source: UNIDO design document logical framework and evaluation qualitative data, March 2018.

The feedback from NCCBM during the evaluation did provide some indication that advances have been made in relation to the KPIs for the project. The project has achieved the introduction of two new industry standards in collaboration with BIS which contributes to the strengthening of the Indian cement sector. The project facilitated the twinning of NCCBM with relevant international institutions. International study and fellowship tours further contributed to the establishment of network opportunities, for example with Verein Deutsche Zementwerk (VDZ). Technology suppliers also expressed an interest to work along with NCCBM to explore further potential in Indian cement plants.¹⁸ In combination, these activities have contributed to an increase in the competitiveness of the cement sector.

In summary, the main issue in understanding the extent of impact was (i) KPIs were not fully realistic in relation to the project timeframe and resources and (ii) there was a lack of evidence to confirm whether progress has been achieved or not. The evaluation concluded that there is sufficient evidence of progress towards the aim given the short time frame of the project, but that the aims and objectives were too ambitious for the timeframe and resources applied to the project.

5.5. Sustainability

The sustainability of the project was assessed by determining whether any benefits from the project will continue after the development assistance has been completed. Aspects included knowledge transfer; improved training; the development of new standards; the existence of new products available to the sector and the provision of CO² and AF audits. In addition, a main consideration

¹⁸ Summary of Second Study Tour to Belgium, Germany and Poland, 17 to 27 October 2016, p.13

was the capacity and willingness of NCCBM to continue building on the gains achieved through the project to build on and continue results. The positive achievements in this regard contribute to the project sustainability to be assessed as Satisfactory.

Project outcomes in terms of strengthened capabilities and the cement industry to achieve economic gains through higher performance & environment compliance and become globally competitive: In order to sustain these gains, NCCBM needs to maintain its level of improved knowledge, to continue to share its improved knowledge and to build on the knowledge gained. NCCBM needs to become better at accessing international knowledge and keeping abreast of new technologies and practices. From a technical perspective, the improved technologies focus on improved environmental practices and hence contribute to wider sustainability.

Knowledge transfer and improved training: Project activities contributed direct capability & capacity building of selected scientist/technical staff, and indirect capability & capacity building of rest of the scientist/technical experts at NCCBM. In the short and medium term these directly as well as indirectly trained experts are expected to take up technical assistance assignments for supporting cement industry in taking on new age challenges. Interviews with project participants were indicative that new technologies have been transferred and applied (e.g. the adoption of new technology resulted in a change to the thermal substitution rate (TSR) from less than 1% to 4%); and, that skill development has taken place (e.g. in the development of skills to do an AF and CO² audit). Participants trained during the project are responsible for the delivery of training at NCCBM and it is through transfer of knowledge to other stakeholders in the sector that project achievements may be sustained. The development of new curricula for the sector also contributes to the sustainability of the project.

Replication of project activities: Project participants reported a fair amount of replication of new technologies within NCCBM, for example in the use of waste-derived fuels. NCCBM is in the position to stimulate the replication of project activities in the cement sector through the provision of technical support to cement clusters and SMEs. A demand for new products and services to the cement industry in energy management, pollution control and waste re-use technologies provided by NCCBM will strengthen its capacity to provide technical assistance to the industry.

Continuing collaboration on R&D: While project activities facilitated NCCBM experts to undergo overseas fellowships and training programmes at various reputed international institutions, there was also evidence to confirm NCCBM is maintaining links both bilaterally between some of the participants linking with specific scientists and through the regular conference activities of NCCBM. Furthermore, there has been a continuing direct relationship between the experts introduced through the project and the industry to further technology transfer. These are positive indications; however, more could be done in this regard to ensure that NCCBM remains up to date. There needs to be collaborative arrangements between NCCBM and international institutions towards joint research initiative and/or knowledge exchange mechanisms, in order to ensure an ongoing flow of knowledge.

Environmental outcomes: The development of a standard for the cement industry on the treatment of C&D wastes may have an environmental impact;

however, there is insufficient data available to assess what the impact is. Training of NCCBM staff on the use of Alternative Fuels in the production of cement to reduce the use of fossil fuel and carbonated raw material may result in a reduction of greenhouse gas emissions if applied. Participants interviewed confirmed the adoption of co-processing of wastes; however, whether it has resulted in a reduction of greenhouse gas emissions is yet to be confirmed.

Future funding: The project outputs could be achieved because of available funds from donor. There are no clear evidences on future funding mechanism for NCCMB to pursue further on the action plan developed out of the diagnostic exercise of NCCBM. Also, no evidences were available to confirm co-financing opportunity either from cement industry or any governmental support scheme/programme. NCCBM has yet to establish few successful pilots/showcasing examples in order to develop a viable revenue model from the newer services to self-suffice on the follow-up activities of the project.

6. Project management and crosscutting issues

This project was implemented in collaboration with the International Centre for inclusive and Sustainable Development (IC-ISID). Close coordination between IC-ISID and NCCBM resulted in the successful completion of project activities. DIPP, as key partner to this project, was kept up to date on the progress of the project through regular meetings¹⁹ attended by the key stakeholders in IC-ISID projects and/or regular/periodic reporting.²⁰ The operational framework of IC-ISID contributed to the success of this project through its aim on enhancing the competitiveness of both NCCBM and clusters; building capacity and developing skills in the cement industry.²¹

The close collaboration between IC-ISID and the NCCBM allowed NCCBM to be actively engaged throughout the project. As result of this collaboration, NCCBM has built on the skills and experience gained in the project by undertaking assignments to consult with both national and international cement manufacturers. The project has not fully developed the management capacity of NCCBM as expected in the diagnostic. A tender process to conduct a training programme in management areas such as identifying new market opportunities; understanding customer needs; and communication strategy and management have been initiated, however it has not been completed.

The inclusion of both genders was addressed in the outline of the project phases in the project document. It was envisaged that there will be discussions with both male and female owners and managers as part of the diagnostic study and that sex-aggregated data will be collected in order to address possible gender issues. It was further envisaged that gender related indicators will be included in the development of KPI's.²² Even though the project document stated that there will be both male and female participants in the international study tours, aall of the participants were men. One female was identified but was unable to travel. The training in-country did include women staff and this was well appreciated by the women interviewed. NCCBM is increasingly employing women as they attain the qualifications required so there are prospects for the future. However, there was little more that the project could have done to increase participation of women.

¹⁹ UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the cement sector, p.21

²⁰ Minutes of 4th Steering Committee Meeting of UNIDO-DIPP. International Centre for Inclusive and Sustainable Industrial Development (IC-ISID).

²¹ UNIDO, 2017. Annual Report 2016, p.49.

²² UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the cement sector, p.10.

7. Conclusions and recommendations

7.1. Conclusions

Cement production and ancillary businesses are an important industry in India. The industry creates employment to more than a million people thereby making this project, with its emphasis on strengthening NCCBM's capacity and capability to support clusters and individual SMEs to enhance productivity and to increase the competitiveness of the Indian cement sector in the global market, very relevant. Based on the evaluation findings and analysis, Table 4 presents a summary of the project's performance.

Table 4: Project assessment summary with rationale

Project Element	Summary assessment	Assessment
Relevance	The overall relevance of the project was satisfactory on macro and meso level. The project's focus on strengthening NCCBM through a series of activities is relevant to the project outcome. A lack of management support activities in the project design is noted.	<i>Satisfactory</i> <i>(S)</i>
Effectiveness	The overall effectiveness of the project is effective, with some aspects of the project assessed as highly effective. All outputs were completed and, in some areas, exceeded.	<i>Satisfactory</i> <i>(S)</i>
Efficiency	The evaluation found that the project operated efficiently. All project activities were completed within the project timeframe with good value for money. Delays were experienced; however, it did not affect the achievement of project activities negatively.	<i>Satisfactory</i> <i>(S)</i>
Impact	Substantial progress was made towards impact. The project has achieved improved knowledge within NCCBM; the introductions of improved technology and standards as well as greater compliance to international standards that will improve the long-term competitiveness of the Indian cement industry.	<i>Moderately satisfactory</i> <i>(MS)</i>
Sustainability	The project has taken various steps to ensure its sustainability. NCCBM management are actively working on embedding improvement in on-going services to industry.	<i>Satisfactory</i> <i>(S)</i>

Table 5: Summary of ratings by evaluation criteria

#	Evaluation criteria	Mandatory rating
A	Impact (or progress toward impact)	MS
B	Project design	S
1	• Overall design	S
2	• Logframe	MS
C	Project performance	S
1	• Relevance	S
2	• Effectiveness	S
3	• Efficiency	S
4	• Sustainability of benefits	S
D	Cross-cutting performance criteria	
1	• Gender mainstreaming	S
2	• M&E: ✓ M&E design ✓ M&E implementation	S
3	• Results-based Management (RBM)	S
E	Performance of partners	
1	• UNIDO	S
2	• National counterparts	S
3	• Donor	N/A
F	Overall assessment	S

Project aligned with GOI's development priorities and needs of clusters and individual SMEs: The project is strongly aligned with the GOI's National Manufacturing Policy (2011) as well as with NCCBM's need for strengthened capability and capacity to support clusters and individual SMEs to enhance their productivity and to enter the export market. The Indian cement manufacturing industry has been lagging behind in the usage of AF in cement manufacturing. As a result of this identified weakness, the topic of AF has been a special focus in this project with project activities. Mr. Ashutosh Saxena, Director General NCCBM confirmed that the project activities have been very useful in addressing the use of AF. As a result, NCCBM have been able to act as consultant in the area of AF.²³

The project was also receptive of the opinions of cluster units and individual SMEs on NCCBM. Two cement companies and the CMA were included in diagnostic sessions with NCCBM and industry units and other NCCBM clients had the opportunity to voice their perception of the NCCBM via an online survey. There is, however, no further indication of how feedback on the results of the

²³ Minutes of 4th Steering Committee Meeting of UNIDO-DIPP. International Centre for Inclusive and Sustainable Industrial Development (IC-ISID), p.2

project was provided to cluster units and individual SME's.

NCCBM capacity and capability improved to support clusters and individual SMEs in efforts to enhance productivity performance and enter export markets: The capacity and capability of NCCBM to provide support to cluster units and individual SMEs has been strengthened through a combination of project activities, including through the development of an action plan that were based on the benchmarking and diagnostic assessment of NCCBM; through the transferral of state of the art technologies to NCCBM; through the delivery of technical workshops and the development of curricula for NCCBM skills development; through the experience of international fellowship and study tours; and through the collaboration of NCCBM with BIS to develop new standards for the cement sector.

NCCBM has, as a result of its strengthened capacity and capability, successfully undertaken consultancy assignments with cement industries abroad as well as with national cement industries in the areas of alternate raw materials and fuels usage in the manufacturing of cement.

Integrated learning from project transferred into broader institutional processes: Learning from the project has been transferred into broader institutional processes through the use of pilot demonstrations at sample units from each cluster as well as through training and technical workshops conducted at unit level.²⁴

The dissemination of knowledge is still at an early stage and there is a need for NCCBM to continue to build on the knowledge gathered to understand and action broader knowledge flow to the industry. The training courses delivered by NCCBM are a prime mechanism for transferring knowledge to industry, there is also a need to find practical and affordable means to adapt the knowledge to the Indian context and ensure rapid uptake of improved technologies.

Efficient usage of resources, adoption of latest technologies and implementation of global best practices in the Indian cement sector: The project has made efficient use of project resources such as the use of international experts. Dr. Daniel Lemarchand and a group of international experts were selected to assess the Indian cement Industry and NCCBM specifically. This team was retained to also conduct the KPI workshop; develop an Action plan for NCCBM and to conduct the technical workshops. Dr. Lemarchand and an additional team member further accompanied NCCBM staff on the international study tour.

A number of interventions were completed to facilitate knowledge transfer of AF, including a technical workshop, a visit to cement plants using AF as well as training on how to create an AF audit toolbox. Participants interviewed suggested that further training is necessary to enable them to apply theoretical knowledge to practice in a commercial setting. Additional audits at potential cement plants are being organised during which NCCBM engineers will work under the supervision of an international expert. This will enable NCCBM engineers to apply their knowledge on AF and CO₂ audits to the Indian cement industry.

Skill and technical capacity and capability of NCCBM developed: The skills

²⁴ IC-ISID Phase II Presentation. Proposals for the second phase of the 3 ongoing projects nearing completion (paper, cement, leather), p.10.

and technical capacity and capability of NCCBM have been successfully strengthened in this project. Knowledge related to state-of-the-art technologies in the area of AF has been transferred to, adapted and implemented by NCCBM. Topics for six technical workshops were identified and workshops were conducted at NCCBM. The skills of NCCBM staff were further developed through international fellowship and study tours at industry leaders in Austria, Belgium, Denmark, Germany, Poland, South Africa, and Spain during which participants also visited relevant institutions and industry bodies.

NCCBM’s capacity and capability to disseminate new skills and technologies to the national and international cement industry: The capacity and capability of NCCBM to introduce and implement new skills and technologies has been effectively developed in this project. The development of NCCBM’s management capacity has, however not been sufficiently addressed to expand the learning more broadly across the industry. In order for NCCBM to effectively disseminate new skills and technologies and to subsequently increase its competitiveness in the global market the capacities of the organisation need to be further developed.

7.2. Recommendations

Recommendation	Action suggested
<p>1. NCCBM to continue to promote and expand the work with industry on energy audits and other initiatives related to improved technologies.</p>	<ul style="list-style-type: none"> • Development of an improved promotion, marketing and communication system that will allow NCCBM to communicate new approaches and technologies to cluster units and individual SMEs; • Continued training of cluster units and individual SMEs in new technologies, with strengthened assessment processes for training courses to track adoption levels from training; • The implementation of a feedback system that will allow cluster units, individual SMEs and other NCCBM customers to provide feedback to NCCBM.
<p>2. Develop internal capacity in NCCBM’s viability assessment of technological options for industry and tailored problem solving to accelerate uptake of advanced technologies.</p>	<ul style="list-style-type: none"> • Additional training of selected NCCBM staff in the assessment of viability for application of technical theory to the industry; • Continued provision of technical workshops and technology demonstrations for industry partners; • More specific collaboration with industry to collect viability data on the costs and benefits of installed technologies and improved practices to build real case studies; • Development of simple communication briefs on the promoted technologies and potential cost-benefits.
<p>3. Increase NCCBM’s capacity for social marketing of their training and</p>	<ul style="list-style-type: none"> • Stronger promotion of NCCBM training courses in relation to good environmental practices; • Increase on-site technology demonstrations where possible, e.g. by making videos of installed equipment

Recommendation	Action suggested
<p>consultancy services to support industry in environmental improvements.</p>	<p>(de-identified to avoid competition concerns);</p> <ul style="list-style-type: none"> • Training of NCCBM scientists as industry consultants; with improved ability to communicate with industry in operational matters rather than only scientific terms.
<p>4. Maintain momentum in keeping up (and ahead) with new technologies in order to increase competitiveness in global market.</p>	<ul style="list-style-type: none"> • Building coalitions with best practice industry leaders; • Investing in a comprehensive R&D strategy; • Support engagement in industry conferences.

Annex 1. Six-point rating scale

Score		Definition*	Category
6	Highly satisfactory	Level of achievement clearly exceeds targets and expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	
4	Moderately satisfactory	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory	Level of achievement is negligible and there are severe shortcomings.	

Annex 2. List of documents reviewed

United Nations Industrial Development Organization, 2013. Country Programme of Technical Cooperation with India: Promote the sustainable and inclusive development of India.

United Nations Industrial Development Organization, 2015. Country Programme 2013-17 Of Technical Cooperation with India (Addendum): Draft Addendum – UNIDO Country Programme 2013-2017.

United Nations Industrial Development Organisation, 2015. Annual Report 2015. UNIDO Operations in India.

United Nations Industrial Development Organisation, 2016. Annual Report 2016. UNIDO Operations in India.

UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the cement sector.

UNIDO, 2016. AF/ARM Workshop presentation by Bauer, du Toit & Lemarchand, Delhi June 5 – 7 2016.

UNIDO, 2016. Summary of Second Study Tour to Belgium, Germany and Poland, 17 – 27 October 2016.

UNIDO, 2016. UNIDO – India Cooperation: marking the 50th anniversary of UNIDO. https://www.unido.org/sites/default/files/2016-12/newUNIDO_INDIA_SP_0.pdf

UNIDO, 2017. Benchmarking Report. Enhancing Productivity in the Cement Sector.

UNIDO, 2017. Diagnostic Report. Enhancing Productivity in the Cement Sector.

UNIDO, 2017. NCCBM training program CO² Audit – Scope 1. Final Report.

UNIDO, 2017. Technical Report – Alternative Fuels and Alternative Raw Materials. Enhancing Productivity in the Cement Sector.

UNIDO, 2017. Technical Report – Best Available Technology. Enhancing Productivity in the Cement Sector.

UNIDO, 2017. Technical Report – Key Performance Indicators. Enhancing Productivity in the Cement Sector.

Country meters, 2018. India Population 2018.

<http://countrymeters.info/en/India#facts> [Accessed 20 February 2018].

Forbes, 2017. India. <https://www.forbes.com/places/india/> [Accessed 21 February 2018].

ICCO Cooperation, 2018. India. <https://www.icco-cooperation.org/en/countries/India> [Accessed 21 February 2018].

Statista, 2018. India: Literacy rate from 1981 to 2015.

<https://www.statista.com/statistics/271335/literacy-rate-in-india/> [Accessed 21 February 2018].

The World Factbook, 2017. South Asia: India.

https://www.cia.gov/library/publications/the-world-factbook/geos/print_in.html [Accessed 21 February 2018].

United Nations Development Programme, 2015. Human Development Report.

http://hdr.undp.org/sites/default/files/hdr_2015_statistical_annex.pdf [Accessed 21 February 2018].

World Integrated Trade Solution (WITS), 2018. Overall Exports and Imports for India 2016. <https://wits.worldbank.org/CountrySnapshot/en/IND/textview> [Accessed 21 February].

World's Top Exports, 2018. India's Top Trading Partners.

<http://www.worldstopexports.com/indias-top-import-partners/> [Accessed 21 February 2018].

Annex 3. List of people interviewed

Name	Job title/Position in organisation
UNIDO	
Mr. Rajeev Vijh,	Director, UNIDO International Centre for Inclusive and Sustainable Industrial Development (IC-ISID)
Mr. Vikas Kumar	Deputy Director, UNIDO International Centre for Inclusive and Sustainable Industrial Development (IC-ISID)
Ms. Shraddha Srikant	Project Assistant, UNIDO International Centre for Inclusive and Sustainable Industrial Development (IC-ISID)
Mr. Anders Isaksson	Senior Industrial Development Officer and Project Manager
Mr. Rene van Berkel	UNIDO Representative
National Council for Cement and Building Materials (NCCBM)	
Mr. Ashutosh Saxena	Director General
Mr. S K Chaturvedi	Jt. Director and Head
Mr. Nath	Environment Department
Mr. Puneet Khurana	Concrete Department
Mr. Kapil Kukreja	Manager Project Engineering & System Design
Mr. V. Naga Kumar	Manager
Anupam	General Manager Process Optimisation & Productivity
Mr. Prateek Sharma	Deputy Manager
Cement Manufacturers' Association	
Dr. Surrinder K. Handoo	Technical Advisor
Others	
Daniel Lemarchand	Leader of international experts engaged for the project
Dalmia Bharat Cement	
Mr. Ashwini Pahuja	Executive Director Manufacturing (Former Deputy General of NCCBM)

Annex 4. Evaluation checklist

Project title	Development and adoption of appropriate technologies for enhancing productivity in the cement sector	PROJECT ID	150267		
Portfolio (Green or Economic)	Inclusive Economic Development				
Executing partners	Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India (GoI). Executing agency: UNIDO				
Project Manager	Anders Isaksson				
Overall project objective	To strengthen the global competitive position of the Indian cement sector				
Project components	<ul style="list-style-type: none"> • Reports on the cement sector • Diagnostic study of NCCBM • List of KPIs • Action plan for NCCBM • Skills and technical capability of NCCBM upgraded • Final report (lessons learnt, implications, advocacy) 				
Key dates and duration	Start date: December 2015	Completion original: 31 March 2018	Extension	Y ✓	N
Level of operation	Intensity of activities	High	Medium	Low	None
	<input type="checkbox"/> Macro level (policy)		✓		
	<input type="checkbox"/> Meso level (institutional)	✓			
	<input type="checkbox"/> Micro level (direct)			✓	
Finance data (pls check & give reason/add info for any amendments)					
UNIDO funding (USD)					
Co-financing (USD) both in-kind & in cash	Funding not specified per funder				
Total project cost (USD)	1,270,685				
Budget expended (USD)	1,069,300				
Key results achieved so far					

Linkage & cooperation with other projects in India						
Capacity Development²⁵ (tick evidence level)	1	2	3	4		
Assessment²⁶	HU	U	MU	MS	S	HS
Coordination between HQ and Field office						
Relevance to Strategic Context					✓	
Relevance to Industry					✓	
Relevant Design					✓	
Effectiveness - Assessment of results					✓	
Efficiency of operations					✓	
Impact: Overall contribution to Transformational change.						
• Macro change				✓		
• Meso change					✓	
• Micro change				✓		
• Evidence of Net economic gain					✓	
• Evidence of net environmental gain ²⁷					✓	
• Gender equity			✓			
• Age diversity ²⁸			✓			
• Population diversity			✓			
• M&E/RBM ²⁹				✓		
	HUL	UL	MUL	ML	L	HL
Sustainability mechanisms³⁰				✓	✓	

²⁵ Based on the Kirkpatrick model (Section 2)

²⁶ Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU).

²⁷ Has the project resulted in any environmental enhancement or addressed degradation?

²⁸ This was designed to primarily to assess if benefits have accrued more at a senior level executive or younger workers. Has consideration has been given to younger participants – was there an age barrier to access of the program?

²⁹ Evidence based decision making

³⁰ Sustainability and Benefits was rated from Highly Likely (HL) to Highly Unlikely (HUL)

Partnerships	Yes	No						
• GoI Partners	Y						✓	
• India UNIDO Office	Y						✓	
• Made in India Program		N						
• Other Government Program		N						
• UN Country Team		N						
• Other development partners		N						
• IC-ISID	Y						✓	
• Industry Partners	Y					✓		

Annex 5. Terms of Reference

Note: Since this is a combined ToR foreseen for two projects (ID: 150267 Cement sector and 150282 Pulp sector) only the relevant portions that apply to this Evaluation (Cement sector) may be considered.



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE

Independent terminal evaluation of projects of the International Centre for Inclusive and Sustainable Industrial Development (IC-ISID) ⁽³¹⁾:

Development and adoption of appropriate technologies for enhancing productivity in the cement sector

and

Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector

UNIDO project ID: **150267** and 150282

December 2017

³¹ IC-ISID is a joint initiative of the Department of Industry Policy and Promotion (DIPP), Government of India, and the United Nations Industrial Development Organization (UNIDO)

Contents

- I. PROJECT BACKGROUND AND CONTEXT
 1. Project factsheet
 - Cement Project factsheet
 - Paper Project factsheet
 2. Project context
 - Rationale and origin of the projects
 - Cement Project
 - Origin of the project
 3. Project objective: please briefly describe the project objectives and its components
 - Project implementation arrangements
 4. Budget information
- II. Evaluation purpose and scope
- III. Evaluation approach and methodology
 1. Data collection methods
 2. Evaluation key questions and criteria
 3. Rating system
- IV. Evaluation process
- V. Time schedule and deliverables
- VI. Evaluation team composition
- VII. Reporting
- VIII. Quality assurance

Annex 1: Project Results Framework

Annex 2: Detailed questions to assess evaluation criteria

Annex 3: Job descriptions

Annex 4- Outline of an in-depth project evaluation report

Annex 5: Checklist on evaluation report quality

I. Project background and context³²

1. Project factsheet

Cement Project factsheet:

Project title	Development and adoption of appropriate technologies for enhancing productivity in the cement sector
UNIDO project ID	150267
Region	Asia and the Pacific
Country	India
Project donor(s)	India
Project approval date	7 May 2015
Project implementation start date	15 October 2015
Expected duration at project approval	22 months
Expected implementation end date	31 March 2018
Executing partners	UNIDO
Donor funding	1,270,685 USD
Total project cost (USD)	1,270,685 USD
Planned terminal evaluation date	Q1 2018

(Source: Project document)

Paper Project factsheet:

Project title	Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector
UNIDO project ID	150282
Region	Asia and the Pacific
Country	India
Project donor(s)	India
Project approval date	18 July 2015
Project implementation start date	15 October 2015
Expected duration at project approval	21 months
Expected implementation end date	31 March 2018
Executing partners	UNIDO
Donor funding	1,644,150 USD
Total project cost (USD)	1,644,150 USD
Planned terminal evaluation date	Q1 2018

2. Project context

This Independent Terminal Evaluation covers two different projects implemented by the United Nations Industrial Development Organization (UNIDO) in India. The first is the project “*Development and adoption of appropriate technologies for enhancing productivity in the cement sector*” – UNIDO project ID 150267, hereinafter referred to as ‘Cement Project’ – the second is “*Development and adoption of appropriate technologies for*

³² Data in this chapter is to be validated by the Consultant against the project document and any changes should be reflected in the evaluation report.

enhancing productivity in the paper and pulp sector – UNIDO project ID 150282, Paper Project.

Despite tackling two different sectors of the Indian economy, namely the cement and the paper and pulp industries, the two projects arise from the same issue, i.e. the imbalance between a larger internal production and a significantly lower demand. This particular situation led to the need of taking advantage of UNIDO's expertise in building up cooperation and coordination to create the necessary preconditions in order to increase the volume of export within the sectors.

Rationale and origin of the projects:

Cement Project

India is the second largest cement producing country in the world, only trailing China in terms of quantity and technology, producing about 7% of the global production. The country experiences a particular situation where the production is much greater than its domestic demand. The per capita cement consumption is relatively low at 180 kg, much below the global average of 450 kg, although India is the second largest cement producer worldwide. This mismatch has made India looking outwards to other markets to export the excess, with the realization that there is a need to be cost competitive and be able to export. India is among the world's top ten exporters of cement both in value and volume; but it has yet to compete with countries such as Turkey, China, Pakistan, Vietnam, Japan and the USA, leading to a significantly reduced market share since 2012.

To address this issue, this project was formulated in 2015 in line with the direct request from and consultation with the Department of Industrial Policy and Promotion (DIPP), Government of India (GoI), as well as relevant industry associations. It has been implemented in collaboration with the International Centre for Inclusive and Sustainable Industrial Development (IC-ISID) in New Delhi, India. The project is expected to be completed by the 31st of March 2018.

Paper Project

The Indian paper industry accounts for 2.6% of the world's production of paper. In the past two decades, a widening gap between supply and demand has developed, with the former significantly falling short of the latter. An important reason for insufficient supply is due to firms' inadequate productivity performance, which in turn is related to employment of relatively unsophisticated technologies, untrained staff, inadequate management practices, weak handling of waste emissions as well as suboptimal resource efficiency.

The project was developed in response to a request from the Government of India (GoI) dated 18th July 2015. It was started in October 2015 and was expected to be completed at the end of March 2018. The project's objective is to introduce new and more advanced technologies, provide up-to-date skills to staff and transfer the most knowledge in the above mentioned areas.

Firms' successful enhancement of their productivity performance are likely to bring the additional advantage of improved international competitiveness, which can allow firms to enter export markets. There is thus significant growth potential to be seized by the industry, both domestically and internationally.

The target beneficiaries are firms, which serve as demonstration units, and technical institutions such as the Indian Paper Manufacturers Association (IPMA) and the Central

Paper and Pulp Research Institute (CPPRI), the Indian Agro and Recycled Paper Mills Association (IARPMA), the Indian Newsprint Manufacturer's Association (INMA) as well as the Indian Recycled Paper Mills Association (IRPMA). In the longer term, it is expected that the strengthening of such institutions will enable sustainability of the project activities and self-sufficiency of the sector.

3. Projects' objectives

Cement Project

The objective of the project is to bolster the capacity and capability of technical institutions such as the National Council for Cement and Building Materials (NCCBM) to enable them to better support clusters and individual SMEs in their efforts to enhance their productivity performance and enter export markets. Such support entails transfer of relatively advanced technologies, skills development of staff, enhanced management practices and building knowledge for increased resource efficiency and emission reduction. The final goal is to strengthen the global competitive position of the Indian cement sector.

The project consists of 7 different outputs, 4 in the inception phase, 1 in the implementation phase and 2 in the post-implementation phase.

Following are the key outputs:

1. Undertaking analysis and drafting a report of the cement sector to develop an accurate baseline scenario.
2. Conducting a diagnostic study, first to assess the gaps in technology and skills in NCCBM and, secondly, to gain an in-depth understanding of and global best practices.
3. Developing Key Performance Indicators (KPIs) to analyse the performance of the cement sector.
4. An action plan for capacity building for NCCBM.
5. Upgrading of skills and capacity through mechanisms of technology transfer (transfer, adaptation, and implementation), structured and focused expert dialogue, international study tours, twinning programmes and mechanisms of training and learning-by-doing.
6. Drafting and presentation of the final report and,
7. A terminal evaluation report of the project.

Project implementation arrangements

INCEPTION PHASE

During the inception phase activities of planning and logistics have been carried out with the aim of ensuring that all key stakeholders are on board, that planned activities are in line with the expected goal, reasonable KPIs are developed and an action plan for capacity building is formulated.

During this stage the following outputs have been achieved:

1. Output 1: Reports on the cement sector (responsibility: NCCBM, UNIDO)
 - 1.1 Review of global best practices on management of the cement sector
 - 1.2 Global view of:
 - Energy usage and energy efficient solutions
 - Waste derived fuels

- CO2 emissions and green technologies
 - Patents and IPRs
 - Global best practices
 - Up-to-date technologies
- 1.3 Analysis of results (activities 1.1-1.2)
- 1.4 Drafting of findings (activities 1.1-1.3)
2. Output 2: Diagnostic study of NCCBM (responsibility: UNIDO)
- 2.1 Analysis of the issues/technology gaps faced by NCCBM
- 2.2 Analysis of the skills gaps faced by NCCBM. Information will be disaggregated by sex
- 2.3 Analysis of the gaps in management best practices faced by NCCBM. Information will be disaggregated by sex
- 2.4 Analysis of NCCBMs international and technical support network
- 2.5 Analysis of current technology types promoted by NCCBM (the usage of energy, type of process, fuel type, CO2 emissions, waste, etc.)
- 2.6 Drafting of findings as a report
3. Output 3: List of LPIs (responsibility: NCCBM, UNIDO)
- 3.1 Utilize a six step process for the development of KPIs, namely:
- Step 1 – Create objective
 - Step 2 – Describe results
 - Step 3 – Identify measures
 - Step 4 – Define thresholds
 - Step 5 – Upload structure/data into a performance management system
 - Step 6 – Interpret results
4. Output 4: Action plan for NCCBM (responsibility: NCCBM, UNIDO)
- 4.1 Consultation meeting with NCCBM
- 4.2 Drafting of action plan
- 4.3 Expert group meeting – technical review of action plan

IMPLEMENTATION PHASE

After the completion of the diagnostic study, the next phase develops the missing capacity that was identified as a result of the inception phase. This took place primarily within the frame of implementing an action plan. This output is process by which skills and capacity will be upgraded through mechanisms of technology transfer (transfer, adaptation, and implementation); structured and focused expert dialogue; international study tours; twinning programmes; and mechanisms of training and learning-by-doing.

5. Output 5: Skills and technical capacity and capability of NCCBM upgraded (responsibility: NCCBM, UNIDO, BIS)
- 5.1 State of the art technologies transferred³ (transfer, adaptation, implementation) to NCCBM
- 5.2 Curricula development for NCCBM skills development
- 5.3 Six technical workshops on:
- Energy usage and energy efficient solutions

- Waste derived fuels
- CO2 emissions and green technologies
- Patents and Intellectual Property Rights (IPRs)
- Global best practices
- Up-to-date technologies

5.4 Skills development of NCCBM female and male staff

5.5 Training of female and male trainers in order to create self-sufficiency and sustainability

5.6 International study tours, 8 female and male scientists/engineers

5.7 International fellowship tours, 32 female and male scientists/engineers

5.8 NCCBM to coordinate with Bureau of Indian Standards (BIS) for the development of new standards for the cement sector

POST - IMPLEMENTATION PHASE

The final two stages of the project in the post implementation phase are reporting and evaluation. Drafting and presentation of the final report enables for experiences gained throughout the project to be codified and disseminated. The final report may be used as a tool for the purposes of providing evidence-based policy advice to the GoI, pertaining to the cement sector. Recommendations for gender issues are also provided. A final meeting with stakeholders and DIPP was conducted to present what has been done and achieved with the use of the KPIs and targets identified during the inception phase. The rationale for this is to increase the outreach of NCCBM to its client base and to present the portfolio of new improved services offered.

6. Output 6: Final report (lessons learned, implications, advocacy) – Responsibility NCCBM, UNIDO

6.1 Drafting of final report

6.2 Presentation of final report

6.3 Development of a sliding price scale for services offered by NCCBM

6.4 PR and marketing of NCCBM's improved service portfolio

7. Output 7: Evaluation Report (Responsibility UNIDO)

7.1 Independent evaluation

Paper Project

The final goal of the project is to strengthen the global competitive position of the Indian paper and pulp sector. With this regard, despite the fact that the Indian paper industry holds its importance to the national economy, it stands very fragmented and dominated by small and medium-sized units.

There is a strong need to close up the increasing gap between demand and supply by increasing firms' productivity and resource efficiency by introducing new and more advanced technologies as well as through skills development. There is a growing need to modernize the Indian mills, improve productivity and build new capacities.

In order to achieve this goal it is imperative that the capacity and capability of technical institutions such as the Indian Paper Manufacturers Association (IPMA), the Central Paper and Pulp Research Institute (CPPRI), the Indian Agro and Recycled Paper Mills Association (IARPM), the Indian Newsprint Manufacturer's Association (INMA) and the Indian Recycled Paper Mills Association (IRPMA) are bolstered. With this in mind this project aims

to increase the technical capacity and capability of IPMA, CPPRI, IARPMA, INMA and IRPMA so that it can better support the Indian paper and pulp sector and increase its global competitiveness.

The project consists of 8 different outputs, 5 in the Inception phase, 2 in the implementation phase and 1 in the post-implementation.

Project implementation arrangements

INCEPTION PHASE

The inception phase planning and logistics activities have been carried out with the aim of ensuring that all key stakeholders are on board and that planned activities are in line with the expected goal.

During this stage the following outputs have been achieved:

1. Output 1: Identification of target clusters/units (Responsibility: CPPRI, UNIDO)
 - 1.1 Analysis of the database of potential clusters/ units in 4 regions- South, North, West and East
 - 1.2 Consultation meetings with the stakeholders and identification of potential target units for diagnostic study/ technology status
2. Output 2: Reports of the pulp and paper sector (Responsibility: CPPRI, UNIDO)
 - 2.1 Study of the technology status of the paper and pulp sector with a focus on selected clusters in India
 - 2.2 Review of global best practices and state of the art technologies, including green technologies, for the paper and pulp sector
 - 2.3 Analysis of results and drafting of findings (activities 2.1-2.2)
3. Output 3: Diagnostic studies of CPPRI, IPMA, IARPMA, INMA, IRPMA and selected units (Responsibility: CPPRI, IPMA, IARPMA, INMA and IRPMA, UNIDO)
 - 3.1 Assessment of CPPRI, IPMA, IARPMA, INMA and IRPMA on key aspects: R&D infrastructure/ skills, gaps faced and the requirement of international and technical support network, etc. Information will be disaggregated by sex
 - 3.2 Analysis of the prevalent technologies used and the issues/technology gaps faced by the selected units
 - 3.2 Conduct analysis such as: SWOT, five forces, and PEST or PESTLE
 - 3.4 Analysis of results and drafting of findings (activities 3.1-3.3)
4. Output 4: List of KPIs (Responsibility: UNIDO)
 - 4.1 Utilise a six-step process for the development of KPIs, namely:
 - Step 1 – Create objective
 - Step 2 – Describe results
 - Step 3 – Identify measures
 - Step 4 – Define thresholds
 - Step 5 – Upload structure/data into a performance management system
 - Step 6 – Interpret results
5. Output 5: Action plan for CPPRI, IPMA, IARPMA, INMA, IRPMA and industry associations (Responsibility: CPPRI, IPMA, IARPMA, INMA and IRPMA, UNIDO)
 - 5.1 Review meeting with stakeholders

5.2 Drafting of action plan for capacity building

5.3 Expert group meeting – technical review of action plan

IMPLEMENTATION PHASE

During the implementation phase, a full package of mechanisms has been put in place to support the project goal. In particular, activities of skills, knowledge and technology transfer, together with study tours, twinning programs, training of trainers and structured expert dialogue have been carried out.

6. Output 6: Skills and technical capacity of CPPRI, IPMA, IARPMA, INMA, IRPMA upgraded (Responsibility: CPPRI, IPMA, IARPMA, INMA and IRPMA, UNIDO)

6.1 Technology demonstration (lab/bench scale)/transfer (know-how/ knowledge) to CPPRI, IPMA, IARPMA, INMA, IRPMA and clusters and units. The potential areas are:

- improved energy efficiency and chemical recovery from non-wood based black liquor using liquor heat treatment or other process
- biochemical/membrane separation process for reduction of colour and total dissolved solids (TDS) in effluent
- promotion and adaption of zone leaching in medium- sized agro- and wood-based paper mills

6.2 Four knowledge dissemination workshops (one for each region East, West, North and South) on:

- productivity enhancement in recycled fibre (RCF) based mills with new recycling and paper making concept
- other available environmentally sound technologies and processes including biotechnology applications
- global best practices in paper and pulp manufacturing

6.3 International study tours

6.4 Twinning of industrial associations and technical institutions with international equivalents

6.5 International fellowship tours, 20 female and male scientists/engineers

6.6 Training of trainers in order to create self-sufficiency and sustainability and upscaling

7. Output 7: Final report (lessons learned, implications, advocacy)

7.1 Drafting of final report

7.2 Presentation of final report

7.3 Development of a sliding price scale for services offered by CPPRI, IPMA, IARPMA, INMA, IRPMA

7.4 PR and marketing of improved service portfolio of CPPRI, IPMA, IARPMA, INMA, IRPMA

POST - IMPLEMENTATION PHASE

The final two stages of the project in the post implementation phase are reporting and evaluation. The final report is conceived be used as a tool for the purposes of providing evidence-based policy advice to the GoI, pertaining to the paper and pulp sector. Finally, an independent evaluation is planned to take place in the first quarter of 2018.

8. Output 8: Evaluation (Responsibility: UNIDO)

4. Budget information:

Table 1a. Cement Project - Financing plan summary - Output breakdown³³

Project outputs/components	Total (\$)
1 Reports of the cement sector	60,000
2 Diagnostic studies of NCCBM	70,000
3 Development of KPIs	30,000
4 Action plan for NCCBM	135,000
5 Skills and technical capacity and capability of NCCBM upgraded	725,000
6 Final report (lessons learned, implications, advocacy)	74,500
Monitoring and evaluation	30,000
Total	1,124,500

Table 1b. Paper Project - Financing plan summary - Outcome breakdown³⁴

Project outcomes/components	Total (\$)
1. Identification of target clusters/units	25,000
2. Report of the pulp and paper sector	50,000
3. Diagnostic studies of CPPRI, IPMA, IARPMA, INMA, IRPMA and selected units.	210,000
4. List of KPIs	30,000
5. Action plan for CPPRI, IPMA, IARPMA, INMA, IRPMA and industry associations	135,000
6. Skills and technical capacity of CPPRI, IPMA, IARPMA, INMA, IRPMA upgraded.	900,000
7. Final report (lessons learned, implications, advocacy)	75,000
Monitoring and evaluation	30,000
Total	1,455,000

³³ Source: Project document.

³⁴ Source: Project document.

Table 2a. Cement Project - UNIDO budget execution

Item	2015	2016	2017 (Jan-Nov)	Total Expenditure (\$)
Contractual Services			69,995	69,995
Local travel	7,769	39,103	29,685	76,557
Nat.Consult./Staff		10,494	11,312	21,806
Other Direct Costs	14	9,096	38,108	47,218
Staff & Intern Consultants		258,672	102,984	361,656
Staff Travel		8,108	7,707	15,815
Train/Fellowship/Study		61,430	176,254	237,684
Grand Total	14	386,903	438,062	830,731

Source: UNIDO project ID, December, 2017

Table 2b. Paper Project - UNIDO budget execution

Item	2016	2017 (Jan – Nov)	Total Expenditure (\$)
Contractual Services	235,983	140,545	376,528
Local travel	22,583	67,871	90,454
Nat.Consult./Staff	31,264	35,956	67,220
Other Direct Costs	2,422	11,587	14,009
Staff & Intern Consultants	22,325	28,351	50,676
Staff Travel	8,456	19,936	28,392
Train/Fellowship/Study	101,412	108,481	209,893
Grand Total	426,461	414,744	837,172

Source: UNIDO project ID, December, 2017

II. Evaluation purpose and scope

The purpose of the evaluation is to independently assess the two projects in analysis to help UNIDO improve performance and results of future programmes and projects.

The evaluation has two specific objectives:

- (i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact;
- (ii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

The independent terminal evaluation (TE) will cover the whole duration of the projects from their starting time in October 2015 to the estimated completion date in 03/31/2018.

III. Evaluation approach and methodology

The TE will be conducted in accordance with the UNIDO Evaluation Policy³⁵ and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle³⁶.

The evaluation will be carried out as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the project will be informed and consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Independent Evaluation Division (ODG/EVQ/IEV) on the conduct of the evaluation and methodological issues.

The evaluation will use a theory of change approach and mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning.

The theory of change will identify causal and transformational pathways from the project outputs to outcomes and longer-term impacts, and drivers as well as barriers to achieve them. The learning from this analysis will be useful to feed into the design of the future projects so that the management team can effectively manage them based on results.

1. Data collection methods

Following are the main instruments for data collection:

- (a) **Desk and literature review** of documents related to the project, including but not limited to:
 - The original project document, monitoring reports (such as progress and financial reports, mid-term review report, output reports, back-to-office mission report(s), end-of-contract report(s) and relevant correspondence.
 - Notes from the meetings of committees involved in the project.
- (b) **Stakeholder consultations** will be conducted through structured and semi-structured interviews and focus group discussion. Key stakeholders to be interviewed include:
 - UNIDO Management and staff involved in the project; and
 - Representatives of donors and counterparts.
- (c) **Field visit** to project sites in India

2. Evaluation key questions and criteria

The key evaluation questions are the following:

- (b) What are the key drivers and barriers to achieve the long term objectives? To what extent has the project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long term objectives?
- (c) How well has the project performed? Has the project done the right things? Has the project done things right, with good value for money?
- (d) What have been the project's key results (outputs, outcome and impact, if possible)? To what extent have the expected results been achieved or are likely to

³⁵ UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)

³⁶ UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

be achieved against the project design? To what extent the achieved results will sustain after the completion of the project?

- (e) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the project?

The evaluation will assess the likelihood of sustainability of the project results after the project completion. The assessment will identify key risks (e.g. in terms of financial, socio-political, institutional and environmental risks) and explain how these risks may affect the continuation of results after the project ends. Table 3 below provides the key evaluation criteria to be assessed by the evaluation. The details questions to assess each evaluation criterion are in Annex 2.

Table 3. Project evaluation criteria

#	<u>Evaluation criteria</u>	<u>Mandatory rating</u>
A	Impact (or progress toward impact)	Yes
B	Project design	Yes
1	• Overall design	Yes
2	• Logframe	Yes
C	Project performance	Yes
1	• Relevance	Yes
2	• Effectiveness	Yes
3	• Efficiency	Yes
4	• Sustainability of benefits	Yes
D	Cross-cutting performance criteria	
1	• Gender mainstreaming	Yes
2	• M&E: ✓ M&E design ✓ M&E implementation	Yes
3	• Results-based Management (RBM)	Yes
E	Performance of partners	
1	• UNIDO	Yes
2	• National counterparts	Yes
3	• Donor	Yes
F	Overall assessment	Yes

3. Rating system

In line with the practice adopted by many development agencies, the UNIDO Independent Evaluation Division uses a six-point rating system, where 6 is the highest score (highly satisfactory) and 1 is the lowest (highly unsatisfactory) as per Table 4.

Table 4. Project rating criteria

Score		Definition	Category
6	Highly satisfactory	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	
4	Moderately satisfactory	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory	Level of achievement is negligible and there are severe shortcomings.	

IV. Evaluation process

The evaluation will be implemented in five phases which are not strictly sequential, but in many cases iterative, conducted in parallel and partly overlapping:

- i. Desk review and data analysis;
- ii. Interviews, survey and literature review;
- iii. Field visits;
- iv. Data analysis and report writing.

V. Time schedule and deliverables

The evaluation is scheduled to take place in the first quarter of 2018. The evaluation field mission to India is tentatively planned for February 2018. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project.

After the evaluation field mission, the evaluation team leader will visit UNIDO HQ for debriefing and presentation of the preliminary findings of the terminal evaluation. The draft TE report will be submitted to UNIDO 3 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO IEV, UNIDO Project Manager and other stakeholders for comments and verification of factual and interpretation errors. The TE leader is expected to revise the draft TE report based on the comments received, edit the language and form and submit the final version in accordance with UNIDO ODG/EVQ/IEV standards.

Table 5. Tentative schedule

Timelines	Tasks
January 2018	Desk review and preparation of inception report
22 January -3 February 2018	Briefing with UNIDO Project Manager and experts based in Vienna – through Skype
11-23 February 2018	Field visits
5-6 March 2018	Debriefing in Vienna Presentation of evaluation findings
March 2018	Preparation of first draft evaluation report Internal peer review of the report by the UNIDO ODG/EVQ/IEV and other stakeholders comments to draft evaluation report
April 2018	Final evaluation report

VI. Evaluation team composition

The evaluation team will be composed of one international evaluation consultant acting as the team leader and one national consultant. The evaluation team will possess relevant strong experience and expertise on evaluation and on private sector development. Both consultants will be contracted by UNIDO.

The tasks of each team member are specified in the job descriptions annexed to these terms of reference.

According to UNIDO Evaluation Policy, members of the evaluation team must not have been directly involved in the design and/or implementation of the project under evaluation.

An evaluation manager from UNIDO ODG/EVQ/IEV will provide technical backstopping to the evaluation team and ensure the quality of the evaluation. The UNIDO Project Manager and national project teams will act as resourced persons and provide support to the evaluation team and the evaluation manager. The UNIDO Project Manager and the project team in India will provide logistical and administrative support the evaluation team to prepare for the field visits. The project team will provide a proposed list of stakeholders (e.g. government officials, private sector representatives and other relevant individuals) to the evaluation team who will make the final decision on who to consult. The project team will arrange the meetings and prepare field visit schedule for the evaluation team, following their request, prior to the field visit.

The evaluation team will maintain close liaison with the representatives of UNIDO, other UN agencies as well as with the concerned national agencies, and with national and international project staff. The evaluation team is free to discuss with the authorities concerned anything relevant to its assignment. However, it is not authorized to make any commitments on behalf of the Government, the donor or UNIDO.

VII. Reporting

Evaluation report format and review procedures

A draft report for each project will be delivered to ODG/EVQ/IEV (the suggested report

outline is in Annex 4) and circulated to UNIDO staff and national stakeholders associated with the project for factual validation and comments. Any comments or responses, or feedback on any errors of fact to the draft reports provided by the stakeholders will be sent to UNIDO ODG/EVA for collation and onward transmission to the project evaluation team who will be advised of any necessary revisions. On the basis of this feedback, and taking into consideration the comments received, the evaluation team will prepare the final version of the terminal evaluation report.

The evaluation team will present its preliminary findings to the local stakeholders at the end of the field visit and take into account their feed-back in preparing the evaluation report. A presentation of preliminary findings will take place at UNIDO HQ after the field mission.

The TE report of each project should be brief, to the point and easy to understand. It must explain the purpose of the evaluation, exactly what was evaluated, and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Findings, conclusions and recommendations should be presented in a complete, logical and balanced manner. The evaluation report shall be written in English and follow the outline given in Annex 4.

VIII. Quality assurance

All UNIDO evaluations are subject to quality assessments by UNIDO ODG/EVQ/IEV. Quality assurance and control is exercised in different ways throughout the evaluation process (briefing of consultants on methodology and process of UNIDO ODG/EVQ/IEV, providing inputs regarding findings, lessons learned and recommendations from other UNIDO evaluations, review of inception report and evaluation report by UNIDO ODG/EVQ/IEV).

The quality of the evaluation report will be assessed and rated against the criteria set forth in the Checklist on evaluation report quality, attached as Annex 5. The applied evaluation quality assessment criteria are used as a tool to provide structured feedback. UNIDO ODG/EVQ/IEV should ensure that the evaluation report is useful for UNIDO in terms of organizational learning (recommendations and lessons learned) and is compliant with UNIDO's evaluation policy and these terms of reference. The draft and final evaluation report are reviewed by UNIDO ODG/EVQ/IEV, which will submit the report to the donor and circulate it within UNIDO together with a management response sheet.