INDEPENDENT EVALUATION DIVISION
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

Independent Terminal Evaluation

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

UNIDO Project No.: 150282

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

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India

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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.

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Abbreviations and acronyms

Acronym	Meaning
BILT	Ballarpur Industries Limited
CNNPRI	China National Pulp and Paper Institute
CPPRI	Central Paper and Pulp Research Institute
DIPP	Department of Industrial Policy and Promotion
GDP	Gross domestic product
GNI	Gross national income
GoI	Government of India
IARPMA	Indian Agro and Recycled Paper Mills Association
IC-ISID	International Centre for Inclusive and Sustainable Industrial Development
IIM-A	Indian Institute of Management, Ahmedabad
INMA	Indian Newsprint Manufacturer's Association
IPMA	Indian Paper Manufacturers Association
IPR	Intellectual Property Rights
IRPMA	Indian Recycled Paper Mills Association
KPIs	Key Performance Areas
MoEFCC	Ministry of Environment, Forests and Climate Change
MoP	Ministry of Power
MSMEs	Micro, small, and medium enterprises
NDA	Non-disclosure Agreement
NMP	National Manufacturing Policy
PAT	Perform Achieve and Trade
R&D	Research and development
SMEs	Small and Medium sized Enterprises
TE	Terminal evaluation
TOC	Theory of Change
TPA	Tonnes per annum
UNIDO	United Nations Industrial Development Organization

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 (TE) for the project "*Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector*" (Project ID 150282). The project was formulated in response to a direct request from the Department of Industrial Policy and Promotion (DIPP), of the Government of India (GoI), and through the auspices of the UNIDO International Centre for Inclusive and Sustainable Industrial Development (IC-ISID).

The Indian pulp and paper industry has been an important industry in India but recently has been experiencing a range of changes as demand shifts, raw material has been more difficult to source and environmental controls have intensified. The overall paper demand and production has increased but there are reports of a reduction in the number of producers. This has an impact on employment and economic contribution from the industry. The pulp and paper industry globally has been adapting to the changing context and in other countries, the industry has been growing.

This project arose from an aim identify and address constraints in the Indian Pulp and Paper industry and to increase industry capacity and capability in order to improve productivity and competitiveness. The project aimed to support the Indian paper and pulp industry by strengthening the capacity and capability of the nodal technical institution for the sector, the Central Pulp and Paper Research Institute (CPPRI), and selected national industry associations to provide better management and technical support to the industry to strengthen the global competitive position of the Indian pulp and paper sector.

The evaluation

The independent terminal evaluation covered the whole duration of the project from its start date in December 2015 to the estimated completion date on the 31st of 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 report was assessed against the internationally recognised evaluation criteria of relevance, effectiveness, efficiency, impact and sustainability. Assessment of relevance focused on the project's alignment with partner priorities, policies and requirements and relevance to UNIDO's mandate. Effectiveness focused on the extent to which the project achieved its objectives; while efficiency measured how economically resources and inputs were converted to results.[1] Impact identified longer-term, changes that the project has contributed to. Sustainability was used to

[1] OECD-DAC, 2010. Glossary of Key Terms in Evaluation and Results Based Management.

assess the extent to which benefits arising from the project's interventions were likely to continue.

KEY FINDINGS

Relevance

The evaluation found the overall relevance of the project to be **highly satisfactory.** The project is aligned with the Government of India's National Manufacturing Policy, the Perform Achieve Trade scheme and the Charter for Water Recycling and Pollution Prevention in Paper and Pulp Industries in the Ganges River basin.[2] The project's focus on improving the technical capacity of CPPRI and selected industry association staff, the transfer or knowledge in the international arena, the improvement of technological know-how and environmental management capacity are relevant to the achievement of the project outcomes. In addition, the project was identified at a critical juncture for the industry. The current constraints facing the industry, and the opportunities for diversification mean that the project was very timely to identify how the industry in India should adapt to respond to challenges and opportunities.

Effectiveness

The evaluation found the effectiveness of the project to be **satisfactory**. The project completed all of its intended outputs. The evidence available demonstrates that the activities were reasonably successful in achieving the targets set. The CPPRI found the project particularly effective because it not only improved their ability to provide technical support to the pulp and paper sector but it enhanced their capacity for knowledge expansion/transfer through the international visits and encouraged the exploration of new areas of research. The key technologies identified such as water treatment using ozone and membrane separation technology in which the capability of CPPRI would have been strategically enhanced; as well as the emergence of the area of bio-refineries as of potential importance to the Indian paper industry have the potential to update, upgrade and create a strategic shift in the industry. These changes could bring the opportunity for the Indian Pulp and Paper sector to compete more strongly in the global market, as well as improving productivity and good environmental practices.

Other stakeholders such as the national associations and involved industry stakeholders also appreciated the project activities, although relatively less involved than CPPRI. The project activities have resulted in an increase in awareness of IPR and the patenting process within CPPRI, as well as the progressing to bench testing of new technologies. A few industry partners have been testing the new technologies, although industry uptake is still nascent.

[2] Charter for Water Recycling and Pollution Prevention in Pulp & Paper Industries (Specific to Ganga River Basin States) http://www.inpaper.com/Annexure-II.pdf [Accessed 28 June 2018]

Efficiency

The evaluation found the efficiency of the project to be **satisfactory**. The project was largely completed within its given timeframe and it utilized available resources in a timely and economic manner. A number of measures were taken to ensure that the project was delivered on time, that the available budget for each activity was used effectively and that progress was being constantly monitored. There were slight adjustments made in budget allocations as the detailed costs of activities became known but these were managed to ensure that the overall objectives of the project were progressed as far as possible within budget ceilings.

Impact

The evaluation found the impact of the project to be **satisfactory** overall given the scope and timeframe of the project. The project was focused on internal capacity development and this has been effectively achieved. The training has clearly resulted in improved knowledge and capability of CPPRI staff. This was the direct impact expected from this project.

There is also evidence of institutional development towards sector improvement. The technologies pursued are capable of improving industry competitiveness and productivity. Within the scope of this project, good progress has been achieved. There is an expectation that the capacity will be transferred to industry. However, this project did not include the time or mechanism for this to occur. Nonetheless, within the scope of this project, the steps towards impact have been progressed satisfactorily.

Sustainability

The sustainability of the project was evaluated as **moderately satisfactory.** The sustainability of the project was assessed by establishing whether any benefits and, or impacts of the project will continue once the development assistance has been completed. Aspects included the strengthening of institutional linkages; the improvement of the CPPRI and industry association's staff; scaling-up and pilot demonstrations of new technologies at unit level; the mainstreaming and broader industry adoption of new technologies; replication of project activities; and the environmental sustainability of the project.

While there is strong commitment within CPPRI to continue to build and extend the knowledge gained through the project, the institution itself is constrained by limited budgets and staff. The project itself did not clearly identify the means by which CPPRI would reach out to industry, expecting associations to fulfil this role; yet the role of the associations is more strongly related to advocacy than technological development. The lack of a decentralised structure for CPPRI means that it does not have sufficient mechanisms or resources in place to effectively reach out to industry. Similarly, the diagnostic generated 86 recommendations for change within the agency; yet unless there is a further concerted effort to update and upgrade the institution, the potential of sustaining the pace and extent of change may be limited. The likelihood of sustainability would be greatly enhanced by a follow-on project to build on the gains achieved and develop sustainability mechanisms.

Management and Cross Cutting Issues

Close coordination between IC-ISID and CPPRI resulted in the successful completion of the majority of the project activities. DIPP, as partner to this project was kept informed on the progress of the project through the mechanism of regular meetings and/or periodic reporting. The project has, however, not developed the capacity and capability of the CPPRI and industry associations to provide management support yet.

The participation and inclusion of both genders was addressed in the project document. It was foreseen that female participants will participate in the international fellowship and study tours as well as in the training of the trainers programme. Female participants were also envisioned to have the opportunity to participate in short courses internationally to upgrade their academic qualifications. A total of two female participants participated in the international fellowship and study tours and there is some evidence of a continuing role of some (although limited) female participation in implementation.

CONCLUSIONS

The project has been assessed as satisfactory overall. Project activities have resulted in positive steps towards strengthening of the global competitive position of industry. The new and more advanced technologies that were introduced or further explored through the project are now being more intensively pursued and several technologies are being demonstrated at lab level to adapt them to the Indian context for potential commercial adoption. In order to achieve this, the capacity of CPPRI and/or partners needs to be enhanced to demonstrate and promote the cost-benefit of new and improved technologies. The improved ability of the CPPRI to provide technical support services and to enhance knowledge transfer is not yet assured. The strategic positioning of the industry through stronger advocacy in line with the development priorities of the GOI is required to build understanding of the potential and priority requirements of the industry in line with diagnostic findings.

RECOMMENDATIONS

Six key recommendations arose from the evaluation findings:

Recommendation	Suggested Action
1. The CPPRI must position itself more strategically to be aware of opportunities for industry diversification and to stay on par with knowledge of new technologies in order to support industry associations and cluster units.	• CPPRI to maintain effective communication mechanisms with key stakeholders as well as to the GOI; • Maintaining a working relationship with international networks to maintain current knowledge and be aware of emerging good practices; • Seek opportunities for further training and exposure opportunities in identified technologies at best practice technical institutions.
2. Strengthen the strategic advocacy capability of the CPPRI and industry associations; highlight the project's beneficial role in India.	• Appoint a Public Relations/media officer to assist the CPPRI and industry associations to communicate the benefits of the technologies and industry opportunities for project stakeholders as well as for the broader society;

	• Communicate the impact and benefit of new technologies to the environment, e.g. a reduction in the consumption of fresh water; ability of industry to meet stringent discharge norms; reduction of pollutants; and better energy efficiency to key decision-makers and the public.
3. Establish the techno-feasibility of the processes in membrane filtration, ozone bleaching and liquor heat treatment to allow the industry to engage with the technologies and identify the most effective ways for knowledge transfer to industry.	• Adopt a systematic approach to piloting that will ensure access of industry clusters to the lessons generated through the proposed pilots; • Establish demonstration sites for identified technologies to the industry at cluster level (commercial paper making environment); • Integrate and prove the technological and financial requirements for new technologies, as well as the expected cost-benefits of installing the technologies at MSME level.
4. Efforts between key industry associations and CPPRI need to be synergised, following up from the diagnostic report, to facilitate more efficient and coherent support for the paper and pulp industry in India. The activities related to association strengthening, recommended in the diagnostic that were not adequately covered in Phase 1 should be reviewed for whether still required and included in a Phase 2, with in depth consultation with associations and key industry cluster associations.	• Developing and implementing a knowledge delivery model to facilitate communication, support and assistance to the cluster units across the paper and pulp industry; • Specifically adding resources for travel to industry for pilot demonstrations to the project budget in Phase 2; • Fund and develop a mechanism as to communicate the results of project activities to industry stakeholders, e.g. communication of learning; and, technology demonstrations. • Develop online technology tool/portal to overcome the disparity of stakeholders in the industry so as to allow paper mills from different regions to attend multiple technology demonstration sessions.
5. Support provided by the CPPRI must be more responsive to the needs of the industry associations and to units.	• Ensuring that support to industry associations are context-specific and specific to the technologies demonstrated. • Pilot demonstrations and workshops at unit level must be specific on how it is to be implemented.
6. Progress to phase two of the project to support the above activities and consolidate benefits from project	• Secure funding for Phase 2 of the project; • Develop a detailed M&E plan that is realistic and helps to track transfer of technology to industry and the contribution of improved technology to industry performance.

1. Introduction

This report documents the terminal evaluation (TE) for the project "*Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector*" (UNIDO Project No.: 150282). The project was formulated inline with a direct request from the Department of Industrial Policy and Promotion (DIPP), Government of India, and was implemented in collaboration with the International Centre for Inclusive and Sustainable Industrial Development (IC-ISID). This report commences with an overview of the context of the project followed by the methodology used in the evaluation. The findings of the evaluation are presented according to the evaluation criteria followed by an overall assessment. The report concludes with conclusion 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)[3].

Overview of the Pulp and Paper Industry: India holds 15th rank among paper producing countries in the world with a 2.6% share of the pulp and paper market worldwide.[4] The estimated turnover of the industry is approximately USD9,259 Million (INR 50,000 crore) and its contribution to the national economy is around USD833 Million (INR 4500 crore)[5]. The industry currently provides direct employment to around 500,000 persons, and indirectly to around a further 1,5 million.[6] India is the fastest growing market for paper globally and it presents a scenario with potential for growth; by 2024-25, under the baseline scenario,

[3] 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.
[4] ASHIKA, 2016. Indian Paper Industry.
[5] UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector, p.2.
[6] IPMA, 2017. Indian Paper Industry Pre-Budget Memorandum 2017 – 2018, p. 1

domestic consumption is projected to rise to USD 23.50 million tons per annum (TPA).[7]

The structure of the Indian pulp and paper industry: The Indian production volume of paper, paperboard and newsprint amounts to over 17 MTPA, despite an installed capacity of around 25 MTPA. The industry is fragmented with over 800 rather small-sized paper, pulp and board mills, of which only 610 are operational. The mills are scattered among the country, with bigger clusters in the Northern (Uttar Pradesh, Punjab, Uttarakhand), Southern (Tamil Nadu, Andhra Pradesh) and Western (Gujarat, Maharashtra) regions. Despite the high demand, the utilization rates hover around 80% (PFI 2017).

Table 1 illustrates the structure of the Indian pulp and paper industry, thereby depicting the central position of SMEs in the Indian pulp and paper industry. More than 600 small and medium sized units account for 65% of the industry's production. Packaging grade paper is the main final product of SMEs operating in the Indian pulp and paper industry.

Table 1. Structure of Indian Paper Industry

	No. of Mills	Production, MTPA (*)	Production Share (%)
Wood based (Large Integrated)	32	4.0	23
Agro based (Medium Scale)	124	1.56	9
Recycled Fibre based (Medium and Small Scale)	707	11.81	68
Total	**863**	**17.37**	**100**

(*) Figures based on production of operating mills.

In descending order by volume, the main raw materials used by the Indian paper industry are recycled waste paper, wood and agricultural residues. The main products of the Indian paper industry are industrial (57%), writing and printing (35%), and newsprint (8%) grades of paper. While non-wood fibre sources account for only about 5–10% of the global pulp production, it was revealed in the diagnostic phase of the project that in some cases, the majority of the small and medium size paper mills in the Indian paper industry is using up to 100% recycled waste paper as the main source of raw material.

Growth in the Indian paper industry: The Indian pulp and paper industry is the 15th largest producer and fastest growing in the world. Growth of demand is expected to be 6% per annum, equalling an increase in demand of 0.7 Million Tonnes Per Annum (MTPA) per year. The turnover of the Indian pulp and paper industry is estimated to be USD 7.3 billion (see Table 2). Projections about the

[7] Ibid.

contribution of the Indian paper industry to the global paper production estimate around 4% (Dey 2014; PFI 2017; Deloitte 2012; Chaudhery 2011; Ashika 2016).

Table 2. Statistical and Financial Parameters of Indian Paper Industry

Number of mills	863
Total Installed capacity, MMT	25.17
Operating Installed Capacity, MMT	20.5
Production of Paper, Paperboard and Newsprint, Mtpa	17.37
Capacity utilization, %	83
Per capita Consumption, kg	13.2
Contribution to Exchequer, INR in ten millions	4500
Employment Direct, million people	0.5
Indirect Employment, million people	1.5
Indian Share in World's Production, %	4.0

The paper industry in India has become more promising as the domestic demand is on the rise. Increasing population and literacy rate, growth in GDP, improvement in manufacturing sector and lifestyle of individuals are expected to account for the growth in the paper industry of India. The domestic market/consumption of paper is over 16 million tonnes per annum (TPA), with over 2 million TPA being imported. About 1 million TPA of integrated pulp, paper and paperboard capacity has to be created in India on an annual basis over the current capacity to meet the growing demand.[8] Such investments would create a multiplier effect on the economy through gross capital formation of USD1,278 (INR 8,500 crores) every year, direct employment to 15,000 people every year and further giving additional livelihoods of 72 million man days per year (for people involved in farm forestry).[9] There is a need for Indian firms in the paper and pulp sector to increase their productivity and competitiveness, hence enabling them to meet domestic demand, as well as looking outwards to global markets.

Raw material scarcity is a constraint for the Indian Pulp and paper industry: The Indian Pulp & Paper Industry has agro forestry roots and strong backward linkages with the farming community, from whom wood is sourced, which is a key raw material. Of the total demand for wood, around 90% is sourced from industry driven agro/farm forestry, with the rest from Government sources and imports. This has generated significant employment opportunities for the local community, especially in rural areas.[10] India is, however, a wood fibre deficient country and inadequate raw material availability domestically is a major constraint for the Indian Pulp & Paper Industry as there is no dedicated enabling policy for industrial plantation. Current demand for wood by Paper industry is about 11 million TPA,

[8] IPMA, 2017. Indian Paper Industry Pre-Budget Memorandum 2017 – 2018, p. 1
[9] Ibid.
[10] IPMA, 2017. Pre-budget Memorandum 2017-2018. Indian Paper Industry.

against domestic availability of 9 million TPA, and is projected to rise to 15 million TPA by 2024-25. Wood prices have gone up steeply, more than doubling in the last three-four years, making the Indian Pulp & Paper Industry non-competitive.[11]

Geographical disparity of paper mills is responsible for the characteristic regional production and consumption of the industry: The paper mills are scattered throughout the country with major clusters located in the states of Gujarat and Maharashtra (Western part), Uttar Pradesh and Uttarakhand (Northern part) and Tamil Nadu and Andhra Pradesh (Southern part). The mills use a variety of raw material, for example wood, bamboo, recycled fibre, bagasse, wheat straw, rice husks, etc. Approximately 31% of production is based on chemical pulp, 47% on recycled fibre and 22% on agro-residues.

The pulp and paper industry in India is fragmented and under pressure: Despite the fact that the Indian paper industry holds its importance to the national economy unfortunately it stands fragmented. The paper sector is dominated by medium and small scale units. Approximately 75% of all the mills are found in 6 different regions: Gujarat; Uttar Pradesh; Tamil Nadu; Maharashtra; Punjab and Andhra Pradesh, where the majority of regions are located in the northern, northwestern or southern parts of India. The number of mills with a capacity of 50,000 tons per annum or more is not more than 25. Less than half a dozen mills account for almost 90% production of newsprint in the country. Supply of raw materials is constricting with the growing focus on improved forestry management. At the same time, there are stronger environmental compliance requirements through, for instance, the National Mission for Clean Ganga programme of the GoI to reduce waste water outflow to the Ganges.

Furthermore, the pulp and paper industry has been noted as one of the most polluting industries in India (currently in the list of industries under the 'red' category as identified by the Ministry of Environment and Forests, GoI[12]), despite the industry largely recycling product and removing pollutants from the waste paper received. Yet, as a result of these pressures, the smaller industries in particular are finding competition difficult and the number of MSMEs in the industry is declining. There is a growing need to modernise the Indian mills, improve productivity and build new capacities.

Gap between supply and demand in the industry: 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

[11] IPMA, 2017. Indian Paper Industry Pre-Budget Memorandum 2017 – 2018, p. 1
[12] Classification of industries for consent management. http://envfor.nic.in/legis/ucp/ucpsch8.html [Accessed 22 May 2018].

resource efficiency.[13] To meet the increasing gap between demand and supply, firms need to increase their productivity and resource efficiency by introducing new and more advanced technologies as well as through skills development. If successful, this will bring the additional advantage of enhanced international competiveness, which will allow firms to enter export markets. There is thus significant growth potential to be seized by the industry.

Introduction of eco-friendly products in the pulp and paper industry: The focus of the paper industry is now shifting towards more eco-friendly products and technology. Government of India has established rules and regulations to control the population and degradation of forest.[14] These measures taken by the government has brought the significant changes in the paper industry of India.[15] In addition, the industry is increasing focus on paper recycling technology and is contributing substantially to the recycling initiatives in the country. In the recycling processes, there is a need for new technologies to improve waste water treatment and recycling and in proper handling of waste products.

[13] UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector, p. 1

[14] Pulpapernews, 2018. India paper industry forecast 2013 – 2017. http://www.pulpapernews.com/20161229/4929/india-paper-industry-forecast-2013-2017 [Accessed 21 February 2018].

[15] TechSci Research, 2017. India Paper Industry Forecast and Opportunities. https://www.techsciresearch.com/report/india-paper-industry-forecast-and-opportunities-2017/314.html [Accessed 21 February 2018].

3. Overview of the Project

Project Rationale: There is a need for the Indian pulp and paper industry to increase its capacity and capability in order to improve productivity**.** The Indian pulp and paper industry largely operates in the MSME sector (see Table 2). The large mills are already taking steps to modernize and upgrade technology in line with market shifts. The rest of the industry operates at different levels of modernity and efficiency depending on the situation of each medium and small scale unit. The sector faces several challenges in areas such as the scarce availability of raw materials, low economies of scale, energy efficiency, low pulp yield, inefficient internal water handling and environmental concerns regarding solid waste disposal and effluent treatment. As a result, there is a growing need to modernise Indian mills, improve productivity and augment capacities.[16]

Project Approach: A project was formulated by the Department of Industrial Policy and Promotion (DIPP) and UNIDO to address the needs of the pulp and paper industry. The project has been formulated in line with the direct request from DIPP and is in line with the Government of India's (GoI) National Manufacturing Policy (NMP) which aims to improve productivity and to also be more proactive in industrial environmental good practice. The project was implemented in collaboration with the Central Pulp and Paper Research Institute (CPPRI), major national industry associations and the DIPP supported International Centre for Inclusive and Sustainable Industrial Development (IC-ISID) that acted as project management support.

The aim of the project: Under the aegis of IC-ISID, the project aimed to support the Indian paper and pulp industry by strengthening the capacity and capability of the nodal technical institution for the sector, the Central Pulp and Paper Research Institute (CPPRI), and selected industry associations to provide better management and technical support to the industry to strengthen the global competitive position of the Indian pulp and paper sector. The identified industry associations were the Indian Paper Manufacturers Association (IPMA), Indian Agro and Recycled Paper Mills Association (IARPMA), Indian Newsprint Manufacturers Association (INMA) and Indian Recycled Paper Mills Association (IRPMA).

Project Objectives: The objective of this project was to introduce new and more advanced technologies, provide up-to-date skills to staff and transfer up to date knowledge to improve productivity and competitiveness within the sector.

Expected outcomes: Through project support, it was expected that the capacity of capability of the CPPRI, IPMA, IARPMA, INMA and IRPMA would be strengthened to

[16] UNIDO, 2017. Benchmarking Report. Enhancing productivity in the Indian Paper and Pulp Sector, p. 11.

provide management and technical support to the Indian paper and pulp sector. The achievement of these outcomes would be measured through:

- Change in services
- Change in internal policy
- Technologies offered
- Change in management practices

Project Design: The project consisted of eight outputs, five in the inception phase, two in the implementation phase and the post-implementation phase (See Table 3).

Table 3 Project phases and outputs

Inception Phase
1. Identification of target clusters/ units.
2. Reports of the pulp and paper sector.
3. Diagnostic studies of CPPRI, IPMA, IARPMA, INMA, IRPMA and selected units.
4. List of KPIs.
5. Action plan for CPPRI, IPMA, IARPMA, INMA, IRPMA and industry associations.
Implementation Phase
6. Skills and technical capacity of CPPRI, IPMA, IARPMA, INMA, IRPMA upgraded.
7. Final report (lessons learned, implications, advocacy).
Post-implementation Phase
8. Evaluation of the project.

Inception Phase: The identification of target clusters related to previous work that had been carried out in the sector to identify where the main location of medium and small scale paper and pulp units operate. In these areas, there are also local cluster associations that provide a potential means of dissemination of information. The project then supported international experts to work with the project partners to study the current status of the industry and to generate a series of institutional and technology or industry oriented diagnostic studies. This work was to then inform the development of industry key performance indicators (KPIs) that would be disseminated to industry to guide the implementation of good practices. It was also expected that these would enhance the self-monitoring of performance by the industry. The end result was to generate action plans that would guide project partners in industry development activities.

Implementation Phase: In line with the findings of the diagnostic, the implementation phase was designed to target knowledge and capacity gaps in skill levels within CPPRI to serve the Indian Pulp and Paper industry. Then a series of capacity development activities were designed to address those gaps. The project design provided detailed targets for the capacity development activities and suggested areas for potential technological capacity development as below:

- Bleaching of non-wood pulp
- Paper making and recycled fibre utilisation

- Chemical recovery for non-wood based mills
- Energy management
- Environmental management
- Bleaching of pulp
- Chemical recovery for non-wood based mills
- Recycled fibre

Budget allocation: The budget for the project illustrates a strong focus on the upgrading of skills and capacity of CPPRI and related industry associations (see Table 4). The Inception Phase covered 30% of the allocated budget; skills and technical capacity development 63%, with the remaining 7% being used for analysis and reporting.

Table 4 Project Budget

Total Budget	Budget USD	% of Total
INCEPTION PHASE		
Output-1: Identification of target clusters/units.	25,000	2%
Output 2: Report on the pulp and paper sector.	50,000	3%
Output 3: Diagnostic studies of CPPRI, IPMA, IARPMA, INMA, IRPMA and selected units.	210,000	14%
Output 4: List of KPIs	30,000	2%
Output 5: Action plan for CPPRI and the four industry associations.	135,000	9%
PROJECT IMPLEMENTATION PHASE		
Output 6: Skills and technical capacity of CPPRI, IPMA, IARPMA, INMA and IRPMA upgraded	900,000	62%
Output 7: Final report (lessons learned, implications, and advocacy)	75,000	5%
POST IMPLEMENTATION PHASE		
Output 8: Independent Evaluation	30,000	2%
Total excluding PSC 13%PSC **Grand Total including 13%PSC**	1,455,000 189,150 **1,644,150**	100%

4. Methodology

Evaluation purpose:

The objectives of the Terminal Evaluation were to:

1. Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact;
2. Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.
3. 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.

Evaluation scope:

The independent terminal evaluation covered the whole duration of the project from its start date in December 2015 to the estimated completion date on the 31st of March 2018. The evaluation covered all technical components plus project management components and was conducted in accordance with the UNIDO Evaluation Policy[17] and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[18].

Methodology:

The evaluation was implemented in four phases which are not strictly sequential, conducted in parallel and partly overlapping:

1. Desk review and data analysis;
2. Interviews and field visit;
3. Data analysis, and
4. Report writing.

Throughout the inception stage, the evaluation team reviewed relevant and available documentation for the project. (See References for list of documents reviewed) Interviews were conducted with UNIDO's Project Manager in Vienna and other key stakeholders in India. The field trip was conducted from February-March 2018 and included a visit to the CPPRI facility in Saranapur. Meetings were held with officials from CPPRI, IPMA, INMA and IARPMA (See Annex 2 for people interviewed). A visit to an industry cluster in Vapi was also made to visit industry sites and interact with owners and cluster association members. At the end of the field mission, a presentation was made to DIPP and the stakeholders involved in this project on the preliminary findings. Feedback was provided that has been incorporated into this report. Furthermore, this project evaluation was conducted at

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

[18] 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)

the same time as the overall UNIDO Country Programme Evaluation. This involved further discussion with wider stakeholders, Paper and pulp industry stakeholders also participated in this process which was designed to guide the development of the UNIDO country programme from 2018 to 2023.

Key evaluation questions: The evaluation was guided by the following 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?

Evaluation criteria: Guided by these questions, the project was assessed against the internationally recognised evaluation criteria of relevance, effectiveness, efficiency, sustainability and impact. Assessment of relevance focused on the project's alignment with partner priorities, policies and requirements and relevance to UNIDO's mandate. Effectiveness focused on the extent to which the project achieved its objectives; while efficiency measured how economically resources and inputs were converted to results.[19] Sustainability was used to explore the extent to which benefits arising from the project's interventions were likely to continue. Impact identified longer-term, transformational changes that the project has contributed to. Impact is difficult to measure so more attention was paid to the specific objectives in the design, the expected outcomes and the expected pathway to impact. A 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).

Data analysis: Data was analysed and processed against the evaluation criteria (See **Error! Reference source not found.** 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 Six key recommendations arose from the evaluation findings:

[19] OECD-DAC, 2010. Glossary of Key Terms in Evaluation and Results Based Management.

Recommendation	Suggested Action
1. The CPPRI must position itself more strategically to be aware of opportunities for industry diversification and to stay on par with knowledge of new technologies in order to support industry associations and cluster units.	• CPPRI to maintain effective communication mechanisms with key stakeholders as well as to the GOI; • Maintaining a working relationship with international networks to maintain current knowledge and be aware of emerging good practices; • Seek opportunities for further training and exposure opportunities in identified technologies at best practice technical institutions.
2. Strengthen the strategic advocacy capability of the CPPRI and industry associations; highlight the project's beneficial role in India.	• Appoint a Public Relations/media officer to assist the CPPRI and industry associations to communicate the benefits of the technologies and industry opportunities for project stakeholders as well as for the broader society; • Communicate the impact and benefit of new technologies to the environment, e.g. a reduction in the consumption of fresh water; ability of industry to meet stringent discharge norms; reduction of pollutants; and better energy efficiency to key decision-makers and the public.
3. Establish the techno-feasibility of the processes in membrane filtration, ozone bleaching and liquor heat treatment to allow the industry to engage with the technologies and identify the most effective ways for knowledge transfer to industry.	• Adopt a systematic approach to piloting that will ensure access of industry clusters to the lessons generated through the proposed pilots; • Establish demonstration sites for identified technologies to the industry at cluster level (commercial paper making environment); • Integrate and prove the technological and financial requirements for new technologies, as well as the expected cost-benefits of installing the technologies at MSME level.
4. Efforts between key industry associations and CPPRI need to be synergised, following up from the diagnostic report, to facilitate more efficient and coherent support for the paper and pulp industry in India. The activities related to association strengthening, recommended in the	• Developing and implementing a knowledge delivery model to facilitate communication, support and assistance to the cluster units across the paper and pulp industry; • Specifically adding resources for travel to industry for pilot demonstrations to the project budget in Phase 2; • Fund and develop a mechanism as to communicate the results of project activities to industry stakeholders, e.g. communication of learning; and, technology demonstrations. • Develop online technology tool/portal to

Recommendation	Suggested Action
diagnostic that were not adequately covered in Phase 1 should be reviewed for whether still required and included in a Phase 2, with in depth consultation with associations and key industry cluster associations.	overcome the disparity of stakeholders in the industry so as to allow paper mills from different regions to attend multiple technology demonstration sessions.
5. Support provided by the CPPRI must be more responsive to the needs of the industry associations and to units.	• Ensuring that support to industry associations are context-specific and specific to the technologies demonstrated. • Pilot demonstrations and workshops at unit level must be specific on how it is to be implemented.
6. Progress to phase two of the project to support the above activities and consolidate benefits from project	• Secure funding for Phase 2 of the project; • Develop a detailed M&E plan that is realistic and helps to track transfer of technology to industry and the contribution of improved technology to industry performance.

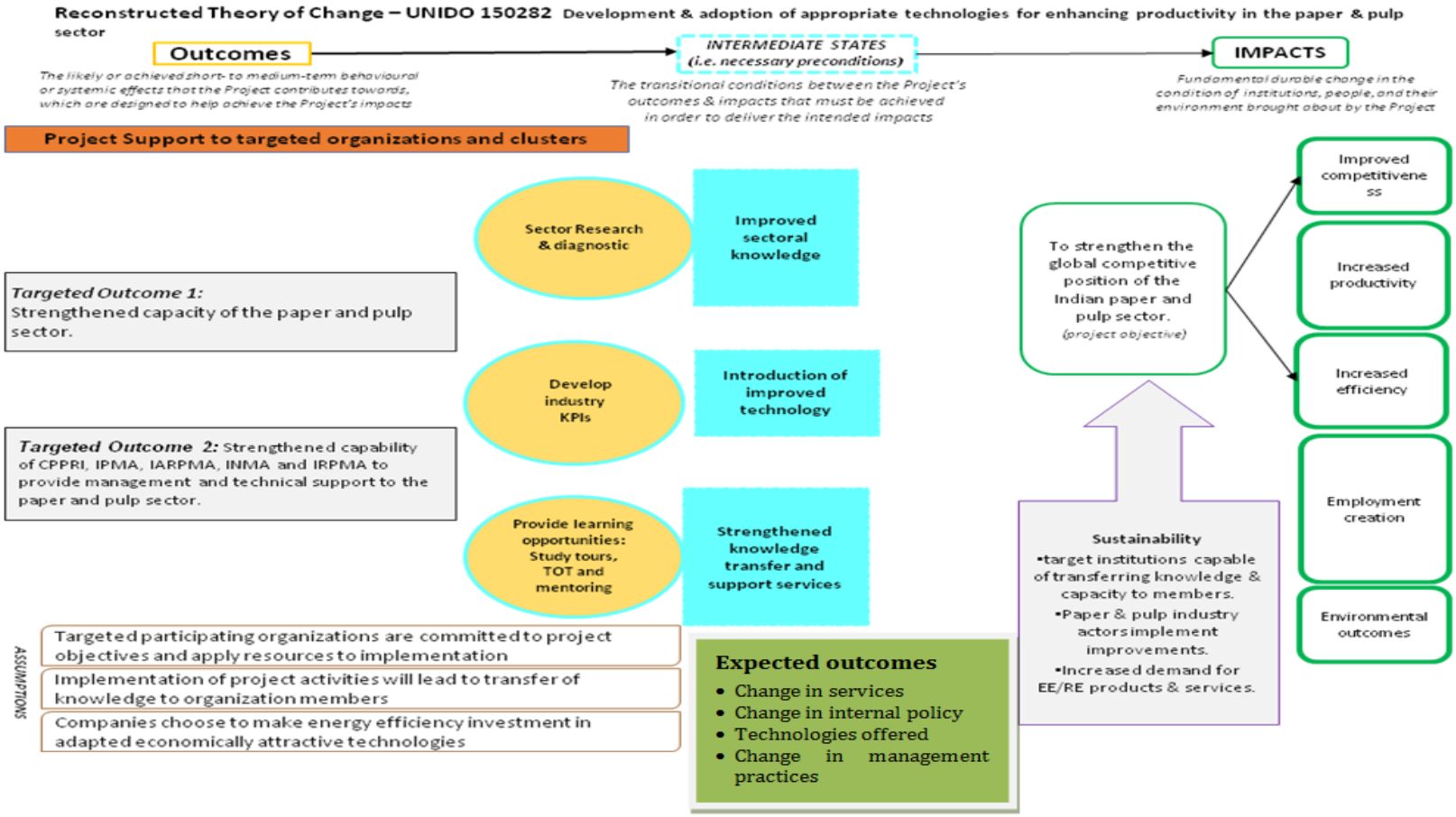
Annex 1). Ratings were based on all information gathered, including documentary data, key informant interviews and field visits. The evaluation used a theory of change (TOC) or pathway to impact approach and mixed methods to collect data and information from a range of sources and informants. A TOC was 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. This reconstructed TOC is shown in Figure 1. It shows the original objectives and how the project initiatives were due to generate impact towards industry competitiveness. The TOC relies on the project intent as described in the design document. In general, it shows that the expected impact is long range and that given the short duration of the project, more attention needs to be paid to interim results such as the "state" of results at the end of the project in terms of:

1. Improved sector knowledge
2. Improved technology, and
3. Increased knowledge transfer and support services.

The third state is most critical as it is the main process to generate the expected intermediate outcomes of changes in policy, services and technology offered to industry and management of services. Therefore, in the analysis of impact these outcomes are used to assess overall results.

Limitations of the evaluation: The evaluation experienced a time limitation for conduct of the evaluation with specific reference to visiting paper mills. Due to the geographical disparity of sites, it was only possible to visit one site at Vapi. This did not enable time to gain detailed data on the extent to which industry clusters had been able to engage with the project. However, the reports from associations and the project were that Vapi had been one of the most active clusters during the feedback sessions for the diagnostic and therefore can be considered as a positive example of project effect.

Figure 1 Theory of Change



5. Evaluation Findings

5.1. Relevance

The evaluation found the overall relevance of the project to be **highly satisfactory.** The project is aligned with the Government of India's National Manufacturing Policy, the Perform Achieve Trade scheme and the Charter for Water Recycling and Pollution Prevention in Paper and Industries in the Ganges River basin. The project's focus on improving the technical capacity of staff, the transfer or knowledge in the international arena, the improvement of technological know-how and environmental management capacity are relevant to the achievement of the project outcomes. Yet, it is the timing of the project that raises the relevance from satisfactory to highly satisfactory. Industry stakeholders emphasized the rapid changes in the industry, the recent closure of a number of industry players due to their inability to compete in the market.

The evaluation found the overall relevance of the project as highly satisfactory overall (See Table 5).[20] The project is aligned with the development priorities of the country and the objectives of the manufacturing sector. In particular, it is highly relevant to the needs of the pulp and paper industry. It was developed at a time, and in a manner that was relevant to industry stakeholder, targeting initiatives that are relevant to re-invigorate the industry. The project's focus on strengthening CPPRI and industry associations through a series of activities, including the upgrading of skills and technical capacity are relevant to the achievement of the project outcome.

Table 5. Relevance Evaluative findings

Area of relevance	Evaluation
Relevance to Strategic context	Highly satisfactory
Relevance to Industry	Highly satisfactory
Relevant Design	Satisfactory
Overall relevance	Highly satisfactory

Strategic relevance: The project's strategic relevance is rated as high as it is in line with the GoI's National Manufacturing Policy (NMP, 2011); with the 'Perform Achieve and Trade' (PAT) scheme as well as with the Charter for Water Recycling and Pollution prevention in Paper and Industries in the Ganges River Basin as introduced by the Ministry of Environment, Forests and Climate Change (MoEFCC). The aim of the Charter is to minimise fresh water consumption, waste water discharge and overall pollution load through recycling and reusing treated waste water. The project also strongly aligns with the NMP in its aim to introduce new and more advanced technologies in, and to upgrade the skills of the paper and pulp

[20] See **Error! Reference source not found.** for the Evaluation Checklist.

sector. The NMP emphasises the importance of technology development and upgrading as prerequisites for (i) becoming globally competitive, and (ii) ensuring the sustained growth of the sector. The project's focus on energy efficient alternatives as well as on the introduction of environmentally sound technologies aligns it with the 'Performa Achieve and Trade' (PAT) scheme launched by the Ministry of Power (MoP) to achieve energy efficiency in the paper and pulp sector.

Relevance to industry: The project is also highly relevant at industry level as it aims to address key issues facing the pulp and paper industry in global competitiveness. The current state of the industry is in danger of significant decline with stakeholders already noting that there have been an increasing number of business closures. Unless the industry rapidly adjusts and diversifies, there is likely to be declining rather than increasing competitiveness, with resultant loss of economic contribution and employment. This would be a critical challenge in an industry that employs many people across the country.

During the evaluation, the stakeholders noted that the project had assisted them to become more acutely aware of the challenges facing the industry; and at the same time open their mind to wider opportunities that are not currently being fully explored and adopted in the industry sector in India. Of particular interest were technologies that could reduce production costs, enhance water re-use and decrease energy use. In addition, opportunities for new products in the market place were identified such as membrane filtration and bio-refinery technology. These shifts are of critical importance to the pulp and paper industry. Therefore, the role that the project has had in raising the profile of these new technologies is highly regarded, particularly in CPPRI.

Relevance at cluster/unit level: The inclusion of technical institutions like IPMA, IARPMA and IRPMA and industry associations like INMA, functioning as membership hub for paper mills in India makes this project relevant on cluster/unit level. Clusters and units in the paper and pulp industry are also identified as project beneficiaries, and are participants in the majority of envisaged project activities, for example in the benchmarking and diagnostic assessment as well as in information sessions on the technologies promoted. In this regard, the design extended the scope too far within the timeframe, and the implicit inclusion of clusters/units as direct beneficiaries in the design was premature.

Relevance of project design: The project design was assessed as satisfactory. It provided a good analysis of the sector and clear targets and output indicators. The project utilised a phased design with project activities progressing through the inception, implementation and post-implementation phase. Outputs are logically placed to ensure that the project outcome is achieved. Key stakeholders have been incorporated into the design of the project in order to address the current, emerging and future needs of the paper and pulp sector. The project design addresses the need to enhance the capacity of key stakeholders by improving their technical capabilities at a meso level. As a result, the CPPRI and industry associations are better equipped to technically assist the Indian paper and pulp sector achieve higher quality, productivity and environmental performance standards.

The paper and pulp industry have been experiencing low productivity performance related to the employment of relatively unsophisticated technologies, untrained staff, inadequate management practices, weak handling of waste emissions as well as suboptimal resource efficiency. Financial constraints and the absence of a specific policy for the paper and pulp sector have contributed to these challenges in terms of technological know-how and environmental management capacity. The focus of project activities on CPPRI was relevant as a means to create sectoral change at the institutional level. For IPMA, IARPMA, INMA and IRPMA design was also relevant, although the associations, whose main role is advocacy would have liked more focus on being able to share experiences with advocacy organisations during the study tours and more assistance in knowing how and what to communicate with members. The input of key industry stakeholders was incorporated into the design of the project in order to address the current, emerging and future needs of the paper and pulp sector.

Monitoring and evaluation framework too ambitious: The project design addresses the need to enhance the capacity of key stakeholders by improving their technical capabilities at a meso level. The project design is, however, not clear on how indicators set for the project objective will be attained; for example, 'Patents IPR' has been set as an indicator which seemingly correspond to the workshop entitled 'Patents and IPR'. It is, however, unclear whether the indicator for this output will be in the form of a report submitted or in the form of a patent lodged. Clusters and units in the paper and pulp industry were also identified as project beneficiaries, and as participants in the majority of envisaged project activities. Yet, the activities were largely focussed on CPPRI, rather than the clusters. This leads to some undue expectations in relation to the extent to which that direct industry benefits could be achieved within the project period. Also, this was a two year intervention that was focussed on institutional strengthening and capacity development, yet the outcome indicators suggest that there is an expectation that the project will result in direct industry improvements. This is unrealistic given the rest of the project design; however, in this regard, it is the monitoring and evaluation framework that is not relevant, while that actual design of the project itself is robust.

Summary of relevance: The evaluation concluded that the overall relevance of the project was highly satisfactory. The project was relevant on strategic and industry level and is positioned to be relevant on unit level as well. Even though the indicators as set in the monitoring and evaluation tended to be too ambitious, the project design itself was relevant to the achievement of the intended objectives.

5.2. Effectiveness

The evaluation found the effectiveness of the project to be **satisfactory**. The project completed all of its intended outputs. The evaluation found the activities to be reasonably successful in achieving the targets set (see Table 6). The CPPRI found the project particularly effective because it not only improved their ability to provide technical support to the pulp and paper sector but it enhanced their capacity for knowledge expansion/transfer through the international visits and encouraged the exploration of new areas of research as well.

Effectiveness is the extent to which the project has fulfilled its expectation in term of activities completed and outputs completed. It also considers the extent to which those activities have generated direct results. The following table provides a summary of the extent to which project activities, as stated in the design logical framework, have been completed in accordance with targets set in the design document. The following paragraphs provide further information on the effectiveness of the activities undertaken to achieve each output.

Table 6 Progress on outputs

Output	Progress	Summary of effectiveness
Output 1: Identification of target clusters/units – workshops held in each cluster to raise awareness of key technologies.	Completed	**Effective** – four target clusters were identified and consultation meetings were held with stakeholders. Nine mills were selected to participate in the benchmarking process.
Output 2: Report on the pulp and paper sector – updated information on the sector.	Completed	**Effective** – A benchmarking report was prepared, presented and submitted to DIPP, CPPRI and industry associations.
Output 3: Diagnostic assessment and report Diagnostic assessment of CPPRI. Diagnostic studies of IPMA, IARPMA, INMA, IRPMA and selected units.	Completed	**Highly effective** – A diagnostic report of CPPRI, IPMA, INMA, IARPMA, IRPMA and selected units were presented and submitted. This output was well received and has been implemented. **Moderately effective** – these were incorporated in the main diagnostic report and were not circulated directly to the associations. Also they were not as detailed as the industry associations expected to facilitate achievement of results.
Output 4: List of KPIs	Completed	**Moderately ineffective** – Work was carried out on the development of KPIs for the Indian paper and pulp industry by the University of Helsinki. The KPI work did provide a useful opportunity for industry discussion but output was not progressed. Stakeholder feedback on the usefulness of this activity was lukewarm as being of limited use for their activities.
Output 5: Action plan for	Completed	**Effective** – the action plans designed

Output	Progress	Summary of effectiveness
CPPRI Action plan for the four industry associations.		for CPPRI has been instrumental in a range of follow-on activities. **Moderately effective** – Associations would have appreciated more specific detailed action plans as per the design. Instead there were only a few overarching actions incorporated into the overall action plan.
Output 6: Skills and technical capacity of CPPRI, IPMA, IARPMA, INMA and IRPMA upgraded. Study tours and fellowships, piloting.	Completed	**Effective** – Project activities have exceeded the intended outcome in a number of activities, including in technology demonstrations; workshops; study tours and international organisations added to CPPRI's international network. However, a decision was made in collaboration with DIPP to reduce the number of fellowships from 20 to 10. The piloting is underway and achieving good preliminary results.
Output 7 & 8: Final report (lessons learned, implications, and advocacy) & Evaluation	Jan – Mar 2018	In progress

Output 1: Identification of target clusters/units: Based on discussions with CPPRI and industry associations, it was decided to include four different clusters (Kashipur, Chandigarh, Vapi & Coimbatore) considering the different raw materials and the product segments. Consultation meetings were conducted with the four selected clusters during which participants were sensitised about the project scope. A questionnaire prepared to collect details from the paper units received 32 responses and nine mills were subsequently selected to be assessed on their technology status. It is clear that the identification of target clusters have been achieved, and that the indicator of developing four regional databases has occurred and has been of benefit in organising feedback sessions with each cluster on the diagnostic and industry feedback sessions that were conducted. The feedback from representatives of the Vapi cluster on the effectiveness of the workshops conducted was positive for those who attended. They indicated a level of interest in the information presented and confirmed that the workshops have been effective in raising their level of knowledge about potential improved technologies. They also stated that there was insufficient information provided on how to start to apply those technologies and are seeking further assistance in this regard.

Output 2: Report of the pulp and paper sector: A technology assessment was successfully completed by the selected team of experts from the Paper and Fibre Research Institute (PFI) in Norway, and the resultant technology benchmarking report was prepared and presented to DIPP, CPPRI and industry associations. This report was well received and led to detailed discussion about the most appropriate technologies and approaches to pursue for most effective industry development approaches.

Output 3: Diagnostic studies of CPPRI, IPMA, IARPMA, INMA, and IRPMA: The diagnostic study of CPPRI and industry associations were successfully completed and a diagnostic report was presented to DIPP, CPPRI and the industry associations. An expert from Impello, Norway was engaged in reaction to a recommendation made in the diagnostic report that indicated the need for a separate, detailed assessment of CPPRI.

A second report on CPPRI was subsequently submitted, thereby exceeding the identified output. This report has been important for CPPRI in identifying key requirements for it to ensure that it is relevant to industry and at the forefront of supporting technological development in the sector. The report noted the staffing constraints of the institution and that there is a need for CPRRI to be able to connect more with the industry. There need to be more mechanisms for outreach to industry and a closer relationship with industry partners. This aspect was explored and confirmed during the evaluation. CPPRI is situated in Saranapur only, with no presence in the main industry clusters. This inhibits their ability to connect with industry.

The feedback from the four industry associations was that the diagnostic was useful overall but had generalised comments in relation to the role and actions required for the associations. In general, as key beneficiaries of the project, they felt that more attention could have been paid in the diagnostic and action plans to how the associations should operate in line with the recommended new strategic directions. They felt that a separate report should have been submitted for each association rather as proposed in the design, rather than incorporating the findings into the main report.

Output 4: List of KPIs: A KPI workshop with participation from CPPRI, industry associations and industry was held on 2-3 May 2016 in New Delhi. The workshop was found to be moderately effective as a created a forum for discussion on industry performance. A report entitled 'Key Performance Indicator (KPI) Examples for the Paper and Pulp Industry' was subsequently submitted to DIPP and CPPRI as a draft. The feedback from stakeholders was that the output was too general to be useful and there is no evidence that the report has been used beyond this stage.

Output 5: Action plan for CPPRI, IPMA, IARPMA, INMA, and IRPMA: An action plan based on findings from the technology and diagnostic assessments was

prepared and submitted to DIPP, CPPRI and the industry associations.[21] As noted above, although the action plans for the associations were limited and have not resulted in substantial change, the joint activities and awareness raised of new industry opportunities has brought the associations into a far closer cooperation than previously and this is yielding positive results on a stronger, cohesive voice for the sector.

The action plan for CPPRI has been useful and is under active implementation. The project has continued to actively support CPPRI as it has progressed the action plan. The appointment through IC-ISID of Dr Rakesh Kumar Jain, IC-ISID Technical Expert, a previous CPPRI senior official and a highly experienced scientist in the Pulp and Paper industry has been important to maintain the momentum of activities for CPPRI. This has involved follow-up activities such as further networking with international partners on progressing knowledge exchange, forging of partnerships and continued opportunities for CPPRI staff training. The project has stimulated a higher level of activity in relation to the identified technologies and this is leading to intense action by CPPRI, including seeking other external funding to continue to fund the technology improvements.

Output 6: Skills and technical capacity of CPPRI, IPMA, IARPMA, INMA, and IRPMA upgraded: The project has delivered the majority of its outputs and intended outcomes. Project activities were effective and produced positive results, particularly at the institutional level for CPPRI. The project successfully enhanced the strategic understanding of the market for CPPRI, as well as association management. It raised awareness of technological opportunities for the sector that could improve the global competitiveness of the industry.

The project activities allowed the CPPRI and the industry associations to improve their knowledge and to better orient themselves to work together towards more efficient, relevant and effective support of the paper and pulp industry. Project activities aimed to upgrade the skills and technical capacities of CPPRI and industry associations include technology demonstrations; four knowledge dissemination workshops; two international study and fellowship tours; twinning of industrial associations; and training of trainers. Project activities have been completed, and in some areas have been exceeded, for example two study tours were conducted with participant lists indicating a total of 13 participants, thereby exceeding the intended 10 participants.[22] Additional project activities that exceeded the intended outputs include the conducting of an additional knowledge dissemination workshop; the identification of an additional area of water treatment using ozone and membrane separation technology in which the capability of CPPRI would be strategically enhanced; the emergence of the area of bio-refineries as of strategic importance to the Indian paper industry; and, the formalisation of an international network with relevant international institutions such as the University of Toronto (Canada),

[21] University of Helsinki, 2016. Recommended Actions for the Indian Pulp and Paper Industry.
[22] CPPRI, 2016. International Study Tour Report, p. 37; CPPRI, 2017. Second International Study Tour Report, p.43.

University of Maine (USA), University of British Columbia, the China National Pulp and Paper Research Institute (CNPPRI).

Overall, within CPPRI, the technical capacity and capability of CPPRI scientists has been strengthened through the exchange of knowledge, the visual learning through understanding how the technologies are developed and applied and the networks and connections for continuing development. Once this capacity had been built, the scientists are more capable of providing technical support to the Indian paper and pulp sector operators.

Strengthened global competitive position of the Indian paper and pulp sector: The project's logframe targets a range of outcome indicators related to strengthening the global competitive position of the Indian paper and pulp sector (See **Error! Reference source not found.**). The project has achieved two of the identified seven indicators, namely a workshop and report on patent IPRs in the paper and pulp sector as well as technology transfer agreements with RISE PFI, the Bangladesh Paper Mills Association (BPMA), CNNPRI and CTP. No data is available to assess whether the project has achieved an increase in production values and productivity; an increase in exports and decrease in energy usage. However, as identified in the relevance section, the indicators were too ambitious for the inputs and timeframe of the project and place unrealistic expectations on the project to deliver beyond its scope. Furthermore, the wider industry performance has many other influences such as market factors, currency exchange rates, power availability, amongst others. The project was of limited scope and therefore, even if data had been collected, the attribution to project input would have been difficult to trace without a more robust methodology.

Table 7 Achievement of outcome indicators

Indicator	Achievement
Technology transfer agreements	• Joint declarations for collaboration between CPPRI and RISE PFI; between CPPRI and BPMA; between CPPRI and CNPPRI; and between CPPRI and CTP have been signed. • A non-disclosure agreement (NDA) between Xylem Water Solutions and CPPRI was exchanged to collaborate on the establishment of the techno-economic feasibility of ozone bleaching of agro-based pulp and waste water treatment technologies.
National statistics	• No monitoring data available
Production values	• No monitoring data available
Productivity	• No monitoring data available • The achieved lab-scale demonstrations of membrane filtration; ozone bleaching;

Indicator	Achievement
	and liquor heat treatment will have a positive impact on the productivity of the paper and pulp industry, however for this to occur the technologies have to be upscaled and demonstrated to the industry.
Exports	• No monitoring data available
Energy usage	• No monitoring data available • The introduction and adaptation of the identified new technologies may result in better energy efficiency.[23]
Patents IPR	• A workshop on 'Patents and IPR' was conducted for CPPRI staff on 8-9 June 2017. • A patent analysis report was prepared by Dr. Arundhati Bhattacharyya outlining the process and opportunities for patenting IPRs in the paper and pulp sector.

Strengthened capacity and capability of CPPRI: The technical capabilities of CPPRI have been strengthened in a number of areas, including the bench scale demonstration of three world class technologies: (i) Environment-friendly total chlorine-free bleaching (ii) Membrane filtration (iii)Liquor heat treatment for improved chemical recovery and energy efficiency. Results and findings have been shared with the industry through four workshops held in different parts of the country. In order to provide more efficient and coherent support for the paper and pulp industry in India, the key industry associations (IPMA, INMA and ARPMA) have synergised their efforts. The CPPRI and the industry associations have also developed institutional linkages to foster knowledge transfer and to keep up-to-date with advancements in technology and global best practices. Increased international exposure has already resulted in the transference of knowledge across the Indian paper and pulp sector. CPPRI scientists stated that the project had given them the capacity to internationally benchmark their area specific requirements for engineering capabilities, the latest infrastructure for conducting pilots and the advanced laboratory equipment required in the industry. It also encouraged the exploration of experimental areas of research, learning and knowledge-application. Some of these new areas include; membrane filtration and ozone bleaching.

[23] IC-ISID, Proposals for the second phase of the 3 ongoing projects nearing completion, slide 5.

Beyond CPPRI, the effectiveness of the project was diluted, partly due to the limited resources within CPPRI to reach out to industry. The project did include feedback sessions in each of the four clusters, but for some industry stakeholders, this was the first interaction that they had with CPPRI and they were not fully aware of how to continue to work and partner with CPPRI. The centralised structure of CPPRI inhibits wider industry outreach. Although the project was effective for the industry associations, there was an interest for the project to be more oriented to the sector development activities of the associations. The associations have less focus on the scientific aspects of the technologies so do not deliver technical support directly to industry (as implied in the project objective); however, they have benefited from the technical and wider knowledge generated through the project to increase a united front for the industry and to advocate for the sector.

Summary of effectiveness: Overall, the evaluation concludes that the project was effective in delivering the expected outputs and that there are indications of positive outcomes towards the objectives. Although the expected targets for outcomes have not been achieved, the project has been effective in delivering results that benefit the sector both now and with potential for further development into the future. Further analysis on the pathway towards industry outcomes is covered in the section on impact.

5.3. Efficiency

The evaluation found the efficiency of the project to be **satisfactory**. The project was largely completed within its given timeframe and it utilized available resources in a timely and economic manner. A number of measures were taken to ensure that the project was delivered on time and that progress was being constantly monitored.

The efficiency of the project was assessed against the project expenditure per output/component (see Table 4) as well as against the indicated timeframe as set out in the project document.

The project was in the most part completed within the timeframe. Despite a reduction in timeframe from the original design the project was largely completed in the planned timeframe. Slight delays resulted from issues beyond the control of the project, for example the availability of an international organisation for the international fellowships. Additional activities undertaken during the extension until the 31st of March 2018 were done at no-cost to the project.[24] The project had a timeframe of 21 months and the majority of activities were completed within this timeframe. Within the closing months of the project, it was extended by 5 months in order to conduct the final evaluation and additional activities. The project engaged the external consultancy services in a timely manner and achieved the intended

[24] Minutes of Meeting: 4th Steering Committee Meeting of UNIDO DIPP International Centre for Inclusive and Sustainable Industrial Development (IC-ISID) 24 October 2017, p.2

outputs within the permissible timeframe. The project utilised its resources in an economic manner in order to produce its intended outputs within the timeframe. Within the closing months of the project, it was extended by 5 months at no cost in order to continue follow-on support activities through IC-ISID and conduct the final reporting requirements.

Efficient use of project resources: Project resources have been efficiently used to gain project results. Measures were taken to ensure that the project progressed in a time efficient manner. For example, a structured reporting system of project activities was used to regularly review progress against the work-plan. During a no-cost extension period from the original completion date of September 2017 to 31 March 2018, several additional activities were implemented, for example an additional technology demonstration based on the findings of the diagnostic assessment; additional study tours; the formalisation of an international network; participation in INCHEM Tokyo 2017; and the development of a training module.

Capitalising on the knowledge of international experts and consultants: Visits from international experts were used not only to assist CPPRI with technical guidance and bench scale demonstration for the three identified technologies (i)chemical recovery from black liquor, (ii)colour and TDS in effluent and (iii)ozone bleaching, but also as opportunity to establish an international network. However, the management of stakeholders was neither efficient nor effective. Both the industry associations and the industrial units faced communication difficulties and engagement difficulties with the project activities and their progress.

Investments likely to yield long term benefits within CPPRI: The benefits from the project have just been completed and full results from the investments have not yet been generated. The activities are likely to yield long term results due to the majority of the budget being invested in knowledge gain within CPPRI; international expert consultants and creating international industry linkages. The efficient use of resources could have been enhanced if the technology was adopted by the industry and if it was not restricted to the sharing of experimental studies and results.[25] Yet these activities were not incorporated in the design and not budgeted for and therefore cannot be considered within the direct assessment of the efficiency of implementation.

Summary of efficiency: The evaluation concluded that the overall efficiency of the project was satisfactory. The project was largely completed in the given timeframe and made efficient use of resources provided, for example in capitalising on the knowledge of the international experts and consultants. As a result, it is foreseen that investments in this project are likely to yield long term benefits for the stakeholders involved.

[25] Ibid.

5.4. Impact

The evaluation found the impact of the project to be **satisfactory** overall given the scope and timeframe of the project. The project was focused on internal capacity development and this has been effectively achieved. The training has clearly resulted in improved knowledge and capability of CPPRI staff. This was the direct impact expected from this project.

There is also evidence of institutional development towards sector improvement. The technologies pursued are capable of improving industry competitiveness and productivity. Within the scope of this project, good progress has been achieved. There is an expectation that the capacity will be transferred to industry. However, this project did not include the time or mechanism for this to occur. Nonetheless, within the scope of this project, the steps towards impact have been progressed satisfactorily.

For the processes of assessing impact, the evaluation paid attention to the indications that the project investments are making progress towards the intermediate outcomes as defined in the original project document and the expected pathway to impact illustrated through the theory of change framework in section 4.

The expected outcomes for the project were that the project would result in changes in services offered to industry, changes in internal policies, improvement in technologies offered and change in management practices. However, as noted in the assessment of relevance, the design was not sufficiently clear on expected impacts so this section discusses more detail about possible impacts and how these are reflected in the evidence available to the evaluation team.

Change in services: The industrial clients of the CPPRI are both larger companies and MSMEs. The diagnostic identified that CPPRI shows a declining curve of interactions in R&D level, being more and more reduced to technical training, testing and environmental energy assessment services and therefore with a declining income stream from industry. The diagnostic notes that CPPRI needs to be revitalised to become more relevant to industry. It was also reported that some of the facilities are getting obsolete and that the types of services offered have been reduced. For this reason, the project did include participation by some of the younger staff members. The feedback from these staff was very positive in terms of the lessons learned and the level of activation and enthusiasm to reach out to industry.

Yet CPPRI faces considerable challenges in reaching out to industry and offering services. It does conduct occasional training and conferences at the CPPRI site but these are largely attended by the larger industry actors that already have access to improved technology. A more comprehensive reach to industry with enhanced services requires further consideration. Important factors in these considerations are a mechanism for decentralisation of services. These points were discussed during the evaluation with key stakeholders and included ideas to forge a stronger relationship with cluster associations, to create partnerships with local instituted and/or industry suppliers and out-posting of staff closer to the clusters. Either one or a combination of these and other ideas would assist CPPRI to have closer ties with industry so that they are more directly aware of the services required and how these can most effectively be delivered. This may require further training and orientation,

particularly for younger staff so that CPPRI can be as relevant as possible in the dynamic context of the industry.

From budget and financial statement reports, it is also evident that the relative share of funding coming directly from industrial clients is declining and consequently the dependency on governmental funding is increasing. Therefore, the project has contributed to the potential for improving services to industry; however, there are still key initiatives required to further pursue the benefits from the project to ensure that impact in this regard will be attained.

Change in internal policy: The project design document does not amplify the expected outcomes in relation to internal policy change. It does, however, note an expectation that the diagnostic would generate information that would assist CPPRI in external policy dialogue. It also notes the important role that both CPPRI and the associations play in policy dialogue for the industry. This has occurred to some extent. The Diagnostic report contains many key recommendations for strengthening of the Pulp and Paper industry. These points have been raised through the associations and there is active advocacy on-going through DIPP and other industry forums for the need to support development of the industry. Yet, stakeholders met during the evaluation mentioned that despite the important role of the industry in recycling paper, and generating products that are of value to the market, the wide spread of the industry and the significant employment through the industry, the industry is not given prominence. There is still substantial work to do to raise the profile of the industry, to address issues such as the need to control on-site pollution processing and management, the opportunities for industry expansion into new products and markets and the need for energy management. This requires a stronger, united voice between CPPRI, industry associations and the larger producers. While the project has been instrumental in creating stronger links between the national associations, and to some extent with CPPRI, there is a need for a more coordinated approach.

Technologies offered: As noted in the previous section on outputs, the project has been successful in identifying new technologies that have good potential for strengthening the competitiveness of the industry. During the evaluation all discussions with industry stakeholders demonstrated positive interest in these technologies. The project reports that already some industry stakeholders are already using their own resources to explore the potential of the technologies for their own benefit. For smaller industry stakeholders, it is more difficult for them to translate their interest into the technologies into actual adoption. Industry stakeholders mentioned that it would be useful to have more practical information on how the technologies can be installed and incorporated into the production processes. They also noted constraints in securing investment capital for new equipment. In this regard, the specs for equipment and an assessment of potential savings and viability assessment in terms of production capacity and likely benefits of the technology are require to convince directors, Board members and bankers to invest in the new technologies. The first steps that CPPRI has taken to bench test technologies and in communicating with local suppliers and suitable engineering contractors on costs of installation and maintenance are heading in the right direction. However, further efforts are required to build on the initial gains and the potential of the improved technologies.

Change in management practices: The industry studies and diagnostic were designed to probe and better understand the status and challenges in management practices of the industry, particularly CPPRI. The diagnostic process resulted in the identification of 86 recommendations, many of which refer to the management role and capacity of CPPRI. The CPPRI stakeholder confirmed that the recommendations are valid and valuable and action has already commenced on implementation. However, the reality is that the organisation is operating. According to the diagnostic (page 59) currently, the total number of staff in the CPPRI is 56 permanent and 59 contractual staff members. The 56 permanent staff is subdivided into 16 scientists, two senior scientific assistants, seven technical officers, 16 technicians and 15 within administrative functions. Approximately 50% of the contractual staff is research related staff, either as associates, senior or junior research fellows, the remaining is mostly project and field assistants. This does provide a firm basis for further activation in the industry but requires a organisation-wide change management process, with support in critical areas where additional budget may be required, for example, a dedicated travel budget to allow staff to travel and engage with industry more.

There may need to be an influx of funding to set up better systems of communication and engagement with cluster associations. Therefore, while the project support has led to more potential that impact could be achieved, the likelihood of the expected results in terms of better industry visibility, stronger and more effective industry management, better organisational capacity being achieved in the longer term will rely on further support being provided.

Summary of impact: Overall, the project has started a process of change towards improved competitiveness (macro change). The identification of new products and process improvements has substantial potential for impact in the industry. The diagnostic and capacity building has resulted in improved knowledge and capability. This in turn has raised the profile of CPPRI, for instance, CPPRI has been invited to represent India (one out of five countries invited) under the delegate programme at an international conference, INCHEM Tokyo 2017.[26] The focus on water recycling and waste reuse has good potential for economic benefit for the industry. 4 dissemination workshops were organised across India to create awareness and to disseminate the findings from the bench-scale demonstration of the three technologies. There is clearly potential to build on the gains of the project by progressing the bench pilots and demonstration sites, as well as more work on viability and promotional material to create wider awareness, adoption, replication and ultimately industry impact.

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

5.5. Sustainability

The sustainability of the project was evaluated as **moderately satisfactory.** The sustainability of the project was assessed by establishing whether any benefits and, or impacts of the project will continue once the development assistance has been completed. Aspects included the strengthening of institutional linkages; the improvement of the CPPRI and industry association's staff; scaling-up and pilot demonstrations of new technologies at unit level; the mainstreaming and broader industry adoption of new technologies; replication of project activities; and the environmental sustainability of the project. However, CPPRI is not yet operating with a structure and mechanism that facilitates sustainable support services to industry as envisaged as a key outcome of the project. This would require greater decentralization and closer relationships with industry with defined mechanisms for effective transfer of knowledge as well as adapted technologies to the commercial context of the clusters/units.

Strengthening of institutional linkages: The project activities contributed to the strengthening of institutional linkages within the international arena. For example, the fellowship and international training programmes with the CPPRI scientists provided a mechanism for improving knowledge flow and transfer on an ongoing basis. This flow of information will increase the sustainability of the Indian paper and pulp sector by enabling it to stay updated on international best practices and technological advancements from around the world.

Improvement of capacity and capability of CPPRI and industry association staff: The project activities contributed to the improvement of the capacity and capability of key scientists and technical staff within the CPPRI and the industry associations. They helped to raise awareness of advanced solutions for operational and environmental challenges. The improvements in institutional capability are expected to contribute positively towards economic gains for the paper and pulp industry, and consequently, enhance the sustainability of the sector in India.

Scaling-up and demonstration of new technologies: The project has just commenced pilot bench demonstrations. There were no resources included in the budget for demonstration sites at the unit level. The CPPRI and industry associations are presently struggling with inadequate financial and human resources (e.g. a lack of in-house engineering adaptation capability) that will enable the technologies to be scaled up and demonstrated at unit level. This creates a barrier to technical assistance by the CPPRI at a large scale for the paper & pulp industry. Also, there is currently no clear strategy within CPPRI for scaling up and dissemination of technology, apart from occasional information-sharing events. It is therefore less likely that in the short to medium term a scaling up will take place, without a specialised effort and provisioning for the same.

Mainstreaming and broader adoption: No evidence was present on availability of any ongoing or future policy incentives or support schemes from GoI that could support mainstreaming of project activities. There is however potential of support for innovation e.g for bio-technology initiatives with the incentives/schemes from Ministry of Science & Technology to support technology development in the country. This scheme could support the promotion of joint R&D with a partner country institution. There may also be opportunities through the Ministry of Environment,

Forest & Climate Change to provide and incentives to industry for complying with environmental norms through application of improved technologies.

Replication of project activities: There is a fair scope of replication for the advance technical solutions that are presently being piloted by the CPPRI's for the paper and pulp industry. If the ongoing pilots by CPPRI scientist within paper industry are successful and are effectively promoted, it is likely that medium and small-scale units in the paper & pulp sector will gain higher confidence and come forward to seek technical solutions from the CPPRI. The CPPRI will also be able to approach other units with the results of successful pilots to catalyse replication.

Future funding: While donor funding enabled the project to successfully execute its activities there is little evidence to suggest that any mechanism for the follow-up and review of those activities has been planned or of future income streams to support on-going development. The collaborative potential between the CPPRI and the industry associations has not been adequately explored. There has also been no discussion of a co-financing venture for the continuation or extension of the project from the paper and pulp industry, nor any governmental support. The uncertainty of future funding casts a shadow over the long-term sustainability of this project.

Environmental sustainability: Benefits to the industry have the potential to be substantial in terms of a reduction in fresh water consumption; energy savings as result of an energy efficient production process; improved waste recycling meeting discharge norms; and re-use and control of pollutants like colour, COD, TDS, AOx, heavy metals and organo chlorides.[27] The CPPRI's ability to expand work on key areas of importance to environmental improvements for the industry will, however, be hindered by its limited human resource capacity (15 key staff members to cover 800 companies).

Summary of sustainability: The evaluation found the sustainability of the project to be only moderately likely unless there is further support to capitalize on the initial gains and further develop sustainability mechanisms. The project has not yet achieved the successful demonstration of new technologies at unit level. CPPRI has demonstrated some advances at lab level and it is envisaged that it will be piloted and mainstreamed in a second phase; but this is at the time of this evaluation, uncertain. The resultant strengthening of institutional linkages and improvement of the CPPRI and industry association's staff have contributed to the sustainability of the project direct benefits in terms of internal knowledge for CPPRI but does not fully extend to sustainability of outcomes in terms of additional services and technologies reaching industry.

[27] IC-ISID, Proposals for the second phase of the 3 ongoing projects nearing completion, slide 5.

6. Project management and cross cutting issues

Close coordination between IC-ISID and CPPRI has resulted in the successful completion of the majority of the project activities. DIPP, as partner to this project was kept informed on the progress of the project through the mechanism of regular meetings and/or periodic updates.[28] The project has not developed the capacity and capability of the CPPRI and industry associations to provide management support yet. Due to the limited human resource capacity CPPRI the provision of management support will have to be a collaborated effort on the parts of the CPPRI and the industry associations. [29]

The participation and inclusion of both genders was addressed in the project document. It was foreseen that an adequate number (number associated with adequate not specified) of female participants will participate in the international fellowship and study tours as well as in the training of the trainers programme. Female participants were also envisioned to have the opportunity to participate in short courses internationally to upgrade their academic qualifications. One female out of a group of seven participants participated in the international fellowship tour (17–30 August 2017);[30] one female participant out of a group of eight participants participated in the first international study tour (2-11 November 2016);[31] and no female participants out of five participants in the second international study tour (14-23 February 2017).[32]

[28] Minutes of 4th Steering Committee Meeting of UNIDO-DIPP. International Centre for Inclusive and Sustainable Industrial Development (IC-ISID).
[29] IC-ISID, 2018. Progress Report IC-ISID projects, p.10.
[30] CPPRI, 2017. Report – Fellowship [Training Programme, p.12.
[31] CPPRI, 2016. International Study Tour Report 2 -11 November 2016, p.36.
[32] CPPRI, 2017. Second International Study Tour Report, p.43.

7. Conclusions and recommendations

7.1. Conclusions

The paper industry is an important industry in India as it provides employment to more than 0,5 million people directly and to 1,5 million people indirectly. This industry has the potential to grow as its current supply falls short of the demand.[33] The diversification of the interest into new forms of packaging materials and recycled products means that the industry in India has a prime opportunity to modernise and expand. This means that the project investment was highly relevant to the current context.

Further there are a range of new and improved technologies and good practices available across the industry that are not yet been established in the industry in India, particularly not in MSMEs. This project addressed the industry constraints and opportunities by introducing new and more advanced technologies. The project was successful in transferring knowledge and skills to CPPRI staff and providing an entry point for the industry to improve and grow. Based on the evaluation findings and analysis, Error! Reference source not found. presents a summary of the project's performance.

Table 8 Project assessment with rationale

Project Element	Summary assessment	Assessment
Relevance	The evaluation found the overall relevance of the project to be **highly satisfactory.** The project is strategically aligned with the Government of India's development priorities. The project's focus on strengthening the capacity and capability of the CPPRI and industry associations was relevant and timely for the industry. Expected outcomes were somewhat ambitious given the short duration and limited scope of the project.	**Highly satisfactory (HS)**
Effectiveness	The evaluation found the effectiveness of the project to be **satisfactory**. The project completed all of its intended outputs and found the activities to be reasonably successful in achieving the intended outcomes. The CPPRI and the industry associations found the project particularly effective because it not only improved their ability to	**Satisfactory (S)**

[33] UNIDO, 2015. Project Document. Development and adoption of appropriate technologies for enhancing productivity in the paper and pulp sector, p.2

Project Element	Summary assessment	Assessment
	provide technical support to the pulp and paper sector but it enhanced their capacity for knowledge expansion/transfer through the international visits and encouraged the exploration of new areas of research as well.	
Efficiency	The evaluation found the efficiency of the project to be **satisfactory**. The project was largely completed within its given timeframe and it utilized available resources in a timely and economic manner. A number of measures were taken to ensure that the project was delivered on time and that progress was being constantly monitored.	**Satisfactory (S)**
Impact	The evaluation found the impact of the project to be **satisfactory**. Substantial progress has been made towards strengthening the Indian paper and pulp's global competitive position through technology transfer agreements and improving the sector's knowledge and skills. Yet the pathway to impact relies on sustaining and building from the project gains.	**Satisfactory (S)**
Sustainability	The sustainability of the project was evaluated as **moderately satisfactory**. The direct impact on CPPRI has been positive and the knowledge will be retained by the individual participants. Yet from an institutional and sector perspective, the gains achieved may not be sustained and further developed to achieve the expected impact unless the institutional strengthening envisaged in the diagnostic, technology transfer to industry and stronger advocacy for the sector occurs.	**Moderately satisfactory (MS)**

Table 9 Summary of Ratings by Evaluation Criteria

#	Evaluation criteria	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	HS
2	• Effectiveness	S
3	• Efficiency	S

#	Evaluation criteria	Rating
4	• Sustainability of benefits	ML
D	**Cross-cutting performance criteria**	
1	• Gender mainstreaming	MS
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**

7.2. Recommendations

Six key recommendations arose from the evaluation findings:

Recommendation	Suggested Action
7. The CPPRI must position itself more strategically to be aware of opportunities for industry diversification and to stay on par with knowledge of new technologies in order to support industry associations and cluster units.	• CPPRI to maintain effective communication mechanisms with key stakeholders as well as to the GOI; • Maintaining a working relationship with international networks to maintain current knowledge and be aware of emerging good practices; • Seek opportunities for further training and exposure opportunities in identified technologies at best practice technical institutions.
8. Strengthen the strategic advocacy capability of the CPPRI and industry associations; highlight the project's beneficial role in India.	• Appoint a Public Relations/media officer to assist the CPPRI and industry associations to communicate the benefits of the technologies and industry opportunities for project stakeholders as well as for the broader society; • Communicate the impact and benefit of new technologies to the environment, e.g. a reduction in the consumption of fresh water; ability of industry to meet stringent discharge norms; reduction of pollutants; and better energy efficiency to key decision-makers and the public.
9. Establish the techno-	• Adopt a systematic approach to piloting that

Recommendation	Suggested Action
feasibility of the processes in membrane filtration, ozone bleaching and liquor heat treatment to allow the industry to engage with the technologies and identify the most effective ways for knowledge transfer to industry.	will ensure access of industry clusters to the lessons generated through the proposed pilots; • Establish demonstration sites for identified technologies to the industry at cluster level (commercial paper making environment); • Integrate and prove the technological and financial requirements for new technologies, as well as the expected cost-benefits of installing the technologies at MSME level.
10. Efforts between key industry associations and CPPRI need to be synergised, following up from the diagnostic report, to facilitate more efficient and coherent support for the paper and pulp industry in India. The activities related to association strengthening, recommended in the diagnostic that were not adequately covered in Phase 1 should be reviewed for whether still required and included in a Phase 2, with in depth consultation with associations and key industry cluster associations.	• Developing and implementing a knowledge delivery model to facilitate communication, support and assistance to the cluster units across the paper and pulp industry; • Specifically adding resources for travel to industry for pilot demonstrations to the project budget in Phase 2; • Fund and develop a mechanism as to communicate the results of project activities to industry stakeholders, e.g. communication of learning; and, technology demonstrations. • Develop online technology tool/portal to overcome the disparity of stakeholders in the industry so as to allow paper mills from different regions to attend multiple technology demonstration sessions.
11. Support provided by the CPPRI must be more responsive to the needs of the industry associations and to units.	• Ensuring that support to industry associations are context-specific and specific to the technologies demonstrated. • Pilot demonstrations and workshops at unit level must be specific on how it is to be implemented.
12. Progress to phase two of the project to support the above activities and consolidate benefits from project	• Secure funding for Phase 2 of the project; • Develop a detailed M&E plan that is realistic and helps to track transfer of technology to industry and the contribution of improved technology to industry performance.

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 persons interviewed

Name	Job title/Position in organization
UNIDO	
Mr. Rajeev Vijh	Director, IC-ISID
Mr. Vikas Kumar	Deputy Director, IC-ISID
Dr. Rakesh Kumar Jain	Technical Expert, IC-ISID
Mr. Andres Issakson	Project Manager
Mr. Rene Van Berkel	UNIDO Representative
CPPRI	
Dr BP Thapliyal	Director
Mr. Alok Goyal	Scientist
Dr. Sanjay Tyagi	Scientist
Dr Ravi Godiyal	Scientist
Dr. MK Gupta	Scientist
Dr. A.K. Dixit	Scientist E-II In charge
IARPMA, INMA, IPMA	
Mr. P.G.N. Mukundan	Secretary General, IARPMA
Mr. Vijay Kumar	Secretary General, INMA
Mr. Rohit Pandit	Secretary General, IPMA
Paper Mills	
Mr. Ashraf Nathani	Mehali Paper Pvt. Ltd.
Mr. Hautam D. Shah	Shree Ajit Pulp & Paper Ltd.
Lalit Garg	Director, Ramjo Board and Paper Mill Pvt.Ltd.
Mr.A.K. Shah	Chairman, Shah Paper Mills Limited
Mr. Pritesh Shah	Shah Paper Mills Limited
Mr. Gautam D. Shah	Chairman and Managing Director, Shah Paper Mills Limited
Mr. Ashraf Nathani	Mehali Paper Pvt.Ltd.

Annex 3. References

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Annex 4. Evaluation 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 (Pulp sector) may be considered.

TERMS OF REFERENCE

Independent terminal evaluation of projects of the International Centre for Inclusive and Sustainable Industrial Development (IC-ISID) ([34]):

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

[34] 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[35]

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*

[35] 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.

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

Despite tackling two different sectors of the indian economy, namley 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 significatively 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 competiveness, 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 (IARPMA), 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 breakdown[36]

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 breakdown[37]

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

[36] Source: Project document.
[37] 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 Policy[38] and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[39].

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

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

[39] 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)

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 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

#	Evaluation criteria	Mandatory rating
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

#	Evaluation criteria	Mandatory rating
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.