Chapter 2 – Planning, execution and monitoring of network projects

As discussed in Chapter 1, Network projects were projects in which more than one laboratory collectively sourced inputs in implementing the identified objectives. The projects were to be executed during Tenth Plan period. Network projects were envisaged as target oriented projects and their output was expected to generate new areas of business.

For selection and implementation of network projects, CSIR formulated 'Guidelines for Financial, Administrative, Scientific, Monitoring and MIS of Networked Projects' (Guidelines) in September 2004 for guiding its constituent laboratories for successful execution of the projects. The Guidelines contained detailed mechanisms for identification and project formulation, preparation of project proposal, implementation of the project, financial arrangements, monitoring and MIS.

The details of 27 selected projects including names of the nodal and participating laboratories, date of sanction, date of completion, number of activities taken up under the project and completed, sanctioned cost and expenditure of projects, outputs from projects, etc. is given in **Appendix II**. This chapter presents an overview of deficiencies observed by audit in selection, implementation and monitoring of 27 selected projects.

2.1 Delay in preparation of Network Project Guidelines

Audit observed that CSIR formulated the Guidelines for network projects only in September 2004, after more than two years of commencement of Tenth plan. By then, 26 of the 27 selected projects had already been sanctioned. Thus, applicability of Guidelines of CSIR regarding identification of the project and process of preparation of detailed project proposals were rendered redundant in most of the projects.

CSIR did not offer comments on the observation (November 2013).

2.2 Delays in sanctioning and completion of projects

According to Para 2.1 of the Guidelines, laboratories were required to identify R&D areas for network projects and submit detailed project proposals to CSIR at the beginning of the Five Year Plan. Para 2.4.1 of the Guidelines stipulated that the date on which financial sanction was issued was deemed to be the date of start of each project. Para 2.4.1.2 (iv) further

stated that since network projects were a planned activity, laboratories had agreed to complete the same during Tenth Five Year Plan period.

Audit observed delays in sanctioning projects, which affected the schedule of activities of network projects and their completion within the plan period. Actual commencement of these projects was delayed by periods ranging from 12 to 34 months from the scheduled date of commencement i.e. April 2002, as given in Table 1:

Table 1: Delays in sanctioning of Network Projects

Delay in years	Number of projects
Upto one year	1
More than one year and upto two years	24
More than two years	2

The detailed list of these projects is given in **Appendix III**. The delays in sanctioning of projects also led to consequential delay in their completion. Examination revealed that of 27 projects, 14 were completed in time and 13 were completed after delays ranging from six to 48 months. The details are given in **Appendix IV**.

CSIR did not comment on the observation (November 2013).

Recommendation 1:

CSIR may ensure timeliness in sanctioning plan projects having a definite time frame of implementation.

2.3 Deficiencies in identification and project formulation

Para 2.1 of the Guidelines stipulated that laboratories of CSIR would identify, through internal exercise, discussions, meetings with peers and users, R&D areas of importance and project proposals would be prepared on the basis of the key areas identified through these discussions. The project proposals were to be complete with specific details and time schedules of activities and projects, user involvement (if any), target outputs, milestones, etc. Para 2.1.1 further stated that project proposals should detail the activities by including deliverables over the five year period in terms of financial, economical, technological, societal benefits, etc.

Prior to issue (September 2004) of the Guidelines for network projects, Ministry of Finance (MoF) had also introduced (May 2003) guidelines for formulation, appraisal and approval of

Government funded plan schemes/projects. The MoF guidelines stated that terms of reference of project proposals should indicate development objectives in order of importance and deliverables/ outputs for each development objective should be spelt out clearly. Success criteria for each deliverable/output of the project should be specified in measurable terms to assess achievements against the goals.

Audit observed deficiencies in identification of project objectives and project formulation, which are discussed below:

2.3.1 Project deliverables not identified in project proposals

As stated above, project proposals were required to include targeted outputs and deliverables over the five year period. Audit observed that project deliverables for all parameters viz. financial, economical, technological and societal benefits were quantified in only one out of 27 projects examined by audit. Project proposals of 10 projects did not contain deliverables for any of the above measurable parameters and 16 project proposals contained only some of the project deliverables.

The number of projects in which measurable deliverables were not found in their project proposals is given in Table 2. The detailed position is given in **Appendix V**.

Table 2: Project deliverables not defined in project proposals

Measurable deliverable	No. of projects in which deliverable was not defined out of 27 projects	Percentage of projects in which deliverable was not defined
Number of technologies	20	74
Number of patents	14	52
Number of publications	18	67
Generation of revenue from sale of technology	26	96
Generation of External Cash Flow (ECF)	18	67
Generation of import substitution	24	89
Generation of societal benefits	24	89
Generation of employment	24	89

Absence of deliverable parameters indicates that projects were taken up without definite targets, thereby leaving no criteria for measurement of achievements against any of the above parameters. This made defining the success of network projects more abstract rather than concrete.

CSIR did not offer comments on the observation (November 2013).

Recommendation 2:

CSIR may ensure that in future, comprehensive project proposals containing defined and measurable deliverables expected to be achieved from the project are prepared.

2.3.2 Deficiency in project formulation

In two projects, audit noticed that unrealistic project objectives and targets were set, which resulted in incomplete activities under the projects. In another project, it was seen that though participating laboratories were asked to rectify deficiencies in project proposals submitted by them, revised proposals were not received and the project was nevertheless sanctioned. The cases are detailed below:

Projects having deficiencies in project formulation

Exploration and exploitation of microbial wealth of India for novel compounds and biotransformation process- IMTECH

IMTECH took up (January 2004) above project at sanctioned cost of ₹20.47 crore with a view to collect and isolate micro-organisms from various parts of the country and exploit them as a major source of biotechnological products and processes. It was seen that work on exploitation of microbial cultures was not completed because focus was restricted during the project tenure towards only exploration of microbial diversity.

CSIR stated (July 2012) that it was realised that it was not possible to explore and exploit the microbial diversity simultaneously. CSIR also stated that the targets set in the project were part of CSIR's ambitious delivery strategy and were of an indicative range.

Development of medicinal plant chemotypes[5] for enhanced marker and value added compounds-CIMAP

The project envisaged development of 20 chemovars from 10 identified medicinal plants which were to be released to farmers for commercial cultivation. The project was completed (March 2007) after incurring an expenditure of ₹21.66 crore. Audit observed that as against target of at least 20 chemovars only five were developed, reportedly due to over ambitious targets.

CSIR stated (July 2012) that it always put ambitious targets and that not all scientific endeavours provided anticipated results.

[5] A chemotype or chemovar is a chemically distinct entity in a plant or microorganism.

Design analysis and health assessment of special structures including bridges- SERC

SERC took up (March 2004) above project at a sanctioned cost of ₹16.70 crore to be implemented with six[6] other CSIR laboratories. Based on a review of operation of network project by CSIR, SERC impressed upon (January 2004) all participating laboratories to furnish inputs clearly defining scope of work of participating laboratory, correlation of inputs with specific outputs and deliverables and commitment on measurable performance in terms of papers, patents and technology transfer, etc. Audit observed that revised project proposals were received from only three laboratories namely AMPRI, CMERI and CECRI. Audit further observed that AMPRI made no commitment in respect of transfer of technology in its project proposal and CMERI did not indicate any target on development of technology or generation of patents. In spite of non-receipt of revised project proposals from three out of six participating laboratories, consolidated project proposal was finalised and sanction obtained.

CSIR stated (July 2012) that output of the project was commendable as was evident from publications, developing knowledgebase, developing a few advanced courses, imparting trainings for capacity building of engineers, evolving patents and producing PhD thesis and M. Tech dissertations. The reply of CSIR may be viewed in the context that output of the project could not be measured in quantifiable terms in absence of targets. Further, of 24 technologies developed, none was transferred, no patents were granted and all the papers published had zero impact factor[7].

2.4 Deficiencies in involving industry with projects

Para 6.1 of the Guidelines stated that 'network projects of CSIR aim at the generation of knowledge, usable knowledge and useful knowledge as products. Therefore, those projects which target usable and useful knowledge as products are exacted to afford commercialisable results. In these projects, it was necessary to involve industry at some convenient stage'. The para further stipulated that when emergence of a process or product with potentials for commercialisation was recognised, an interested industry was to be invited to meeting of the monitoring committee, a suitable presentation made to the potential client and a business led model adopted for further work under the project.

A total of 399 technologies were developed from 27 network projects, of which 51 technologies were transferred and 38 technologies were commercialised. The sale of technologies generated revenue of ₹3.83 crore. As such, very limited knowledge generated by CSIR in the form of technologies were utilised for societal benefits. While examining the projects, audit found that in case of five projects, laboratories failed to identify and involve industry at any stage during implementation of projects, due to which the final product/process developed failed to find commercial use in the industry, as discussed below:

[6] CBRI, CMERI, CRRI, NML, AMPRI and CECRI

[7] An indication of quality of a research paper is impact factor of the journal in which the paper is published.

Failure to involve industry with projects during implementation

Developing capabilities in advanced manufacturing technology- CMERI

CMERI took up (January 2004) above project at a sanctioned cost of ₹17.85 crore. The project envisaged development of indigenous manufacturing technologies with a view to reduce dependence on imported technologies, promote self reliance in manufacturing of speciality components for strategic sectors, import substitution, improve product quality, etc. The project proposal stated that certain industries were consulted for their involvement in the project. However, there was no further involvement of industry with the project. Out of six technologies developed from the project, only one was transferred and one commercialised.

CSIR stated (July 2012) that Indian industries needed some more time to reach maturity to provide the essential inputs both from design side as well as from process technology side for product development. Therefore transfer of technology to the industry did not take place.

Developing capabilities & facilities for Micro-electromechanical systems (MEMS) and sensors-CEERI

CEERI undertook above project (January 2004) at a sanctioned cost of ₹31.71 crore. The project was completed (March 2007) after incurring total expenditure of ₹31.89 crore.

The project proposal envisaged that the technologies and products developed under this programme would be transferred to the industry for production. It was however seen that industry was not involved at any stage of the project. Monitoring Committee (MC) had also recommended (February 2005) that potential customers may be identified and invited to the next MC meeting to be informed of development under the project. MC further recommended (April 2007) that market survey of the polymer gas sensor should be done to ascertain the status of use of the sensors. Audit however observed that neither any potential client was invited to meetings of the MC nor was any formal market survey conducted by CEERI. Out of 16 technologies developed under the project, only two were commercialised.

CSIR stated (July 2012) that there were no real MEMS labs in the country. Also the Indian market was not taking risk and relied on imported technologies rather than investing in R&D. CSIR further added that in MC meetings, interim results were discussed which were sometimes confidential in nature and it was not appropriate to expose those to the industry.

The reply of CSIR is contrary to the Guidelines of network project which provide for interested industries to be invited to MC meetings.

Positioning Indian nutraceuticals[8] and neutrigenomics[9] on a global platform-CFTRI

CFTRI took up (August 2003) the above project at a sanctioned cost (revised) of ₹14.74 crore. The project was expected to result in development of globally competitive and cost effective technologies for the production of diverse groups of nutraceuticals from foods. One of the activities of the project was to develop effective active ingredients from oils and fats having nutraceutical and nutrigenomic properties. It was stated in the project proposal that efforts would be made to network with agencies like Technology Mission for Oils and Pulses (TMOP) and industry

[8] Neutraceuticals are food products which have health and medical benefits e.g. ayurvedic medicines such as 'Çhyavanprash'.

[9] Neutrigenomics is a study focusing on the health benefits from a variety of plant resources and their ingredients.

for commercialisation of the process after generating initial results. Audit observed that neither TMOP nor industry was involved during implementation of the project. Although four processes were developed from this activity, only one process was stated to be commercialisable.

CFTRI accepted (January 2012) that no efforts were made for ensuring participation of agencies like TMOP and industry at the beginning of the project and that commercialisation was initiated only after getting the outcome of the project.

Environment friendly leather processing technology-CLRI

The project was sanctioned (January 2004) by CSIR for implementation by CLRI based on the request of Ministry of Environment and Forests (MoEF) for support from CSIR laboratories in addressing problems viz. TDS[10] and colour water recycle in tanneries and desired that cost effective solutions be found in a time-bound manner (before December 2005) for enabling the industry to comply with the demands of Corporate Charter[11]. In the project proposal, CLRI envisaged that implementing the improved technologies developed through the project would lead to a saving of ₹40-60 crore per year for Indian leather sector and stated that this saving was possible only if CSIR was able to influence at least 75 *per cent* of the industry in leather sector. The project was completed (March 2007) after incurring an expenditure of ₹17.44 crore.

At the time of initiating the project, it was supported by the All India Skin and Hide Tanners and Merchants Association (AISHTMA). Audit observed that there was no further interaction between CLRI/CSIR and the Association either during tenure of the project or after its completion. Thus, though the project was designed for industry, CLRI did not make adequate efforts to involve industry during implementation of the project. Out of 13 technologies developed, four were transferred, two were commercialised and revenue of ₹25 lakh[12] was earned. Audit observed that one technology[13] stated to be transferred under network project was already being delivered by CLRI in the form of consultancy services since 2004-05 onwards.

CSIR did not offer comments on the issue (November 2013).

Development of catalysis and catalysts-NCL

NCL took up (August 2003) above project at a sanctioned cost of ₹23 crore with a view to providing indigenous technologies for the chemical manufacturing industry. The project was completed (September 2007) after incurring total expenditure of ₹23 crore. Audit observed that there was no association with industry at any stage of the project. Out of five technologies developed, one was transferred and one was commercialised. Audit further observed that though outputs were achieved under three activities[14], scaling up work for possible commercialisation was not done in any of the activities as of July 2012.

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[10] Total Dissolved Solids

[11] Tanneries are one of the 17 red category industries which have entered into a Charter (March 2003) for Corporate Environmental Commitment for Pollution Prevention and Control with the Central Pollution Control Board (CPCB) under Ministry of Environment and Forests. The Charter included action points for the tanneries for waste management, reduction of pollution and compliance to environmental standards.

[12] Figures as per project completion report

[13] Technology for design packages for secured land fill

[14] (i) Out of 15 mesoporous materials synthesised, characterised and standardised, 13 materials were not scaled up; (ii) Under the activity 'Catalysis for specialty chemicals', out of eight processes developed, seven processes were not scaled up and (iii) Though process for synthesis of chiral auxiliaries was developed, it was not scaled up.

CSIR stated (July 2012) that scaling up was out of the scope of the work as that would have involved an industrial partner and added that the processes would be scaled up as and when industry would show interest.

The reply of CSIR was in contradiction of the project proposal, in which scaling up was mentioned as an objective under each of above three activities.

Recommendation 3:

The objective of CSIR being scientific and industrial research, adequate and minimum interaction with appropriate industry leading to commercialisation of its research should be formalised and monitored, for its projects.

2.5 Non utilisation of equipment procured under projects

A sum of ₹375 crore was approved by CSIR for procurement of equipment for 27 projects, of which records relating to procurement of equipment of ₹172 crore were examined in audit. It was observed that 38 items of equipment (each costing more than ₹10 lakh) costing ₹48.73 crore from 15 projects, were received/installed/commissioned either after completion of project or at the fag end of project duration. The list of equipment is given in **Appendix VI**. As such, projects were declared completed without installing/utilising the equipment. The delayed procurement of equipment was injudicious, resulting in non-utilisation of equipment for the intended purpose.

Recommendation 4:

CSIR may ensure timely procurement of equipment and their installation so that equipment are utilised in projects under which they were procured.

2.6 Monitoring and evaluation

Provisions for monitoring and evaluation of network projects were contained in Para 4 of the Guidelines for network projects. Three levels of monitoring of network projects were defined, viz. laboratory level, Task Force (TF) level and Monitoring Committee (MC) level. The monitoring mechanism for each level as per the Guidelines was as follows:

Table 3: Monitoring mechanism for network projects

Level	Monitoring level	Composition	Scope of monitoring	Frequency of meeting
First	Laboratory	Director of concerned participating Laboratory	Monitoring of individual activities assigned to the Laboratory. Concerned scientists were required to make a presentation of the activity before the Director.	Monthly
Second	Task Force	Director of the nodal Laboratory, Directors/ nominees of participating laboratories and Head, R&D Planning Division, CSIR.	Monitoring of all the activities of the project. Participating laboratories were to present the progress of the activities to the Task Force.	Quarterly
Third	Monitoring Committee	Members of the Task Force and external experts with an eminent Scientist as Chairperson	To study critically approved project proposal, evolve suitable and monitorable parameters, monitor timely delivery of goals and milestones and make suitable recommendations for further actions and course changes.	Half yearly

Audit evaluated second and third levels of monitoring mechanism and our observations are given in subsequent paragraphs.

2.6.1 Shortfall in frequency of monitoring

Audit observed shortfall in the meetings of TF and MC against prescribed frequency. The extent of shortfall is given in Table 4:

Table 4: Shortfall in frequency of meetings of Monitoring Committee and Task Force

Range of shortfall (in *per cent*)	No. of projects having shortfall in meetings of Monitoring Committee	No. of projects having shortfall in meetings of Task Force
No shortfall	5	1
1 to 30	5	1
31 to 60	10	7
61 to 90	4	7
Details not available	3	11
TOTAL	**27**	**27**

It is seen that MC met at prescribed frequency in only five projects and TF in the case of only one project. In the remaining projects, shortfall ranged between one to 90 *per cent*. Project wise details of shortfall in meetings of the two committees are given in **Appendix VII**.

The substantial shortfall in holding meetings of monitoring bodies reflected inadequate internal controls in monitoring mechanism.

While accepting the observation, CSIR stated (July 2012) that besides full fledged MC meetings, several other meetings and field demonstrations were conducted as per advice of MC.

Recommendation 5:

CSIR may ensure that meetings of various monitoring committees are held as per prescribed frequency.

2.6.2 Non-compliance with recommendations of MC

Audit further observed that recommendations made by MC during its review of projects were not followed in two projects, as detailed below:

Non-compliance with recommendations of MC

Industrial waste minimisation and clean up-NEERI

NEERI took up (April 2004) above project with the objective of studying the problems of at least 10 categories of highly polluting industries and providing cost effective environmental solutions for treatment of air emissions, waste and waste water. The project was completed (September 2007) after incurring expenditure of ₹13.93 crore.

During review of the project, MC felt (December 2004) that detailed milestones for pilot projects, field tests for commercialisation and utilisation of technology in the industry should be prepared and accordingly it circulated certain monitorable parameters[15] to all participating laboratories. The monitorable parameters were again circulated (August 2005) in MC meeting. However, audit observed that no further progress against the same was furnished in the next four meetings of MC.

Subsequently MC recommended (March 2007) closure of 11 activities, completion of 22 activities and carrying forward of four activities. MC also recommended that project reports with techno economic feasibility, lab scale demonstration, field demonstration and industrial demonstration should be prepared in respect of the closed projects. Though this was reiterated (September 2007) in the final MC meeting NEERI did not prepare project reports.

[15] Execution of pilot projects and testing them in field for commercialisation and utilisation of technology by the industry, identifying the technologies, benchmarking them and finding industrial partner for fine tuning the solution, delineation of milestones with an emphasis on commercialisation and utilisation of technology, studying technology on a pilot scale at a user site , etc.

CSIR stated (July 2012) that out of 37 activities, objectives of 27 activities were achieved completely. CSIR, however, did not comment on the issues of non-preparation of detailed milestones and project reports as directed by MC.

Coal preparation for quality enhancement-CIMFR

CIMFR took up (May 2004) above project at a sanctioned cost of ₹14 crore. While reviewing the project, MC recommended (June 2006) that techno-economic feasibility study may be conducted. However, this was not done by CIMFR. In its next meeting (December 2006) MC, while expressing its dissatisfaction, recommended extension of the project duration by six months for preparation of the techno-economic feasibility report. Audit, however, observed that techno-economic feasibility report was not prepared by CIMFR. The project was closed (September 2007) after incurring total expenditure of ₹7.31 crore.

CSIR did not offer any comment on the issue (November 2013).

2.7 Impact assessment not conducted

The Guidelines of network projects stated that an impact assessment mechanism for each network project would be designed and implemented by CSIR both as an internal alert during execution and in final outcome analysis (para xxii of summary recommendations). The Guideline however, did not specify how or by whom impact assessment would be carried out. It was observed that CSIR neither carried out impact assessment of network projects on its own nor did it engage an external agency for the same.

CSIR confirmed (August 2012) that as the Guidelines did not provide for external-body evaluation of outcome of the projects, no external-body evaluation was conducted.

Audit is of the opinion that impact assessment of network projects was significant as it was a new initiative and was viewed as providing a new learning experience to CSIR. Further, an unbiased impact assessment would be possible only by involving outside experts in the field along with CSIR's own expertise.

Recommendation 6:

In future, formal impact assessment of important projects may be done by involving outside experts along with CSIR's own experts.