Managing Research Projects from Concept to Conclusion

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Introduction

SERC (Science and Engineering Research Council) is one of the most popular programmes of DST (Department of Science and Technology), widely accessed by individual researchers across institutions and disciplines. DST receives a large number of research proposals every year in various areas of science and engineering, for possible financial support, under this programme. Quite understandably, few of them are quite outstanding while many are fairly acceptable. However, still a good number of projects are not so well written and grossly deficient in content. This article is an attempt to provide useful information and deeper insight into various stages of a research project viz. formulation, presentation, implementation, completion/conclusion and follow up.

Technical work elements of a research project are obviously of paramount importance. Nevertheless, it is equally important for the Project Leader (PI) to understand and appreciate the perspective of funding agency, respect its policies and comply with its rules and procedures for efficient execution of the project.

The information presented here is specific to the PAC (Programme Advisory Committee) mechanism of funding and more so for Engineering Sciences Programme. However, it will be relevant and applicable in the general sense to all similar programmes of DST. To a good extent, the core philosophy behind the contents may also be valid while dealing with other funding agencies as well, beyond the procedural aspects.

Project Formulation

SERC considers research projects in almost all the disciplines of science and engineering without any barriers. The areas will have sub-areas and further specialisations. At times, there are identified thrust areas to make a significant impact, both from the viewpoint of creating infrastructure and building expertise. However, one is ultimately free to give the project in the area of his interest, which is considered without any prejudice. It is worthwhile to note here that the idea behind the proposed work is important and not the area as such. It is quite natural that some of the upcoming areas would provide better opportunities for new and exciting ideas than those where significant amount of work has already been done over a period of time. But as long as the idea is original and challenging, it would generally find merit for support irrespective of the area it belongs to. One should, therefore, be primarily concerned with identifying an original and challenging problem in his area of interest and where he has adequate background and expertise to deal with it. The project should be suitably structured around the identified problem.

SERC primarily supports basic or fundamental research. This is also a unique feature of SERC in the sense that some of the sectoral funding agencies concerned with specific areas do not essentially encourage basic research in their own areas and are more interested in applications and process/product development. Basic research should be idea driven and while evaluating such proposals it is a good yardstick to see in what way and to what extent the proposed work is likely to contribute to the existing state of knowledge and lead to further possibilities in terms of basic research as well as applications development.

Application/technology development projects are also considered as long as one can demonstrate specific value addition over the existing state of development in terms of enhanced performance, reduced cost, improved life cycle, environmental impacts, functional aspects, operational considerations and safety reasons. Strategic importance to the nation/society could also be a positive consideration in case of replication, where technology is not freely available. In all such cases, probability of the output actually implemented by the downstream user is also an important factor. In general, it is desirable to have such downstream tie-ups right from the beginning by way of appropriate technical and financial commitment of the user industry/agency. This serves two purposes - first it demonstrate the feasibility of work by way of industry commitment, and secondly it ensures smooth transition to the next level of work (scale-up /commercialisation) once the project is complete.

Objectives of the project should be clearly brought out, focussed and realistic. Similarly, the work plan and methodology should be coherent with the objectives and properly outlined in sufficient details. Items like national/international status, literature review, references etc. should be covered adequately. The duration of the project should normally be up to three years and work envisaged in the project should be compatible with the duration. One should realise that a project is a definite entity in time and space, having a clearly defined beginning and an end, although the research as such is an open-ended process, which may continue even beyond the project duration. Accordingly, one should clearly define the specific work, proposed to be done as a part of the project and separately list out likely outcomes and possible follow up work. Later on, there should be a serious attempt to achieve pre-stated objectives and complete proposed work within the stipulated duration. Any additional work may be taken up in the form of a new/follow-up

project, which DST would certainly encourage to support if the previous work is inspiring. This demonstrates a disciplined–professional approach and is also important from the administrative point of view. While formulating the project, this background will help to finalise objectives and duration, which are realistic and feasible, yet challenging.

The budgeting part should be decided carefully. The number of research staff and their positions/ qualifications should be commensurate with the proposed work. One should also keep in mind the ground reality about the availability of people/students for various positions within the academic and administrative framework of the host institution. One can either follow salaries as per DST norms (for certain specified positions) or go by the norms of host institution. Generally, a consolidated salary is preferred due to reasons of simplified handling. Non-scientific support-staff like typist, mechanic etc., are not permissible and this should be made available by the host institution, if needed.

Permanent Equipment (PE) should be those which may be directly required for the specific work proposed to be done under the project. Use of existing equipment and centralised facilities in the host institution is preferred, as far as possible. DST generally does not encourage creating new/major facilities from scratch or dedicated testing and characterisation equipment/facilities for individual projects. If needed, these can be considered separately at the departmental/institutional level under other suitable programmes like FIST (Fund for Improvement of S and T Infrastructure in Higher Educational Institutions)/IRHPA (Intensification of Research in High Priority Areas). PCs are provided, either as an integral part of an experimental unit to capture and process data, or when the work involves a high degree of computation as may be the case with modelling and simulation work. Stand-alone general-purpose PCs are not encouraged. While writing the project document itself, one should have a fairly realistic assessment of the specifications and cost. This would avoid unnecessary complications later at the time of final sanction, although the final cost is based on actual quotations and may vary within marginal limits from the one indicated in the project document.

Complete documentation should be sent to DST as per prevailing guidelines and format, for which one may access DST-SERC website.

Project Evaluation/Presentation

The project evaluation is a three-tier process involving peer review, a formal presentation before the PAC in the concerned area and the final decision of SERC. Projects below a cut-off value are not discussed formally by SERC and a decision is taken based on the recommendations of the PAC.

Investigators are generally given an opportunity to make a personal presentation on their project before the PAC unless the reviews are extremely and consistently un-supportive. Typically, the total time allocated for a project would be about 30 minutes, out of which 20 minutes are meant for the presentation and the remaining 10 minutes for discussion. One should plan and structure the presentation in advance so as to complete within this time frame. It is always a disadvantage

to be suddenly made to downsize the presentation and still make proper impact to drive home the core message.

The presentation should be structured around the core theme of the project and focussed on the proposed problem, clearly bringing out the novelty of idea. One should not waste much time on items like introduction, background, national/international status, literature review/references, bio-data, publications and budgetary portions. These items are already covered in adequate details in the project document, which is made available to all the members of the expert committee in advance. It may be a good idea to keep the number of slides for the core presentation to the minimum and keep the back-up slides on related details separately, in case these are required in response to some specific query.

Generally, the reviews are made available to the PI before the presentation in whatever form, which may vary from one programme to another. These may be edited, un-edited or excerpts involving key concerns. Sometimes, a formal response is also required from the investigator. One should examine the comments objectively and use them as an input for the presentation. Presentation can be accordingly moderated to address the relevant portions of the reviews. The expert committee will ignore the irrelevant portions and try to clarify the relevant concerns even if they are not a part of the presentation. It may be noted here that the reviews alone are not the only criteria for the final decision. The final recommendation is a considered opinion based on the information in the project document, reviews and the presentation, the later being the most important and carrying maximum weightage. The criteria for accepting a project is strictly based on the technical merits of the proposed work it terms of its novelty and/or utility as well as the competence (publications record and the presentation) of the PI to be able to do justice to it.

The final decision on the project is communicated shortly after the presentation day and if favourable, the PI is to furnish additional documentation (salary norms, quotations, etc.) to finalise the budget and issue a formal sanction. Specific instructions to this effect are communicated to the PI subsequently, along with the decision.

The entire process of evaluation outlined above involves many steps, individuals and activities taking considerable amount of time, which may appear unrealistic or even unjustified to an outsider. The DST person handling a particular programme has to depend on number of individuals from within DST and outside. Most of the field experts and reviewers are from academic/research institutions or industry, who do a voluntary job. Then, there are independent nodes like Finance, which has its own style of functioning, yet having considerable influence on the overall processing cycle. The volumes are often significantly high as compared to resources available to the programme.

In view of all this, an overall processing cycle time of 4-6 months (from receipt to sanction) can be considered fast and efficient. Anything up to 9 months could be considered fairly acceptable. However, anything beyond that would be undesirable for the reasons of obsolescence as well as discouragement to the researcher. The reasons for such inordinate delay can either be attributed to the general inefficiency in a programme or at times to the PI concerned himself in terms of

failing to meet certain requirements or not being responsive fast enough. It may be appreciated that overall systemic deficiencies and constraints, either at DST or at the host institution, need to be addressed at a different level. These should not be allowed to unduly affect the process, for which a degree of initiative and perseverance is required both on the part of DST person coordinating a particular programme as well as the concerned PI.

Project Implementation

There is some time lag between the technical and the administrative approval (decision of PAC/SERC and the issue of formal sanction) of the project, which could generally be about one to two months. Prompt response from the PI in terms of additional documentation comprising of budgetary quotations for PE and salary norms etc. would help in reducing this time lag to some extent. This should be possible if these documents are arranged in advance and kept ready in anticipation of technical approval of the project. This time lag should also be utilised to do necessary preparatory work such as identification of project staff and other in-house paper work for recruitment and procurement, before the final administrative approval is received. All this planning and coordination will ensure that the technical work can be started immediately after receiving the formal sanction without wasting much time in these administrative/procedural matters. It may sound trivial but these matters do eat up a lot of actual project duration, if not handled in a planned and controlled manner. The month following the date of sanction is generally taken as the project start up date. The money reaches the host institute in about a month's time from the date of sanction. But the actual project work can start (recruitment of staff and placement of orders for PE), once the formal sanction order is received without waiting for the bank draft, if the host institute so permits. One should try to keep the start up time to the minimum so that most of the project duration is effectively and optimally utilised for actual technical work. Things like literature survey should have been done even before submitting the proposal (during formulation) and should be a part of project documentation. Any topping-up work, if necessary, should also be completed during the period between the technical and the administrative approval of the project.

DST assigns great importance to monitoring the progress of ongoing projects. Review meetings are organised to monitor the progress of sanctioned projects at regular intervals, normally every year but at least once during the currency of the project. This is considered a serious business and the PI is himself expected to attend these meetings to present the technical work carried out during the period since last review. As an exception, if the PI is not able to attend due to genuine reasons, the Co-PI is allowed to present the work. While these reviews provide vital technical inputs for mid-course corrective actions, they are also helpful in sorting out various administrative and financial matters to facilitate smooth execution of the project work. A brief report on the technical work/progress is generally required in advance of the review meeting for circulation to experts. This is in addition to the routine Annual Progress Report.

Minor changes to the original terms of the grant, arising due to reasons beyond control in genuine cases, may be permissible. However, this should be viewed as an exception rather than rule. It is encouraged to observe a strict sense of discipline in project implementation and every effort

should be made to adhere to the original terms and schedules. In any case, it is important to note that any such changes can be made/effected only with the prior and formal permission of DST.

During the currency/tenure of the project, the PI is required to furnish financial statements, comprising of Utilisation Certificate (UC) and Statement of Expenditure (SE), in the prescribed format. These statements are to be furnished financial year-wise, at the end of each financial year. While a separate UC is required for the concerned financial year, the SE is a consolidated one reflecting separate expenditures in all preceding financial years and the total expenditure.

The total project cost and yearly head-wise allocations are reflected in the original sanction letter, however, the money is released in instalments. The first instalment is released in the beginning of the project and the subsequent instalments are considered depending upon the actual expenditure position. A formal request should be made to this effect when the earlier funds are nearly used-up and an abridged SE should be furnished to indicate up-to-date expenditure position to substantiate the claim. Request for subsequent release can be made any time depending upon the actual expenditure position and need not coincide either with the close of financial year or the twelve calendar months period. Release of next instalment may roughly take about a month from the date of receipt of papers, and assuming that they are in order.

The financial and administrative matters should not be exclusively left to the concerned function in the host institute. One must keep regular track and do necessary follow up/coordination to avoid oversights and last minute surprises.

Round-up/Completion

While the project is in last lap of its tenure (last 3-6 months), work should also start on the winding up activities, as well. This includes preparation of Project Completion Report (PCR). The PCR should be prepared so as to present the entire technical work in totality and continuity, including conclusion of findings with respect to pre-stated objectives. A mere compilation of publications is not acceptable as PCR.

The PCR should be furnished to DST immediately after the project completion (say within 1-3 months) along with list of publications/patents, final UC/SE and list of PE with their individual costs. The unspent balance, if any, should be refunded by a bank draft to DST. On the other hand, if some money is due from DST, it may be claimed as final settlement based upon the expenditure indicated in the final UC/SE. It is expected that financial support of DST for the work is acknowledged in the publications. Also, PI should cooperate with DST in case of any follow-up matter like user/industry interaction or additional information, even when the project is complete.

The project is considered complete in technical, financial and administrative terms when the aforesaid project closure formalities, comprising of PCR and settlement of accounts, are over. DST generally considers only one project at any given time. A new/follow-up project can be submitted about six months prior to the anticipated completion of the current project. The new project, if

approved, should be through the procedural mill and functional by the time old project is complete. This would ensure adequate interface between the two projects and continuity of work and project staff, if necessary.

Conclusion

It is believed that the above information will be helpful for writing, presenting and implementing research projects, particularly for young researchers and first-timers who do not have much prior experience. It will also bring in a sense of transparency into the functioning of the funding agency and the evaluation process. It has been attempted to cover the process over the entire life cycle of a research project with sufficient details, in the general sense. However, it is impractical to visualise and incorporate answers to all possible situations, which may actually arise during the implementation. In such situations, the best thing is to consult the concerned DST person, facilitating that particular scheme, for appropriate advice. Effective communication is the most important step in dealing with seemingly difficult situations and it is advisable to remain in constant touch with the facilitator during the implementation of the project.