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Impact of SARD Funding on Improving the Research and Academics in the State of Kerala: A Preliminary Study

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ABSTRACT

The purpose of this study is to find out the impact of funding under the Selective Augmentation of Research and Development (SARD) scheme of Kerala State Council for Science, Technology and Environment (KSCSTE) on strengthening the research and academics in the State of Kerala. Our sample consisted of more than 50% of the SARD funded departments from 2002. The instrument that was used for data collection was a questionnaire, while the ongoing programmes were exempted from impact evaluation studies. One-way ANOVA and paired t-test revealed the significant impact of the SARD implementation in improving the publications. The study highlights the need to develop key indicators to measure the S & T outcomes in the state of Kerala.

1. Introduction

Selective Augmentation of Research and Development (SARD) is a scheme initiated by Kerala State Council for Science, Technology and Environment (KSCSTE) in 2002. The scheme envisages modernization of laboratories by way of acquisition of essential equipment and upgrading the existing facilities for promoting research in science department / centres of universities, colleges and R & D institutions in Kerala. The national counterpart of this state scheme is the Fund for Improvement of S&T Infrastructure (FIST) in Higher Educational Institutions managed by Department of Science and Technology, Govt. of India. While the SARD offers a maximum grant of Rs. 40 lakh per department, the grant under FIST is to the tune of Rs. 3 crore as two levels. A total of 50 institutions / departments were supported using SARD funds during the period 2002-2015. The present study highlights the particulars of the SARD supported institutes / departments in terms of region, discipline, type of institution and nature of management and further attempts to evaluate the impact of the scheme for the 50 departments/institutes that were augmented using SARD support.

The support from KSCSTE for University/college research as well as to various R & D institutions in Kerala under various schemes is commendable. A reasonable plan fund share is being spent each year in order to strengthen the research ecosystem in the State. However, mechanisms to measure the impact of this public funding in terms of knowledge creation and R & D outputs are not available or not yet sorted out. The public investments in R & D are motivated by the conviction that advances in scientific understanding will contribute to the nation's economic growth as emphasized by Rosenbloom *et al.*[1] Though, this is the general perception, only scant studies are available still in proof of the relationship between R & D funding and the generation of knowledge contributing to productive outcomes. Jacob and Lefgren[2] studied on the possible influence of the Government funding for scientific research on the size of the research sector as well as the productivity of researchers within the sector in which they noted small relative effect of funding on the research output in case of individual researchers.

The Post Graduate departments are meant to train the students, impart them with research skills and to equip them with the knowledge. The academic research productivity of students can be considered a surrogate measure of universities' ability to prepare the next generation of scientists[3]. While we aspire about the individual research support, the indirect support to the researchers by strengthening the research laboratories also becomes relevant. Imparting of research skills remain a crucial aspect as far as postgraduate training is concerned. According to Cloete *et al.*[4] providing research skills inculcates scientific inquiry, at the same time equip students with knowledge and skills to critically appraise evidence before applying it.

The study was initiated hypothesizing that the research infrastructure strengthening improved the R & D output in terms of publications, patents etc., provided research training to PG students, facilitated scientific knowledge creation and enabled uplifting the department to centre of excellence in focused research area.

2. Objectives of the Study

This study was guided by the following objectives:

1. To uncover the details of the SARD sanctioned departments/ institutes in terms of region, discipline, type of institution and nature of management
2. To find out the impact of SARD support in improving the R&D output
3. To find out the impact of SARD support in scientific knowledge creation

3. Methodology

Our study was driven by the hypothesis that there is relationship between SARD funding and the improvements in research and knowledge outputs.

The database of the sanctioned SARD programmes from 2002-2015 was searched to extract the particulars of the beneficiaries in terms of region, discipline, type of institution and nature of management.

The impact analysis study employed aself-administered questionnaire targeting the co-ordinators of the completed SARD programmes. The survey design collected data from co-ordinators, while the ongoing programmes were exempted from the study. The percentage analysis was carried out to examine the responses. One-way ANOVA and paired t test were used for statistical analyses, with a threshold for significance set at P < 0.05. Statistical analyses were carried out in Microsoft Excel 2010.

Table 1. District-wise number of SARD sanctioned departments / institutes (2002-2015) in Kerala

District	No. of SARD supported institutes / departments (n=50)
Thiruvananthapuram	17
Kollam	1
Pathanamthitta	1
Alappuzha	1
Kottayam	6
Ernakulam	9
Thrissur	3
Kozhikode	4
Kannur	2
Malappuram	3
Wayanad	1
Palakkad	2

4. Distribution of SARD grants

An examination of the distribution of the SARD grants (n=50 completed programmes) throughout Kerala revealed maximum support to the institutions in Thiruvananthapuram district (n=17), followed by Ernakulam (n=9) and Kottayam (n=6) (Table 1). While Life Sciences departments were supported the most, the support to Departments offering Earth System, Environmental and Mathematical Sciences remained meagre (Fig. 1). Major infrastructural support went to Govt. institutions (68%) (Fig. 2); with the College and University Science departments having received greater benefits (Fig. 3).

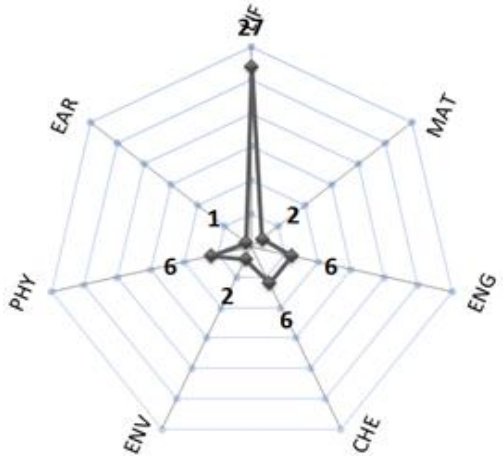


Fig.1. SARD sanctioned institutes/ departments(2002-2015): discipline-wise mapping (n=50)

LIF- Life Science, MAT – Mathematical Science, ENG – Engineering science, CHE – Chemical Science, ENV – Environmental Science, PHY – Physical Science, EAR – Earth Sciences

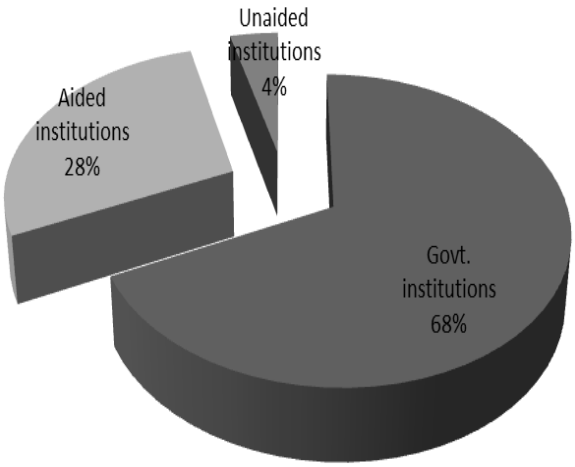


Fig. 2.SARD beneficiaries (2002-2015) in terms of nature of management (n=50)

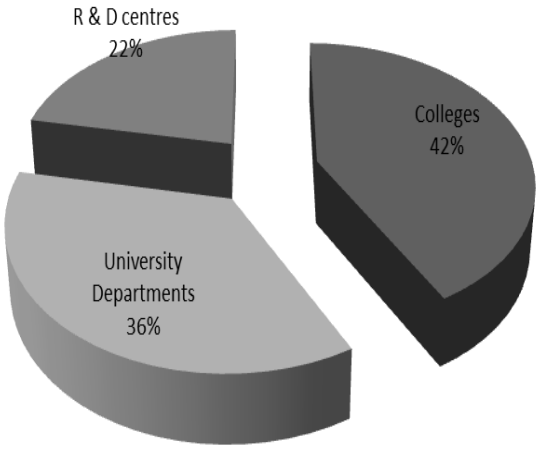


Fig. 3.SARD beneficiaries (2002-2015)in terms of type of institution (n=50)

The self-administered questionnaire was sent to 50 co-ordinators for response. Out of the 50 respondents reached out, only 25 questionnaires were fully completed and returned. This gave a response rate of 50%.Table 2 gives a picture of the response on the impact of SARD from the co-ordinators on refining the quality of R & D. Most of them responded that they were able to set up a new research facility in their department because of the SARD support; 12 out of the 25 respondents agreed that their department was elevated to Centre of Excellence after the SARD assistance. While most made high impact publications, output in terms of patents was limited.

Table 2. Responses of SARD co-ordinators on the sustenance of the support and on the outcome of SARD support with respect to improving the quality of R & D

Question	Count (n)	yes	No	NA
Does the SARD support enable you to set up a new research facility in your department?	25	96%	4%	0%
Are the equipments procured under SARD still in use?	25	96%	4%	0%
Whether the equipment was out of order any time?	25	64%	36%	0%
Whether you were able to rectify the defects in short time?	25	56%	4%	40%
Is there anybody specially trained for using particular equipment?	25	60%	40%	0%
Whether the equipments procured under SARD enabled you to take up new projects?	25	88%	12%	0%
Whether the department was able to get FIST# support from DST$?	25	52%	40%	8%
Does the SARD scheme persuaded to apply for FIST?	25	60%	32%	8%
Whether other departments within your University /College/Institution benefitted from your Infrastructure?	25	92%	0%	8%
Whether other institutions within your district benefitted from the Infrastructure?	25	76%	16%	8%
Whether other institutions outside your district benefitted from the Infrastructure?	25	68%	24%	8%
Whether the Post-Graduation students get benefitted out of the SARD facility?	25	100%	0%	0%
Whether the SARD facility enabled you to make high impact publications?	25	84%	16%	0%
Whether the SARD facility enabled you to file any product/process patent?	25	24%	76%	0%
Whether the SARD enabled you to develop innovative technologies?	25	44%	52%	4%
Whether the SARD enabled you to elevate the department to a Centre of Excellence in a particular subject?	25	56%	40%	4%
Are you satisfied with the monitoring mechanism associated with SARD implementation?	25	100%	0%	0%

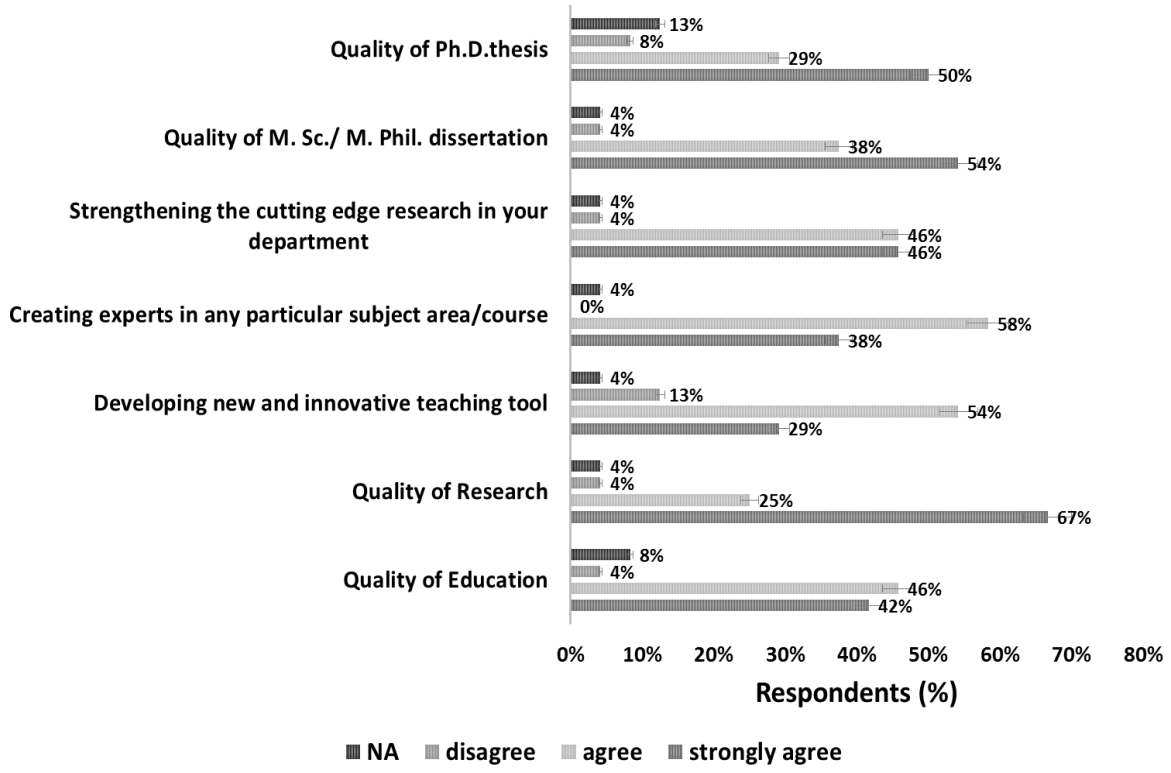
**already a centre of excellence* *NA – Not Applicable*

#FIST – Fund for Infrastructure Strengthening in S & T

$DST – Department of Science and Technology, Govt. of India

The responses are indicative of the fact that in most of the departments, the equipments procured using the SARD support are still in use and there are trained personnel to operate the equipment. Strengthening the existing S&T infrastructure support system in the universities and other related institutions aided in improving the quality of the Ph.D. thesis as well as the M.Sc./M. Phil. Dissertations as is evidenced from the fact that 50% of the respondents strongly agree and 29% agree to it. Also, from the study it is evident that 15 departments out of 25was able to get FIST support from the Department of Science and Technology, Govt. of India which is a big funding for the same purpose; most of the respondents states that the SARD support persuaded them to apply for a bigger funding (Table 2).

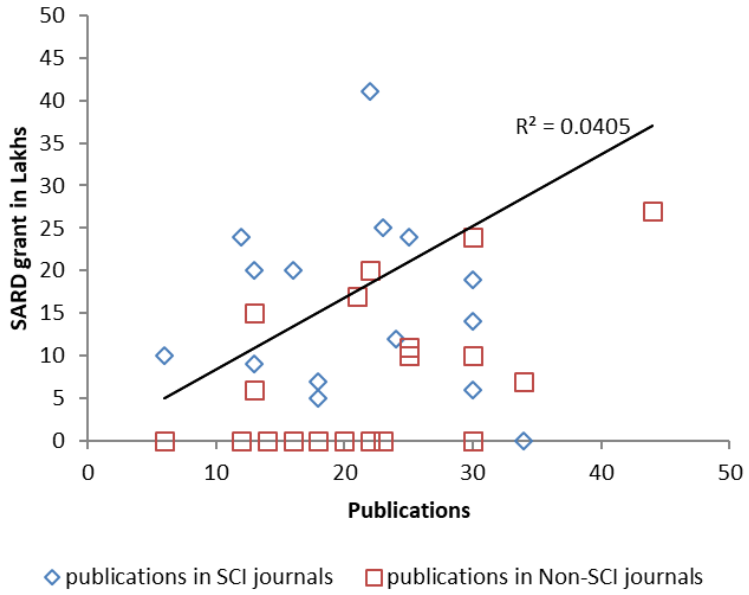
Fig. 4. Responses of SARD co-ordinators on certain parameters indicative of improvement in academics and R&D (n=25)



The responses made in terms of research publications made before and after the SARD implementation were analysed to test whether the publications improved significantly after the SARD support. From the total sample of 25 departments studies, it was noted that the research publications before and after the SARD implementation improved significantly (t-test, $p<0.005$). At a confidence level of 95% the mean difference in the publications before and after SARD implementation was 20.4 and 61.4; 61.4 being the upper confidence level.

Looking at funding totals for the 25 departments in this analysis that received SARD grants, there was no correlation between the amount of funding received and the research publications in indexed journals (Fig. 5). No significant variation was observed among the departments (one-way ANOVA, $P>0.05$) in the number of publications with increasing funding totals.

Fig. 5. Amount received under SARD Funding and number of Publications



5. Discussion

The Universities and Research Institutions have to play a major role as providers of high calibre human resource and as repositories of national intellectual wealth in the R & D sector. Strengthening the existing infrastructure support system in these higher education / research institutions was the objective of introducing the 'Selective Augmentation of Research and Development (SARD)' scheme. The SARD support provided support for basic infrastructure, augmented the laboratory facilities and enabled a conducive environment thus promoting R &D in new and emerging areas of research. The procurement of highly sophisticated equipments for carrying out research in cutting edge areas of modern science was supported under this scheme; thus, faculties and scientists were able to overcome the constraints in pursuing research to some extent.

The productivity in terms of research and academics is what is expected when investing substantially in R & D1.The present study explored how SARD funding affect the research impacts in supported institutions / departments. The research publication rate considerably improved ($p<0.005$) after SARD support; however, the number of publications showed no bearing with the amount of fund sanctioned. Impact is generally a decelerating function of funding5.The study conducted by Fortin and Currie5 suggested that few big strategy would be less effective than the many small strategy if maximizing the total impact of the entire pool of guarantees is the goal. The SARD grants utilised for procuring equipments was for different departments and wider disciplines. Hence the impact could vary greatly among researchers: perhaps differences in co-ordinator career stage, responsibilities (teaching and administrative), institutional priorities, or perhaps differences in something ineffable5.

The researchers who compete for SARD funds probably also compete most successfully for funds from other sources. This is justified by the co-ordinator's statement (>50%) that that they were persuaded to apply for FIST because of the infrastructural augmentation provided by the SARD. Further, the SARD evaluation process enhances the confidence levels of young faculty in applying and getting funds from outside agencies. Also, quite a number of departments were elevated into Centres of Excellence in due course. It is also pertinent to note that the SARD support brought in considerable improvements in academic perfection as is evidenced from the increase in number of students qualifying National level competitive examinations viz., National Eligibility Tests (NET) for JRF (Junior Research Fellowship) conducted by various agencies & Lectureship, GATE (Graduate Aptitude Test in Engineering) etc. (Data not shown).

Through this preliminary study, we would particularly like to highlight the impact in terms of academic and research performance that the SARD scheme has brought in the State of Kerala. Though, the study has limitations in terms of limited sample size, lack of refined statistical analyses etc., it throws light into developing key indicators to measure evident

outcomes for such schemes which are implemented for a definite purpose of bringing growth in Science and Technology in the State.

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