Atomic Research Centres to Intensify Research – An Innovative Approach of Srinivas University, India

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ABSTRACT

Purpose: *To find an innovative way to boost research work and contribution by individual faculty members of higher education institutions including universities by creating their own micro-research centre. This should also help faculty members to plan and intensify their research at low cost and internally available resources and to contribute to the research output of their institutions, and society in a micro but effective way.*

Methodology: *Proposing and implementing micro-research centres in individual departments of universities by individual faculty members. This centre is independently coordinated by an individual faculty member along with colleagues and students at research, Post-graduate, and Undergraduate levels. The research methodology consists of developing a case study by collecting information about individual efforts of innovative research and crystalizing such efforts to be a systematic innovation as best practice in the higher education space. Information is collected from the research and innovation council of Srinivas University through its website and by interviewing its faculty members. The collected information is analyzed using ABCD analysis framework and presented in scholarly article format.*

Results & Outcome: *This case study on innovation in research efforts by motivating faculty members to develop and coordinate a micro-research centre called Atomic Research Centre to carry out intensive and focussed research on a micro-topic by individually and through a micro-team consisting of self, colleagues, and students at research, Post-graduate, and Undergraduate levels. This best practice speeds up and intensifies the research activities of individual faculty members in many micro-research areas without the huge investment in research as research funding. This best practice of individual research contribution through Atomic research centres (ARCs) also allows the faculty members to coordinate on one or many research topics at a time, individually or with different small teams. Based on an intense search in the literature, it is found that initiation and implementation of Faculty level Atomic Research Centre to promote and intensify departmental research is a unique innovative best practice in HEIs and Universities.*

Originality: *Studying the initiation, formation, modalities, and details of faculty-initiated Atomic Research centres and their success in contributing to departmental research is studied systematically and analysed using ABCD analysing framework.*

Type of Research: *Case Study & Analysis.*

Keywords: Atomic Research Centre, Individual faculty research centre, Research and Innovation, Micro-research, Best practice in University, Higher education innovation, Srinivas University, Holistic research, ABCD analysis

1. INTRODUCTION :

Research is an important activity to find solutions to problems in society by creating new knowledge or a new interpretation of existing knowledge to help in making decisions. Research in any area is carried out by researchers out of their curiosity to identify new things, new processes, new concepts, new theories, new analyses, etc. by means of an experimental study, or an empirical study, or an exploratory study. Each method further uses qualitative, quantitative, and mixed approaches [1-2]. Higher education institutions (HEIs) and Universities are major contributors to systematic research in any country other than government-sponsored research organizations and company-based Research & Development Centres. In India, based on the new National education policy (NEP-2020), higher education institutions and universities are encouraged to involve in research and innovations by involving both students and faculty members of undergraduate (UG) and postgraduate (PG) levels. The objective of NEP 2020 is student-centered, research & innovation focussed higher education service in the county to provide knowledge, skills, and attitude (character & ethics) among the citizens of the county. This will improve the confidence, competency, and innovativeness of the citizens [3-4]. In order to improve the research contributions of the HEIs and Universities, they have followed many strategies as institutional innovations and best practices. These practices are intended to enhance the research contributions of their students and faculty members. Such strategies include API-based incentives, promotions, project funding, recognition, etc [5-7]. It is also known that by motivating and setting the goal through target fixing and continuously monitoring the performance, it is possible to improve the faculty member's research productivity [8-10]. HEIs and Universities which follows such strategies have shown improvements in their research productivity [11-15]. Many case studies are published on innovations of HEIs as best practices [16-18].

In this paper, we have presented our observation of an innovative way to boost research work and contribution by individual faculty members of Srinivas University a higher education institution, by creating their own individual micro-research centre. This unique practice helps faculty members to plan and intensify their research at low cost and internally available resources and to contribute to the research output of their institutions, and society in a micro but effective way. Srinivas University, being a research and skill focussed university developed a holistic model with bottom-up or inductive approach of developing an integrated student development model to provide student-centred curriculum and satisfactory graduate attributes. The innovation in research implemented by the University is discussed here as a best practice case study in the education industry.

*[Srinivas University is a private research and skill-oriented university located at Mangalore, Karnataka state, established by A. Shama Rao Foundation, Mangalore in the year 2013. Srinivas University is an extension of Srinivas Group of Colleges which were started in the year 1988 under the aegis of A. Shama Rao Foundation, Mangalore, which is a Charitable Trust established in 1988 itself under the guidance of a noted industrialist and senior Chartered Accountant and the current Chancellor of SU, Dr. CA A. Raghavendra Rao. Srinivas Group of Colleges strived incessantly for imparting quality professional education in the fields of Hotel Management, Physiotherapy, Business Management, Computer Science & Applications, Social Work, Education, Nursing Sciences, Pharmacy, Engineering & Technology, Architecture, Medicine, Allied health sciences and Dental sciences through 18 Colleges/institutions during last 33 years with recognition from AICTE, NCTE, NCI, MCI, DCI, PCI, COA as well as NAAC – A Grade.

The infrastructure, faculty, and research-oriented teaching-learning processes are synchronized to develop the student's capability and confidence in the future pursuits of life. The unwavering commitment to quality education in Srinivas Group of Colleges facilitated easy evolution of **SRINIVAS UNIVERSITY** in Karnataka State which is first private university established in coastal Karnataka. The government of Karnataka published **SRINIVAS UNIVERSITY ACT-2013** of Karnataka Act 42 of 2013 under clause (3) of Article 348 of the constitution of India in the Karnataka Gazette for general information on Thursday, May 15, 2013.

The University operation commenced from 15th May 2015 and the Sponsoring body integrated the then 8 existing institutions namely Srinivas College of Hotel Management (1988), Srinivas College of Physiotherapy (1993), Srinivas Institute of Management Studies (1999), Srinivas Institute of Social Work (2001), Srinivas First Grade College (2001), Srinivas College of Education (2003), Srinivas School of Technology (2010), and Srinivas College of Allied Health Sciences (2013), to constitute Institute of Management & Commerce, Institute of Computer & Information Sciences, Institute of Social Sciences & Humanities, Institute of Engineering & Technology, Institute of Hotel Management & Tourism, Institute of Physiotherapy, Institute of Allied Health Sciences, Institute of Nursing

Sciences, and Institute of Aviation Studies offering innovative industry-oriented specialized courses at UG, PG, and Research levels. The university is also a member of the **Association of Indian Universities (AIU)**, since 2015 so that the degrees offered by the University are acceptable for higher education admissions and for earning government, public sector, and private sector jobs all over the world. The university is also recognized by **Karnataka Higher Education Council (KHEC).**
In the year 2019, SU has obtained the Recognition of **Department of Scientific and Industrial Research, (DSIR)**, of Dept of Science & Technology, Govt. of India to encourage Industrial Research. This year, Srinivas University has got UGC Recognition under 2(f) section and became eligible to apply for NIRF & NAAC gradings.
With the vision to be a trendsetter among universities and build students who emerge as leaders with competence, conscience and compassion by empowering them with sound education and high standards of ethical and professional behaviour enabling them to build and promote a more humane, just and sustainable world for future generations. With the slogan - **Creating Innovators** and with the mission to provide an exceptional learning environment where students can develop and enhance their leadership and teamwork skills, creative and intellectual powers and passion for learning by providing an uncompromising standard of excellence in teaching; embodying the spirit of excellence to educate the citizen-leaders of society with distinction. **Hard work through winning Strategy,** the University is committed to provide ten **Core Values** to be inculcated among all stakeholders which include: *Team Work, Respect, Responsibility, Ethics, Etiquette, Social Service, Communication, Character & Competency, Techno-savvy & Scientific Thinking, Quest for Excellence, and promoting open systems (including Software & Publications)* (*Source: Srinivas University website www.srinivasuniversity.edu.in.)] [54].

2. REVIEW OF RELATED WORK :

Innovations in research are essential in higher education institutions (HEIs) and Universities. In order to contribute to research, Universities and other HEIs develop their own procedures and strategies that facilitate, motivate, or regulate faculty research [19-23]. Some of such procedures and strategies lead to a unique way of innovation in doing/supporting research and are identified as best practices of universities and HEIs. A systematic review of the available literature is conducted from the Google Scholar search engine of the published journals between 2000-2022 with the help of the keywords such as Innovations and best practices in Higher Education Institutions and Universities. Table 1 summarizes the analysis of some of the scholarly research papers in the area of Innovations and Best Practices in the Higher Education system.

Table 1: Scholarly papers in Innovations and Best Practices in the Higher Education area

S. No.	Area	Focus	Outcome	Reference
1	Innovations & best practices	Transforming HEIs	The effect of the best practices concerning admission, fees, attendance, teaching, performance, skill building, employability, student involvement, collective learning, value addition, ensuring transparency, information dissemination, etc on the quality of higher education imparted by the institution.	Aithal, P. S., & Kumar, P. M. (2015). [16]
2	Innovations & Best Practices	Quality Enhancement in Office Management of HEI	Two best practices adopted in the library are elaborated by considering their aim, contextual features, implementation and uniqueness, and evidence of success, and which have contributed to the achievement of the Institutional objectives and/or contributed to the Quality	Aithal, P. S., et al. (2015). [17]

			improvement of the core activities of the library.	
3	Innovations and Best Practices	HE Institutional study	68 innovations and 27 best practices of SIMS – a higher education institution are identified, listed and analysed.	Aithal, P. S., & Kumar, P. S. (2014). [18]
4	Cultivating innovations	A general framework for developing innovations in HE curriculum	An analysis of several curriculum innovations related to the embedding of graduate attributes yields a framework that highlights the critical factors required to ensure the longevity of important developments in teaching and learning.	Bajada, C., et al. (2019). [24]
5	Innovations and Best Practices	A guide to teaching statistics	Addresses the critical aspects of teaching statistics to undergraduate students, serving as an invaluable resource for both novice and experienced statistics teachers. Classroom exercises, computer applications, and internet resources designed to promote active learning tips for incorporating real data into course content recommendations for integrating ethics and diversity topics into statistics education.	Hulsizer, M. R., & Woolf, L. M. (2009). [25]
6	Pedagogical innovation in HEIs	Flying not flapping: a strategic framework for e-learning and pedagogy	Suggested four-quadrant model related to technology & pedagogy and market innovation are created as a framework for an e-learning strategy.	Salmon, G. (2005). [26]
7	Innovation and quality in HE	ICT and e-learning–catalysts	ICT and e-learning can improve the quality of higher education by increasing students' motivation, interest, and engagement, facilitating skill acquisition, and improving teacher training, which will eventually improve communication and information exchange.	Pavel, A. P., et al. (2015). [27]
8	Innovations and best practices	Entrepreneurship education	To capture the four domains of activities involved, the 'WHAT-HOW-WHO-WHERE' framework was used. Developed a fairly comprehensive picture of what is going on in the field and proposed a theoretical model emphasising the dual role of entrepreneurship education, namely the development of enterprising individuals in society and the provision of knowledge and skills necessary for enterprise creation.	Manimala, M. J., & Thomas, P. (2017). [28]
9	Educational innovation management	A case study at the University of Salamanca	Explained the processes to define the indicators and their application to a set of selected projects that have been stored in the repository.	García-Peñalvo, F. J., et al. (2015). [29]

10	Defining best practices	Excellence in doctoral education	Best Practices Approaches to Attrition Research and Retention at Western Michigan University are concerned with the identification of various factors that contribute to attrition, without the benefit of conversations that address the implementation of best practises, those interventions that are currently in use that alleviate this trend.	Di Pierro, M. (2007). [30]
11	Innovations in private universities	A case of Srinivas University	Srinivas University's vision is to produce stars who are intellectually strong, technically competent, economically productive, socially inclined, ethically and emotionally sound, and thus best suited to face emerging challenges in all walks of life. We investigated the STAR framework as an overall beacon for the development of Srinivas University in this paper.	Aithal, P. S., & Kumar, P. M. (2016). [31]
12	Best practices	In e-assessment	Discuss the development and use of e-Learning in the design and implementation of an assessment programme at a mid-sized higher education institution in the United States. Computerized longitudinal testing, online diagnostic testing, competitive networked simulations, rubrics, student discussion transcripts, taped presentations, and electronic portfolios are all part of the programme being profiled.	Buzzetto-More, N. A., & Alade, A. J. (2006). [32]
13	Best practices	In online learning and teaching in higher education.	The work stimulates reflections on effective strategies to enhance faculty success in their transition from traditional pedagogical platforms to online learning and teaching.	Keengwe, J., & Kidd, T. T. (2010). [33]
14	Best practices and contemporary challenges	Field education for clinical social work practice	Discussed the development of evidence-based best practices for field education, the changing context of field education, and analyze current challenges and potential responses.	Bogo, M. (2015). [34]
15	Best practices for online instructors: Reminders	Reminders for online instructors	Recommends that higher education faculty improve the quality of their online courses. To design and develop quality online instruction, a faculty member must think differently about teaching and learning, learn a slew of new technological skills, and engage in ongoing faculty development.	Fish, W. W., & Wickersham, L. E. (2009). [35]
16	A review of best practices	Organizational ethics education and training	The study reveals specific trends, which can inform, guide and improve practitioners' efforts to further	Sekerka, L. E. (2009). [36]

	and their application		develop ethical decision-making and action within their organizations.	
17	Faculty best practices	Using blended learning in e-learning and face-to-face instruction	Comments on conceptual definitions of blended learning, its epistemological and pedagogical bases and foundations, and the technological and instructional problems, difficulties, constraints, and successes encountered by faculty when employing a blended learning approach.	Mortera-Gutiérrez, F. (2006). [37]
18	Best practices to music education	Motivation-driven educational game design	The overall pedagogical goal of playing video games is to encourage players' curiosity and creativity by allowing them to easily play music using gamepads as musical instruments. Because motivational lapses due to instrumental limitations frequently lead to resignation and surrender, this example perfectly illustrates in the results.	Denis, G., & Jouvelot, P. (2005). [38]
19	Best practice models	Of inter-professional education	The need for administrative support, inter-professional programmatic infrastructure, committed faculty, and the recognition of student participation as key components to success for anyone developing an IPE-centered programme were among the summary recommendations for best practises.	Bridges, D., et al. (2011). [39]
20	Information technology innovations	In library management: a case of SIMS.	The impact of the automated system on staff, job satisfaction, and client relations is discussed. The developed system had a significant impact on the quality of library service management, according to the results.	Harischandra, P., et al. (2016). [40]

Based on the review of related scholarly papers, it can be observed that many extraordinary innovations in the higher education industry can be implemented as best practices and they can be systematically studied for a period of time for their advantages, benefits, constraints, and disadvantages. There are many opportunities to the researchers to identify innovations and best practices and study them systematically as a case study. This article consists of a systematic study and documentation of a best practice of Srinivas University to intensify its research contribution namely Atomic Research Centres.

3. OBJECTIVES OF THE CASE STUDY :

In the process of identifying and analyzing innovations and best practices, the paper focus on the following objectives:

(1) To discuss the importance of innovations and best practices in University research.

(2) To review various scholarly innovations and best practices in Higher education & research.

(3) To propose a new innovative best practice of creating faculty co-ordained Atomic Research Centres.

(4) To study the efforts of Srinivas University, India in intensifying faculty Research by means of Atomic Research Centre – a Case Study.

(5) To analyse the effect of Atomic Research Centres on university research using qualitative ABCD listing.

(6) To learn the implications and impact of such Atomic Research Centres to Intensify University Research.

4. OBJECTIVES OF THE PRACTICE :

(1) To carry out Collaborative Research Work in the areas of Management, Social Science, Computer Science, Information Science, Nano Science, Engineering, Physiotherapy, and Education.

(2) To encourage quality publication in conference proceedings and journals.

(3) To provide a platform for the scholars and practitioners to deliberate discussions on the published papers through discussion forums.

(4) To conduct conferences, collaborative and interdisciplinary Minor and Major projects, workshops, etc and avail grants from the funding agencies.

(5) To link researchers belonging to relevant multidisciplinary areas relating to the area of operation of the centre.

(6) To encourage in-house Research Projects and publications by the Students of Post-Graduation, and guiding them to publish their research projects as published papers.

5. THE CONTEXT :

Accelerating research productivity of all the faculties, Srinvias University has introduced a policy of constituting 2 exclusive Atomic Research Centres (ARC) per every permanent faculty to leverage individual efforts in contributing to the institutional research productivity. These centres will enable all faculties to lead atomic research centres as coordinators and facilitate collaboration with other researchers both in-house and outsiders in research work. The centres work as a platform to conduct research studies, projects, workshops, and seminars along with the publication of the findings. The University established 250 research centres working in the domains of financial behaviour, green business, Nano Technology, quantum computing, ideal business, banking, science, branding, social media, consumerism, retention, entrepreneurship, IT, Cyber Security, waste management, aviation, stress, relationship, tax, research, supply chain, talent, Human Resource, Corporate Social Responsibility, Market, Shares, education, empowerment, social audit, counselling, gender studies, law, minority, psychology, engineering, environment, mathematics, chemistry, physics, civil, mechanical, emerging technology, rehabilitation, etc.

6. THE PRACTICE :

The research council of all the constituent colleges aimed at quality research works and publications with respect to the following aspects.

(1) Conducting Survey & In-house Micro Research Projects.

(2) Organising Conference & leading to the conference as well as Journal Publications.

(3) Facilitate Forum Discussions among scholars, academicians, and students.

(4) Organising Conferences, Workshops, and Seminars.

(5) Intensifying Student-Faculty Interaction to foster research productivity.

7. ATOMIC RESEARCH CENTRE MODEL :

7.1 ARC as New Research motivation Model:

Centre for Research and Innovation of Srinivas University, India has proposed individual faculty-level research centres called Atomic Research Centres (ARC). ARCs is a new concept of individualizing focussed research by identifying faculty-specific research topics and planning the research systematically is the motive of this innovation. Atomic Research Centre is a new concept and thinking in individualizing research in institutions.

Origin of the concept: Atomic Research Centre is a name given for a mini research center coordinated by an individual faculty member to do focused research in one or more interested area/areas individually or using a small team of researchers comprising of their UG, PG, and research students. There are many other similar concepts and names available in the literature which include:

(i) Atomic subspaces in Mathematics: The concept of atomic subspaces with respect to a bounded linear operator is used in mathematics on a separable Hilbert space which leads to the concept of K-fusion frames, a generalization of fusion frames [41].

(ii) Nuclear Family Concept: Nuclear family, also called elementary family, in sociology and anthropology, a group of people who are united by ties of partnership and parenthood and consists of a pair of adults and their socially recognized children. Typically, but not always, the adults in a nuclear family are married. Thus, the Nuclear family refers to the core members of a family, usually parents and children [42-45].

(iii) Atomic family Concept: Atomic family concept is also used in sociology to represent the family with male and female members [46]. For the sake of discussion of the new family paradigm, the atomic property of an element (Physical Science) has been chosen as an ideal way to represent the family system being introduced in the Second Demographic Transition wave. In the simplest to being with the atom, which consists of a nucleus (proton and neutrons) and surrounding circulatory part i.e. electrons. Here the inner part of the atom i.e. proton and neutron are correspondence to male and female respectively in a core part of the family system and the electron is taken to be similar to LGBT in the social system. During new liberal and competitive economic phase, family structure has disintegrated from joint or extended family to nuclear or atomic families.

ARC planning involves:
(1) Identifying the researchers among the faculty members,
(2) Stimulating the research interest by a role model,
(3) Discussing the possible research areas by individual faculty members by using minimum resources,
(4) Developing research area based on individual researcher interests and departmental focus group advice,
(5) Finalizing the optimum research area within limited available research facilities and useful to the industries or Society,
(6) By identifying the Research topic based on their interest, and curiosity, the researcher will search for the current status of the topic, research gap, and possible research agendas,
(7) Planning the systematic research by choosing any one or more types of research methodology which include (a) Experimental research method, (b) Empirical research method, and (c) Exploratory research method.

Our research group has identified and published many such innovations and best practices already available and futuristic [47-59]. ARC is one of such innovation converted into best practice.

7.2 Format of ARC:

The format of ARC documentation is given in Figure 1. The Atomic Research Centre Proposal format contains (a) Name of the ARC, (b) Photo and name of the ARC coordinator, (c) Name and designation of the coordinator, (d) Name of the Institute of coordinator, (e) Purpose of ARC, (f) Objective of ARC, (g) Description on Proposed Research which includes Research Methodology & Design, (h) Expected Outcome, (i) List of the Team Members, (j) List of Working Papers, (k) List of related Published Papers in Journals, Proceedings, Book Chapters, Magazines by Coordinator & his/her Group year wise in APA format.

Atomic Research Centre (ARC)

Name of ARC

(Example: Centre for Green Business Research)

Photo of the Coordinator

Name & Designation of the Coordinator
(Example: Dr. P. S. Aithal, Professor)
Name of SU Institution
(Example: Institution of Management & Commerce)

1. Purpose of ARC :

2. Objective of ARC :

3. Description on Proposed Research :
(Example. Includes Research Methodology & Design)

4. Expected Outcome :

5. List of the Team Members :

6. List of Working Papers :
(1)
(2)
(3)

7. List of related Published Papers in Journals, Proceedings, Book Chapters, Magazines by Coordinator & his/her Group year wise in APA format.
(1)
(2)
(3)

Name & Signature of Coordinator with date.

Fig. 1: Format for Atomic Research Centre [60]

7.3 Various possibilities/ Combinations in ARC:

The research and innovation centre in association with various institutes of Srinivas University has created ARCs of following combinations:
(1) Atomic Research Centre with Coordinator as only one member,
(2) Atomic Research Centre with Coordinator and Student members (UG & PG),
(3) Atomic Research Centre with Coordinator and a Ph.D. scholar of the University as member,
(4) Atomic Research Centre with Coordinator and one or more colleagues of the department,
(5) Atomic Research Centre with Coordinator and one or more colleagues of other departments of same university,
(6) Atomic Research Centre with Coordinator and one or more researchers of other departments of the same university,
(7) Atomic Research Centre with Coordinator and one or more researchers of other departments of the different universities,
(8) Atomic Research Centre with Coordinator and one or more researchers of other countries.

8. ATOMIC RESEARCH CENTRE EXAMPLES :

Following tables (Table 2 to Table 8) provide ten sample ARCs of Each Institution of the Srinivas University:

Table 2: Ten sample ARCs of Institute of Management & Commerce of the Srinivas University [60]

S. No.	Name of Atomic Research Centre	Focus	Name of the Coordinator
1	Centre for Ideal Business Model Realisation	Ideal Business characteristics & Strategies	Dr. P. S. Aithal
2	Centre for Research in Base of the Pyramid Market	Base of the Pyramid Market	Prof. Keerthan Raj
3	Centre for Talent Management	Talent Management	Dr. Shailashri V. T.
4	Centre for Women's Studies	Women Studies	Dr. Sonia Delrose Noronha
5	Centre for Innovative Practices and Emerging Pedagogies in Management Education	Management Education	Dr. Narayan Kayarkatte
6	Centre for Training Effectiveness Research	Training Effectiveness	Dr. (Lt Cdr) P. K. Suresh Kumar
7	Centre of Community-based Enterprises (CCBE)	Community-based Enterprises	Dr. Ganesh Bhat S.
8	Centre for Building Theory of Retailing in India (SUTRI)	Indian Retail sector	Dr. Ganesha H. R.
9	Centre for Research on Aviation and Airport Management in India	Aviation sector	Prof. Pavithra Kumari
10	Centre for Campus Placement Affairs (SCCPA)	Placement Affairs	Prof. Varun Shenoy

Table 3: Ten sample ARCs of Institute of Engineering & Technology of the Srinivas University [60]

S. No.	Name of Atomic Research Centre	Focus	Name of the Coordinator
1	Centre for materials for energy and environment	Energy and environment	Dr. Sandhya Shenoy U.
2	Centre for green hydrogen production	Hydrogen generation using green Chemistry	Dr. Praveen B. M.
3	Centre for study on preparation and nonlinear optical characterization of dye-doped polymer films for optical limiting.	Polymer films	Dr. Shubhrajyotsna Aithal
4	Centre for transportation oriented geotechnical engineering	Transportation	Dr. Ramakrishna Hegde
5	Centre for synthesis and characterization of ultrafine spinel's	Spinel's preparation	Dr. Santosh D. Shenoy
6	Centre for image processing, machine learning, power electronics and sliding mode control system	Sliding mode control system	Dr. Rajanna G. S.
7	Centre for artificial intelligence & machine learning	Artificial Intelligence & Machine Learning	Dr. R. Srinivasa Rao Kunte
8	Centre for Cyber Forensic	Cyber forensic	Dr. Jagadeesha S. N.
9	Centre for the development of AI & ML applications to data science and IoT	IoT applications	Dr. K. T. Veera Manju
10	Centre on Cyber security/forensics, AI and quantum computing	Develop a robust cyber security system	Dr. A. M. Sudhakara

Table 4: Ten sample ARCs of Institute of Social Science & Humanities of the Srinivas University [60]

S. No.	Name of Atomic Research Centre	Focus	Name of the Coordinator
1	Centre for Cyberbully Perpetrator & Victimization	Cyberbully Perpetrator & Victimization of Students	Dr. Talwar Prashanth Yadav
2	Centre for Women Studies	Women, Gender, and Sexuality Studies	Dr. Bhuvana Ramachandra
3	Centre for Women and Mental Health	Common Mental health problem, cognitive alternates, Emotional sanity	Dr. Vidya N.
4	Centre for legal studies	Public Administration, Gender Sensitive Legislations, Procedural and Substantive Laws, Business Laws, Financial Regulations	Dr. Pradeep M. D.
5	Centre for Social Psychology and Mental Illness	Adolescents, girl children, Quality of life, Family therapy, Institution and non-institutional care	Dr. Laveena Dmello
6	Centre for Coastal Diversity	Coastal Habitat Coastal and marine environment	Dr. Rajesh Bejjangala
7	Centre for Cultural Studies	Identify Literature, Theoretical Foundation	Dr. Manjula. K.T
8	Centre for Gerontology	Challenges of elderly, Management of local resources	Dr. Suphala S. Kotian
9	Centre for Inclusive Education Niranthara	Students and Special Needs. Learning Styles	Dr. K. T. Shwetha
10	Centre for Language and Literature	Approach to English language and English culture	Dr. Lourdusamy

Table 5: Ten sample ARCs of Institute of Allied Health Science of the Srinivas University [60]

Sl. No	Name of atomic research centre	Focus	Name of the coordinator
1	Centre for Endodontic therapy	Oral health related quality of life and satisfaction outcomes of patients afternoon surgical Endodontic therapy	Dr. Souparna Madhavan
2	Centre of Dental Micronuclei in exfoliated oral epithelial cells	Comparative evaluation of Micronuclei in exfoliated oral epithelial cells in potentially malignant disorders and malignant lesions using H & E stain	Dr. Varsha Shetty
3	Centre for Respiratory therapy research	Establishment of A Rewarding Profession: Respiratory Therapy In India	Jithin Sreedharan
4	Centre for Matrix Rhythm therapy	Effect on Matrix Rhythm therapy on oral motor movement in children with Cerebral palsy	Sonali Srivastava
5	Centre for preventive medicine/life style disorders	To prevent and reverse the life style disorders by modifying the living pattern of the people which affects health, socio-cultural and psychological factors	M. Shashidhar Kotian
6	Centre for Haematology Pathology	The role of heart-type fatty acid binding protein (H-FABP) in the early diagnosis of acute coronary syndrome with chest pain	Dr. Sukesh/ Mohammed Safeer
7	Centre for Haematology Pathology	Curcuma longa extract can be used as a safe natural alternative for synthetic eosin	Dr. Sukesh/ Rubina M.P.

8	Centre for Millets Based Dietary Therapy	A Study To Assess Knowledge, Attitude and Practice of Diabetic Patients on Millets Based Dietary Therapy	Dr. N. M. Jose & Pradeepa M.
9	Centre for Internet Addiction, Associated Factors	Prevalence of Internet Addiction, Associated Factors And Its Impact on the Health of Adolescents	Dr. Florine Clara Fernandes, & Venu A. S.

Table 6: Ten sample ARCs of Institute of Computer and Information Science of the Srinivas University [60]

S. No.	Name of Atomic Research Centre	Focus	Name of the Coordinator
1	Centre for 4G and 5G Mobile Communication Technology for Online Banking Services	To develop a novel system or model or approach or architecture to online banking or mobile banking services with user centric approach through 4G and 5G communication technology.	Dr. Krishna Prasad K
2	Centre for Artificial Intelligence & Machine Learning	Focus on all aspects related to AI & ML along with its current and future applications, in all possible sectors from health care to manufacturing and business analytics. To build intelligent machines and applications with a combination of machine learning, analytics and visualisation technologies.	Dr. R. Srinivasa Rao Kunte
3	Centre for Business Intelligence	To identify the role of credentials like income-group, age-group in purchasing a product at the time of first visit to the online store. To improve Business opportunities.	Dr. Nethravathi P. S.
4	Centre for Artificial Intelligence & Machine Learning Research	To study the technical competence required in graduates by applying knowledge of contemporary advances in AI for providing practical and innovative solutions.	Dr. Jayanthiladevi
5	Centre for IoT Assisted Wireless Sensor Networks Using Blockchains	To define privacy and security in blockchain based wireless networks. Focusing on the design of Blockchain Assisted Clustering with Mutlihop Routing Protocol (BAC-MRPP) for secured IoT-WSN. Focusing on the design of Blockchain Assisted Clustering with Mutlihop Routing Protocol (BAC-MRPP) for secured IoT-WSN.	Dr. S. Brilly Sangeetha
6	Centre for Development of AI &ML Applications to Data Science and IoT	To implement various algorithms and make a comparative study for the suitability of their applications to specific areas of business intelligence, NLP and for robust systems of IoT to overcome the limitations or shortcomings of security with respect to data and other applications considering real time applications	Dr. K. T. Veera Manju
7	Centre for Intelligent Computational Center (ICC)	To propose the best alternative solution for any such complex problems involving multi- dimensional aspects and parameters.	Prof. Subrahmanya Bhat B.

8	Centre for Research in Database and Web Technology	To focus on large-scale data analysis. To conducts fundamental research in the computational analysis of massive data sets that arise in various scientific and industrial applications.	Prof. Vaikunth Pai
9	Centre for Research in Energy Management	Focuses on the energy challenges in India, the cause and the effects of the same in economic development, and sustainability. Focuses on efficient production and use of renewable energy using sustainable long-term energy sources like bright sunlight, wind blow, the wave and tides near the sea shore.	Prof. P. Sridhar Acharya
10	Centre for Machine Learning & Deep Learning	To prepare a model on historical, labelled information (i.e., information for which the result is known) to predict the value of some quantity on the basis of a new data item for which the target value or classification is unknown.	Dr. Jagadeesha S. N.

Table 7: Some sample ARCs of Institute of Physiotherapy of the Srinivas University [60]

S. No.	Name of Atomic Research Centre	Focus	Name of the Coordinator
1	Centre for Musculoskeletal Pain and Neurorehabilitation	Integration of Implementing Best Research With Clinical Expertise and Patient Values	Dr. S. Rajasekar
2	Centre for Movement Sciences	Ergonomics and Community Health	Dr. Ajay Kumar
3	Centre on Neurorehabilitation	Understanding of the Rehabilitation Potential of Adults and Children with Acute and Chronic Neurological Disorders	Dr. Thrishala Noronha
4	Centre on Cardio Pulmonary Rehabilitation	Current clinical practice and patients values and it's a customized outpatient program of exercise and education.	Dr. N. Mageswaran
5	Centre on Stroke Rehabilitation	Stroke Rehabilitation	Dr. Jeyaganesh Vellaisamy
6	Centre on Movement Control in Rehabilitation	Movement Control in Rehabilitation	Dr. Pathak Anupama Anand
7	Centre on Paediatric Sciences and Rehabilitation	Restoring The Movements and Improving the Overall Functional Activity of The Child.	Dr. Radhika Gopal S.

Table 8: Ten sample ARC of Institute of Education of the Srinivas University [60]

S. No.	Name of Atomic Research Centre	Focus	Name of the Coordinator
1	Centre for educational psychology	To Comprehend the theories of Educational psychology and the traits of healthy personality with their educational implications	Dr. Jayashree K.
2	Centre for Mathematical education	Focus on different mathematical processes& to explain socio cultural perspectives in mathematical education	Dr. Vijayalakshmi Nail
3	Centre for Language Innovations	To develop an understanding of nature and functions of language and to	Mrs. Reshma M. Y.

		critically analyse the language policy and politics and their implications for teaching the language	
4	Centre for Biological Sciences	To acquire an understanding of the scientific focus of biology and to note its relationship with other branches of science	Dr. Padmanabha C. H.
5	Centre for pedagogical practices in social science	To understand the issue and challenge in articulating the nature of social science curriculum and its pedagogical practice	Mrs. Shakeela K.
6	Centre in modern physical sciences & their Significance	To explain the nature and structure of science and recognize the significance of physical science in modern world.	Mrs. Seema P. V.
7	Centre in EM & Evaluation	To explore the study of evaluation reforms at higher education level.	Dr. B. Devadas Pai
8	Centre on Learner Autonomy related education system	To develop learner autonomy in English language learning situation by adopting physical learning mode.	Mr. Prasad M.
9	Centre on learning science beyond classroom	To implement innovation research based teaching strategies which go beyond the routine classroom practice	Mrs. Rekha
10	Centre on constructivism technique in school education	To control an experimental study of teaching science by adapting constructivist approach in the science teaching process.	Mrs. Vidyashree

9. EVIDENCE OF SUCCESS :

Table 9 depicts how intensifying ARC concept and spreading it to the entire University has improved the University research outcome during the last 5 years.

9.1 From University Point of View :

(i) Focus on Research Objectives: Srinivas University has declared itself as a Research focussed university and the objective of the university is to nurture a system that can create innovators for solving problems of society.

(ii) Number of Atomic Research Centres year wise: As the number of faculty members is increased with time, the university has created more Atomic Research Centres based on a minimum of one ARC per faculty member. This, in turn, increased the number of ARCs year-wise as the university expands.

(iii) Increase in Research output: The ARCs focus on both individual and team-based research and review once a year creates awareness and responsibility of faculty members to carry out focussed research with publication. The number of conferences conducted by the departments further speeds up individual ARCs research output.

(iv) Enhanced Contribution to IPR (Copyright & patents): University has created a motivational eco-system to encourage and support the faculty members to involve in research at a low cost and support them to publish scholarly papers in journals, Proceedings, Edited books, and Patents. University itself is involved in applying and getting the Copyright of its faculty publications in their name. This will, in turn, increase its IPR.

9.2 From Faculty Members Point of View:

(i) Awareness Creation: All faculty members are briefed about the importance and creation of ARC in their coordinate-ship in every Faculty Development Programs (FDPs). This creates awareness about ARC in individual faculty members.

(ii) Planning for Research: Implementation of ARC concept allows and ensures that individual faculty members of the University.

(iii) Target setting: ARC model ensures all faculty members are identified one or more research topics in their specialization or interesting area and active in research. Through systematic planning for research, use of their students in the research process, arranging conferences, and publishing

University journals as research output, ARC concept sets individual faculty members target and improves annual research productivity.

(iv) Collaboration/ Networking: ARC concept encourages collaboration with UG, PG, and Research student communities, and internal and external Faculty member communities for both research and publications.

(v) Enhanced Research Productivity: Every individual faculty member is associated with his/her own ARC (one or more), and spends substantial time for research and publication both in conferences and journals, as a compulsory requirement, the research productivity and IPR of the university enhances.

(vi) Better Career Advancement: Involvement in research through ARC will keep the faculty members engaged in research and hence their individual research productivity. This in turn improves Annual Research Performance Indicator (ARPI) scores and hence eligible for better career advancement in terms of increments or promotion.

(vii) Job Satisfaction: Moreover, involving in research individually after Ph.D., other than guiding research scholars, ensures effective utilization of faculty members research skills in organizational research contribution and in turn provides satisfaction to faculty members for effective utilization of their time for generating individual and organizational IPR.

Table 9: Enhanced research outcome [60]

Area of Work/Year	**2017-18**	**2018-19**	**2019-20**	**2020-2021**	**2021-22**
International Conference Presentation	4	6	22	35	60
National Level Conference	35	45	49	110	130
Papers in Conference Proceedings	40	85	80	375	400
Papers in Journal Publication	200	270	300	418	450
Total	**275**	**406**	**451**	**903**	**1040**

10. PROBLEMS ENCOUNTERED AND RESOURCES REQUIRED :

Some of the problems encountered while planning and implementing the practice are:

(1) Leveraging interest among new faculties on intensive research is really challenging.
(2) Rigorous review process implemented to ensure quality in publications has increased pressure to reviewers of conference proceedings and journals.
(3) Guiding Post Graduate students to derive publication out of their academic research was really challenging to faculties in the initial phases.
(4) Motivating conference conveners to derive conference proceedings required much orientation efforts.
(5) Need for seed money and financial aid for conducting activities minor projects is the need of the day.
(6) The outcome demands timely research contribution or guidance from the research experts and professors.

11. ABCD LISTING OF THE BEST PRACTICE – ARC :

Analysis and interpretation of issues is a part of scholarly research. There are different analysis frameworks used to analyse the issues which include SWOC analysis as internal analysis [61-63], ABCD analysis as stakeholder's or product/service analysis [64-69], PESTLE analysis as external analysis [70-72], six-thinking hats analysis [73-75], etc. In this section, we have used ABCD listing [76-88] framework to analyse ARC in Universities as the best practice. In ABCD listing, a list of advantages, benefits, constraints, and disadvantages are identified from this case study point of view.

11.1 Advantages:

(1) Involves individual faculty members in research irrespective of their academic grade.
(2) Faculty members are focused and keen on their research objective.
(3) Involving students and other researchers in topic-focused research.
(4) Improves assessment & accreditation scores under the research & innovation part of the university.

11.2 Benefits:

(1) Increases the overall research contribution of the university.
(2) Increase in faculty members' research productivity and contribution to institutional IPR.
(3) Increases student contribution and experience in research.
(4) Enhances brand value of the University which in turn, improves quality admission.

11.3 Constraints:

(1) Faculty members should have research background and experience
(2) High cost projects are not viable and progress is very slow.
(3) Involving students, in turn, enhances their research skills, which is a value addition by the University.

11.4 Disadvantages:

(1) Faculty members are facing high competitive pressure.
(2) Faculty members who do not have research interests will be discouraged in the system.

Based on the above ABCD listing analysis, it can be understood that the advantages and benefits of ARC initiation and implementation in universities are far above than its constraints and disadvantages.

12. IMPLEMENTATION & IMPACT :

The concept of ARC is developed to involve individual faculty members in research, especially in their interesting areas as micro centers on futuristic topics. ARC is one faculty member directed research effort by creating a small group of interested people and by optimally utilizing available time and resources along with full-fledged teaching responsibility. Srinivas University, through its Research and Innovation Council, has implemented this new concept of Atomic Research Centres in its 10 institutes through University Research Director. Each institute under Srinivas University has a faculty Research Coordinator who is responsible for explaining the concept of ARC, creating a good number of ARC by motivating, inspiring, and supporting individual faculty members, implementing the objectives of ARC through faculty members, and monitoring their effectiveness.

The best practice of enhancing faculty involvement in research activities by implementing the practice of creating ARC by individual faculty members resulted in increased research productivity. Further, the impact of ARC best practice made to identify micro-research ideas and to involve students and fellow faculty members in the implementation of research ideas in real practice through effective teamwork. The impact of ARC implementation in the University is of three folds: (1) Increase in research activities and research output year-wise, (2) Increased competition among the faculty members to perform better in terms of ARPI scores through intensified team activity, and (3) Effective utilization of available resources (faculty, students, and research related infrastructure) to fulfil the research-focussed objectives of the University.

13. CONCLUSION :

Higher education institutions and universities are part of the education service industry and are expected to provide satisfactory service to their students who are the primary and internal customers. Involving students in faculty research activities will enhance students' research skills which include analysing, evaluating, and creating new knowledge or new interpretation. The customer attraction, retain, and delight (CARD) model [89] of customer satisfaction suggests service innovations and in education institutions, and it can be in the form of best practices. Here, one of the best practices of Srinivas University to fulfill its research focused objective is analysed as a case study by using faculty members to involve students in research activities. The micro research centers proposed by faculty members and implemented using students for data recording for experimental studies, or data collection for empirical studies, or information collection for explorative studies are implemented systematically to improve the research output.
This unique practice helps faculty members to plan and intensify their research at low cost and internally available resources and to contribute to the research output of their institutions, and society in a micro but effective way. Srinivas University, being a research and skill focussed university could reach its objective of enhanced research contribution to society using its stakeholders as a best practice

in the education industry and become a role model for other universities.

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