



# **SOCIAL IMPACT ASSESSMENT**

**Infrastructural Development of Pharma Research Laboratory  
in Baramati, Maharashtra**

**2024**

Study conducted by







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**Infrastructural Development of Pharma Research Laboratory in Baramati, Maharashtra**



**CSR Project by**  
Sun Pharmaceutical Industries Limited  
Mumbai



**Implemented by**  
Agricultural Development Trust  
Baramati



**Study conducted by**  
Pluriversal Research and Action (PRA)  
Delhi

2024

# CONTENTS

List of Figures	ii
Acknowledgement	iii
Abbreviations	iv
Executive Summary	v
<b>Introduction</b>	<b>1</b>
About Sun Pharmaceutical Industries Limited	1
About Agricultural Development Trust (ADT), Baramati	2
About Baramati	2
About the Project	3
<b>Methodology</b>	<b>5</b>
<b>Findings</b>	<b>8</b>
Need and Purpose of the Project	8
Project Implementation Model	13
<i>The Research Ecosystem – Application of the Research</i>	13
<i>A Multi-Stakeholder Approach</i>	14
Reach and Quality of the Labs	19
<i>Social Accessibility</i>	19
<i>Administrative Accessibility</i>	23
<i>Information Accessibility and Usage</i>	25
<i>Quality of the Project</i>	30
Outcomes and Social Impact of the Project	36
<i>High-quality Research Output</i>	36
<i>Women in STEM Research</i>	39
<i>Community-oriented Research</i>	40
<i>Impact on Agriculture</i>	41
<i>Impact on Animal Health through Research &amp; Advocacy</i>	44
<i>Impact on Entrepreneurs and Start-ups</i>	46
OECD DAC Evaluation Criteria	49
<b>Conclusion</b>	<b>52</b>
Project Outcomes and Impact	53
<b>Way Forward</b>	<b>56</b>



# LIST OF FIGURES

Figure 1: CSR Objectives of Sun Pharma	1
Figure 2: Maps representing Baramati in Pune district of Maharashtra State, India	2
Figure 3: Stakeholders of the Study	6
Figure 4: Students' understanding of the purpose of research laboratory	9
Figure 5: The AAAQ Framework	19
Figure 6: Gender distribution of the student participants	19
Figure 7: Social category of the students presenting social accessibility	20
Figure 8: Course diversity in the student sample	21
Figure 9: Faculty teaching at various degree levels	22
Figure 10: Usage of lab as per students' year of study	25
Figure 11: Students' levels of engagement with the research laboratory	26
Figure 12: Various ways in which Faculty are using research laboratory	28
Figure 13: Overall satisfaction with the research laboratory	31
Figure 14: Aspects contributing to satisfaction for Faculty	31
Figure 15: Ratings of safety arrangements in the research laboratory	32
Figure 16: Rating of the quality of consumables by students and teachers	33
Figure 17: Outcomes of advanced research laboratory	37
Figure 18: Effects of research laboratory on students	38
Figure 19: The OECD DAC Evaluation Criteria from OECD.org	49
Figure 20: Key Outcomes of the Project	52





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We would like to thank all the participants at ADT, Krishi Vigyan Kendra (KVK), Bhimthadi Foundation, and community members in Baramati for their complete cooperation, time, and sharing their experiences and insights that have enriched this report.

We hope this report presents deeper insights on the impact of the CSR project and empowers more rural and research communities through the research and development facility.

**Dr. Priyanka Korde, Ph.D.**  
Co-founder & Partner  
Pluriversal Research and Action (PRA)



# ABBREVIATIONS

AAS	Atomic Absorption Spectrophotometer
AAAQ	Availability, Accessibility, Acceptability and Quality Framework
ADT	Agricultural Development Trust
CoE	Centre of Excellence
DAC	Development Assistance Committee
DEI	Diversity, Equity, and Inclusion
FGD	Focus Group Discussion
FPO	Farmer Produce Organization
HP-LC	High-Performance Liquid Chromatography
KVK	Krishi Vigyan Kendra
LC-MS	Liquid Chromatography–Mass Spectrometry
NGO	Non-Governmental Organization
OECD	Organisation for Economic Co-operation and Development
PhD	Doctor of Philosophy
SHG	Self-Help Group
SMS	Subject Matter Specialist
STEM	Science, Technology, Engineering, and Math



# EXECUTIVE SUMMARY

Sun Pharmaceutical Industries Limited ('Sun Pharma'), a leading global specialty generic pharmaceutical company, implemented a CSR Project 'Infrastructural Development for Pharma Research Laboratory' by setting up specialized equipment for carrying out scientific, dairy and agricultural research, implemented by Agricultural Development Trust (ADT), Baramati. The Social Impact Assessment Report of this project emanates from a robust, multi-stakeholder methodology, rich field data, participant narratives, and a comprehensive analysis of the findings keeping 'People at the Centre of Development'. This mixed-methods study found the project to be highly impactful with a multi-pronged impact created and felt by multiple stakeholders, such as farmers, women entrepreneurs, students, faculty, Krishi Vigyan Kendra, and so on. The study revealed a holistic impact of the research laboratory set-up, that is social, economic, environmental, health, and educational impacts. The outcomes and impact of the project were assessed along the AAAQ framework and OECD DAC Evaluation criteria revealing the robust design and implementation of the project.

The study brought some powerful voices describing the impact of the research laboratory from applied research to the agricultural fields, entrepreneurship, environment, and much more. These showcase the effectiveness of equipment like LC-MS, AAS, and others in testing soil, milk, water, and products of farmers, women SHG members, entrepreneurs, by providing opportunities to the faculty and students to conduct research that directly influences the practices of farmers and industry bodies to adopt better products and techniques.

Indicators	Quantitative Findings	Qualitative Findings
<b>Availability &amp; Accessibility</b> (Social & Administrative Accessibility)	<ul style="list-style-type: none"> <li>70.6% women students</li> <li>49.2% students from marginalized backgrounds</li> <li>68.4% faculty from marginalized backgrounds</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging research ecosystem</li> <li>Multi-stakeholder design</li> <li>High community access &amp; reach through minimal protocol; no/ low charges; 100% accuracy; saves time</li> <li>Exposure of all students &amp; faculty on the sophisticated equipment</li> </ul>

“

*All the facilities are very good, reports are excellent. There is complete accuracy in the testing facilities. Earlier, when this facility was not available locally, we would go to another city for testing. We had to go very far, 50 km away. And we had to incur very high fees – a test for Rs. 200 here cost us Rs. 500-600 there. We have got milk tested when needed. When our cows get mastitis then to ascertain exactly which type of bacterial infection they have, we get milk samples tested at ADT. Based on the type of infection, we also understand the type of treatment we need to give to the cow. Sometimes unnecessarily a higher antibiotic is given when the infection is unknown. From the report if we get to know that it is E.coli then we give the correct antibiotic accordingly.*

**- Dairy Farmers, Yesgar Basti, Baramati**

Indicators	Quantitative Findings	Qualitative Findings
<b>Acceptability (Information Accessibility &amp; Usage)</b>	<ul style="list-style-type: none"> <li>◆ 80.2% frequent usage by students</li> <li>◆ 63.1% frequent usage by faculty</li> <li>◆ 96.8% students used/ assisted/ observed the labs</li> <li>◆ 94.7% faculty use lab for student research projects</li> <li>◆ ~78-84% faculty use lab for department/ independent research projects</li> </ul>	<ul style="list-style-type: none"> <li>◆ Hands-on training of students &amp; faculty on using the equipment</li> <li>◆ Involvement of students in applied research to address real, field issues</li> <li>◆ Inter-disciplinary &amp; innovative research experiments</li> <li>◆ Trainings organized for faculty and students of other educational institutions</li> </ul>



*The cost of dry fodder is high and the availability is scarce. Further, here the sugarcane trash (bagasse) was burnt that causes high carbon emissions. These two problems were discussed, and we (group of students) were selected to work on this problem. We arrived at the conclusion that dry fodder can be replaced by bagasse. But, bagasse contains lignin that decreases the lactation capacity of the cows, which needed to be reduced. We worked on collecting samples to reduce lignin from bagasse using biological techniques to make it cost-effective. We started our experiment and got the best results. We have done toxin and nutritional analysis of the product developed at the lab and are getting favorable results.*

– Student, M.Sc. Microbiology

Indicators	Quantitative Findings	Qualitative Findings
<b>Quality (Satisfaction Levels)</b>	<ul style="list-style-type: none"> <li>◆ 95.2% students' satisfaction levels</li> <li>◆ 100% faculty satisfaction levels</li> <li>◆ 42.1% faculty satisfied with lab use for research opportunities</li> <li>◆ ~94-98% students &amp; faculty highly rated safety arrangements at the lab</li> <li>◆ ~93-97% students &amp; faculty highly rated availability &amp; quality of consumables</li> </ul>	<ul style="list-style-type: none"> <li>◆ Higher motivation of students &amp; faculty towards research</li> <li>◆ Dairy &amp; Agri farmers highly satisfied with animal disease diagnosis, milk &amp; feed testing, soil &amp; water testing and advisory support facilities by ADT/ KVK</li> <li>◆ Women SHG members &amp; entrepreneurs highly satisfied with nutritional testing and support from ADT/ NGO</li> <li>◆ Community participants recounted benefits of improved reliability of their products through nutritional testing</li> </ul>



*Based on my soil testing, KVK advised me to water the crops only once a month as the water here is polluted by milk and sugar industries. They also informed us that we must use ordinary grade fertilizers; we do not need superior grade. They explained polluted water and urea are spoiling the soil. Urea is most commonly used by the farmers, so we stopped using it. This way it will slow down the deterioration of soil. Now, my crop produce has doubled in just 4-5 years. In fact, we reduced the land area, yet the produce increased. For instance, if we were producing 1000 tonnes of sugarcane in 20 acres of land, we are able to now do that in just 15 acres.*

– Farmer, Khandaj, Baramati

Indicators	Quantitative Findings	Qualitative Findings
Quality (Outcomes)	<ul style="list-style-type: none"> <li>Outcomes of research facility as per students &amp; faculty:</li> <li>~84-95% new research experiments undertaken</li> <li>Over 81% high quality research output</li> <li>Over 71% research trainings undertaken</li> <li>~54-79% high quality research papers published</li> <li>~31-68% patents/ grants/ awards</li> <li>~77-90% students inclined towards research field/ career</li> <li>~89% faculty find improved quality of research</li> </ul>	<ul style="list-style-type: none"> <li>Labs-ADT Colleges-KVK-Community connect made it possible to innovate sustainable solutions for issues of farmers from agriculture to animal health and dairy products</li> <li>Labs-ADT Colleges-NGO-Community connect maximized reach of nutritious products of women SHGs</li> <li>Labs-ADT-Startups-Entrepreneurs connect helped them launch high-quality products</li> </ul>



*This year I sold two tonnes of only mango pickle. The testing has greatly benefited us as we can test our products and know about the contents. We can now tell our customers that our products are preservative-free as they have been tested. I am also training women all over Maharashtra wherever I am invited, on preparing chutneys, pickles, hotel-style gravies, and vegetables and taking orders for all these food items. I can take a training for easily up to 50 women at a time, and they have got excellent results. I give them continued guidance even after training to set up and grow their business.*

– SHG Member – Spices and Pickles Business, Nimbut

The study also looked at how the outcomes of the project were achieved against the planned objectives and project deliverables presented as follows:

Objectives	Outcomes & Impact
To provide facilities for clinical testing of human and veterinary medicine	<ul style="list-style-type: none"> <li>Highly accessible research facility made available to students, faculty, industries, researchers, and rural, marginalized communities of Baramati</li> <li>8214 clinical testing done so far in animal disease diagnosis lab, nutrition lab, and LCMS/MS</li> <li>Over 1500 students have taken training and internships at the laboratory</li> <li>Total 240 students (120-D.Pharm.; 120-B.Pharm.) benefited from these research facilities every year</li> <li>More than 300 professors from other educational and research institutes have taken advantages of the advanced equipment in the research laboratory</li> <li>Testing facilities started for food toxin, pharma drug, soil, animal diseases, and feed sample: <ul style="list-style-type: none"> <li>© Nutrition Lab – Crude Protein (CP), Acid Insoluble Ash (AIA), Crude fat/ Ether extract/Oil (EE), Crude fiber (CF), Dry matter (DM), Moisture Total Ash (TA)</li> </ul> </li> </ul>
To provide pesticide testing facility for agriculture produce	



	<ul style="list-style-type: none"> <li>⊙ Animal Disease Diagnostic Lab – Blood Testing (Hemoglobin, TLC, TEC, Lymphocytes, Neutrophils (band cells), Eosinophil's, Monocytes, Basophiles, Platelets), Theileria Testing, Babesia Testing, Pregnancy Testing, Brucellosis Testing by ELIZA, Milk Testing (Mastitis), Foreign Body Testing, Bilirubin Testing</li> <li>⊙ Analytical Lab – Drug Analysis, Toxicity Analysis, Melamine, Aflatoxin [g1, g2, b1, b2, m1, m2] Testing, Pesticide Residue Analysis, Aflatoxin Analysis, Heavy Metals Analysis, Trace Minerals Analysis</li> </ul>
<p><i>To develop formulation of medicines associated with human and animal health through plants</i></p> <p><i>To develop formulation of natural animal or plant based health care and hygiene products for instance use of goat milk in cosmetics products</i></p> <p><i>To develop formulation of herbal medicine for human and veterinary use</i></p>	<ul style="list-style-type: none"> <li>◆ Innovative research experiments undertaken and solutions provided to dairy/agri farmers through KVK</li> <li>◆ 19 patents on various herbal drug technology filed by startups</li> <li>◆ 08 technologies have been commercialized</li> </ul>
<p><i>To provide consultancy for pilot scale medicine development for startups/ entrepreneurs</i></p>	<ul style="list-style-type: none"> <li>◆ Incubated social startup has provided standardization and credibility of food products through nutritional analysis for rural women entrepreneurs</li> <li>◆ 44 start-ups have been supported so far since its inception through the laboratory support related to agriculture, food-tech, socio-economic, health, and women</li> <li>◆ On-boarding of more than 48 world-class mentors to support startups</li> <li>◆ Around 10 startups secured funding from Government grants/ Incubator seed funds</li> <li>◆ 07 start-ups have been successfully graduated</li> <li>◆ 19 high-quality patents filed by incubated startups</li> <li>◆ More than 300 employments generated by incubated startups of this project</li> </ul>
<p><i>To collect, process and disseminate scientific data related to humans as well as animal health based on their geographic presence and studying their location based variance</i></p>	<ul style="list-style-type: none"> <li>◆ 300 research papers are published in refereed research journals including Scopus Index, Web of Science Index and UGC-CARE listed journals</li> <li>◆ 52 papers are in the pipeline</li> </ul>
<p><i>To work as a bridge between academia and the corporate sector in the plant based medicine</i></p>	<ul style="list-style-type: none"> <li>◆ Tie-ups with national and international reputed corporate and academic partners and incubators around the globe</li> <li>◆ ADT has tie-ups with 04 Pharma, Chemical and Herbal industries</li> <li>◆ Feed samples are tested for renowned MNCs like Altech Biotechnology, Corteva, Baramati Agro Pvt. Ltd, Vetoquinol Pvt. Ltd, Schreiber Dynamix Ltd, Bayer Corporation, Salauddin Poultries, A.P, Swaraj Serum Pvt. Ltd, Advantage Agri Pvt. Ltd.</li> </ul>

Certain aspects are working effectively in this project, making it more impactful. These need to be highlighted and continued by the implementing partner:

- a. Availability of Sun Pharma's high-quality, specialized research equipment in rural area
- b. Leadership vision to develop a holistic research ecosystem with multi-stakeholders like KVK, Bhimthadi Foundation, students, faculty, startups, SHGs, farmers, and industries.
- c. Easy and complete accessibility to the laboratory with hands-on training and usage to the stakeholders
- d. Interdisciplinary environment for applied research
- e. A bottom-up approach to identify problems and a strong commitment to innovate and address community concerns
- f. Experts and services attached to the labs to guide the communities with evidence-based sustainable solutions
- g. Developing a scientific temperament among rural communities and a social temperament among scientific communities

To strengthen the project and make it more impactful, specific recommendations have been put forth in the areas of higher research engagement, academic writing and publishing, material and human resources, community impact, environmental research and advocacy, and quality accreditation.



Picture 1: Agricultural Development Trust - Atal Incubation Centre





Picture 2: Flower Show at Krishi Vigyan Kendra, ADT, Baramati



# INTRODUCTION

India has the world's third largest pharmaceutical industry by volume with a market size of around USD 50 billion and poised to grow exponentially – estimated at USD 120-130 billion<sup>1</sup>. To achieve this, there is a need to strengthen the industry at all levels starting with education and research – the fundamental pillars to ensure quality output with quantitative reach. In this context, Sun Pharmaceutical Industries Limited, under its Corporate Social Responsibility (CSR) initiatives, implemented the 'Infrastructural Development of Pharma Research Laboratory' in Baramati, Maharashtra.

The Social Impact Assessment looked at and beyond the planned and specified purposes of the laboratory and its specialized equipment through a holistic and innovative approach. The advanced research laboratory set up by Sun Pharma was aimed at research and development in varied fields of Agriculture, Pharmacy, Microbiology, Veterinary, Life Sciences, Health Systems, and Entrepreneurship. The study adopted and adapted the international AAAQ framework and OECD Evaluation Criteria to evaluate the availability, accessibility, acceptability, quality, and impact of the project in creating a research ecosystem and making quality services accessible to the most marginalized rural communities through a multi-stakeholder approach.



Figure 1: CSR Objectives of Sun Pharma

## About Sun Pharmaceutical Industries Limited

Sun Pharmaceutical Industries Limited ('Sun Pharma')<sup>2</sup>, is a leading global specialty generic pharmaceutical company. The company strongly believes in strengthening partnerships with its stakeholders to augment value creation across communities. Built on the vision of 'Reaching People, Touching Lives,' Sun Pharma has robust CSR programs across major areas, such as health, education, water, and sanitation to environment conservation, rural development, and disaster relief. These are guided by a comprehensive CSR Policy and CSR Committee to ensure effective implementation. Further, Sun Pharma's CSR vision and mission support innovative and inclusive CSR interventions across underserved and marginalized communities.

<sup>1</sup> <https://pib.gov.in/PressReleasePage.aspx?PRID=1960812>

<sup>2</sup> <https://sunpharma.com/csr/>

## About Agricultural Development Trust (ADT), Baramati

The CSR Project has been implemented at and by the Agricultural Development Trust (ADT), Baramati<sup>3</sup>. ADT was established in 1971 to address the agricultural concerns of the then-drought-prone region of Baramati by training the farmers to adopt scientific methods and practices in water conservation and cropping. ADT further expanded its activities beyond agriculture to support dairy, poultry, nursery, agri processing, entrepreneurship, veterinary, and industries. ADT initiated schools and colleges to encourage farmers and other communities to educate girls and women from the rural areas in Maharashtra.

Currently, the ADT campus spread across 110 acres houses educational institutions for boys and girls, Krishi Vigyan Kendra (KVK) or Farmers' Science Centre, Centres of Excellence for Dairy and Vegetables for farmers and dairies, Bhimthadi Foundation for Women Self Help Groups (SHGs), and advanced research laboratory set up by Sun Pharma for the research and development in the fields of Agriculture, Pharmacy, Microbiology, Veterinary, Life Sciences, and Health Systems. ADT, Baramati is a reputed institution and has expertise in pharmacology, toxicology, pharmaceutical chemistry, bioinformatics and pharmaceutical biotechnology.

## About Baramati

Baramati<sup>4</sup> is a tehsil and a municipal council city in the district of Pune, Maharashtra. The city is situated about 100 km south-east of Pune and divided into 25 wards. As per Census 2011, the population of Baramati Municipal Council was 54,415 and that of the Baramati Tehsil was 4,29,600. Baramati is majorly agriculture-based and known for its sugarcane crop and sugar factories. Other crops include grapes, jowar, cotton, and wheat and other industries include textile, dairy, and food products.

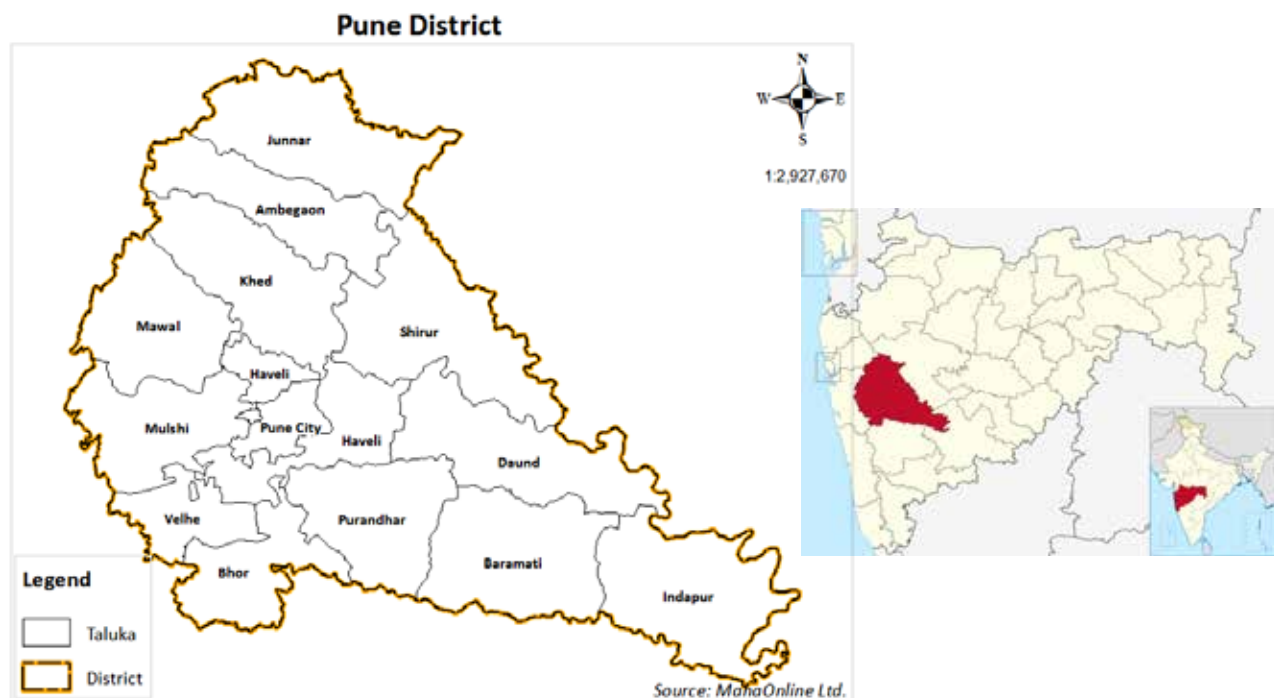


Figure 2: Maps representing Baramati in Pune district of Maharashtra State, India. Image Sources: Maharashtra State Data Bank; Wikipedia

3 <https://agridevelopmenttrustbaramati.org/>

4 Census of India, 2011

## About the Project

The project has been undertaken by Sun Pharma to set up a pharma research laboratory at the scientific research institute, ADT's campus at Baramati, Maharashtra for carrying out scientific, dairy and agricultural research. The Company has contributed INR 50 million in two equal instalments of INR 25 million each in FY 2020-21 and 2021-22 towards the project that has been implemented by ADT, Baramati. The setting up of the laboratory was completed in 2021-22 and Sun Pharma commissioned this third-party Social Impact Assessment study as per the compliances of Section 135 of the Companies Act, 2013 in 2023-24.

The research laboratory is constructed in approximately 22,000 square feet of new and improved space in the ADT's campus – specifically, the Centre of Excellence for Dairy for research and development activities, equipped with sophisticated and specialized analytical equipment as part of Sun Pharma's CSR Project. The purpose of research laboratories according to the company's CSR Annual Report 2020-21 is:

*“The purpose of the lab is to provide facility for research to students, teachers and young entrepreneurs and facilitate start-ups through incubation.”*

Following table presents the list of instruments installed in the research laboratory:

**Table 1: List of Instruments Provided at the Research Laboratory, ADT**

S. No.	Name of Instrument	Make
1	Micro Kjheldhal's Machine	Gerhardt
2	Soxhlet's Ether Extract Apparatus	Glassco
3	Fibertec Machine	Gerhardt
4	Hot Air Oven	Newtronic
5	Muffle Furnace	Cintex
6	Vacuum Pump for Fiber Analysis	Gerhardt
7	Infrared Reflectance Spectroscopy	Bruker Alpha 2
8	Distillation Unit	Gerhardt
9	Atomic Absorption Spectrophotometer	Thermo Fisher
10	Weighing Balance	Radwag
11	Digestion Chamber with Hot Plate	Gerhardt
12	LC-MS	Shimadzu
13	Differential Scanning Calorimetry	Setline
14	Dissolution Apparatus	Labindia

Specifically, the lab was developed to support research and product development in: formulation, development, and testing of plant-based and herbal human and veterinary medicines; natural animal and plant-based health care and hygienic products; consultancy for pilot-scaling medicine development for start-ups and entrepreneurs; collect, process, and disseminate scientific data on human and animal health; connect academia and corporate in plant-based medicine; and pesticide testing facility for agriculture produce.





Picture 3: AAS equipment at the research laboratory at ADT, Baramati

# METHODOLOGY

The study was conducted developing comprehensive objectives and data collection methods to holistically understand the impact of the CSR project of Sun Pharma.

## Objectives of the Social Impact Assessment Study

- ⦿ To understand the availability, accessibility, and usage of the equipment in the research laboratory set up by Sun Pharma at Agricultural Development Trust (ADT), Baramati
- ⦿ To assess the impact of the services experienced and perceived by the multiple stakeholders using the equipment for the testing of their products
- ⦿ To assess the processes and mechanisms followed by the implementing partners
- ⦿ To provide suitable recommendations to strengthen the projects

## Methodology of the Study

The study adopted an exploratory research design with a mixed-methods approach including both quantitative and qualitative methods. The study collected primary and secondary data from various stakeholders. The fieldwork involved quantitative (n=145) and qualitative (n=75) data collection from a total of 220 participants who were impacted by/implementing the project, described in Table 2.

- ⦿ The secondary data and interactions with the Project Coordinator at ADT formed the base of the study. The data recorded by ADT was used to understand the types and uses of equipment provided by Sun Pharma, the stakeholders covered, the implementation details, and the

Picture 4: Interaction with Undergraduate Students at ADT, Baramati



outcomes of the project.

- ⊙ Based on the secondary data, discussion with the Project Coordinator and the intended goals of the project, the sample was finalized to reach out to the project stakeholders and design multiple tools of data collection for each stakeholder.
- ⊙ In the primary data collection, the data was collected from multiple stakeholders, as mentioned in Figure 3.



Figure 3: Stakeholders of the Study

## Methods and Tools for the study

**Secondary Data analysis:** The data compiled by ADT for various works undertaken using the laboratory equipment were analyzed to understand the groups impacted and sectors of work.

**Quantitative Data:** One self-administered questionnaire each was prepared for students and faculty at ADT, Baramati to collect data about their access, usage, experience, and feedback of the facility.

**Qualitative Data:** Semi-structured interviews, group interviews, and focused group discussions were conducted with various ADT officials, faculty, students, PhD scholars, SHG groups, farmers, KVK officials, start-up incubates, Bhimthadi Foundation’s officials to gain deeper insights about the access and usage of equipment.

Table 2: Details of Sample Covered in the Study

S. No.	Location	Participants	Sample Covered	
			Quant.	Qual.
1	ADT Colleges	Students	126	19
2	ADT Colleges	Faculty	19	29
3	ADT	ADT Officials	-	8
4	KVK	KVK Officials	-	3
5	ADT Incubation Centre	Start-up Staff & Incubates	-	3
6	Bhimthadi Foundation	NGO Staff, Food Quality Control	-	2
7	Villages, Baramati	Women Entrepreneurs (3 SHGs of 15 members)	-	4
8	Villages, Baramati	Farmers (Animal husbandry, Agriculture)	-	7
<b>Total</b>			<b>145</b>	<b>75</b>
<b>GRAND TOTAL</b>			<b>220</b>	



## Data Analysis and Reporting

The quantitative data was cleaned and analyzed using Statistical Analysis Software Platform (SPSS) (Version 22) software. Descriptive analysis of the data is presented with frequencies and cross-tabulations as relevant. The qualitative interviews/FGD recordings were thematically coded by listening to each interview and FGD. Both datasets were triangulated, presenting the descriptive and thematic analyses for a comprehensive assessment of the impact of the laboratory developed by Sun Pharma at ADT.

The impact has been presented through international frameworks such as the Availability, Accessibility, Acceptability and Quality (AAAQ) framework and the OECD DAC Evaluation Criteria for development projects adapted for this assessment. The report presented emanates from a robust, multi-stakeholder methodology, rich field data, participant narratives, and a comprehensive analysis of the findings keeping 'People at the Centre of Development'.



Picture 5: Presentation about start-ups incubated at ADT-AIC

# FINDINGS

## Need and Purpose of the Project

Sun Pharma set up research and development infrastructure in the form of specialized analytical laboratories to undertake scientific, dairy, and agricultural research at ADT, Baramati. The purpose of the research laboratory according to the company's 2020-21 CSR Report:

*“The purpose of the lab is to provide facility for research to students, teachers and young entrepreneurs and facilitate start-ups through incubation.”*

Specifically, the lab was developed to support research and product development in: formulation, development, and testing of plant-based and herbal human and veterinary medicines; natural animal and plant-based health care and hygienic products; consultancy for pilot-scaling medicine development for start-ups and entrepreneurs; collect, process, and disseminate scientific data on human and animal health; connect academia and corporate in plant-based medicine; and pesticide testing facility for agriculture produce.

The social impact assessment found that at the ground-level usage of the laboratories and its specialized equipment went beyond the planned and specified purposes through innovative ways. Interestingly, each stakeholder explained different purposes of the laboratories from the perspective of their roles and needs. But, a commonality was found in the responses of all stakeholders that they saw the purpose of the labs was to use research and development to devise solutions for the socio-economic development of communities and environmental development.



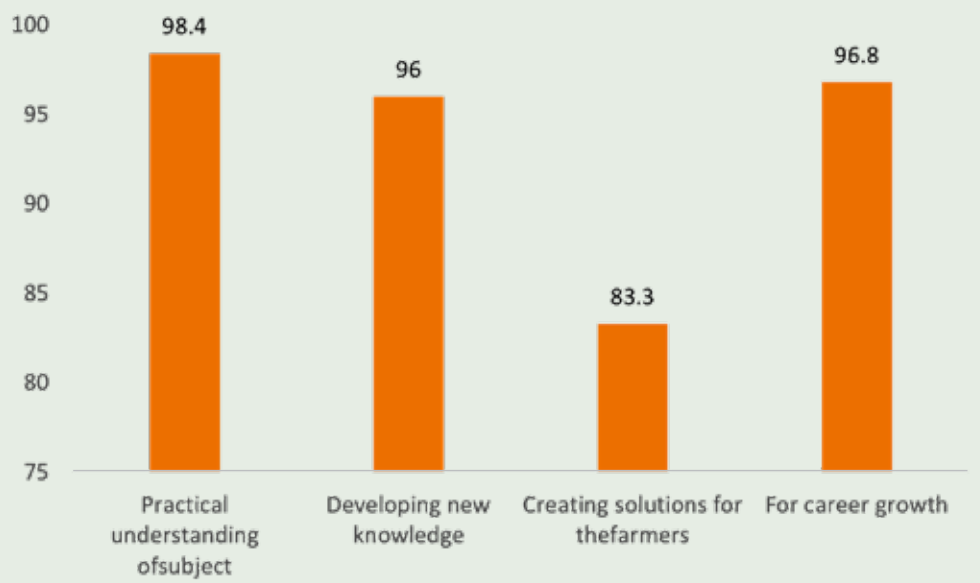


Figure 4: Students' understanding of the purpose of research laboratory

For instance, more than 80 per cent of student participants stated the labs were developed to 'create solutions for farmers'. This indicates the students' understanding of the application of their research to grassroots problems and the need to innovate solutions for the farmers. Nearly all the students (98.4%) described the purpose of the labs as 'for practical understanding of the subject'. This was closely followed by 'career growth' and 'developing new knowledge'.

The Director of ADT shared how these laboratories are important to tackle the issues faced by farmers and entrepreneurs. Also, students and faculty from the region are exposed to the labs to conduct significant experiments and develop research acumen.

This was corroborated by various participants of the study who shared the challenges they faced in the absence of such research laboratories in other institutes. This underlined the need for such labs in the Baramati region.



Picture 7: Interview of Prof. Nilesh Nalwade, Project Director, ADT



“

Here, we have LC-MS and HPLC – so that makes a huge difference. In my M.Sc. project at my previous college, I had to stop at isolation and purification at the lab level. If I had the instruments there, I could have definitely done more. I could have purified the enzymes with LC-MS and I could have gone for patent filing also. If I had got positive results on its effects, then the product would have been in the market also.

- PhD Scholar 1st Year, Microbiology

“

There were limitations in research topics when I studied M. Pharm. For my Master's research, I needed HPLC, HPTLC, and LC-MS. But the institute where I studied did not have LC-MS. So, there is certainly a benefit here to have such machines if I want to undertake further research on my subject area. I am learning about new topics and I can study them in an in-depth manner here. Along with students, we are also getting to learn new things.

- Faculty, Pharmacy

Participants gave illustrations of their research to demonstrate the need and significance of using specialized analytical equipment like LC-MS, AAS, and PCR for their research. Each equipment has a different purpose based on the kind of sample that needs to be tested – if it can be turned into liquid and gas form or if it is in solid, or powder form.

Further, field experiments related to the fertility of soil and problems of soil are conducted using specialized equipment like AAS. They mention the need for specific equipment like spectrophotometer and digestion unit. Participants also needed the equipment to isolate microorganisms to develop bio-fertilizers, identify safer or pesticide-free solutions, and improve soil health and crop yield for safe and sustainable agricultural products. The equipment was also necessary to develop new veterinary drugs for specific animal diseases.

Picture 8: Pharmacy students presenting design of their experiment





“

*I need to know what my microorganism is producing to degrade the silica which is there. The talk between the organisms is called Quorum sensing and they produce Quorum sensing molecules. LC-MS is used to detect if these molecules are being produced by my organisms. And for soil analysis, AAS is very important. They find out the amount of silica concentration present in the soil or plant if I give them the soil and crop samples. Now, I have isolated all the organisms, and to do the molecular analysis of the organisms, I need amplified DNA for which I need PCR.*

**- PhD Scholar 2nd Year, Microbiology**



“

*I have worked on salinity stress mitigation in soil. I isolated a different plant material and analyzed different chemical components present in the material using LC-MS, and I am using the extract to overcome the salinity stress. Till now we have got positive results and the plant has tolerated the salinity stress so far. We are doing physical, morphological, and molecular analyses of the plant to see the effects. The Chemistry teacher is helping with these analyses.*

**- Faculty, Botany**

The ADT participants shared that women SHGs preparing food products were not aware of the quality aspects of their products – specifically which components are surplus or lacking in their products. They were keen on increasing sales and the reach of their products but were not aware of the requirements of quality standardization to scale up and gain entry into the urban markets. The nutrition analyzers at the labs are used to evaluate the food quality of their products and suggest modifications to the recipes.

“

*Women felt that I should do some home-based work. They did not have the required skills such as, how to reduce moisture content in a product and increase its shelf-life so it can be sold more. So, we give them training to develop these skills.*

**- Food Quality Control Expert,  
Bhimthadi Foundation**

“

*We come across women who have unique products that would do really well with some modification and branding. If they want to sell these products in supermarkets in a city like Pune, then the contents need to be certified – quantity of protein, carbohydrates etc. If its components are authorized, then we can do branding and it will be accepted in the market.*

**– Project Coordinator, ADT**



Picture 10: Interview of Mr. Sagar Shinde, Project Coordinator and HoD-Pharmacy , ADT

Further, the Project Coordinator shared that there was no testing facility in Baramati and if any sample was to be tested, that used to go to Pune or Mumbai. They were continuously working with farmers who had raised a lack of testing facilities as a concern. Also, the cost was high in these labs.

All the interventions with farmers, dairies, or SHGs are related to quality standardization of toxins-free plant and animal-based products leading to healthy products, better reach in the market, and higher production. Moreover, developing and testing new drug formulations and disseminating such research holds benefits for the scientific community and the wellbeing of humans and animals at large. Understanding these varied needs, the advanced research laboratory with advanced analytical equipment at the scientific research institute of ADT was proposed to Sun Pharma.

“

*We were clear in our objectives right from the start that we wanted to develop this R&D facility and it will go till the end-users. It will hold benefits for education, farmers, corporate sector, and there will be an overall social impact as well. We were planning for multiple labs and the analytical machines have dual components of testing for humans and animals. So, the idea was that the machine should be continuously engaged and everyone should benefit from it.*

**– Project Coordinator, ADT**

This was done considering multiple needs and to create an ecosystem that handholds farmers, entrepreneurs, women SHGs, and others. Further, the equipment list was created keeping highly sophisticated instruments in mind as their results are considered valid by international standards. The Agriculture and Pharmacy colleges of ADT are engaged in research and development experiments that require advanced technologies with higher accuracy to file patents, and copyrights, publish articles in journals of international repute, and based on these apply for awards and grants. Creating such a robust and vibrant research ecosystem with specialized equipment requires methodical planning and implementation in a project mode.





**Picture 11:** Women SHG members preparing their food product in Someshwar village, Baramati

## Project Implementation Model

### *The Research Ecosystem – Application of the Research*

The study found a comprehensive eco-system built for applied research at ADT, Baramati. All the departments and officials of ADT work in tandem to conduct experiments, produce knowledge, and implement solutions to support farmers, young entrepreneurs, and SHG members. The ideas and proposals are discussed in joint stakeholder meetings to understand their scope. The problems faced by farmers engaged in agriculture and animal husbandry, SHG members, industries, faculty and students from other colleges, and entrepreneurs are connected with the labs developed at ADT with the support of Sun Pharmaceuticals Industries Limited. The research facilities combined with advisors from Krishi Vigyan Kendra (KVK), Bhimthadi Foundation, and ADT colleges provide a complete platform to all these stakeholders for research and scale-up to solve contemporary issues.

“

*The Subject Matter Specialists from KVK share with us the problems faced by farmers. And then according to the problem, we discuss and design experiments, develop objectives, and distribute an experiment among different groups of PG students, mainly on agriculture. The overall project may take more than a year. We give a part of the project to the students, they submit the results and it contributes to the overall objectives. Like M.Sc. students are doing the Bagasse project right now.*

*– Faculty, Microbiology*

The culture in the institute allows students to own the facilities and use the lab equipment wisely and with utmost care. The students learn about equipment through orientation and training programs and further by preparing samples and testing them on equipment themselves, under the guidance of the faculty and lab technicians. This gives them hands-on experience on such high-end equipment, boosting their confidence, knowledge, and career prospects. The faculty explained that from the first year, they encourage students to conduct research on the real, ground-level challenges that are on-field, in the local area or even global contemporary issues.

“

Firstly, we see that students should get to research a topic of their interest. Secondly, we take up research on crucial issues that come up related to pest management in the Baramati area or Maharashtra. For instance, we found some silage residues in our lab and continue to find more. There is a pest called Fall Armyworm that attacks maize crops. To protect their crops, farmers pervasively use a broad-spectrum pesticide and later the same crop is used for silage. This (silage residue) was detected at our lab. So, we have put forth this challenge to the students to work on residue-free pest management of Fall Armyworm through in-lab and on-field research.

– Faculty, Agriculture Entomology

## A Multi-Stakeholder Approach

A multi-stakeholder approach has been designed by ADT to make the specialized equipment accessible to a wider population and for a larger impact. A unique aspect of the project implementation was that all the stakeholders, especially the farmers and women entrepreneurs, were provided with advisory support to understand and course-correct based on the test results.

“

Most farmers access the Centre of Excellence (CoE) Dairy for animal disease testing because of a variety of diseases that affect them, such as the Lumpy skin disease outbreak in the last couple of years. The CoE does not stop at testing and providing reports, but goes further into advisory and counselling of farmers to make them understand the cause and effect of feed on animals or an ingredient in a food product. For instance, if there are issues with feed purchased by farmers from the market, the CoE advises them to change the feed quality.

– ADT Official (CoE Dairy)

Further, ADT has appointed Subject Matter Specialists (SMS) at KVK who visit farmers in villages, inform them about various projects going on in KVK and train them in various new techniques and technologies. These technologies on seed, feed, soil, cropping techniques and patterns, and silage are demonstrated to farmers by SMS in the villages and at KVK. Based on these demonstrations, farmers replicate new techniques in their plots of land and reap the benefits of higher yield. The KVK located in ADT covers around 143 villages in seven tehsils of Maharashtra. The trials and demonstrations of various technologies and procedures are conducted in around seven to eight villages.

“

We go to the villages and then we take up a program and advise what to do, like testing the fibrosilosis for toxins, how to make residue-free milk, and how we can avoid toxins in the field.

– Subject Matter Specialists, KVK

“

Our veterinary doctors visit each village and demonstrate how silage is prepared based on the technology developed at KVK. We have prepared silage culture, and one-litre culture is enough which they can procure from us Rs. 40-50. That culture can be sprayed on maize. The technique is about how to prepare silage layer-by-layer.

– Project Director, ADT





Picture 12: Interaction with Subject Matter Specialists (SMS) at KVK

The participants added that consultation with the SMS is very crucial in this whole process as they are the subject experts working on-field closely with the farmers. They identify the major issues faced by the farmers and deliberate on them in the regular meetings with the faculty.

Based on these deliberations, they jointly decide to work on research experiments and mitigate the problems. Through these specialized research findings, issues can be explained and demonstrated in a better way to the farmers. For instance, in the ongoing research on pesticide residue in crops, farmers who are into silage production have been informed that they should avoid using certain pesticides as faculty/student research studies have found them to be harmful. These pesticide residues have a harmful impact when it is consumed by cows and it has been detected in cow-milk as well.

“

*Earlier, we would sprinkle fertilizers randomly, following whatever our elders would tell us. But now we use exact quantities as KVK has told us. There are specific proportions needed for everything. They give us a complete schedule entailing what to use, how much, and when. We stopped using some harmful pesticides and continue to use some others, but in much lesser quantities, as much is required to address the problem. If we share a problem we are facing with KVK, then they provide us with solutions.*

**- Farmer, Khandaj, Baramati**

The ADT officials shared that manufacturing companies in the nearby areas are also making use of LC-MS machines for their product testing, such as feed production, veterinary feed, and checking of toxin levels in silage. There are stricter norms and companies want to comply with them to make the best out of their business. They use the labs for quality standardization of their products with fewer toxins and high nutritional values. Further, the facility is used by milk-producing cooperatives and FPOs to check the toxin levels. One of the KVK officials shared that they were able to analyze merely nutritional information earlier, but now they could analyze and disseminate critical information on toxin levels in products and the source of the same.

“

*We visit the villages proactively to promote and create awareness about the facility among the farmers. We inform the farmers regarding soil testing, leaf petal testing, irrigation water testing, potable water testing, soil health and plant nutrition, water management, and drip irrigation. We also organize training programs, field days, and demonstrations of various technologies.*

**– Subject Matter Specialists, KVK**

“

*Last year, a farmer brought a ghee sample for testing and we found some pesticide residue in that even when the farm was maintained organically. We investigated and found that he procured animal feed from different sources and through that the milk product was affected. So, this is how farmers at the local level are benefitting from these machines.*

**– ADT Official (CoE Dairy)**

KVK officials informed about multiple initiatives they had taken to reach out to farmers to support them in agriculture and animal husbandry. Some of them are social media, a mobile application called 'Krushik', agro exhibitions, community radio, and village campaigning. Farmers visit KVK during Krishi Mahotsavs and learn about the evidence-based sustainable agricultural practices that are tested and developed in the laboratories.

“

*We get the benefits of KVK's training programs and seminars. I attended a two-day training on how to increase sugarcane production. Due to polluted water, we get less produce. So, they shared do's and don'ts through their programs. They had explained it well. Many farmers are associated with KVK and attend the Krushik Mela in large numbers. The KVK team visit the farmers' plots as well.*

**– Farmer, Khandaj, Baramati**

Further, farmers proactively approach KVK to check the feed they give to their producing animals to get a holistic understanding of the best composition of the feed. The farmers shared that the testing facilities and interventions by KVK have benefited them to change their mindset and adopt a modern and scientific approach to the agriculture and dairy business.

“

*In the last three years that we have been associated with ADT, around 10 training programs have been conducted for the farmers. Generally, one to two programs per year are done and hundreds of dairy farmers associated with our milk collection centres attend them. Also, sometimes the KVK team comes for a study tour of our dairy farms and we guide them.*

**– Dairy Farmers, Yesgar Basti, Baramati**



Picture 13: FGD with Dairy and Agriculture Farmers in Yesgar Basti, Baramati

Research and development on millets is a contemporary and significant need of the day as the awareness about these cereals is growing as climate-resilient superfoods. In this context, new research experiments are being conducted on various types of millets by KVK before replicating them with farmers. The research takes into account contextual factors like salinity in the soil, water scarcity, effects of the products on health, and minimal pesticide use so that it can benefit all the stakeholders – from producers to consumers. The research on millets is also conducted in a multi-stakeholder approach by ADT using the laboratory provided by Sun Pharma and other institutes' research on millets.

“

*We made a material transfer agreement with IIMR, Hyderabad and the scientists sent us 64 different genotypes of millets to check which kind of genotype is suitable in our region because the production is very low. So that's why farmers are hesitating whether they can grow such kinds of millets, whether the market is available, if someone will consume that kind of millet, if so what kind of adverse effects can be there on consumer's health, etc. To overcome all these problems, we conducted some research trials in our farm. We planted 64 different varieties and among a few of the varieties, we found really amazing results. So, presently we are multiplying those varieties. Once farmers become aware of those kinds of varieties, we can distribute the seeds to the farmers.*

**– Faculty, Agriculture**

A key stakeholder connected to the research laboratory is women entrepreneurs through the Bhimthadi Foundation located on the ADT campus. The NGO supports women SHGs in branding and marketing of their products which requires nutritional testing. At present, there are 86 women SHGs registered – covering around 250 women, across the villages of Baramati. The NGO connects the women to the labs for nutritional analysis of their products and support to prepare nutritionally rich, high-quality, and standardized food products.



“

Some want to increase their product's shelf-life and use chemical preservatives instead of natural preservatives. So, we advise them on quality, testing, branding, and labelling for marketing their products. We provide them with back-end support with all this knowledge and accuracy through our research facilities. Training is provided at ADT and also in the villages for collective groups of SHGs. We also support them through our food science experts who have knowledge of food product quality control and help them with certification, modifying the recipes, improving the nutritional value, and increasing the shelf-life of their products.

– Project Coordinator, ADT

Similarly, the ADT incubation centre connects food start-up incubates to the labs where they can test the components of their products and make necessary modifications before they roll them out. The officials from the ADT incubation centre shared how the incubates were unaware of the exact quantity of ingredients in their products and were supported through nutritional testing in a research laboratory. The guidance from the experts helps them in understanding the nutritional analysis and standardizing the quality of their products.



Picture 14: Interaction with Bhimthadi Foundation's official at the AIC-ADT Incubation Centre

## Reach and Quality of the Labs

The Availability, Accessibility, Acceptability and Quality (AAAQ) framework is a transparent tool that can be used to assess how the economic, social, and cultural rights of the people are being realized in a development project<sup>5</sup>. Availability refers to the regular and sufficient availability of the facilities being provided under the project. Accessibility refers to physical, financial, social, information, and other types of accessibility to the facilities that ensure a non-discriminatory approach. Acceptability refers to the project being sensitive to the needs of individuals and marginalized communities, and cultural and ethical practices which make various people comfortable accessing the facilities. Lastly, the framework assesses the quality of the facilities, including skills and knowledge, safety, and ethical practices that are followed to maintain optimum quality in the project.<sup>6</sup>



Figure 5: The AAAQ Framework

In this research, the AAAQ framework helps to understand how the research facility is reaching the various stakeholders, the most marginalized communities, and is easily and equally accessible to all the stakeholders. Therefore, in this social impact assessment, it is imperative to assess if the research equipment and facilities can meet the optimum possible standards of availability, accessibility, acceptability, and quality to a diverse population.

### Social Accessibility

The profile of the participants accessing the equipment indicates that the research laboratory is available to and accessed by gender and social minorities in diverse subject fields. This indicates the effectiveness of Sun Pharma's CSR project as the goal of 'last mile approach' and diversity, equity, and inclusion (DEI) indicators are being achieved to a great extent.

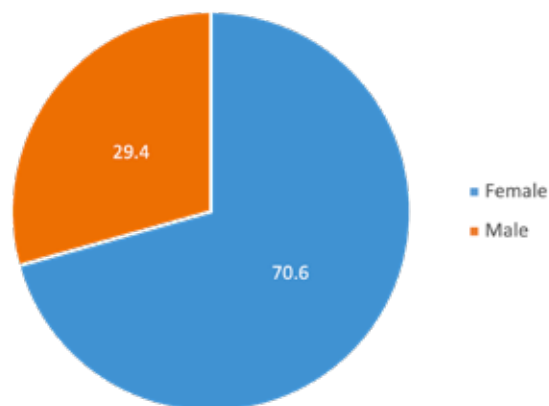


Figure 6: Gender distribution of the student participants

<sup>5</sup> [https://humanrightseducation.dk/HRBA\\_Training\\_Package/HRBA\\_in\\_practice/AAAQ%20Toolbox%20concept%20note%20brief.pdf](https://humanrightseducation.dk/HRBA_Training_Package/HRBA_in_practice/AAAQ%20Toolbox%20concept%20note%20brief.pdf)  
<sup>6</sup> <https://gbvguidelines.org/wp/wp-content/uploads/2019/11/AAAQ-framework-Nov-2019-WEB.pdf>



Picture 15: Interaction with Bachelor's Pharmacy Students

The students surveyed were in the age-group of 20-27 with most of them (85.7%) below the age of 24 and the rest of them were 24 and above. The study included more women than men: in the survey, 70.6% of women participated, while in the qualitative study, out of 15 all except one were women participants. This reflects the strong approach adopted by the ADT to empower girls and women resulting in a gender-inclusive approach towards greater women participation in higher education, especially STEM education and research.

The students belonged to various social groups indicating diversity in the population accessing the facility. Nearly half of the students belonged to marginalized social groups (49.2%). This data shows the research facilities and engagement in specialized research are accessible to the most marginalized gender and social groups.

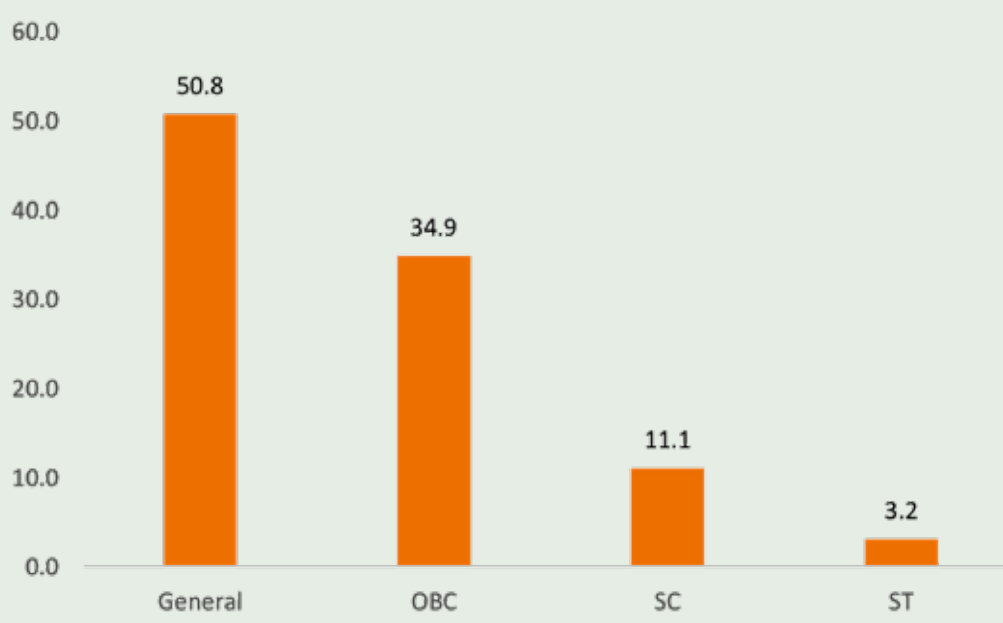


Figure 7: Social category of the students presenting social accessibility



The research team interacted with undergraduate, postgraduate, and PhD level students for the assessment. The students were from Pharmacy, Microbiology, Horticulture, and Agriculture programs – revealing that the facility is available and accessible to various subject fields.

The ADT officials informed that students belonged to various regions of the state of Maharashtra. For the quantitative survey, the students of Bachelor’s and Master’s levels participated in nearly equal proportions. A greater proportion of students were in the final year of Bachelor’s (48.4%) and Master’s degrees (31%) as they were more closely involved in using the labs than the newer students entering the colleges.

Further, the qualitative survey included more students from the Masters Level as they were directly involved in experiments using the labs. The participants were covered from all the varied and relevant programs available at the ADT colleges:

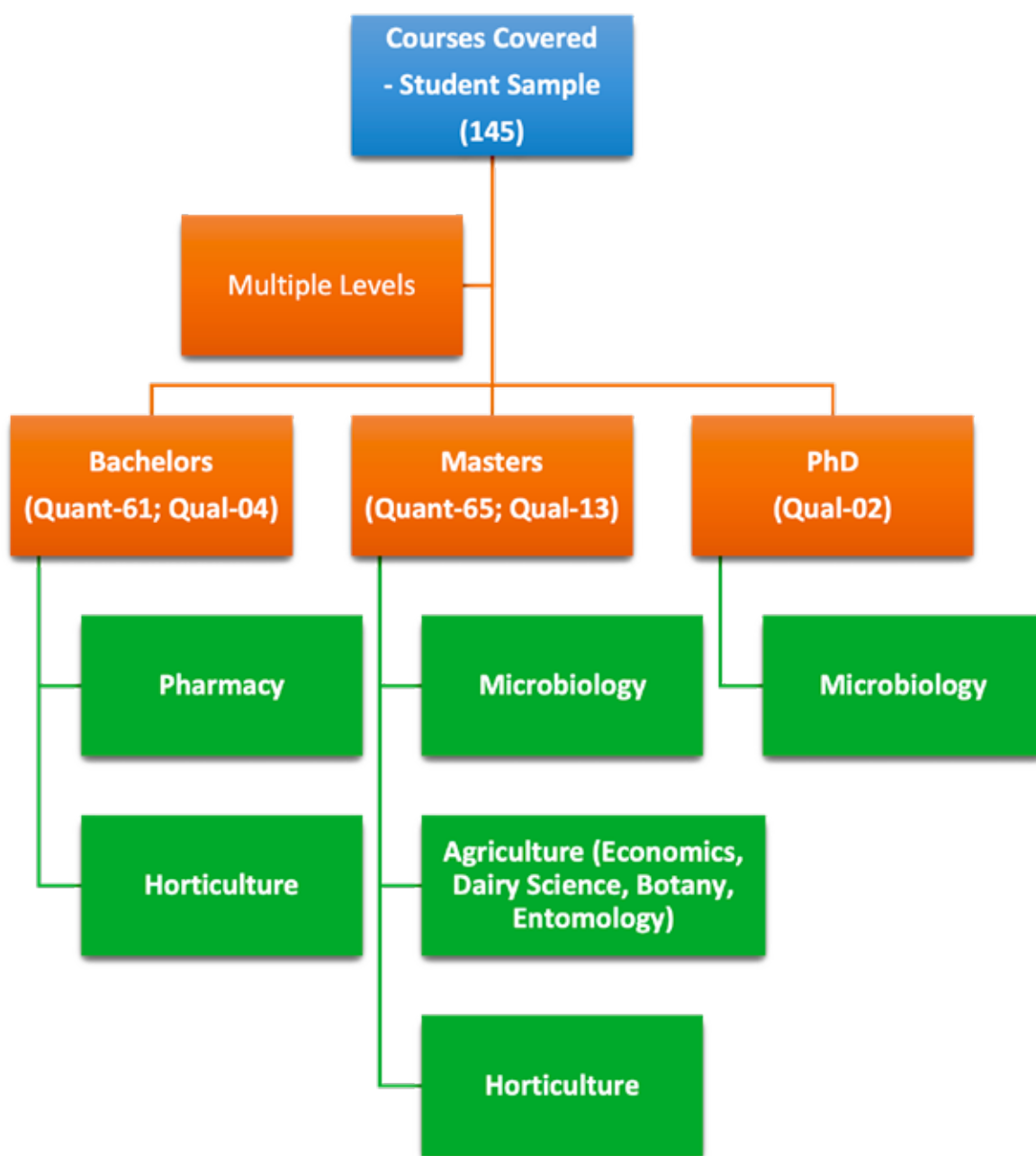


Figure 8: Course diversity in the student sample

The faculty participated in the survey were in the age-group of 24 to 49 years, with a minimum of one to five, to more than 10 years of experience. A majority of them were below the age of 35 years (68.4%) with up to 5 years of teaching experience (47.4%). Twelve out of 19 teachers who participated in the online survey were men and the rest of them were women. Most of them belonged to marginalized social groups (68.4%) indicating the favorable social accessibility of the facility. The faculty in the qualitative discussions were from assistant professors to senior-level professors, including Principals and Heads of departments, with a maximum experience of more than 20 years.

All the surveyed faculty taught at the undergraduate level. Around 42 to 47 per cent of them taught at diploma and postgraduate levels, while fewer (15.8%) were guiding the PhD scholars.

Most of the faculty surveyed were from the Pharmacy discipline, while the rest were from agriculture, botany, microbiology, and veterinary sciences. In the qualitative assessment, the faculty members were from the following disciplines and subject areas:

1. Pharmacy
2. Agriculture – Agriculture Entomology, Agriculture Botany, Horticulture, Plant Pathology, Genetics and Plant Breeding, Agronomy, Soil Science, Livestock Production Management
3. Sciences – Microbiology, Botany, and Chemistry

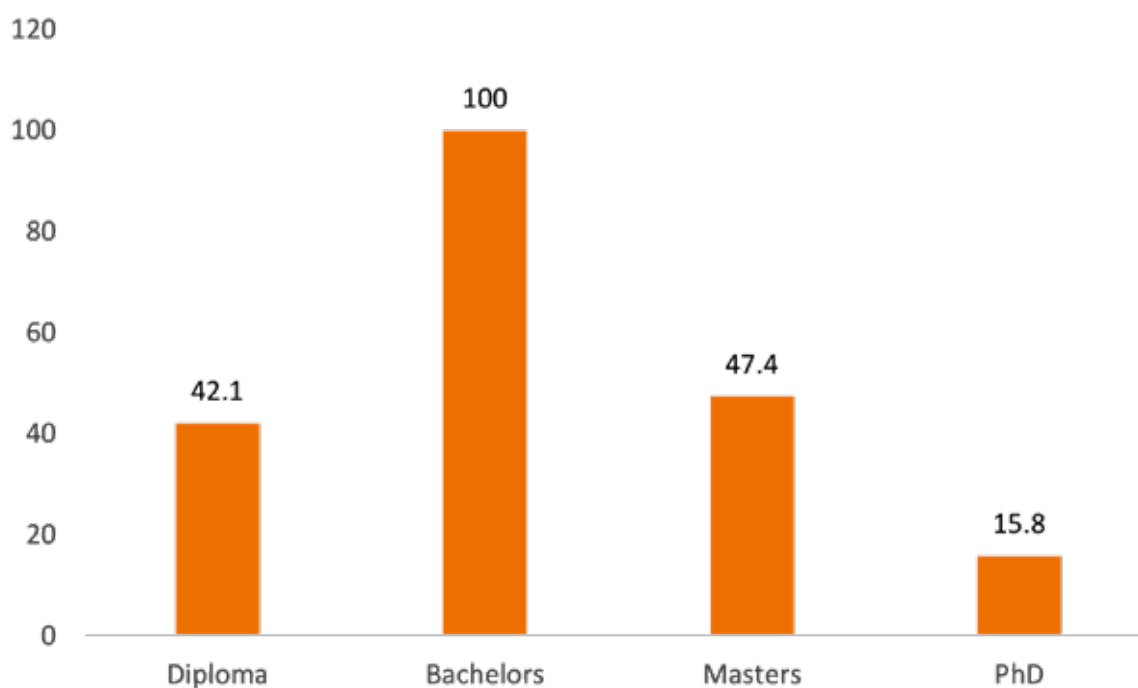


Figure 9: Faculty teaching at various degree levels

## Administrative Accessibility

The findings revealed that the research labs were made accessible to multiple stakeholders within and outside the ADT campus. The ADT officials shared how the model is sustainable and cost-effective. The testing of feed and food products is a regular need for corporates as they need to test every batch of products. The local availability of such a lab in Baramati made it convenient for them to test their products with shorter waiting periods. ADT has fixed volume and cost, which helped them in raising the funds to maintain the labs and provide subsidized services to the students, farmers, institutions, SHG women, and researchers.

“

*Our network grew through campaigning and people got to know about the availability of equipment at ADT. Several people came to us that they were sending products for testing to Mumbai and Pune and spent a lot of money on that, while the product was yet to be developed. They asked about long-term engagement with us. Further, as this lab is through CSR funds, we are providing facilities to all in need. We had students from Gujarat during COVID-19 as they had a project on blood components. Some students from Kolhapur used the labs for 3-4 months.*

– **Project Coordinator, ADT**

“

*The facility is accessed by faculty and students from other colleges for free or at nominal charges. They also use the laboratories for their research and experiments.*

– **Project Director, ADT**

The study participants substantiated that the labs were made easily accessible and the protocol to test their experiments was also made simple and speedy.

- ✓ Minimal protocols
- ✓ No or subsidized charges for testing
- ✓ Saves time – quick results
- ✓ 100% accuracy
- ✓ Training on the specialized equipment

The ADT officials informed that the accessibility aspect was further addressed by removing the bureaucratic hurdles that are normally faced by the research community in availing, accessing, and using such specialized research labs located at educational institutions. This was done strategically by the top management of ADT to encourage students and faculty to undertake experiments on the specialized equipment. This was substantiated by the various participants of this study who had recently accessed the labs and benefitted from the results.

“

*We cannot afford to pay the high fees for testing our products, here we can do all the tests completely free of cost. And we can be assured that we will get a complete analysis of our product. You need support to scale up your business. They taught us about testing, marketing, and many more nitty-gritty of quality.*

– **SHG Member, Snacks Business, Nimbut**



“

*Earlier, we had to prepare our samples and send them for analysis. But now we can do it all here in one place. The period has also been decreased due to the availability of these instruments here. We just need to give one written application a week in advance. If we submit the samples, we get the results in 3-7 days. Overall, the process is very simple.*

**– Faculty, Life Sciences**

“

*In other places, we skip some of the tests due to the high costs, but here we get all the testing parameters done at subsidized costs. This testing facility here is even better than in a city like Pune.*

**– Start-up Incubate**

The accessibility aspect is further improved by training provided to all faculty and students on the instruments. This was found to motivate the students to work on research experiments involving these instruments. All the students surveyed had accessed the research labs. The students were well-aware of the specialized research equipment and the ADT officials shared that all students were given orientation and training on the equipment after their enrollment in the college. The faculty shared that students get hands-on 3-4 days' training on the equipment and a certificate, which helps students with placements in good companies, specifically due to their knowledge and hands-on experience on these sophisticated instruments. Such practical experience is preferred by the companies and gives an edge to the students in the highly competitive environment.

“

*Sir taught us about LC-MS. For the first time, he told us everything about the machine and gave us all the information. He gave us a demonstration as the machine is costly. Then, we handled the machine in his presence.*

**– B.Pharm. Students**

“

*In other colleges, such facilities are not available. So, students have to limit their research experiments as they cannot study to the full extent. Here, it is not only possible to do such research, but there is also easy accessibility. For us (teachers) and students, this makes a big difference. If such a facility were not there, and we took such a topic, we would start worrying about its completion. Students also don't have to limit their thinking at any point. Due to quick results, they can keep going further in their research and find new topics as well in campus due to easy accessibility and interaction with others' research work. Here, everything is in one place.*

**– Faculty, Pharmacy**

## Information Accessibility and Usage

Most of the students had used the research laboratory for two years (53.2%). The rest of the students (46.8%) had used the labs for one year or less. The data indicates that more than three-fourths of the students had used the labs with substantial frequency (sometimes, often, or always). Looking closely at these responses through cross-tabulation with the year of study, around 45 per cent of the students who frequently used the labs were in the Fourth Year of their study and around 21 per cent were in their Second Year.

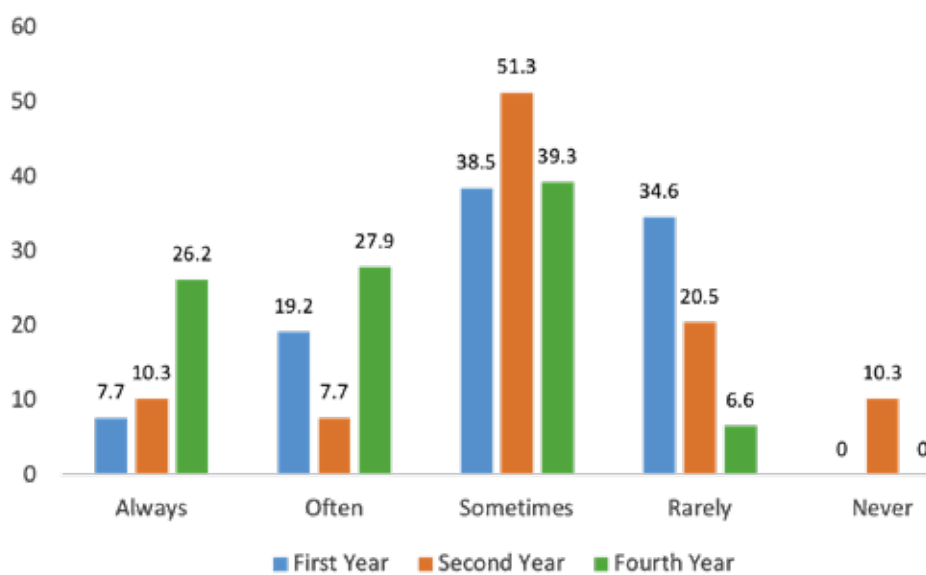


Figure 10: Usage of lab as per students' year of study

Usage of labs is majorly dependent on the degree level and research topics chosen by students in their final year of study that is, whether it requires more access to the analytical instruments available at the labs. PhD Scholars had also been trained and were working on research topics that involved analysis using specialized equipment.

“

*In our final year of Pharmacy, we have to do a research project. We have many research instruments in our dairy. LC-MS is the best and highly sensitive research equipment, so we thought that we could do it by using LC-MS. So, we finalized a method to determine preservatives in bakery products. Other colleges do not have such high-end equipment. So, they have to change their projects or take simpler projects.*

– B.Pharm. Students

“

*They taught me almost all the equipment – FTIR, AAS, PCR. But I worked more on LC-MS for two months. I did sample loading also, I did pretty much everything from loading to the analysis part. The lab staff were supervising me in everything, but they encouraged me, that ‘you will do it and we will stand behind’. To be honest, I was very scared, that I shouldn’t make a mistake because it is a very expensive machine, – but it all went well. After that, I came to the maintenance of the parts which is very crucial and they taught me how to do it, everyone does not get to do it. I got the opportunity to do this, so that was very nice.*

– PhD Scholar 2nd Year, Microbiology

Along with access and frequency of usage, learning is significantly dependent on the level of engagement with the equipment. More than one-third of the students had personally used the equipment and more than 60 per cent of the students had either observed or assisted another student, scholar, or faculty using the equipment.

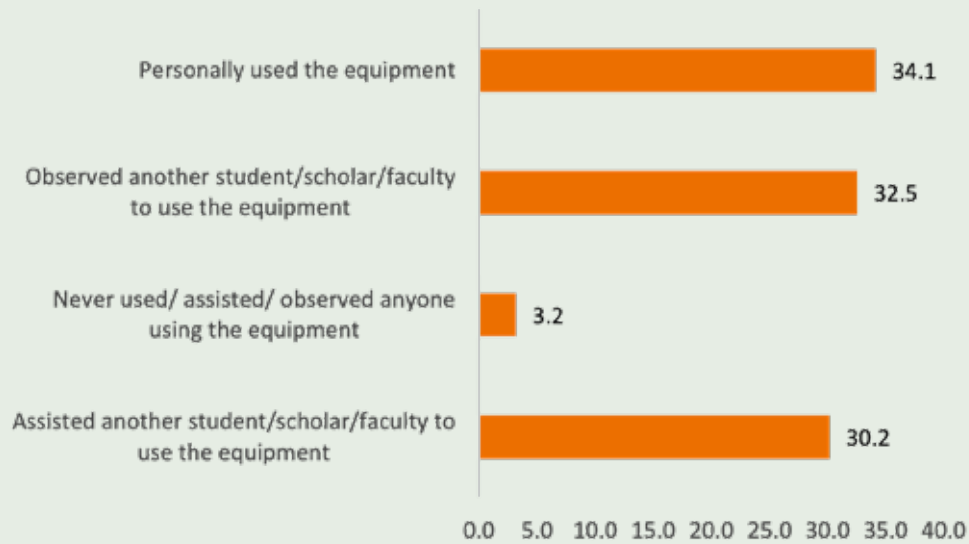
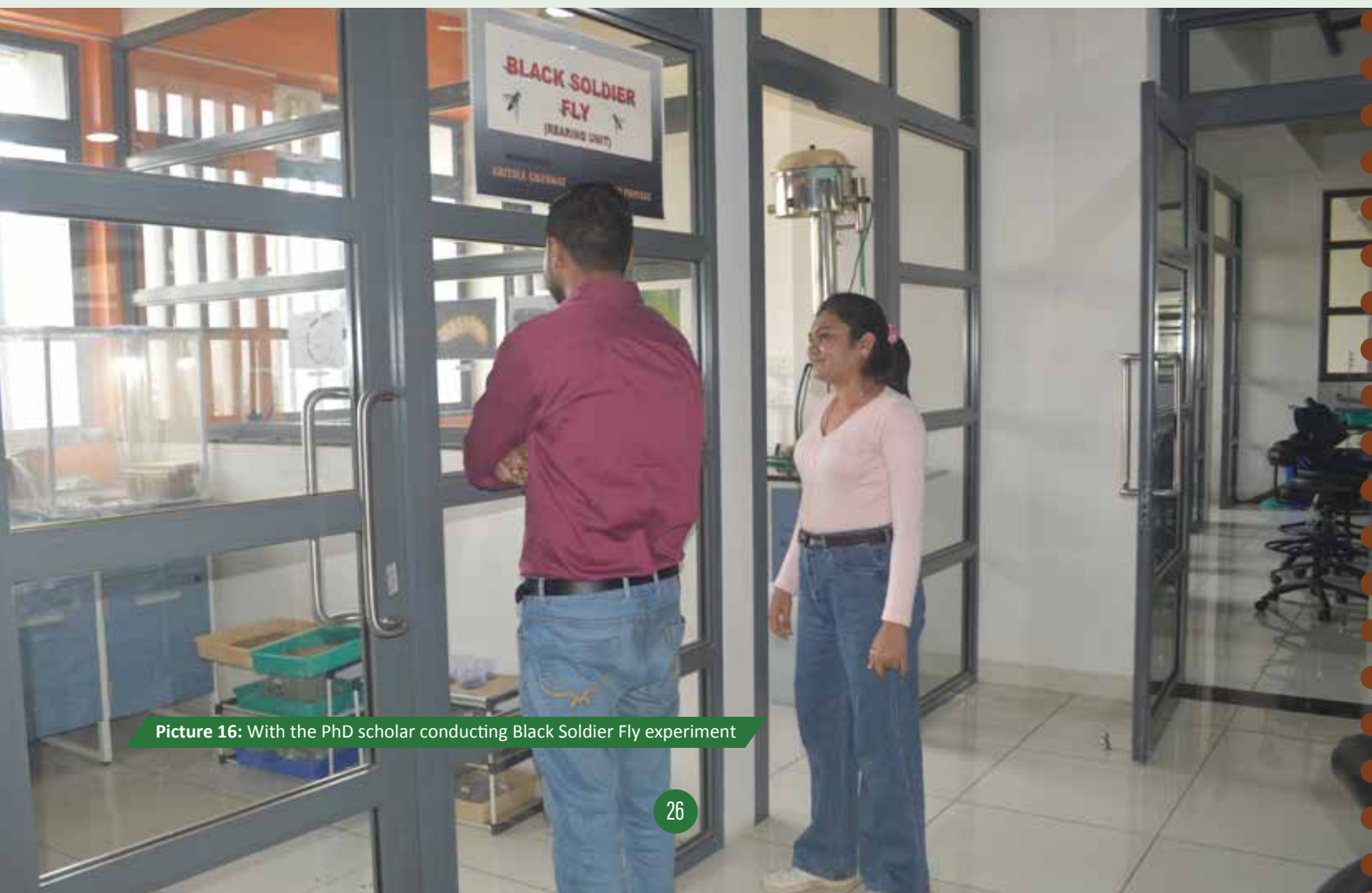


Figure 11: Students' levels of engagement with the research laboratory



Picture 16: With the PhD scholar conducting Black Soldier Fly experiment



Students shared that availability of the specialized equipment enables them to take up research projects requiring advanced analysis. They were aware of various equipment at their research lab which widened their horizons about choosing a research project. As a case in point, in one of the experiments undertaken by undergraduate students, they were oriented about LC-MS, learnt how to make samples, and how to interpret the reports. The college also arranged guest lectures for students to train them in reading reports and graphs generated through these tests.

“

*The cost of dry fodder is high and the availability is scarce. Further, here the sugarcane trash (bagasse) was burnt which causes high carbon emissions. These two problems were discussed, and we (a group of students) were selected to work on this problem. We arrived at the conclusion that dry fodder can be replaced by bagasse. But, bagasse contains lignin that decreases the lactation capacity of the cows, which needed to be reduced. We worked on collecting samples to reduce lignin from bagasse using biological techniques to make it cost-effective. We started our experiment and got the best results. We have done toxin and nutritional analysis of the product developed at the lab and are getting favorable results.*

**– Student, M.Sc. Microbiology**

Most of the faculty were also using the equipment since the time the labs were set up at ADT, which shows continued access and knowledge of the equipment. More than 60 per cent of the faculty used the specialized equipment regularly, based on their project's need (daily, weekly, or fortnightly basis), where the most common response was 'weekly' (36.8%).

“

*We have regularly used LC-MS for the secondary metabolite analysis of plants. I am from Botany, so we analyze plants which are medicinally important using LC-MS. And we have published many papers with such analysis.*

**– Faculty, Botany**



**Picture 17:** FGD with M.Sc. students working on Baggase project

Nearly all the faculty had accessed the labs for student research projects and most of them were accessing it for department (84.2%) and independent (78.9%) research projects as well. The faculty talked about the wide reach and new research areas opened due to the easy availability and accessibility of the equipment at no cost of travel and testing. This has given them space for limitless possibilities in choosing any research topic. The data shows more than half of the faculty were also engaged in providing training and mentorship to start-ups. Less than half engaged in industry research projects and a few teachers were involved in training and counselling farmers directly. Mostly, direct engagements with industry and farmers were found to be taken care of by the SMS at KVK and faculty were invited as per subject expertise required. The access of faculty to the labs improved their grassroots connections and motivated them to resolve farmers' issues.

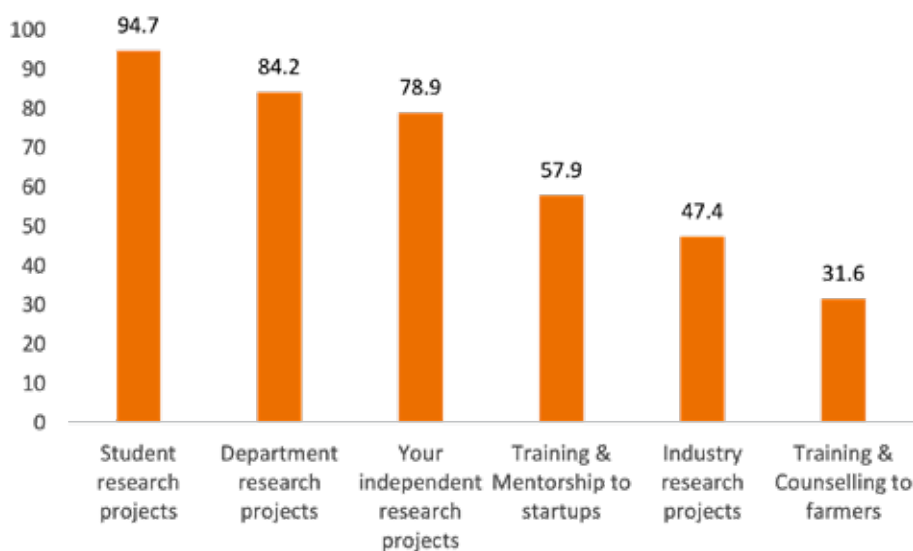


Figure 12: Various ways in which Faculty are using research laboratory

The study revealed the access and usage of the labs, especially LC-MS, was maximized through interdisciplinary research projects undertaken by the students and faculty to provide optimum quality output to the farmers engaged in agriculture and animal husbandry. Projects varied from developing bio-pesticides and bio-fertilizers to organic feed for poultry, fishery, and cattle, to plant-based drug formulations and safe preservative levels in food, undertaken by Microbiology, Botany, Chemistry, Agriculture Entomology, and Pharmacy departments. Thus, the deliberations involving multiple stakeholders and experts resulted in the optimum utilization of the labs.

“

*Recently, our department has developed bio-pesticides from medicinal plants. So, they all work together and conduct interdisciplinary research. For example, the Botany teacher identified the plants to be used, the Chemistry teacher analyzed the contents and the Microbiology teacher identified the anti-bacterial, anti-pest activity. So, in that way, they are collaborating and utilizing the instrument. We also do interdisciplinary research in Agriculture.*

– Faculty, Life Sciences

“

*Bakery products in the markets use a very high concentration of preservatives, while there is a limit specified by the government for this. So, we are working on a research project on bakery products using LC-MS at our CoE to find out what are the levels of concentration used in it. Other machines like HPLC, HPTLC, and FTIR have been used earlier for such research, but LC-MS has not been used so far, so we want to see the results. There are some advantages with LC-MS. Comparatively, other machines take more time and use more chemicals to analyze.*

– Principal, Pharmacy



Picture 18: FGD with Faculty of Agriculture and Allied Sciences

The community participants also shared about the testing facilities they had availed at the research lab. The dairy farmers were able to access and use the animal testing facilities through blood samples as well as soil and water testing for their crops.

ADT has attached other facilities like mobile application and on-field training with the labs to disseminate the test results and suggest solutions to the farmers at their fingertips like which kind of crops a farmer can grow how much quantity of fertilizer, and which type of fertilizer should they use. The SMS informed that more than three lakh farmers are using this application.

“

*We have got all kinds of testing for our cattle for diseases such as Brucellosis, X-ray, milk, and all other possible tests at the Dairy. Our farmers also got soil and water testing done at ADT. We understood what is important for the soil, which fertilizer should we use, which one should we not use, and how much. We now understand which micronutrients are in lesser amounts in our soil and we provide only those specific ones which are lacking.*

**– Dairy and Agri Farmers, Yesgar Basti, Baramati**

Similarly, women entrepreneurs and start-ups also accessed the labs for nutritional analysis of their food products helping them in standardized packaging and branding their products through the Bhimthadi Foundation. Start-ups being incubated in food technology at ADT were also given access to labs for one month to check the ingredients and nutritional levels of their products. This enabled them to analyze, improve, and launch their products in markets. All these entrepreneurs shared that they were able to improve the quality and market their natural and healthy products after testing their ingredients.

“

*We have got all our products tested at the lab. All my Diwali snacks have been tested there. We got very good reports as we use all natural and good quality raw materials. For 10 years or more, we have been in this business, but we have not changed our quality.*

**– SHG Members, Snacks Business, Nimbut**





**Picture 19:** Woman entrepreneur showing her food products tested at the research laboratory

“

Women SHGs have benefitted from the quality tests of their products. They bring their ready products to us and we do an evaluation, quality control – nutritional analysis of its components and also advise them on enhancement. If we find that by making some value addition to their unique products, they can make it even more nutritious, then we suggest modifications in their recipes and then re-test the quality of the modified product. This helps in standardizing their product.

**- Food Quality Control Expert,  
Bhimthadi Foundation**

## Quality of the Project

The findings of the assessment show the participants rated the quality of the research equipment highly. Moreover, most of the students and faculty rated highly for availability, knowledge, and support of the lab technician and lab attendant in conducting experiments. On the whole, nearly all the students (95.2%) rated high satisfaction levels (excellent/very good/good) with the lab, which was mainly owing to the quality of lab equipment, followed by the quality of lab technician, support from teachers to conduct new research, and sufficient time for learning. All the faculty rated high overall satisfaction with the lab (excellent/very good/good). Findings show students are eager for more time for practical learning on the specialized equipment. Similarly, all the faculty participants showed positive levels of satisfaction with the research labs.

“

The lab technicians are good and anytime you go they are always available for you. Everybody knows their job very well. My experience with LC-MS was good. So you can get introductory learning in two days, but if you want to handle the machine then it needs more training than that.

**– PhD Scholar 2nd Year, Microbiology**

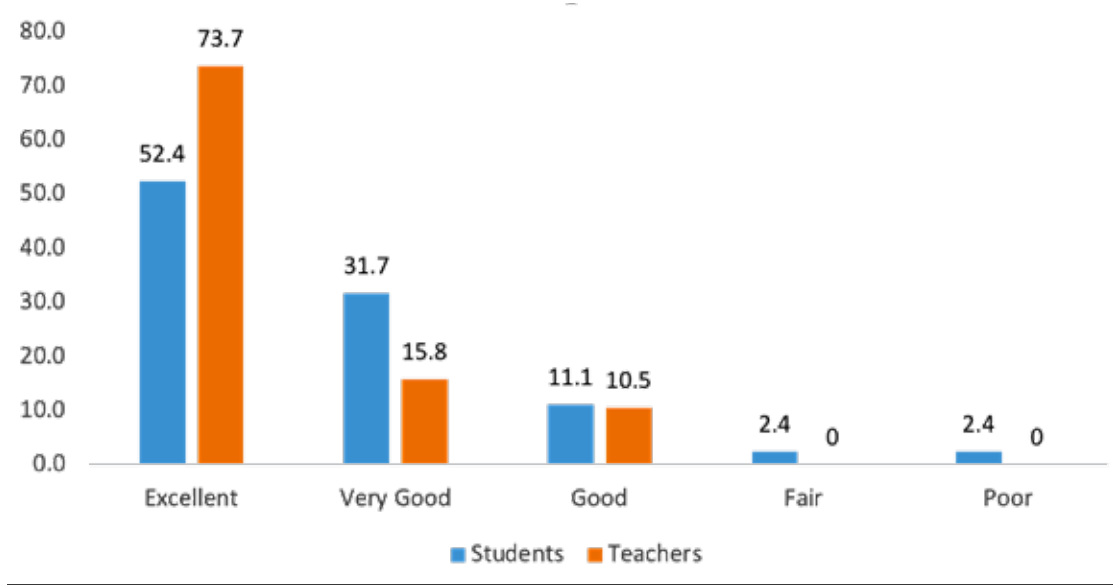


Figure 13: Overall satisfaction with the research laboratory

The major aspect that contributed to the overall satisfaction of the faculty with the research facility was found to be research opportunities (around 42%), followed by a contribution to the development of their field, training opportunities, and quality of lab equipment.

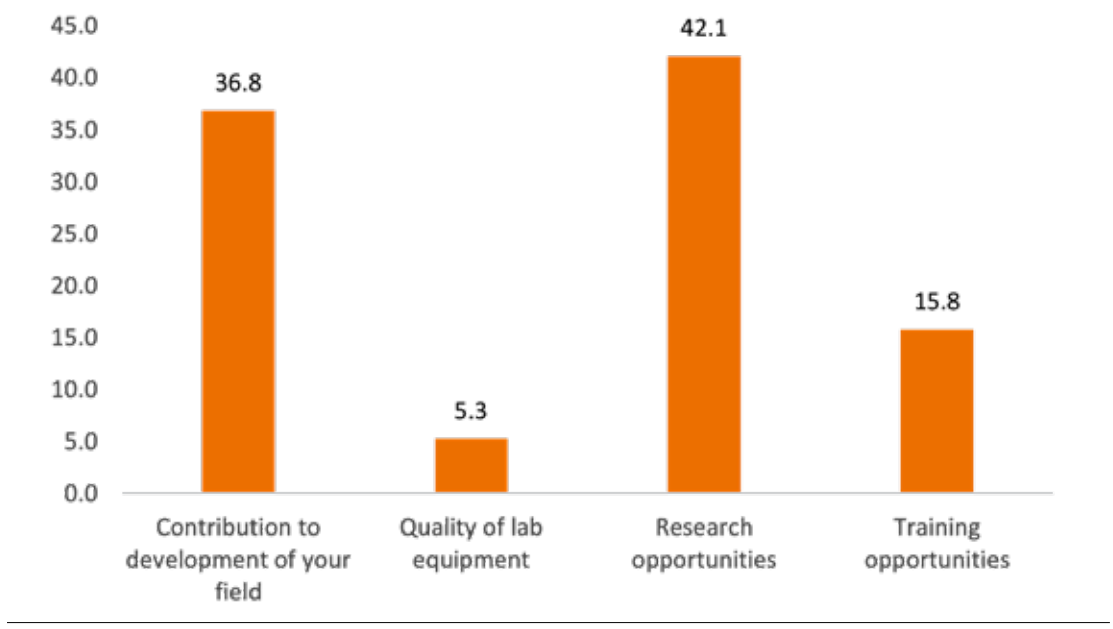


Figure 14: Aspects contributing to satisfaction for Faculty

The faculty from life sciences shared that the usage of equipment like LC-MS results in publishing study findings in journals with high impact factor.

“

We can go till the formulation development stage using the machines here. We can check the chemical constituents, their quantity, and quality. All these tests can be done at our lab. We are working on 19 projects and around 12 of them will go through the patenting process this year. Almost all our faculty have published their research findings in UGC Care-listed and SCOPUS journals. We target to publish at least two papers from a study. The benefits of such research publications are for the institution, faculty-guide, students, and even the society at large. For instance, our faculty is working on a research project on prostate cancer. Without a facility like LC-MS, such research in a time-bound, speedy manner would not have been possible. If we have to send our samples outside, the labs have high waiting periods and re-testing takes time, which delays the results and publications.

– Project Coordinator, ADT

Within the research laboratory, safety measures are an important aspect of the researchers’ wellbeing and maintenance of the sophisticated analytical equipment available in the labs. Most of the faculty and students stated safety measures such as lab coats, hand gloves, protective glasses, masks, and bio-safety disposal are used in the lab.

“

For safety in the lab, we used aprons, hand gloves, and caps. While entering the dairy, we have to follow sanitizing protocols by showering powder on our shoes. In Pharmacy experiments, we get a kit containing everything and we have to use that while conducting experiments. We are not allowed in the lab without wearing that kit. We even have to remove jewelry.

– B.Pharm. Students

In general, lab-coat was the most common protocol followed in the labs, followed by masks used by students and hand-gloves by faculty. Overall, nearly all the participants were satisfied with the safety arrangements evidenced by the high ratings.

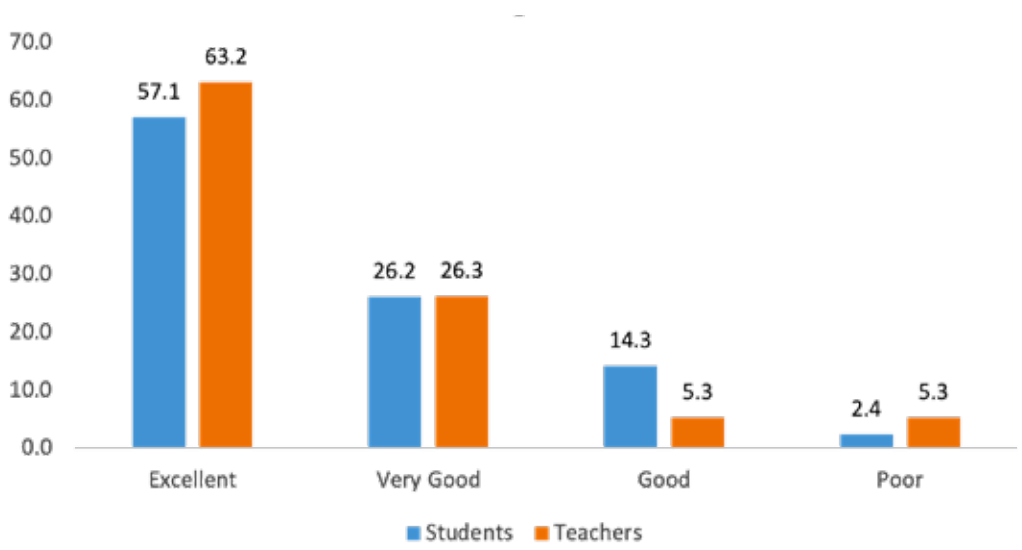


Figure 15: Ratings of safety arrangements in the research laboratory



The participants had favorable opinions about the availability and quality of equipment and other resources at the labs. The faculty added that the make and functions of the equipment were of the best quality and features, which made it very easy for them to do advanced testing and analysis. The SMS at KVK also shared how the high-quality equipment helped them arrive at relevant and accurate results and recommended suitable solutions to the farmers. The community participants also echoed this view and shared positively on the quality of reports and support from the lab staff. They pointed out how accurate testing was benefiting them in animal disease identification and treatment. It was not only the cost, but also the trust of the community in the quality testing and analysis by the ADT labs was high and was reflected in their choice.

“

*All the facilities are very good, reports are excellent. There is complete accuracy in the testing facilities. Earlier, when this facility was not available locally, we would go to another city for testing. We had to go very far, 50 km away. And we had to incur very high fees – a test for Rs. 200 here cost us Rs. 500-600 there. We have got milk tested when needed. When our cows get mastitis then to ascertain exactly which type of bacterial infection they have, we get milk samples tested at ADT. Based on the type of infection, we also understand the type of treatment we need to give to the cow. Sometimes unnecessarily a higher antibiotic is given when the infection is unknown. From the report, if we get to know that it is E.coli then we give the correct antibiotic accordingly.*

**- Dairy Farmers, Yesgar Basti, Baramati**

Nearly all the student and faculty participants (around 93-95%) agreed the required consumables were available at the lab when they conducted their experiments, rating them good to excellent quality (around 95-97%); also substantiated in discussions with the participants. If the researchers want to test a new element, then specific consumables are required such as different lamps for AAS, which were ordered by the college.

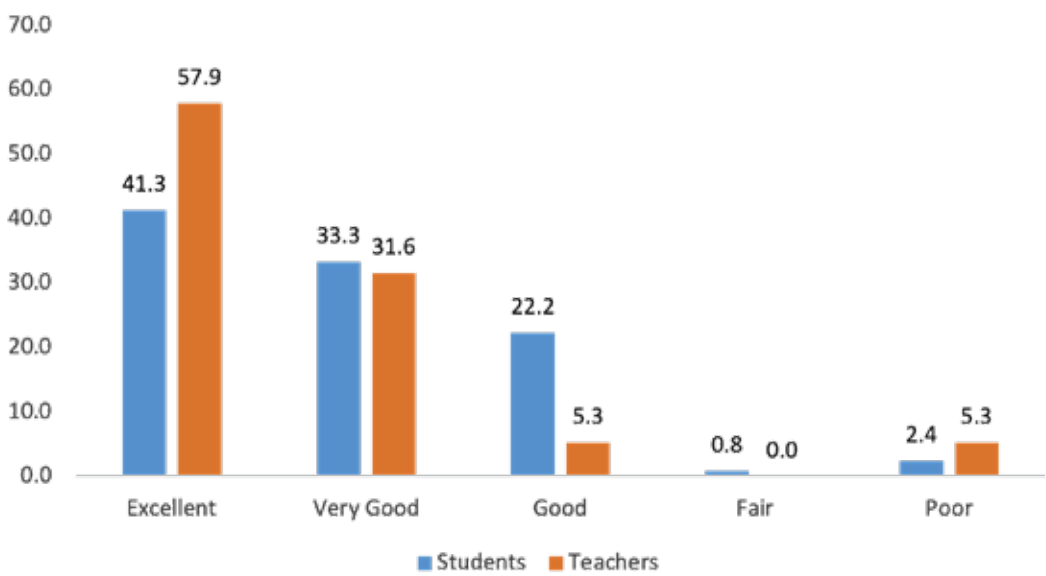


Figure 16: Rating of the quality of consumables by students and teachers

“

*The quality of consumables is the best. Most common consumables are always available. For some very specific and sophisticated consumables, we have to order and wait as there is a proper procedure that is followed by our main office. The process is very smooth and transparent. But again, as we all are connected on this campus, if any consumable is available in another department, then it is not necessary that we have to buy it, we can take it from them and use it for our experiments as well.*

**– Faculty, Microbiology**

The SHG members expressed high levels of satisfaction due to quality testing and professional packaging with nutrition information that had given their local products brand value. The women participants experienced the direct benefits of testing in scaling up and tapping urban online markets and e-commerce platforms to sell their high-quality and standardized food products. The analytical testing combined with food quality experts' knowledge and guidance enables the women entrepreneurs to build a well-branded product.

Moreover, the women participants shared that the evidence from the labs that their products were organic and healthy built their credibility and business manifold in the last few years.

“

*When we joined Bhimthadi, we sent all our 5-6 spices to the lab for testing. Then we got reports for all the spices. They have provided branded packaging to us, listing the nutritional information after testing. We did not do that earlier. Now, our product is going from local markets to cities and online markets. Plus, we sell 200 kg of one of our products per month to Bhimthadi Foundation. We don't have to go to multiple buyers and we get confirmed payment here. We plan to increase production of products which have higher sales.*

**– SHG – Spices Business,  
Someshwar**



**Picture 20:** Discussion with the staff at the Nutrition Laboratory

On the whole, the participants were satisfied with the quality of the laboratories. Additionally, some suggestions were given that would help them overcome the challenges they faced in areas such as animal and food testing.



Picture 21: Set-up of a Cooperative Dairy in a Village at Baramati

“ There should be some system to do this testing at home. If they can come and do the x-ray or sonography through home visits that will be the best way. Because the cows really suffer in taking them for testing and back home. The farmers generally avoid it as it is a cumbersome and expensive affair to take a cow all the way to the lab for testing. The labour cost is more as we need 2-3 people to get the cow into a tempo, about Rs. 4000 has to be incurred by the farmer only for transport. He ends up spending most of his day on this task instead of attending to his other cattle and so on. Also, getting her in and out of a tempo is a real task. Recently a cow had got hurt very badly on her leg while they were trying to get her out of a tempo. So, not for all cases, but if there is an emergency patient then it would really help to have a doorstep service.

– Dairy Farmers, Yesgar Basti, Baramati

“ There should be pregnancy testing kits available for cows as we have for humans where farmers can place the urine sample and get the result at home. Something like this can be innovated here. Embryo transfer at subsidized cost should also be provided. Milk production has increased drastically, we have visited Punjab and seen that.

– Dairy Farmers, Khandaj and Yesgar Basti, Baramati

“ We can add more vitamin testing to our facility. We will know if we can be within the required limits for specific vitamins like calcium, phosphorous, etc. There are new mandates with RDA values issued by the government. Earlier, it was not required for dry summer products like papad, saandge, kurdai etc. But now it is required. Most of the products of the women SHGs’ are for the summer. So, we need to test their products according to the new limits and suggest modifications in the recipe to achieve those permissible limits in their product. For instance, for organic products there are some 152 tests, so it would be best if we could do those also in-house.

– Food Quality Control Expert, Bhimthadi Foundation



## Outcomes and Social Impact of the Project

The study found that the participants perceived and experienced multiple direct-to-indirect outcomes and immediate to long-term social impacts of the project. The in-depth analysis revealed these impacts emanated from the implementation model, which emphasized accessibility, affordability, and quality labs and allied services with a multi-stakeholder approach.

### **High-quality Research Output**

The survey findings reveal the availability of specialized analytical labs resulted in creating an environment for undertaking high-quality, applied research. Majority of the students stated the outcomes were high-quality research that was produced because of such equipment (81.7%), research trainings that were undertaken (71.4%), and high-quality research that could be published (54%) due to the availability of this specialized research equipment. Few students also highlighted the outcome of research facility in the form of patents, grants, and awards.

Some of the students and PhD scholars shared they took admission in ADT College specifically due to the availability of the advanced labs which would give them an edge in pursuing a research career. Even the first-year undergraduate students were keen to work on publications and patents in their final year.

“

*Many students in other universities do not know how to operate equipment even after completing their degrees. But we changed that which changed the views of the students. They look at research as a career prospect. We incorporated research at an undergraduate level where they are conducting experiments, writing journal articles, and filing for patents and copyrights, which is giving them an edge in the job market.*

**– Project Coordinator, ADT**

Similarly, most of the faculty (84.2%) viewed the outcomes of having access to the specialized equipment were significant experiments that were undertaken, and high-quality research produced. Publishing of high-quality research papers and research training were also seen as outcomes of the specialized equipment by more than three-fourths of the faculty participants. A significant proportion of the faculty also shared that patents filed (68.4%) and grants mobilized/ awards won (47.4%) were also outcomes of this facility.

The students and faculty shared that practical experience and publications using equipment like LC-MS, FTIR, and AAS gave them an edge in their careers. This high-quality research, publications, patents, grants, and awards motivate the students and faculty, and it further benefits the institution in availing national and international grants, MoUs, accreditation, and so on.

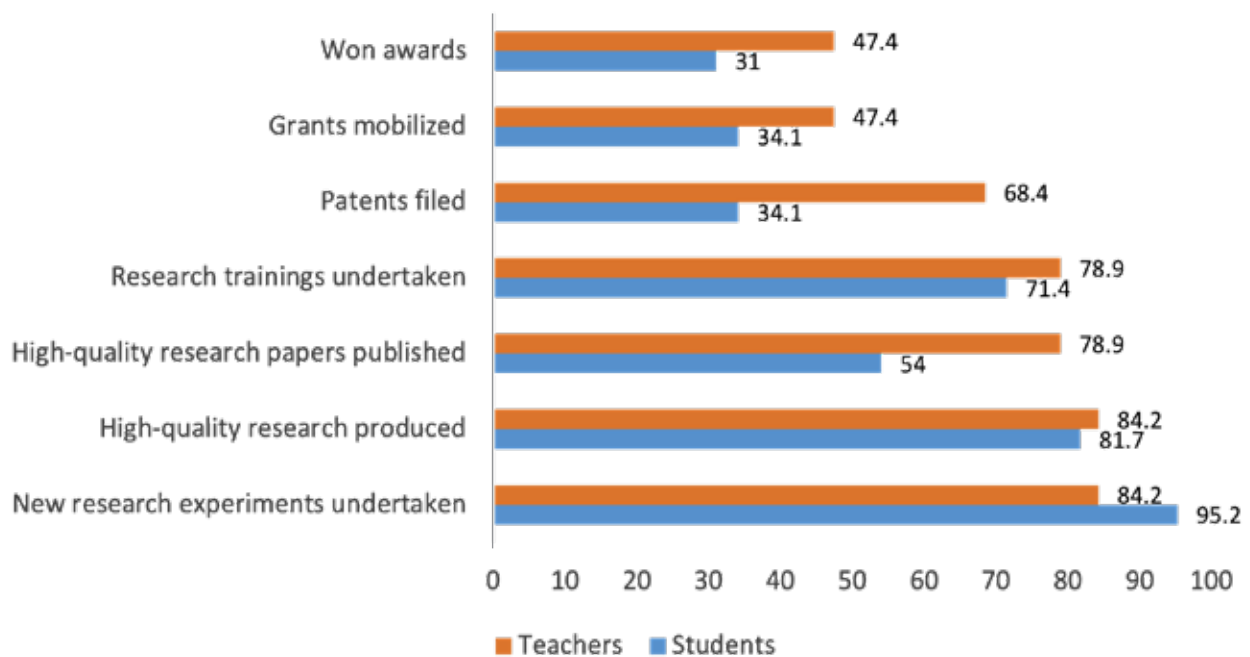


Figure 17: Outcomes of advanced research laboratory

“

*This instrumentation facility has not only helped us in interdepartmental but also international collaborations. For the last two years we have been involved in collaborations with the Universities of Microsoft, Oxford, and Johannesburg Business School (JBS), South Africa and with their help we have developed a Farm of the Future in KVK with the help of satellite sensors and drones. We have collected huge amounts of data in the last six months on sugarcane, chilli, strawberry, potato, tomato, and exotic vegetables. Before we publish, the universities want to know what is the composition of AI-based plants is as compared to non-AI plants – control and treatment tests. So, we are collecting the samples and sending them to LC-MS for analysis.*

– Faculty, Life Sciences

The Likert-scale statements also revealed the effect of the specialized equipment on the research inclination of the students. Their interest and understanding of the significance of research was evident through their strong levels of agreement (77 to 90% approximately) with the given statements.

The in-depth discussion with students highlighted that close engagement with faculty encourages them to pursue research. The faculty pointed out the availability of labs had resulted in a positive research culture as an easily accessible, similar research facility is completely absent in other places. The access to specialized equipment combined with training sessions and innovative research projects encourages the students in the field.

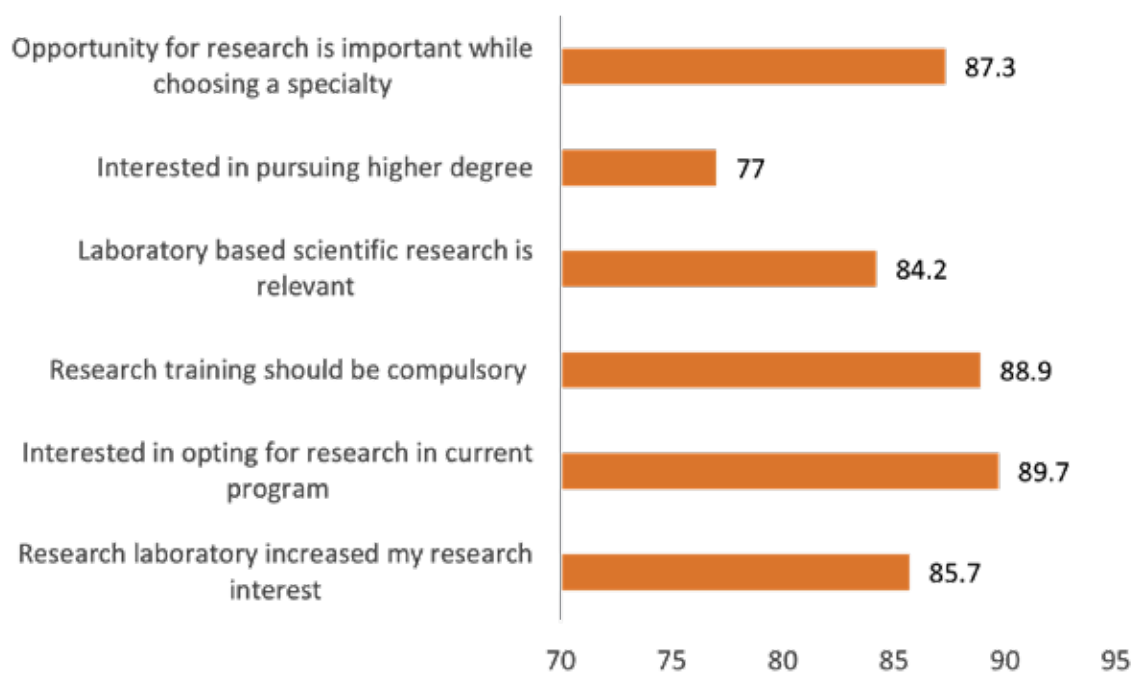


Figure 18: Effects of research laboratory on students

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*Other institutions do not have a research environment. At B.Pharm. level there is no research project. Universities ask colleges to give research projects to UG students, so the colleges go for some projects for the sake of it. Here, we specifically focus on actual research projects even at the UG level. Once we have a PG level here, students can undertake research in an in-depth manner. Moreover, other colleges do not have such equipment like LC-MS and if they have some specialized equipment the teachers do not allow the students to even touch it. Here, they get access to it. Moreover, in a short period publication of faculty has also gone up due to this facility. I had around 15 publications and after joining here I have got 50 publications. We publish with students and other faculty also collaboratively. So, it is really beneficial for our career development.*

**– Principal, Pharmacy**

Additionally, the novelty of new drugs is proven, and formulations are prepared by the faculty from the Pharmacy department based on their experiments at the research facility. Further, the majority of faculty (89.4%) agreed that the quality of research work undertaken has improved after setting up the research facility.



“

*We are researching drug formulations for liver cancer or liver sclerosis due to alcohol consumption. There are many side-effects of synthetic drugs. So, we are working on an herbal formulation to cure the damage to the liver with alcohol consumption. The clinical trials are ongoing for this research. Also, we are working on another herbal formulation for improving the immunity of the body to protect from viruses. So, we are running tests right now. So, with every formulation-based project, we aim is to cure diseases, so there is a community impact in all our projects.*

**- Faculty, Pharmacy**

“

*We have received research grants under the DST star scheme for three departments, and for that, we need to do very good research. Secondly, we have been granted the PG Curie scheme, based on the research we have done which was fruitful due to these instruments. We have also got a project from the National Medicinal Plant Board (NMPB). As we have added these instruments, the quality of research has improved, which has made it possible for us to apply to all these schemes. Students have also presented their research at national and international conferences and won awards.*

**- Faculty, Life Sciences**

## **Women in STEM Research**

Setting up the research labs has had a positive social impact on encouraging women in STEM by giving them real-world experience with specialized equipment that they would otherwise not get in pharmaceutical and other manufacturing companies. This leads to motivation among women students to pursue a career in research.



**Picture 22:** Interaction with M.Sc. Microbiology students

This was also evidenced through the higher proportion of women students in this study who showed high levels of enthusiasm to undertake research in the fields of agriculture and allied sciences, pharmacy, microbiology, and others – specifically taking up topics that would require analysis of their samples on LC-MS, AAS, and other equipment at the labs. Students were also interested in the incubation of their prototypes through the testing and start-up facilities at ADT. Similar interest and participation in research were seen among women faculty members as well.

“

*Girls get really excited with just two days' workshop to take up a project that requires analysis on LC-MS. They are fascinated with the machine. They are not aware of what exactly kind of work are the Pharma companies doing as they are not allowed to actually visit inside these companies and see the research equipment. Without knowing or seeing the actual workings, they won't be motivated to fill up the forms for an internship or a job in the companies and they will end up getting married without jobs. But when they look at such a research facility, they understand that if they learn the machine, I can do it as well. Such a candidate with hands-on experience with these machines will be preferred by the Pharma companies. So, the students get accessibility and motivation to do research. The Trust really encourages us to research and that environment is there.*

– PhD Scholar, 2nd Year, Microbiology

“

*During our PhD, we (faculty) faced a lot of challenges in outsourcing to these instruments for analysis. But now it is ready here at the Dairy and we can send our students any time and get the results. We have both instruments and students with us to work on the experiments, we are just a mediator. It would have been difficult if we had to do everything alone. So, that is a very good and motivating research environment for us. The enthusiasm of both students and teachers is such that we now add a research objective for PhD students as we have LC-MS so they can do analysis on this instrument.*

– Faculty, Life Sciences

## **Community-oriented Research**

The specialized equipment, according to the students and faculty, allowed them to work on innovations that benefited the community and had a social impact. Students and faculty showed how their research directly worked on solutions for farmers' problems. They felt connected with the larger purposes of their research on communities.

“

*Our research is helping society because they burn bagasse which is dangerous for the atmosphere. We are using bagasse and converting it into nutritious and cost-effective fodder, which will help the farmers and reduce carbon emissions. The sugar industry also needs to use bagasse, so our work will support the industry as well. In this way, our project is helping many stakeholders in multiple ways and affecting society positively.*

– Student, M.Sc. Microbiology

“

*We have a lot of land and a lot of farmers around us. They come to visit and we can actually demonstrate as the machine is right here. We have that technology here and we are doing research at a much lower price. I see this is a very good social impact. Plus, locals, that is the non-teaching staff here, are the second economy as they can come and earn here if they don't have crop yield. There are a lot of other institutes that come to visit our institute and they get an idea of what they can do. Similarly, students also get good ideas and get motivated because of that. That is a really good social impact of the research facility.*

**– PhD Scholar 2nd Year, Microbiology**

The faculty described the social impact of the research equipment made available under Sun Pharma's CSR project to multiple fields of agriculture, pharmacy, entrepreneurship, and women empowerment. They found the research undertaken using the lab benefitted the farmers in various ways such as getting pesticide analysis, developing fertilizers, bioactive metabolites, and crop production, which ultimately made improvements in their agricultural produce and largely to the field of agriculture. The faculty further found the impact of such specialized analytical lab on women entrepreneurs who could develop high-quality products and boost their empowerment and development.

They also pointed out that the research on drugs contributed to the field of pharmacy and positively impacted students and researchers.

“

*The difference here is that all the departments and KVK are connected. In other institutes, students are given research projects based on the teacher's point of view, but here the point is totally different. Here we are focusing on the local community, we are taking the grassroots problems in the community and solving those. Projects in other institutes are restricted to the labs, but here they are applied in the field. Students are working face-to-face with the farmers and whatever organisms they are isolating and experiments they are conducting are benefitting the society.*

**– Faculty, Microbiology**

### **Impact on Agriculture**

The experiences of farmers, faculty, and students demonstrated how such testing and experiments are directly related to sustainable and safe agricultural outcomes and impacts. The faculty shared illustrations of experiments where they tested soil, plant, and isolated microbes samples to identify solutions for the high salinity in the soil.

“

*We are testing soil samples, plant samples, and some biochemical analyses, for example, protein analysis from oil content. From the farmers' point of view, we are going to collect samples from salt-affected areas and salt accumulation is a major problem in this region. So, from that basis, more than 100 samples analyses will be there. On that basis, we can draw a map as well as a soil fertility index for this area and then we can recommend to farmers how to reduce this problem.*

**– M.Sc. Agriculture Teachers**



“

The AAS machine is very useful because we can't understand the deficiencies of the soil without testing them thoroughly. Due to this machine, we identified the proper deficiencies, such as deficiencies of manganese. So, in that case, we directly recommend to the farmers that they must use 8-10 kg manganese sulphate in the soil and spray the manganese sulphate by 0.5%.

– **Subject Matter Specialists, KVK**

“

Based on my soil testing, KVK advised me to water the crops only once a month as the water here is polluted by the milk and sugar industries. They also informed us that we must use ordinary-grade fertilizers; we do not need the superior grade. They explained polluted water and urea are spoiling the soil. Urea is most commonly used by farmers, so we stopped using it. This way it will slow down the deterioration of soil. Now, my crop produce has doubled in just 4-5 years. In fact, we reduced the land area, yet the produce increased. For instance, if we were producing 1000 tonnes of sugarcane in 20 acres of land, we are able to now do that in just 15 acres.

– **Farmer, Khandaj, Baramati**

A success story was shared by one of the farmers and KVK officials about the increase in crop yield – specifically chana (green chickpeas). Farmers in the region had completely stopped growing chana due to high wastage and high cost of production. However, the preventive solution advised by KVK was implemented by one of the farmers which led to record production of the crop. Due to publicity, it was replicated by other small and big farmers in the region. The faculty further explained how their applied research experiments directly impacted the farmers through the interventions by KVK. This positively impacted agriculture by reducing toxins in farming practices and thereby bringing healthy crop produce.

“

We were facing a disease due to dewdrops during season change falling on the chana (green chickpeas) crop, so most of the crop would go to waste and farmers would incur losses. But then I sought advice from KVK for this issue and followed their advice on spraying medicine and specific amounts of water. Now, even in seasonal change, the dew doesn't fall on the crop. I got the excellent quality of chana crop produce and in much higher quantity. I was barely able to get five quintals of chana earlier, now I got 17 quintals in just one acre of land.

– **Farmer, Khandaj, Baramati**

“

The impact is direct. Farmers come to KVK and buy our bio-fertilizers and bio-pesticides. The isolation is done in the Microbiology department, then we hand over the culture to the KVK and now they are producing it in large quantities for the farmers. Similarly, we have also developed types of fungal agents that make associations with the roots of the plants and help in their growth. So, in the future, we will transfer the fungal cultures to KVK for production. Similarly, last year we developed a soilless medium. Generally, coco peat is used which goes on the costlier side. KVK gave us the names of five different mediums and we did experiments in the poly-house. The experiment resulted in an increase in the yield, number, weight of fruits etc. which now they are using instead of coco peat. It is a mixture of one-two things, but it costs on the lower side.

– **Faculty, Life Sciences**



Picture 23: Farmer from Khandaj village, Baramati who benefitted from research laboratory at ADT

The SMS at KVK shared the impact of their awareness drives among farmers. Farmers have started an intercropping system where they are growing soybeans or black gram with sugarcane. The SMSs also shared about classic case of burning sugarcane trash. This was burnt earlier by the farmers but now that has almost stopped. The SMSs, faculty, and students at ADT have been working on this project together and converting the sugarcane trash into animal feed. The project is supporting farmers to adopt trash mulching and decomposition methods.

“

*Here in the area, around 90% of farmers are not burning their trash. Also, we have created awareness about how this can be used as a bedding material in dairy. So, the problem has been reduced. Previously they were burning and were not using in loose housing systems. In a loose housing system, bedding is a problem. So, we used that trash as a bedding material. Like Western countries, they use a bedding system. So, we advised them and now most of the farmers adopted it. So, they are using the trash as a bedding material, which is helping to increase the carbon content in the farm.*

– Subject Matter Specialists, KVK



## ***Impact on Animal Health through Research & Advocacy***

Similarly, the dairy farmers talked about the advantages and outcomes of the equipment, such as early and accurate animal disease testing, pregnancy detection, and improvement in the quality of the cattle fodder. The farmers shared that the significant impact of the research labs and the training programs by KVK was a reduction in cattle mortality incidences and overall improvement in the dairy business.

“

*The major benefit to us due to the ADT research facility is that we have stopped losing cows to diseases. The incidence of deaths of our cows has gone down drastically and nearly stopped. This has resulted in an increase in milk production and a decrease in costs incurred by farmers. Now, farmers have started doing dairy business using modern methods. These benefits are specifically due to the training given to us.*

**– Dairy Farmers, Yesgar Basti, Baramati**

Secondly, pregnancy testing was said to be a major advantage for dairy farmers. Earlier, they could confirm their cow's pregnancy only through physical examination after three months. But, now as soon as the 30-35 days have passed, they can take the sample and confirm the pregnancy. This has reduced the waiting period to confirm cattle pregnancies.

**Picture 24:** Dairy Farmer who benefitted from ADT's animal and feed testing at his animal farm in Yesgar Basti, Baramati







*A big advantage to farmers is they get multiple disease testing done at one place, such as Brucellosis, pregnancy tests, or if a cow is ailing and needs diagnosis, we don't have to go anywhere else. I get all the tests done there. If I suspect a cow has mastitis, then we send her milk for testing. If I am planning to purchase a cow or bull, then I do not trust outsiders, I trust ADT. I get the blood sample from there and get it tested here. I bought this very expensive bull, and if I had not got him tested and if he had not turned out to be of the promised purity, all my next batch of cows would be of poor quality and my investment would have gone waste. So, whatever claims the sellers make, I get testing done at ADT before the purchase.*

**– Dairy Farmer, Khandaj, Baramati**

Further, there is a direct impact on disease detection, the effects of silage on animals, and the volume of milk production. The study found that small to big farmers are using the facility to test silage and prepare good feed for their animals. This resulted in a decrease in diseases among the cattle, more and better milk production and ultimately increasing the household income. Similarly, the dairy farmers shared a success story where the testing of packaged cattle feed at the labs and later advocacy with the manufacturing company led to long-term change for over 400 farmers associated with their FPOs.



*When we got tests done at the lab, they told us we were getting less protein in the cattle fodder than what was being claimed by the company selling that feed. So, we raised a complaint to the feed company that you are claiming that there is 24% protein in this, but in reality, there is only 17-18% protein. They realized that these people understand all these things, so they made changes to their product. Now, they print everything on the packet - protein, fat etc. Earlier, they did not print all this. After they improved the quality of the product, we re-tested it and now we are getting the desired levels. There are 150 farmers associated with my dairy and 250 with his dairy so whatever changes are brought by us, they benefit all these 400 farmers.*

**– Dairy Farmers, Yesgar Basti, Baramati**

## **Impact on Entrepreneurs and Start-ups**

The women SHGs have benefitted from testing their food products at the research labs. This has enabled them to improve the quality of their products and market them with ease. The foundation has helped them to standardize their recipes, packaging – branding and marketing under its own banner. This has opened urban markets to the women entrepreneur’s products, which were otherwise unknown to them.

“

*The response to the branded products is very positive now. Earlier it was not there. Now, their products can be marketed at any shop. If they want to market their products in urban areas then the basic requirement is that the product should be well-packaged, and licensed, and it should have a nutritional label – with at least five components displayed. Due to all these facilities provided to them, women can sell their products in any market now. As a success story, due to these testing facilities, women SHGs have been able to raise the bar of their products and their products are now recognized and marketed online markets like JioMart and in supermarkets like Dorabjee’s in Pune. Earlier, they were selling their products only at exhibitions, among relatives and friends – they were limited to these circles. But now that has changed.*

**– Food Quality Control Expert, Bhimthadi Foundation**

The faculty shared in the discussion that comprehensive planning brings all the stakeholders on one platform to complete the supply chain. For instance, the millet project’s market linkages are connected with women SHGs created by the Bhimthadi Foundation. These linkages support the farmers in procurement of their produce and provide women entrepreneurs with an opportunity to earn a livelihood.

“

*There are around 300 active SHGs. The team is working with self-help groups to process and market the selected crop varieties and providing support to farmers in primary and secondary processing.*

**– Faculty, Agriculture**

Women entrepreneurs shared the benefits of the testing facilities and knowledge gained to use good quality oil, maintain utmost cleanliness, and use media to showcase products. They narrated about gaining the trust and goodwill of consumers and increasing sales and income due to the testing and branding facilities. For instance, earlier one of the SHG members would get a few orders and make sales of Rs. 20,000 a month, but now it is continuous orders with business into a lakh. After getting quality recognition and support from Bhimthadi, they get large orders from Mahila Gruh Udyog company as well. The aspect of women empowerment was highlighted through their narratives of the women entrepreneurs, where they could progress in their business and gain confidence to employ and train other women to learn and earn.

“

I have been doing this home business for 10-12 years. Earlier I did not use any media to publicize my products. I would only get a few Diwali orders due to word-of-mouth publicity, but not as much as I get now. My orders have significantly increased since I got associated with the Bhimthadi Foundation. It is like social media for us. Their name carries a huge value and their support for my product has helped me gain people's trust. Earlier, I had to convince women to buy my products because they did not know me. But women know the ADT brand and feel that their products are being branded by such a big organization, so they must be good.

– SHG Member – Snacks Business, Nimbut

“

This year I sold two tonnes of only mango pickle. The testing has greatly benefited us as we can test our products and know about the contents. We can now tell our customers that our products are preservative-free as they have been tested. I am also training women all over Maharashtra wherever I am invited, on preparing chutneys, pickles, hotel-style gravies, and vegetables and taking orders for all these food items. I can take training for easily up to 50 women at a time, and they have got excellent results. I give them continued guidance even after training to set up and grow their business.

– SHG Member

– Spices and Pickles Business, Nimbut

The start-ups incubated at ADT could test and launch their products in the market with suitable modifications in their content and standardized packaging with nutritional information.



Picture 25: Women entrepreneurs and SHG members in Nimbut village, Baramati





Picture 26: Interaction with a food start-up incubated at AIC-ADT

The Project Director of ADT highlighted the deeper geographical penetration of the specialized labs on entrepreneurs.

“

*In most cases, start-up incubations are present in metropolitan cities. But, because of support from multiple companies and organizations, the incubation at Baramati has become a golden opportunity for young entrepreneurs in Tier II and III cities and villages. For instance, a young woman entrepreneur has made a nutri-bar. She finalized the recipe and standardized it by taking support of the equipment provided by Sun Pharma. If the lab is not developed, there would not be any opportunity for such projects.*

– Project Director, ADT

“

*Because of high-end testing machines, the lab facilities are accessed by farmers, industries, entrepreneurs, and SHGs to make their produce of high quality. For instance, products prepared by SHGs are getting labelled with nutritional value, getting tested for toxins, and getting converted into a branded product. This became possible because of the various testing machines available at CoE. Bhimthadi Foundation plays a crucial role in connecting SHGs with the CoE. The combined impact is healthy products, high profits, availability of market, and encouragement to women and household entrepreneurship.*

– Project Coordinator, ADT



## OECD DAC Evaluation Criteria

The OECD DAC Evaluation Criteria<sup>7</sup> helps in understanding the merit of an intervention by analyzing it through a normative framework. The assessment framework is comprehensive and assesses intervention through six evaluation criteria. Sun Pharma's research laboratory project commissioned at ADT, Baramati is presented through these criteria.

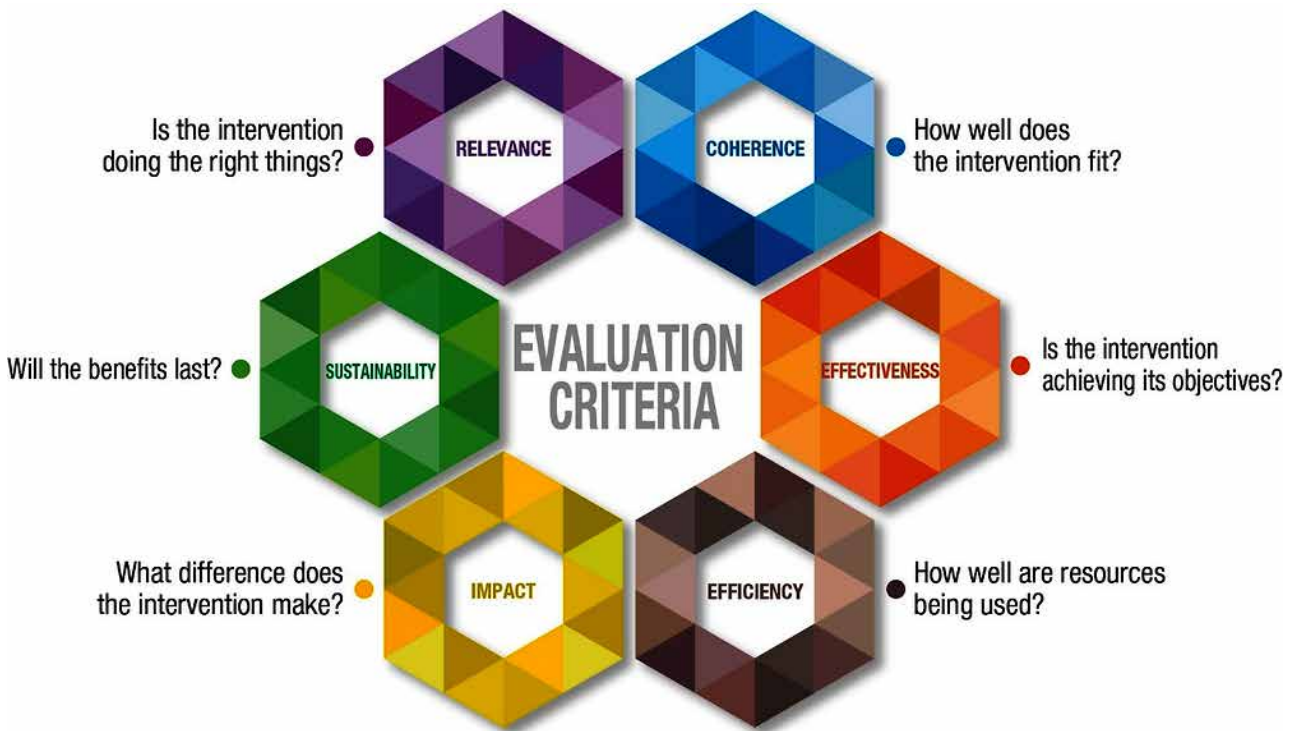


Figure 19: The OECD DAC Evaluation Criteria from OECD.org

### Relevance

The relevance is assessed based on how the intervention has impacted the project stakeholders. The objectives of setting up the research laboratory were established on the principles of a bottom-up approach to address the needs of farmers, women SHG members, entrepreneurs, students, faculty, and industry bodies. Their specific needs were identified and research equipment were procured to support them in their endeavors. The objectives laid were found to be achieved through the intervention at scale as presented in the findings. It was found that ground-level problems are identified and the research laboratory is used extensively to work on the experiments and develop solutions related to agriculture, waste management, animal husbandry, food toxicity, and drug formulations in pharmacy. The relevance of the research laboratory was also analyzed for the quality of project design, which was found to be in sync with ADT's overall goal to support research and development in the fields of agriculture and pharmacy. ADT has extensive experience in these fields and has the organizational and financial capacity to use the laboratory optimally for community development.

<sup>7</sup> <https://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm#relevance-block>

## Coherence

The research laboratory supported by Sun Pharma was found in coherence with the overall aims of Sun Pharma's CSR and ADT to conduct innovation and research in pharmacy, agriculture, microbiology, veterinary, life sciences, and health systems. As presented through the findings, multiple departments of ADT work together to co-create solutions with a direct impact on human and animal health. These included internal coherence in conducting interdisciplinary research with faculty from various departments of Agriculture and allied sciences like Microbiology, Botany, Chemistry, Entomology, Pharmacy, and so on with ADT's scientists and officials working dedicatedly in the field of agriculture, animal husbandry, milk production, women entrepreneurship, and start-ups. The external coherence of this project can be directly mapped with SDG 3 of Good Health and Wellbeing, SDG 4 Quality Education, SDG 5 Gender Equality, and SDG 17 Partnership for the Goals. The details of impact of the research laboratory on education, good health and wellbeing, quality education, gender equality, and partnership between multiple stakeholders are presented in the findings section.



Image Source: <https://sdgs.un.org/goals#icons>

## Effectiveness

The goal of the project was to create a research facility for the advancement of research in pharmacy, agriculture, and allied sciences. The aim was to cater to the students and faculty of ADT and other educational and research institutes, start-ups, farmers, women SHG members, KVK, and industries. The facility was completely established in FY 2022-23. Since then, the laboratories have been extensively used by all the stakeholders. This facility was further extended to provide services to the industries requiring testing of their products on the high-end machines available and to the colleges in the vicinity of the research facility.

## Efficiency

ADT has created a comprehensive plan to ensure the efficiency of the research laboratory. The lab provides advanced technology and quality services to the stakeholders at a lesser cost than the other service-providers in a quick turnaround time. The model to maintain the lab financially also increased the efficiency of its usage as the cost is different for stakeholders. The industries pay the market cost which subsidizes the cost of testing for communities and faculty and students of other institutes, while making it completely free, as of now, for SHG women, start-up incubates, faculty, and students of ADT. ADT works on a non-profit basis.

## ***Impact***

The project has impacted all the stakeholders and the environment while developing a scientific temperament in communities towards their agriculture, dairy, and food businesses and a social temperament among students, faculty, and scientists towards community concerns. The research on multiple topics has changed the norms of cropping – multi-cropping, intercropping, understanding of soil, organic farming, and so on. Further, it has also changed the norms around rearing animals and converting it into a profitable business. The reach of ADT in communities through multiple methods like training sessions, community radio, mobile vans, and networks with the Postal Department has created an automated system to connect the stakeholders with the research laboratory. The farmers have higher crop yields at less cost with low usage of pesticides. There is a direct impact on the health and rearing of animals and milk production because of awareness of farmers about best practices and research-based advocacy with manufacturing companies to improve the products. With the new technology, farmers can know about animals' diseases, pregnancy, and treatment, which saves lives, time, and cost.

The faculty and students undertake advanced experiments because of machines like LC-MS, AAS, and nutritional analyzer. The advanced equipment strengthens their findings to get published, file patents and copyrights, and attract grants. Further, the women entrepreneurs working independently or through SHGs in villages are now able to brand their homemade products. The testing of nutrition, moisture, toxins, and so on has provided them with the confidence to publicize their products and brand them through the Bhimthadi Foundation, impacting their socio-economic conditions. Further, the availability of advanced equipment have made it possible for companies to test their products in time locally and get support in making changes in the composition of feed. Lastly, the specialized labs and high-quality research are bringing trust, collaboration, and reputation to the institute – ADT.

## ***Sustainability***

ADT is already working on the financial, social, and environmental sustainability of and through this CSR project supported by Sun Pharma. For instance, ADT requires multiple lamps, standards, and libraries in LC-MS to run advanced tests. This can be catered to by taking a higher number of industry requirements to generate funds to cover the cost of consumables. The outcomes from the research laboratory result in environmental sustainability by using soil, pesticides, fertilizers, and water judiciously. Further, it results in financial sustainability for the stakeholders like farmers, women, and start-up incubates. This CSR project by Sun Pharma is resulting in sustainable solutions through research experiments conducted by faculty and budding researchers, which are generating lasting and scalable livelihood and environmental solutions.

Picture 27: Centre of Excellence - Dairy at ADG, Baramati





# CONCLUSION

The Social Impact Assessment study has found the CSR Project initiated by Sun Pharma and implemented by ADT, Baramati to be highly impactful. The study revealed a holistic impact of the research laboratory on social, economic, environmental, health, and educational aspects. These impacts involve close engagement of students, faculty, scientists, entrepreneurs, women SHGs, and farmers, through a dynamic multi-stakeholder approach by ADT.



Figure 20: Key Outcomes of the Project

## Project Outcomes and Impact

As detailed in the report, the outcomes and impact were assessed along the AAAQ framework and OECD DAC Evaluation criteria revealing the robust design and implementation of the project.

Indicators	Quantitative Findings	Qualitative Findings
<b>Availability &amp; Accessibility (Social &amp; Administrative Accessibility)</b>	<ul style="list-style-type: none"> <li>70.6% women students</li> <li>49.2% students from marginalized backgrounds</li> <li>68.4% faculty from marginalized backgrounds</li> </ul>	<ul style="list-style-type: none"> <li>Encouraging research ecosystem</li> <li>Multi-stakeholder design</li> <li>High community access &amp; reach through minimal protocol; no/ low charges; 100% accuracy; saves time</li> <li>Exposure of all students &amp; faculty on the sophisticated equipment</li> </ul>
<b>Acceptability (Information Accessibility &amp; Usage)</b>	<ul style="list-style-type: none"> <li>80.2% frequent usage by students</li> <li>63.1% frequent usage by faculty</li> <li>96.8% students used/ assisted/ observed the labs</li> <li>94.7% faculty use lab for student research projects</li> <li>~78-84% faculty use lab for department/ independent research projects</li> </ul>	<ul style="list-style-type: none"> <li>Hands-on training of students &amp; faculty on using the equipment</li> <li>Involvement of students in applied research to address real, field issues</li> <li>Inter-disciplinary &amp; innovative research experiments</li> <li>Trainings organized for faculty and students of other educational institutions</li> </ul>
<b>Quality (Satisfaction levels)</b>	<ul style="list-style-type: none"> <li>95.2% students' satisfaction levels</li> <li>100% faculty satisfaction levels</li> <li>42.1% faculty satisfied with lab use for research opportunities</li> <li>~94-98% students &amp; faculty highly rated safety arrangements at the lab</li> <li>~93-97% students &amp; faculty highly rated availability &amp; quality of consumables</li> </ul>	<ul style="list-style-type: none"> <li>Higher motivation of students &amp; faculty towards research</li> <li>Dairy &amp; Agri farmers highly satisfied with animal disease diagnosis, milk &amp; feed testing, soil &amp; water testing and advisory support facilities by ADT/ KVK</li> <li>Women SHG members &amp; entrepreneurs highly satisfied with nutritional testing and support from ADT/ NGO</li> <li>Community participants recounted benefits of improved reliability of their products through nutritional testing</li> </ul>
<b>Quality (Outcomes)</b>	<ul style="list-style-type: none"> <li>Outcomes of research facility as per students &amp; faculty:</li> <li>~84-95% new research experiments undertaken</li> </ul>	<ul style="list-style-type: none"> <li>Labs-ADT Colleges-KVK-Community connect made it possible to innovate sustainable solutions for issues of farmers from agriculture to animal health and dairy products</li> </ul>

	<ul style="list-style-type: none"> <li>◆ Over 81% high quality research output</li> <li>◆ Over 71% research trainings undertaken</li> <li>◆ ~54-79% high quality research papers published</li> <li>◆ ~31-68% patents/ grants/ awards</li> <li>◆ ~77-90% students inclined towards research field/ career</li> <li>◆ ~89% faculty find improved quality of research</li> </ul>	<ul style="list-style-type: none"> <li>◆ Labs-ADT Colleges-NGO-Community connect maximized reach of nutritious products of women SHGs</li> <li>◆ Labs-ADT-Startups-Entrepreneurs connect helped them launch high-quality products</li> </ul>
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The outcomes of the project achieved against the planned objectives and project deliverables are as follows:

**Table 3: Objectives vs. Outcomes of the Project**

Objectives	Outcomes & Impact
<p><i>To provide facilities for clinical testing of human and veterinary medicine</i></p>	<ul style="list-style-type: none"> <li>◆ Highly accessible research facility made available to students, faculty, industries, researchers, and rural, marginalized communities of Baramati</li> <li>◆ 8214 clinical testing done so far in animal disease diagnosis lab, nutrition lab, and LCMS/MS</li> <li>◆ Over 1500 students have taken training and internships at the laboratory</li> <li>◆ Total 240 students (120-D.Pharm.; 120-B.Pharm.) benefited from these research facilities every year</li> <li>◆ More than 300 professors from other educational and research institutes have taken advantages of the advanced equipment in the research laboratory</li> <li>◆ Testing facilities started for food toxin, pharma drug, soil, animal diseases, and feed sample: <ul style="list-style-type: none"> <li>⊙ Nutrition Lab – Crude Protein (CP), Acid Insoluble Ash (AIA), Crude fat/ Ether extract/Oil (EE), Crude fiber (CF), Dry matter (DM), Moisture Total Ash (TA)</li> <li>⊙ Animal Disease Diagnostic Lab – Blood Testing (Hemoglobin, TLC, TEC, Lymphocytes, Neutrophils (band cells), Eosinophil's, Monocytes, Basophiles, Platelets), Theileria Testing, Babesia Testing, Pregnancy Testing, Brucellosis Testing by ELIZA, Milk Testing (Mastitis), Foreign Body Testing, Bilirubin Testing</li> <li>⊙ Analytical Lab – Drug Analysis, Toxicity Analysis, Melamine, Aflatoxin [g1, g2, b1, b2, m1, m2] Testing, Pesticide Residue Analysis, Aflatoxin Analysis, Heavy Metals Analysis, Trace Minerals Analysis</li> </ul> </li> </ul>
<p><i>To provide pesticide testing facility for agriculture produce</i></p>	



<p><i>To develop formulation of medicines associated with human and animal health through plants</i></p>	<ul style="list-style-type: none"> <li>◆ Innovative research experiments undertaken and solutions provided to dairy/agri farmers through KVK</li> <li>◆ 19 patents on various herbal drug technology filed by startups</li> <li>◆ 08 technologies have been commercialized</li> </ul>
<p><i>To develop formulation of natural animal or plant based health care and hygiene products for instance use of goat milk in cosmetics products</i></p>	<ul style="list-style-type: none"> <li>◆ Innovative research experiments undertaken and solutions provided to dairy/agri farmers through KVK</li> <li>◆ 19 patents on various herbal drug technology filed by startups</li> <li>◆ 08 technologies have been commercialized</li> </ul>
<p><i>To develop formulation of herbal medicine for human and veterinary use</i></p>	<ul style="list-style-type: none"> <li>◆ Innovative research experiments undertaken and solutions provided to dairy/agri farmers through KVK</li> <li>◆ 19 patents on various herbal drug technology filed by startups</li> <li>◆ 08 technologies have been commercialized</li> </ul>
<p><i>To provide consultancy for pilot scale medicine development for startups/entrepreneurs</i></p>	<ul style="list-style-type: none"> <li>◆ Incubated social startup has provided standardization and credibility of food products through nutritional analysis for rural women entrepreneurs</li> <li>◆ 44 start-ups have been supported so far since its inception through the laboratory support related to agriculture, food-tech, socio-economic, health, and women</li> <li>◆ On-boarding of more than 48 world-class mentors to support startups</li> <li>◆ Around 10 startups secured funding from Government grants/ Incubator seed funds</li> <li>◆ 07 start-ups have been successfully graduated</li> <li>◆ 19 high-quality patents filed by incubated startups</li> <li>◆ More than 300 employments generated by incubated startups of this project</li> </ul>
<p><i>To collect, process and disseminate scientific data related to humans as well as animal health based on their geographic presence and studying their location based variance</i></p>	<ul style="list-style-type: none"> <li>◆ 300 research papers are published in refereed research journals including Scopus Index, Web of Science Index and UGC-CARE listed journals</li> <li>◆ 52 papers are in the pipeline</li> </ul>
<p><i>To work as a bridge between academia and the corporate sector in the plant based medicine</i></p>	<ul style="list-style-type: none"> <li>◆ Tie-ups with national and international reputed corporate and academic partners and incubators around the globe</li> <li>◆ ADT has tie-ups with 04 Pharma, Chemical and Herbal industries</li> <li>◆ Feed samples are tested for renowned MNCs like Altech Biotechnology, Corteva, Baramati Agro Pvt. Ltd, Vetoquinol Pvt. Ltd, Schreiber Dynamix Ltd, Bayer Corporation, Salauddin Poultries, A.P, Swaraj Serum Pvt. Ltd, Advantage Agri Pvt. Ltd.</li> </ul>



## WAY FORWARD

Certain aspects are working effectively in this project, making it more impactful. These need to be highlighted and continued by the implementing partner:

- a. Availability of Sun Pharma's high-quality, specialized research equipment in rural area
- b. Leadership vision to develop a holistic research ecosystem with multi-stakeholders like KVK, Bhimthadi Foundation, students, faculty, startups, SHGs, farmers, and industries.
- c. Easy and complete accessibility to the laboratory with hands-on training and usage to the stakeholders
- d. Interdisciplinary environment for applied research
- e. A bottom-up approach to identify problems and a strong commitment to innovate and address community concerns
- f. Experts and services attached to the labs to guide the communities with evidence-based sustainable solutions
- g. Developing a scientific temperament among rural communities and a social temperament among scientific communities

Based on multiple in-depth discussions to strengthen the project and make it more impactful, there are specific recommendations emerging that have been put forth for greater community reach, higher research output, and additional quality inputs:

### ***1. Higher Research Engagement***

There is both interest and scope for higher engagement in research projects and more practical sessions on the specialized equipment for the students and faculty. More hands-on experience with the equipment and how to prepare, load, and test the samples was found to be motivating and required for students, PhD scholars, and faculty as well as encouraging women in the STEM field. More arrangements could be made for students to make the labs on other campuses accessible.

### ***2. Academic Writing and Publishing***

Students would benefit from more sessions on writing and publishing research articles based on experiments done on such specialized equipment. Such sessions would also be highly useful and motivating for students, faculty, and researchers from other institutions as well which could be combined with an orientation to the research laboratories.

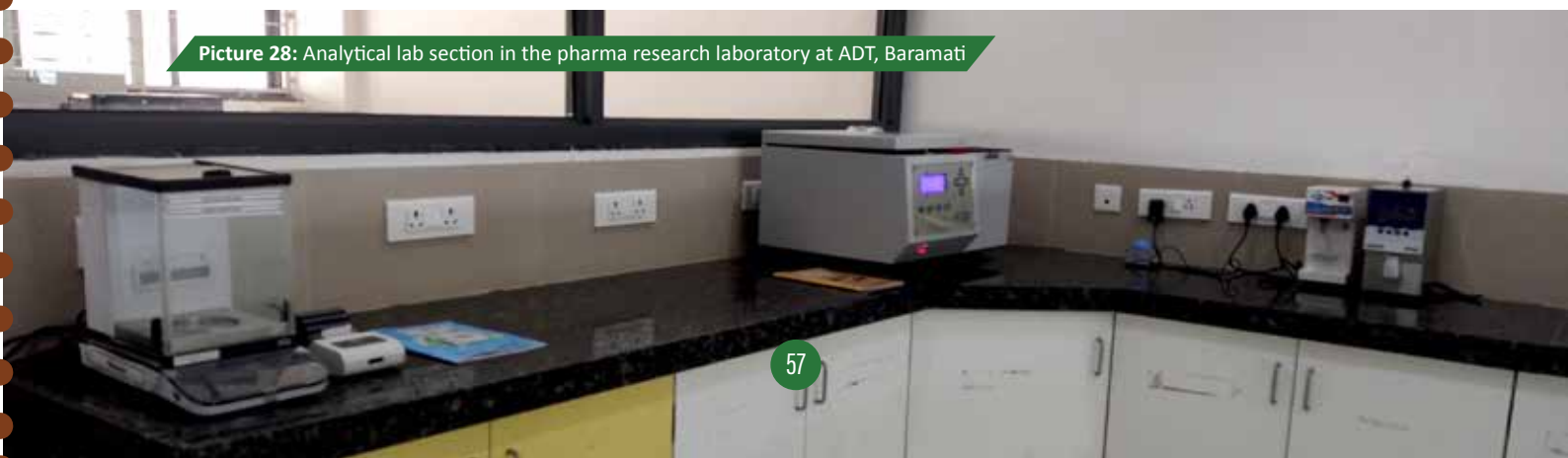
### ***3. Material and Human Resources***

Given the extensive reach and access of the equipment, there is immense need and potential to strengthen the research laboratory by adding some material and human resources. More number of equipment like LC-MS and AAS and some new equipment were suggested by the participants as the quantum and diversity of research being undertaken using the specialized equipment was significantly high and the waiting period to use the limited equipment was gradually increasing. This would provide more time, training, and access to more students, faculty, and other stakeholders. They also suggested updating the equipment by expanding the libraries of the equipment like LC-MS and FTIR to accommodate more nuanced analysis.

Further, existing staff need advanced capacity building for utilizing and handling such specialized equipment, reading, interpreting, and analyzing the reports, and applying the findings to the field. Faculty could also further benefit from advanced training to handle the equipment, analyze the results, and further train others.

Following is the suggested list of equipment that can be added for the research facility development, provide testing services to stakeholders, and maximize its impact across the rural area:

**Picture 28:** Analytical lab section in the pharma research laboratory at ADT, Baramati



**Table 4: Suggested List of Additional Equipment for the Research Facility**

S. No.	Name of equipment	Use
1	Gas Chromatography – Mass Spectroscopy (GC-MS)	Volatile component detection, residual analysis in vegetable, environmental & forensic application major pesticide, gaseous component analysis, lipophilic compound detection
2	RT-PCR	Molecular research in Life sciences
3	Scanning Electron Microscope	Used in materials science for research, quality control, and failure analysis
4	X-ray diffraction (XRD)	Used for the primary characterization of material properties like crystal structure, crystallite size, and strain
5	Inductively coupled plasma mass spectrometry (ICP-MS)	Used to measure elements at trace levels in biological fluids
6	Biochemistry analyzer	To perform various tests like albumin tests, sugar level tests, or to detect levels of enzymes and creatinine in the blood.
7	Ultra-High-Performance Liquid Chromatography	Used predominately to identify, quantify and separate components of a mixture by using high pressure to push solvents through the column.
8	Automatic Tablet Punching Machine	For research purpose of research scholars and students

#### 4. Community Impact

The community participants had a few suggestions to improve the reach and effectiveness of the labs. The dairy farmers suggested devising on-call home testing facilities like portable x-ray, sonography, and pregnancy home-testing kits as the cattle suffer in the travel, especially in emergency cases. The farmers also expressed the need for more soil testing, so more visits by KVK for testing, sample collection, guidance, and on-field demonstrations would help address some of the crucial needs of the farmers and generate more awareness about the research facility.

#### 5. Environmental Research and Advocacy

Advanced research and development facility and resources at ADT, Baramati should be used to address the persisting issues of polluted water in the Baramati region at its root cause. This will ensure long-term relief to farmers and nurture the environment, animal, and human health through healthy soil, water, and crops. It was reported that industry pollutants are adversely affecting the local water sources, which cannot be filtered by the farmers. Thereby, the farmers are compelled to use polluted water on their land for irrigation which damages the soil health permanently. These aspects can only be addressed at a larger scale through research and advocacy with industries and government by testing the water sources and devising permanent solutions through the research laboratories by ADT.

#### 6. Quality Accreditation

National Accreditation Board for Testing and Calibration Laboratories (NABL) process is already in pipeline. This should be done at priority for accreditation to the laboratories at ADT with the required national norms and standards. This will further give recognition and higher credibility to the labs and result in optimum quality testing services to the multiple stakeholders of the CSR Project.



Pluriversal Research and Action (PRA)



## CERTIFICATE OF PROJECT COMPLETION

05/04/2024

To,  
Sun Pharmaceutical Industries Ltd.  
Acme Plaza Andheri-Kurla Road Andheri East  
Mumbai-400059,  
Maharashtra, India

**Subject:** Completion of Social Impact Assessment of CSR Project titled 'Infrastructural Development of Pharma Research Laboratory at Agricultural Development Trust, Baramati, Maharashtra'.

Pluriversal Research and Action (PRA), Delhi was commissioned in FY 2023-24 to undertake the Social Impact Assessment by Sun Pharmaceutical Industries Ltd. (Sun Pharma) for its CSR project titled 'Infrastructural Development of Pharma Research Laboratory at Agricultural Development Trust, Baramati, Maharashtra'.

A team of researchers conducted the Social Impact Assessment by developing a robust methodology to collect data, conducting fieldwork with participation of multiple stakeholders of the project, and presenting findings from the primary and secondary data. The fieldwork for the same was carried out from 12th – 17th February in Baramati by the team.

Based on the data, the team prepared and submitted the report to Sun Pharma. The report adopted and adapted the AAAQ Framework and OECD DAC Evaluation Criteria to present the impact of the CSR project as per international standards. The report highlights the quantitative and qualitative impact by showcasing the achieved outcomes and impact made holistically. Based on independent and people-centric assessment, the report concludes with the areas that can be replicated further and recommendations to scale the impact for the way forward.

Best Regards,

**Dr. Priyanka Korde, Ph.D.**  
Co-founder & Partner  
Pluriversal Research and Action (PRA)

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## ABOUT PLURIVERSAL RESEARCH AND ACTION (PRA)

Pluriversal Research and Action (PRA) is a registered partnership firm, founded by two partners, to reaffirm the importance of people's voices and participation in the development exercise. The approach adopted is people-centric with technical and managerial inputs used as means to facilitate the development of people. Engagement of diverse groups is imperative to understand community problems and implement long-lasting solutions. The role played by PRA is of facilitator, based on a democratic model where the governance is with those who get affected by the development problems and interventions. PRA undertakes projects across India with the founder-members having pan-India experience of research studies and community development projects in wide-ranging thematic areas. We have rich experience and understanding of backward and aspirational districts, rural and urban realities, and multiple marginalization in the Indian context that we integrate in our methodologies and approaches.

### **Our areas of work are:**

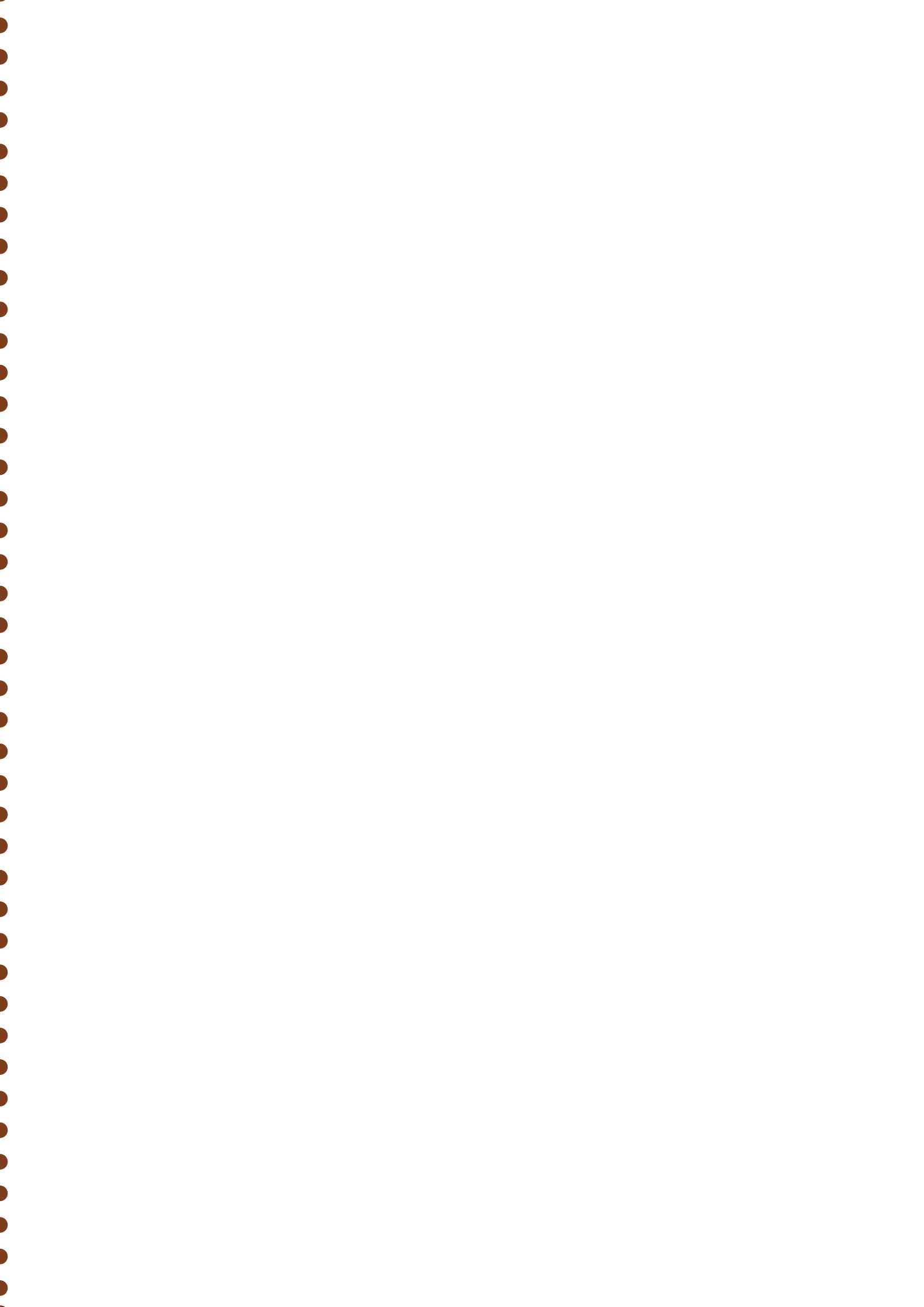
- ⊙ Research Studies
- ⊙ Reports and Documentation
- ⊙ Capacity Building of Development Professionals
- ⊙ Strategic Direction to Development Organizations

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