

Faculty Development Programme (FDP) Research and Advanced Data Analysis with R Programming

AIU – Academic and Administrative Development Centre (AADC) and Department of Economics, Berhampur University in Collaboration with the Association of Indian Universities (AIU) successfully organized One Week Faculty Development Programme (FDP) on Research and Advanced Data Analysis with R Programming during the period from June 26 to July 01, 2023. The FDP programme was attended by 56 faculty members and researchers from various parts of the country. The program's main objective was to train the teachers and researchers in learning various data analysis tools and use these tools and techniques with R programming software for improving their research output.

R is an open-source statistical package based on the S language. It is a powerful software for statistical analysis with a state-of-art graphics facility. It provides the means to define and manipulate the data, but the way one can go about the job is not predetermined like many of the menu-driven statistical software. A session with R differs from most other statistical software since it follows an interactive approach where the results from one step lead to the next. This was the idea behind the present training Programme on R.

The six days FDP had 12 technical sessions (excluding inaugural and valedictory sessions) covering various topics and hands-on training on the following topics:

- Introduction to research and data analysis using R
- Installing R and R Studio on Windows
- Introduction to basics of R, Data Frames in R and R Studio, R Scripts
- Contents and components of R packages including the Tidyverse package
- Working directories in R Studio
- Merging and Importing Data
- Data types, R Objects and Factors
- Exploratory Data Analysis using R
- Plotting Histograms and Pie Chart, Bar Charts and Scatter Plots etc.
- Data visualization with ggplot2 and dplyr Package
- Make use of R loop functions and debugging tools
- Data Simulation using R
- Collecting detailed information using the R profiler

- Inferential statistics (Hypothesis testing)
- Correlation and Regression analysis
- Analysis of Variance (ANOVA): One-way and two way
- Multivariate Analysis: Data reduction and data classification tools
- Discriminant Analysis and Cluster Analysis
- Factor Analysis and Principal Component Analysis
- Logit and Probit Analysis
- Understanding Forecasting and Volatility Models: ARIMA, ARCH & GARCH models
- Panel Data Regression: Application of ARDL and NARDL

The sessions were designed to provide a comprehensive understanding of various research tools and techniques using R programming. Adequate practical sessions were also conducted to ensure that the participants gain hands-on experience. The recordings of all sessions were also provided to all participants so that they can learn and re-learn about the application of R programming for data analysis. The distinguished speakers from state universities, central universities, and other Institutes of national importance such as IIT Bhubaneswar delivered their sessions during the FDP programme.

On 26th June 2023, the inaugural ceremony of the Faculty Development Program (FDP) was held at Berhampur University in Berhampur, India. The event started with the lighting of the lamp and Saraswati Vandana. Dr. Mrutyunjay Swain, AADC Nodal Officer AIU-AADC, Berhampur University and the convener of the program delivered the welcome address, and introduced the guests and the event's topic. The workshop was inaugurated in the hands of Hon'ble Vice Chancellor Prof. Geetanjali Dash and Prof. S.N. Tripathy, former president of Odisha Economics Association. Prof Manas Ranjan Patra was the guest of honour of the inaugural session. 56 faculty members and researchers from various parts of the country have joined the programme. Dr. Bishnu Charan Behera, the joint programme coordinator offered a vote of thanks to invited guests and participants.

On 26th June 2023, Prof. Dhaval Maheta of the Department of Business and Industrial Management, Veer Narmad South Gujarat University (VNSGU) Surat was the resource person of the 1st technical session. He discussed the fundamentals of research and data analysis using R; basics of R, data frames in R and R Studio, R scripts, working directories in R Studio, and merging and importing data. The discussion centred around the basic concepts of the

application of R for data analysis. Prof. Maheta provided some hands-on training on exploratory data analysis to the participants.

The second technical session of day 1 was taken by Dr. Prafulla Kumar Swain of the Department of Statistics, Utkal University. He discussed on data types, R objects and factors, matrix and determinants using R; contents and components of R packages including the Tidyverse package.

On day 2 (27th June 2023), Dr. Prafulla Kumar Swain delivered his lecture on R loop functions and debugging tools and their applications; collecting detailed information using the R profiler and data simulation using R. The second session of day 2 was taken by Prof. Dhaval Maheta of VNSGU Surat. He covered the topics such as exploratory data analysis using R, plotting histograms and pie charts, bar charts and scatter plots, box plots etc. He used various R packages along with ggplot2 and dplyr Packages.

Dr. Madhusmita Mohanty, an Assistant Professor Sr. grade (Finance & Analytics) at Vellore Institute of Technology, Amaravati Campus, Andhra Pradesh was the resource person for the 1st technical session of day 3 (28th June 2023). Dr. Mohanty covered topics such as inferential statistics (hypothesis testing), and various parametric and non-parametric tests using R programming. The second session of the day was managed by Dr Anjali Dash, Assistant Professor, School of Management, Centurion University of Technology and Management, Odisha. She covered some important topics like Correlation and Regression analysis. She continued her deliberation the next day, the 4th day of the programme and she covered Analysis of Variance (ANOVA), both one-way and two-way. She provided hands-on training using R to the participants on the above topics.

Dr. Tufleuddin Biswas, Assistant Professor, Department of Agricultural Economics and Statistics, Centurion University of Technology and Management, Odisha was the resource person for the 2nd technical session of day 4. He elaborately discussed various data reduction and data classification tools. During his 1st lecture, he covered important tools like discriminant analysis and cluster analysis. He demonstrated the application of the above topics in research using R. On the 5th day, Dr Biswas covered the other data reduction techniques such as principal component analysis and factor analysis and he discussed their usefulness and provided hands-on using R.

The second technical session of the 5th day was taken by Dr. Pabitra Kumar Jena, Assistant Professor in Economics at the School of Economics, Faculty of Management, Shri Mata

Vaishno Devi University, Katra, Jammu & Kashmir. The esteemed resource person who has already trained more than 800 faculties and 600 research scholars took his session on qualitative regression models including logit and probit models. On the 6th day, he provided his training with R on various forecasting and volatility models such as ARIMA, ARCH & GARCH models.

Prof. Bimal Kumar Sahoo of the Indian Institute of Technology (IIT), Bhubaneswar addressed the participants during the afternoon session of the last day. With his vast experience in data analysis, he elaborately discussed various panel data regression models and the application of ARDL and NARDL models. He discussed the fixed effect and random effect models and demonstrated the panel data analysis using R programming.

The Six-day Faculty Development Programme (FDP) on Research and Advanced Data Analysis with R Programming, organized by the Academic and Administrative Development Centre (AIU-AADC) in collaboration with the Association of Indian Universities (AIU) and the Department of Economics at Berhampur University, concluded on Saturday, July 1, 2023. The programme aimed at upskilling the faculty members with the necessary data analysis skills and knowledge using R programming language to excel in their research endeavours and teaching. Distinguished guests, including renowned academicians and experts in the field, attended the session.

The valedictory session commenced with a warm welcome extended by Dr. M. Swain, the FDP Convener and Nodal Officer of AAU-AADC, Berhampur University. Dr. B. C. Behera, the Joint Coordinator of the FDP, provided a summary of the various sessions conducted during the program. The event's Chief Guest, Prof. S.S Kalamkar, Director of the Agro-Economic Research Centre at Sardar Patel University, Gujarat, delivered an inspiring address. He highlighted the role of advanced data analysis techniques in advancing research in various fields. He advised the participants to focus on the quality of data and data collection methods before using those data for research.

Many participants shared their experiences of their participation in FDP. Most of them expressed their gratitude for participating in such a fruitful faculty development programme that has enriched their skills. They expressed their satisfaction for getting adequate hands-on sessions and copies of the recordings of all sessions which were very useful for their learning. Prof. Geetanjali Dash, the Hon'ble Vice Chancellor of Berhampur University, graced the occasion with her presence and delivered an address, appreciating the efforts the organizing committee and participants put forth in making the FDP a success. Expressing her satisfaction

at the successful completion of the FDP, Prof. Dash assured that more such programmes will be organised for improving the skills of teachers and researchers so as to improve the quality of research in various academic institutions.

The Vote of Thanks was delivered by Dr. Raj Kishor Kampa, Assistant Coordinator of AIU-AADC, Berhampur University, expressing gratitude to all the dignitaries, participants, and organizers who contributed to the successful completion of the FDP.

Dr. Mrutyunjay Swain, Convener of the FDP and the Nodal Officer, AIU-AADC, Berhampur University delivering his introductory address during the valedictory session. Joint Coordinator of FDP Programme Dr. Bishnu Charan Behera presenting the proceedings of the various sessions of FDP during valedictory session. The Chief guest of the valedictory session Prof. S.S. Kalamkar, Director, of the Agro-Economic Research Centre, Sardar Patel University delivering his valedictory speech. Vice Chancellor Prof. Geetanjali Dash addressing the participants during the valedictory session. Dr. Raj Kishore Kampa, Asst. Coordinator, AIU-AADC, Berhampur University proposing the vote of thanks during the valedictory session. Participants attending the valedictory function of the FDP.