

Repository Landscape in Türkiye and GCRIS: The first National Research Information System

Türkiye has one of the largest higher education landscapes in Europe, with 207 universities. 129 of them are financed publicly, and the rest are non-profit foundation universities. The Council of Higher Education - CoHE has been administrating the activities of the universities in Türkiye. Higher education institutions (HEIs) aim for research excellence; therefore, it is essential to be aligned with Europe and beyond in the Open Science movement.

The concepts of Open Access (OA) and Institutional Repositories (IRs) have come to the forefront of the Turkish information management landscape with the formation of the Anatolian University Libraries Consortium (ANKOS) in the early 2000s. ANKOS Open Access and Institutional Repositories Working Group was established in 2006 to raise awareness of Open Access and Institutional Repositories among information professionals in Türkiye. The Open Access movement began mainly with the activities of this group. IZTECH (Izmir Institute of Technology) participated in the OpenairePlus Project in 2011, OpenAIRE 2020 Project in 2015, and OpenAIRE Advance Project in 2018; IRs and Open Science practices have gained tremendous momentum lately in the country.

As a result of strong collaboration between major stakeholders; CoHE, TUBITAK ULAKBİM (The Scientific and Technological Research Council of Türkiye - Turkish Academic Network and Information Center), ANKOS, and IZTECH; TUBITAK, the leading agency of Türkiye for management, funding, and conduct of Research, has taken decisive actions detailed below:

- Established DergiPark in 2014, an open journal hosting platform, now consists of 2.482 journals and is one of the biggest OpenAIRE data providers.
- Developed The Turkish Academic Archive – Harman (<https://harman.ulakbim.gov.tr/>) in 2016, blends academic archives in Türkiye, includes nearly 2.500.000 records from 161 institutions. Harman requires using DSpace, GNU EPrints, or any open archive software supporting the OAI-PMH protocol and the OAI_DC format.
- Established Türkiye's Open Archive "Aperta" in 2018, containing research outputs from all fields of science.
- Created Research Data Management Training Portal in 2019,
- Being a member of (EOSC European Open Science Cloud) in 2020,
- and now working on Aperta Türkiye Academic Archive and Open Science Portal.

In 2010, the number of institutional repositories in DOAR from Türkiye was only eight, but by March 2022, this number is increased to 174. Türkiye is the 7th in the world with the number of repositories according to OpenDOAR Statistics. The number of repositories registered in OpenAIRE is 131, where the number is 164 in ROAR, and 113 in ROARMAP. 427 Turkish OA journals were registered to DOAJ.

CoHE is the driving force behind increasing the number of institutional repositories. CoHE highlighted the importance of establishing the "Open Academic Archive System" in the international standards in all universities. CoHE sent an official letter to all universities and required reports of the work carried out by universities and the number of publications in open academic archives in a method and format specified by CoHE.

IZTECH is a Turkish state university established in 1992 to offer higher education and carry out research in science and technology. Teaching and research are carried out in 18 undergraduate programs, 27 master's programs, and 19 doctoral programs. It has around 613 academicians and 6769 students. IZTECH is a pioneer and leader in Türkiye studies in open access, open science, open data, and IR. Like most institutions in Türkiye, IZTECH had also been using the DSpace platform between 2013 and 2021. However, since April 2021, GCRIS (<https://gcris.iyte.edu.tr/>) has been used in IZTECH. GCRIS was developed in collaboration with Technopark Izmir, the institute's technopark, to offer publicly all Institute research components and outputs, such as awards, projects, and data sets.

GCRIS Research Information System is Türkiye's first Research Information System in international standards, which was developed with data analytics and continues to be improved. GCRIS contains DSpace-CRIS 6.3 in its core. It is wrapped with new web client technologies, such as TypeScript and React 16.3, React Bootstrap, React Range. Some web pages are replaced by the pages developed with these new technologies. The home page, along with headers and footers, is designed to be configurable to match the university theme. The researcher page is prepared to reflect various statistics and listings from different sources. Moreover, a new reporting and dashboard module is coded and integrated. This module is developed using Restful API on Spring Boot running on JVM. The repository layer of the three-layer architecture is created following the repository-service pattern and developed by SOLID principles to work with JDBC. This layer connects to the database created by DSpace-CRIS software and generates reports with custom SQL queries. HikariPool has been added to the system to make SQL queries run faster. By using Plotly.js technology at the presentation layer, users can choose both chart types and parameters and produce charts that allow comparison. The reporting and dashboard module has been developed as a docker container to integrate the DSpace-CRIS software. Docker-compose is used to install the module on servers more efficiently. Containerizing the module and installing it on different servers is automated with shell scripts. GCRIS is accelerated with the use of Redis cache.

IZTECH is the first university to use GCRIS, and it has been used by other universities, such as TOBB ETU (University of Economics & Technology) (<https://gcris.etu.edu.tr/>), Eskişehir Technical University (<https://gcris.eskisehir.edu.tr/>), and Konya Technical University (<https://gcris.ktun.edu.tr/>).

GCRIS provides linking researchers to research outputs, linking research outputs to institutions, and Creating Author Collaboration networks. It includes research measurement via metrics, such as bibliometric and Altmetric. It also has intelligent reporting. It provides observations about research trends and suggestions by extracting relevant insights, ultimately empowering decision-makers to act. Because of all these features, with the increase in the number of universities using GCRIS, Türkiye's Research Ecosystem will be much better and facilitate its integration with the World. Some of the benefits of GCRIS are as follows:

- To increase visibility for researchers and organizational units of universities, including the universities themselves in Türkiye.
- To increase the visibility of Türkiye's publications.
- To help Turkish researchers concentrate on their research rather than their visibility and eliminate tasks like submitting performance data and performance report compilation.

- To help Turkish universities with fulfilling their reporting obligations with one click.
- To provide universities with business intelligence to derive their strategies with advanced reporting tools.