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Spectroscopic analysis model to be performed in a public archive

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Abstract: Public archives in Turkey are central archives located in the central organizations of institutions and where archival material and archival material are stored for longer periods (between 10-15 years) than unit archives within the elements of legislation. A public archive can contain documents of different characteristics and various purposes. Among the factors that cause this difference is the fact that the relevant institution has documents produced in various areas of activity that it has conducted in the past and continues to date and the archival material also changes depending on the progress of technology. Public archives are places of different types, sizes, paper types, produced for different purposes in some cases the reasons for their arrival in this archive are different, depending on the situation they can show the ability to write and carry manuscripts in their compilation. Public archives are a cultural heritage and often the archival materials they hold in their compilations are original and single copies. The aim of the article is to present a spectroscopic digitization process analysis taking into account the technical and legal requirements required in a study to be conducted in a public archive with different paper types, sizes and documents produced for different purposes.

Keywords: Archive; Digitization; Process Analysis; Public Archive; Spectroscopy.

Bir kamu arşivinde gerçekleştirilecek spektroskopik analiz modeli

Özet: Türkiye'de kamu arşivleri, kurumların merkez teşkilâtları içinde yer alan ve arşiv malzemesi ile arşivlik malzemenin mevzuat unsurları dahilinde birim arşivlerine nazaran daha uzun süreli saklandığı (10-15 yıl arası) merkezî arşivlerdir. Bir kamu arşivinde farklı özelliklerde ve çeşitli amaçlarla üretilmiş belgeler bulunabilir. Bu farklılığa sebep olan etmenler içerisinde, ilgili kurumun geçmişte yürüttüğü ve güncel olarakta devam ettiği çeşitli faaliyet alanlarında ürettiği belgelerin olması ve teknolojinin ilerlemesine bağlı olarak arşivlik malzemenin de değişmesinden kaynaklanmaktadır. Kamu arşivleri farklı türde, boyda, kâğıt tipinde, farklı amaçlarla üretilmiş, bazı durumlarda o arşive geliş sebepleri de farklı olan, duruma göre yazma ve nadir eserleri de dermesinde taşıyabilme özelliği gösterebilen mekânlardır. Kamu arşivleri kültürel bir mirastır ve çoğu zaman dermelerinde bulundurdukları arşivlik malzemeler orijinal ve tek nüshalardır. Makalenin amacı; oluşturulacak farklı kâğıt tipi, boyutu bulunan ve farklı amaçlar için üretilmiş belgeleri bulunan bir kamu arşivinde yapılacak bir çalışmada gereken teknik ve hukuki şartları göz önüne alarak spektroskopik bir dijitalleştirme süreç analizini ortaya koymaktır.

Anahtar Kelimeler: Arşiv; Dijitalleştirme; Süreç Analizi; Kamu Arşivi; Spektroskopi.

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1. Introduction

With the development of archive digitization projects it is ensured that external users can access archive work areas more quickly and efficiently as well as save space and human resources. Archival institutions can be prevented from constantly investing in these important transactions which are continuous and never limited. Thanks to the emerging technologies today, digitisation of documents in paper media stored under appropriate conditions is brought to the forefront in order to access information faster and more reliably. It is also important that these digitisations are supported on legal grounds. It is important that archive documents can be protected within legal storage periods and that users can access documents securely. Technical development of digitization projects will also enable more efficient use of archives, especially during disaster and pandemic periods.

2. Archive and digitisation in archives

Archives are chain structures formed by accumulating efficiently over the centuries, taking into account the important documents and cultural heritage in administrative, legal, political, sociological and social life that arise as a result of the self-produced and/or relations of all world states with other states. All the administrative or private history of a country and society is in the archives of that country. In the Ottoman Archives and Archives of the Republic which were inherited from the Ottoman State in our country there is a recorded history of our nation that has come to this day. With the intensification of e-government work in our country in the 2000's it has come to the fore that all public services adapt to the digital world. In this direction, digitization of both state archives and private archives has begun to be important. Along with these developments, digital archives and digitization projects in public institutions have gained momentum with the spread. As digitization processes begin, the archive resources that will be scanned need to be identified first. The realization of these studies also accelerates the acceleration of achieving the goals. It is of great importance that the goals are achievable and measurable in the analysis and planning process of digitization studies.

A few definitions can be given about digitization in archives. "*Digitization in archives is an information coding procedure that allows document copying*" (Petrescu, 2008). *"With digitization in archives, resources that were previously not visible for various reasons can come into visible form. Access to archival resources increases. Resources become accessible to everyone, not just a group of researchers. In addition with digitization, the problem of space and time is eliminated. Digital information is interactive and the digital environment and linguistic, auditory and visual meanings are combined to provide great convenience to the user. With digitization the physical space limitation of documents is eliminated*" (Eke, 2011; Bezirci, Bostancı, Gürel, 2012).

For this reason, 'digitization technical plans in archives' are being made.

3. Archive digitization project technical plan

Archive digitization projects are digitization projects that use new techniques, materials and methods in accordance with current situations which have not yet been put into operation but are planned to be passed. The gains that will be achieved as a result of the implementation of the

projects always contribute positively to the institution. Especially today, the importance of digitization in terms of accessibility in archive services has come to the fore. For this purpose, various tools, strategies and technologies are being developed. "*Digitalization has had a major impact on archival research services. Therefore, scientific and economic developments have a special place in the development of Digital Archives. Through digital applications easy access to archives is provided. But the rapid change in technology, archival institutions face different problems. From these problems among some, the need for hardware and software development for system maintenance is increasing costs include system management, protection, and data management*" (Özçubukçu, 2019). Especially with the rapidly growing big data concepts, data mining and data analysis, the expansion and increase of investments in these fields gains more importance. For this reason, serious work needs to be done on 'archive digitisation projects'.

Digitization projects in archives also positively affect the way archives are used and user behavior. With the introduction of electronic devices and communication technologies in all areas of life the services that users expect from archives also change accordingly. "*This, along with the increasing number of uses, increases the demand for users to access archives from anywhere*" (Ünal, 2019).

Digitisation of the library archive of Ankara University Faculty of Political Sciences realized in 2010 is an important project. In 2012, a project to digitize rare works of Istanbul University Faculty of Law Library was made. Efforts were made to digitize the archives of the T.C. Presidency of Religious Affairs in 2018 and the archives of the T.C. Ministry of Foreign Affairs in 2019.

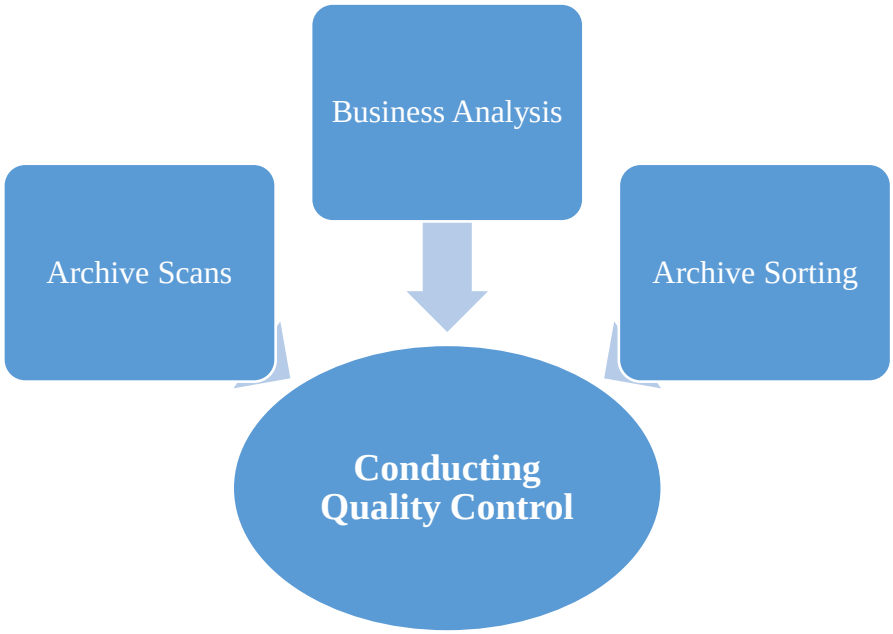

Figure 1. Archive digitization project technical plan design.

The technical plan of the digitization project discussed in Figure 1 follows the following various processes. These operations can be defined as:

3.1. Business analysis

Business analysis is a disciplined approach put forward in nonprofit enterprises and/or government departments to promote and manage change to organizations. Business analysts who perform business analyses identify solutions that maximize the value delivered by an organization to its stakeholders. Business analysis processes include:

- Document inventory removal operations are performed,
- Unnecessary document destruction plans are prepared,
- Storage plans are prepared,
- E-document recording formats are determined,
- Project risks and recommendations are finalized.

3.2. Archive sorting

The classification process in archives is the basis for organizing the goals, inputs, outputs and related activities of archive resources with various elements. Here, it is important that the classification system works together with all its elements and stages in accordance with its purpose. "*The main purpose of the classification system is to make documents ready for accurate and fast access*" (Rukancı and Koç, 2011).

- Cleaned from impurities,
- Necessary ReStores are made to easily pass through the browser used,
- Barcodes are attached to documents according to document types, a special barcode page is determined for historical documents,
- Physical document integrity is maintained and stored in the temporary scan area with the label scanned in the corresponding box.

3.3. Archive scans

Scanning operations in archives are the transfer of organized documents to a computer environment by scanning them with professional document scanners.

- Scanning operations are performed in the relevant scanners in the specified quality format and profile,
- Scanning process, skip, double feed, tear in scanned documents etc. operations are observed one-on-one,
- Scanned digital copies are recorded on disk in the corresponding recording format,
- Compares the number of pages saved in the system and the number of digital copies created,
- If it is to be done, it is subjected to automatic OCR process by the system,
- Scanned documents are stacked again physically intact.

3.4. Conducting quality control

Scanning quality, numerical data accuracy quality checks are performed on scanned documents and the transfer of finished documents to the central database is performed.

4. Legal basis of digitalization

Cultural heritage is one of the most important elements of human history. For this reason, in order to ensure the permanence and sustainability of cultural heritage it is seen that countries go to legal regulations and take into account international agreements and conventions on this issue. Besides the legal regulations for digitizing and digital protection of cultural heritage products it is also important to ensure the reuse of these products with current technologies. Established throughout Turkish history; various lineage, family, principality, state e.g. all works produced in institutions are very important in terms of reflecting our history. In particular, a single copy and/or a rare work must be stored and transferred to future generations. Transfer to future generations is possible by understanding and preserving cultural heritage. In terms of cultural development of society and not lagging behind the era in which it is located, these rare artifacts should be able to be accessed efficiently. "*In order to serve the community and ensure that citizens have adequate, up-to-date and timely access to the information they need, the realization of information publication is the most basic goal. The most important institutions that publish information are archives and libraries*"(Şeşen and Gürbüz, 2018). Archives and libraries are also indirectly responsible for the protection of cultural heritage.

Legal and technical studies for digitalization and digital protection practices in Turkey were scattered in the early periods. Among the laws for the management of cultural heritage is the 63rd. Amendment of the Constitution (1982). This article includes requirements for the protection of cultural assets as a scope. In addition, in accordance with the Laws 4848 and 2863 issued in 2003 (Ministry of Culture and Tourism, 2003) responsibilities related to the management of cultural assets it has been awarded to the T.C Ministry of Culture and Tourism. The National Archives Law (National Archives Law, 1993) which was discussed as a draft law in 2007 also stands out in terms of defining the duties and responsibilities of the T.C. General Directorate of State Archives on cultural heritage products.

According to the legal regulations, digitalization applications, training for these applications, training and Research Center establishment are the responsibility of the Presidency of the Manuscripts Institution of Turkey. In addition, digitization is included in the legal regulations as a method in the process of reproducing works without damaging the original copy. "*Applications for works other than writing and manuscripts are considered within the scope of the law on ideas and works of art and the law on compilation of duplicated ideas and works of art*" (Çakmak, 2016).

One of the largest libraries in the world is the American Library of Congress. A.B.D. the capital of Washington D. C. It is also located in three different buildings. "*The American Library of Congress, in 1815, Thomas Jefferson donated all the books (6,487 pieces) contained in his library to this library and the library grew over time. Over time, the library has sought to preserve historical and cultural materials for educational and academic purposes*" (Hubbell, 2009). "*Many works are preserved in the American Library of Congress to be given to future generations. For example, 'Master Of Puppets', the third album by the American Heavy Metal band Metallica, released in 1986 and considered one of the best albums in metal history was selected among the albums protected by the National Register of the library of Congress for transfer to future generations*" (Şeşen, 2019). It is a good example of the digitization and preservation of American Archives.

Considering the legal regulations on this issue in general, digitization practices in Turkey are mostly considered in the size of writing and manuscripts. This is positive from the point of view of

archivalism but not enough. Support should be provided for the digitisation of all types of printed resources. Any digitized material will be more useful to researchers in future times.

5. Digitalization process model

Stages of a digitization project;

- Selecting,
- Conversion / Creation,
- Quality Control,
- Metadata,
- Technical infrastructure system,
- Distribution / Presentation,
- Must be storage / Numeric protection.

The digitisation process should be carefully planned and objectives and objectives, copyright restrictions, financial resources and corporate competencies should be taken into account. Cooperation between librarians, researchers and administrators should be ensured in projects. Academics resource collection, detailed image analysis, data visualization, geographic mapping and social media etc. they need to develop digital research methods that include such elements.

The entire work must always be digitised. After digitalization, the original makeshift should never be discarded. Free and universal access to digitized objects and research resources should be ensured to users and meta data collection easily collect, use and digital research and publishing platforms should be offered the opportunity to download so you can stream to.

"*After the digitization is completed, answers to the following questions should be sought:*

How, by whom and for what purpose are the digitized resources used?

Is digitalization catching up with the pace of access technologies and academic developments?

Encouraging users to access these cultural heritage resources in digital format is an important consideration. At the stages of digitization, training should be provided for both archivists and users. Knowing the expectations of users from digital sources and teaching them how to access them is a very important issue. Here, user requests should be received and their analysis should be done well" (Eke, 2011; Bezirci, Bostancı, Gürel, 2012).

6. Spectroscopic analysis of archives

Studies on laser physics are used in many branches of science. Some of these branches of science are production, health, energy and security. With the development of technology the introduction of new devices and their use in science analysis studies has become widespread. With the development of optics and laser physics, developments have also been made in spectroscopic

devices. Spectroscopy is used in a wide variety of researches and it is at the service of scientists in examining the archives which are the subject of the study by spectroscopic methods.

Statistical methods are used to examine handwriting and signatures. If certain methods are used together with measurable details in writing (letters, numbers) and signatures, the signature and ink variety of the writings written on the document, forgery elements such as addition, falsification, replacement are determined. Reports are prepared based on the findings obtained with the help of devices such as Electron Microscope, VSC 2000 - 8000, SLM 4177, XP 4010 D, Docu box, ESDA (Electrostatic Detection Apparatus (Determination of hidden texts).

Forensic XP-4010D-New Generation Document Analysis System Device has been produced by TUBITAK BILGEM (The Scientific and Technological Research Council of Turkey-Information and Information Security Advanced Technologies Research Center). The measurement method based on physically measurable optical spectroscopy parameters, it provides accurate results without the need for user interpretation. It is a commercially produced spectrograph that uses the hyperspectral method to be used in the examination of large documents (TUBITAK BİLGEM, 2015).

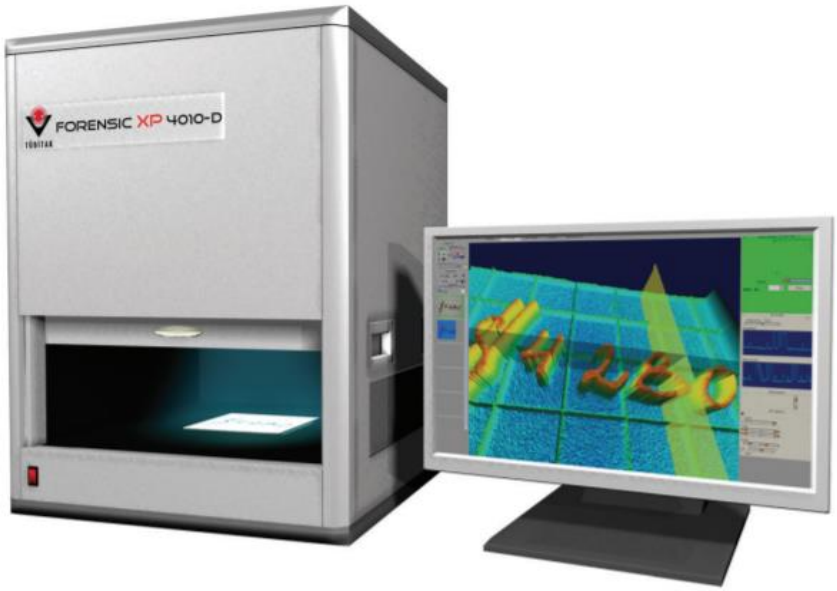

Figure 2. Forensic XP-4010D- new generation document inspection systems.

The creation of new diagnostic methods based on modern tools for diagnostic visualization is an urgent task for physics, medicine and engineering. As in the example above, the development of new technological products for archives and handwriting is offered to the service of forensic sciences and criminology. Basically, these devices use spectroscopic methods.

Raman spectroscopy is extensively used in analysis of the cultural heritage artefacts. In order to protect heritagematerials by ‘spectroscopic cryptology techniques’ (Infrared and Raman spectroscopy) play a crucial role in understanding and differentiating the fake/artificial materials from each other (Unsalan et al., 2017).

The principles of laser spectroscopy the development of basic methods and application areas the dissemination of good practice examples the application of spectroscopic cryptology and

analysis techniques in documents and their recording in databases are of great importance for researchers.

Cryptography is methods for ensuring the confidentiality and authenticity of information. Cryptography, a branch of science, refers to the encryption of information. It undertakes to ensure privacy. Protecting confidential information from unwanted people is the duty of cryptography.

It is very easy to understand whether historical manuscripts, rare works and handwritings are original works by using Cryptography and Spectroscopy methods together.

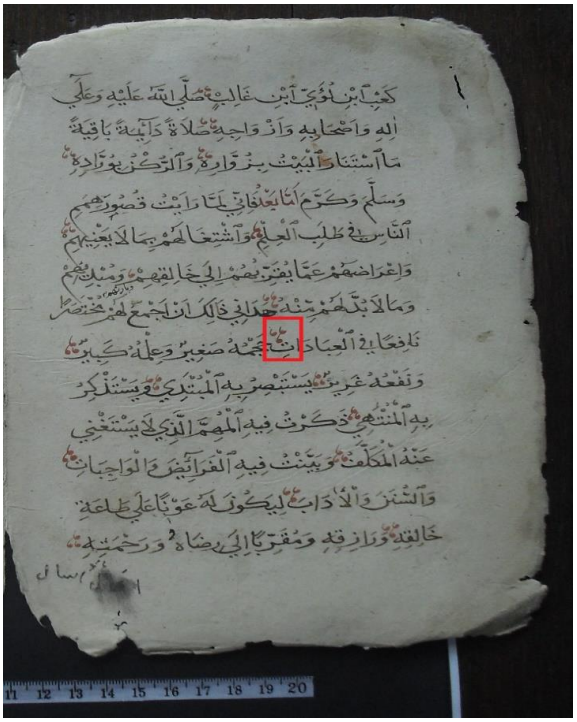

Figure 3. Selecting a letter for cryptography on a historical manuscript.

Starting from the examination of a historical manuscript in Figure 3, choosing the letter t (ت), which is the 10th letter from the right of the 8th line of the 5th page, making both black and red ink analysis of this letter and the signs on it, making the paper and cover analysis with spectroscopic methods, it is an important work to be done for the risk of preparing its replica the result of theft. This cryptological information will be known by the archive authorities where the manuscript is located. If the manuscript is the subject of a court case, it will be an important judicial evidence.

Comparative Raman Spectra of the samples paper surfaces for identification of aging and environmental conditions can be obtained with spectroscopic analysis. These methods (visual techniques, spectroscopic analysis methods etc.) offer user friendly, cost efficient features and non-destructive working on rare boks, this method can be used for diagnosis, restoration and risk assessment issues in this field this model can be turned into a software which is included all data overall risk (Unsalan and Kuzucuoglu, 2016).

It is also very important to digitize all pages of the work in terms of ensuring the integrity of the information. This issue is explained in the other section. Information integrity is also one of the tasks of cryptography.

In the case of editing electronic documents and in confidential text, unauthorized persons can access the transmitted information. Therefore, electronic documents also need cryptographic protection.

7. Conclusion and recommendations

When the standards that may affect digitization practices in Turkey are examined the 'TS13298 Document Management Standard' appears on the subject (TS 13298, 2015). The transition to electronic records management in the public sector started in 2005. Within the framework of the turkey e-transformation Action Plan, operations were started in accordance with the standards of archive management in the public sector as an e-government component. "*The study, carried out by a commission under the Coordination of the General Directorate of State Archives was transformed into the Electronic Document Management System criteria reference model in April 2006. Electronic Document Management System criteria the reference model has been developed to determine the standards necessary to preserve the quality of archival documents produced and/or likely to be produced in public institutions. The Model was adopted as a standard by TSE on 19 June 2007 under the name TSE 13298 information and documentation - Electronic Document Management"* (Kandur, 2006; Önaçan et al., 2012)

In Turkey, The Information Society Strategy Action Plan covering the period between 2006 and 2010 it is seen that indirect statements on digital information and cultural heritage issues are included. In the plan, digitization studies are expected to be carried out in cooperation with the Ministry of Culture and Tourism, Prime Ministry, YÖK, TUBITAK, TSE, Universities, Local Governments, Non-Governmental Organizations (NGO's) between 2014 and 2017.

"*In the policy documents that can be addressed within the scope of digitization policies in Turkey it is seen that the transfer of cultural heritage to future generations and the protection of national values, the preservation of cultural assets and the issues of education and research are discussed*" (Çakmak, 2016, p. 9). "*Digitalization and digital libraries in Turkey on transfer/display speed, color quality, audio quality, conversion and quality control standards and information covering each other's with similar services to share data centers or platforms for digital collections to allow you to import is missing*" (Anameriç, 2014).

It is important that the costs of digital archive projects are strengthened on legal grounds in the future. There is a direction towards a world where scanned documents of institutions can be accepted through judicial and many official processes. With the development of such positive states, it becomes important in spectroscopic methods in archives. It is also unlikely that any malicious artificial interference can be made on archival materials identified by spectrofic methods. Important archival materials revealed by spectrostroscopic methods can be used both in court files and in some international distressed situations between states.

It is important to develop specstroscopic techniques with the possibilities brought about by technology. In order to develop specstroscopic methods, it is imperative to increase the digitalization rate of archives. For this purpose, past shortcomings in the digitization of archives should be completed as soon as possible and the digitization function of institutions should be implemented quickly.

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