

Evaluation of EDMS Usage in Terms of Environmental Sustainability

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ABSTRACT

Innovation in information technologies have led to the rapid spread of electronic applications and brought a new dimension to document management processes. Document management systems, which are used by digitizing traditional printed documents, have gradually been replaced by Electronic Document Management System (EDMS). EDMS is of strategic importance for organizations, not only increasing operational efficiency but also saving costs and energy. In addition, the contribution of EDMS to sustainability goals is also noteworthy, as it minimizes environmental impacts by reducing paper use and contributes to a greener future. Although there have been various studies on EDMS in Turkey, the energy saving and sustainability aspects of the subject have not been emphasized enough. The aim of this study is to reveal the cost and energy savings, operational efficiency and sustainability contributions of EDMS in universities. In addition, it is aimed to create a resource that will provide guidance to institutions that have switched to EDMS or are in the process of transition. In this context, the savings and sustainability advantages of EDMS in universities are analyzed. As a result of the data obtained regarding the environmental impacts of the use of EDMS at Batman University, it was seen that 113 trees were saved and 572 tons of water were saved in 2023. In addition, 32.4 tons of CO₂ emissions and 2.3 tons of waste were reduced.

1. Introduction

Electronic Document Management Systems (EDMS) are one of the fundamental components of digital transformation processes, providing organizations with advanced technology to manage their documents in digital environments. By eliminating the complexity and slow pace of traditional paper-based processes, they enable faster, more secure, and more efficient document management. Moreover, EDMS is not limited to accelerating business processes or reducing costs; it also offers significant advantages in terms of environmental sustainability. These benefits can be considered a vital tool in achieving sustainable development goals today. Environmental sustainability refers to an approach aimed at reducing the impact of human activities on natural ecosystems and safeguarding natural resources for future generations [1]. EDMS contributes significantly to this area, particularly by minimizing paper consumption, supporting the preservation of forest resources, reducing carbon footprints, and decreasing waste production. The environmental costs associated with traditional paper use, such as energy consumption, water waste, and greenhouse gas emissions are significantly reduced through the processing of digital documents. For instance, considering that the production of one sheet of paper

results in approximately 600 ml of water, 34 grams of CO₂, and 2.4 grams of waste, widespread use of EDMS can yield substantial resource savings on a large scale [1, 2].

This study, conducted at Batman University, demonstrates the environmental impact of EDMS with concrete data. The system implemented within the university has not only increased the speed of business processes but has also led to significant reductions in energy efficiency and carbon emissions through annual paper savings. For instance, the savings observed during a specific period were associated with tangible benefits, such as the preservation of hundreds of trees and the prevention of the release of tons of carbon dioxide. These types of gains provide an important model not only for Batman University but also for the implementation of similar systems in other institutions and organizations. In this context, electronic document management is viewed not only as an operational innovation but also as a strategic tool that facilitates achieving environmental sustainability goals. The widespread adoption of EDMS will contribute to increased environmental awareness both locally and globally, enabling more efficient resource use. Thus, digital transformation processes will be integrated with sustainability, allowing institutions to adopt a more responsible structure in both economic and ecological terms. The environmental impacts of EDMS are not limited to short-term gains; they also ensure the widespread adoption of environmentally conscious policies in the long term and leave a more livable world for future generations. Research that further highlights the benefits of such systems will increase awareness in both the academic and institutional worlds and will create significant gains for a sustainable digital transformation [1, 3, 4].

2. The Impact of EDMS on Environment

The environmental impacts of paper production are generally prepared using average values and aim to demonstrate the environmental costs of the paper production process. This type of assessment may suggest a correct approach, but precise figures can vary depending on the production processes, raw materials used, and energy sources. It is estimated that approximately 10,000 to 20,000 liters of water are required to produce one ton of paper. The use of recycled paper can reduce water consumption. Various sources report differing values for water consumption in the production of a single A4 sheet. According to TÜBİTAK data, 13 liters of water can be used to produce one A4 sheet of paper. Other sources state that CO₂ emissions for the production of one A4 sheet range from 13 to 35 grams. Waste produced during paper production is a result of the cellulose and chemical processes, and the amount of waste varies depending on the production process [5].

It is evident that energy, water consumption, and waste quantities during paper production have an impact on environmental sustainability. Particularly, chemicals and intensive processes used in cellulose production increase the environmental costs. Negative effects have even been observed in common methods such as Kraft (sulfate) due to chemical use. The importance of recycling paper production is emphasized here. For example, recycled paper production consumes 64% less energy and uses less water compared to virgin cellulose-based paper production. Additionally, one ton of paper produced through recycling saves 26 tons of water. Recycled paper products significantly reduce the environmental impact by decreasing waste quantities and energy consumption. For institutions, reducing paper consumption and encouraging recycling are critical measures. The widespread adoption of digital solutions such as Electronic Document Management Systems can make significant contributions to environmental sustainability goals [6].

2.1 PExample of Batman University

Since 2014, Batman University has been using EDMS to digitize all its documents. The environmental impacts of the system implemented at Batman University were examined in 2023 based on the following values for producing one A4 sheet of paper: 600 ml of water, 34 g of CO₂, and 2.4 g of waste.¹

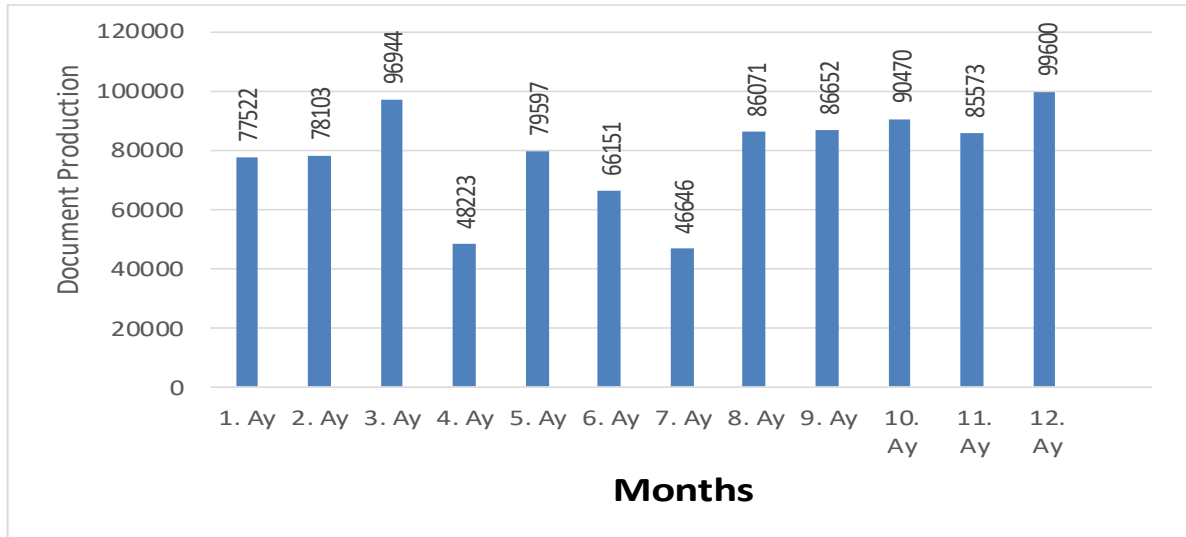


Table 1 Electronic Document Production at Batman University in 2023

In 2023, the monthly production of electronic documents ranged from a low of 46,646 in July to a high of 99,600 in December. The peak production in March (96,944 documents) and December indicates busy work periods, while the decrease in months like April (48,223 documents) and July may be due to holidays or seasonal slowdowns. A total of approximately 950,000 documents were produced throughout the year, significantly reducing paper use and contributing to environmental sustainability. The positive impacts on water, carbon emissions, and waste due to paper savings for each electronic document highlight the critical role of digitalization in both economic and environmental dimensions.

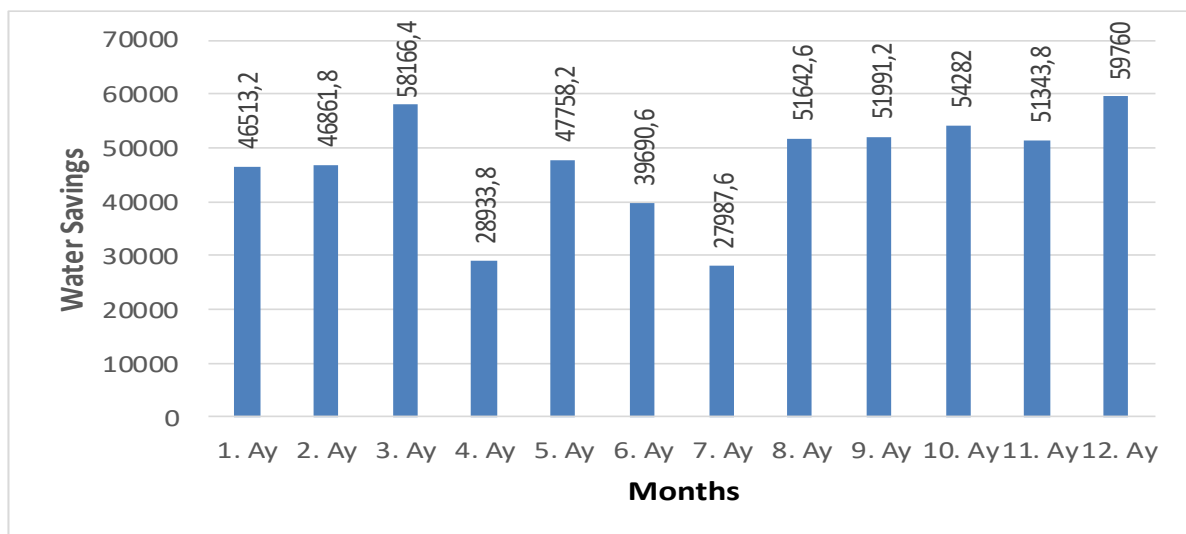


Table 2 Water Savings from EDMS Use at Batman University in 2023

¹ It was calculated using the formula found in the Batman University Electronic Document Management System Environment Module.

According to the graph data, varying amounts of water savings were achieved throughout the year, with the highest savings (59,760 liters) occurring in December. By not using paper in 2023, Batman University saved 572 tons of water.

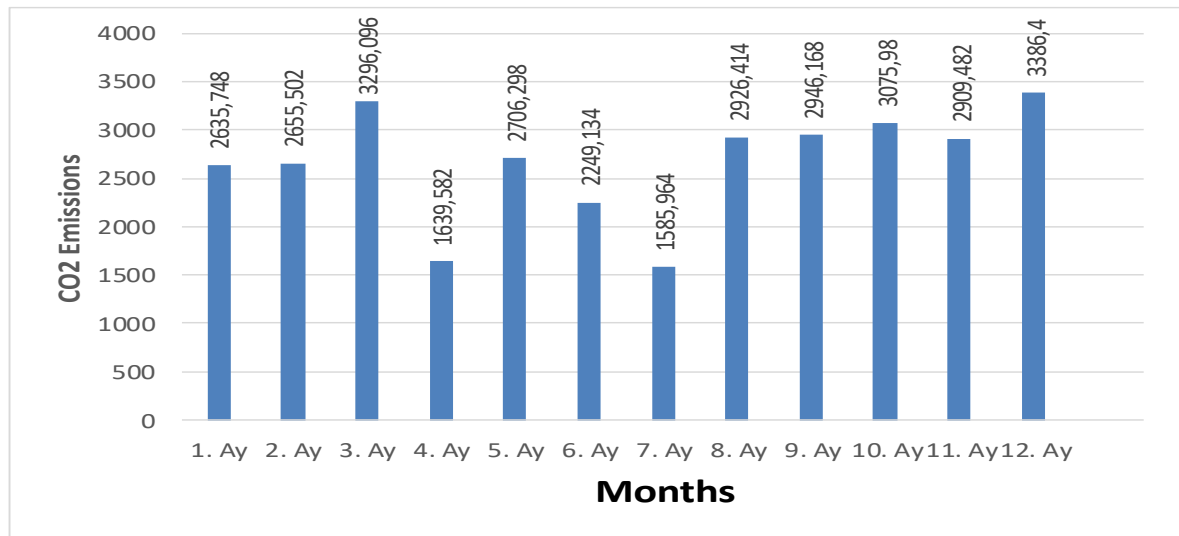


Table 3 Reduction in CO2 Emissions Due to EDMS Use at Batman University in 2023

This figure clearly illustrates the impact of the Electronic Document Management System (EDMS) on reducing carbon emissions. A regular decrease in carbon emissions throughout the year was observed with the use of EDMS, contributing significantly to environmental sustainability. Notably, in March and December, the system's impact peaked with a reduction of approximately 3,500 kg. EDMS use resulted in a decrease of 32.4 tons of carbon emissions in 2023.

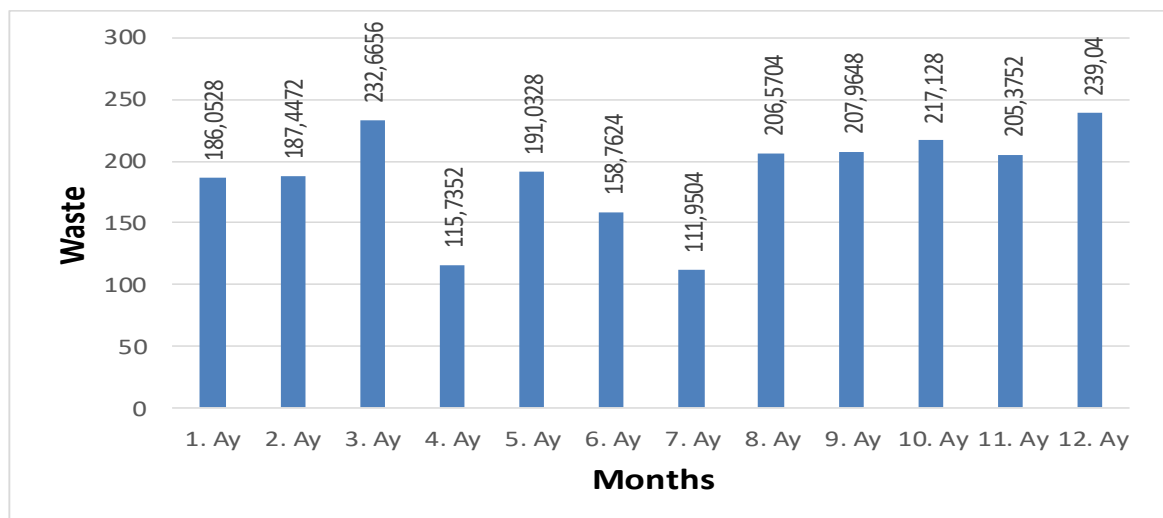


Table 4 Waste Prevention Due to EDMS Use at Batman University in 2023

The environmental benefits of EDMS are highlighted through the amount of waste prevented. Monthly data show that waste prevention ranged from 150 to 250 kg. Especially in March and December, the amount of waste prevented peaked, and a total of 2.3 tons of waste was prevented in 2023. This contribution not only reduces institutional waste management costs but also minimizes environmental impacts. This reduction in waste production is a significant step in protecting natural resources and easing the burden on waste storage areas.

3. Conclusion

The example of Batman University highlights the contributions of Electronic Document Management Systems (EDMS) to environmental sustainability. The study reveals that EDMS reduced paper usage, preventing the cutting of 113 trees in 2023, saving 572 tons of water, and reducing CO2 emissions by 32.4 tons. Additionally, 2.3 tons of waste were prevented. It was determined that the system offers significant benefits not only in terms of environmental impact but also in energy and cost savings. The research demonstrates that EDMS is a vital tool for achieving sustainability goals and can guide other institutions. The findings confirm that digitalization plays a critical role in both environmental and economic terms.

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