



## Ain Shams University- Paving the way towards a paperless University.

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**Abstract.** The conventional use of paper-based operations in daily working practices introduces numerous risks and financial burdens. Nowadays, Universities are aligning with the growing movement of "green" campuses. Going paperless is a green initiative contributing to sustainable development goals 11 and 12. Ain Shams University (ASU) attempted to establish a paperless campus through digital transformation as this movement promises high-quality academic and administrative services. This paper aims to highlight ASUs developed 3 R's approach for paper waste reduction include switching to electronic exams, customizing paper amounts annually, implementing electronic payment and service options, and using barcodes for cafeterias by creating E-Systems to deliver services online. Starting with the ASU community's cultural level, awareness campaigns are being conducted on proper waste management. Parallely, segregation bins are placed throughout the campus to effectively separate waste streams for recycling options, either internally by the artistic activities or externally by our specialized partners. To ensure the efficiency of this digital transformation, this study investigates the different waste streams, generation rates and quantities. Statistical methods will be used to analyze relationships between variables and identify potential paper waste reduction and recycling plans. The outcome of this study is an evaluation of the current progress in implementing the strategy. Additionally, it could be used as a case study for developing strategies in moving toward establishing a successful paperless university model.

**Keyword:** Paperless University, Reduce, Recycle, Reuse

## 1. Introduction

Ain Shams University (ASU), founded in 1950, is one of the oldest Egyptian governmental universities in Cairo, Egypt. The university comprises 7 campuses distributed across Cairo Region accommodating 220614 students, 5860 international students, 20540 postgraduate students in 19 different faculty and 1 postgraduate institute. Approximately, 1455 faculty staff and 10388 employees working on 48 credit hour programs and 26 joint programs and 259 research projects. The university, also, has 19 libraries and 11 hospitals [1].

The conventional use of paper-based operation in daily working practices introduces numerous environmental and financial risks and impacts human health negatively. Nowadays, Universities worldwide are aligning with the growing movement of paper use reduction by undertaking progressive steps in reducing the paper waste through efficient tools like online platforms and applications to minimize the paper waste [2], [3] and digitalizing internal paperwork system which will also reduce the printing cost and the ink usage [4]. Going paperless is a green initiative contributing to Sustainable Development Goals (SDGs): SDG11: Sustainable cities and communities; SDG12: Responsible Consumption and Production; and SDG13: Climate Action [5]. And aligns with the presidential initiative “Go Green” which aims to promote awareness and social responsibility towards an environmentally sustainable inclusive and equitable society [6], in line with Egypt’s national development strategy “Egypt 2030”. ASU attempted to establish a paperless campus through digital transformation as this movement promises the provision of high-quality academic and administrative services that reduces paper usage by 45 to 55%. This could contribute towards air and water pollution reduction and decrease deforestation.

ASU adapts the 3 R’s approach which is to reduce, reuse, and recycle paper waste leading to a paperless university [7], which contributes to promoting a green campus. The Reduce strategy aims to decrease the amount of paper consumption and minimize waste. This is achieved through creating information networks and databases linking all the faculties, building technological infrastructure, and establishing a service automation system, as well as training the staff and increasing their capability. Whereas the recycle and reuse strategies aim to manage paper waste and reuse the paper product a couple of times rather than disposing them after a single use. Data has been analysed statically to evaluate the status and the application of the 3 Rs approach. The outcome could be used as a case study for developing strategies in moving toward establishing a successful paperless university model.

## 2. 3 R’s University Approach

The actions ASU has undertaken to implement the 3 R's strategy towards paperless campus, illustrated in Figure 1. These actions were statistically analysed to identify the potential paper waste reduction and recycling plans, detailed in the following subsections.

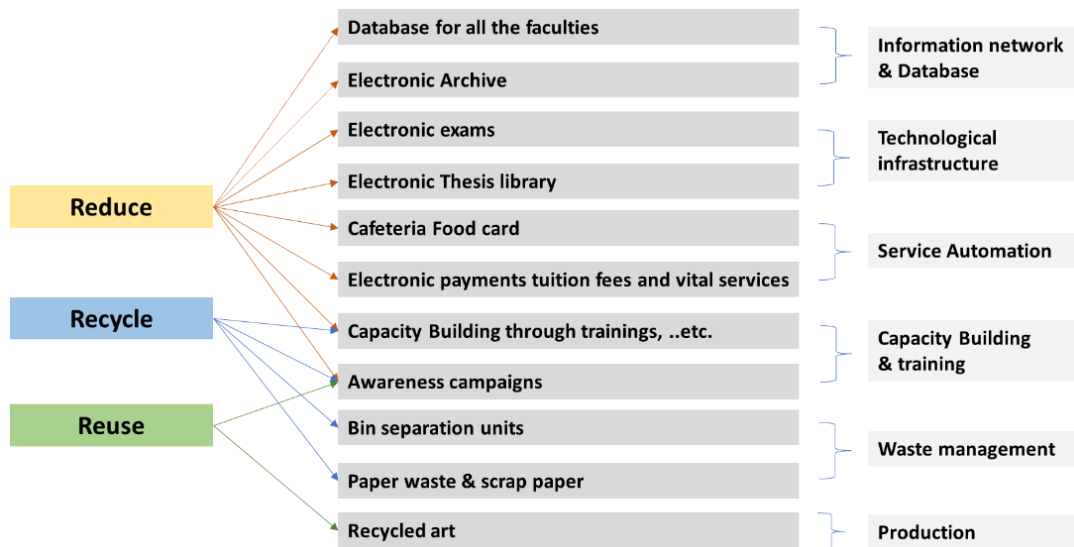


Figure 1: The university 3 R's approach towards a paperless university.

### 2.1. The University Reduce Applied Approach

The university first mapped the paper use sources, Figure 2. It appears that most of the paper usage at the university is related to printing exams and answer booklets, as well as the circulated publications within the different faculties, departments and related units. This accounts for roughly 74% of paper use, conversely, exhibitions and conferences, as well as the administration section which includes the university's president, vice president, and professors have much lower contributions to paper usage, at 4% and 3% respectively. The publication costs are high since it is required to purchase papers in different types and sizes, ink, and printers, as well as indirect expenses such as electricity and regular maintenance.

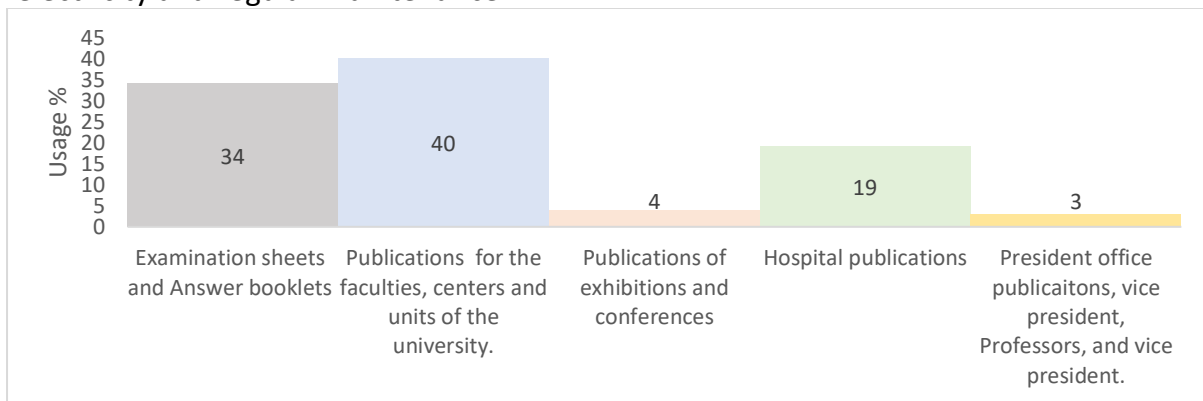


Figure 2: Paper usage at the University.

The university considered sustainable practices and sought out opportunities to further reduce paper usage in areas where it is most heavily consumed, such as printing exams and answer booklets and considered implementing policies to encourage the use of digital documents and reduce the reliance on printed materials. Among these are:

- The development of a secure **electronic examination system** has been undertaken, encompassing a question bank, exam formation, and automatic correction. This platform aims to simplify the process of exam creation and grading. The first phase of the implementation involved providing training to the control head and members, unit heads, and teaching staff. The accompanying chart illustrates the proportion of trained

personnel across various faculties. The platform was initially designed for undergraduate studies and now in the process of being extended to postgraduate studies. Furthermore, there are nine designated electronic examination halls that can accommodate up to 1950 students. Students have been examined and corrected electronically.

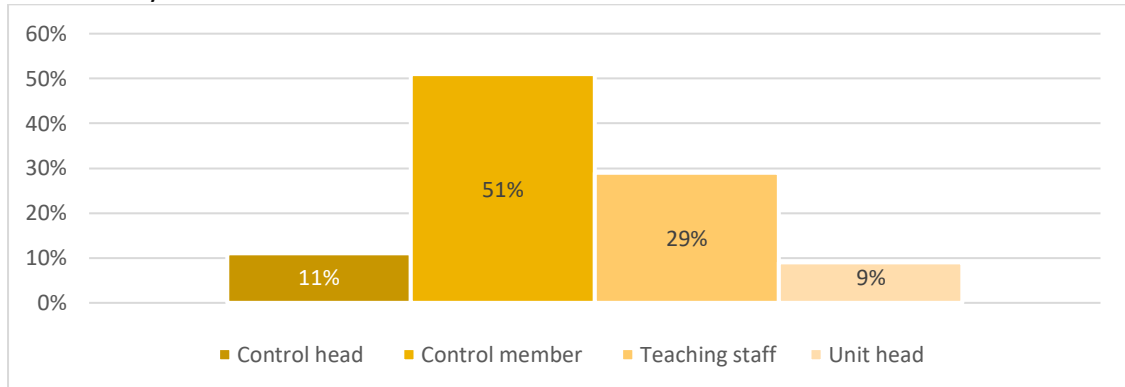


Figure 3: Trained members for the electronic exam's preparation and application

- The food barcode system** has been implemented to replace paper coupons for all the students and staff to obtain their daily meals at the university restaurants, Figure 4. The system is designed to be efficient and accommodate all university students and staff across different faculties that could be applied through the student or the employee's portal. To achieve this, a high-speed internet system has been constructed, barcode readers and computers have been installed at the restaurant, and training courses have been provided for employees on how to utilize the system. A database has been generated which reduces waste and raw materials since it specifically tracks the number of students and employees receiving meals per day and determines the peak hours. Additionally, meal delivery for the students and workers is monitored and the restaurant's performance can be investigated.



Figure 4: The food barcode system at the university's restaurant.

An electronic thesis library has been created in alignment with Egypt's major electronic knowledge platform, the "Egyptian Knowledge Bank" (EKB) which gives the opportunity to access to unlimited resources for Egyptians [8]. The university library transforms M.Sc. and PhD thesis work into electronic copies, figure 5. Currently, 94% of the work has been digitally transformed at the library database and the remaining 6% is in progress from 35000 thesis. Also, these theses can be accessed through the Egyptian universities' libraries consortium [9]

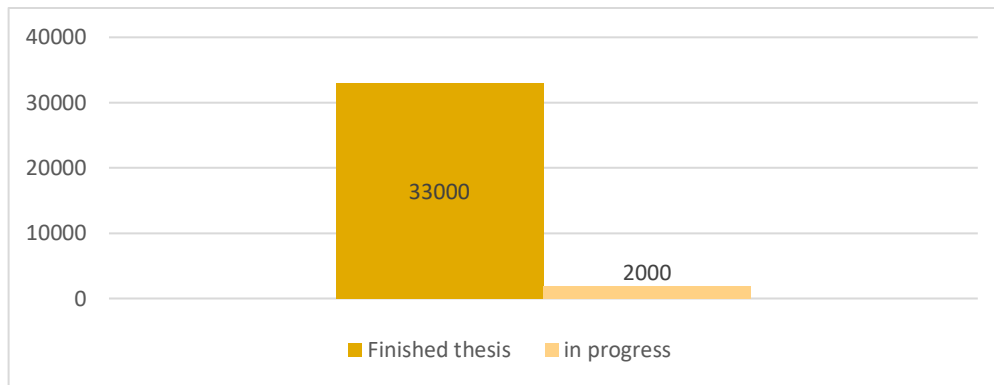


Figure 5: Digital thesis library progress

- A digital service platform named “University Management System” UMS for ASU staff, Students, Postgraduate, scientific research, alumni, employees, and other services such as media, community, and health care services has been developed [1]. An example of the UMS is the **student portal** which allows students to register for courses, open and withdraw course requests, **pay tuition fees** using a secure and guaranteed electronic payment gateway for all card types, access the student and examination schedules and results, request an appeal, and file a complaint if required. Students, also, can request any vital services such as meal booking, dormitory requests, request medical assistance, apply for international courses such as Coursera or TOEFEL, and military education application. This system is applied across the different facilities for students, ASU staff, Postgraduate students, Alumni, and employee’s portal. The database is generated from all the faculties and electronically archived to ease the decision-making process of the students’ affairs and the university administration.

This digital service is extended to serve students who wish to transfer to other universities by contacting the students’ affairs committee which reviews and revises the admitted files, approximately 50,000 transferred students. The committee coordinates with the required entities such as the Supreme Council of Universities.
- The university aids in the electronic admission process for colleges and institutions through the **E-coordination service**. In coordination with the Ministry of Higher education, the university provides a venue, high-speed internet, and guidance for high school students, Arab, and foreign technical diploma students of various types to enroll in universities. This service is undertaken in some faculty laboratories such as the faculty of Women, engineering, agriculture, computer science, arts, and the student’s village. These labs provide assistance and tools that ensure the required service quality and excellence to provide good reception for students. They accompany and guide students to complete the coordination process in the required manner under the supervision of the university leader from 2019. This service has been ongoing for approximately 30, 000 applicants yearly.
- Lastly, in areas where paper usage is already relatively low, such as in exhibitions and conferences and the administration section, the university applied different strategies such as emailing scanned documents rather than photocopying, the use of bar code scanning in organized conferences, the submission of course work in electronically submitted in most of the faculties such as the faculty of engineering, measurement and evaluation unit at the faculty of specific education, faculty of Alsun and faculty of

women.

## 2.2. The University Recycle Applied Approach

Paper wastes have been collected from various resources, foremost expired publications from the print warehouse. The collected paper is sorted and stored in piles depending on the paper type which could be white or coloured paper, cardboard, or answer sheets. Following law 182 (2018), this process is moderated by the university procurement administration. The university uses public auction selling and/or Direct buyer (when items did not reach the estimated values). In year 2020/2021, 169 tons were sold and in 2021/2022 42 tons were sold and this refers to the less paper waste produced in the last year, figure 6.

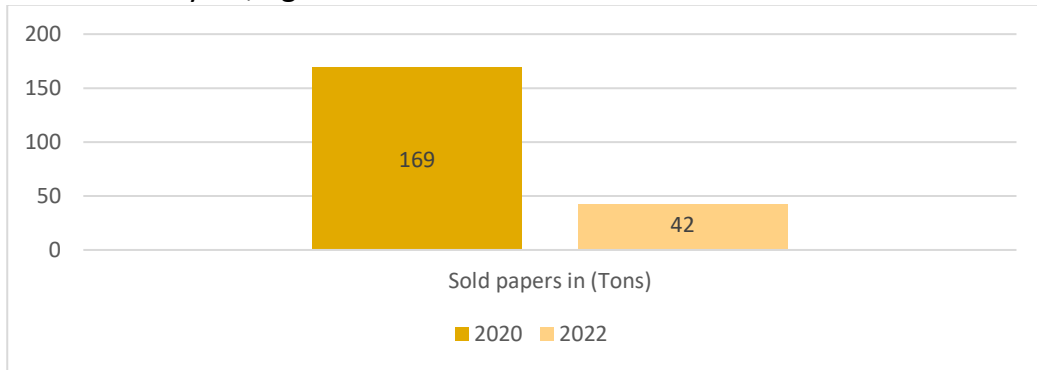


Figure 6: Sold paper waste in tons year 2021 and 2022.

Moreover, waste separation bins have been installed throughout the campuses of the university. These bins have potential use in pilot programs to promote knowledge and understanding of waste segregation for future applications. Egypt Solid Waste Management Center of Excellence (ESWMCE) is a world-class applied research and consulting center developed by Ain Shams University's faculty of engineering. It was founded through a capacity building project funded by the Science and Technology Development Fund (STDF), and Ain Shams University, Egypt. ESWMCE participated in awareness-raising campaigns targeting students and employees on the significance of waste separation bins, Figure 7. This initiative included the installation of informative posters and conducting training programs on waste management and segregation to provide guidance to workers on proper waste handling practices.



Figure 7: Waste bins before and after the implementation of segregation bins and the awareness campaigns at the Faculty of Engineering, Ain shams university

Various reuse strategies have been employed in the different faculties, alongside campaigns aimed at increasing awareness of paper reuse culture. For example, a pilot program was implemented by the Shams be Green Centre, located at the Institute of Environmental Studies and Research, which involved recycling paper waste using a paper recycling machine, as illustrated in Figure 8. The resulting recycled paper was then repurposed by students in the Faculty of Specific Education to create artistic canvases, which were showcased in an exhibition attended by faculty members.



Figure 8: The paper recycling machine located at Shams be green center (right), Samples from the students work paper reuse (left).

### 2.3. The University Reuse Applied Approach

ASU has implemented various reuse strategies across its different facilities. For example, paper usage in offices is minimized by reusing paper when possible. Single-sided printed or used papers are repurposed as draft prints or scratch paper. Wastepaper is shredded and repurposed as packing material. In addition, the Faculty of Alsun has a practice of donating books and unwanted magazines to students. Furthermore, during the environmental week held in April, a free book fair is organized, providing an opportunity to further promote book reuse.

### 3. Concluding remarks

Ain Shams University is an institution that provides education, research, and services. The university has implemented the 3Rs approach across different faculties and units to become a paperless university. Successful actions such as the digital students' services and electronic exams have been taken; however, further actions are needed to fulfil the university's aim of becoming a paperless university. More focus shall be drawn on minimizing the circulated publications within the different faculties, and its departments and related units through digitalizing the administrative communications within ASU. These actions could be used as a case study for developing strategies in moving toward establishing a successful paperless university model.

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