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Drivers and Barriers for Going Paperless in Tertiary Educational Institute

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Abstract. Tertiary educational institutes especially universities have become one of the major consumers of paper. Since paper uses natural resources and energy, universities are being encouraged to turn processes paperless. However, there are certain barriers along with drivers which lead to turning processes paperless. Although some work has been done on similar work, most of these works are not from Bangladesh's perspective and do not show as-is or to-be models of processes. This paper presents the current scenario of paperless initiatives, the impact of going paperless, and the driving forces and barriers to making processes paperless. Due to limitations in time and resources, only personnel working at East West University were interviewed for this qualitative study. To analyze the data from the interviews, the 'Gap Analysis' method. The interview data was then used to build as-is and to-be models for two processes at East West University which are not yet paperless. The drivers and barriers to these processes turning paperless were also explored. Going paperless not only reduces paper usage, but also reduces manpower, physical storage space, and time needed to maintain the processes. However, barriers specific to different processes still remain which include but are not limited to fear of data center failure and transparency maintenance.

Keywords: Paperless · Drivers · Barriers · Process model

1 Introduction

In a world full of modern technology, going paperless is a sustainable form of practice. Going paperless – as the name describes is a process to reduce the usage of paper and shift to digital documentation.

Going paperless is time efficient, easy to store, and lastly environment friendly. As papers are made from fiber that comes from trees, yearly, millions of trees are cut down

for making paper. Going paperless can reduce the number of trees cut and hence help to be more environmentally friendly.

Organizations use a lot of paper to store information. As a result, a lot of trees are cut down to meet the required amount of paper used by the current population resulting in environmental damage [1]. Moreover, using papers lead to slow transfer or loss of information and low data security [1]. Also, manufacturing papers use water, trees, and energy which is environmentally expensive [2]. In fact, if resource preservation, pollution prevention, and cost reduction are considered, waste minimization is more beneficial compared to recycling [2]. Hence, organizations must focus on reducing paper consumption rather than on ways to deal with the used paper.

To solve these issues, the concept of going paperless emerged in 1975 for offices that were to use computers instead of paper to store information [3]. Now, when educational institutes, especially universities, have become one of the largest consumers of paper usage, they are being encouraged to reduce the amount of paper used. Examples of institutes that have realized the benefits of turning processes paperless include Yale University, the University of California, and Xavier University [3].

The more papers used in tertiary educational institutes, the more resources, like trees and energy, will be used. Since the first emergence of the idea of turning organizations paperless back in 1975, many universities have been trying to turn organizational processes paperless. There have not been many empirical studies to know why universities in Bangladesh are not implementing paperless environments at the service level and if some universities did implement such environments what were the drivers and barriers.

This study will focus on the following objectives

1. To identify which processes can be paperless.
2. To identify the process's as-is model and to-be model.
3. Find out the drivers and barriers of identified processes.

This study will focus on finding the drivers and barriers to making processes paperless in tertiary educational institutes in Bangladesh and drawing the as-is and to-be models of those processes. This study will only be focusing on one departmental (departmental archiving of the Computer Science and Engineering department) and one administrative (graduation application) process at East West University.

2 Related Work

Similar work has been done related to this field in the past but most of those works are not empirical and not from Bangladesh's perspective.

In one of the studies [4], the sectors which are trying to implement paperless applications in Indonesia were identified and compared with those that are moving most towards paperless. The authors collected data from the education, government, and industry sectors and found that the education sector uses the most paperless applications.

In another study [5], the authors described the practices and methods that minimize paper usage. In order to reduce the usage of paper and enhance the system workflow, these existing problems need to be solved. The authors mentioned the government initiatives taken at the institutional level, ECM guidelines, etc. for making paperless administration.

In another study [6], the negative impacts of paper-based systems on the environment which include, increasing deforestation and hindering sustainability, are mentioned. The paper-based system led to harmful effects on the environment. After the findings, the authors came to the conclusion that 325 people from the paperless campus could protect 195 trees. To conclude, the paper recommends that universities should embrace paperless campuses for ensuring a sustainable low carbon society.

A study [3] was carried out to find paperless models in Uzbekistan universities. Paper usage there led to the loss of information, duplication of papers, and corruption. The paper suggests services like timetable management for students, teachers, and transportation, online appointment, and usage of E-student cards.

In another study [1], the barriers to the implementation of paperless processes in Nigerian universities were described. Paper-based processes were slow and unreliable. The suggested solutions include getting political actors' financial support, filling the infrastructural gap in the ICT area, training staff members, making electronics and the internet affordable, and replacing old computers with powerful ones.

Another study [7] was carried out to find out the writing and reading preferences of students in a paperless classroom. The authors found that students prefer to read short texts or articles on computers but, prefer to read longer texts or stories in printed papers. The authors also found that students prefer to use the computer for long texts or assignments rather than writing on paper.

In one study [8], authors attempted to seek the possibility of a paperless Higher Education system in Nigeria which sought to unravel the concept, challenges, and prospects of the paperless school system as a means to solving the current challenges of record keeping in their school system. The study established that the paperless system is a 21st-century trend and should be embraced by a higher system of knowledge and identified areas to begin the paperless system which can be achieved with committed efforts by management, decision makers/implementation personnel, and the general school system.

In another study [9], the theory and practice of paperless classrooms are analyzed critically, and an observational analysis of the undergraduate students of Dhofar University and their engagement with digital devices in the classroom has been done. The study finds that paperless classrooms are more dynamic, engaging, and productive will enable learners not only to develop autonomous learning, data collection, and analysis, collaboration, and teamwork in the classroom but also delimit the geographical and time restrictions which can be done by Paperless classrooms equip learners with the technological skills.

The other study [10] aims to investigate how capable, and available the students at senior high schools are at implementing paperless classrooms with substitutes such as the digital mode in learning activities. For the amount of 108 students majoring in Computer Network Engineering in the Bekasi area from different grades are chosen as a sample and found that there are significant influences from Environmental Awareness, digital literacy, and habit affected the student's readiness to implement the paperless Concept of 41.3%.

Another study [11] was carried out to find the student's perception regarding paperless English classrooms at Japan IT University. The authors find out that, the major 4 concerning factors for a paperless classroom are - skill, tools, vocabulary, and notes.

The authors also described that the transition from paper to a paperless classroom won't be smooth. The instructors of the university have to show students, how to use digital materials for academic purposes.

3 Methodology

3.1 Data Collection Method

The method of collecting data is one of the most necessary parts of the research process. In order to investigate qualitative research, some examples of data collection methods are interviews, focus groups, and observation [12]. The interview was chosen as the data collection method so that data regarding the processes can be collected from the chosen experienced people. For the research purpose, the authors have chosen to take interviews in the semi-structured form which is preferable since it offers a great deal of flexibility to the interviewer.

3.2 Participants and Sampling

With the given time, the authors were able to take 5 interviews. The 5 participants of the interview were from East West University and were interviewed to know about 2 processes; graduation application and departmental archiving.

The participants for the interview were selected based on two factors; the position they are working in and the number of years they worked at the university. To know about the graduation application process, the authors interviewed one person from the Controller of Examination, who is also involved with policy-making for this process, and another personnel who is in charge of overseeing this process. To know about departmental archiving, the authors interviewed 2 senior faculties and in charge personnel who have been in the CSE department for a long time and thus have good organizational memory.

3.3 Data Analysis

For analyzing the gathered data from interviews, the authors chose the "Gap Analysis" method. This method is a combination of narrative and grounded theory analysis. Here, 4 major steps which lead to the answers to the research questions are [13]:

- Identify the present scenario: From the interviews, authors identified 2 processes that can be paperless. Authors have drawn their as-is process using BPMN.
- Determine the ideal scenario: Authors have drawn the to-be model of the 2 processes using the interviewee's suggestions.
- Highlight the gaps that exist: Authors identified the major barriers from data.
- Plans to fill the gaps: Authors extracted the ideas to implement the to-be model.

3.4 Research Ethics

The major ethical issues that need to be considered include informed consent, protection of the confidentiality of the participants, and respect for the participants' privacy. A consent form was provided to each participant of the interview which was to be read by them before the researcher could take any interview. All the data that will be used, will be kept confidential and anonymous. No data will be used for the malicious purpose which may result in any kind of distresses to the participants.

4 Results

As mentioned, qualitative data for this study was collected through interviews. The authors interviewed each of the 2 faculty members twice. From the first interview, they gathered information on processes that could be paperless. From the different processes mentioned, they chose to focus on departmental archiving and the graduation application process. In a second interview with the faculties, the authors specifically concentrated on the chosen two processes. The authors also interviewed 3 personnel related to these two processes. The collected data were analyzed to find an estimate of paper usage and drivers and barriers to those processes.

From interviews authors took from the CSE department and Controller of Examination office, authors found that 2 major processes can go paperless which are the graduation application process and departmental archiving. The current models of these 2 processes are very complex and are time and paper-consuming.

The as-is model of the processes is given below

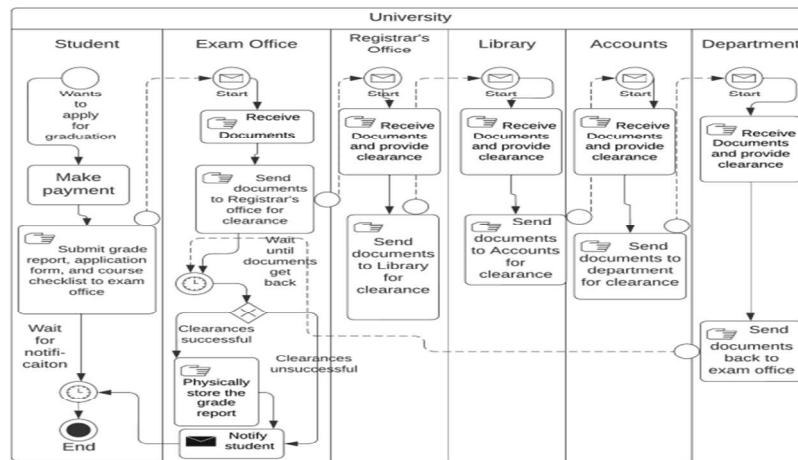


Fig. 1. As-is model of the graduation application process

In Fig. 1, we see that the graduation application process starts with the student making a payment. After this, the student must come to the university and submit different documents like grade reports, application forms, and course checklists. These documents

are then sent to the Exam Office, Registrar's Office, Library, Accounts, and finally to the respective department of the student for clearance. After the final clearance, the documents are then sent to the Exam office. If all the clearances are successful, the grade report is stored in physical storage and the student is notified.

We can see that this process requires many clearances and manual confirmations. This requires a lot of time and manpower. They also maintain a student application file for all the students which uses a lot of paper.

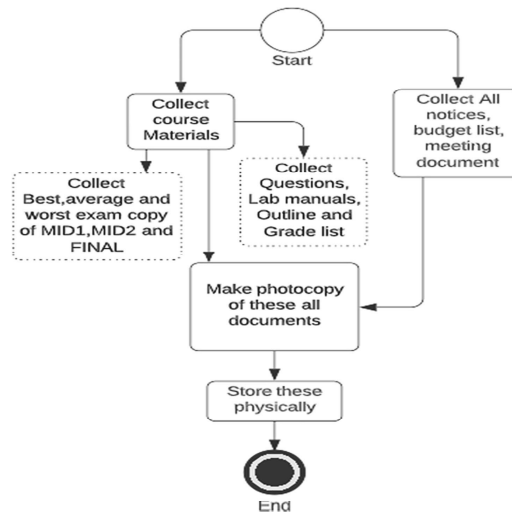


Fig. 2. As-is model of departmental archiving

In Fig. 2, the departmental archiving uses a huge amount of paper as they photocopy and archive course files, mid and final scripts, and departmental documents. This is also time and money-consuming.

From the interviews and the author's idea, the following to-be model is proposed.

Figure 3 shows that almost all the processes can be conducted online from submitting documents to notifying different departments like the Registrar's Office, Library, Accounts, and Exam office. Without receiving paper applications physically, the university can accept these documents through the East West University online student portal. The files can get clearances one after the other without the need to manual handling and send the paper documents.

A graduation application file consists of 3 papers for a student. i.e. main application, course checklist, and grade report. According to the interviewees, storing grade reports online is risky since they fear data center failure and hence strongly suggested physical storage of the grade reports which means 2 pages per student can be still saved with the proposed model.

In Fig. 4, the authors proposed scanning files rather than photocopying. After scanning it can be stored in cloud storage or the university's server.

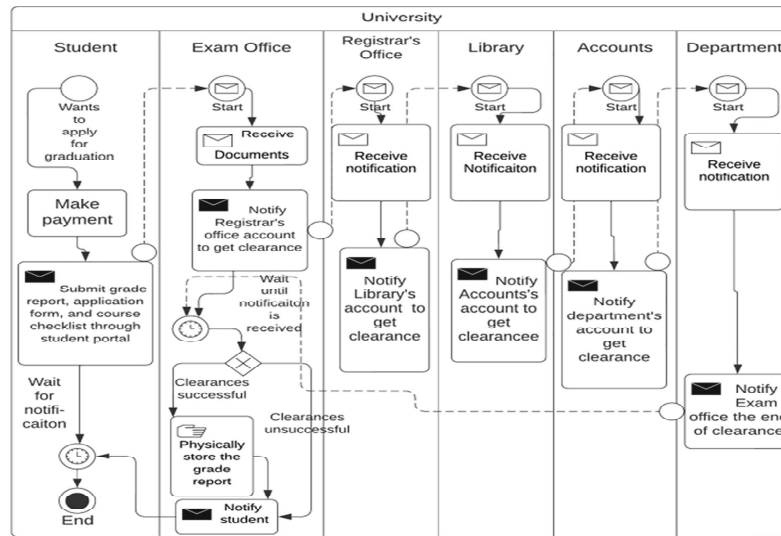


Fig. 3. To-be model of Graduation application process.

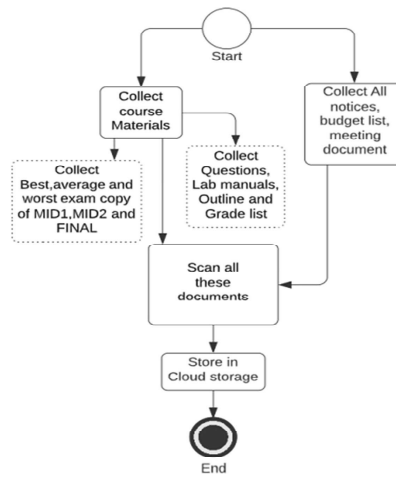


Fig. 4. To-be model of departmental archiving

If only course file archiving is considered, each semester 9 exam scripts (each consisting of 8 pages on average), 3 exam questions, 1 outline, 1 grade list, and an average of 5 lab manuals are archived for each course.

Table 1 shows the approximate pages required for the Graduation Application process. 3 pages per student are required for this process. This number summed up to 5079 pages for all the students in the year 2022.

Table 1. Paper usage of the graduation application process

	For 1 student (pages)	For all students per year (pages)
Graduation application	3	5079 (year 2022)

Table 2. Paper usage of course archiving process

	For 1 course (pages)	For all courses per year (pages)
Course archiving	82	29,192 (year 2019)

Table 2 shows the approximate pages required for the Course Archiving process. 82 pages per course is required for this process. This summed up to 29,192 pages for all courses in the year 2019.

Paper usage of the last 5 years for both processes is given below.

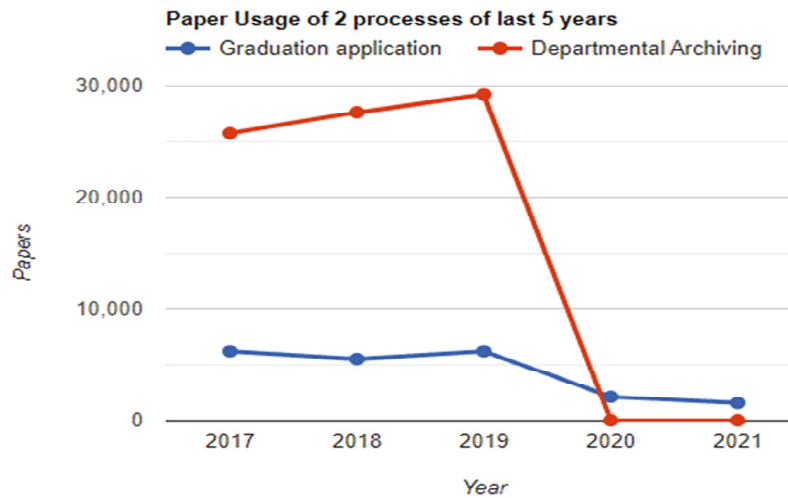
**Fig. 5.** Paper usage of last 5 years of giving two processes.

Figure 5 summarizes the paper usage of the 2 processes between the years 2017 and 2021. The blue and orange colored plot shows the paper usage in the last 5 years of the Graduation Application and the Departmental Archiving process respectively.

5 Discussion

Previous works do not present any estimation of paper usage, particularly on graduation applications and departmental archiving processes. Moreover, though some mentioned certain ways to turn different processes paperless, no as-is or to-be models of the processes were shown.

From the interviews taken, authors got to know that, as of today no specific paperless initiatives have been taken. University authority is discussing turning the graduation application process online, but since the student portal is still developing the initiative has yet to be taken.

The results from this paper can be used as a guide to estimate the paper usage of the mentioned processes and the two to-be models proposed in this paper can be used if needed. Figure 5 shows the amount of paper used between the years 2017 and 2019 for the two processes: The graduation Application process and Departmental Archiving. However, in the years 2020 and 2021, these processes took place online for Covid-19, and hence the figure shows 0 paper usage for departmental archiving. However, the graduation application process still required storing a single copy of the grade report of each student manually during these two years which is represented by the reduced but still visible amount of paper used by this process in the graph. All these thousands of papers could be saved by implementing the to-be model.

The 5 interviewees showed great enthusiasm to turn these two processes paperless. However, some barriers were also found. The authors have tried to summarize the main drivers and barriers to going paperless in the following two tables:

Table 3. Drivers for going paperless

Graduation application	Departmental archiving
Maintenance of student files needless	Storing paper documents needless, reduces physical storage space
Ensuring several clearances on paper is troublesome	Faster and easier sorting and searching of files according to dates, course, and section
Manual checking course checklists is needless, saves time and manpower	Disposing of documents like mid and final scripts is needless
Cost reduction as less number of papers will be needed	Cost reduction as less number of papers will be needed

Table 3 summarizes the main drivers for a university wanting to go paperless. The first and second column shows the drivers for the Graduation Application and Departmental Archiving process respectively.

Table 4 summarizes the main barriers that stand in the way of the university making the processes paperless. The first and second column shows the barriers to the Graduation Application and Departmental Archiving process respectively.

Table 4. Barriers to going paperless

Graduation application	Departmental archiving
Course checklist is considered to be a very critical section which is risky to leave it to the IT section only	To archive the mid and final scripts, they must be scanned first which needs manpower
Grade reports encouraged to be saved physically fearing data center failure	Officials who come for accreditation purposes prefer paper-based files to review than scanned/soft copies of the paper

6 Conclusion

The objective of this study was to find the drivers and barriers to going paperless in education institutes. The authors found that no specific paperless initiative has been taken by the university yet. The author described that by changing the existing process model university can reduce paper usage, reduce manpower, save time, and also save physical space.

Due to the limitation of time and resources, the authors considered only the CSE department for the departmental process and only one administrative process of East West University. For less time authors couldn't conduct the study at other universities.

As a continuation of this study, different departments and processes of different universities could be explored since paper usage will vary among different departments, processes, and universities. As this study was based on a private university, so same study on a public university might tell some other results. This then can also be used to make a comparison between different departments and universities.

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