The Role of Digital Transformation in Enhancing Agility and Circular Economy Integration in Higher Education

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Abstract- ***This study investigates how digital transformation encourages the integration of the circular economy (CE) and enhances institutional agility in higher education. The study assesses how students view digital tools, how they affect learning, and how they support sustainable behaviors using Galgotias University as a case study. Based on survey data from 22 students, a mixed-method approach shows that online platforms and learning management systems (LMS) are widely used, that people have favorable opinions about digital flexibility, and that CE practices like paperless learning are indirectly supported. But problems like broken logins, inadequate infrastructure, and a lack of knowledge of sustainable frameworks draw attention to the need for improved digital training and strategic coordination. The report ends with suggestions for enhancing CE instruction, infrastructure, and digital literacy.***

I. INTRODUCTION

Both the pressing need for sustainable practices and technological advancements have contributed to the swift and irrevocable changes that have occurred in the higher education environment in recent years. A major factor in the delivery of higher education is online learning, virtual communication, and digital administrative procedures, all of which were further accelerated by the global COVID-19 pandemic. Along with altering access to and consumption of education, this development has brought up new demands for adaptability, responsiveness, and environmental responsibility.

The term "digital transformation" in higher education describes the thorough incorporation of digital tools like learning management systems (LMS), cloud-based platforms, virtual classrooms, and AI-enabled tools into the administrative and academic structure. These technologies improve institutional agility, which is the ability of an organization to quickly adjust to shifting circumstances while preserving academic integrity and service quality, when used properly. In the fast-paced world of today, when institutions must react instantly to disruptive technologies, policy changes, and health emergencies, agility is extremely important.

Universities are also coming under more and more pressure to support global sustainability objectives. The circular economy (CE) has become a pertinent framework in higher education as a result of this. The circular economy places more emphasis on resource efficiency, waste minimization, and ongoing material reuse and recycling than typical linear models that use a "take, make, dispose" strategy. Initiatives like paperless classrooms, digital documentation, e-certifications, and sustainable IT procurement are all included in this framework.

Although digital transformation and sustainability have been examined independently, little is known about how they interact. A rising number of people believe that by lowering the consumption of physical resources, streamlining digital processes, and encouraging environmentally conscious academic communities, digital transformation can be a potent enabler of circular economy practices in education. The purpose of this study is to look into how digital transformation helps Galgotias University, a new university in India, integrate the concepts of the circular economy and increase institutional agility.

The institution has implemented a number of digital technologies, including virtual classrooms, online registration portals, and learning management systems (LMS). However, there is little empirical data on how students view these systems and if they

believe they improve learning, flexibility, and sustainability.

The study used a mixed-method exploratory approach with a structured survey given to students in order to close this gap. Digital tool awareness and usage patterns, usability, perceived learning benefits, and sustainability implications were all investigated in this study. The results advance our knowledge of how universities should strategically coordinate their digital transformation initiatives with the objectives of agility and the circular economy.

This study addresses the following fundamental questions in doing so:

- Do students know about the university's digital platforms and are they happy with them?
- In academic contexts, how do digital tools improve responsiveness and agility?

To what degree are circular economy practices reflected in or supported by digital systems?

By answering these issues, this study provides insightful information for educators, policymakers, and institutional leaders who want to promote a future in higher education that is both ecologically conscious and technologically advanced.

II. REVIEW OF LITERATURE

A. Higher Education's Digital Transformation

Digital transformation is more than just the digitization of instructional materials. It entails a thorough and calculated incorporation of technology into every aspect of institutional operations, including administration, governance, student services, and academic delivery. Digital transformation in education, according to Selwyn (2016), is the transition from static, offline models to dynamic, data-driven ecosystems that support scalable operations, real-time interaction, and individualized learning.

The transition to online learning brought on by the pandemic acted as a spur, quickening the adoption of digital technology in educational institutions around the world. Virtual classrooms, cloud-based collaboration platforms, and learning management systems (LMS) have become the standard rather than the exception. According to Dwivedi et al. (2020), this change has altered the ways that education is delivered, therefore organizations now need to reconsider their digital strategy and technical preparedness. However, issues including inequitable infrastructure, a lack of digital literacy, and inconsistent platform quality prevent developing nations like India from fully utilizing digital potential. Platforms including as online test systems, LMS portals, and e-resources have been implemented at Galgotias University to increase academic accessibility and efficiency. However, little is known about how these platforms affect students' experiences and how well they connect with larger institutional objectives, which emphasizes the need for empirical research like this one.

B. Digital Tools Facilitate Institutional Agility

III. The ability of an organization to quickly adjust to shifting social, technological, economic, or regulatory circumstances without sacrificing efficacy or quality is known as institutional agility. Teece (2007) highlights that agility in businesses, especially educational institutions, is largely dependent on dynamic characteristics including quick response, innovation, and system reconfiguration. Agility in higher education is demonstrated by the ability to offer remote learning, establish flexible academic calendars, adopt novel course structures, and instantly address the demands of students. Universities with solid digital foundations are better able to innovate, customize instruction, and remain resilient in the face of challenges, claim Kane et al. (2019).

Agility is not just a technological issue, though. Strong leadership, faculty support, and ongoing assistance for staff and students are also necessary. Even the most sophisticated digital solutions might be ineffective without the proper operational and cultural foundation.

A. Sustainability and the Circular Economy in Education

The circular economy (CE) is an economic model that emphasizes renewing natural systems, planning out waste, and preserving goods and materials. It stands in opposition to the conventional linear economy, which is predicated on disposal and consumption. Through initiatives like virtual events, e-certification, digital documentation, and sustainable ICT procurement, CE is being embraced in the educational sector more and more.

CE is a new sustainability paradigm that fits in nicely with educational institutions' principles, claim Geissdoerfer et al. (2017). CE in education, however, frequently stays ancillary or informal. In 2020, the Ellen MacArthur Foundation promotes by incorporating CE principles into operations and curricula, educational institutions can not only practice sustainability but also teach it.

By doing away with paper-based procedures, cutting down on emissions from transportation, and promoting resource optimization, digital tools can help higher education implement CE. Despite this, even when their actions (such as using e-books or taking online courses) are consistent with the CE framework, students frequently do not know about it. This implies a communication gap between student comprehension and institutional actions, which is what this study aims to investigate.

B. Connecting the Circular Economy, Agility, and Digital Transformation

Despite the fact that the circular economy, institutional agility, and digital transformation are usually researched separately, new study suggests that they reinforce one another.

According to Bocken et al. (2016), digital innovation promotes environmental sustainability and economic resilience. For example, cloud-based learning contributes to a smaller ecological footprint by reducing dependency on physical infrastructure while simultaneously increasing academic flexibility.

Essentially, when used strategically, digital tools can promote sustainability (CE) and innovation (agility) at the same time. This connection may result in what some scholars call a "digitally-enabled sustainable education model"—one that encourages environmental stewardship, stakeholder response, and ongoing development.

Yet, most studies have focused on Western institutions or theoretical models, leaving a gap in practical, student-centered research from Indian universities. The present study addresses this gap by focusing on Galgotias University and gathering first-hand student insights on how digital systems influence their academic experiences, adaptability, and awareness of sustainability practices.

III. METHODS

A. Research Methodology

In order to find out how digital transformation affects institutional agility and the adoption of circular economy (CE) practices in a higher education setting, this study uses an exploratory, mixed-method approach. Since this topic is new and hasn't been studied much in India, particularly from the viewpoint of students, an exploratory approach was thought to be suitable in order to gather both qualitative and quantitative data.

B. Design of the Research

To collect information from students at Galgotias University, a well-known private university in India, a structured questionnaire was created. Google Forms was used to produce the survey, which was then disseminated digitally through email and student organizations connected to the university. In order to provide students the opportunity to elaborate on their experiences, opinions, and recommendations, the survey included both closed-ended (Likert scale, multiple choice) and open-ended questions.

C. Participants and Sampling

Current students enrolled in undergraduate and graduate programs at Galgotias University were the study's target group. The adoption of a non-

probability convenience sampling technique made it possible to quickly gather data from consenting and accessible individuals.

- There were 22 valid responses in the sample.
- Demographics: Most respondents were enrolled in postgraduate courses, such as Master of Business Administration (MBA), and included both male and female students between the ages of 18 and 25.

D. The questionnaire's structure

The three main themes of the study—digital transformation, institutional agility, and circular economy integration—were reflected in the questionnaire's design. The following sections comprised it:

1. Demographics: degree program, age, and gender
2. Knowledge of and Utilization of Digital Platforms: Exam portals, online courses, and LMS
3. Usability and Contentment: Infrastructure, user-friendliness, and platform dependability
4. Agility: Views on the university's digital ecosystem's responsiveness and adaptability
5. Awareness of the Circular Economy: Techniques include electronic resources, virtual events, and paperless work
6. Challenges and Suggestions: Free-form answers that highlight problems and potential areas for development

E. Analysis of Data

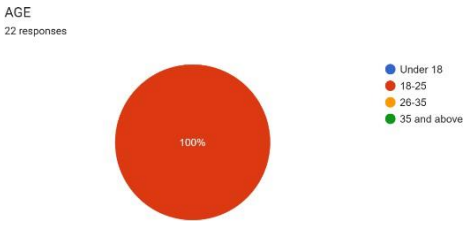
Descriptive statistics, such as frequency distributions and percentage breakdowns, were used to examine quantitative answers using Microsoft Excel. Response trends (such as awareness levels and satisfaction ratings) were displayed using charts and graphs.

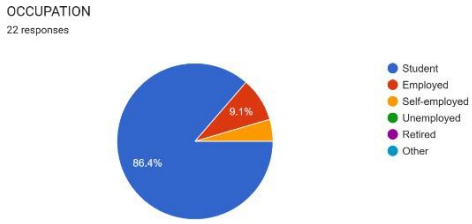
Thematic analysis was used to examine the qualitative information gathered from open-ended questions. The following themes were identified from recurring terms and phrases: "technical issues," "training gaps," "paperless convenience," and "platform effectiveness." Contextualizing the quantitative results and deriving more profound conclusions from the viewpoint of the user were made easier by this approach.

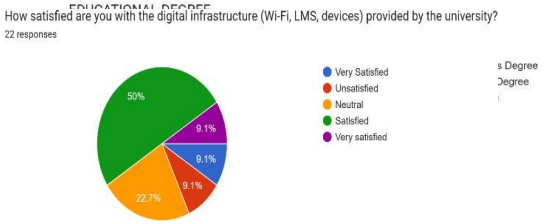
F. Moral Points to Remember

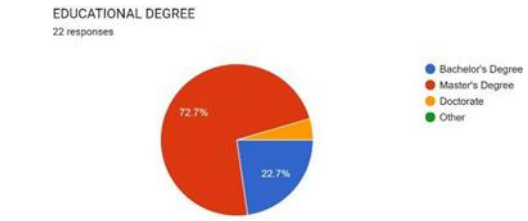
The ethical standards for academic research were followed in this work. Participation was entirely optional, and participants were told that their responses would only be used for scholarly objectives. No information that could be used to identify the individual was gathered. Only the author and study supervisor had access to the safely kept data.

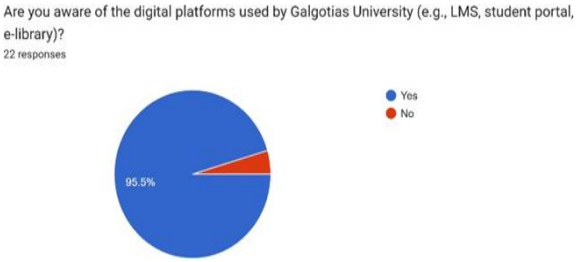
IV. DISCUSSION OF FINDINGS

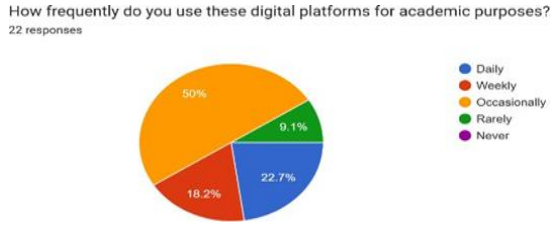


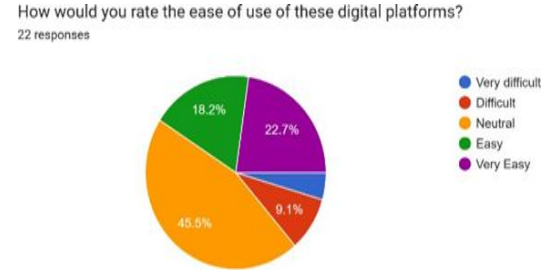


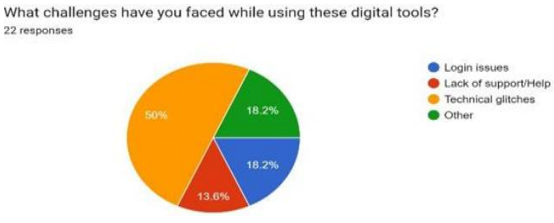


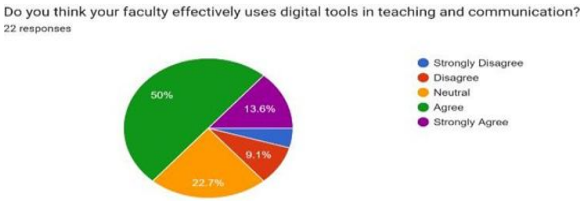


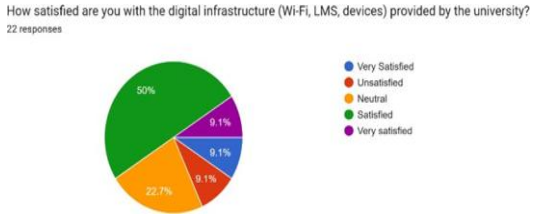


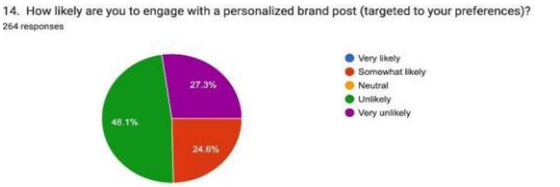


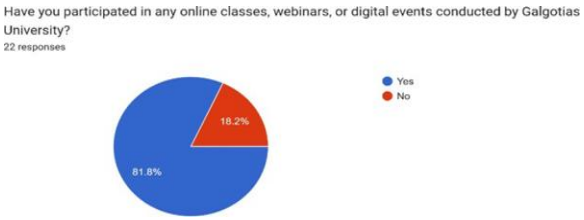












1. Knowledge of Online Resources

• Indeed, 21 pupils (95%)
• No. 1 pupil (5%)

Discussion: The high degree of knowledge shows how well the university communicates about digital platforms including student portals, e-libraries, and learning management systems. This shows successful onboarding at the fundamental level and is in line with institutional aspirations for digital transformation. The 5% of those who are not aware points to a small gap that can be filled with better outreach and orientation.

2. Frequency of Digital Platform Usage

• Weekly: 4
• Daily: 5
• Sometimes: 11
• Seldom: two

Discussion: Nearly 50% (sometimes or seldom) show inconsistent involvement with digital media, while 41% using them consistently (daily or weekly). This suggests that platform usefulness or course expectations vary. Promoting digital uniformity among faculty members can enhance their agility and consistency in using platforms.

3. Digital Platform Usability

• Quite Simple: 5
• Neutral: 9
• Easy: 4
• Tough: 2.
• Extremely challenging: 2.

Discussion: Just 41% of students said using the platforms was easy or very easy, while 18% said they had trouble. A high percentage of neutral responses points to insufficient training or uncertainty. This backs up the suggestion to provide more user-friendly interfaces and conduct hands-on sessions during onboarding.

4. Instruction in Digital Tools

• No: 9
• Yes: 13.

Discussion: Approximately 41% of students said they had not received any instruction, which is closely related to those who had trouble using the platforms. This suggests a need for scheduled sessions or LMS video lessons to fill the training gap.

5. Difficulties Encountered

• Ten technical hiccups
• Four login problems
• Lack of assistance or support 3
• Other: 4

Discussion: Nearly half of the respondents said that technical difficulties were the main problem. Problems with login and support indicate inadequate infrastructure or backend support. This emphasizes the necessity of improved server uptime, quicker troubleshooting, and a specialized IT support.

6. Effect on the Educational Process

• Agree: 4
Strongly Agree: 10
Disagree: 7
Neutral: 1

Discussion: More than 64 percent of students concur that using digital tools has enhanced their education, indicating that this is in line with the objectives of institutional agility. However, 32% expressed no opinion or were unsure, indicating that some students may not yet fully see or benefit from digital transformation in terms of improving academic achievement.

7. Use of Digital Tools by Faculty

• 16 people agree or strongly agree.
• Disagree/Neutral: 6

Discussion: According to the majority of students, instructors effectively employ digital technologies, which enhances online participation. The remaining 27%, however, suggests that certain faculty members lack the necessary training or tool uptake, necessitating faculty development initiatives.

8. Contentment with Digital Facilities

Five percent are very satisfied, eleven are satisfied, five are neutral, and one is not.

Discussion: There has been significant development in infrastructure, as evidenced by the 73% of respondents who expressed satisfaction. The 27% who are neutral or dissatisfied, however, represent inconsistent experiences, perhaps brought on by incompatible devices or bad internet connection. It is necessary to invest in campus-wide IT policy and Wi-Fi infrastructure.

9. Taking Part in Internet Events

• Yes: 19
No: 3.

Discussion: Students strong digital adoption and responsiveness to virtual forms are confirmed by the high participation rate. This demonstrates

preparedness for hybrid learning approaches as well. Platform access problems or scheduling constraints could be the cause of the 14% non-participation rate.

10. Recommendations for Enhancement (based on open responses)

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The following themes were found:
• Increased tool training
• Better Wi-Fi and LMS uptime
• New student orientation
• Integration of sustainability consciousness

CONCLUSION

Using Galgotias University as a case study, this study investigated how digital transformation is influencing institutional agility and the integration of the circular economy (CE) in higher education. The research sought to evaluate awareness, usage patterns, satisfaction levels, and difficulties connected to the university's digital infrastructure using a mixed-method approach that included a structured student survey.

The results unequivocally show how popular and well-liked digital tools are among students. Galgotias University has built a strong foundation for digital learning, as seen by the 95% of students who report being aware of and regularly using platforms such online learning management systems and learning management systems. Particularly in the midst of disruptions like the COVID-19 pandemic, students value the ease, adaptability, and consistency that these systems provide. This responsiveness is a reflection of the university's rising institutional agility, which allows it to adjust to changing conditions without sacrificing the caliber of instruction.

According to the survey, students are actively engaging in sustainable practices that support the ideas of the circular economy, such as submitting work electronically, using digital content, and attending virtual events. However, a large number of pupils did not know what the term "circular economy" meant, indicating a disconnect between awareness and practice. This implies that the institution's digital strategy needs to make sustainability more intentional, visible, and instructive.

Even with the advancements, a number of difficulties still exist. Digital platforms' full potential is hampered by technical problems, uneven training, and a lack of support systems. Approximately 41% of students said they had never received any instruction, and a number of them mentioned regular technical issues or delayed help. These problems show a disconnect between end-user experience and infrastructure deployment.

Additionally, students offered helpful criticism, pointing out the need for more integration of sustainability instruction into the digital environment, better Wi-Fi, a dedicated IT support staff, and digital literacy initiatives. These recommendations demonstrate a strong desire for a digital system that is more dependable, inclusive, and ecologically responsible.

In conclusion, the analysis reveals that there is much space for improvement, even if Galgotias University has made admirable progress in digital transformation and subtly encourages circular economy principles. Future tactics ought to concentrate on:

The results advance our knowledge of how universities should strategically coordinate their digital transformation initiatives with the objectives of agility and the circular economy.

This study addresses the following fundamental questions in doing so:

- Enhancing infrastructure and technical support; giving instructors and students organized instruction.
- Encouraging sustainability via platform and curriculum design; actively tracking user experience via feedback mechanisms.

- Galgotias University—and other similar institutions—can become really flexible, future-ready, and environmentally conscious leaders in higher education by coordinating its digital objectives with user requirements and sustainability goals.

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