Paperless Technologies in Universities: Examination in Terms of Unified Theory of Acceptance and Use of Technology (UTAUT)

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Abstract: This study aims to determine the factors affecting the use of paperless technologies by university office staff and academicians. The study sample comprised 726 academics and administrative staff from 10 public and 3 foundation higher education institutions in Turkey. Care was taken to ensure that the selected universities had switched to paperless processes or that work was largely conducted through digital tools. When the path analysis results were examined, it was determined that performance expectation, effort expectation, and social impact positively affected the intention to use paperless technologies. In addition, intent to use has a mediating role on the effect of social influence, effort expectation, and performance expectation on actual usage of paperless technologies. Our hypotheses were supported. According to the research results, social impact, effort to be spent, and the performance of paperless technologies effectively encourage academic and administrative staff at universities to use paperless technologies.

Keywords: environmentally friendly; paperless technologies; UTAUT; technology acceptance

1. Introduction

Developments in information technologies facilitate the sharing of information and increase the transaction volume, causing changes in how things are performed and enabling the transmission source of information to take different forms in written communication. Information technologies, which allow for the effective circulation of information, ensure that work is conducted faster in organizations. However, many processes where paper use is necessary have begun to be carried out paperless via information technologies [1].

According to a study conducted in 2011, paper consumption worldwide has increased by 400% in the last 40 years [2,3]. In total, 35% of the trees cut down worldwide are used in the paper industry. Approximately 300 million tons of paper are consumed every year in the world. Most paper consumption is made from virgin pulp, not recycled paper [2,3]. When researching paper consumption per capita in the world in 2017, Slovenia came first with 344 kg, followed by Luxemburg with 279 kg, Germany with 248 kg, Austria with 242 kg, the USA with 214 kg, and Japan with 205 kg. In Turkey, the consumption of paper and cardboard products per capita in 2017 was 59 kg [4]. The information in question shows that many natural resources are spent on paper production. Large-scale consumption of natural resources can lead to major problems such as climate change [5]. Therefore, it can be stated that preventive studies should be carried out using technology to reduce the amount of paper consumed.
Digital processes to reduce paper use can generally be seen in organizations such as libraries, hospitals, banks, and universities [6–8]. E-libraries that provide services in a completely digital environment without printed books [9] and carrying out all patient-specific transactions in hospitals (examination appointments, diagnoses and treatments, analysis results, etc.) with electronic health records systems are some of the digital transactions [10,11]. Digital platforms enabling bank personnel to carry out their correspondence by reducing paper use and mobile applications facilitating customers’ access to banking services through digital channels [12] are important steps taken towards going paperless. Companies spend more than $120 billion annually on printed forms. Most of these printed forms become invalid within just three months. It is estimated that each misfiled document in a filing cabinet costs $125 for a company. The cost of a lost document ranges from $350 to $700 [13]. These figures demonstrate the cost-saving potential of paperless offices, which store information digitally.

Educational institutions are also organizations where paper-based transactions are frequently carried out [14]. Universities host a large number of students. Universities represent a large organization, not only with students but also with academics, office staff, and other support services. Paper is one of the consumable materials widely used in this organizational structure. In this context, reducing paper as a consumable material is one of the universities’ main responsibilities in minimizing negative environmental impacts [15]. Using paper at a minimum level in universities may be beneficial in reducing paper waste and ensuring environmental sustainability. Employees at higher education institutions typically fall into two primary categories in Turkey: academic personnel and administrative personnel. Academic staff are responsible for the educational and scholarly pursuits of the institution, including research and teaching endeavors. On the other hand, administrative staff typically handle tasks related to facilitating research, supporting teaching activities, and managing correspondence [16].

Important research in education shows that using digital tools in universities requires broad stakeholder participation [17]. Since technologies that reduce paper use result from digitalization, special stakeholder participation is required to realize paperless applications in universities. In particular, the roles of the rectorate, higher education institutions, students, academics, governments, social stakeholders, and IT employees can ensure the spread of paperless technologies. Stakeholders’ acceptance and support of digital technologies can ensure the spread of paperless technologies in universities. As Camilleri and Camilleri [18] claim, digitalization has accelerated in education through the COVID-19 pandemic. Digital processes that emerge necessarily and become widespread in education can support the widespread use of paperless technologies in universities. Isaeva and Yoon’s [19] research reveals that universities will increase efficiency and costs by reducing paper use and moving document management to the digital environment. The role of digital competencies of academic and administrative staff in the spread of paperless technologies is important. Zhao et al.’s [20] research results show that the digital competence of academics and students is sufficient in most universities. Sufficient digital proficiency of students may motivate academic staff and administrative staff to use digital tools.

High paper usage, environmental damage, natural resources, etc., cause it to be high. For this reason, it is beneficial to use technologies that will reduce the amount of paper usage in universities. While many universities have come to the fore to focus on practices that reduce paper use, prioritizing environmental awareness can ensure that these efforts yield positive results. In this way, both the quality of work and environmental awareness can be achieved. On the other hand, using paperless technologies may face several barriers in universities. These barriers include factors such as the expected benefit of paperless technologies, the effort required to operate them, and the support of management and stakeholders.

These barriers to the use of paperless technologies and the factors affecting the use of these technologies have yet to attract sufficient attention from researchers. Based on reviews, studies have not been found on accepting paperless practices by university aca-
demics and administrative staff. The few studies in the literature are focused on paperless universities [19,21–23]. In other studies, it is generally seen that it is about the usefulness of information technologies [24,25].

Research on accepting and using new digital tools, such as paperless technologies, often draws on the technology acceptance model. The model, which has been expanded with the contributions of many researchers, is called the UTAUT (Unified Theory of Acceptance and Use of Technology). Another reason for using the UTAUT is that it provides the opportunity to evaluate from an individual, social, and organizational perspective [26]. When the above studies on determining the factors affecting the use of paperless technologies were examined, no research examined the UTAUT. In addition, in studies on paperless technology, no research has been found in which individual, organizational, and social factors are used as a whole.

As a model with broad explanatory power, the UTAUT can be useful in demonstrating how to adopt and use paperless technologies. However, it is seen that the perceived acceptance level of paperless transactions has yet to be determined in the literature, and the extent to which individuals are perceptually ready for paperless processes has yet to be resolved. This deficiency negatively affects our knowledge about what factors will affect environmentally friendly digital tools such as paperless technologies in universities.

In line with the views above, the research question, “What factors affect university employees’ use of paperless technologies?” was determined. The main motivation of this study is to determine the perspective of administrative staff and academicians who use paper in universities towards paperless practices and the individual, social, and organizational factors that affect this perspective. Thus, this study is important regarding the university stakeholders’ acceptance of a paperless transaction process, the implementation of the paperless transaction idea, or its contribution to a sustainable environment by minimizing paper use at a basic level. This study aims to evaluate the responsibilities of academicians towards students and their perspectives on academic studies and administrative staff, especially their correspondence, through information systems without using paper. This study is based on the idea that information systems can carry out university processes.

This study focuses on using paper at the lowest possible level rather than the idea of a completely paperless university because paper-based processes of supervisory institutions/organizations in developing countries such as Turkey may pose an obstacle to “zero paper use”. Considering the constraints created by control mechanisms, it is more realistic to strive to make paperless applications as widespread as possible and to reduce environmentally damaging practices as much as possible.

2. Conceptual Framework

2.1. Paperless Technologies and Education

Paper is one of the most important inventions in human history. However, excessive use of paper can lead to negative consequences. Problems arising from paper use can be resolved due to efforts reduced by the individual [3]. In other words, as individual awareness increases and usage decreases by everyone, the possibility of solutions to general problems may increase.

A paperless system can be expressed as eliminating or greatly reducing paper use, converting documents and other papers into digital forms, and presenting this information electronically [27]. In the late twentieth century, “paperless society” ideas became widespread to reshape the future. According to Martin’s [28] study, paper use in this process increases with developing technology. Increased use of paper can be thought to be because, as technology develops, printing tools become more widespread and easily accessible to everyone [29].

Some studies on paper use have investigated how paper use will be shaped in light of technological developments. Lancaster [30] predicted that there would be major changes in libraries until the early 2000s and that a paperless society could be realized [9]. Some of the applications made by taking advantage of developing technology and information systems
have reduced paper use in various areas. Healthcare institutions can be cited as one of the areas that reduce paper use with these applications. In 2003, the Ministry of Health in Turkey introduced an electronic medical record system with the “Health Transformation Program”, thus minimizing the risks of medical errors, reducing paper consumption, and eliminating hard-to-read handwriting [31].

Transferring from paper-based to web-based systems in government documents and payments can save an average of 50% on administrative costs [32]. In the HIMSS19 organization, it aimed to create and popularize the concept of a “digital” and “paperless hospital” [33]. Another application is the paperless library study launched by Stanford University in 2010. This application aims to move from a paper-based infrastructure to a paperless and digital infrastructure. E-books have replaced previously printed books [9,34,35].

In universities, the use of paper by students is as important as the level of paper usage by academics and administrative staff. According to a study, some students were pleased to take notes differently on electronic devices, while others thought taking notes traditionally on paper was more useful [36]. The two types of note-taking have different advantages for the student. For this reason, it can be said that students’ individual preferences, needs, habits, and behaviors are important in implementing the paperless university system more effectively [6]. The most effective of these behavioral styles may be “green behavior” [37], defined as the performance and behavior of individuals that contribute to environmental sustainability or move away from behaviors that hinder environmental sustainability. In Carrio and Riemer’s [38] research, it was observed that employees’ green behaviors and attitudes in the individual and organizational areas were different. It has been determined that the reason for this is that employees think that green attitudes and behaviors in their individual lives provide economic benefits for themselves. However, they do not receive any financial return in the organizational environment. This information indicates the necessity of creating a perception of benefit in university staff and students to encourage them to engage in green behavior, including reducing paper use. The perception of benefit can be created through methods such as rewarding activities, training, etc., supported by the management, or it can develop spontaneously due to compulsory reasons depending on periodic conditions. One of these periods may be the COVID-19 pandemic period. With the transition to distance education at universities during the COVID-19 pandemic, students, academics, and administrative staff have had to use digital ICT-based collaboration technologies more than in previous periods. Thus, due to the transactions being carried out in a digital environment, there has been a decrease in most transactions made on paper [18].

Excessive dependence on paper in transmitting information requires large storage space, and organizations arrange files in limited areas. The best solution to reduce the risk of incorrect records in these files is the global “paperless” trend of adopting technology tools. In this century, the information source must be automatic and accessible. Considering that the students of this generation are Generation Z, their adaptation to technology use is high. However, a paperless approach is required to design information flow processes between administrative personnel [27]. Despite its numerous advantages, digital data storage can also give rise to various challenges. Data can be adversely affected or compromised by computer hackers, unauthorized access, viruses, worms, or system failures. It is crucial to cultivate awareness of data security within organizations and take measures to ensure business continuity, safeguard national and international investments, and protect data from all forms of threats and data thieves [39].

Paperless education involves teachers and students using laptops, tablets, or other digital devices as an alternative to classroom textbooks and notebooks. All information exchange, tests, assignments, exams, and grading are also undertaken electronically. This dependence on electronic devices is achieved by keeping textbooks and notebooks away from learning environments. Students must bring their laptops or tablets to school and use them throughout the day for all academic activities [40].

Education in paperless universities has various benefits for both academics and students. Firstly, since there will be no physical paper, the possibility of information being
forgotten or lost will be decreased; by uploading course content and notes to online platforms, academics can provide students with access to course content whenever and wherever they want. Students will be able to listen to the lecture notes they missed later on the online platform, and they will not need notes or incorrect or incomplete information from other students. In addition, obtaining support from different games or applications in teaching will also have a positive effect [41]. Paperless applications can also increase students’ digital literacy and sustainability awareness [42].

On the other hand, although paperless education management has benefits, it also needs help in practice. It is seen that it is easier for individuals to work on paper when they need to work for a long time. Using paper for the same job is more natural and inner than digital technologies. In addition, current mainstream digital environments cause more eye and brain fatigue, compared to that of paper-based approaches [29,43]. In addition, students who take notes using paper can better organize text and drawings while taking notes, creating a more effective learning method for some students with tactile experience [36]. One of the most important challenges is that not all students have easy access to the Internet at home [41]. Especially in developing and underdeveloped economies, not only do they not have Internet access, but many students do not have tablets or computers [44].

In order to successfully implement the paperless university system, it is necessary to select appropriate software and technologies, digital document storage and sharing methods, train students and staff, create sustainability policies, and take digital security measures [19]. Of course, these can be meaningful as long as the economic and technical infrastructure of the geography allows.

The University of California, one of the institutions that support the concept of paperless universities, advocates that universities and colleges should use the paperless system in all applications by reducing the documents that require paper. While Oklahoma Christian University announced the “Digital Campus” campaign to use technological systems in daily routine operations and management and, as a result, to minimize the use of paper, and Loyola University Maryland launched the “Paperless University” project using electronic systems [45]. Recently, interest in this field has been increasing, as it has been seen that paperless universities can achieve many advantages such as faster and more efficient business processes, easy accessibility, space-saving, less paper consumption, environmental sustainability, and cost savings [19,46]. Although some universities have taken initiatives to reduce paper use, higher education worldwide has faced challenges and potential threats in effective learning and teaching support for the last ten years. Excessive dependence on paper in educational processes creates a reducing effect on nature and funds. Developing technology reduces paper use when used appropriately [27].

2.2. UTAUT

From a historical perspective, significant technological advancements have consistently prompted society to place greater demands on education. The emergence of new technologies introduces innovative and rapidly evolving methodologies that are poised to exert substantial future influence on individuals, institutions, and their interaction dynamics within socio-economic spheres, alongside the associated processes of knowledge production [47]. The effectiveness of these models may be closely related to individuals’ susceptibility to innovation and technology.

There are many models and approaches in the literature on individuals’ levels of acceptance of new technologies. The theory of diffusion of innovations [48], the theory of reasoned behavior [49], the theory of planned behavior [50], the technology acceptance model [51], and the integrated technology acceptance model [52] are widely used in the literature. According to these approaches, individuals develop an awareness of innovation, form positive intentions towards its use, and finally use it [53]. These skills—collaboration, communication, creativity, critical thinking, problem-solving, ICT literacy, and social and cultural competencies—are essential for individuals to effectively adapt to the evolving
business environment and innovations [54,55]. For instance, when a new program needs to be processed in banks, employees may feel obliged to adapt to it. However, this adaptation may vary depending on several factors. Bouteraa et al. [56] conducted an examination of the challenges influencing green banking technology based on the UTAUT framework. The research indicated that as technology acceptance increases, there is a corresponding rise in the utilization of green banking services, alongside a reduction in paper usage within this sector. Approaches to accepting innovations generally focus on developing and adopting features of innovations. Those who are developer-focused are based on the advantages of the new element. Acceptance-based approaches, on the other hand, focus on the benefits provided to the user, and the user’s attitudes and perceptions [57]. It may not be enough to consider accepting innovations from a single perspective, so much so that individuals may not use innovations solely based on internal factors or their superiority [57,58]. Approaches associated with the acceptance and use of innovations in the literature are listed in Table 1.

Table 1. Some approaches to the acceptance and use of innovations.

<table>
<thead>
<tr>
<th>Theory and Models</th>
<th>Dimensions in Theories and Models</th>
<th>Descriptions</th>
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<tbody>
<tr>
<td><strong>Diffusion of Innovation Theory</strong></td>
<td>Relative benefit, complexity, relevance, experience, ability, observability.</td>
<td>According to Rogers [48], in the acceptance of innovations, the usefulness of the new compared to the old (relative benefit), ease of use (complexity), compatibility of the new with values, expectations, and experiences (compatibility), being testable (experiential), and the ability to examine the way other individuals use the new (observability) are important.</td>
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<tr>
<td><strong>Theory of Reasoned Behavior</strong></td>
<td>Attitude, specific norms, intention.</td>
<td>According to [49], in accepting innovations, the individual’s positive and negative value judgments, social pressures, and users’ readiness to use innovations are important.</td>
</tr>
<tr>
<td><strong>Technology Acceptance Model</strong></td>
<td>Usefulness, ease of use, attitude, intention.</td>
<td>According to the technology acceptance model [59], which tries to explain individuals’ tendencies to accept new technologies, the most important elements for individuals to accept new technologies are benefits and ease of use. In addition, external factors constitute the independent variable of the model [51,60].</td>
</tr>
<tr>
<td><strong>Planned Behavior Approach</strong></td>
<td>Attitude, specific norms, behavioral control, intention.</td>
<td>Locus of control within the scope of the planned behavior approach [50], which is based on the theory of reasoned behavior, refers to the “sufficiency of the individual to perform a behavior”.</td>
</tr>
<tr>
<td><strong>Unified Theory of Acceptance and Use of Technology (UTAUT)</strong></td>
<td>Performance expectation, effort expectation, social impact, facilitating elements, intent to use, attitude, actual behavior</td>
<td>It was created to overcome the shortcomings of other approaches [52]. In the UTAUT, significant variables are performance expectation, effort required by the new technology, social impact, and ease of use [52,61]. Additionally, there are four moderating variables (gender, age, experience, volunteering) in the model.</td>
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Performance expectation in the UTAUT is expressed as the strongest variable in the model [62]. Performance expectation refers to the work outputs obtained from using new technologies to be more satisfactory than old technologies [52,62]. Effort expectancy refers to the ease of using new technology and its compatibility with work [52,53]. Social impact refers to other individuals seeing the new technology as useful [52,63]. Facilitating factors are the individual’s opinion about whether the organization or the new technology has sufficient infrastructure regarding the new technology used [52,64]. Intention to use
expresses the intensity of the individual’s desire to use new technologies and his readiness to realize the usage behavior [65]. Attitude towards use reflects an individual’s beliefs about using new technologies. These beliefs can be positive or negative [51]. Finally, actual behavior refers to the individual’s actual use of the new technology [65]. The UTAUT is used as the basic approach of this study because it includes individual, organizational, and social factors together in using new technologies.

2.3. Relationships between Concepts and Hypothesis Development

Effort expectancy is expressed as the degree of ease individuals perceive using the system [52]. One factor that directly affects intention or usage dimensions is effort expectation. Behavioral intention measures the individual’s probability of performing a behavior [66]. This measurement also shows “how much effort people plan to exert to perform a behavior” [50]. In their studies, Venkatesh et al. [52] and Alleyne and Lavine [67] found that effort expectation positively affected behavioral intention. The appropriate level of effort made by university employees to use paperless technologies can positively affect their behavioral intentions. The hypothesis created in the light of this information is as follows:

H₁. Effort expectancy has a positive effect on behavioral intention.

Social impact is the extent of social pressure the individual applies to adopt new technology [28,68]. It can also be expressed as people around the individual (family, friends) that they consider important making them feel the need to use a certain technology [69]. With this social impact on individuals, it can be expected that they will develop behavioral intentions towards technology use. In universities, academic and administrative staff receiving support from their social environment or university administration and receiving support to use paperless technologies can positively affect their behavioral intentions. Therefore, the hypothesis created about these variables is as follows:

H₂. Social influence has a positive effect on behavioral intention.

Performance expectation measures the benefits and performance gains individuals achieve when using technology [70]. There have been studies conducted in different fields on this subject. For example, some researchers [28,71–74] indicate that performance expectation has a significant impact on users’ behavioral intention to adopt Internet banking. In addition, it has been determined that performance expectation is the strongest determinant of behavioral intention to use mobile applications [75]. Performance expectation is seen as the variable that has the most important effect on behavioral intention [52,76]. If academic and administrative staff think they will perform well in their jobs by using paperless technologies, their behavioral intentions to use these technologies may increase. In the light of all this information, the hypothesis created about these variables is as follows:

H₃. Performance expectation has a positive effect on behavioral intention.

Behavioral intention is the subjective probability of an individual performing a certain behavior [66]. In other words, this concept expresses the possibility of individuals performing the behavior. According to Mathieson [77], actual usage is determined by the behavioral intention variable. For example, some studies have shown that users’ behavioral intentions are effective in their purchase of electronic tickets [78], their use of electronic library services [79], and their membership on electronic learning platforms [80]. These examples strongly demonstrate the impact of behavioral intention on actual usage [81]. Behavioral intention shows university employees’ intention to use paperless technologies. Strong behavioral intention may increase the use of paperless technologies by academics and civil servants at the university for their work. The hypothesis created based on this information is as follows:

H₄. Behavioral intention has a positive effect on actual usage.

According to the research of Alleyne and Lavine [67], performance expectation affects behavioral intention. In the same study, it was determined that behavioral intention also
impacted actual usage. The relationship between actual usage and performance gives important clues about the intention to use technology [52]. Therefore, behavioral intention has a mediating role on the effect of performance expectation on actual usage.

Actual use is defined as the frequency and duration of use of the technology [82]. It is related to how close individuals are to the use of technology. In their studies, Isaac et al. [83] and Venkatesh et al. [52] found a positive relationship between performance expectation and actual usage. In their research, Alleyne and Lavine [67] also determined a strong relationship between participants’ performance expectations and their level of technology use. Many studies show a positive relationship between performance expectation and usage [84,85]. The fact that academics and administrative staff expect paperless technologies to provide good performance may increase their intention to use them, resulting in actual use. Therefore, the hypothesis established between these variables is as follows:

H5. Behavioral intention has a mediating role on the effect of performance expectation on actual usage.

Effort expectation, which indicates the degree of ease in using the system, is expected to impact the actual usage variable, which reflects individuals’ technology usage time. In the study of Alleyne and Lavine [67], a positive and significant relationship was observed between effort expectation and actual usage. In addition to this, Wang et al. [86] found that effort expectation increases the intention to continue using e-banking services.

Effort expectancy indicates the level of ease in using the system [52]. As individuals’ perception of convenience increases, their behavioral intentions will encourage them to use it. In their research, Chua et al. [81] stated that since behavioral intention is the most important determinant of actual usage, application developers should focus on improving the elements that direct behavioral intent, including performance expectation, effort expectation, and social impact, to increase actual usage. The reasonableness of the effort spent to use paperless technologies can increase employees’ behavioral intention and enable the use of paperless technologies. The hypothesis created based on this information is as follows:

H6. Behavioral intention has a mediating role on the effect of effort expectation on actual usage.

Chua et al.’s [81] research found that social influence was the most important driving force for actual use, especially among young people. Regarding social influence, participants agreed that peers and other social factors influence technology use behaviors [67]. Previous studies have shown that social influence greatly impacts the use of technology in Internet banking [28,68,74,87]. Therefore, it is expected that the expectations from the environment and the social influence that pushes individuals to use technology will positively affect the actual usage variable.

Yang [88] found a positive relationship between social influence and behavioral intention. On the other hand, behavioral intention determines individuals’ actual behavior [77]. According to Chua et al.’s [81] research, the mediating role of behavioral intention on the effect of social influence on actual usage was determined. In addition, according to the example of Segrest et al. [89], faculty members can participate in distance education technologies because rectors at universities provide financial support or incentives to those who use distance education technologies. Using distance education technology may be correct. In this example, the behavioral intention has developed towards obtaining a good impression due to the social influence on the actual use of technology. So, the support of all university stakeholders, especially the management, to use paperless technologies can increase the intention of academics and other staff to use paperless technologies and, subsequently, the level of use. The hypothesis established based on this information and interpretations is as follows:

H7. Behavioral intention has a mediating role on the effect of social influence on actual usage.

Figure 1 shows the research’s conceptual model, which was created considering the study’s hypotheses. Performance expectancy, effort expectancy, and social impact are the
independent variables (x) in Figure 1. Behavioral intention is the mediating variable (m), and actual usage is the dependent variable (y).

**Figure 1.** Conceptual model.

### 3. Materials and Methods

The methods used in this study are explained in this section. The data collection process was completed between December 2022 and June 2023. A mass e-mail was sent to university personnel. Then, reminder e-mails were sent. The SPSS 25 package program was primarily used to analyze the research data. Exploratory factor analysis (EFA), reliability analysis, and descriptive statistics were examined through the SPSS 25 package program. Hair et al. [90] were taken as the basis for examining EFA values. In the exploratory factor analysis, KMO sampling adequacy, Bartlett’s Sphericity test, total variance explained, factor loadings, and Cronbach’s Alpha coefficient were evaluated in the reliability analysis. In evaluating the findings of the factor analysis and reliability analysis, publication-accepted limit values (KMO $\geq$ 0.70, Bartlett’s test $\leq$ 0.05, total variance explained $\geq$ 60%, factor loadings $\geq$ 0.40, Cronbach’s Alpha $\geq$ 0.70) were taken as the basis [91].

In examining the goodness-of-fit values obtained as a result of CFA (Table 2), Barrett [91], Kline et al. [92], and Hair et al. [90] presented the criteria that were used. Structural equation modeling was preferred because it has strong theoretical foundations and is powerful in solving complex models [90].

#### 3.1. Measurements

Five dimensions and twenty items of the extended technology acceptance model were used to collect data. Measurement tools have been shown to have high validity and reliability scores in the literature [93–95]. For this reason, the UTAUT measurement tool was used because it gave appropriate values.

A 5-point Likert measurement was preferred in data collection (1—Strongly disagree, 5—Strongly agree). Information about the measurement tool is presented in Table 2.

#### 3.2. Participants and Procedure

This study aims to determine the factors affecting the use of paperless technologies by university office staff and academicians. In line with the research purpose, the sample consisted of academics and administrative staff from 10 public and 3 foundation higher education institutions in Turkey. Care was taken to ensure that the selected universities had switched to paperless processes or that work was largely conducted through digital tools. The selection of academicians and administrative personnel as research groups is effective if these groups are the people who will be directly affected by a possible paperless application. An online survey form was used to collect data. The purpose of the research and what paperless technologies are was explained in the survey form (December 2022; June 2023). Ethics committee permission was received from Istanbul Beykent University...
on 30 September 2020. During the data collection, incomplete, uniform responses, or out-of-sample participants were eliminated. In total, 726 survey forms that responded appropriately were obtained during the data collection process.

Table 2. Measurement tools.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Item</th>
<th>Sources</th>
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<tbody>
<tr>
<td>Performance expectation</td>
<td>4</td>
<td>Venkatesh et al. [69], Catherine et al. [96], Nikolopoulou et al. [97], Çakır &amp; Kazancıoğlu [98]</td>
</tr>
<tr>
<td>Effort expectation</td>
<td>4</td>
<td>Venkatesh et al. [69], Catherine et al. [96], Nikolopoulou et al. [97], Çakır &amp; Kazancıoğlu [98]</td>
</tr>
<tr>
<td>Social impact</td>
<td>4</td>
<td>Venkatesh et al. [69], Catherine et al. [96], Nikolopoulou et al. [97], Çakır &amp; Kazancıoğlu [98]</td>
</tr>
<tr>
<td>Behavioral intention</td>
<td>4</td>
<td>Venkatesh et al. [69], Catherine et al. [96], Nikolopoulou et al. [97]</td>
</tr>
<tr>
<td>Actual usage</td>
<td>4</td>
<td>Hossain et al. [99], Nikolopoulou et al. [97]</td>
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</table>

The research sample consisted of 55.1% women and 44.9% men. A total of 20.2% of the staff were 29 years old and under, 41.6% were between 30 and 39 years old, 22% were 40–49 years old, and 16.2% were 50 years old and over. While 18.2% of the personnel use devices such as smartphones, tablets, and computers for work for an average of fewer than 3 h a day, 42.5% use them between 4 and 7 h, and 36.6% use them for 8 h or more. A total of 2.7% of participants did not respond. When the frequency of participants experiencing problems in online transactions in recent times was examined, 17.4% reported having problems 1–2 times, 28.9% 3 times, 31.8% 4 times, and 21.9% 5 or more times. A total of 67.1% of the personnel spent most of their life in metropolitan cities, 24.8% in the provinces, and 8.1% in smaller settlements. A total of 69.4% of the participants were academic, and 30.6% were administrative (non-academic) personnel.

4. Results

Exploratory factor analysis (EFA) and reliability analysis were first conducted to determine the suitability of the measurement tools. The EFA and Cronbach’s Alpha coefficient findings are presented in Table 3.

According to the EFA findings, the KMO value of the UTAUT was 0.928. The Bartlett’s test was significant at the \( p < 0.05 \) level, the total variance explained was 75.91%, and the factor loadings were >0.40. The Cronbach’s Alpha coefficient, which was examined for reliability, was found to be 0.935. The measurement tool of the UTAUT consists of 5 dimensions and 20 items. According to the findings, the measurement tool provided a high level of suitability.

Confirmatory Factor Analysis (CFA) was used to validate the EFA and measure the observed variables [100]. During the measurement model process, covariance was established between items e3 and e4 in the performance expectation scale, items e11–e12 and e10–e9 in the social impact scale, and items e17–e18 in the actual usage scale. The measurement model goodness-of-fit values are presented in Table 4.

When the structural model fit indices were examined as the first step in analyzing the structural equation model, they were determined as \( \chi^2/\text{df} = 3.567 \), GFI = 0.927, CFI = 0.962, TLI = 0.954, RMSEA = 0.61, NFI = 0.949, RMR = 0.037, and AGFI = 0.902. It is seen that the goodness-of-fit values of the structural model fit the acceptable/good fit criteria. According to the findings, the measurement tool used to represent the extended technology acceptance model provides sufficient validity and reliability values.
Table 3. EFA and reliability analysis results.

<table>
<thead>
<tr>
<th>Component</th>
<th>Actual Usage</th>
<th>Behavioral Intention</th>
<th>Social Impact</th>
<th>Effort Expectation</th>
<th>Performance Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>q24</td>
<td>0.851</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q22</td>
<td>0.846</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q23</td>
<td>0.832</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q25</td>
<td>0.730</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q18</td>
<td>0.872</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q19</td>
<td>0.828</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q17</td>
<td>0.808</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q20</td>
<td>0.632</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q12</td>
<td>0.839</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q9</td>
<td>0.828</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q11</td>
<td>0.804</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q10</td>
<td>0.780</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q7</td>
<td>0.800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q8</td>
<td>0.794</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q6</td>
<td>0.761</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q5</td>
<td>0.652</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q2</td>
<td>0.803</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1</td>
<td>0.774</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q3</td>
<td>0.662</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q4</td>
<td>0.448</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variance Explained: 16.92% 15.93% 15.04% 14.99% 13.03%

KMO (Kaiser–Meyer–Olkin): 0.928. Bartlett’s Test of Sphericity: 0.000, Df: 190, Approx. Chi-Square: 11,004.53, Total Variance Explained: 75.91%. Cronbach’s Alpha: 0.935, N of items: 20.

Table 4. Model fit.

<table>
<thead>
<tr>
<th>Fit indices</th>
<th>X2/Df</th>
<th>GFI</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA</th>
<th>NFI</th>
<th>RMR</th>
<th>AGFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable fit</td>
<td>5</td>
<td>0.85</td>
<td>0.90</td>
<td>0.9</td>
<td>0.8</td>
<td>0.90</td>
<td>0.10</td>
<td>0.85</td>
</tr>
<tr>
<td>Good fit</td>
<td>3</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
</tr>
</tbody>
</table>

In order to measure the internal consistency of the data, the composite reliability (CR) value must be greater than 0.70 [101]. As can be seen in Table 5, the CR value of all dimensions is above 0.70. The average variance extracted (AVE) value is used to test the convergent validity. The AVE value must be above 0.50 [90]. As shown in Table 5, the AVE value of all dimensions is above 0.50. Discriminant validity refers to variables being different from each other. If the values on the diagonals are greater than the correlations, this indicates discriminant validity. Since all values on the diagonals are greater than the correlations (Table 5), the discriminant validity of the scale is ensured. The discriminant, convergent, and composite validity values are provided.
Table 5. Relationships between variables, discriminant, and composite validity.

<table>
<thead>
<tr>
<th>Variables</th>
<th>AVE</th>
<th>CR</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance expectation (1)</td>
<td>0.54</td>
<td>0.82</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort expectation (2)</td>
<td>0.66</td>
<td>0.89</td>
<td>0.712</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social impact (3)</td>
<td>0.57</td>
<td>0.84</td>
<td>0.488</td>
<td>0.422</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral intention (4)</td>
<td>0.72</td>
<td>0.91</td>
<td>0.737</td>
<td>0.622</td>
<td>0.399</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Actual usage (5)</td>
<td>0.79</td>
<td>0.94</td>
<td>0.67</td>
<td>0.685</td>
<td>0.467</td>
<td>0.558</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Diagonal elements in the parentheses are the square root of the AVE.

The path analysis results are shown in Table 6. The table shows the direct effects. The analysis results are examined at the $p < 0.05$ significance level.

Table 6. Path model results.

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Estimate</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance expectation</td>
<td>Behavioral intention</td>
<td>0.469</td>
<td>0.000</td>
</tr>
<tr>
<td>Effort expectation</td>
<td>Behavioral intention</td>
<td>0.272</td>
<td>0.000</td>
</tr>
<tr>
<td>Social impact</td>
<td>Behavioral intention</td>
<td>0.066</td>
<td>0.024</td>
</tr>
<tr>
<td>Behavioral intention</td>
<td>Actual usage</td>
<td>0.550</td>
<td>0.000</td>
</tr>
</tbody>
</table>

When the path analysis results are examined, it can be seen that performance expectation ($\beta = 0.469, p < 0.05$), effort expectation ($\beta = 0.272, p < 0.05$), and social influence ($\beta = 0.066, p < 0.05$) positively affect the intention to use. Additionally, it was determined that intention to use positively affected actual usage ($\beta = 0.550, p < 0.05$). Performance expectation is the most important factor affecting staff’s intention to use paperless technologies. Social impact is the factor that least affects the staff’s intention to use paperless technologies. According to the findings, hypotheses $H_1$, $H_2$, $H_3$, and $H_4$ were supported.

The indirect impact results are shown in Table 7. When the indirect effect values are examined, the role of intention to use in the effect of social influence on actual usage is significant ($\beta = 0.036, p < 0.05$). However, this relationship could be higher, and there are doubts about its significance value ($p = 0.049$). The role of intention to use in the effect of effort expectation on actual usage is significant ($\beta = 0.15, p < 0.05$). Usage intention ($\beta = 0.258, p < 0.05$) is important in the effect of performance expectation on actual usage. According to the findings, intention to use has a mediating role on the effect of social influence, effort expectation, and performance expectation on actual usage of paperless technologies. According to the indirect effect findings, the $H_5$, $H_6$, and $H_7$ hypotheses were supported.

Table 7. Mediator effect.

<table>
<thead>
<tr>
<th>X</th>
<th>M</th>
<th>Y</th>
<th>Estimate</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social impact</td>
<td>Behavioral intention</td>
<td>Actual usage</td>
<td>0.036</td>
<td>0.049</td>
</tr>
<tr>
<td>Effort expectation</td>
<td>Behavioral intention</td>
<td>Actual usage</td>
<td>0.15</td>
<td>0.010</td>
</tr>
<tr>
<td>Performance expectation</td>
<td>Behavioral intention</td>
<td>Actual usage</td>
<td>0.258</td>
<td>0.010</td>
</tr>
</tbody>
</table>

The study’s conceptual model (Figure 1) was tested with structural equation modeling. The analysis findings supported all hypotheses. The “realized model” formed based on the research conceptual model is presented in Figure 2.
According to the research findings, university employees’ intentions to use environmentally friendly technologies are compatible with the assumptions of the UTAUT. According to the UTAUT, individuals’ use of technologies develops depending on many factors. The ease of use of technologies, the usefulness of technology, access to technical support, providing pleasure, encouraging use in social and business environments, demographic factors, trust, necessity, risk of technology, innovative personality traits, etc., [102–110] are the factors that enable the use of technology by individuals. Some studies in the literature also show that new technology is useful [111,112], easy to use [113,114], and that supportive elements in the social and business environment for using this technology [69] have been found to increase individuals’ intention to use new technology and use it.

However, the technologies represent an important context that influences the formation of usage intentions. Since using environmentally friendly technologies will solve environmental problems, employees’ intention to use them becomes important. Briscoe [23] argues that the development of technology and individuals’ use of these technologies for business purposes are important in realizing environmentally friendly technologies (especially paperless offices). The author claims that the decline in paper production (in an inverted U shape) is related to technological advances. The environmental benefits of using environmentally friendly technologies emerge, albeit delayed. For this reason, it becomes important for employees to accept environmentally friendly technologies in business areas where paper is used extensively, such as universities.

Assuming that the pioneers of the use of environmentally friendly technologies and paperless technologies in universities are office staff and academicians [115], it is necessary to offer them applications that provide performance outcomes, require little effort for use, and whose use can be supported in the business and social environment. Thus, achieving the motivation to use paperless applications may be possible. One of the factors that enables the use of environmentally friendly technologies is the performance contribution of technology. Having environmentally friendly practices in universities with a design suitable for education can make it easier for academic and administrative staff to accept technology [116–119].

Figure 2. Resulting model.

5. Conclusions and Discussion

According to the research findings, when employees think they will obtain an adequate performance from environmentally friendly technologies, their intentions to use these technologies increase, and the process of using them takes place. Another factor that affects university employees’ use of environmentally friendly technologies is the effort required to use the technologies. Using environmentally friendly technologies requires little effort to help employees use these technologies. According to another finding, it was determined that social influence was effective in university employees’ intention to use environmentally friendly technologies. However, the intention to use it was at a negligible level. When the findings are evaluated in general, the most important factors for university employees to use environmentally friendly technology are that the technologies increase their job performance and they do not have to make much effort to use them.

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The results of this study, in which the factors affecting the use of paperless technologies are determined, are compatible with similar studies in the literature. However, the results of this study differ from the literature with some findings. This study, conducted in universities where paperless applications are widely used, was based on an actual practice rather than an expectation. In addition, it is important to demonstrate the sustainability of using paperless applications, as it is carried out with the participation of academics and administrative staff as employees who ensure the continuation of university processes. One of the important findings of this study is that the reasons why academics and administrative staff use it are related to rational factors. For example, meeting performance and effort expectations will increase the use of paperless, environmentally friendly technologies.

Regulatory bodies and organizations inspect universities in countries such as Turkey. Therefore, barriers to using environmentally friendly technologies may arise when auditing criteria-mandated paper-based processes. For example, the prevalence of paper-based auditing procedures may lead to increased use of paper in academic and administrative processes at universities. The policies of regulatory institutions/organizations are important in sensitivity efforts in this respect.

The research findings show that the use of paperless technologies in universities is welcomed. It is also possible to claim that the support of stakeholders at the university [17], the fact that paperless technologies are easy to use/do not require much effort, and that paperless technologies provide performance to employees motivate the use of paperless technologies.

As stated in the UTAUT, performance expectation, effort expectation, and social impact are important in adopting or using a new technology. However, paperless technologies may not be easily adopted in areas with heavy paper use, such as universities. These research results can be useful to show how paperless technologies are accepted in areas where paper-based business processes are intense. Rarely have studies on paperless technologies used the technology acceptance model. This study may be useful in promoting the UTAUT in research that prioritizes environmental awareness, such as paperless technologies.

It is known that there are some barriers to the use of paperless technologies. Paper use can be high, especially in developing countries, when auditing mechanisms mandate paper-based procedures. On the other hand, it is routine for academics and other personnel to have used paper-based transactions for many years. These routines are a barrier to the frequent use of paperless technologies. The UTAUH variables (social impact, performance outcomes, effort expectation, etc.) can be a benefit to overcome the abovementioned obstacles.

6. Limitations and Recommendations

The research results have some limitations. One of the main limitations of this study is the sample. This study is conducted only with academic and office staff. Considering that students are an important stakeholder for universities, the research results lack the views of this important stakeholder. Another important limitation is that it is still being determined whether paperless technologies and environmentally friendly practices are voluntary or obligatory for users, so much so that the acceptance level of technologies based on compulsory use by employees may differ [120].

On the other hand, an important limitation is the differences between the adequacy of institutions’ digital and technological resources. This study was carried out with data obtained from different universities in Turkey. Different levels of geographical region, human resources, and technology resources may impact the findings regarding using paperless applications [121–123].

As a result of this study, some suggestions are offered to decision-makers. The first is to raise awareness among employees and other stakeholders about environmental practices. Increasing competence and awareness about environmentally friendly technologies can remove barriers to using technologies [120,124–126]. In addition, by raising the awareness of people who use these technologies in terms of the benefits and environmental contributions that will be obtained as a result of use, the frequency of use by individuals can be
increased. Knowing the benefits of technologies resulting from their use is an element that enables technology to be used more frequently [127–131]. Additionally, this study examines the environmentally friendly approach, specifically in paperless technologies. Thus, it focuses on a problem that is more widespread and faster to respond to regarding environmental awareness. As Briscoe [23] states, significant developments have been made in using paper in recent years. The basis of these developments lies in the development of information technologies. While the results of many environmentally friendly applications appear delayed, the fact that paperless applications yield rapid results may indicate the importance of paperless applications/technologies.

Some suggestions can be offered for future research. It is recommended that studies on paperless technologies and environmental awareness be designed to include more stakeholders of universities. Thus, barriers to paperless applications can be identified. On the other hand, employees’ digital literacy levels may support using paperless technologies. When employees’ digital literacy provides positive performance outcomes regarding tasks [132], employees’ tendency to use paperless technologies may increase. Therefore, it may be recommended to examine the role of digital competencies in using paperless technologies in future research. Finally, management support is important for employees to use technological tools and applications [133,134]. How management encourages paperless technologies can affect employees’ intention and frequency of using those technologies. Additionally, management support may reduce employees’ negative attitudes about technologies. For this reason, it is recommended that future research investigates the consequences of management’s encouragement of paperless and environmentally friendly technologies in terms of usage.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

References
3. Obiora, S.C.; Bamisile, O.O.; Dodge, K.; Dagbasi, M. Identifying corporate socially responsible, cost minimizing, management, and energy saving techniques to be implemented on a university campus, through a paperless initiative. IOSR J. Bus. Manag. 2017, 19, 55–66. [CrossRef]
87. Venkatesh, V.; Davis, F.D. A theoretical extension of the technology acceptance model: Four longitudinal field studies. Manag. Sci. 2000, 46, 186–204. [CrossRef]
94. Wang, Y.; Wang, L.; Wang, J.; Wei, J.; Wang, C. An empirical study of consumers’ intention to use ride-sharing services: Using an extended technology acceptance model. Transportation 2020, 47, 397–415. [CrossRef]

126. Ho, C.W.; Wu, C.C. Exploring intention toward using an electric scooter: Integrating the technology readiness and acceptance into norm activation model (TRA-NAM). *Energies* **2021**, *14*, 6895. [CrossRef]

127. Anser, M.K.; Yousaf, Z.; Zaman, K. Green technology acceptance model and green logistics operations: To see which way the wind is blowing. *Front. Sustain.* **2020**, *1*, 3. [CrossRef]


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