Impact of Digitalisation on Paper Consumption

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Abstract

The last few decades have seen a rapid increase in technology, which has led to an increase in urbanization. At the same time, the environment has been significantly damaged by the human race. This has led to a shift to online and digital methods instead of traditional methods of using paper for all kinds of tasks. The paper industry is changing rapidly, with contracts, invoices, and everyday communication becoming much faster without paper. Print magazines and newspapers have also been declining for many years, as consumers have been using online and mobile versions for their daily needs. With all the focus on a paperless world, it is understandable to think that the pulp and paper industries are going out of business. This research paper will look at the extent of the impact of digitalization on the paper industry and how it has reduced the consumption of paper. It will also look at the various causes and factors that have contributed to the shift to digital technologies, as well as suggest solutions for a more sustainable approach.

Keywords: sustainable, digital, consumers,

Introduction

In the digital era, technology has had a considerable influence on a variety of industries. One such industry has been the digitalisation industry, which has had a considerable impact on the use of paper.

Digital technology has altered the way we create, store, and trade data. There has been a significant movement from analogue to digital ways of information interchange, from PCs to cellphones to the internet. This article investigates the environmental, economic, and social consequences of paper usage as a result of digitalization.

History

Paper comes from the Latin word "papyrus", which means paper. It takes a lot of resources to make one ton of paper - twelve trees, water, and chemicals - and it also uses fuel. Unfortunately, the amount of recycled paper produced is only 37%. We often take paper for granted, so it's important to be careful when using it.

Before paper, communication was done in a variety of ways. People carved drawings and symbols in tree bark, painted on caves, and wrote on papyrus and clay tablets. Clay was a popular material for writing in the River Plains of Mesopotamia around 3000 BC, but it was too messy to send messages. Then, around 3000 BC, people in Egypt discovered a way to write on paper that was easy to transport. They made a flexible, smooth surface from a type of aquatic plant that grew near the Nile and held ink without smudging. People in China used narrow bamboo strips to write in a single line or two lines, and this was used for around 1000 years during the Shang Dynasty. Eventually, people in the Mediterranean started using more expensive substitutes like animal skin and membranes. Finally, leather was used to write on one side of a page since 2500 BC.

In India, the two primary forms of writing were the hard and the soft. Examples of the hard materials included stone, metal, and shells, as well as pottery. The soft materials used for writing included wood board and dust, as well as birch bark and palm fronds. Additionally, leather, cotton cloths, and other materials were also used for writing. Writing was typically done through a variety of methods, such as engraving and embossing; painting; and scratching.

Discovery of paper

The paper was first produced by an individual named Cai Lun, in China. Apparently, Cai Lun mixed mulberry bark, hemp and rags with water, crushed them into a paste, strained the liquid and hung a thin mat. Dry in the sun. Slowly and gradually, the invention of papermaking spread to the Middle East. Many materials were not available to Middle Eastern papermakers, instead they used hemp and other substitute fibers.

The first paper factory in the Islamic world was founded in Samarkand (now Uzbekistan).

In the 13th century, Muslim merchants brought papermaking to India, where it almost completely replaced native writing materials. The paper manufacturing business was mainly established in Delhi and Lahore. Punjab Paper Mills was established in 1925 and has an annual production capacity of 6,000 tonnes. From 1930–1931, India's showed an upward swing in production by touching 45,600 tons, i.e. almost 12,500 tons more than the year 1925.

Exhaustive usage of paper in the present scenario is the outcome of the gradual increase in paper utilization across various civilization.

Paper consumption trends

The patterns of paper consumption have been fluctuating over time due to a variety of technological, ecological, and social factors. Nevertheless, it is essential to recognize that paper consumption trends can evolve over time as a result of changes in human behaviour, technology, and consciousness. Here are some changes in paper use patterns throughout time:

1. **Historical Paper Consumption:**
   According to historical trends of paper consumption, paper consumption has grown dramatically throughout time due to factors such as the advent of the printing press, industrialization, and the demand for bureaucratic record-keeping.
   Paper consumption increased significantly during the twentieth century as a result of the extensive production of newspapers, journals, and office documents, particularly in industrialized nations.
2. **E-commerce Packaging Impact:**
   As e-commerce grew in popularity, so did the use of paper-based packaging materials to meet the rising demand for online shopping. Efforts were made, however, to optimize packing and eliminate waste.
3. **Decline in Print Media:**
   Consumption of traditional print media, such as newspapers, periodicals, and printed books, has decreased due to the advent of digital alternatives. Many readers now get their news, articles, and reading materials from internet sources.
4. **Transition to Digital Learning in the Education industry:**
   There has been a change in the education industry toward digital learning platforms and e-books. Online textbooks and e-learning resources were increasingly used by students and educators, eliminating the demand for printed educational materials.

Environmental Impacts

93% of raw material for the production of paper comes from trees. IT industry once predicted that its emergence is to make paperless offices but amazing finding is that still 95% of office work across the world is still done on paper.

The business of issuing paper receipts, by itself, is a microcosm of the problem. Here are some statistics, courtesy of mobile payment company Square, on the environmental damage we cause by using receipts:

- ✓ Receipts waste one-billion gallons of water
- ✓ To make them, we kill 10 million trees
- ✓ Almost 250 million gallons of oil is used to make them available
- ✓ In totality, the whole process leads to 1.5 billion pounds of waste

- ✓ Deforestation: Approximately 4 billion trees are cut down each year to produce paper. In 2010, India had 31.3 Mha of natural forest, extending over 11% of its land area. In 2022, it lost 117 kha of natural forest, equivalent to 62.9 Mt of CO_2 emissions. The state of Assam reported the major tree cover loss.
- ✓ Greenhouse Gas Emissions: The production of paper also contributes to greenhouse gas emissions. The pulp and paper industry were responsible for just under 2% of all emissions from industry in 2022 and majorly leading to emission of Nitrogen oxides and sulphur oxides. From 2001 to 2022, India lost 2.19 Mha of tree cover, equivalent to a 5.6% decrease in tree cover since 2000, and 1.11 Gt of CO_2 emissions.
- ✓ Energy Consumption: The pulp and paper industry are the fourth largest industrial user of energy, consuming 6.4 EJ in 2005. This accounts for about 6% of the world's total industrial energy consumption. The paper industry consumed a total of around 1,361 petajoules of energy in 2021.
- ✓ Water Consumption: The US benchmark for water use within pulp and paper mills is approximately 17,000 gallons/ton of paper. The water consumption in the paper industry ranges from 6 to 17 litres of water per kilogram of paper produced. Even the crispest piece of A4 pulp paper has swallowed up to 20 litres of water during its production.
- ✓ Waste Concerns: Paper production also contributes to waste concerns. When not recycled, paper waste ends up in landfills where it decomposes and releases methane, a potent greenhouse gas.

The chemicals used in paper manufacture, including dyes, inks, bleach, and sizing, can also be harmful to the environment when they are released into water supplies and nearby land after use It is very difficult to restore back polluted water back. And Dichlorination is a lengthy process.

Nutrients such as nitrogen and phosphorus can cause or exacerbate eutrophication of fresh water bodies such as lakes and rivers. Organic matter dissolved in fresh water, measured by biological oxygen demand (BOD), changes ecological characteristics.

In Canada, for example, this industry is the third source of lead (Pb) emissions to water In the U.S., the pulp and paper industry is responsible for 9% of industrial releases to water. In 2015, the pulp and paper sector were ranked first in the amount of toxic weighted pound equivalents (TWPE) discharged to water by industry.

What is digitalization?

Before we get into how digitalisation affects paper usage, let's start by defining what digitalisation is. What is digitalisation? Digitalisation refers to the process by which information is digitised and made available and usable through the use of technology.

What is digital revolution?

The onset of digital revolution dates back to 1980s which witnessed a shift from analogue electronic and mechanical technology to digital technology. It is also referred as the third industrial revolution. The digital revolution also marks the start of the information era.

The Internet was the catalyst for the Digital Revolution. It all began in 1947 with the invention of the transistor, which led to the creation of contemporary digital computers. In the 1950s and 1960s, computer systems were employed by the government, military, and other institutions. The computer became a regular part of everyday life in the 1980s, and by the late 1980s, it was so popular that knowing how to use it was a necessity for many employments. The internet was launched in the 1990s, and by 1996, about half of the US population was using it. The Digital Revolution moved to the developing world in the 2000s, with mobile phones becoming more prevalent, more people utilizing the internet, and televisions converting from analog to digital.

Attitude of Consumers

Initial Skepticism and Resistance: In the early days of digital technology, many individuals were apprehensive about leaving behind traditional paper-based methods. They expressed concerns regarding the security of digital data, the learning curve associated with new technology, and the potential for technical glitches. Some even

perceived digitalization as a potential threat to job security, particularly in sectors heavily reliant on paper-based processes.

Gradual Acceptance and Transition: As digital technology evolved and became more user-friendly, there was a gradual acceptance of digital means for everyday tasks. People began to recognize the convenience offered by digital tools like email, word processors, and digital calendars. Additionally, the environmental advantages of reducing paper consumption started gaining traction and resonating with individuals.

Digital Natives and New Generations: Younger generations, often termed as "digital natives," have grown up with digital technology as an integral part of their lives. For them, transitioning to digital tools is second nature, and they often perceive paper-based methods as outdated. Their attitude toward digitalization is generally positive and enthusiastic, especially for tasks such as communication, research, and organization.

Environmental Awareness: Increasing awareness of environmental concerns has contributed to a more favorable outlook on digitalization. Many individuals now view reducing paper usage as an environmentally responsible choice. Consequently, there's been an uptick in the adoption of digital tools for tasks like document storage and sharing.

Productivity and Efficiency: The advantages of digitalization in terms of productivity and efficiency have significantly impacted attitudes. People appreciate the ability to access information and collaborate with others seamlessly, regardless of location. This aspect has become increasingly valuable in today's interconnected world.

Security Considerations: Despite the convenience offered by digitalization, concerns related to data security breaches and privacy have arisen. Some individuals maintain a cautious approach and may prefer paper for tasks or documents involving sensitive information.

Hybrid Approaches: Many individuals have embraced a hybrid approach, incorporating both digital and paper methods based on task-specific requirements or personal preferences. This flexible approach allows them to leverage the benefits of both mediums.

Trends in Digitalization

1. Exchange of Information and Communication

Communication and information sharing have undergone a revolution since the introduction of digitalization. Physical letters, memoranda, and printed communication are no longer necessary because to the widespread use of email, social networking platforms, instant messaging apps, and video conferencing capabilities.

Real-time interactions made possible by digital communication enable previously impossible global connectivity and collaboration.

With digital platforms acting as a source of information, news, and updates, access to information has considerably increased.

2.Document Management

Across industries, digitalization has changed how document management is done. Nowadays, businesses use digital document management and storage systems instead of physical filing cabinets and printed records.

Electronic Document Management Systems (EDMS) improve document retrieval times, optimise workflow procedures, and strengthen document security through encryption and access controls.

Offices that have gone paperless have significantly reduced their costs for storage, paper, and document archiving.

3**. E-books and digital publishing**

The publishing industry has changed as a result of the popularity of e-books and digital publishing platforms. Due to their accessibility, portability, and convenience on e-readers and mobile devices, e-books are becoming more and more popular.

Self-publishing is made possible by digital publishing, which democratises the publishing industry and enables authors to reach a worldwide audience without the help of traditional publishing gatekeepers.

The reading experience is improved by interactive multimedia components like integrated videos and hyperlinks in digital publications.

4. Digital Records and E-Government

Globally, governments are embracing digitalization to boost efficiency, transparency, and public services. Initiatives in e-government digitalize administrative procedures, cutting down on paper work and improving citizen access to services.

Government documents may be preserved and easily retrieved thanks to digital records and archives, which promotes accountability and openness.

By minimising the usage of paper forms, applications, and documents in government transactions, e-government projects improve sustainability.

Numerous facets of contemporary life have changed as a result of the continuous digital transition, including how we communicate, handle documents, consume information, and interact with government services. These trends, which are still developing, have wide-ranging effects on numerous industries and have the potential to drastically reduce paper usage while posing new problems and opportunities for society.

It is crucial to understand the economic effects of digitization because it has gradually replaced the use of paper.

Economic Implications of Digitalization

1. Lower Costs for Digital Document Management

Organisations can save a lot of money by adopting digital document management solutions and paperless procedures. Because electronic records are simpler to look for, find, and exchange, organisations can operate more productively and efficiently.

2.Challenges for the Paper Industry

The traditional paper sector has faced many difficulties as a result of the shift towards digitization. The profitability of the sector has been damaged by the decline in demand for paper products, such as printed advertisements, magazines, and newspapers.

3. Change to Digital Business Models

Many companies have made the switch to digital business strategies and now provide goods and services online. Software-as-a-service (SaaS), e-commerce, and digital advertising are a few examples of industries that have prospered in the digital age.

The emergence of new job opportunities in the technology, digital marketing, and e-commerce industries is one result of this digital transformation in terms of the economy.

4. Intellectual property and Digital Revenue Models:

The distribution and monetization of intellectual property have been transformed by digitalization. Musicians, authors, and other content producers have investigated a variety of digital revenue sources, such as streaming services, digital downloads, and crowdsourcing.

6. **Economic Inequality and Inclusivity**

Individuals and areas that are economically underdeveloped could find it difficult to access digital resources and fully engage in the digital economy.

Societal Consequences

1. Accessibility and inclusivity

Accessibility to information and services for people with impairments could be improved via digitization. People with visual or aural impairments now have greater access to digital content because to assistive devices, screen readers, and other innovations.

To assure inclusivity in the time of technological advancements, it is vital to address digital accessibility norms and rules.

2. Job Relocation and Employment Changes

Certain industries have experienced job displacement as a result of the automation of regular operations and procedures by digital technologies. The most impacted job categories have been those in administration and manufacturing, which has changed how people are employed and given rise to new work categories.

To assist displaced workers in moving into positions compatible with the digital economy, it is crucial to engage in workforce development and retraining programmes.

3. Cultural Changes in Information Sharing

A cultural change in the way information and ideas are shared has been facilitated by the accessibility of digital information sharing through social media, blogs, and online forums. Online activism, citizen journalism, and viral material have all grown to be powerful factors in influencing public conversation.

The dissemination of false information, fake news, and the function of social media platforms in content moderation are issues raised by this transition, though.

4. Data security and privacy

Significant privacy and data security concerns have been created by the digitalization of personal information, including online purchases and social media activity. It has been realized that organisations and governments bodies are carrying out unsolicited surveillance, further creating a fear of data breaches and leading to infringement of individual privacy.

The General Data Protection Regulation (GDPR), for example, aims to protect peoples' rights to privacy and regulate data handling procedures.

5. Digital Literacy and Education

Effective digital navigation skills are becoming more and more crucial. A vital skill, digital literacy now affects schooling, employment prospects, and social engagement.

In order to give students and adults the skills they need to succeed in the digital age, educational institutions and governments are putting a lot of effort into incorporating digital literacy into curricula.

6. Social Inequities and the Digital Divide

While digitalization has many advantages, it also draws attention to differences in access to technology and online services. The digital divide can be exacerbated by socioeconomic considerations, rural-urban inequalities, and infrastructure issues. These variables all contribute to existing social injustices.

Making sure that everyone has equal access to technology, internet connectivity, and digital education is necessary to close this gap.

For legislators, educators, corporations, and individuals alike, it is essential to comprehend the social effects of digitalization. It entails tackling both the advantages and disadvantages of the digital age, including cultivating digital literacy, promoting digital inclusion, and protecting privacy rights. To successfully and ethically navigate these societal shifts as digitization continues to shape our society, proactive steps are required.

Case Study

The Japanese Plantable Papers

The Mainichi Shimbusha daily's publisher in Japan has created a "green" newspaper campaign that allows readers to plant the paper wherever it ends up.

How Come It Was Created?

The Japanese Daily created The Green Newspaper as a method to clean up their cities and villages while also preserving the environment. It was produced on 100% biodegradable paper using plant-based inks.

Each of its pages contained seeds that, when planted, would develop into blooms to entice butterflies and other pollinators. Some of them could even cultivate edible herbs! The newspapers had instructions on them, telling whoever picked them up to cut up the used and discarded papers and put them in the ground. Considering that branding is 185% more effective in print advertising than it is online (Newswoks, print vs Digital Advertising, 2020), the addition of plantable pages to the mix only serves to increase the printed word's allure.

How had it been successful?

The Japanese Daily has engaged in environmental initiatives before, including the Green Newspaper. Their reputation has been established through prior marketing initiatives, such as a drive to donate water to areas experiencing drought and unclean drinking water.

Their green newspaper has achieved great success. It currently circulates more than four million copies every day throughout the nation, and its sales exceed eighty million yen, or more than £500,000.

In order to educate kids, increase their awareness of current environmental challenges, and instil in the future generation the value of recycling, the campaign has also incorporated schools.

Exactly how is seed paper made?

The concept of plantable paper is not new. It's a tendency that has been developing gradually for some time. It is a straightforward mixture of water, recycled paper, and tiny flower or herb seeds.

Challenges and Opportunities

As we move towards a paperless future, there are both challenges and opportunities that will affect different parts of our society, tech, economy, and the planet. Let's look at some of them in more detail.

CHALLENGES

1. **Digital divide**
   Not everyone has the same access to digital technology or the internet, which can make it harder for people and communities to take advantage of the paperless future. This is known as the digital divide.
2. **Cybersecurity Threats:**
   The use of digital platforms brings with it a host of concerns, from data breaches and cyber-attacks to identity theft and privacy violations. As the amount of data digitized increases, so does the need to protect sensitive information.

3. **Obsolescence of Technologies:**

Technology is advancing so quickly that outdated tech and platforms can quickly become outdated, making it hard for some people or companies to keep up.

4. **Electricity reliance**

In the paperless future, it's really important to have reliable electricity and a reliable power system. If there's a power outage or if there's not enough energy in certain areas, it could mean that you can't access important digital services.

5. **Data Recovery and Loss:**

Data can get lost in digital systems due to technical issues, viruses, or people accidentally deleting it. To protect yourself, make sure you have the right backup and recovery systems in place.

OPPORTUNITIES

1. **Environmental Sustainability**

Vital environmental challenges like deforestation , and waste disposal etc can be prevented only with smooth shift to paperless society.

2. **Cost savings and operational efficiency**

3. Digital procedures expedite operations, eliminate paperwork, and cut expenses connected with document production, storage, and dissemination.

4. **Remote cooperation and adaptability**

In a worldwide society, digital technologies offer effective remote cooperation, increasing flexibility and efficiency for individuals and companies.

5. **Integration and Innovation**

Digital platforms allow for ongoing creativity, AI and automation integration, and the development of new opportunities for improved services, products and user experiences.

6. **Global Communication & Connectivity**

A paperless world allows for worldwide communication and collaboration, breaking down geographical constraints.

Balancing Print and Digital

Print media is the oldest way to share information. It's a popular way to get your message out there. Print media can be anything from newspapers and magazines to books, flyers, and brochures. Print media can reach a lot of people. Print media disseminates information and news to individuals through printing technology. Digital media is any way of sharing information outside of print media, like radio, TV, and the web. It's a type of material that can be shared on your phone and broadcast to more people.

Today, consumers are exposed to digital media in the same amount of time as they are exposed to print media. The proliferation of smartphones and tablets, as well as the wireless networks connecting them, suggests that an ever-increasing number of consumers are consuming digital media. This also suggests that an increasingly large number of consumers are viewing ads on digital devices. There are a number of benefits to utilizing digital media in marketing and advertising, such as: Depending on the details of each individual campaign, digital media may be less costly than print media; digital campaigns may be created, initiated, and updated at a faster rate than print advertisements; and, in many cases, digital media can be interactive. Through social media promotion, marketers can interact directly with customers by sending messages, comments, tweets, and wall postings, among other means, to answer questions and offer rewards. Additionally, users can search a digital document.

The appeal of print media is undeniable, as it offers customers a more tangible, tangible medium. It also provides a more personal connection to customers, as well as an old-fashioned charm that digital media cannot replicate. Additionally, print advertisements have a more localized presence than digital media, as signs and banners can draw attention and help customers locate the business. Furthermore, posters, flyers, and other print media can be disseminated in the local area to raise awareness and draw customers to the business. Therefore, when asked whether print or digital media is superior, the answer is likely to be in the affirmative: both.

Statistics and reports

With the advancement, paper usage primarily for packaging and cardboard amounts to almost 400 million metric tons. Online shopping has further added to the usage with paper being used majorly for packaging.

Share of global paper and paperboard production 2021,

It is alarming that Asia contributed to major paper production, nearly 49.5 percent in the year 2021, followed by Europe being the second-largest paper-producing. In fact, the whole production jumped to 417 million metric tons the same year

How the paper industry has changed

A recent change in the consumer behaviour has shown advancement in the usage of digitalization. Newsprint has seen a drastic fall from 12 percent to almost 4 percent in the usage of paper thus leading to a decline in paper production. However, there has been a upward swing in the paper usage in packaging industry. Corrugated case material which is the primary component used in e-commerce has shown a sharp rise to 43 percent from 30 percent in almost a decade. It is projected that there will be sharp rise touching close to 221 million metric tons which is almost 30 percent higher than the 2020 levels.

Global market size of paper and pulp 2021-2029

This sector is worth 351.53 billion U.S. dollars in 2021 and is expected to roar. There is an estimated projection of compound annual growth rate of 0.72 percent from 2022 to 2029 to touch close to 373 billion U.S. dollars.

Growth in paper packaging demand

E-commerce and plastic packaging pollution are going to influence the paper packaging consumption in future. The most popular containerboard is projected to grow 27 percent from 2021 through 2032 to reach 226 million tons.

Pulp consumption for paper production

Year 2021 witnessed almost 203 million tons of recycled paper pulp consumption for paper production, out of which 171 million was taken from virgin wood species like eucalyptus trees. For this production, Bleached Chemical Pulp (BCP) contributed almost 40 percent.

Future Trends

The paper industry was in the midst of a number of new trends that had the potential to shape its future. With time, numerous changes occurred in the paper industry resulting into few following potential future trends:

1. Emerging Digital Technologies
   Digitalization is on the rise, and there are some exciting new technologies like AR, VR, blockchain, and IoT that could revolutionize the way we consume digital content. AR and VR apps could give us an immersive reading experience that could challenge the traditional printed book.
2. Sustainable Paper Alternatives
   As the paper industry seeks to lessen its environmental imprint, environmentally friendly paper production is becoming increasingly crucial. This involves using recycled paper more frequently, discovering new, tree-free paper sources (such as bamboo and agricultural leftovers), and implementing more environmentally friendly pulp and paper manufacturing procedures. Consumers and companies are increasingly seeking for environmentally friendly alternatives to traditional paper goods, and this trend is expected to continue as environmental awareness and regulatory demands rise.
3. Evolving Consumer Preferences

   Understanding evolving consumer preferences is key to predicting future paper consumption trends. Younger generations, often more digitally oriented, may continue to drive the shift toward digital content consumption.

However, there remains a demand for printed materials, particularly in areas like fine art, book collecting, and certain academic contexts. Understanding and catering to these niche markets will be crucial for print industry survival.

4. Digital Preservation and Archives

   As digital content proliferates, ensuring the preservation and accessibility of digital records, documents, and cultural heritage become paramount. Long-term digital preservation strategies, including digital archives and digital heritage initiatives, will continue to develop. Preservation technologies such as block chain and advanced digital storage solutions are expected to play a significant role in safeguarding digital content for future generations.

5. . Digital Literacy and Cybersecurity

   Future trends will include an increased emphasis on digital literacy and cybersecurity education. With a growing reliance on digital technologies, individuals and organizations will need to navigate a complex digital landscape safely and effectively.

   Addressing digital threats, such as cyberattacks and data breaches, will require ongoing efforts to bolster cybersecurity measures and protect sensitive information.

The digitalization and paper trends of the future are interlinked, reflecting the ever-changing nature of our technological environment. To successfully navigate this landscape, it will be necessary to combine digital innovation, sustainable practices, and the preservation of paper's value in various areas of our lives.

Conclusion

The impact of digitalization on paper consumption is a complex and multifaceted phenomenon with far-reaching implications. While the shift towards digital technologies has reduced paper consumption in many contexts, it has also created environmental and societal challenges, along with economic opportunities. As digitalization continues to evolve, it is essential to strike a balance between the benefits of reduced paper consumption and the need for sustainable practices, inclusivity, and responsible information management.

The research highlights that paper's endurance in the digital era is not merely a testament to its adaptability but also to its irreplaceable role in packaging and certain niche applications. The future is poised to witness a continued expansion in paper packaging driven by e-commerce and an elevated focus on sustainability.

This research paper serves as a comprehensive examination of the interplay between digitalization and paper consumption, providing insights for policymakers, businesses, and individuals to make informed decisions in an increasingly digital world. By addressing the environmental, economic, and societal dimensions of this transformation, we can navigate the transition towards a more sustainable and digitally inclusive future.

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