



## **The Relationship between Fast Fashion Growth and Environmental Degradation: The Role of Sustainability Using ARDL Model An Empirical Study of China's Apparel Sector (1990-2022)**

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Received: 22.08.2025 Accepted: 16.12.2025 Published: 25.02.2026

### **Abstract:**

This study aims to analyze the dynamic relationship between the growth of the fast fashion economy in the apparel sector and the deterioration of environmental quality in China over the period 1990–2023, highlighting the importance of environmental sustainability within this vital industry. The research employs the Autoregressive Distributed Lag (ARDL) model to examine both the short- and long-run relationships between economic growth variables—such as the scale of fast fashion production—and environmental degradation indicators, including carbon dioxide emissions, water pollution, and natural resource consumption.

The results reveal a strong and statistically significant positive correlation between the increase in fast fashion production and the deterioration of environmental indicators, confirming that the rapid industrial expansion of this sector has exacerbated pollution and resource depletion problems in China. According to 2025 statistics, China accounts for approximately 60% of global fast fashion production, generating revenues exceeding USD 86 billion in 2022 and producing around 22 million tons of textile waste annually, with a recycling rate of about 25%, reflecting growing efforts to foster a circular economy.

The study underscores the importance of integrating environmental sustainability practices by improving resource-use efficiency, promoting the circular economy, enforcing stricter environmental policies, and increasing sustainable consumer awareness to reduce the environmental footprint of the fast fashion industry. Furthermore, it demonstrates that implementing sustainability strategies and clean technologies within China's five-year



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memory and reduce overall cognitive efficiency. Digital technology also plays a powerful role in shaping emotional experiences. Social media platforms, in particular, influence emotions through social comparison, feedback, and exposure to curated content. Positive interactions can enhance feelings of connection and belonging, while negative experiences such as online criticism, exclusion, or cyberbullying may contribute to stress, anxiety, and emotional distress. The frequent comparison with idealized representations of others' lives can further intensify feelings of inadequacy and dissatisfaction. From a human science perspective, the emotional and attentional effects of digital technology must be understood within broader social and cultural contexts. Individual vulnerability, social support systems, and patterns of technology use all mediate psychological outcomes. Digital tools themselves are not inherently harmful or beneficial; their impact depends on how they are designed and used. A human-centered approach emphasizes the need for mindful technology use, digital literacy, and supportive environments that promote emotional well-being and healthy attention in an increasingly digital world.

### **Conclusion**

The digital age has fundamentally transformed human behavior, social interaction, and psychological processes, making it an essential area of inquiry within the human sciences. As this study has shown, digital technologies influence how individuals communicate, construct identities, manage attention, and experience emotions. These changes extend beyond individual behavior to reshape social relationships, cultural norms, and power structures within society. From a human science perspective, understanding digital-age behavior requires an interdisciplinary approach that recognizes the interaction between human agency and technological systems. While digital platforms offer opportunities for connection, self-expression, and access to information, they also present challenges such as attention fragmentation, emotional strain, social comparison, and ethical concerns related to privacy and control. The effects of digital technology are not uniform; they vary according to social context, cultural background, and patterns of use. The findings emphasize that technology should not be viewed as an autonomous force shaping human life, but as a social construct embedded within human values and institutions. Responsible design, informed policy, and digital literacy are crucial for ensuring that technological development supports human well-being rather than undermines it. By placing human experience at the center of analysis, the human sciences can contribute meaningfully to debates on the future of digital society. A human-centered understanding of digital behavior is vital for navigating the complexities of contemporary life. As digital technologies continue to evolve, ongoing research grounded in human science perspectives will be essential to promote ethical, inclusive, and psychologically healthy digital environments that align with fundamental human needs and social values.

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centered approach to studying online interaction emphasizes the need to balance technological innovation with social responsibility, ethical awareness, and respect for meaningful human relationships.

### **Identity Formation and Self-Presentation in the Digital Age**

The digital age has introduced new ways in which individuals construct, express, and negotiate their identities. Online platforms provide spaces where people can present selected aspects of themselves through profiles, images, language, and interactions. Unlike offline identity, which is shaped largely through face-to-face relationships and social roles, digital identity is often more flexible, fragmented, and continuously editable. This allows individuals to experiment with different identities, but it also raises questions about authenticity and self-consistency. Self-presentation in digital environments is highly influenced by platform design and social feedback mechanisms. Features such as likes, comments, followers, and shares act as forms of social validation, shaping how individuals choose to represent themselves. Many users engage in strategic self-presentation, highlighting socially valued traits while minimizing aspects that may attract negative attention. While this can enhance confidence and social recognition, it may also create pressure to maintain idealized online personas, leading to anxiety, comparison, and reduced self-esteem. Digital spaces also enable the coexistence of multiple identities. Individuals may present different versions of themselves across professional networks, social media platforms, and anonymous forums. This multiplicity can empower users by allowing greater control over self-expression, especially for marginalized groups who may find supportive communities online. At the same time, managing multiple digital identities can be psychologically demanding and may blur boundaries between personal, social, and professional life. From a human science perspective, identity formation in the digital age reflects the interaction between individual agency, social expectations, and technological structures. Cultural norms, peer influence, and algorithmic visibility all shape how identities are constructed and perceived. Understanding digital identity therefore requires attention to psychological processes, social contexts, and ethical concerns related to privacy, surveillance, and data ownership. A human-centered approach emphasizes the importance of supporting authentic self-expression while safeguarding individual well-being in increasingly mediated social environments.

### **Psychological Impacts of Digital Technology on Attention and Emotion**

Digital technology has significantly influenced cognitive and emotional processes, particularly attention and emotional regulation. The constant presence of smartphones, notifications, and digital media has created environments characterized by continuous stimulation and rapid information flow. As a result, individuals are frequently required to divide their attention across multiple tasks and platforms, which can reduce sustained attention and increase mental fatigue. One major psychological impact of digital technology is the fragmentation of attention. Continuous exposure to short-form content, instant messages, and alerts encourages rapid shifts in focus rather than deep concentration. Over time, this pattern may affect the ability to engage in reflective thinking, long-term learning, and meaningful engagement with tasks. Research in psychology suggests that excessive multitasking in digital environments can impair working



and related disciplines, offer valuable tools for examining how digital environments interact with human cognition, emotions, and social structures. Sociology helps explain changes in social relationships, power dynamics, and institutions in the digital era. Psychology contributes insights into attention, motivation, mental health, and behavioral change influenced by digital media. Anthropology provides a cultural lens to understand how different societies adopt, adapt, or resist digital technologies based on values and traditions. Together, these disciplines enable a holistic understanding of digital-age behavior. This paper adopts a human science perspective to analyze the complex relationship between digital technologies and human behavior. It focuses on key areas such as identity formation, social interaction, emotional expression, ethical concerns, and human agency in digital contexts. By emphasizing the interplay between technology and human experience, the study seeks to highlight the importance of developing digital systems that respect human dignity, promote well-being, and support meaningful social life. In doing so, the paper contributes to ongoing discussions on how societies can navigate technological change while remaining grounded in human values.

### **Human Behavior and Social Interaction in Online Environments**

Online environments have become central spaces for human interaction, reshaping how individuals communicate, form relationships, and participate in social life. Social media platforms, messaging applications, online forums, and virtual communities allow people to interact beyond geographical and temporal boundaries. These digital spaces facilitate rapid communication and broaden social networks, but they also transform the nature of interaction by reducing face-to-face cues such as body language, tone, and physical presence. One significant change in online interaction is the shift toward mediated communication. Interactions are often text-based, image-driven, or algorithmically filtered, which influences how emotions, intentions, and identities are expressed and interpreted. Individuals carefully curate their online presence through profiles, posts, and reactions, leading to selective self-presentation. This can enhance social connection and self-expression, but it may also create pressures to conform to idealized images, affecting authenticity and self-esteem. Online environments also alter social relationships and group dynamics. Digital platforms enable the formation of virtual communities based on shared interests, beliefs, or identities, often transcending traditional social boundaries. At the same time, they can intensify social comparison, echo chambers, and polarization, as users are frequently exposed to like-minded opinions through algorithmic recommendations. These patterns influence attitudes, beliefs, and collective behavior, shaping public discourse and social norms. From a human science perspective, online social interaction reflects the ongoing interaction between human agency and technological structures. While individuals actively choose how to engage, digital platforms shape behavior through design features such as likes, shares, notifications, and visibility metrics. These features influence attention, validation-seeking behavior, and patterns of participation. Understanding online interaction therefore requires attention to both human intentions and the social and technological contexts in which behavior occurs. Online environments represent neither purely positive nor purely negative spaces for social interaction. They offer opportunities for connection, support, and collective action, while also presenting challenges related to miscommunication, exclusion, and psychological strain. A human-



## **Understanding Human Behavior in the Digital Age : A Human Science Perspective**

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Received: 20.08.2025 Accepted: 12.12.2025 Published: 25.02.2026

### **Abstract**

The rapid expansion of digital technologies has significantly reshaped human behavior, social interaction, and cognitive processes. From social media and digital communication to algorithm-driven decision-making, the digital age has altered how individuals perceive themselves, relate to others, and engage with society. human behavior in the digital age from a human science perspective, integrating insights from sociology, psychology, anthropology, and related disciplines. digital environments influence identity formation, social relationships, attention, emotional expression, and patterns of participation in public and private life. The study also addresses ethical concerns such as privacy, surveillance, digital inequality, and the impact of technology on autonomy and well-being. By adopting an interdisciplinary human science approach, the complex interaction between technological structures and human agency. It argues that understanding digital-age behavior requires moving beyond purely technical explanations to consider cultural contexts, social norms, and psychological dynamics. The need for human-centered digital frameworks that promote responsible technology use, social inclusion, and holistic human development in an increasingly connected world.

**Keywords** Human behavior, Digital age, Human sciences, Technology and society, Social interaction

### **Introduction**

The digital age has brought profound transformations in the way human beings think, communicate, and organize social life. The widespread use of the internet, smartphones, social media platforms, and artificial intelligence has restructured everyday experiences, influencing personal relationships, work patterns, learning processes, and cultural practices. These changes are not merely technological in nature. They deeply affect human behavior, values, emotions, and social interactions, making the study of digital life a central concern for the human sciences. Human behavior has always been shaped by social, cultural, and historical contexts. In the contemporary era, digital technologies have become a powerful context within which human actions are formed and expressed. Online communication alters traditional forms of interaction, blurring boundaries between public and private spaces. Digital platforms enable new forms of identity construction, self-presentation, and community formation, while also introducing challenges such as social isolation, information overload, and dependence on technology. Understanding these patterns requires more than technical or economic explanations; it calls for a human science perspective that places individuals and societies at the center of analysis. The human sciences, including sociology, psychology, anthropology,



current information revolution, particularly in social sciences. AI plays a crucial role in analyzing relationships between studied variables, providing statistics on topics, and making predictions to understand human behavior and societal dynamics.

From this research paper, we conclude the following:

- AI contributes to the analysis of large-scale social data.
- AI helps in understanding patterns and trends in human societies.
- AI improves the quality of research in social sciences.
- AI reduces the time and effort for social researchers.
- AI aids in predicting future social life based on the analysis of current social studies.

### **Recommendations:**

- It is essential to enhance collaboration between AI experts, sociologists, and researchers to optimize the use of AI in social sciences.
- The development of analytical tools in AI should be tailored to the needs of research in social sciences.
- Training courses should be offered to improve the capacity to effectively use AI applications.
- Efforts should be made to encourage research and scientific events focused on artificial intelligence.

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explore relationship structures that display cooperative actions in the field of multi-agent systems, showing such practices between individual artificial intelligences. At its core, social interaction and relationship between intelligent agents (or more) can be framed within larger structures where similar factors emerge." (Hasib, 2021, p. 335)

Thus, we summarize the overlap and relationship between artificial intelligence and scientific research in sociology in the following points:

- Social research helps in formulating guidelines for the development of artificial intelligence to ensure a safe social environment.
- "Artificial intelligence research has utilized some social theories to interpret research issues, while sociology has not yet incorporated AI into its methodological tools or the development of its theories."
- Sociology must develop its concepts, tools, and theories to align with the Fourth Industrial Revolution and artificial intelligence technologies, rather than remaining confined to its traditional domain.
- Sociology research has focused on local issues, neglecting global research issues that also have local implications and reflections.
- Sociology must break free from its traditional research bias that has persisted for decades and renew its research projects to align with the global situation and the developmental trends of the country.
- Furthermore, in what is called the coexistence between the two disciplines in this paper, it is essential to understand that this is not a one-way street. AI research can benefit equally from social inputs, and vice versa. With more cooperation, studies, and interdisciplinary approaches, theories can not only be redefined but also expanded through new theories and complementary knowledge, which will benefit the entire research community.
- Innovation in academic content, from the undergraduate stage to the curriculum offered at the preparatory stage for master's students, should align with Egypt's 2030 development agenda." (Hasib, 2021, p. 367)

Social research contributes to the development of artificial intelligence guidelines to ensure a safe social environment, where AI can benefit from social theories to understand research issues. Meanwhile, sociology needs to integrate AI techniques into its tools and methodologies to keep pace with the Fourth Industrial Revolution. Sociology should also expand its research areas to include global issues with local impacts, updating its methods and approaches in line with developmental trends. The collaboration between sociology and AI is a two-way street, where each can enrich the other through interdisciplinary studies, leading to the development of new theories and integrative knowledge that benefits both scientific research and society. Furthermore, continuous development requires updating academic content from the undergraduate stage to graduate-level curricula, in alignment with Egypt's 2030 sustainable development agenda.

### **Conclusion:**

Artificial intelligence (AI) is one of the branches of computer science that provides accurate information in various fields. The use of AI in scientific research is one of the hallmarks of the



- Educational systems that contain artificial intelligence elements, with the task of tracking and monitoring student work, providing guidance, and gathering information about the performance of each student individually.
- Computer-based educational systems with independent databases, which include knowledge bases for educational content and teaching strategies.
- Intelligent learning systems serve as a link between the behavioral style of computer-based learning and the cognitive pattern. These systems are the result of research in the field of artificial intelligence, as they include models for the area to be learned by the expert in that field. Education professionals believe that the system's efficiency, as well as components for students and teachers, should be based on the knowledge acquired rather than what was taught." (Baden, 2021, p. 160/159)

Thus, AI applications in higher education include educational systems and programs, as well as computer-based systems.

### **5\_ Applications of Artificial Intelligence in Scientific Research in Social Sciences:**

"In order to approach artificial intelligence from this perspective, we first need to understand what the fundamental basics of social society are. Defining this social model represents a challenge, given the flexibility of the term in the contemporary world. Depending on where it is used, it can represent a variety of meanings. Levinson highlighted how the social ontology has not yet integrated the works of fields such as anthropology, linguistics, psychology, and cognitive science to formulate a comprehensive definition of human society. Therefore, we will begin from the structural perspective of society and take two major sociologists and their views on the 'social.'

Karl Marx's idea of the social was closely linked to a critical social approach, where society, by nature, was tied to cooperation and connection between humans, but it was also fundamentally linked to the material domain, especially the economic domain. Society is seen as something inherent in humans, something reinforced through the process of socialization and their social reality. Thus, 'sociality' is an essential feature of human life, given to them at birth and developed throughout their lives. On the other hand, Max Weber defined 'sociality' as being linked to 'the structure of social fields existing outside individuals.' He expanded on Marx's previous deterministic economic model and introduced a structure where a wide range of social fields influences an individual's social life. In this sense, 'sociality' is created from inherent connection, cooperation, and the influence of humans on each other. It is shaped by the structures around them.

Although this definitional task of society within sociology could be greatly expanded with more influential thinkers, it highlights a crucial point. Integrating such theories into defining what it means to be social, especially in the case of artificial intelligence, is extremely difficult. Its inherent focus on structural elements limits its ability to be applied in contemporary frameworks for a more individual-centered AI approach. However, it can help us understand hybrid social structures once artificial intelligence is increasingly integrated into human society." (Hasib, 2021, p. 334/335)

For artificial intelligence to succeed in its tasks, it must operate within social environments and entities, as they are designed for human "social" purposes by nature. Other examples will



Computer applications in medical diagnosis in clinics and hospitals, as well as performing surgical operations. Artificial intelligence programs in analyzing economic data such as the stock market and developing stock trading systems. Gaming programs such as chess and video games. Google's research clusters on the computer via the internet.

Applications for learning various natural languages and understanding the rules for written and spoken language processing, automatically responding to questions with pre-programmed answers, and real-time machine translation systems for languages.

Expert systems that can perform tasks in a way similar to experts and assist them in making decisions accurately, based on a series of logical operations to reach the correct decision or a set of logical options. This is one of the most important and significant concerns of artificial intelligence today and in the future.

Smart home services, self-operating weapons, phones, televisions, and hundreds of other applications.

Artificial intelligence plays an important role in improving and facilitating scientific research through a range of uses. Here are some ways artificial intelligence is used in scientific research:

1. **Big Data Analysis:** AI can analyze massive amounts of data quickly and efficiently, contributing to the discovery of patterns and trends that may not be visible through traditional methods.
2. **Improving Experimental Processes:** AI can be used to enhance the design of scientific experiments and analyze results more accurately, guiding research toward more beneficial directions.
3. **Research Guidance:** AI can analyze previous literature and research to identify future research trends and suggest new topics that respond to current needs.
4. **Assisting in Experiment Design:** AI can help researchers design their scientific experiments by guiding them toward the best methods and significant variables.
5. **Automated Research:** AI can generate hypotheses and research suggestions automatically based on data analysis and previous literature.
6. **Improving Classification and Filtering Processes:** AI techniques can be used to filter and classify information according to specific criteria, contributing to the effective presentation of relevant results.
7. **Machine Learning for Research Guidance:** Machine learning techniques can be applied to identify future research directions based on historical trends and models derived from data.

In summary, artificial intelligence enhances scientific research by accelerating analytical processes, improving accuracy and efficiency, and guiding research toward the most productive paths.

#### **4-Applications of Artificial Intelligence in Higher Education:**

"The diagnosis of education in developing countries, with Algeria being one of them, shows that their education systems mainly focus on issuing certificates to graduates without paying attention to the quality of knowledge and skills. Even if they try, the examination systems are designed to ensure that the curriculum aligns with the qualifications. The AI applications implemented to develop the educational process include the following:



Artificial intelligence is used in many fields such as military, industrial, economic, technological, medical, educational, and other service sectors. Some of its most important applications include the following: (Information, 2021, p. 05)

- Self-driving cars and drones,
- Robots, which are mechanical devices programmed to work independently of human control and designed to perform tasks and achieve the motor and verbal skills that humans carry out, as well as other applications in nuclear reactors, wire installation and repair of underground wiring, mine detection, car manufacturing, and other specialized fields.
- Nonlinear control, such as railway control,
- Smart devices capable of performing mental operations, such as inspecting industrial designs, monitoring processes, and decision-making,
- Cognitive simulation using computers to test theories about how the human mind works And the functions it performs, such as recognizing familiar faces and voices, handwriting recognition, image processing, extracting useful data and information from them, and activating memory.
- Computer applications in medical diagnosis in clinics and hospitals, as well as performing surgical operations. Artificial intelligence programs in analyzing economic data such as the stock market and developing stock trading systems. Gaming programs such as chess and video games. Google's research clusters on the computer via the internet.
- Applications for learning various natural languages and understanding the rules for written and spoken language processing and automatically responding to questions with pre-programmed answers, as well as machine translation systems for languages in real-time.
- Expert systems that can perform tasks in a manner similar to human experts and help them make precise decisions based on a series of logical operations to arrive at the correct decision or a set of logical options. This is one of the most significant areas of artificial intelligence in both the present and future.
- Smart home services, self-operating weapons, phones, televisions, and hundreds of other applications. Artificial intelligence is used in many fields such as military, industrial, economic, technological, medical, educational, and other service sectors. Some of its most important applications include the following: self-driving cars and drones, robots, which are mechanical devices programmed to work independently of human control and are designed to perform tasks and achieve the motor and verbal skills that humans carry out, as well as other applications in nuclear reactors, wire installation and repair of underground wiring, mine detection, car manufacturing, and other specialized fields. Nonlinear control, such as railway control, smart devices capable of performing mental operations like inspecting industrial designs, monitoring processes, and decision-making, cognitive simulation using computers to test theories about how the human mind works, and the functions it performs, such as recognizing familiar faces and voices, handwriting recognition, image processing, extracting useful data and information from them, and activating memory.



and implementation processes to achieve the desired results. This behavioral system consists of a set of interacting elements.

### **1.3. Social Sciences:**

Social sciences constitute a comprehensive field for studying social interactions, organizational structures, and dynamics occurring within human societies. This field aims to understand how social and cultural factors influence individual and collective behavior, and how identities and communities are shaped. It relies on various methodologies to study societal changes and transformations, seeking to uncover the interactions between individuals and the social environment to which they belong. This contributes to enhancing our understanding of complex social phenomena and their impact on human life.

### **2. Scientific Research in Social Sciences:**

Social sciences play a vital role in understanding social interactions and building comprehensive insights into the dynamics of society. Scientific research in this field serves as a window into the complex world of human interactions, effectively contributing to the interpretation and analysis of social transformations and understanding the issues that affect the lives of individuals and communities.

The concept of scientific research in social sciences goes beyond merely collecting data and statistics; it encompasses a deep understanding of social phenomena and their interactions. The goal of scientific research in this field is to highlight social challenges, analyze structural changes in society, and examine the interactions between individuals and the social environment they deal with daily.

Social sciences encompass a wide range of disciplines, including sociology, anthropology, political science, psychology, and social economics. Researchers in these fields examine cultural, economic, and political transformations and how they affect interactions between individuals and groups.

The challenges of the modern era require deep thinking on issues such as cultural diversity, identity, social justice, and technology. Researchers in the social sciences analyze these challenges and understand their impact on society, contributing to the formulation of public policies and effective solutions for emerging societal issues.

In turn, research techniques in the social sciences provide powerful tools for data collection and analysis, whether through field studies, surveys, or statistical analysis. This methodological diversity broadens the scope of research and enhances the quality of understanding.

In conclusion, scientific research in the field of social sciences plays a crucial role in developing societies and deepening the understanding of social phenomena. The advancement of research paves the way for improving social life and achieving sustainable progress in various fields.

### **3. Fields of Artificial Intelligence:**



predict election outcomes, evaluate the psychological impact of media, and even offer solutions to reduce social and economic disparities.

However, integrating AI into scientific research is not without its challenges and ethical dilemmas. There are concerns about algorithmic bias, as AI models may inherit and reinforce existing social inequalities present in the training data. Privacy is another pressing issue, given that AI often relies on analyzing personal data, which may be sensitive. Additionally, researchers face difficulties in interpreting the decisions made by AI systems, raising questions about their reliability and transparency—issues that lie at the heart of this discussion.

## **1. Study Concepts: Artificial Intelligence, Scientific Research, Social Sciences**

**1.1. Artificial Intelligence:** Artificial intelligence (AI) is a branch of computer science aimed at creating systems capable of performing tasks that typically require human intelligence, such as perception, reasoning, learning, and decision-making. AI encompasses areas such as developing algorithms and software programs that can analyze data, learn from it, and make predictions or decisions based on that analysis. AI can be classified into various subfields like machine learning, natural language processing, robotics, and computing. Consequently, the significance of AI will be evident in the near future. It can also be said that AI is the simulation of human intelligence processes by systems resembling computer systems. AI is characterized by the ability to "think" and "learn" through analyzing large amounts of data. AI can be used to automate tasks, make predictions, or identify patterns that humans may not be able to detect. AI is applied in a wide range of applications, from virtual personal assistants and chatbots to self-driving cars and medical diagnostic systems. Therefore, the future of AI is promising and holds new horizons. This article will present a study on artificial intelligence. (Artificial Intelligence, 28/11/2023)

From this definition, we understand that artificial intelligence is a set of technologies and systems aimed at giving machines the ability to perform tasks that typically require human intelligence. The primary goal of AI is to create technological systems capable of analyzing data, making decisions, and performing tasks independently.

## **1.2. Scientific Research:**

Scientific research is a systematic approach to human behavior aimed at investigating the validity of a particular piece of information, testing a hypothesis, or clarifying a specific situation or phenomenon, with a focus on understanding its causes and the mechanisms for addressing it. Scientific research also aims to find successful solutions to a specific problem or to social behaviors that impact individuals and society.

For example, scientific research in the field of production development might involve testing the effectiveness of new techniques, such as using soil-free agriculture as a new system for vegetable production. The research may also include testing the success of specific varieties or types intended for this kind of agriculture.

Thus, scientific research can be defined as a behavioral system aimed at expanding human perception and enhancing the ability to benefit from available knowledge above and below the surface, with the goal of achieving sustainable civilized living for both individuals and society. Scientific research is considered a conscious procedural behavior involving diverse planning



## **The involvement of artificial intelligence in scientific research in the field of social sciences**

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Received: 16.08.2025 Accepted: 08.12.2025 Published: 24.02.2026

### **Abstract:**

Scientific research is considered an educational and research process that aims to understand facts and build scientific knowledge in various fields. Scientific research depends on organizing facts in an accurate and acceptable method and in accordance with generally accepted scientific conditions. There is a modern intellectual revolution called artificial intelligence that invests in many fields, including the field of scientific research. Artificial intelligence is a branch of computer science that relies on the use of computers and programming while simulating human capabilities.

From this standpoint, the importance of this study, which centers on artificial intelligence and its investments in the field of scientific research in the social sciences, is highlighted. Through this study, we aim to clarify the aspects of the relationship between them and demonstrate the extent of the use of artificial intelligence in the field of scientific research in the social sciences.

**Keywords:** intelligence , artificial intelligence, research ; scientific research, social sciences

### **Introduction**

In the digital age, artificial intelligence (AI) is no longer just a technical tool; it has become a revolutionary force that is transforming various fields, including social sciences. With the massive growth of digital data, it has become increasingly difficult for researchers to analyze information using traditional methods. This is where AI plays a crucial role, offering a paradigm shift in how data is collected, analyzed, and how hidden social patterns—often impossible to detect through conventional means—are uncovered.

Scientific research in social sciences is no longer solely reliant on classical methodologies such as surveys, interviews, and document analysis. Instead, it now incorporates advanced techniques such as machine learning, natural language processing, and big data analytics. These intelligent tools enable researchers to understand societies and human behaviors with greater accuracy by analyzing billions of words from social media platforms, studying user interactions with digital content, and even predicting social and economic changes in real-time based on massive data streams.

AI technologies facilitate sentiment analysis and the assessment of public opinion trends, providing deep insights into social, political, and cultural issues. Moreover, deep learning algorithms help in analyzing collective behavioral patterns, enabling governments and organizations to make well-informed decisions based on precise data. For instance, AI can



energy-efficient construction standards. Other cities can learn a lot from these that are trying to achieve carbon neutrality and sustainable growth.

## **Conclusion**

To combat the climate catastrophe and secure the cities' long-term viability, decarbonizing urban landscapes is essential. Their impact on both the acceleration and slowing of climate change is becoming more crucial as cities keep expanding and using more and more energy. By using sustainable city planning practices, communities can lessen their impact on the environment, strengthen their economy, make the public healthier, and raise residents' standard of living. showcase the multi-pronged strategy needed to decarbonize cities—from integrating renewable energy sources and developing green infrastructure to constructing energy-efficient buildings and implementing sustainable transportation systems. Although decarbonization is not without its difficulties, it is possible with the help of innovation, government backing, and community involvement, as shown in the case studies of Copenhagen, Freiburg, Singapore, Stockholm, and San Francisco. But governments, businesses, and citizens must work together to overcome obstacles including technical restrictions, fiscal restraints, and regulatory gaps. Cities may take the lead in achieving a low-carbon future by investing in sustainable technology, developing policies that support these technologies, and encouraging a sustainability culture. Cities may become more fair, resilient, and livable as we move towards decarbonization, which also tackles the urgent problem of climate change. A sustainable and carbon-neutral future for urban landscapes globally will be shaped by the lessons learned and best practices shared as cities throughout the world continue to investigate and implement measures for decarbonization.

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- **Sustainable Urban Mobility:** Numerous bus and metro lines make up Singapore's vast network of public transit alternatives. In addition, the government has implemented measures to discourage the use of private automobiles, such as congestion charging and car-sharing programs.
- **Smart Grids and Energy Efficiency:** Smart grid technology, which Singapore has invested in, optimizes energy use and lowers wastage. Solar power is one of the renewable energy sources that the city is aiming to include into its electrical infrastructure.

#### ***4. Stockholm, Sweden: The Eco-District Model***

The Hammarby Sjöstad project is one example of Stockholm's eco-district efforts that demonstrates how sustainable practices may be integrated into urban development.

- **Eco-Districts:** The environmental effect relative to a typical district was aimed at halving during the development of Hammarby Sjöstad. Renewable energy sources, water-saving technology, and energy-efficient structures are all part of the district's design.
- **Waste-to-Energy Systems:** An sophisticated waste management system that converts garbage into electricity is in place in Stockholm. As part of Stockholm's larger decarbonization initiatives, this system generates power and heats the city.
- **Sustainable Mobility:** Stockholm encourages its residents to take public transportation, ride bikes, and own electric vehicles. The city has put a lot of money into building a system of bike-sharing and electric buses so people don't have to drive as much.

#### ***5. San Francisco, USA: Decarbonizing Through Zero Waste and Renewable Energy***

With the lofty targets of reaching zero waste by 2020 and carbon neutrality by 2050, San Francisco has earned a reputation as one of the most environmentally conscious American cities.

- **Zero Waste Initiative:** The city of San Francisco has launched a garbage management program that rivals the best in the world. The city has significantly cut down on landfill waste and emissions by using waste diversion initiatives, recycling programs, and composting.
- **Renewable Energy Programs:** The city's shift to renewable energy sources, particularly solar electricity, has been quite successful. San Franciscans have access to renewable energy sources through the city's public utility company, which helps lessen the city's need on fossil fuels.

**Green Building Policies:** All new structures in San Francisco must fulfill high levels of sustainability and energy efficiency, as mandated by the city's stringent green building laws. These examples show that decarbonization in urban areas is not only doable, but also within reach, thanks to a variety of approaches adapted to different city types. Carbon emissions can be drastically cut, economic growth can be fostered, and quality of life can be enhanced, if communities invest in renewable energy, sustainable transportation, green infrastructure, and



### ***1. Copenhagen, Denmark: Leading the Charge Towards Carbon Neutrality***

Aiming to become the world's first carbon-neutral capital by 2025, Copenhagen is renowned as a global leader in urban sustainability. The city has taken a holistic approach to decarbonization by incorporating green building efforts, sustainable transportation options, and renewable energy sources. Important approaches consist of:

- **Renewable Energy:** Now that wind and solar power have made the switch, more than half of Copenhagen's electricity comes from green sources. An important part of this endeavor is the city's well-known offshore wind farms.
- **Sustainable Transportation:** With over half of the population making their way to work by bike, Copenhagen has earned a reputation as a cycling mecca. The city has made significant investments in bike lanes and streets that are friendly to pedestrians in order to decrease reliance on cars.
- **District Heating System:** Using renewable energy sources and excess heat from waste incineration, Copenhagen's revolutionary district heating system reduces carbon emissions and eliminates the need for individual heating systems in more than 98% of the city's buildings.

### ***2. Freiburg, Germany: A Green Energy Pioneer***

The city of Freiburg in Germany has gained renown as an example of environmentally responsible urban planning and development. Renewable energy, sustainable transportation, and community-driven environmental regulations are the key to the city's prosperity.

- **Solar Energy:** Freiburg is one of the most prominent solar cities in Europe, thanks to its innovative use of solar energy and the abundance of solar panels installed on city buildings. Thanks to its dedication to renewable energy, the city is now using less fossil fuels.
- **Public Transportation:** Reducing reliance on cars is one goal of Freiburg's public transportation system, which incorporates trams, buses, and pedestrian zones. Additional choices for low-carbon commuting are made available through a robust bike-sharing scheme.
- **Green Building Standards:** Energy efficiency and the utilization of sustainable materials are heavily emphasized in the city's rigorous construction regulations, which are especially applied to new construction. As a result of these initiatives, emissions from the construction industry have dropped dramatically.

### ***3. Singapore: A Smart City Approach to Urban Decarbonization***

In order to maximize resource usage, reduce emissions, and promote sustainability, Singapore has chosen a "smart city" strategy to urban decarbonization. This method integrates cutting-edge technology and data analytics.

- **Green Buildings:** Aiming to green 80% of its building portfolio by 2030, Singapore has set high ambitions for green construction. The city-state has implemented new construction regulations that prioritize green building practices, such as reducing water use, saving energy, and using sustainable materials.



corporations, and governments must all work together to decarbonize urban environments, which is a complex and multi-faceted process. In addition, there are a lot of obstacles that must be overcome, such as a lack of funding, outdated policies, and limited technology. The primary methods for reducing carbon emissions from cityscapes by using sustainable urban design. Success stories from cities all across the world, the new methods that are being used to lessen pollution and strengthen environmental resistance. The plans for policies and partnerships that will be required to assist in the shift to cities that produce no net carbon emissions. The purpose of this paper is to analyze the topic thoroughly in order to shed light on the key role that cities may play in addressing climate change and fostering sustainability in the long run.

#### The Role of Cities in Global Carbon Emissions

While cities play a pivotal role in the world's economy, new technologies, and population expansion, they are also the epicenter of the climate catastrophe. More than half of the world's population lives in urban areas, and these places are also a major source of carbon dioxide (CO<sub>2</sub>) emissions, accounting for almost 70% of the world's total. Modern urban living, with its high energy consumption levels, is largely responsible for this disproportionate contribution to global emissions. This includes transportation, industrial operations, heating, cooling, and power use. Although urbanization presents chances for economic growth and development, it also worsens environmental problems. The burning of fossil fuels is a common means by which the growing demand for energy in cities is fulfilled. There are a lot of greenhouse gas emissions because we utilize so many fossil fuels to power our energy needs. Cities also have a larger carbon footprint because of the high concentration of buildings, transportation systems, and industries there. The transportation sector is a major polluter in urban areas, releasing greenhouse gases and air pollutants in the form of emissions from cars, buses, and freight trucks. Inefficient and carbon-intensive transportation systems are encouraged by city designs that revolve around cars, which makes the problem worse. In addition, a large portion of the energy that is used for heating, cooling, and lighting comes from structures in cities. Carbon emissions are higher since many older buildings are not energy efficient. Cities frequently fail to adequately decrease their carbon emissions due to a lack of appropriate green infrastructure and urban design. These problems are getting worse at a faster rate in developing nations because of rapid urbanization, which is driving up the demand for energy, housing, and infrastructure. Because of this, regulations and plans for sustainable urban development that cut emissions, increase energy efficiency, and promote the use of renewable energy sources are urgently needed. Cities, being the center of people and commerce on a global scale, should take the lead in the fight against climate change by reducing carbon emissions and paving the way for a more sustainable future.

#### Case Studies of Successful Urban Decarbonization

In an effort to create more sustainable urban settings and lower carbon emissions, cities worldwide have started to employ creative techniques. These case studies show how different cities have taken steps towards decarbonization by improving energy efficiency, integrating renewable energy sources, developing green infrastructure, and promoting sustainable transportation.



## **Decarbonizing Urban Landscapes: Exploring Strategies for Sustainable City Planning**

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Received: 16.08.2025 Accepted: 08.12.2025 Published: 24.02.2026

### **Abstract**

Cities are at the center of environmental problems and sustainable development potential as urbanization speeds up. Given that cities contribute significantly to global warming through their emissions of greenhouse gases, decarbonizing urban landscapes is an essential step in combating this pressing environmental issue. techniques for environmentally friendly urban design that strengthen ecosystems while decreasing human impact on the planet. how to create low-carbon urban settings by the use of renewable energy, green infrastructure, sustainable transportation, and energy-efficient building designs. Furthermore, the report delves into case studies of different cities around the world that have effectively executed decarbonization programs, extracting valuable insights and highlighting successful practices. the necessary frameworks for policies and coordinated endeavors to bolster the decarbonization initiative. This research offers vital insights into influencing the future of sustainable city design by tackling the problems of transitioning to carbon-neutral urban environments and developing new solutions.

**Keywords :** Decarbonization, Urban Landscapes, Sustainable City Planning, Greenhouse Gas Emissions

### **Introduction**

More than half of the world's population lives in urban areas, and cities are the main culprits when it comes to climate change. They also produce about 70% of the world's carbon emissions. A major obstacle to sustainable development is the increasing strain on natural resources and the environment caused by rapid urbanization. Reducing carbon footprints, decarbonizing urban landscapes, and building climate-resilient, sustainably-built cities for the next generation are all critical goals in the fight against climate change. Decarbonization is the process of lowering emissions of carbon dioxide (CO<sub>2</sub>). This can be achieved by switching to renewable energy sources that produce less pollution and by instituting greener policies and procedures in all areas of society. Decarbonization, as it pertains to urban development, demands a reevaluation of city planning strategies with the goals of reducing energy use, increasing the use of sustainable mobility, and incorporating environmentally beneficial green infrastructure. Achieving this shift is greatly facilitated by sustainable city planning, which tackles the intricate interplay of energy consumption, urban planning, transportation, and environmental preservation. Renewable energy sources, such as solar and wind, energy-efficient building design, and public transportation promotion are some of the tactics that cities throughout the world are implementing to lower their carbon emissions. Municipalities,

*The Sankalpa: International Journal of Management Decisions*

ISSN: 2454-7425

Volume 12, Issue 1 (January - June 2026)



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- The state should review and organize the regulations and laws of marketing while providing a set of facilities for sports institutions.
- Determine the obstacles facing sports institutions.
- The necessity of paying attention to modern methods of sports marketing and keeping up with all technological developments that contribute to the success of sports institutions.

## **12. Conclusion**

Sports have proven to be one of the most important and profitable investment fields in recent years. It is not only a leisure activity but also an economic power that can be a considerable source of income all over the world. Major industrialized countries have realized this fact and began to treat sports as a legitimate industry with large capital investments. This had a positive impact on the sporting conditions in these countries, allowing for the development of their sports institutions as well as the performance and superiority of their clubs. Today, the real challenge facing sports institutions is a sports marketing strategy that allows them to face functional changes and adapt to economic developments. Internet marketing is a feature of technological development because it allows the institution's products and services to be activated and increased through virtual marketing.

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## **10. Conclusions:**

- There is a serious shortage of professionals specialized in sports marketing.
- Sports marketing works only with the participation of all stakeholders; yet, there are issues that prevent this idea.
- The absence of laws governing sports marketing.
- Lack of online marketing culture for executives of athletic institutions.
- There is clearly a lack of awareness of the importance of e-marketing among sports establishment personnel.
- Modern methods of sports marketing must be followed.
- Lack of experience and ability concerning the use of the Internet to be active in the field of online marketing.
- Sports institutions are not interested in conducting research and studies on the marketing of the sports industry.
- The absence of clear strategies and policies of modern sports marketing.
- The increased interest in sports marketing positively influences the activity and performance of sports institutions.
- Using modern methods of sports marketing contributes to improving sports institutions.
- Modern methods of sports marketing play an important role in the success of sports institutions.

## **11. Suggestions and recommendations:**

- Provide sports institutions with programming and web development specialists.
- Employ experts in the field of sports marketing, including coaches, consultants, and program experts, and keep pace with various technological developments.
- Switching from old, traditional management to electronic management.
- Develop and update sports institutions' websites to keep pace with recent developments.
- Create official and professional social media pages and update them with news about the institution.
- Provide a solid telecommunications network infrastructure and all its accessories and activities associated with it. The latter is done through maintenance and care by addressing its deficiencies and by linking it with the global communications network.
- Work on accurate studies to activate sports marketing in Algeria.
- A cooperation proposal between Algerian sports institutions and their counterparts from international sports institutions that witness large incomes and marketing operations to transfer their experiences to Algeria.
- Hold specialized training courses in the field of e-marketing for all employees of sports institutions.



### **9.2. Discussion of the results of the second hypothesis:**

Following the presentation and analysis of the findings of the second axis of the questionnaire, titled "Use of email and free samples plays a part in the success of sports institutions", and based on our examination of the participants' replies, we conclude that:

The responses provided by the participants to question N°8 confirm this hypothesis. The majority of participants confirmed that e-mail and free samples increase the institution's marketing activities by 66.7 %. Hence 96.7% of the study participants replied to question N°9 that communication through e-mail and the use of free samples helps to raise the performance of the institution. To question N°10, 66.7% of the study participants confirmed that e-mail and free samples contribute to the marketing of the service provided electronically to increase the enterprise's effectiveness. Participants confirmed question N°11 with 83.3 % that delivering the list of items through email and offering free samples helps the enterprise's sales increase. Moreover, 56.7 % responded to question N°12 that the institution's e-mail and free samples had a beneficial role in marketing the enterprise's varied products and services. 56.7 percent responded to question N°13 saying that promotional emails and free samples help in marketing enterprise services. Question N°14 was answered by 83.3 % i.e. the majority of the surveyed participants said that using email and free samples to market the enterprise's services was beneficial. Concerning, the results of question (15), 73.3 % believe that the use of email and free samples morally leads to enhancing the enterprise performance. From the foregoing conclusion, the second hypothesis is realized.

### **9.3. Discussion of the results of the third hypothesis:**

After presenting and analyzing the findings of the questionnaire's second axis, under the title "Use of online advertising pages and websites plays a part in the performance of sporting institutions," and based on our questionnaire response analysis and the first hypothesis, we reached that:

The participants' replies confirm this hypothesis based on the findings. By answering question N° 16, the majority of participants indicated that the online advertising page strategy and web pages contribute to the enterprise's performance by 83.3 %. 93.3 percent of the survey participants who answered question N°17 declared that the institution has online advertising pages and attractive web pages. Regarding question 18, 96.7 % of participants said that the simplicity of using online advertising sites and web pages improves the company's efficiency. Regarding the responses of participants to question 19, 83.3% replied that online advertising pages and web pages contribute to raising the quality of services at the organization, while 93.3% responded to question 20 that online marketing of services via online advertising pages and web pages increases the performance at the company. 93.3% answered question N° 21 by that online advertising pages and web pages help increase the market share of the organization. The participants' answer to question N° 22 was confirmed by 76.7% who believed that online advertising pages and web pages improved marketing in the company. Therefore, the third hypothesis is confirmed.

Based on the foregoing and since partial hypotheses are realized, the general hypothesis that "the use of modern sports marketing methods has a role to play in the success of sports institutions" is achieved.



No	00	00.0					<b>Significant at 0,05</b>
Sometimes	02	6.7					
The total	30	100					

Source: Prepared by researchers, 2025, based on outputs SPSS.

Through the results of Table N° 6, we note that the responses of the study sample (30 participants) were divided into two groups. The first group consisted of participants whose response to question (21) was centered on "Yes," with 28 participants and by 93.3 percent. The second group included the 6.7 percent of those who answered "sometimes" to this question, numbering (02) participants.

To determine the significance of these variations in frequencies and percentages, we used the statistical significance test ( $K^2$ ). As shown in the table above, the value at the degree of freedom (02) is calculated to be 21.766. It is a statistically significant value at the significance level (0.05), indicating that there is a statistically apparent difference between the three groups in favor of the first higher group (yes). The rate of confirmation of this result is 95%, with a 5% margin of error.

This means that most participants of the survey see online advertising pages and web pages as helping to increase the institution's market share.

**9. Hypotheses results discussion:**

**9.1. Discussion of the results of the first hypothesis:**

Following the presentation and analysis of results of the first axis of the questionnaire, titled "The use of social media advertisements plays a role in the success of sporting institutions," and based on our survey response analysis and the first hypothesis, we conclude that:

Through the findings, the participants' answers validate this hypothesis. Through question N° 01, most of the participants confirmed that the social media accounts of the institution contribute to reducing the time to publish the advertisements of the institution with 83.3%. 73.3% of the survey's participants said that social media sites decrease advertising costs for the institution, and 66.7 percent responded that social media sites improve the institution and enhance its service quality. In response to question 04, 50.0 % of participants said that the institution's social media sites serve to influence the institution's clients, while 83.3 % said that social media sites serve to achieve constant communication with the institution.

93.3% replied to question 06 that social media sites help to offer various products and services, reflecting positively on the growth of the institution. The participants' response to question 07 was 83.3% considering that the institution is eager to vary marketing approaches through social media sites in order to improve the institution's performance.



(02) was estimated at 7.300, which is a significant value at the significance level of alpha (0.05). As a result, there is a statistically significant difference among the three groups in favor of the first group with the highest frequency (Yes). Hence, the confirmation percentage of this study is 95%, with a 5% margin of error.

This suggests that the majority of participants agreed that promotional messages sent via e-mail and free samples help the marketing of the company’s services.

**The third axis:** The utilization of online advertising sites and web pages has a role in the success of sports companies.

Sixteenth Question: Does the strategy of online advertising pages and web pages add to the company’s performance?

The purpose of the question: To know whether the strategy of online advertising pages and web pages contributes to raising the performance of the company.

**Table 05:** Displays the responses of the participants to the strategy of online advertising pages and websites that contribute to the institution’s productivity.

The answer	Frequency of scenes	The Percentage	Calculated K <sup>2</sup>	Scheduled K <sup>2</sup>	Degree of freedom	Significance level	Statistical evaluation
Yes	20	66.7	16.400	5.99	02	0,000	Significant at 0,05
No	03	10.0					
Sometimes	07	23.3					
The total	30	100					

Source: Prepared by researchers, 2025, based on outputs SPSS

According to the results of table N° 05, we observe that the responses of the study sample, namely 30 participants, were divided into three groups. The first group was the participants who answered question (16) with "Yes", numbering 20 participants by 66.7%. The second group represented participants (07) who answered this question with "sometimes", representing 23.3%. The third group represented participants who responded to the question with "no", and they numbered (03) with an estimated percentage of 10.0%.

In order to ascertain the significance of these differences in frequencies and percentages, the statistical significance test (K<sup>2</sup>) has been used. According to the table above, the degree of freedom (02) is estimated at 16,400, which is a statistically significant value for the significance level (0.05). Accordingly, there is a statistically significant difference between the three groups in favor of the first group (yes). The rate of confirmation of this result is 95%, with a 5% margin of error.

This means that most participants view the online advertising page strategy and web pages as raising the performance of the institution.

**Table 06:** Indicates participants' responses regarding online advertising pages and Web pages that help increase the institution's market share.

The answer	Frequency of scenes	The Percentage	Calculated K <sup>2</sup>	Scheduled K <sup>2</sup>	Degree of freedom	Significance level	Statistical evaluation
Yes	28	93.3	21.756	3.84	01	0,000	



Yes	20	66.7	15.000	5.99	02	0,000	<b>Significant at 0,05</b>
No	05	16.7					
Sometimes	05	16.7					
The total	30	100					

Source: Prepared by researchers, 2025, based on outputs SPSS.

Table No° (03) shows that the research sample’s (30) responses were divided into three groups. The first group consisted of participants whose answers to a question (08) were concentrated on the option "yes," and their number reached (20) by 66.7 percent. The second group includes individuals who answered "sometimes," totaling (05) with 16.7 percent. The third group represents the participants whose answer to this question was the alternative "No". The number of which is (05) by 16.7 percent.

To confirm the significance of these differences in frequencies and percentages, we used the statistical significance test ( $K^2$ ). We can observe from table N°3 that its value at the degree of freedom (02) was estimated at 15,000, which is a statistically significant value at the significance level of alpha (0.05). Thus, there is a statistically significant difference among the three groups in favor of the first group with the highest frequency (yes). The degree of certainty for this result is 95%, with a 5% margin of error.

This suggests that the majority of participants agree that using e-mail and free samples helps the company’s marketing activities.

Thirteenth question: Do promotional emails and free samples aid in the marketing of the company’s services?

The question’s objective is to find out if promotional e-mail and free samples serve in the marketing of the company’s services.

**Table 04:** Shows the answers of participants about email promotional messages and free samples to help in the marketing services in the company.

The answer	Frequency of scenes	The Percentage	Calculated $K^2$	Scheduled $K^2$	Degree of freedom	Significance level	Statistical evaluation
Yes	17	56.7	.7300	5.99	02	0,025	<b>Significant at 0,05</b>
No	07	23.3					
Sometimes	06	20.0					
the total	30	100					

Source: Prepared by researchers, 2025, based on outputs SPSS.

According to the results of Table No. (04), the study sample, which is (30) participants, was divided into three groups: the first group represents participants whose answer to question (13) focused on the option "yes," and their number reached (17) participants with a percentage of 56.7 percent. The second group represents participants whose answer to this question with "sometimes", about (06) participants with a percentage of 20%. The third group represents participants whose answers are "no," and they were (07) participants, with a percentage of 23.3 percent.

To confirm the significance of these differences in frequencies and percentages, we adopted the statistical significance test ( $K^2$ ). We note from table 4 that its value at the degree of freedom



Based on these results the research participants believe that the company’s social media sites help to reduce the time it takes to produce advertising for the company.

Sixth question: Do social media sites assist in the exhibition of various products and services, which will positively impact the company’s development?

**Table 02:** Displays the responses of the participants to social media ads that promote the presentation of various products and services, as indicated in the company’s development.

The answer	Frequency of scenes	The Percentage	Calculated K <sup>2</sup>	Scheduled K <sup>2</sup>	Degree of freedom	Significance level	Statistical evaluation
Yes	28	93.3	22.523	3.84	01	0,000	Significant at 0,05
No	00	00.0					
Sometimes	02	6.7					
The total	30	100					

Source: Prepared by researchers, 2025, based on outputs SPSS.

Based on the results of Table No. (02), we can note that the study sample, which consisted of (30) participants, was separated into two groups. The first group is made up of people whose answers to question (06) centered on the alternative "yes," and their total number reached (28), approximately 93.3 percent, while the second group includes participants who answered "sometimes", and they were (02) by 6.7 percent. In order to verify the significance of these differences in frequencies and percentages, we resorted to the statistical significance test (K<sup>2</sup>), where we note from table N<sup>o</sup>2 that its value at the degree of freedom (01) was estimated at 22.523, which is a statistically significant value at the level of significance of alpha (0.05). Therefore, there is a statistically significant difference among the three groups in favor of the first group with the highest frequency (yes). The certainty of this result is 95%, with a probability of error of 5%.

We conclude that the study participants believe that social networking sites help to show diverse products and services, which has a positive impact on the company's progress.

**The second axis:** E-mail and free samples play a part in the development of sports organizations.

The eighth question is, do e-mail and free samples help to increase the institution’s marketing activity?

The question objective is to determine whether e-mail and free samples help the institution’s marketing efforts.

**Table 03:** Displays participants' responses to e-mail and free samples, which help to increase the institution's marketing activities.

The answer	Frequency of scenes	The Percentage	Calculated K <sup>2</sup>	Scheduled K <sup>2</sup>	Degree of freedom	Significance level	Statistical evaluation
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method. The results of the outputs of the statistical packages program demonstrated that the reliability of the study axes was high, reaching 0.974, i.e. more than 0.6, indicating the reliability of the questionnaire.

**Statistical significance:**

**K<sup>2</sup>'s Law:**

This law helps to examine and determine the extent of significant differences in the answers of the study's sample.

$$X^2 = \frac{(f_o - f_e)^2}{f_e}$$

Frequencies observed:  $f_o$

Repetitions observed:  $f_e$

The indication level is 0.05.

The degree of freedom is  $(n-1)$ , where  $(n)$  is the number of categories and columns.

**8. Presentation and discussion of the findings:**

The first question: Does the company's social networking sites help to shorten the time it takes to post adverts.

The question's objective: is to determine if the company's social networking sites help to reduce the time it takes to post the company's adverts.

**Table 01:** Displays the sample members' responses on the role of the institution's social media in reducing the time to publish adverts of the institution

The answer	Frequency of scenes	The Percentage	Calculated K <sup>2</sup>	Scheduled K <sup>2</sup>	Degree of freedom	Significance level	Statistical evaluation
Yes	25	83.3	14.333	3.84	02	0,000	Significant at 0,05
No	00	00.0					
Sometimes	05	16.7					
The total	30	100					

Source: Prepared by researchers, 2025, based on SPSS output.

The results of Table No° (01) show that the responses of the research sample members, who numbered (30), were separated into two groups. The first group was represented by individuals whose answer to question (01) focused on the alternative "yes," and their number reached (25) individuals with a percentage of 83.3 percent, while the second group is represented by individuals whose answer to this question was "sometimes", and their number is (05) with a percentage estimated at 16.7 percent. To ensure the significance of these differences in frequencies and percentages, the statistical significance test (K<sup>2</sup>) was used, and as shown in the above table, its value at the degree of freedom (02) was estimated to be 14,333, which is a statistically significant value at the significance level of alpha (0.05). This implies that there is a statistically significant difference between the two groups in favor of the first group with the higher frequency (yes). The level of confidence in this outcome is 95 percent, with a 5 percent margin of error.



The sample was selected randomly and included 30 administrators from three clubs: JS Kabylie (JSK), ES Setif (ESS), and MC Algeria (MCA).

## **7.5. Research tools:**

### **7.5.1. Questionnaire:**

In order to test the proposed hypotheses for our research and determine their true nature, and based on its objectives, a questionnaire has been prepared for the persons concerned. The researcher also relied on a questionnaire form aimed at the administrators of the sports clubs. The questionnaire can be defined as a tool for collecting data based on a set of questions, addressing the fields of research and giving us answers and the data needed to detect the aspects identified by the researcher.

The questionnaire in this study consists of (22) phrases constituting the total answers of participants about the use of modern sports marketing methods and their role in the success of the institution. The individual answers by "yes", "no" or "sometimes". The questionnaire is divided into three main axes:

- **First axis:** Using social media ads has a role in the success of sports institutions.
- **Second axis:** Using email and free samples has a role in the success of sports institutions.
- **Third axis:** Using online advertising pages and web pages plays a role in the success of sports institutions.

### **7.5.2. Psychometric properties of the study tool**

#### ***Face validity:***

It is the arbitrators' sincerity. It was a group of five professors from the Institute of Science and Techniques of Physical and Sports Activities. They have been given a questionnaire form containing 22 questions about arbitration; they filled them out and added corrections and amendments.

#### ***Internal consistency:***

Using the outputs of the statistical packages program and calculating the correlation coefficient of the three axes phrases, we note that all of the questionnaire's questions have a very high degree of validity and are statistically significant with the total degree of the axis to which they belong, as it ranged between (0.617 and 0.942) in the first axis, (0.722 and 0.965) in the second axis, and between (0.965 and 0.722) in the third axis. Thus, the questionnaire is internally consistent. One can also note that all of the questionnaire's axes are associated with the total degree of the questionnaire, where the values ranged between 0.814 as the lowest value and 0.980 as the highest value, which is a high value that is close to 1. As a result, the questionnaire has internal consistency and validity.

#### ***Reliability:***

The research used the (Cronbach's Alpha equation) to ensure the reliability of the study tool and the questionnaire. More than 0.7, indicating that the questionnaire is stable. The questionnaire was presented to the members of the exploratory sample, using the re-test



detect facts, accurately describe phenomena, and identify their characteristics in terms of quality and quantity. In doing so, it reveals the pre-phenomena and how they have reached their current form, as well as tries to predict what will be in the future, as it cares about the past and present of the phenomenon as well as its future (Helmi and Saleh, 1983, p. 19).

## **7.2. Pilot study:**

Scientific research tools are the basis of the applied aspect that gives more credibility to the problem at hand. The pilot study is one of the most important tools used in scientific research. It reveals the invisibility of the place where we inquire. It also aims to deepen knowledge of the proposed subject of research, both theoretically and in practice, compile observations on the specific phenomena of the research, as well as recognize the importance of research, determine its assumptions, and develop the first points of research planning (objectives, framework, and research methods). (Dellio, 1995, pp. 46-47)

The first step in our research was to conduct a pilot study in order to determine the circumstances in which the research would be conducted and identify the individuals to whom the study tool would apply and their willingness to cooperate with us. Through the pilot study, we interviewed six members of the board of three football clubs as a sample to know their views, suggestions, and perspectives on a range of key points relevant to the subject matter of the study, as well as obtain sufficient information and answer questionnaire questions.

Through this, we became more familiar with the problem of the study that we are discussing and the reality of this study in terms of time and space, as well as the study community and the number of samples we adopt in the study. This pilot study also helped us to adjust the study hypotheses and determine the time of the questionnaire's distribution.

## **7.3. Research fields:**

### **7.3.1. Spatial field:**

This research was conducted at the level of three professional football clubs of the first professional football association (Mobilis) in Algeria: "JS Kabylie (JSK), ES Setif (ESS), and MC Algeria (MCA)".

### **7.3.2. Temporal field:**

This study was conducted from January to April 2025, when the questionnaire was distributed to individuals in January and February. Data was unloaded, analyzed, and interpreted in March and April.

### **7.3.3 Human field:**

The questionnaire form was distributed to a sample of officials in charge of marketing in the aforementioned sports clubs.

## **7.4. Population and research sample:**

Our study community consists of the Algerian sports football clubs; the first professional league numbering 18 clubs.

The sample is part of the study community from which field data are collected and is considered part of all, i.e. a group of community members is taken to represent the research community in order to reach results that can be generalized to the entire study community.



- **Mohammed Zahaf's study:** Electronic marketing as an entry point for the development of marketing information systems in Algerian sports institutions, Institute of Physical and Sports Activities Sciences-University of M'sila-Algeria, 2018. The study aimed to capture the reality of e-marketing among the clubs of the Professional Footballers' Association, thus determining how e-marketing is applied in a way that enables the development of marketing information systems for sports organizations. The researcher used the descriptive approach on a random sample due to its suitability for this study. The study community consisted of marketing officials of sports institutions. The research sample was chosen based on an intentional manner, reaching 15 administrators of three clubs (Ahli Bordj (CABBA), ES Setif (ESS), and Mouloudia El Eulma (MCEE)). The researcher used the questionnaire tool concerning the field aspect.

The following findings were concluded: Football clubs of the Professional League have modern communication technology in the e-marketing application. However, there are weaknesses in the basic entry points and components of e-marketing applications in both formal and substantive terms. The results also showed a lack of efficiency and strategic planning in the application of e-marketing to sports organizations.

- **Al-Anoud Amer Salim Abo Rokba:** The impact of using e-marketing tools on revitalizing sales in Jordan's capital (field study at the five-star hotel in Jordan, Amman). This thesis was submitted of the requirements for a master's degree in electronic business, Department of Business Administration, School of Business, University of the Middle East, January 2018. This study aimed to measure the impact of using e-marketing tools in revitalizing sales in Amman's hotels in Jordan. The researcher used the analytical descriptive approach based on describing the phenomenon, answering questions and hypotheses, and analyzing the data collected. The study community consisted of all five-star hotels customers in the Jordanian capital (Amman), numbering 16 hotels, while the study sample consisted of 500 individuals. They were selected in a simple random manner. The questionnaire was then distributed to customers dealing with five-star hotels in the Jordanian capital, where 484 questionnaires valid for statistical analysis were recovered, and 16 questionnaires were excluded because they were not valid for statistical analysis.

The most important results are: a statistically significant impact on the use of e-marketing, which includes (the hotel's website, the hotel's chat site, the hotel's social media sites, and the hotel's email) in the sales activation, including (competitions, coupons, and discounts).

## **7. Field research procedures:**

### **7.1. Approach:**

The approach is one of the key elements and important methods that should be available in any study. It is unreasonable to expect any scientific research to be conducted without an approach through which the researcher can verify the validity or invalidity of hypotheses. A researcher's approach to studying any phenomenon must be linked to the nature of the subject matter of the study, hence it is difficult to choose a particular approach for a particular study. Based on the nature, hypotheses, and objectives of the topic, the study relied on the "descriptive approach", which is classified as a research method. It depends on quantification and aims to



From all of the above, the following question can be asked:

***Does the use of modern sports marketing methods play a role in the success of sports institutions?***

**Partial questions:**

- Does the use of social media ads play a role in the success of sports institutions?
- Does the use of email and free samples play a role in the success of sports institutions?
- Does the use of online advertising pages and web pages play a role in the success of sports institutions?

**3. hypotheses:**

The use of modern sports marketing methods has a role in the success of sports institutions.

- Using social media ads has a role in the success of sports institutions.
- Using email and free samples has a role in the success of sports institutions.
- Using online advertising pages and web pages has a role in the success of sports institutions.

**4. Study objectives:** The study aims to:

- Learn about the role of modern methods by which modern sports marketing can be used in sports institutions.
- Trying to show how sports institutions, especially sports clubs, rely on modern sports marketing methods.
- Learn about the most modern electronic marketing tools and methods used in sports institutions.
- Identify the contribution of websites and pages to communicate with clients and their role in the success of sports institutions.
- Recognize the contribution of using social media ads to communicate with clients and their role in the success of sports institutions.
- Recognize the contribution of using email and free samples to communicate with clients and their role in the success of sports institutions.
- Trying to come up with a proposed framework for using modern sports marketing methods to increase the performance of sports institutions.

**5. Research importance:**

The importance of the study lies in the role that marketing plays in the sports institution, especially modern sports marketing. E-marketing is now the most widely circulated topic at both the individual and institutional levels and in the public and private sectors. It works to expand the market by accessing local and global markets and creating new markets so that electronic marketing can be adopted as a core task and marketing channel for various institutions active in the sports field. The research also tries to link modern sports marketing tools with their role in the success of sports institutions.

**6. Previous studies:**



sports facilities cannot be built, nor can players, training frames, technical staff, and other elements contribute to the construction and development of sports. According to the researchers, the success of sports institutions in developed countries and their high technical and artistic capabilities in the sports field have impressed the entire world because of their success in marketing their sports products as a result of their adoption of modern concepts of marketing aimed at the customer, as they have understood and applied marketing philosophy effectively and completely. Sports institutions (clubs, academies, and sports schools) know the desire of the sports consumer and satisfy it in their local or international markets, as well as develop the sports product by designing the appropriate sports marketing mix to achieve the physical and moral benefits of the consumer. Consumers in general, and sports consumers in particular, are the cornerstones of modern marketing. The success of the sports facility depends on the extent to which it satisfies the requirements and needs of consumers and fans on the one hand and exploits the fields of sports marketing on the other hand.

## **2. Study problem:**

Marketing activity in enterprises is one of the most affected activities by Internet technology. The Internet's services and applications can be used by enterprises for an integrated marketing function. The communication process may be a major pillar of enterprises' activity as it brings them closer to their audiences. Furthermore, marketing communications are the most important and indispensable in light of the intense competition because they are the link between the enterprise and the customer, which is the main pillar of its development and growth. Based on this point of view, promoting the use of advanced technology, namely the internet and mobile phones, is one of the most important e-marketing activities due to its direct contact with the most important segment dealt with by enterprises (the consumer). It influences his behavior by providing ideas about products through communicating and interacting with him via electronic channels of communication. (Kaid, 2017, pp. 1-2)

Modern sports marketing is one of the most significant advancements in the field of marketing, and sports organizations have not been left out of it, as sports marketing took these organizations to a new reality in which the traditional organization no longer had a place. Marketing is of great importance in the application as a key determinant of the success of many sports institutions in many global countries. In addition, the problems facing today's organizations as they operate in domestic and international markets have led to the emergence of many concepts, including the concept of e-marketing.

The e-marketing concept in the world has contributed to its low cost and market expansion, with thousands of e-marketing companies established and millions of messages roaming the network daily. "Studies have confirmed that e-marketing has expanded markets and increased companies' market share due to the global spread of the Internet." Electronic marketing can no longer be ignored. In the face of the global technology era, the growing use of modern technology tools, with the majority of Arab countries joining the World Trade Organization and under the requirements of international trade that seek to liberalize trade in goods and services, in addition to that e-marketing and e-commerce, in general, provide facilities in the competition process, ignoring it also indicates an inability to own its tools and deal with the challenges of the age of infancy. (Samahi, 2005, pp. 2-3).

## **Exploring the Reality of Modern Sports Marketing Implementation and Its Contribution to Institutional Success: Evidence from First Division Professional Football Clubs**

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Received: 14.08.2025 Accepted: 07.12.2025 Published: 24.02.2026

### **Abstract**

This study investigates the current application of modern sports marketing methods and their contribution to the success and development of sports institutions, focusing on clubs in the first professional football league. Using a descriptive-analytical approach, data were collected via a questionnaire distributed to 30 club administrators.

Results indicate that adopting contemporary marketing techniques including digital platforms, social media strategies, fan engagement initiatives, and data-driven campaigns substantially improves institutional performance, revenue streams, brand visibility, and long-term sustainability. These approaches enhance fan loyalty, sponsorship opportunities, and competitive advantage in the sports market. Nevertheless, the study reveals a significant lack of digital marketing awareness and skills among administrative staff in sports organizations. This deficiency hinders effective utilization of online tools and emerging trends such as influencer partnerships and interactive content.

The research recommends that sports institutions prioritize the development of integrated marketing programs, provide specialized digital training for cadres, and align strategies with global best practices to achieve greater financial and institutional success.

**Keywords :** Modern Sports Marketing; Digital Marketing in Sports; Sports Institutions; Professional Football Clubs; Online Marketing Culture.

### **1. Introduction:**

The ICT revolution has become an important basis for delivering various types of business. Any life activity including business, universities, e-commerce, media medicine, journalism, tourism, hotel, and others cannot continue, operate, and be active in isolation from ICT. It is also noted that the impact of this has been significant in the field of shopping, as organizations are accelerating the pace of re-engineering traditional marketing functions and components in line with the requirements of this revolution. Hence, many types of e-commerce have emerged that use new and innovative methods to promote goods and services and get the highest level of profits (Anhar and Achkar, 2018, p. 255). Sports institutions play an important role in the dissemination and development of sport among members of society. Without these institutions,



Berta José Costa, Susana Rodrigues 2020 **Circular Economy and Sustainability: Concepts, Perspectives, and (Dis)Agreements** Pages: 26 DOI: 10.4018/978-1-5225-9885-5.ch003

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monitoring development and guaranteeing industry-wide responsibility, it is critical to establish defined measures and standards for circular economy performance.

### **Conclusion**

There are a lot of obstacles that prevent the circular economy from being widely used, even though it has a lot of potential for sustainable resource management. Investing in new technology, reforming regulatory frameworks, and shifting cultural and behavioral norms are all part of the solution, but governments, corporations, and consumers must work together to overcome these challenges. Through the resolution of these issues, communities may lay the groundwork for a future that is less vulnerable to disasters, more resourceful, and less wasteful.

### **Conclusion**

By linking production and consumption once again, a circular economy provides a game-changing strategy for environmentally responsible resource management. Reducing resource depletion, minimizing environmental degradation, and promoting more resilient economic systems are all goals of the circular economy, as this study has shown. From a global viewpoint, it is clear that many countries and sectors are embracing the ideas of a circular economy. However, there are still numerous obstacles that need to be overcome before the full potential of these models can be realized, including technology limits, economic hurdles, regulatory gaps, and consumer behavior. The manufacturing, agricultural, and technological industries are at the forefront of the circular economy movement, which is proving to have social, environmental, and economic benefits. Nevertheless, governments, organizations, and individuals must work together for widespread adoption. In order to remove obstacles and promote more widespread adoption of the circular economy, robust public policy frameworks, financial investments in circular infrastructure, and educational programs are crucial. In the future, the SDGs—the United Nations' 17 Sustainable Development Goals—can be met through the circular economy. A sustainable future can be shaped by the circular economy, which promotes innovation, generates employment opportunities, and safeguards the environment. In order to make these practices more widely used around the world, we need to work on improving cross-sector collaboration and making sure that models for the circular economy can be adjusted to different types of economies. This will help us save resources and keep them sustainable in the long run.

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product take-back schemes and extended producer responsibility (EPR) efforts are complicated since present laws may not account for product reuse or remanufacturing.

Further complicating matters for companies competing on a worldwide scale is the fact that different jurisdictions have different legislation regarding circular economy activities, which can lead to a misalignment of policies. For circular economy techniques to be widely adopted, it is important to harmonize policies and provide a favorable legal framework.

### **5. Supply Chain Complexity**

Products must be built for durability, recyclability, and resource recovery in order to implement circular economy techniques, which include rethinking entire supply chains. But there are a lot of obstacles due to the intricacy of international supply networks. It is challenging to monitor and regulate the full product lifecycle in many industries due to the reliance on complex supplier networks. It is also difficult to guarantee that all phases of manufacturing, distribution, and end-of-life management adhere to circular methods due to the international character of trade.

Many companies face challenges in gaining insight into their supplier networks, despite the fact that supply chain traceability and transparency are essential for a functional circular economy. Working together, thinking creatively, and investing in monitoring tools might be expensive ways to make sure suppliers follow circular principles.

### **6. Cultural and Institutional Resistance**

Changes in organizational culture and institutional mindsets are just as important as changes in technology and policies when it comes to making the transition to a circular economy. There is a lot of resistance to change in many industries since they are so used to linear models of production and consumption. When organizations are hesitant to change their tried-and-true methods in favor of novel, potentially risky approaches, this reluctance takes the shape of institutional inertia.

On top of that, companies might not have the necessary knowledge or experience to properly use the concepts of the circular economy. Adopting circular methods may be hindered by this skills gap, which can also slow down progress.

### **7. Lack of Awareness and Education**

Many regions of the globe still have a low level of public understanding regarding the circular economy. There is still a lot of confusion about the circular economy and its potential benefits among consumers, politicians, and corporations. The momentum necessary for systemic change is difficult to develop in the absence of broad knowledge. In order for stakeholders to be able to take part in and support circular economy projects, it is crucial to provide them with education and training programs.

### **8. Measurement and Standardization Issues**

Circular economy techniques are notoriously difficult and inconsistently measured. Businesses struggle to track their progress and customers struggle to judge the sustainability of products due to the lack of a standardized criteria for measuring circularity. For the purpose of



### **1. Technological and Infrastructural Barriers**

Inadequate infrastructure and cutting-edge technology for effective recycling, remanufacturing, and resource recovery is a major obstacle to implementing circular economy techniques. Many sectors' current tech is best suited to linear production models, and switching to circular processes necessitates heavy spending on new machinery, software, and ideas. For instance, in some areas, especially poor nations, the cost of or lack of development in the necessary technology makes it impractical to recycle complicated products like electronics or textiles.

In addition, not all areas have the necessary infrastructure to implement a complete circular economy. poor waste management services, a lack of proper recycling facilities, and poor product take-back mechanisms all work together to prevent resource loops from being effectively closed.

### **2. Economic Constraints and High Initial Costs**

Industries that use linear production models may find the transition to a circular economy to be costly initially. Companies frequently face the challenge of product redesign, investing in circular technologies, and supply chain reconfiguration. Many businesses, particularly SMEs, may not be able to afford the initial investment needed to implement circular economy models, despite the fact that these models offer significant savings in the long run due to improved resource efficiency.

In addition, there may be an initial rise in manufacturing costs due to certain circular practices, such as the use of sustainable materials or advanced recycling technologies. This may discourage broad use of circular products in price-sensitive sectors by making them less competitive with less expensive linear equivalents.

### **3. Consumer Behavior and Market Resistance**

The success of the circular economy hinges on consumer behavior, yet altering consumption habits isn't always easy. Purchasing new items, utilizing them for a short time, and then throwing them away is the typical linear model of consumption for many customers. Circular activities have both economic and environmental advantages, and educating the public about them is essential if we are to adopt a consumption attitude that prioritizes repair, reuse, and sustainable behaviors.

Furthermore, the market demand for refurbished or used products can be hindered by the stigmatization of such items. There are psychological and cultural hurdles that must be surmounted in order to get people to participate in recycling programs or rent things instead of buying them.

### **4. Regulatory and Policy Challenges**

Circular firms face challenges in many regions due to regulatory structures and policies that are still geared towards supporting linear economies. Companies aren't always incentivized to go circular, and current rules around product safety, waste management, and consumer protection might not work very well with circular models. The legalities and practicalities of



the difficulties of implementing circular economy models while highlighting good practices and evaluating their social, environmental, and economic impacts. To better comprehend the worldwide shift towards a circular economy and how to scale these practices for longer-term sustainability, this study examines case studies from both industrialized and developing nations.

### **The Need for Circular Economy in Sustainable Resource Management**

The current linear production model and the world economy's reliance on limited natural resources have resulted in actions that are harmful to the environment and future economic stability. Ecosystems are in a precarious state due to the extraordinary rates of resource exploitation, biodiversity loss, pollution, and waste generation. There is an immediate need to shift to more sustainable practices due to the increasing strain on Earth's ecosystems; the circular economy offers a practical and efficient answer to this problem. By reimagining resource utilization through closed loops, the circular economy challenges the conventional "take-make-dispose" paradigm. It can greatly lessen the strain on natural resources by emphasizing material efficiency, waste minimization, and product reuse, recycling, and refurbishment. Sustainable resource management, which includes this strategy, aims to strike a balance between human consumption and the ecological boundaries of the world. There are monetary and environmental benefits to implementing a circular economy. Reducing raw material reliance allows industries to minimize production costs, strengthen supply networks, and open up new business opportunities, especially in recycling, repair, and remanufacturing. In addition, the long-term sustainable development goals (SDGs) including responsible consumption and production (SDG 12), climate action (SDG 13), and life on land (SDG 15) are all enhanced by turning to circular economy methods. A key technique to decrease landfill trash and avoid pollution is the circular economy, which is being promoted in light of the rising global waste situation, especially in plastics, e-waste, and building materials. There is a worrying rate of landfill overcrowding, and traditional waste management systems, particularly in developing nations, are frequently overrun. By extending the lifecycle of products and focusing on waste reduction during design, circular techniques can help alleviate these difficulties. While there will certainly be obstacles, the transition to a circular economy has tremendous promise for improving global resource management in an environmentally responsible way. Following the concepts of the circular economy can help economies achieve a better balance between resource consumption and environmental stewardship. This will minimize harm to the environment while ensuring that future generations have access to the resources they need.

### **Challenges in Adopting Circular Economy Practices**

Although there are many obstacles to implementing the circular economy, it does provide a viable strategy for managing resources in a sustainable way. Collectively, these obstacles to widespread adoption of circular economy techniques arise from technical constraints, economic considerations, consumer behavior, regulatory frameworks, and infrastructure deficiencies.



## **Circular Economy Approaches for Sustainable Resource Management : A Global Perspective**

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Received: 14.08.2025

Accepted: 07.12.2025

Published: 24.02.2026

### **Abstract:**

By replacing the conventional linear "take-make-dispose" system with one that prioritizes recycling, reusing, and regenerating materials, the circular economy (CE) model provides a revolutionary strategy for sustainable resource management. a worldwide view of circular economy initiatives, with an emphasis on their capacity to lessen the burden on finite resources, cut down on waste, and boost environmental sustainability. It examines the social, environmental, and economic advantages of implementing circular economy methods in sectors including technology, agriculture, and industry via case studies from both industrialized and developing countries. What drives the shift to a circular economy—public policy, corporate accountability, and consumer behavior. The article delves into the main obstacles, such as rules and regulations, technological constraints, and the need for financial investments. the value of public-private partnerships in fostering an environmentally responsible and economically efficient global economy; illuminating the challenges of scaling up circular economy models for broad implementation.

**Keywords:** Circular Economy, Sustainable Resource Management, Waste Reduction, Recycling and Reuse

### **Introduction:**

As a result of unsustainable consumption patterns, fast industrialization, and population increase, the world's natural resources are under unprecedented strain. Deterioration of the environment, loss of resources, and accumulation of trash have all resulted from the conventional linear economic model's four stages: extraction, production, consumption, and disposal. An encouraging strategy for long-term resource management has evolved in reaction to these problems: the circular economy (CE). The circular economy seeks to minimize waste and environmental damage by supporting the continuing use of resources through recycling, refurbishing, and regeneration. This strategy closes the loop, in contrast to the linear approach. There are societal and financial advantages to the circular economy as well as environmental ones. Companies can help build a stronger economy, improve product designs, and cut production costs by decreasing their reliance on virgin resources. Governments may promote long-term economic growth, job creation, and environmental stewardship through circular economy policies, which are in line with sustainable development goals (SDGs). A healthier, cleaner environment and more environmentally responsible consumer habits are possible outcomes for society as a whole. exploring how many countries and industries are embracing circular economy strategies for sustainable resource management on a global scale. It describes