

## Article

# Proposing a Model for Sustainable Development of Creative Industries Based on Digital Transformation

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**Abstract:** This research aimed to develop a comprehensive model for the sustainable development of creative industries in Iran through digital transformation and interpretive structural modeling. Semi-structured interviews were conducted with 19 experts to extract the dimensions and components of sustainable development. The validated components were presented using a structural equation modeling questionnaire to obtain a comprehensive model. These components were identified and confirmed: sustainable competitive development, consolidation and freeze, sustainable development drivers, digital technology cultural taste, structural social capital, environmental and industrial intelligence, digital work environment, creativity and innovation, financial supply chain management, and digital entrepreneurial ecosystem. The experts validated these components through the research process. It is essential to focus on developing digital infrastructure to achieve sustainable development in creative industries based on digital transformation. It includes digital communications, necessary technologies, and information security, which serve as the foundation to promote creative industries in the digital sphere.

**Keywords:** sustainable development; digital transformation; entrepreneurial ecosystem; COVID-19; creative industries



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## 1. Introduction

Nowadays, sustainability has become a part of businesses worldwide [1]. Creative industries are also interconnected with their physical, biological, and social environments, affecting and being affected by them [2]. Business sustainability enables the possibility of analyzing and improving business management by creating a shared understanding of business logic [3]. Creating a clear vision enables businesses to provide the groundwork for entering markets with their plans and ideas, resulting in the ability to maintain and enhance their position in domestic and international markets [4]. Therefore, it is evident that the sustainability of businesses plays a crucial role in economic development, economic sustainability, and overcoming the conditions of sanctions [5]. For this reason, paying attention to business sustainability is of great importance, especially considering the increasing failure rate of creative industries. Moreover, the implementation of sustainable development principles in corporate governance enables creative industries to achieve some of the objectives in the fields of environmental protection, social rights, and economic prosperity. The results of these objectives are reflected in sustainable development reports, which are useful for decision-making related to stakeholders [6]. Therefore, modern businesses require continuous dynamism and transformation despite their complexity, as the rapid advancement of technology has impacted the competitiveness of creative businesses [7]. In this regard, creative businesses that seek growth and prosperity must continuously reflect on their capabilities and analyze upcoming opportunities [8]. Therefore, paying attention to the sustainable development of creative industries is crucial.

The development of creative industries can be used as a means for the welfare of society, and by increasing the capabilities of the region, it can be effective in the social and

economic spheres [9]. Creative industries can help the economic sector during the crisis. Also, increasing creative industries in a global environment is efficient and effective [10]. Creative industries, on the other hand, are another example of how to create and facilitate the emergency of the new economy and create demand for new skills. Creative industries first gained popularity in Australia in the 1990s and later became an important program for economic development when Tony Blair's government established the Ministry of Culture, Media and Sports to promote creative industries. Today, these industries play an important role in economic development. For example, creative sectors worldwide comprise 1% of the world's economically active population. In addition, creative industries show a wide cluster with industries from technological sectors to non-technological sectors, where knowledge and intellectual property are produced as outputs [11]. The recent past has seen an exponential increase in the number of empirical studies on the sustainable development of creative industries. This phenomenon has attracted much scientific attention from various academic disciplines (for example, business, entrepreneurship, management, marketing, and supply chain) and has produced a vast literature in a short period of time. In addition, there are continuous calls for more studies to investigate the role of sustainable development at different organizational levels [12]. Despite recent advances in the literature on the sustainable development of creative industries, there is a lack of combined knowledge and a lack of comprehensive literature reviews on the subject.

As Iran is facing various economic challenges, it is imperative to focus on the sustainability of creative industries. These industries are rapidly becoming the most significant revenue generator for the global economy. Moreover, the financial turnover of the creative economy is around 2.7 trillion dollars, which accounts for approximately 6% of the world's gross income. According to global statistics, the volume of creative goods exports was around 510 billion dollars in 2018, with China in the first place with 125 billion dollars. Despite Iran's rich cultural and historical background, the export of creative industries is only around 1 billion dollars [13]. One of the essential factors affecting the sustainable development of creative industries is the presence and level of their digital transformation. The general nature of creative industries in Iran is based on the management, application, analysis, and evaluation of information to propose new products and services by commercializing innovative ideas. Therefore, utilizing creative industries with the aim of producing, upgrading, distributing, or commercializing goods, services, and activities with cultural, artistic, or heritage-based characteristics can play a crucial role in commercializing ideas and branding, as well as contributing to the economy through employment, financial turnover, production growth, and other related areas of the economy. However, this will only be achieved if creative industries can internalize digital transformation. Hence, digital transformation is a continuous process of change resulting from digital technology in companies and society, using the convergence of hard forces (technology) and soft forces (people and businesses). Moreover, its foundation is pervasive computations, flexible connections, and value streams, which create value, social welfare, and productivity for organizations and customers [14]. An international consulting firm has predicted that companies will spend nearly 2 trillion dollars on digital domains by 2022, indicating an annual growth rate of 7.16% compared to 2017. Moreover, the company states that 30% of the most important international companies, including the Forbes list, will allocate at least 10% of their annual revenue to strengthen their digital strategies by 2022 [15]. The COVID-19 pandemic had negative consequences for the creative industries (e.g., job losses, turnover reduction, and disruption of value chains). According to UNCTAD (2022) reports, during the COVID-19 pandemic, approximately 10 million jobs disappeared from the cultural and creative sectors, which contracted by 750 billion dollars globally in 2020. Concretely, before COVID-19 (end of 2019), cultural and creative industries employed more than 7.6 million people in the EU-28, and they have added approximately 700,000 (+10%) jobs, including authors, performers, and other creative workers, since 2013 (EY Consulting, 2021) [16]. Next to this, the shockwaves of the COVID-19 crisis strongly affected all cultural and creative industries. However, due to the current technological changes, it is

anticipated that the creative industries will bounce back and retain the features to become productivity leaders, especially regarding the niches related to the technology-intensive aspects (e.g., services). The scaling up and rapid deployment of artificial intelligence (e.g., Chat GPT) is expected to rapidly change many of the processes, products, business models, and activities in the cultural and creative industries. However, it should be underlined that the emerging transformative artificially intelligent tools raise ethical and legal challenges while unearthing multifold positive and negative impacts for society and individuals [17]. The 2030 Agenda for sustainable development presents the concept of data-driven governance and highlights the challenge to “increase significantly the availability of high-quality, timely, reliable, and disaggregated data by 2030”. Digital transformation is defined as “the profound transformation of business and organizational activities, processes, competencies and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritized way, with present and future shifts in mind” [18].

According to the latest survey conducted by the consulting firm (Compagnia Generale Ripresea and the MIT Sloan Management) on more than 400 large companies in various industries, companies that actively use digital technologies and new management methods are 26% more profitable than their competitors. Furthermore, conservative companies (digital conservatives) have only improved their profits by 9.5% [19]. Therefore, with the emergence of new technologies and changes in traditional business beliefs, organizations must embrace change to avoid being left behind in competition [20]. Through digital transformation, they can increase their profitability and positive social impact while minimizing their adverse environmental effects, leading to sustainability. Given that most creative industries are independent, the whole set falls apart with the departure of the main ideator, or they may not continue with the same quality. From a theoretical perspective, this study contributes to the rich literature on the sustainable development of creative industries based on digital transformation. From a practical perspective, the results of this study can provide solutions for creative industry managers to develop effective planning for the successful implementation of their business ventures. Although previous studies have separately addressed sustainability and digital transformation, no study has thoroughly investigated sustainable development based on digital transformation in creative industries. Given the widespread impact of the COVID-19 pandemic, sustainable development and digital transformation have become central topics in recent years.

This is important, especially after the start of the Corona Virus epidemic, which made businesses seriously realize the necessity and importance of using digital technologies and try to use them to improve their business. Although the use of digital transformation technologies is growing and developing from optional to mandatory, however, unless the organizations reform and recreate their business model from the traditional mode to the digital business model, the use and application of digital technologies will not have a significant impact on their success in the era of digital transformation. For this reason, it is necessary for organizations to innovate their business model based on the era of digital transformation. But in the 21st century, digitalization of businesses is no longer enough. Moreover, it is necessary to pay attention to the challenge of sustainability in addition to the challenge of digital transformation and develop their business model based on both challenges of sustainability and digital transformation [21]. Nonetheless, there is no evidence that demonstrates a comprehensive and cohesive mechanism for sustainable development based on digital transformation in creative industries. Additionally, the related literature indicates a lack of inclusive investigation, making this research innovative. Therefore, the aim of this study is to present a model for the sustainable development of creative industries based on digital transformation.

Previous research has focused more on management actions to increase innovation and competitive advantage; therefore, these actions and attitudes have not been integrated into the attention of researchers. Also, most of the previous research has emphasized the systematic review of sustainable development and digital transformation separately,

and integrated components for these two variables have not been considered. Most of the research has focused on manufacturing industries and software companies, and less research has focused on creative industries. Therefore, this research has innovation and research gaps. So, despite the increasing role of sustainable development for creative industries with a digital transformation approach and the recent research interest in its effects, this stream of literature is largely defragmented and scattered. Therefore, there is an urgent need to review this research area to consolidate what we know and provide future research directions. Without a strong understanding of how sustainable development aligns with a digital transformation approach, creative industries may not be able to benefit from this powerful tool for communication and collaboration and may experience negative effects of digital transformation, such as threats to privacy and negative word-of-mouth. Additionally, there is no research that presents a model for sustainable development of creative industries with a digital transformation approach. To address these gaps, this study aims to propose a model for the sustainable development of creative industries based on digital transformation. One significant research gap is the absence of research on the sustainable development of creative industries. Another gap is the absence of research on digital transformation approaches for creative industries. Therefore, this study aims to examine the relationship between the identification of suitable components by scientific and executive experts. To address these research gaps, this study proposes to integrate insights from the management and entrepreneurship literature. By combining these fields, the study aims to present a model for sustainable development of creative industries with a digital transformation approach. The manuscript's remaining framework can be summarized as follows: Firstly, a comprehensive literature review is provided. Subsequently, an applied research method has been employed for data analysis. Lastly, the conclusions drawn from the study are presented along with potential avenues for future research.

## 2. Theoretical Foundations

Creative industries, including advertising, architecture, fashion, film, music, and video games sectors, have the potential to contribute significantly to sustainable development. Creative industries can generate economic growth, provide employment opportunities, and promote cultural diversity and social inclusion. It is essential to consider social, economic, and environmental factors to achieve sustainable development in creative industries. It can involve adopting sustainable business practices, promoting sustainable consumption patterns, and leveraging digital technologies to improve resource use and reduce waste. For instance, sustainable practices, such as using eco-friendly materials and reducing waste, can help promote sustainable development in the fashion industry [22]. In the video game industry, promoting sustainable consumption patterns (e.g., reducing energy consumption) can help reduce environmental impacts [23]. Finally, leveraging digital technologies, such as big data analytics and artificial intelligence, can help optimize resource use and reduce waste in various creative industries [24]. Overall, achieving sustainable development in creative industries requires a collaborative and integrated approach pertinent to economic, social, and environmental factors [25]. It also requires investment in research and innovation to develop sustainable solutions and promote sustainable consumption patterns [26]. Creative industries are always exposed to risks that can challenge their profitability or even survival. The platform of creative industries should be developed so that it can facilitate the management of these risks. If creative industries deviate from their path with any challenge, there can be no hope for success [27]. Therefore, achieving success has made sustainability more valuable in creative industries [13]. Given the current economic challenges in Iran, the sustainability of creative industries is considered an essential issue. Entrepreneurs lead the production and market process by discovering new opportunities and designing actions to take advantage of them, thereby addressing the economic and social needs of society [28]. Therefore, the emergence of new ideas and the creation of business opportunities are considered integral topics in management and entrepreneurship. However, the speed of communications, environmental instability, unpredictability and complexity of

issues, and lack of sufficient information can lead to dissatisfaction among managers in their decision-making process [29]. In situations where unforeseen changes are increasing, the implementation of digital changes and transformations will play a crucial role in the decision-making process. On the other hand, the business strategies for sustainability are in response to stakeholder needs. In addition, sustainable investment leads to sustainable development by providing economic and social benefits [30].

Furthermore, business sustainability is perceived as an economic vision, business planning, monitoring, evaluation, and establishing communication with customers and a wide range of stakeholders. In this regard, an increasing number of methods and tools have been introduced for business sustainability [31]. According to researchers, the sustainability of businesses is achieved through stability, monitoring, evaluation, and maintaining commercial relationships through active participation in social media in the long term [32]. Thus, creative industries aim to promote communication, business relationships, and sustainability [33]. Therefore, establishing and strengthening collaboration among individuals, continuous improvement, and presenting business ideas among individuals based on the competitive advantage of each business are central issues in the business community. Such issues can make the business situation desirable in the virtual space [34]. In fact, active participation in social media is one of the significant factors in business sustainability in facilitating entrepreneurial activities. Moreover, it also has an impact on the sustainability and provision of essential resources for business sustainability [35].

Additionally, sustainability is a crucial principle for management and includes the sustainable allocation of human resources for financial performance and organizational goals. The nature of sustainability in this process is reducing harm to stakeholders and maximizing the results of business activities [36], contributing to the preservation and improvement of the well-being of current and future generations, as well as ensuring the continuity of cultural values of the past, present, and future [37]. Creative industries are regarded as organizations that play a vital role in the economic cycle of countries and facilitate the economic growth and development of countries. Hence, they require managers who can make timely decisions and take reasonable risks towards achieving sustainability and propose timely responses to turbulent environments. These managers should focus on environmental uncertainty based on their practical experience and executive expertise [38]. Individuals should increase their experience and knowledge as well as upgrade the level of training related to digital changes and sustainability, such as awareness of customer needs and awareness of proper customer service. Consequently, the ability to identify and predict suitable markets, based on knowledge of supply and demand trends in the market, can increase the ability to identify appropriate opportunities for sustainability in turbulent environments [39]. Sustainable competitive development has been recognized as a worthy approach for both economic development and environmental preservation [40]. This approach offers many benefits to companies, such as cost reduction, improving relationships with customers, and providing new opportunities for business growth [41]. The achievement of domestic production goals by the creative industries has also been highlighted as a significant area for innovation [42]. Process-oriented innovation has been identified as a critical driver of sustainable value creation in the creative industries [43]. The development of competition through technology has been identified as a means of increasing competitiveness in the creative industries [44]. Additionally, uncertainty in the market and customer behavior, short product lifecycles, and reducing supply–demand imbalances have been identified as challenges that need to be addressed in the creative industries [45,46]. Creative industries play a significant role in the global economy as engines of innovation and growth. To remain competitive in the rapidly changing global market, creative industries need to adapt quickly to foreign market environments and be responsive to changes in the technological environment [47]. A strategic roadmap for digitalization can help creative industries to develop a comprehensive plan for integrating digital technologies into their operations and to respond quickly to market changes [48]. Developing job descriptions in the field of digital transformation is also crucial to ensure



that the workforce has the necessary skills to implement digital technologies effectively [49]. To upgrade the position of creative industries in the global value chain, it is necessary to outperform competitors by focusing on innovation, design, and creativity. Success in competition among existing brands in the global value chain can be achieved by adapting quickly to changes in consumer preferences and trends and by providing products and services that meet customer needs [50]. Flexibility and freedom in selecting products of creative industries by international customers can be enhanced by providing personalized and customized products and services [51]. Intelligent and automated recognition of new creative products by international customers can be achieved by employing machine learning and artificial intelligence techniques [52]. Direct communication with customers in the global value chain can be facilitated by using social media and other digital platforms to engage with customers and gather feedback and insights [49]. The digital transformation of the creative industries has led to the emergence of new technological opportunities that can be harnessed to develop innovative business models and products. Technological change and the development of digital communication infrastructure have facilitated the growth of digital networking and the standardization of existing technologies, making it easier for companies to collaborate and share knowledge. The development of a digital networking ecosystem can also provide access to resources, such as funding, mentoring, and networking opportunities, which are crucial for the success of digital startups [53]. Social capital refers to the resources embedded in social networks, such as trust, norms, and relationships, that can facilitate cooperation and collaboration [54]. Structural capital refers to the knowledge, processes, and systems that organizations use to create value [55]. In the creative industries, social capital can provide access to resources and expertise that are crucial for success. Collaborative networks and partnerships with other businesses, universities, and support agencies can create a supportive ecosystem for sustainable development [56]. Social capital can also facilitate the exchange of knowledge and the creation of new ideas, which can lead to innovation and enhanced competitiveness [54]. Structural capital, on the other hand, can enhance productivity, creativity, and innovation in the creative industries. Cultural taste refers to the individual's preferences and perceptions of cultural products and activities, while digital technology refers to the use of electronic devices and online platforms in the creation and distribution of cultural content. To meet customers' needs and preferences, creative industries must identify and understand cultural taste and use digital technology to improve the production and distribution of cultural products. This involves modifying and developing cultural content to meet the demands of consumers [57,58]. Creativity and innovation are essential in the creative industries, as they allow for the development of new and unique products and services while preserving cultural and artistic identity. Technical skills development is also important in promoting creativity while maintaining the quality of the products and services. Organizational structure, environment, and social system can also affect creativity and innovation in the creative industries. A flexible and supportive organizational structure and environment can encourage creativity and innovation, while a rigid and hierarchical structure can stifle it [59]. The global challenges faced by creative industries, such as changing consumer demands, cultural diversity, and technological advancements, require urgent and innovative solutions. The use of digital technologies, such as virtual reality and artificial intelligence, can help address some of these challenges [60]. Financial supply management is critical in promoting national and local employment and wealth creation. Regional economic revitalization can be achieved by creatively combining tradition and local resources with innovation. Increased competitiveness can be achieved through entrepreneurial savings, private investment, and resource reallocation. One approach to financial supply management is to encourage entrepreneurial savings. This involves promoting entrepreneurship and providing incentives for individuals to invest in their businesses. Entrepreneurial savings can lead to increased investment, job creation, and economic growth [61].

In recent years, creative industries have been recognized as the primary sources of job creation in developed and developing countries. Creative industries play an essential role

in developing new jobs, innovation, and economic growth; thus, they are more exposed to failure, especially in the early years [62]. Among the factors (strategy, human resources, marketing, etc.) affecting the growth of creative industries, human resources are particularly crucial. This is because the growth of creative industries is driven by creative individuals who effectively allocate resources and take responsibility for nurturing and training other individuals to achieve common goals [63]. Indeed, creativity is a culture-based feature of today's era, and digital technologies enable the development of markets, new customers, and unique competitive advantages. Thus, digital technology changes widely affect cultural products, entrepreneurial activities in creative industries, and the nature of creativity [64].

Digital transformation refers to the acceptance of digital technologies and tools by organizations in a way that transforms internal and external activities and processes. Researchers have proposed various definitions for digital transformation. Nevertheless, digital transformation can be seen as the implementation of transformative technologies in business [65]. In fact, digital transformation is the adoption and deployment of digital technologies in the organization in a way that redesigns products, business processes, sales channels, value chains, and business models [66]. The term "transformation" (as opposed to "change") refers to comprehensive actions that an organization must take. Consequently, it can be stated that digital transformation is a transformative strategy within the scope of the organization, which has a comprehensive view of the opportunities, threats, and risks posed by digital technologies. This strategy guides the organization during its digital transformation [67]. Previous literature suggests that, in the decades after the fall of the communist regime in Central Europe and the transition to a decentralized market economy, the creative industries have been presented with a window of opportunity. These industries, which possess a symbolic knowledge base, are essential for regional resilience. The regional synergies established by these industries have a significant impact on the long-term ability of innovation systems to develop. As a result, creative industries have begun to grow and can contribute to the development of post-socialist knowledge-based economies in Central Europe. By identifying three dimensions (geography, technology, and organization) that operate in innovation systems and using entropy statistics to measure their interactions in Slovakia and Hungary, the study demonstrates that the most significant part of the synergy in creative industries emerges at the local level of innovation systems [68]. The results of Maddah et al. (2021) show creative clusters in promoting competitiveness, innovation, urban development, and growth in developed cities. Specifically, the study focuses on the geography of cultural and creative industries in Barcelona, Spain, for the years 2009 and 2017. The findings suggest that cultural and creative industries do not randomly locate themselves, but they tend to cluster in and around Barcelona's prime districts [69]. Indonesia's creative economy sector has experienced promising GDP growth since 2010, with 70% of businesses being micro, small, and medium enterprises. These enterprises face challenges both internally and externally, necessitating the development of resilience to uncertainties. A competitive advantage can be achieved through a flexible business model that adapts to internal and external changes through periodic evaluation and innovation. Stellar/coronae, a creative industry micro, small, and medium enterprise, faces challenges from new competitors in the crowded red ocean market. They are using the blue ocean strategy to create a new market instead of competing in the existing market. The strategy involves external and internal analysis to identify opportunities and threats and evaluate the current business model's strengths, weaknesses, opportunities, and threats. The resulting analysis is used to eliminate, reduce, raise, and create elements in the existing business model to provide a new value proposition in the blue ocean market [70]. Cultural heritage is important for sustainable development, but its role has been marginalized in international development agendas. This paper provides an interdisciplinary study on the potential of cultural heritage (both tangible and intangible) for sustainable development and reflects on how international policies and narratives on cultural heritage have been implemented. It critically examines the contribution of cultural heritage to global developmental issues, including poverty alleviation, gender equality, and environmental

sustainability. The analysis focuses on three heritage development projects funded by UNESCO between 2008 and 2013 in the Middle East and North Africa, discussing key achievements and common pitfalls. The study sheds light on the multifaceted aspects of cultural heritage for sustainable development and highlights its importance in tackling global challenges [71]. The creative industries are a significant source of job creation and contribute to sustainable livelihood and people's well-being. The study targets government, policymakers, development experts, students in economic development and business, and businesses that promote economic growth and innovation through creativity, entrepreneurship, and the development of creative communities to alleviate poverty and improve the quality of life, especially in rural areas. The Accelerated and Shared Growth Initiative for South Africa (ASGISA) has now recognized that creative industries, particularly the craft and film sectors, are recognized as the drivers of sustainable economic opportunities and livelihoods for local communities in South Africa. At the same time, creative industries are expanding business opportunities for small, medium, and micro enterprises [72].

Therefore, the present research has attempted to apply this concept to the challenges of achieving sustainable development goals, the often-overlooked impacts and opportunities of the creative economy, and implementing them for smaller, developing island countries to become more flexible and robust beyond the blue economy. Accordingly, the following questions are posed in this research:

- (a) Which components are effective in the sustainable development of creative industries based on digital transformation using structural interpretive modeling?
- (b) Which indicators are effective in the sustainable development of creative industries based on digital transformation using structural interpretive modeling?
- (c) What is the relationship model of components effective in the sustainable development of creative industries based on digital transformation using structural interpretive modeling for implementing this concept?

### 3. Materials and Methods

The present study is applied in terms of orientation and descriptive survey in terms of research objectives. The data collection method in this study was fieldwork, which was conducted in June 2023. The data collection methods were interviews and questionnaires. The research community includes managers and owners of creative companies of science and technology parks of Iranian universities (Tehran, Shiraz, Isfahan, and Yazd). These companies with 5 years of experience have faced various crises and managed to remain in the market. The creative company is a new and significant concept in the field of modern businesses and the legal system of Iran, which was established in 2016 by the Vice President of Science and Technology. It was aimed at developing the technology and entrepreneurship ecosystem in the country, creating jobs for young people and providing material and legal support through the regulation document. The implementation of the "Creative Companies Ecosystem Development Program" was introduced and its regulations were formulated. According to this regulation, creative companies refer to innovative private companies and institutions that are either engaged in creative and cultural industries or have used new business models in providing their products and services. Unlike knowledge-based companies, their products are not based on advanced technology. Creative and cultural industries are divided into eight main categories: digital businesses and virtual space, visual and audio industries, handicrafts, tourism and cultural heritage, visual arts and performing arts, games, toys and entertainment, design and architecture, publishing, and medicinal plants and traditional medicine.

In the qualitative section, semi-structured interviews were conducted deeply using the 5w1h technique to answer questions, such as how, why, what, where, who, and when to achieve the interpretive structural model. The interviews were purposefully conducted based on snowball sampling. Nineteen interviews were conducted before no new codes were added to the previous ones. Coding was performed at three levels, i.e., open, axial, and selective coding. In the quantitative section, the components obtained from the selective



codes were placed in the structural interpretive modeling questionnaire. The validity of the questionnaire was evaluated and confirmed through content validity. The experts' and knowledgeable people's opinions on the subject were used to measure the content validity. If there is agreement among different individuals regarding the validity of the test, it has content validity. To answer the research questions, the present study was designed to provide appropriate answers to the questions and a clear display of the procedure of the research stages. The following steps need to be taken to achieve a comprehensive model for implementing sustainable development based on digital transformation in creative industries in Iran and identify the relationship between dimensions through structural interpretive modeling:

Step 1: Identifying components related to sustainable development based on digital transformation in creative industries in Iran: In this regard, researchers by obtaining the opinions of 19 university experts, including faculty members and professors who had experience in creative industries, using the Delphi method. This stage of the research involves conducting interviews to identify the underlying factors that contribute to sustainable development through digital transformation. These factors will be extracted based on the analysis of experts' opinions, leading to the development of an initial list. Theoretical saturation was reached after conducting 19 interviews, which were transcribed by a specialist into word processing documents. The transcripts were reviewed by the interviewers, who made revisions based on their notes and converted verbal expressions into a formal format. The qualitative data were analyzed using open and selected coding processes, which are interconnected and can occur simultaneously. Primary themes were labeled, and categories were developed accordingly. The principal category was extracted based on the relationships among primary categories, which could lead to a theory that illuminates the issue. Several codes were extracted in the open coding stage using a line-by-line approach to analyze the data within and outside the study setting. In the axial coding stage, the codes were integrated based on categorization, and relationships among the codes were explained using selective coding. The researchers compared the primary codes to previous studies to extract new components, which were added to the original list of sustainable development based on digital transformation. The ultimate list of codes was formed after reviewing and analyzing the content and sources. The transcripts were stored in Atlas ti8, which supported data analysis. The analytical measures were conducted using interactive and recursive processes and a higher level of abstraction in axial and open coding until the significant abstract categories were entirely unified, forming a larger scheme where the research results were regarded as a coherent theory. The researchers evaluated sustainable development based on digital transformation using lists No. 1 and 2 and integrated the results of the interviews into other resources to form the final draft of the sustainable development index. Conceptual correspondence was used to categorize the extracted codes. The Delphi method was applied for model development; it involved developing a Delphi panel and identifying samples after providing a comprehensive explanation of the research objectives and problem. The experts received an invitation to comment on the need to add or reduce the proposed components. A questionnaire was developed for creative industries based on the results of previous studies and in-depth exploratory interviews, which was sent to the panel of experts for feedback. The ultimate model of sustainable development based on digital transformation for Iranian creative industries was developed after the experts assessed the items, and the interviews were halted after obtaining data saturation. Eventually, 10 components were approved by the experts out of the 23 identified components.

Step 2: Using structural interpretive modeling to construct the initial model for designing a conceptual model of sustainable development based on digital transformation according to the opinions of university experts: Interpretive structural modeling (ISM) is an interactive learning process introduced by Warfield in 1973 [73]. The term "interpretive" in this technique refers to the fact that ISM is a group judgment in which decisions are made about the possible relationships among factors and the nature of such relationships [74].

The ISM methodology helps to establish order in complex relationships between the elements of a system. The ISM model identifies internal relationships between variables and analyzes the impact of one variable on other variables.

Additionally, ISM can prioritize and determine the level of elements in a system, which helps managers implement the designed model more efficiently. The researchers used structural interpretive modeling with four dimensions to achieve the desired model:

(a) Identifying components: In this regard, researchers identified components and relevant indicators with the concept of sustainable development; they used digital transformation by conducting a literature review in the field of sustainable development based on digital transformation and obtaining the opinions of 19 university experts. Consequently, 13 components were identified from all related articles and experts' opinions. Since these components were scattered and sometimes ambiguous, the researchers formed a focus group to modify and standardize them. Ultimately, the number of practical components of sustainable development based on digital transformation in creative industries in Iran was reduced to 10 components.

(b) Preparation of a questionnaire and completion by university experts: The tool used in this stage is a questionnaire consisting of the final 10 identified components. The respondents, including 19 experts, were asked to determine the relationships between the factors by comparing them pairwise (no relationship, one-way relationship, and mutual relationship).

(c) Formation of the self-interaction matrix: The relationship between the influential components of sustainable development based on digital transformation in creative industries in Iran is obtained using this matrix. Moreover, the relationships displayed in Table 1 are used to obtain this matrix.

**Table 1.** If i leads to j: V If j leads to i: A Bilateral effect X Absence of relationship: O.

T	G	F	C	j	i
O (4)	X (3)	A (2)	V (1)	X	

X leads to C.2. F leads to X3. Both G leads to X and X leads to G.4. There is no relationship between X and T.

(d) Creating the initial attainability matrix: This matrix is formed based on the self-interaction matrix and using the following relationships:

1. If cell (j,i) in the self-interaction matrix is marked with the V symbol, the corresponding cell in the attainability matrix takes the value of 1, and the corresponding cell, i.e., cell (i,j), takes the value of 0.

2. If cell (j,i) in the self-interaction matrix is marked with the A symbol, the corresponding cell in the attainability matrix takes the value of 0, and the corresponding cell, i.e., cell (i,j), takes the value of 1.

3. If cell (j,i) in the self-interaction matrix is marked with the X symbol, the corresponding cell in the attainability matrix takes the value of 1, and the corresponding cell, i.e., cell (i,j), takes the value of 1.

4. If cell (j,i) in the self-interaction matrix is marked with the O symbol, the corresponding cell in the attainability matrix takes the value of 0, and the corresponding cell, i.e., cell (i,j), takes the value of 0.

(e) Formation of the final attainability matrix: Given the interactions between the elements, it is necessary to make the initial attainability matrix compatible. Hence, the initial matrix should be raised to the power of  $K + 1$  to achieve a steady state ( $M^k = M^{(K + 1)}$ ). In this way, some of the zero elements will become 1, which are denoted by (1\*).

(f) Determining the relationships and levels between the components: After determining the attainable set (output) and prerequisite set (input) for each element as well as the common set by finding the intersection of these two sets, the elements with the same attainable set are assigned the first priority level. The level of all elements is determined by removing these elements and repeating this process for the remaining elements. Based

on the levels determined and the final attainability matrix, the research model is drawn. It should be noted that in this study, the opinions of 19 experts were used to fill out the questionnaires of the structural equation modeling. In the analysis of penetration power, the sum of the row values in the final attainability matrix for each element indicates the level of penetration, and the sum of the column values indicates the level of dependence. Based on these two factors, four groups of elements can be identified, including autonomous, independent, linkage, and dependent variables.

Step 3: Model validation using CVR: The model created through ISM was validated by scientific and executive experts. Moreover, since no conceptual model has been proposed for sustainable development based on digital transformation in creative industries in Iran, the researchers decided to validate their proposed model.

Step 4: Presenting a comprehensive model for sustainable development based on digital transformation in creative industries in Iran: After testing and validating the model, it can be implemented by experts in the field. This innovative concept can lead to the development and growth of creative industries in Iran, while promoting sustainable development through digital transformation.

#### 4. Results

According to the results of the research, the demographic characteristics of the interviewees are presented in Table 2.

**Table 2.** Demographic characteristics.

Interviewee Code	Age	Gender	Education	Type of Industry	Executive History
E1	39	Female	PhD	Literature and Cultural Products	11
E2	53	Man	Bachelor's degree	Crafts	21
E3	47	Man	Bachelor's degree	Literature and Cultural Products	17
E4	51	Man	Bachelor's degree	Crafts	23
E5	43	Female	Master's degree	Crafts	15
E6	39	Man	PhD	Fashion Industry	19
E7	47	Female	Bachelor's degree	Fashion Industry	17
E8	56	Man	Master's degree	Literature and Cultural Products	31
E9	63	Man	Bachelor's degree	Digital Games	27
E10	71	Man	Bachelor's degree	Digital Games	43
E11	58	Man	Bachelor's degree	Crafts	37
E12	36	Man	PhD	Visual Arts	8
E13	61	Man	PhD	Literature and Cultural Products	31
E14	57	Man	PhD	Crafts	29
E15	59	Man	Master's degree	Visual Arts	19
E16	48	Man	PhD	Visual Arts	25
E17	38	Man	PhD	Digital Games	18
E18	43	Female	Master's degree	Digital Games	13
E19	47	Man	Bachelor's degree	Crafts	27

Since the collected data were examined qualitatively and quantitatively, the research findings are divided into two qualitative and quantitative sections. Accordingly, the researchers identified the practical components of sustainable development based on digital transformation at different levels by reviewing the background in the research area and interviewing experts. As the identified factors were scattered in each study and identified by each researcher, there was a need for a new classification to achieve the research goal. Therefore, the focus group consisted of nine interviewees, which included professors and managers of selected creative industries. Three of them were women and six were men. Three people had a doctorate degree in the field of management and two people had a doctorate degree in entrepreneurship. Three people have a master's degree and one person has a bachelor's degree. One person is working in the fashion industry, three people are working in the cultural industries, two people are working in the literature and cultural

products industry, one person is working in digital games, and two people are working in visual arts. This meeting was held online on the Skype platform. People with more than 5 years of work experience were working in different groups of creative industries. Ten components were finally identified, which are given in Table 3. After identifying the final 10 components, the researchers designed a structural interpretive modeling questionnaire among university experts.

**Table 3.** Components and indicators of sustainable development based on digital transformation in Iran's creative industries (research results).

Components	Indicators	Selective Codes
Sustainable Competitive Development	Sustainable Value Creation	Creating Sustainable and Added Value in Creative Industries
		Realization of Domestic Production Goals by Creative Industries
		Process-Oriented Innovation
	Sustainable Competitive Advantage	Developing Competitiveness through Technology in Creative Industries
		Increasing the Competitive Potential between Creative Industries
	Competitive Environment	Market Uncertainty
		Uncertainty of Customer Behavior
		Short Product Life Cycle
Stabilization and Freezing	Organizational Barriers	Reducing the Mismatch between Supply and Demand
		Employee Resistance to Change
		Lack of Indigenous Technology Development
		Lack of Transparency about the Economic Benefits of Digital Investment
	Legal Barriers	Inequality of Opportunities and Risks of Digitalization
		Lack of Legal Provisions to Manage Cybercrime and Information Theft
		Inefficient Regulations on Work and Employment
		Lack of Legal Provisions to Manage Data Ownership and Copyright
	Technological and Infrastructure Barriers	Failure to Comply with Legal Requirements
		Lack of Technical Standards
		Lack of Information Security and Privacy Protection

Table 3. Cont.

Components	Indicators	Selective Codes
Drivers of Sustainable Development	Individual Stimuli	Demographic Factors (Age/Experience/Gender, etc.)
		Psychological Factors
		Social Orientation and Altruism
	Management Development	Awareness of Digitization of Management and Commitment to It
		Development of a Real-Time Performance Monitoring System
		Collaborate with Business Partners and Support Agencies
		Foreign Participation and Cooperation
	Digital Governance	Commitment to Respond to Stakeholder Pressure
		Registration of Intellectual and Intellectual Property Rights
		Patents and Procedures
Cultural Taste of Digital Technology	Cultural–Social Norms	Taste and Taste in Choosing and Recognizing the Way to Meet the Needs of Customers
		Cultural Reform and Development of Digital Technology
		Defense of Cultural Values of Digital Technology
		The Organization’s Openness to New Technology
		Development of Market-Oriented Attitudes to Solve Social Problems
		Interaction and Transmission of Cultural Content
	Dual Tradition–Modernity	Tradition as a Source of Inspiration for Creative Industries
		Modern Technology as a Source of Inspiration for Creative Industries
		Historical and Cultural Conditions of the Region as a Source of Inspiration for Creative Industries
	Ethics	Respect for Social–Cultural Facts and Truths
		Respecting the Dignity of Actors in the Field of Creative Industries
		Observance of Justice and Fairness in Cultural and Social Issues



Table 3. Cont.

Components	Indicators	Selective Codes
Structural Social Capital	Formal Participation	Participation in Economic Institutions
		Participation in Social Institutions
		Participation in Environmental Institutions
		Participation in Service Institutions
	Informal Partnership	Participation in Charity Associations
		Participation in Literary and Artistic Groups
		Participation in Scientific Associations
Environmental and Industrial Intelligence	Strategic Business Development	Faster Adaptation to the Environment of Foreign Markets
		Attention to Rapid Changes in the Technological Environment
		Strategic Roadmap for Digitalization
		Quick Response to Market Changes
		Development of Job Description in the Field of Executive Activity of Digital Transformation
	Maintaining Industrial Competitiveness	Improving the Position of Creative Industries in the Value Chain in the Global Market
		Overtaking Competitors in the Value Chain in the Global Market
		Success in Competition Between Brands in the Value Chain in the Global Market
	Smart Decision-Making	Flexibility and Freedom in Choosing Creative Industries Products by International Customers
		Intelligent and Automatic Detection of New Creative Industries Products by International Customers
		Unmediated Communication with Customers in the Value Chain in the Global Market

Table 3. Cont.

Components	Indicators	Selective Codes
Digital Work Environment	Development of Human Resource Management	Development of Individual Mentoring Characteristics
		Recruitment of Artistic Professionals
		Development of Specialized Knowledge and Skill Enhancement
		Digital Education and Learning
		Employees' Perception of the Work Environment that Supports Digital Transformation
		Focus on the Digital Organizational Climate
	Treasury of Talents	Identification and Cultivation of Talents in the Master-Apprentice System
		Identification and Cultivation of Talents in the Higher Education System
		Enthusiastic Employee Engagement through Improved IT Experience
		Providing a Suitable Platform for Digital Ideation
Creativity and Innovation	Double Creativity Skill	Creativity while Preserving Artistic Cultural Identity
		Strengthening Technical Skills While Maintaining Creativity
	Social Innovation	Interaction Between Organizational Structure, Environment, and Social System
		Creative and Innovative Solutions to Deal with Social Issues of Creative Industries
		Global Problems of Creative Industries Need Urgent Solutions
		Creating New Ways to Develop and Improve Products and Services
Funding Management	Economic Values	Creating Employment and National and Local Wealth
		Economic Revitalization of the Region by Combining Tradition and Local Resources with Creativity
		Increase Competitiveness
	Support and Financial Support	Entrepreneurial Savings
		Private Investment
		Acceptance of Re-Allocation of Resources

Table 3. Cont.

Components	Indicators	Selective Codes
Digital Technological Entrepreneurship Ecosystem	Digital Technology Infrastructure	Taking Advantage of New Technological Opportunities
		Technology Change
		Digital Communication Infrastructure
		Development of Digital Networking
	Technical Competence of Digitization	Standardization of Existing Technologies
		Matching Products with Innovative Digital Business Model
		Digitalization Knowledge and Expertise
		Competence of Knowledge of Information Technology and Digitalization
	Technological Readiness	Willingness to Adopt New Technologies at Work
		Having Digital Skills to Use New Technology
	Entrepreneurial Orientation	Company Reputation
		Green Entrepreneurship Trend
		Branding and Development of Creative Industries
		Commercialization of Creative Ideas

As displayed in Table 3, 10 components were identified and verified by scientific and executive experts. These components include sustainable competitive development (sustainable value creation, sustainable competitive advantage, and competitive environment), consolidation and freeze component (organizational barriers, legal barriers, and technological and infrastructural barriers), sustainable development stimulus component (individual incentives, managerial development, and digital governance), digital technology taste component (cultural–social norms, tradition–modernity duality, and ethics), structural social capital component (formal participation and informal participation), environmental and industrial intelligence component (strategic business development, industrial competitiveness, and intelligent decision-making), digital work environment component (human resource development management and talent repository), creativity and innovation component (creativity skill and social innovation), financial supply management component (economic values and financial support and backing), and digital entrepreneurial ecosystem component (digital technology infrastructure, digital literacy, entrepreneurial readiness, and entrepreneurial direction).

Using the above table, the primary accessibility matrix was formed, and then, the final accessibility table was obtained based on it, as given in Table 4.

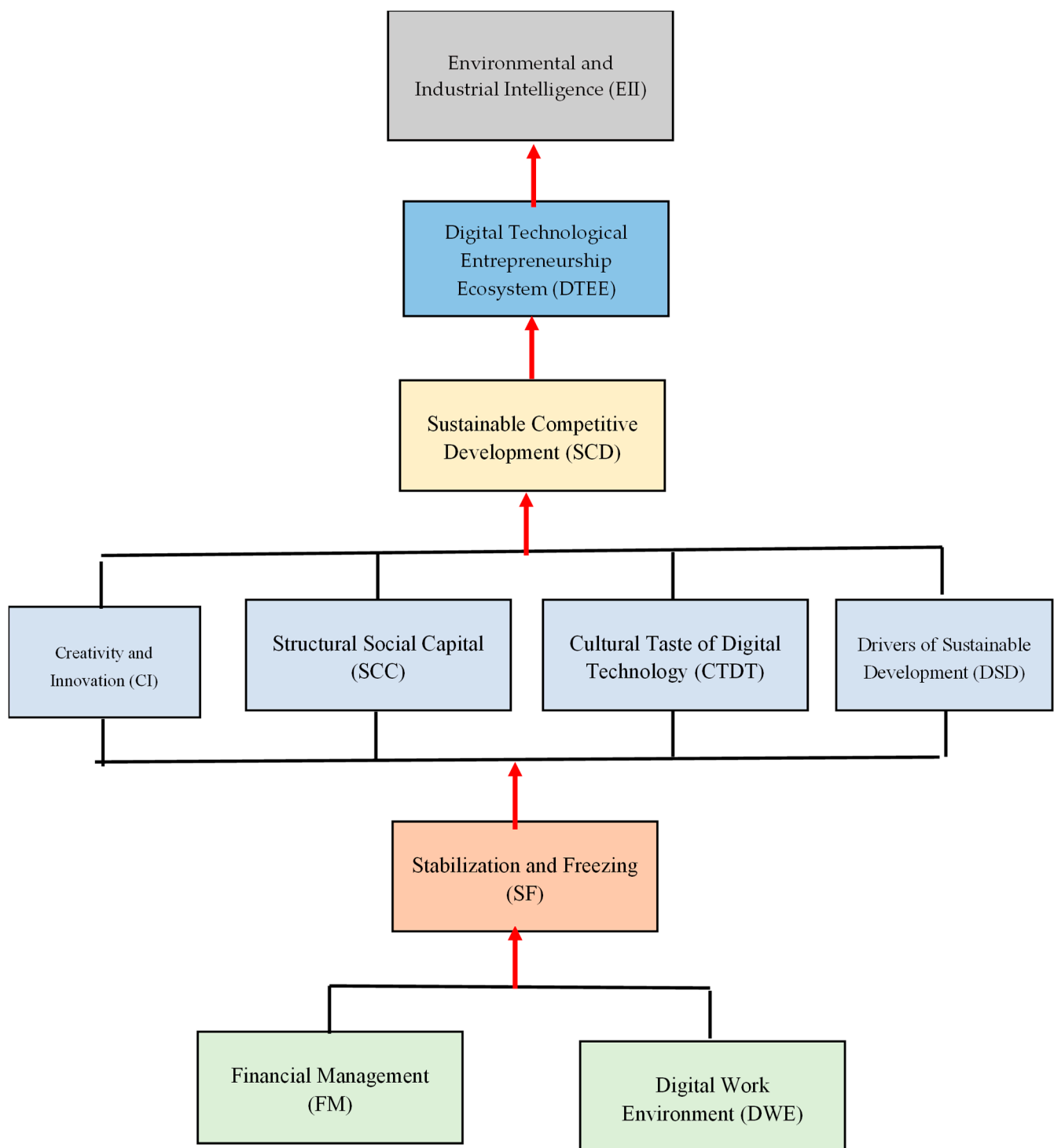
Determining the component levels: It is necessary to identify a common and accessible set (as specified in Table 5) to determine the levels of the dimensions accordingly. The interpretive structural model and the penetration-dependence diagram are drawn based on the data from Table 4 and the interpretive structural model shown in Figure 1. As shown in Figure 2, the sustainable development model based on digital transformation is classified into six levels.

**Table 4.** Final attainment matrix (research results).

Components	(SCD)	(SF)	(DSD)	(CTDT)	(SCC)	(EII)	(DWE)	(CI)	(FM)	(DTEE)	Influence
Sustainable Competitive Development (SCD)	1	0	0	0	0	1	0	0	0	1	3
Stabilization and Freezing (SF)	1	1	1	1	1*	1	0	1*	0	1	8
Drivers of Sustainable Development (DSD)	1	0	1	1	1	1	0	1	1*	1	8
Cultural Taste of Digital Technology (CTDT)	1	0	1	1	1	1	0	1*	0	1	7
Structural Social Capital (SCC)	1	0	1	1*	1	1	0	1	1*	1	8
Environmental and Industrial Intelligence (EII)	0	0	0	0	0	1	0	0	0	0	1
Digital Work Environment (DWE)	1	1	1	1	1*	1	1	1	1*	1	10
Creativity and Innovation (CI)	1	0	1	1*	1*	1	1*	1	1	1	9
Financial Management (FM)	1	1*	1	1	1	1	1	1	1	1	10
Digital Technological Entrepreneurship Ecosystem (DTEE)	0	0	0	0	0	1	0	0	0	1	2
<b>Dependency</b>	<b>8</b>	<b>3</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>10</b>	<b>3</b>	<b>7</b>	<b>5</b>	<b>9</b>	

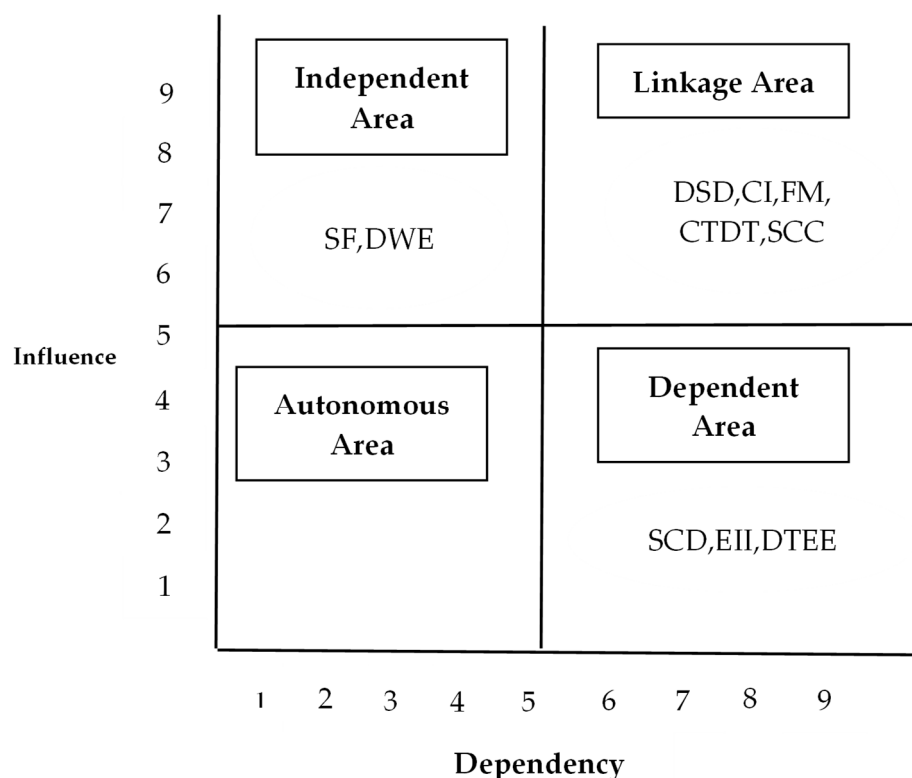
**Table 5.** Determination of model levels (research results).

Components	Achieving Set	Antecedent Set	Common Set	Level
Sustainable Competitive Development (SCD)	(SCD), (EII), (DTEE)	(SCD), (SF), 3, (CTDT), (SCC), (DWE), (CI), (FM)	(SCD)	Fourth
Stabilization and Freezing (SF)	(SCD), (SF), (DSD), (CTDT), (SCC), (EII), (CI), (DTEE)	(SF), (DWE), (FM)	(SF)	Second
Drivers of Sustainable Development (DSD)	(SCD), (DSD), (CTDT), (SCC), (EII), (CI), (FM), (DTEE)	(SF), (DSD), (CTDT), (SCC), (DWE), (CI), (FM)	(DSD), (CTDT), (SCC), (CI), (FM)	Third
Cultural Taste of Digital Technology (CTDT)	(SCD), (DSD), (CTDT), (SCC), (EII), (CI), (DTEE)	(SF), (DSD), (CTDT), (SCC), (DWE), (CI), (FM)	(DSD), (CTDT), (SCC), (CI)	Third
Structural Social Capital (SCC)	(SCD), (DSD), (CTDT), (SCC), (EII), (CI), (FM), (DTEE)	(SF), (DSD), (CTDT), (SCC), (DWE), (CI), (FM)	(DSD), (CTDT), (SCC), (CI), (FM)	Third
Environmental and Industrial Intelligence (EII)	(EII)	(SCD), (SF), (DSD), (CTDT), (SCC), (EII), (DWE), (CI), (FM), (DTEE)	(EII)	Sixth
Digital Work Environment (DWE)	(SCD), (SF), (DSD), (CTDT), (SCC), (EII), (DWE), (CI), (FM), (DTEE)	(DWE), (CI), (FM)	(DWE), (CI), (FM)	First
Creativity and Innovation (CI)	(SCD), (DSD), (CTDT), (SCC), (EII), (DWE), (CI), (FM), (DTEE)	(SF), (DSD), (CTDT), (SCC), (DWE), (CI), (FM)	(DSD), (CTDT), (SCC), (DWE), (CI), (FM)	Third
Financial Management (FM)	(SCD), (SF), (DSD), (CTDT), (SCC), (EII), (DWE), (CI), (FM), (DTEE)	(DSD), (SCC), (DWE), (CI), (FM)	(DSD), (SCC), (DWE), (CI), (FM)	First
Digital Technological Entrepreneurship Ecosystem (DTEE)	(EII), (DTEE)	(SCD), (SF), (DSD), (CTDT), (SCC), (DWE), (CI), (FM), (DTEE)	(DTEE)	Fifth



**Figure 1.** Interpretive structural model of sustainable development based on digital transformation in creative industries in Iran (research results).





**Figure 2.** Influence–dependence power diagram (research results).

To draw the influence–dependence power diagram, the values of influence and dependence from the final attainability matrix (Table 5) were used, which are shown in Figure 2.

#### Reliability and Validity

Content validity refers to the extent to which different individuals agree on the accuracy and relevance of a given test [75]. In this article, the content validity ratio (CVR) index was used to determine the content validity of a questionnaire. The questionnaire was designed based on the components extracted from Table 3 and was sent to nine experts and professionals in sustainable development through digital transformation. The objectives of the test were clarified, and researchers proposed operational definitions relevant to the content of the questions. The experts were asked to categorize each question based on Likert's three-point scale, which included "the component is necessary", "the component is useful but not necessary", and "the component is not necessary". The CVR was then calculated using Formula (1), and the results are presented in Table 6.

$$CVR = \frac{\text{Number of experts who have selected the item "necessary"} - \frac{\text{Total number of experts}}{2}}{\frac{\text{total number of experts}}{2}} \quad (1)$$

Table 6 presented the calculated CVR values for each question in the questionnaire. Questions with a CVR value below the desired amount were excluded from the test due to their unacceptable content validity. As the number of experts in the present study is nine, according to Table 6, the items whose CVR index is below 0.78 were excluded from the questionnaire. In addition to the CVR index, experts discussed the merging and overlapping of items to provide logical reasons for removing certain components. During these discussions, the experts noted that the number of components was too large and their length was excessive. Moreover, some components overlapped with others, leading to confusion and redundancy.

**Table 6.** Minimum acceptable CVR value based on the number of evaluating professionals.

Number of Experts	CVR Value	Number of Experts	CVR Value	Number of Experts	CVR Value
5	0.99	11	0.59	25	0.37
6	0.99	12	0.56	30	0.33
7	0.99	13	0.54	35	0.31
8	0.75	14	0.51	40	0.29
9	0.78	15	0.49		
19	0.62	20	0.42		

Table 7 displays the intercoder reliability coefficient, which was calculated to be 79%. In addition to this measure, experts proposed their opinions regarding the reliability of the present research. The following formula was used to assess the reliability:

$$\text{Reliability} = (\text{Number of agreements}) / (\text{Number of agreements} + \text{Number of disagreements}) \quad (2)$$

**Table 7.** Reliability coefficient.

Components	Reliability Coefficient	Weight of Each Component	Reliability Coefficient: Weight of Each Indicator	Reliability Coefficient Average
Sustainable Competitive Development (SCD)	0.873	0.841	0.734	0.79
Stabilization and Freezing (SF)	0.921	0.736	0.678	
Drivers of Sustainable Development (DSD)	0.813	0.869	0.706	
Cultural Taste of Digital Technology (CTDT)	1.12	0.835	0.935	
Structural Social Capital (SCC)	1.3	0.823	1.07	
Environmental and Industrial Intelligence (EII)	0.941	0.906	0.852	
Digital Work Environment (DWE)	0.753	0.94	0.708	
Creativity and Innovation (CI)	0.861	0.753	0.648	
Financial Management (FM)	0.819	0.748	0.613	
Digital Technological Entrepreneurship Ecosystem (DTEE)	0.97	0.947	0.918	

This formula enabled the researchers to determine the level of agreement among the experts regarding the research findings.

## 5. Discussion

Based on the analysis of the penetration-dependence diagram, examining the nature of variables can lead to a better understanding of those variables. This analysis can be performed as follows:

**Autonomous Area:** These dimensions have high penetration power but weak dependence. These variables are almost separated from the model, as they have weak connections to the model. Nonetheless, such dimensions are not included in the sustainable development model based on digital transformation in Iran's creative industries, indicating a strong relationship between the dimensions in the model.

**Dependent Area:** These dimensions have weak penetration power but strong dependence. These dimensions are mainly the results of the model, where many factors are involved in creating them, and they cannot be a basis for other variables. Accordingly, the components of sustainable competitive development, environmental and industrial intelligence, and digital entrepreneurial ecosystem are located in this area. Companies are required to employ sustainable technologies in their processes and pay attention to innovative and creative approaches, which can help solve environmental and social problems. It also results in the achievement of sustainable competitive development [76]. Furthermore, sustainable competitive development requires collaboration between industry, university, and government to be comprehensively and harmoniously promoted [77]. Finally, companies need to focus on continuous analysis and management of the social, environmental, and economic aspects of their business to develop sustainable competitive development [78]. Creating sustainable value and added value in the creative industries has been emphasized in recent research from an innovation-based perspective [79,80].

Environmental intelligence and industrial intelligence are crucial topics in the context of sustainable development. Environmental intelligence refers to implementing technology and data to monitor and manage environmental issues, such as air and water quality, waste management, and energy consumption [81]. Industrial intelligence, on the other hand, is the application of data analytics and machine learning techniques to improve manufacturing processes and production efficiency [82]. The integration of environmental and industrial intelligence can lead to the development of smart and sustainable manufacturing systems that optimize resource utilization, reduce waste and pollution, and enhance productivity [83]. However, the implementation of environmental and industrial intelligence faces challenges, such as data privacy and security, high costs, and a lack of skilled personnel [84]. Hence, it is necessary to establish policies and regulations that promote the development and adoption of environmental and industrial intelligence technologies, as well as invest in education and training programs for the workforce [83].

The integration of various stakeholders, including entrepreneurs, investors, universities, government agencies, and innovation hubs, can create a supportive ecosystem for digital entrepreneurship in the creative industries. It can provide access to resources, such as funding, mentoring, and networking opportunities, which are crucial for the success of digital startups [85]. Collaboration and coordination among stakeholders and the creation of a supportive policy and regulatory framework are necessary to develop a successful ecosystem. The combination of digital technologies, such as artificial intelligence and blockchain, can enable new forms of creative expression and business models, leading to new opportunities for growth and expansion [86]. It is essential to have digital knowledge and expertise to take advantage of new technological opportunities and develop innovative digital business models. Digital skills are necessary to adopt innovative technologies and develop products that align with digital business models. In addition, companies need to build their reputation and brand to attract customers and investors and to differentiate themselves from competitors [87]. The trend towards green entrepreneurship has also become increasingly important in the creative industries, with a focus on developing sustainable and environmentally friendly products and services. To develop such products, companies need to have digital skills and expertise in digitalization and standardization of processes [88]. Moreover, the commercialization of creative ideas has become a priority for many companies in the creative industries. Accordingly, companies need to develop innovative digital business models in line with their products and services [53]. The development of a digital networking ecosystem can also provide access to resources and expertise that can assist with the commercialization of ideas. In conclusion, the digital transformation of the creative industries has created new technological opportunities that could be harnessed to develop innovative digital business models and products. Digital knowledge and expertise, digital skills, reputation building, green entrepreneurship, and commercialization of creative ideas are essential components of this transformation. The

development of a digital networking ecosystem can also prepare the ground for resources and expertise that are crucial for success in this transformation.

**Linkage Area:** Variables with high influence and dependence are located in this area. The variables in this area are unstable, and any potential changes can affect them as well as other variables. According to the results of this article, the components of sustainable development stimulus, structural social capital, creativity and innovation, financial supply management, and digital technology taste are located in this area. Sustainable development in the creative industries is influenced by various factors (demographic, psychological, and social). Demographic factors, such as age, experience, gender, and education, can affect the adoption of digital technologies and the ability to innovate [89]. Psychological factors, such as creativity, motivation, and risk-taking propensity, are also essential in the creative industries [54]. Social orientation and type of friendship can also influence sustainable development in the creative industries. Here, the meaning of social orientation and altruism refers to a behavior whose purpose is to benefit others. Voluntary and conscious helping others is one of the basic necessities of daily social relations, which, according to some researchers, is decreasing in contemporary societies. It is one of the important social issues, especially in urban environments. Collaborative networks and partnerships with other businesses and support agencies can provide access to resources and expertise essential for success [85]. International cooperation and collaboration can also enhance innovation and competitiveness in the creative industries [90]. Digital literacy and commitment to digital management are crucial for sustainable development in the creative industries. Digital technologies can enhance creativity and productivity, but their adoption and effective use require digital literacy and a commitment to digital management [91]. A performance monitoring system can also help to track progress towards sustainable development goals [92]. Intellectual property protection (e.g., registering trademarks, patents, and copyrights) is essential for sustainable development in the creative industries. It can protect the value of innovative ideas and products and encourage innovation [93].

Social and structural capital are two essential forms of capital that can contribute to sustainable development in creative industries. Knowledge management, intellectual property protection, and investment in research and development are all examples of structural capital that can contribute to sustainable development [94]. To fully realize the potential of social and structural capital, it is necessary to establish policies and regulations that promote collaboration and knowledge exchange, as well as invest in education and training programs for the workforce. Furthermore, developing a digital networking ecosystem can facilitate access to resources and expertise. It is essential to succeed in the digital transformation of the creative industries. In conclusion, social and structural capital can contribute to sustainable development in the creative industries. Establishing policies and regulations, investing in education and training programs, and developing a supportive ecosystem are crucial for success in this transformation. Social and structural capital can be developed through participation in various institutions, including economic, social, environmental, service, charitable, literary and artistic, and scientific associations. These forms of participation can contribute to the sustainable development of the creative industries. Participation in economic institutions, such as business networks and trade associations, can promote access to resources and expertise. These institutions can facilitate the exchange of knowledge and the creation of new ideas, leading to innovation and enhanced competitiveness [54,95]. Participation in social institutions, such as community organizations and clubs, can build social capital by creating opportunities for networking and collaboration. These institutions can also direct organizations toward success by promoting access to resources and expertise [55]. Participation in environmental institutions, such as conservation groups and sustainability initiatives, can foster the development of structural capital by promoting innovation and creativity in the development of sustainable products and services [96]. Participation in service institutions, such as volunteer organizations and community service groups, can build social capital by fostering the development of relationships and trust. These institutions can also provide opportunities for the development

of skills and expertise that are essential for success in the creative industries [54]. Similarly, participation in charitable organizations, such as non-profit organizations and foundations, can contribute to the development of social capital by creating opportunities for collaboration and networking [55]. Engagement in literary and artistic groups, such as writing and art groups, can build social capital by fostering the development of relationships and trust. These groups can also provide opportunities for the exchange of knowledge and the creation of new ideas, which can lead to innovation and enhanced competitiveness [91]. Participation in scientific associations, such as academic and research organizations, can contribute to the development of structural capital by promoting innovation and creativity in developing new technologies and products.

Cultural taste and digital technology are two important factors that can contribute to the development and success of the creative industries. The development of digital technology has also led to changes in cultural development. The creative industries must adapt to these changes and use digital technology to improve cultural development and address issues related to cultural values, openness to new technology, and market-oriented approaches [97]. Creative industries are also responsible to defend cultural values and promote respect for social-cultural realities. It involves promoting cultural diversity and protecting cultural heritage while respecting the dignity of creative actors and promoting justice in cultural-social issues [98]. Tradition and modern technology can both serve as sources of inspiration for the creative industries. Historical and cultural conditions can also inspire the development of cultural content. Moreover, the creative industries must ensure that they interact with cultural content in a way that respects the dignity of creative actors and promotes justice in cultural-social issues [99]. In conclusion, cultural taste and digital technology are essential factors in the success of the creative industries. Industries must adapt to changes in cultural development and use digital technology to meet customers' needs and preferences. They must also defend cultural values, promote cultural diversity, and respect social-cultural realities while drawing inspiration from tradition, modern technology, and historical and cultural conditions.

Private investment is another central factor in financial supply management. Private investors can provide funding for new businesses and projects, leading to job creation and increased economic activity. Public-private partnerships can also be effective in promoting economic growth. Resource reallocation is another effective strategy for financial supply management. Economic growth can be stimulated by reallocating resources from less productive sectors to more productive ones. It can involve promoting the development of creative industries, which can generate new jobs and contribute to regional economic revitalization [100]. One example of the innovative combination of tradition and local resources is the promotion of cultural tourism. This involves leveraging local culture and traditions to attract tourists and generate economic activity. Cultural tourism can also contribute to preserving local heritage and traditions [101]. Consequently, financial supply management is critical in promoting national and local employment and wealth creation, which can be achieved through entrepreneurial savings, private investment, and resource reallocation. The creative combination of tradition and local resources can also contribute to regional economic revitalization and increased competitiveness.

Innovative solutions can also be used to address social issues in the creative industries. For example, utilizing recycled materials in product design can contribute to environmental sustainability, while developing accessible and inclusive products and services can promote social inclusion [102]. Creative industries may also propose new ways of developing and improving products and services. For example, using co-creation and collaboration between different industries can lead to the development of new and innovative products and services [103]. In conclusion, creativity and innovation are crucial in the creative industries, and technical skills development is essential in maintaining the quality of products and services. A flexible and supportive organizational structure and environment can encourage creativity and innovation, and innovative solutions can be used to address social issues. The use of digital technologies and collaboration between different industries



can also help address global challenges and lead to the development of new and innovative products and services.

**Independent Area:** Variables with high influence but low dependence belong to this area. Since these are key variables that form the foundation of the model, they must be prioritized first to initiate the system's operation. In this model, the stabilization and freezing components and the digital work environment are located in this area. Now, considering the importance of the independent area in Figure 2 and also based on Figure 1, managers can focus on the stabilization and freezing components and the digital work environment in order to achieve sustainable development based on digital transformation in Iran's creative industries. Consolidation and freeze can occur in the creative industries due to various factors, including employee resistance to change, lack of native technology development, and a lack of transparency about the economic benefits of digital investment. These issues can lead to inequality of opportunities and digital threats, such as cybercrime and information theft. The lack of legal regulations to manage cybercrime and information theft can also contribute to the consolidation and freeze of the creative industries. Ineffective principles on labor and employment can also hinder growth and development in the industry [104]. Furthermore, the lack of legal regulations to manage data ownership and copyright can discourage innovation and creativity in the industry. Non-compliance with legal requirements, such as technical standards, can lead to consolidation and freeze. Information security and privacy protection are also critical for the creative industries. The lack of technical standards and information security can lead to the leakage of intellectual property and other forms of cybercrime. In conclusion, consolidation and freeze in the creative industries can be caused by various factors, such as employee resistance to change, lack of native technology development, and a lack of transparency about the economic benefits of digital investment. Furthermore, the lack of legal regulations to manage cybercrime and information theft, ineffective regulations on labor and employment, and the lack of legal principles to manage data ownership and copyright can also contribute to this issue. Technical standards, information security, and privacy protection are critical for the growth and development of the creative industries.

The digital work environment requires specialized skills and knowledge, and promoting individual features through mentoring, technical knowledge development, and skill enhancement is essential for success in the creative industries [38]. Attracting professional artistic experts to the digital work environment can also enhance creativity and innovation. Digital training and learning are crucial for the growth and development of the creative industries. Improving employee perceptions of a supportive digital work environment can also contribute to a positive organizational culture and encourage talent identification and development in mentorship systems [105]. Talent identification and development in higher education systems can also help address the skills gap in the creative industries. Highlighting enthusiastic employee participation through improving the digital technology experience and providing suitable platforms for digital ideation can also enhance creativity and innovation [106]. In conclusion, the digital work environment requires specialized skills and knowledge, and developing individual features through mentoring, technical knowledge development, and skill enhancement is essential for success in the creative industries. Attracting professional artistic experts, digital training and learning, employee perceptions of a supportive digital work environment, digital organizational culture, talent identification and development in mentorship systems, talent identification and development in higher education systems, and enthusiastic employee participation through improving digital technology experience and providing suitable platforms for digital ideation are critical for growth and development in the creative industries.

## 6. Conclusions

The development of sustainable creative industries based on digital transformation in Iran is of utmost significance in today's world. With the increasing shift toward digitalization and online platforms, it is crucial for creative industries in Iran to prepare for

growth and development in the digital environment. In this context, developing sustainable creative industries based on digital transformation can serve as a primary solution. To achieve sustainable development in creative industries based on digital transformation, it is imperative to first focus on promoting digital infrastructure. It includes digital communications, necessary technologies, and information security, which serve as the foundation for the development of creative industries in the digital sphere. Moreover, developing essential skills required for working in the digital environment is equally important. Appropriate educational programs should be designed and implemented for individuals working in creative industries, which should include the development of technical and software skills necessary for thriving in the digital world. Furthermore, the support system for creative industries should contribute to sustainable development and growth. This system should include supporting startups, providing financial and cultural facilities, and creating communication networks among creative industries. Finally, comprehensive and coordinated planning is essential for the development of sustainable creative industries based on digital transformation in Iran. Relevant organizations, universities, and private companies should collaborate with the government to design and implement a comprehensive program for developing creative industries. The program should have clear and measurable objectives, taking into account the needs of creative industries and digital transformations. Adequate attention should also be paid to the interactions between creative industries, the government, universities, and other organizations. Overall, with the advent of digital transformations, the development of sustainable creative industries in Iran presents challenges and opportunities. A comprehensive and coordinated approach, taking into account the diverse needs of creative industries, is necessary to take advantage of these opportunities and overcome existing challenges.

#### *6.1. Practical Implications*

According to the selected industries in this research, it can be said that the sustainable development of cultural heritage means maintaining and improving the state of cultural heritage, in order to provide an environment for the realization of sustainable development. This concept is based on the cultural heritage being available for future generations and providing a suitable environment for holding cultural and tourism activities. In other words, the sustainable development of cultural heritage should create employment, strengthen the local economy, attract tourists, preserve cultural identity, and improve the quality of life of local people, while reducing the negative effects on the natural environment and cultural heritage resources. For example, the use of sustainable technologies in the preservation and maintenance of cultural heritage, such as air conditioning systems and waste management methods, can help protect cultural heritage and reduce negative impacts on the natural environment. Also, planning for the development of cultural tourism increases local income and employment; while respecting environmental issues, cultural heritage remains available for future generations. In general, the sustainable development of cultural heritage can be used as one of the solutions for sustainable development in many countries. This approach can improve economic, social, and environmental conditions in local areas and help preserve cultural heritage.

In line with the literature industry and cultural products, sustainable development means improving the situation of the literature industry and the production of cultural products in such a way that natural and cultural resources are preserved and future generations can use them. This approach creates sustainable cultural products and improves people's quality of life. For the sustainable development of literature and cultural products, attention must be paid to factors, such as the consumption of natural resources, waste management, protection of cultural resources, and the creation of suitable economic conditions for the production of sustainable cultural products. In this regard, approaches such as the use of recycled materials in the production of books and magazines, the use of sustainable technologies in the printing and production of cultural products, and the development of sustainable cultural tourism can be used to increase local income and pre-

serve cultural resources. Also, the development of sustainable literature includes creating content centered on environmental issues and providing clear and applicable solutions for environmental protection. This approach can increase the society's awareness about environmental issues and somehow help the sustainable development of the society. In general, the sustainable development of literature and cultural products can be used as one of the solutions for sustainable development in many countries. This approach can improve economic, social, and environmental conditions in local areas and help preserve cultural and natural resources.

The development of sustainable visual arts includes the creation of works of art centered on environmental issues and providing transparent and applicable solutions for environmental protection. This approach can increase the society's awareness about environmental issues and somehow help the sustainable development of the society. In general, the sustainable development of visual arts can be used as one of the strategies of sustainable development in many countries. This approach can improve economic, social, and environmental conditions in local areas and help preserve cultural and natural heritage.

The development of sustainable digital games includes creating digital games centered on environmental issues and providing transparent and applicable solutions for environmental protection. This approach can increase the society's awareness about environmental issues and somehow help the sustainable development of the society. In general, the sustainable development of digital games can be used as one of the sustainable development solutions in many countries. This approach can improve economic, social, and environmental conditions in local areas and help preserve cultural and natural resources. Also, the development of sustainable digital games can help create jobs and add value in developing countries. By providing sustainable development plans for digital games and supporting local manufacturers, it is possible to promote the creation of employment and added value in developing countries. Also, by developing sustainable digital games, we can help promote national culture and identity. Digital games can be used to maintain and preserve cultural and historical heritage through simulation and reconstruction of different environments and, as a result, help promote national culture and identity. In general, the sustainable development of digital games can improve economic and social conditions in developing countries and help reduce poverty and unemployment.

## 6.2. Limitations and Future Research Directions

Although this study made significant contributions to the field, it is crucial to acknowledge its limitations. Conducted exclusively in Iran, the research focused solely on the creative industries in that country, which may limit the generalizability of the findings to other countries or industries. Additionally, the sample size of 19 experts may not be considered large enough for a comprehensive study. Furthermore, cultural variety has made it difficult to include all the influential factors and various features of sustainable development through digital transformation. Lastly, the study utilized interpretive structural modeling, a subjective method that relies heavily on experts' opinions and may not capture the comprehensive objectivity of the research. Therefore, future studies should consider replicating this model across different cultures and industries; then, compare the outcomes to the findings of this research to improve the generalizability of the outcomes.

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