The Challenge of Artificial Intelligence for the Cultural Sector. An overview from USA Sectorial Data

The aim of this paper is to verify the stage of development and diffusion of the AI paradigm in the cultural sector and related industries exploiting the Business Trends and Outlook Survey (BTOS), a recent and new US source of data that asks specific questions on the use of AI in the Non-Farm sector. We focus on questions and answers related to the US Sector 71 that refers to firms operating in the Arts, Entertainment and Recreation activities. We have verified that the diffusion of AI is still in the pioneering phase of adoption, both in the US Non-Farm economy and in arts, entertainment and recreation activities. Nevertheless, in these activities the rate of adoption of AI is higher (6.1%) than that (5.5%) of the Non-Farm sector as whole. We check the now 'vexata quaestio' if AI and its generative applications are a substitute of employment and current equipment and software. We analyse the type of adopted AI technologies/applications, the impact of AI on firm organisation, and the barriers and motivations for non-adopting AI. Surprisingly, a share of 86.2% of firm non-adopters does not see AI as a viable technology in the arts, entertainment and recreation sectors.

El objetivo de este trabajo es verificar el estado de desarrollo y difusión del paradigma de la IA en el sector cultural e industrias relacionadas, aprovechando la Encuesta de Tendencias y Perspectivas Empresariales (BTOS), una fuente de datos estadounidense reciente que formula preguntas específicas sobre el uso de la IA en el sector no agrícola. Nos centramos en las preguntas y respuestas relacionadas con el Sector 71 de EE. UU., que se refiere a las empresas que operan en las actividades de Arte, Entretenimiento y Recreación. Hemos verificado que la difusión de la IA aún se encuentra en una fase pionera de adopción, tanto en la economía no agrícola de EE. UU. como en las actividades de arte, entretenimiento y recreación. Sin embargo, en estas actividades, la tasa de adopción de la IA es mayor (6,1%) que (5,5%) del sector no agrícola en su conjunto. Comprobamos la ahora «vexata quaestio» si la IA y sus aplicaciones generativas son un sustituto del empleo y del equipo y software actuales. Analizamos el tipo de tecnologías/aplicaciones de IA adoptadas, su impacto en la organización empresarial y las barreras y motivaciones para no adoptarla. Sorprendentemente, el 86,2 % de las empresas que no la adoptan no la consideran una tecnología viable en los sectores de las artes, el entretenimiento y la recreación.

Artikulu honen helburua IAren paradigmaren garapen eta hedapen egoera egiaztatzea da, kultura-sektorean eta horiekin lotutako industrietan, Enpresa Joeren eta Perspektibaren Inkesta (BTOS) aprobetxatuz, duela gutxi estatubatuar datu-iturria, IAren erabilerari buruzko galdera zehatzak egiten dituena nekazaritzaz kanpoko sektorean. Arte, entretenimendu eta jolas jardueretan diharduten enpresei buruzko AEBetako 71 Sektorearekin zerikusia duten galdera eta erantzunetan oinarritzen gara. Egiaztatu dugu IAren hedapena oraindik adopzio fase aitzindarian dagoela, bai AEBetako nekazaritzaz kanpoko ekonomian, bai arte, entretenimendu eta jolas jardueretan. Hala ere, jarduera horietan, IAren adopzio-tasa handiagoa da (%6,1) nekazaritzaz kanpoko sektorearena baino (%5,5). Egiaztatu dezagun orain «vexata quaestio» IA eta bere aplikazio sortzaileak egungo enpleguaren eta ekipoaren eta softwarearen ordezkoak diren. Hartutako IAren teknologia/ aplikazio mota, enpresa-antolaketan duen eragina eta ez hartzeko oztopoak eta motibazioak aztertzen ditugu. Harrigarria bada ere, hartzen ez duten enpresen% 86,2k ez dute teknologia bideragarritzat jotzen arteen, entretenimenduaren eta jolasaren sektoreetan.

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1. INTRODUCTION

The evolution of Information and Communications Technology (ICT) after having produced a technological paradigm based mainly on the dissemination of information is now leading to a new paradigm Artificial Intelligence-based that uses computational, statistical and machine-learning techniques to produce original results from a set of inputs and questions. It is a new challenge for the society, the economy and the cultural sector. The AI-based paradigm and its generative AI applications are gradually spreading from R&D laboratories to economy and society.

Over the past decades scholars have investigate the impact of information and communication technologies in different cultural sector (Ateca and Castiglione, 2023; Bertacchini and Morando, 2013; Borowiecki and Navarrete, 2017; among others). Digital innovation in culture reinforces both the production and the consumption on culture through the social network (e.g. TikTok and Instagram), which also stimulates the consumption of younger generations (Symbola, 2024). The effect

is not only on music, but, for example, young people are talking about books on video sharing platforms, giving space especially to a new generation of authors and genres (Symbola, 2024).

More recently, the challenge is linked to the artificial intelligence (AI) that has gradually permeating our lives, but without much fanfare. The results are both promising and surprising: reconstructing a piece of art, completing an unfinished composition of a great musician, identifying the author of an ancient text, or providing architectural details for a potential reconstruction of the Notre-Dame de Paris cathedral would have seemed like science fiction just a few years ago (Symbola, 2024).

According to the 2021 museum innovation barometer, less than 20% of museums across the world covered by the barometer reported they use AI for their collections, administration and management, education and finances (Tykhonova and Widmann, 2021).

Some scholars (Caramiaux *et al.*, 2019; Caramiaux, 2020) have shown that AI has entered the creative value-chain at every level: creation, production, dissemination, and consumption. Examples include image discrimination and generation as well as audio source separation and mastering. Some scholars expect AI to be transformative, especially given recent breakthroughs in Generative AI, leading to a sustained period of high productivity growth (Baily *et al.*, 2023) while others are less optimistic about its impact (Bonney *et al.*, 2024; Gordon, 2024).

The aim of this paper is to analyse the challenge offered by Artificial Intelligence in the cultural sector. Using data provided by Business Trends and Outlook Survey (BTOS) we compare the rate of diffusion of AI (technologies and applications) in the United States both in the arts, amusement and recreation subsectors and in the other of Non-Farm sector. We also analyse the intention of those firms to adopt AI in the next six months.

The rest of the paper is organised as follows. The second section discusses the recent literature on the links between AI, generative AI and the cultural sector. The third section presents the Business Trends and Outlook Survey (BTOS) Survey and its main questions about the use of AI. The fourth one discusses the results of AI BTOS core questions, comparing the rate of diffusion of AI technologies and AI applications both in the sector of arts, entertainment and recreation with the rest of US Non-Farm sector; the diffusion of AI in the arts, amusement and recreation subsectors; and the impact of AI on firm employment, equipment and firm organisation. The last section draws the main conclusions.

2. LITERATURE REVIEW

The Information and Communication Technologies has received increased attention from economists over the past thirty years, with extensive literature

aimed at understanding their impact on economic growth, firm productivity and firm efficiency. The debate then shifted to measuring the impact of ICTs on different aspects of daily life and ICTs have been identified as General Purpose Technologies, i.e. fundamental technological innovations that are characterized by pervasiveness, technological dynamism and innovative complementarities (Brynjolfsson and McAfee, 2011; Castiglione and Infante, 2014). In fact, the interest in ICTs as the engine of the productive system depends not only on their relative economic weight, but also on the spillovers that they can generate to the entire economy. The ICTs show their effects in many sectors and produce a flow of innovation able not only to offer technical solutions but also to open new economic and social opportunities.

The introduction of ICTs have also had an impact on the way in which culture is produced and consumed, disrupting whole sectors, such as the music business (Moreau 2013) or museums (Bertacchini and Morando, 2013), and changing traditional value chains in all cultural and creative industries, as a response to different digitization rates (European Commission, 2017). ICTs have dramatically changed the market for the arts, typically leading to expanded audiences with access to more diverse cultural fares (Tepper *et al.*, 2008), even though cultural institutions (i.e. libraries, archives and museums) have not been able to fully adopt the digital technology (Borowiecki and Navarrete, 2017).

As in other sectors, technological innovation has also played an important role in the production and consumption of the arts. It has given the opportunity to spread faster and to bring new generations closer to the production and consumption of different forms of culture. Nowadays what effects Artificial Intelligence (AI) will have on creative industry became a crucial question in the whole economy but also in the cultural sector.

However, before going into the analysis of the impact of generative AI on the art sector it could be useful to recur to a workable definition of arts just to recall the area that AI can impact. This is a necessary pre-condition since, according to Fancourt and Finn (2019) "the boundaries for deciding what constitutes art, but the specific types of art within these boundaries are diverse and fluid". To this end they use a definition of arts the contains both active and receptive engagement in the arts defining the following five broad categories (Fancourt and Finn 2019):

- Performing arts (some examples are: activities in the genre of music, dance, theatre, singing and film).

- Visual arts, design and craft (some examples are: crafts, design, painting, photography, sculpture and textiles).

- Literature (some examples are: writing, reading and attending literary festivals).

- Culture (some examples are: going to museums, galleries, art exhibitions, concerts, the theatre, community events, cultural festivals and fairs).

- Online, digital and electronic arts (some examples are: animations, film-making and computer graphics).

Reading this list of categories and cultural activities we can prefigure the vast field of applications that generative AI can have on arts activities and the convergence of AI and performing arts is evident, since that main aim of Artificial Intelligence is to mimic (and surpass, someone says enthusiastically or alarmed) the human creativity.

There are many current examples of how AI and human creativity can interact[1]. For example, Magenta is the Google AI open source research project to explore the role of machine learning to understand and generate music, transfer music style, generate music in collaboration between artists. The Magenta's Chamber Ensemble Generator can be used to generate music with a variety of classical and contemporary music and instrument. Magenta also permits the use of Language Model for Dialog Applications (LaMDA) to create novels and poems.

On the other side there are IT firms like Nvidia that have designed a Graphic Processing Unit (GPU) explicitly dedicated to run DeepArt and DeepDream that are two AI projects to create and explore visual arts using neural networks to analyse and recreate images and artworks. Both DeepArt and DeepDream can help making art creation more accessible to people, artists to be more creative, and collaboration between artists and AI (Gupta and Srivastava, 2024). AIVA (Artificial Intelligence Virtual Artist) is an AI system that is a music generation assistant that analysing existing composition can generate new compositions.

GPT-4 (Generative Pre-Trained Transformer) is commonly used to generate creative content starting from prompt as in the case of ChatGPT (Chat Generative Pre-Trained Transformer) that can generate any kind of text response like code, mathematical equations and human-like prose and report. Besides, Dall-E is an algorithm developed by OpenAi that is able to generate images starting from a text description.

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1 In presenting some examples of AI technologies and applications in the field of arts, we explain the main appropriate acronyms but we don't do it for all of them, since many are just fantasy names. For instance: DALL-E is an OPEN AI application in the field of generating images from texts and its name is a sort of syncrasis between the names of Dali (from Salvador Dalì, the Spanish surrealist and Dada extravagant artist) and Wall-E (the little animated robot protagonist of the homonymous PIXAR film).

Some specific examples could help us to understand the relevance the AI is taking place in the creative sector. In the comics sector, the AI is used for both the script and the graphics, but especially in fostering independent production of new proposals through innovative online platforms. An example could be, the Abolition of Man (2022), a pionieristic series interely generated by computer (edited by Living the Line Books and by Diamond Comics, two American firms). In the videogames sector, Artificial intelligence is used to improve the experience of gaming such as the realism of gameplay or the dynamism of the game environment. However, the challenge is to create secondary characters with "human" behaviour. In the movie industry, the AI is used to write of screenplays, this happens overall in experimental movie and in movies produced by small independent film studios. In the post-production, the AI speeds up the editing process as it can quickly sort through hours of footage and recognize recurring patterns, enhancing visual effects of lighting and framing. However, the AI is also used in dubbing, where it corrects wrong or inappropriate terms for a particular market, resynchronizing lips movement and managing not only mouth but also other facial features for an extremely realistic result. Moreover, in the music industry, AI is used to set lyrics to music and define melodies. Whilst in the dance, AI is able to generate increasingly complex and innovative choreography. In the visual arts, the use of AI is no longer just a passive technical tool, today artificial intelligence became an active element.

The previous examples of generative AI in arts, artistic poems, music and design are only just few current examples of the gale of the Schumpeterian creative destruction that is going to hit the art sector. The quantum leap that AI is introducing in the arts requires new adaptive capacities for companies operating in the sector and heavy investment in hardware, software and appropriate skills. In the following we present the US Business Trends and Outlook Survey (BTOS) novel data that we have used to track AI use by firms in the cultural sector.

3. DATA

The Business Trends and Outlook Survey (BTOS) is an experimental data product intended to capture high-frequency changes (by-weekly) in economic conditions through a qualitative survey representative of U.S. employer businesses. BTOS provides information on the state of the economy, providing timely data on key economic measures and business expectations of future conditions (see Bonney et al., 2024; Buffington et al., 2023).

The BTOS sample includes all Non-Farmer employer businesses (single location and multi-location) in the USA. Data are released every two weeks and are available according to North American Industry Classification System (NAICS) by sector, subsector, State, and Metropolitan statistical area.

The BTOS sample consists of approximately 1.2 million employing firms in a given 12-week period[2]. Therefore each bi-weekly collection covers a sub-sample of about 200,000 of the 1.2 million firms sample. The average bi-weekly response rate over the collection period of the main and supplementary AI-related content is about 16%, which translates into a sample of about 164,500 companies for the main analysis sample using the AI supplement for the period December 2023 – February 2024.

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The BTOS survey questionnaire consists of a set of twenty-four basic questions (Core Survey), with two of them referred to the use of Artificial Intelligence, and an additional BTOS AI Supplement of fourteen AI related questions, which is included as needed for the only BTOS survey conducted between November 2023 and February 2024. The BTOS survey collection, starting in September 2023, included two new questions about the use of Artificial Intelligence in the production of goods and services. These "core" AI questions are asked in reference to two time periods: previous two weeks and six months in the future. In particular the first Core question about AI asks: "*Between MMM DD – MMM DD, did this business use Artificial Intelligence in producing goods or services? (e.g., machine learning, natural language processing, virtual agents, voice recognition, etc.)*". Whilst the second one asks: "*During the next six months, do you think this business will be using Artificial Intelligence in producing goods or services? (e.g., machine learning, natural language processing, virtual agents, voice recognition, etc.)*".

In order to better explore the use of artificial intelligence by firms from December 2023 to February 2024, fourteen additional questions to the two AI core questions were introduced in the BTOS survey, asking firms about the type of AI that is used and to which functions of the firm it is directed. While the two core questions on AI are only available for industries classified as two-digit from September 2023 to November 2024, the fourteen AI supplementary questions are available for industries classified as three-digit only for the period December 2023 to February 2024. In our analysis we refer to both the two core AI questions and the fourteen supplementary ones, as the data collection for the AI supplemental content ended in February 2024, while the two core questions about the use of AI in businesses are still present in the survey[3]. However, since we did not have access to the data of the interviewed firms, in the following analysis we only use the BTOS data on the percent-

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2 The BTOS sampling frame consists of establishments on the 2021 Business Register that are in the target population (Non-Farm sector). Proportional sample allocation is used (the same percentage of businesses is selected from each stratum).

3 In particular, for the analysis of the answers (yes, no, do not know) on the adoption of AI in the entire Non-Farm sector, Sector 71 and sub-Sectors 711, 712 and 713 we use combined estimates for data Core survey collected from 11 September 2023 to 12 November 2024. For the analysis of the answers on the type and management of AI technologies and applications adopted in the sub-Sectors 711, 712 and 713 we use combined estimates for data collected from 4 December 2024 to 25 February 2024 for the AI Supplement additional fourteen questions.

age of enterprises answering each question at the aggregated two- and three-digit NAICS level.

4. BTOS SURVEY MAIN RESULTS

In analysing the results of AI diffusion in the US arts and entertainment sector we firstly proceed by comparing the rates of diffusion in the Non-Farm sector and in the NAICS Sector 71 (Arts, Entertainment, and Recreation). The results are quite interesting since they present similar current adoption of AI. The first question was asking: in the last two weeks, did this business use Artificial Intelligence (AI) in producing goods or services? (examples of AI: machine learning, natural language processing, virtual agents, voice recognition, etc.). Table 1 indicates the use of Artificial Intelligence in producing goods or services in the last two weeks (second and third columns) and during the next six months (fourth and fifth columns). The percentage of current adopters of AI is the same (5.0%) in both the businesses at national level (excluding farmers) and the businesses belonging to the sector 71 (Arts, Entertainment, and Recreation). The percentage of non-adopters is slightly higher at the national level (84.2.%) than that of the Sector 71 (82.9%). However, firms in the 71 Sector were more uncertain on the use of AI devices as the percentage of Do Not know responses is 12.1% in this sector and 10.8% in the Non-Farm sector.

Table 1. **USE OF ARTIFICIAL INTELLIGENCE (AI) IN PRODUCING GOODS OR SERVICES IN FEBRUARY 2024 AND AUGUST 2024**

	In the last two weeks (February 2024)		During the next six months (February 2024)		In the last two weeks (August 2024)	
	Non-Farm sector	Sector 71	Non-Farm sector	Sector 71	Non-Farm sector	Sector 71
Yes	5.0%	5.0%	6.5%	6.1%	5.5	6.1%
No	84.2%	82.9%	70.6%	70.0%	88.6	88.7
Do Not Know	10.8%	12.1%	22.9%	23.9%	5.9	7.2

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS)

However, what is important in the diffusion of a new technology is the future trend of AI adoption. In fact, the second BTOS core question asks if the firms have intention to adopt AI technologies in the future (next six month) and the answers demonstrate that firms do intent to enlarge their adoption of AI (columns fourth and fifth). The percentage of firms that at national level Non-Farm economy intend to use AI technologies in the near future (next six months) to produce goods or services is 6.5%, with an increase of 1.5 percentage points. In the arts, entertainment

and recreation sector, the percentage is 6.1 that is lower than that of the rest of Non-Farm economy. Showing that the willingness to adopt AI technologies in this sector, although increasing by 1.0 percentage points, is slightly lower than in the rest of the Non-Farm economy. As previously stated, we do not have data on firms, therefore it is not possible to check whether firms that declared in February 2024 that they would use AI in the following six months to produce goods or services, actually did it. Nevertheless, we can approximate this by observing the aggregate data of firms that declared they used AI in the last two weeks of August 2024, six months after February 2024. To this end, we present two columns (5 and 6) in Table 1 showing the use of AI in August 2024 in the Non-Farm sector and 71 Sector. The results show that in August 2024, only 5.5% of firms in the Non-Farm sector were using AI and its applications, in contrast to the 6.5% of firms that said they were 'willing' to adopt it six months earlier. In contrast, in sector 71, the prediction (6.1%) of adoption was almost similar to the actual use of AI (6.1%) six months later. However, it is interesting to note that within six months, the percentage of firms that clarified their stance on AI use increased, as did the percentage of companies that declared they would not use AI in the last two weeks (88.6% in August 2024 versus 84.2% in February 2024) in the Non-Farm sector and sector 71 (88.7% versus 82.9% respectively). This means that along six months time firms acquire information and have a clearer position on AI adoption as diminishes of 5 points the percentage of "Do Not Know" answers both for Non-Farm Sector and 71 Sector.[4]

4.1. The type of AI technologies/applications adopted

The companies that had given a positive answer on the use of AI in the production of goods or services were then asked a question on the type of AI used. Seventeen types of AI applications were presented, some of them are AI processes and other products. Companies that did not recognise themselves in one of the 17 presented technologies could answer 'other' as the eighteen technology, or answer positively for more than one.

In Table 2, the answers to the type of AI technologies or applications used are presented for the Non-Farm sector and the Sector 71, both in term of overall share (Columns 2-3) and share of users that exclude the non AI users (Columns 4-5).

From columns 2 and 3 emerges that the most used application field of AI is that of marketing automation that registers a rate of diffusion of 2.5% in the all Non-Farm economy and a rate of 2.9 in the arts and recreation industries. This

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4 Due to limited information on the BTOS survey data we could not perform a significance test in adoption and non-adoption rates between the sectors presented in Table 1 and Tables 2, 3, 4 and 5 below. For example, to estimate the Welch's version of the t-test, it is necessary to have the sample sizes (n1 and n2). However, we have the overall size of respondents for the Non-Farm sector (n1) but we cannot determine the sample size for the 71 sector (n2), since we do not have the percentage share of firms in each group (sectors).

Table 2. **SHARE OF FIRMS USING A GIVEN APPLICATION OF AI AND SHARE OF FIRMS CONDITIONAL ON NOT RESPONDING "NONE" (SHARE OF USERS) IN THE PAST SIX MONTHS**

	Non-Farm sector	Sector 71	Non-Farm sector	Sector 71
	(Overall share)	(Overall share)	(Share of users)	(Share of users)
Marketing automation using AI	2.5%	2.9%	14.04%	19.08%
Natural language processing	1.7%	1.5%	9.55%	9.87%
Virtual agents or chat bots	1.9%	1.4%	10.67%	9.21%
Speech/voice recognition using AI	1.4%	1.2%	7.87%	7.89%
Text analytics using AI	1.5%	1.1%	8.43%	7.24%
Data analytics using AI	1.5%	1.0%	8.43%	6.58%
Large language models	1.0%	0.9%	5.62%	5.92%
Machine learning	1.2%	0.8%	6.74%	5.26%
Image/pattern recognition	0.7%	0.8%	3.93%	5.26%
Recommendation systems based on AI	0.8%	0.7%	4.49%	4.61%
Augmented reality	0.1%	0.3%	0.56%	1,97%
Decision making systems based on AI	0.5%	0.3%	2.81%	1.97%
Machine/computer vision	0.5%	0.3%	2.81%	1.97%
Biometrics	0.3%	0.2%	1.69%	1.32%
Neural networks	0.2%	0.1%	1.12%	0.66%
Deep learning (*)	0.3%	0.0%	1.69%	0.00%
Robotics process automation (*)	0.3%	0.0%	1.69%	0.00%
Other	1.4%	1.7%	7.87%	11.18%
None	91.2%	91.5%	-	-

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023-February 2024)

means that firms were relatively (both in Non-farm sector and in sub-Sector 71) more able to adopt methods based on Machine Learning algorithms, capable of analysing vast amounts of data and identifying patterns, provide deeper insights into consumer behaviour, allowing for more targeted and effective marketing strategies (Kedi *et al.*, 2024). Marketing strategies are usually applied to existing products and processes and firms do not have to invest in R&D. This applies in particular for small and medium enterprises (SME) that use marketing automa-

tion algorithms to foster business growth and consumer loyalty, and SME are also the prevalent businesses in the Arts and Entertainment sector. In the whole Non-Farm economy, the rest of technologies and applications registers rates of diffusion very low, ranging from the higher percentage of diffusion of virtual agents or chat bots (1.9%) and Natural language processing (1.7%) to the lowest diffusion of technologies such as Deep learning (0.3%) and Robotics process automation (0.3%), neural networks (0.2%) and augmented reality (0.1%). In the arts and entertainment sector, after the technologies and applications of marketing automation and the miscellaneous "other", the highest rate of diffusion regards technologies such as natural languages processing (1.5%) and virtual agents or chat bots (1.4%), whilst the lower diffusion is registered for technologies such as Biometrics (0.2%) and Neural networks (0.1%). In this sector, technologies, such as Deep learning or Robotics process automation, are not clearly indicated and are report-

Table 3. **SHARE OF FIRMS THAT EXPECT TO USE A GIVEN AI APPLICATION DURING NEXT SIX MONTHS**

	Non-Farm sector	Sector 71
	(Share of expected users)	(Share of expected users)
Machine Learning	22.1%	14.3%
Natural language processing	26.6%	28.9%
Virtual agents or chat bots	28.2%	23.7%
Speech/voice recognition using AI	22.2%	20.5%
Recommendation systems based on AI	16.8%	12.1%
Large language models	15.5%	19.2%
Text analytics using AI	23.0%	21.3%
Data analytics using AI	29.8%	18.8%
Neural networks	3.7%	2.1%
Augmented reality	3.3%	5.7%
Decision making systems based on AI	14.1%	7.2%
Deep learning	7.3%	4.8%
Image/pattern recognition	13.3%	14.9%
Machine/computer vision	7.0%	5.1%
Robotics process automation	5.2%	S
Biometrics	3.8%	1.3%
Marketing automation using AI	36.5%	38.7%
Other	12.4%	15.9%

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023-February 2024)

ed with the symbol (S), that can mean that the answer was skipped by respondents. However, if we focus only to the answers of those firms that have adopted one of the listed eighteen technologies and applications, we can say that the AI market is clearly dominated by the AI technologies/applications of Marketing automation. In fact, in the Non-Farm economy one out of seven businesses (14.04%) has adopted AI tools that permit to deliver personalised contents and favour customer engagement and retentions. In the arts and recreation (sector 71) the Market automation using any form of AI the percentage of adopters reach 19.08%. That is, one out of five businesses that operate in this sector use AI in search of new customers or to retain them. The next AI technologies/applications that penetrate the Sector 71 are natural language processing (9.87%), virtual (voice or visual) agents or chat bots (9.21%). The lowest diffusion is given by those AI technologies/applications that require high investment in hardware and software such as biometrics (1.32%) and neural networks (0.66%).

Next step is to see if the current trend in AI technology/application choices is confirmed by predicted firm choice in the near future (six month span). The firms that gave a positive answer to the question about the use of AI in the next six month, where asked to choose those technologies/applications that they were possible thinking to use (multiple choices were allowed).

Table 3 shows that the favourite AI technology/application of expected AI adoption is Marketing automation using AI for both the whole Non-Farm economy (36.5%) and the Arts and recreation sector (38.7%), followed by Data analytics (29.8%) and Virtual agents of chat bots (28.2%) and Natural language processing (26.6%) in the Non-Farm business, whilst in the Arts and recreation sector the most preferred technologies/applications, besides market automation, goes to Natural language processing (28.9%), virtual agents of chat bots (23.7%), Text analytics (21.3%) and Speech voice recognition (20.5%). In this sector, the least expected AI technologies/applications to be used are Biometrics (1.3%), Neural networks (2.1%) and Robotics process automation.

4.2. The diffusion of AI in the arts, amusement and recreation subsectors

The BTOS Core Survey has continued to maintain the two main questions on the current use of AI and the predicted one for the period September 2023 until November 2024, giving us the opportunity to see the trend in the use and predicted use of AI along four periods time at the three-digit subsector level[5]. This give us the chance to see the trends deeper in the Sector that was conducted between the BTOS surveys on AI, permitting us to go inside the three sub-

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5   We have chosen the data relatives to the initial period of the BTOS survey, the second one is related to February, when ended the Ai Supplement survey, than an intermediate period (June) between February and the latest Survey available when we started writing the paper.

sectors 711 (Performing Arts, Spectator Sports, and Related Industries), 712 (Museums, Historical Sites, and Similar Institutions) and 713 (Amusement, Gambling, and Recreation Industries) that compose the Sector 71 and see the trends that the adoption of AI technologies/applications has followed along fourteen months period.

Figure 1 presents the trends that the subsector 711 has followed in adopting AI technologies/applications. The trend of current adoption of machine learning, natural language processing, virtual agents, voice recognition, etc., is increasing in the four periods passing from a rate of adoption of 5.2% in September 2023 to 7.3% in November 2024, although not so clear as it is for the subsector 712 (Figure 2) where the current adoption neatly increase in all the four surveyed periods, passing from a rate of adoption of 4.3% in September 2023 to 12.5% in November 2024. In the subsector 713 (Figure 3) that comprises the Amusement, Gambling, and Recreation industries the rate of adoption was even lower than in the subsector 711, since it registered a low and stagnant 2.7-3.2% rate of adoption. Comparing the Figures 1-3 we can notice that the firms and institutions operating Museums, Historical sites and similar institutions were the more prompt to adopt generative AI applications (although we cannot detect the detailed ones).

Figure 1. **THE TREND OF AI USE IN THE SUB-SECTOR 711 (PERFORMING ARTS, SPECTATOR SPORTS, AND RELATED INDUSTRIES)**
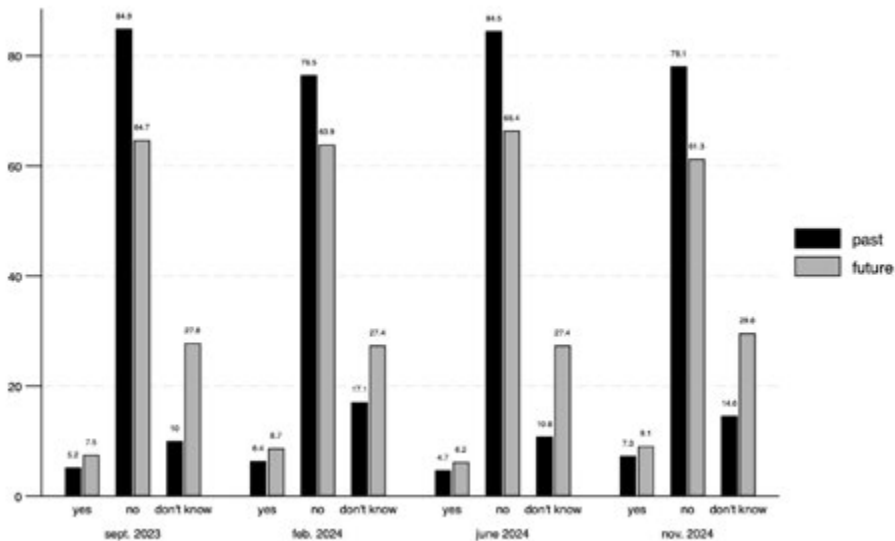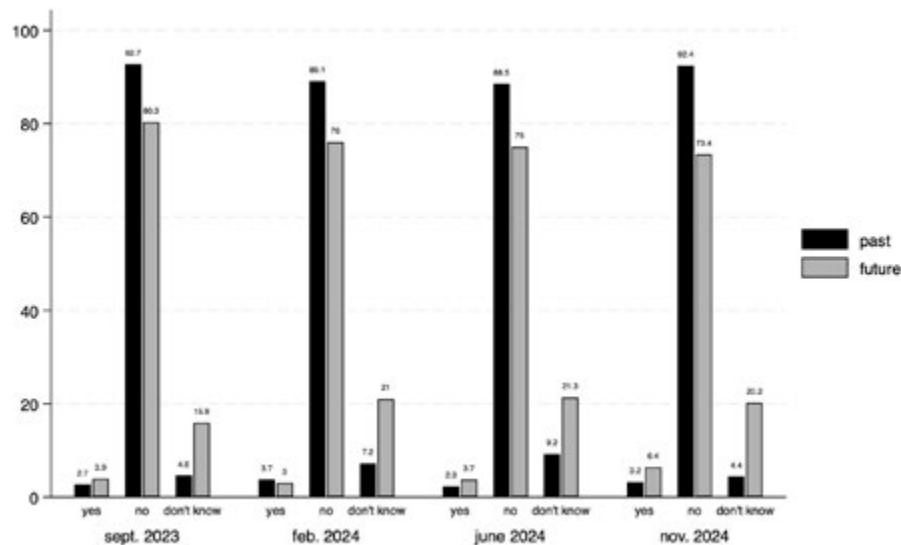

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), Core Survey (September 2023 - November 2024)

Figure 2. **THE TREND OF AI USE IN THE SUB-SECTOR 712 (MUSEUMS, HISTORICAL SITES, AND SIMILAR INSTITUTIONS)**
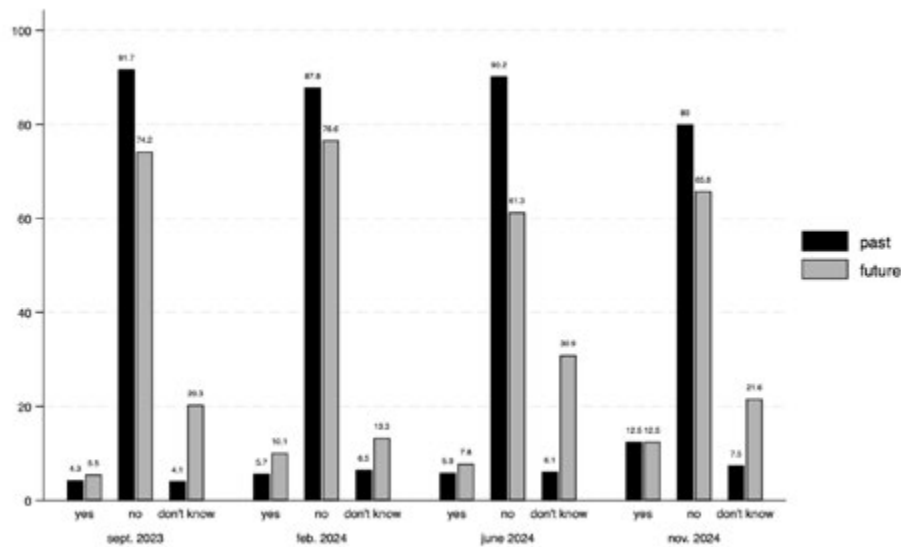
Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), Core Survey (September 2023 - November 2024)

Figure 3. **THE TREND OF AI USE IN THE SUB-SECTOR 713 (AMUSEMENT, GAMBLING, AND RECREATION INDUSTRIES)**
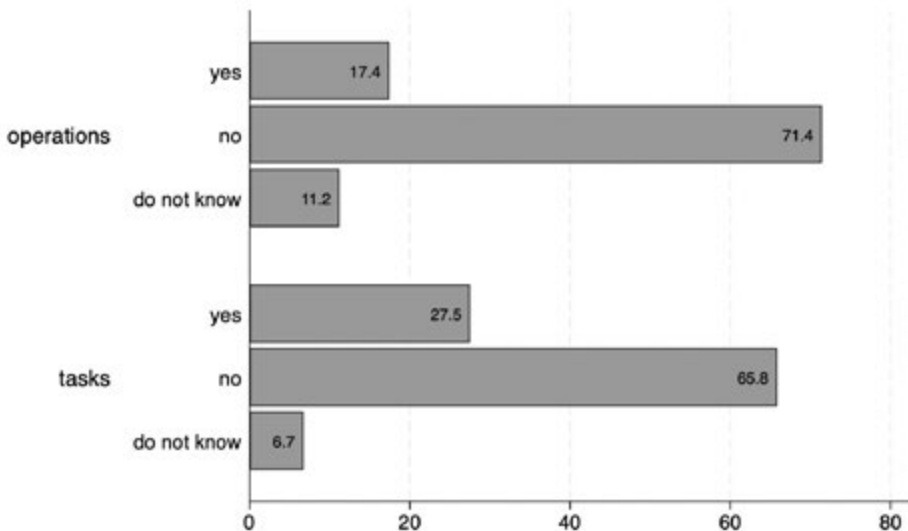

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), Core Survey (September 2023 - November 2024)

### 4.3. AI as complement/substitute of employment or capital equipment

As we have seen in section 4.1 many of the AI technologies/applications have no drastic impact on the employment and the obsolescence of the current capital equipment. The BTOS survey permits us to verify the current 'vexata quaestio' if Artificial Intelligence and its generative applications are a substitute of employment or capital equipment. There are some reports (see Goldman Sachs, 2023) that expect that by five years from now two third of occupations could be partially automated by AI and Generative AI could raise global GDP by 7%. To this end in the Supplement AI survey there are two questions that ask firstly whether in the last six months firms used Artificial Intelligence to perform tasks previously done by employees in producing goods or services and, secondly, whether, in the last six months, the firm used Artificial Intelligence to perform operations previously performed by existing equipment or software in producing goods or services. The answers are presented in Figures 4 and 5 and show that firms in the Sector 71 that have introduced Artificial intelligence for producing goods or services declare that the impact of AI have been conspicuous, although lower in capital equipment operations replacement (17.4 %) than in employees (27.5%) tasks substitution (Figure 4).

Figure 4. **PAST USE (PREVIOUS SIX MONTHS) OF ARTIFICIAL INTELLIGENCE AS A SUBSTITUTE OF EMPLOYEES' TASKS AND EQUIPMENT/SOFTWARE OPERATIONS IN THE ARTS, ENTERTAINMENT AND RECREATION SECTOR (71)**

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023 - February 2024)

Figure 5. **FUTURE EXPECTED USE (NEXT SIX MONTHS) OF ARTIFICIAL INTELLIGENCE AS A SUBSTITUTE OF EMPLOYEES' TASKS AND EQUIPMENT/SOFTWARE OPERATIONS IN THE ARTS, ENTERTAINMENT AND RECREATION SECTOR (71)**
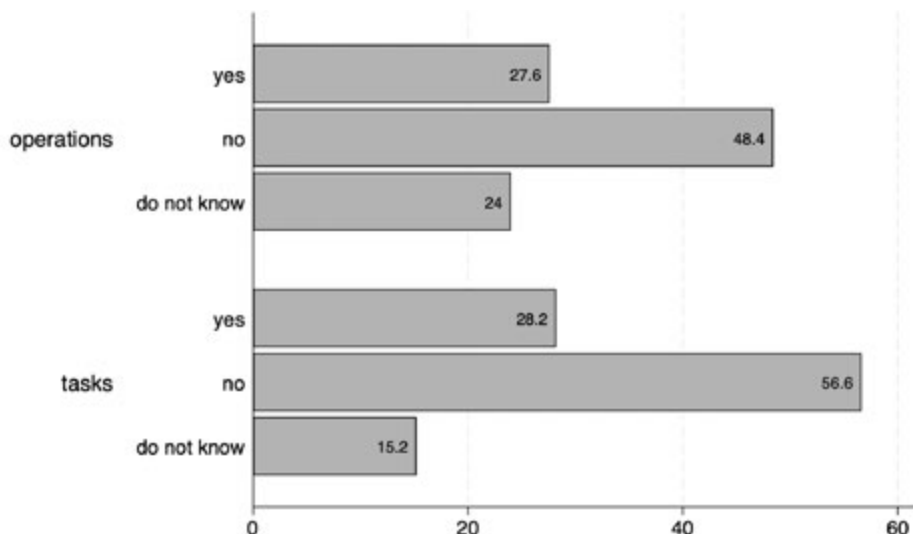
Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023 - February 2024)

The expected trend (next six months) is even worse for current employment than capital/software. The intention to use AI in the next future give a more appropriate vision of the changes the firms adopting AI are planning to do versus the two traditional production factors such as labour and capital/equipment. In fact, Figures 4 and 5 show decreases in the percentage of firms that do not intend to substitute labour tasks with AI, from 65.8% (Figure 4) to 56.6% (Figure 5), and in the percentage of firms that do not intend AI adoption as a substitute for capital equipment operations from 71.4% (Figure 4) to 48.4% (Figure 5). Conversely, it increases the percentage of firms that plan to use AI as substitute for labour (from 27.5% to 28.2%) and the percentage of firms that plan to use AI as substitute for capital equipment operations (from 17.4% to 27.6%). It increases also the percentage of firms that do not know which labour task or capital equipment the adoption of AI will substitute. This demonstrates that over the future firms plan to use AI to substitute both traditional labour and capital/equipment.

4.4. The impact of AI on firm organisation

But which are the areas that firms changed for harnessing the deployment of AI technologies/applications? The answers are represented in Figure 6 that shows that

54.7% of adopting firms have implemented AI without any change in their organization, whilst the rest of them declared different changes in many organizational areas that include different employment and work organization. In particular, more that 20% firms declared that the adoption of AI required the redesigning of the workflows, while another 16.3% needed to upgrade the training of their employees to be able to use AI. Around 10.6% of the firms declared that to use AI they had to purchase cloud services or cloud storage. Around 6% of firms reported that they had to change data collection and data management practices. Other firms (5.0%) declared that they had to recur to vendors or consulting services to install or integrate AI in their production function. Another 4,6% had to buy computing power or specialized equipment. Very few firms (1%) declared that they had the need to hire new staff already trained in using AI.

Figure 6. **ORGANIZATIONAL CHANGES MADE BY FIRMS, IN THE LAST TWO WEEKS AND IN THE NEXT SIX MONTHS, TO HARNESS ARTIFICIAL INTELLIGENCE (AI) IN THE ARTS, ENTERTAINMENT AND RECREATION SECTOR (71)**
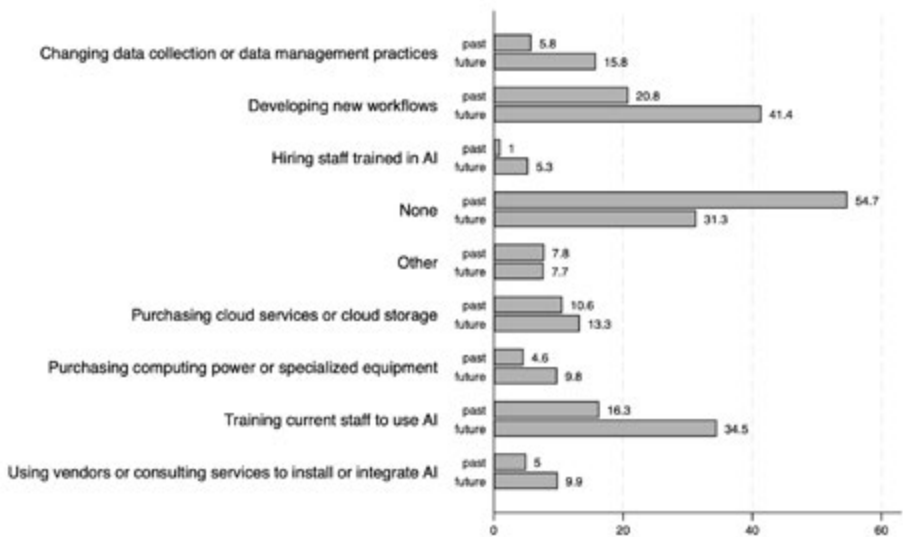
Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023 - February 2024)

However, the changes that firms are expected to make during the next six months, to use Artificial Intelligence, are more interesting (Figure 6). In fact, the percentage of firms that declare that the use of AI do not require any organisational change drops from 54.7% of the last six months to 31.3% of next six months, and training the current staff to use AI become the most relevant need for expected

adoption firms (34.5%), accompanied by designing new workflows (41.4%). The need to use external expertise (vendors or consulting services) increases from 5 to 9.9%. The share of firms making changes to data collection or data management practices (15.8%), using vendors to install/integrate AI (9.9%), purchasing computing power (9.8%), or hiring staff trained in AI (5.3%) are all also expected to increase in view of AI use. These data suggest that as far as the use of AI increases the expected organizational changes increase too. Meaning that to harness the AI firms require a new organizational paradigm that regards the whole firm's tasks and operations.

This new organisational paradigm will have any impact on firm employment? In particular, when firms, conditional in using AI, were asked if the use of AI will affect their total employment in the next six month the vast majority (91.3%) of them, despite the alarming forecasting on the effects of AI on current occupation (see the Report of Goldman Sachs, 2023), declared that it will not affect their total employment, 3.9% of them declared that the use of AI will contribute to increase their total employment, while only 4.8% of firms say that the use of AI will decrease their total employment.

Table 4.   **SHARE OF FIRMS THAT EXPECT THAT THE USE OF AI DURING THE NEXT SIX MONTHS WILL AFFECT THE BUSINESS'S TOTAL EMPLOYMENT**

Increase	3.9%
Decrease	4.8%
Will not change	91.3%

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023-February 2024)

4.5. Barriers and motivations for non-adopting AI in the future

It is also interesting to understand the reasons why firms do not decide to adopt AI technologies/applications in the near future (next sixth months). In the above Table 1 we have reported that 70.6% of firms in the Non-Farm sector and 70% in the Sector 71 have declared that they will not adopt any AI technologies in the near future (next-sixth months). It is a very high percentage of firms that refuse to see any perspective for AI use, although AI is recognised as the new general-purpose technology (Baily *et al.*, 2023; Brynjolfsson *et al.*, 2021; Eloundou *et al.*, 2023). To investigate these barriers and motivations for not adopting AI, we return to the comparisons of motivations between the whole Non-Farm sector and the Sector 71.

Table 5. **SHARE OF THE REASONS FOR NOT PLANNING TO USE ARTIFICIAL INTELLIGENCE (AI) DURING THE NEXT SIX MONTHS**

	Non-Farm sector	Sector 71
	(0verall share)	(0verall share)
Too expensive	4.1%	2.3%
AI is not a mature enough technology yet	6.1%	4.5%
Lack of knowledge on the capabilities of AI	7.3%	5.1%
Concerns about privacy/security	6.6%	4.6%
Concerns about bias	2.8%	2.5%
Lack of skilled workforce	2.9%	2.2%
Lack of required data	2.2%	1.5%
Laws and regulations prevent or restrict use of AI	1.2%	0.8%
Previous or current use of AI did not meet expectations	0.9%	1.0%
Other	4.5%	4.3%
AI is not applicable to this business	80.9%	86.2%

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS), AI Survey Supplement (November 2023 - February 2024)

From the Table 5 it can be seen that firms do not yet understand the opportunities that AI open to their business. In fact for the 80.9% of firms that do not adopt AI in the Non-farm sector the answer is that they do not see AI as applicable to their production processes. The percentage of non-adopters that does not see AI as a viable technology in even greater in the Sector 71, where a percentage of 86.2 of firms declares that AI is not applicable to their sector. The remaining 19.1% of firms in the Non-Farm sector and the 13.8% of firms in Sector 71 give different explanations of their non-adopting behaviour. The highest percentage of firms (7.3% of firms in the Non-Farm sector and 5.1% in the Sector 71) declare that they do not have enough information/knowledge of the advantages of AI technologies/applications, whilst other firms (6.6% and 4.6%, respectively in the Non-Farm sector and in Sector 71) have some concerns about the aspects of privacy and security that AI use involves. A lower percentage of firms (2.9% and 2.2%, respectively in the our two examined sectors) claims that they do not have the skilled workforce to harness AI, or do not have sufficiently clear the legal aspects that AI use ask for. Surprisingly, there is also a small fraction (1%) of firms that declares that have dismissed the use of AI since its technologies did not meet their expectations.

In summary, we must emphasise that the greatest obstacles and motivations for non-adoption (most heavily in sector 71) of AI technologies stem from the lack of vision on the part of entrepreneurs of the possible applications that AI can have in

their enterprise and, consequently, in their target market. This assertion is corroborated by the difficulties in adopting AI technologies due to their cost of adoption and the lack of information on AI development capabilities. This lack of information also leads businesses to believe that AI technologies still do not guarantee privacy and security.

4.6. Differences in the rate of AI adoption in the Non-Farm sector and subsector 71

As we have seen in the subsection 4.1, it emerges that the trend of adoption of AI technologies and application is quite similar for the Non-Farm and cultural-recreational sector. To see if the adoption rates of AI are different between the Non-Farm and the Sector 71, we have conducted an equality test using the by-weekly means of adoption for the whole period (September 2023 - November 2024) in the two sectors. The test has been conducted by for both the past (last two weeks) than for the future (next six months) rates of AI adoption. The results of the two tests confirm that there are no differences in the mean rates of AI adoption between the Non-Farm sector and the 71 Sector. In addition, the results of the two tests demonstrate that the "No" and "DNK" (do not know) means do show significant differences, since in these two cases differ significantly the "NO" and "DNK" rates of responses between Non-Farm sector and the 71 Sector. The results of the mean comparison test (t-test) are reported in tables A_1 and A_2 in the Appendix.

5. CONCLUSIONS

The aim of this paper was to analyse the diffusion of Artificial Intelligence and Generative AI in the Arts and related subsectors. To this end we have used the BTOS survey that from September 2023 is also monitoring the diffusion of AI in the US Non-Farm sector.

Despite the large backlog of AI technologies and some of them as presented in Section 2 have a wide spectrum of applications, such that they are defined as new general purpose technologies (Brynjolfsson *et al.*, 2021), we have verified that the diffusion of AI is still in the pioneering phase of adoption. In the US Non-Farm sector, only 5.0 of the firms declares that have already adopted AI and 6.5 plans to use it in six months time. It seems that many of the potential adopters are postponing AI adoption to see the range of applicability (and profitability) of AI in the economy.

In February 2024, in the Arts, Entertainment and Recreation (Sector 71) the rate of adoption is the same (5.0%) as that of the Non-Farm sector but in six months time (August 2024) the adopters become 6.1% of the firms in the Sector 71, higher than that (5.5%) of the Non-Farm sector, demonstrating a higher capacity in adopting and using AI technologies.

In the three subsectors comprising the Sector 71, the diffusion of AI is higher in the subsector 712 that regards Museums, Historical Sites and Similar Institutions that in September 2023 presents an average rate of adoption of 4.3%, and in November 2024 an higher 12.5%. While the diffusion of AI is lower in the Subsector 711 that comprises the Performing Arts, Spectator Sports and Related Industries, and presents a 5.2% rate of adoption of AI in September 2023 and a higher 7.3% in November 2024. The subsector 713, that comprises Amusement, Gambling and Recreation Industries, registers the lowest rate of adoption (2.7% in September 2023 and 3.2% in November 2024). The different rates of AI adoption between the subsector 712 and 711 may be due to the fact that the former subsector is entirely classifiable in the cultural arts (see section 2), the latter, besides performing arts, contains activities (sport events and related industries) that can hardly be classified as cultural activities and presents characteristics that cannot easily pervaded by AI. The same applies for the subsector 713.

The previous analysis shows that despite the predicted negative consequences that the introduction of AI could produce on the current employment in sectors such in the cultural sector as well as in the rest of the economy, the introduction of AI in the Sector 71 has not yet produced any negative consequences, although AI requires new skilled workforce. At the same time AI is not destroying traditional equipment, although it requires complementary process and product innovations.

However, firms that adopt AI are more positive and, although aware that to harness AI requires a new organisational paradigm, declare that, despite the alarming forecasts (Goldman Sachs, 2023) on the effects of AI on employment, the consequences of AI adoption are not negative for firm employment.

Finally, since a share of 86.2% of firm non-adopters does not see AI as a viable technology in the arts, entertainment and recreation sectors and the low rate of AI adoption in the Arts, Entertainment and Recreation sector is partially justified by the fact that firms do not have clear information about AI technologies and application, an appropriate campaign of communication on the advantages of adopting AI could be a good policy for government to sponsor the new AI technologies.

REFERENCES

ATECA-AMESTOY, V.; CASTIGLIONE, C. (2023): "Live and digital engagement with the visual arts", *Journal of Cultural Economics*, 47: 643–692.

BAILY, M.N.; BRYNJOLFSSON, E.; KORINEK, A. (2023): "Machines of mind: The case for an AI-powered productivity boom", Available at: https://www.brookings.edu/articles/machines-of-mind-how-generative-ai-will-power-the-coming-productivity-boom/

BERTACCHINI, E.; MORANDO, F. (2013): "The future of museums in the digital age: New models for access to and use of digital collections", *International Journal of Arts Management,* 15 (2): 60–72.

BONNEY, K.; BREAUX, C.; BUFFINGTON, C.; DINLERSOZ, E.; FOSTER, L.S.; GOLDSCHLAG, N.; HALTIWANGER, J.C.; KROFF, Z.; SAVAGE, K. (2024): "Tracking Firm Use of AI in Real Time: A Snapshot from the Business Trends and Outlook Survey", NBER Working Paper 32319.

BOROWIECKI, K.J.; NAVARRETE, T. (2017): "Digitization of heritage collections as indicator of innovation", *Economics of Innovation and New Technology* 26 (3): 227–246.

BRYNJOLFSSON, E.; MCAFEE, A. (2011): "*Race Against the Machine. How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*". Digital Frontier Press.

BRYNJOLFSSON, E.; ROCK, D.; SYVERSON, C. (2021): "The Productivity J-Curve: How Intangibles Complement General Purpose Technologies." *American Economic Journal*, Macroeconomics 13, no. 1: 333–72.

BUFFINGTON, C.; FOSTER, L.; SHEVLIN, C. (2023): "Measuring Business Trends and Outlook through a New Survey," AEA Papers and Proceedings, 113: 140–144.

CARAMIAUX, B. (2020): Research for CULT Committee - The Use of Artificial Intelligence in the Cultural and Creative Sectors. European Parliament. Available at: https://bit.ly/3lEaBji

CARAMIAUX, B., LOTTE, F., GEURTS, J., AMATO, G., BEHRMANN, M., *ET AL*. (2019): AI in the media and creative industries. [Research Report] New European Media (NEM). pp.1-35. https://hal.inria.fr/hal-02125504/document

CASTIGLIONE, C.; INFANTE, I. (2014): "ICTs and time-span in technical efficiency gains. A stochastic frontier approach over a panel of Italian manufacturing firms." E*conomic Modelling,* 41: 55–65.

ELOUNDOU, T.; MANNING, S.; MISHKIN, P.; ROCK, D. (2023): GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models, WORKING PAPER, https://doi.org/10.48550/arXiv.2303.10130

EUROPEAN COMMISSION (2017): Mapping the Creative Value Chains – A study on the economy of culture in the digital age. Final Report. Brussels.

FANCOURT, D.; FINN, S. (2019): What is the evidence on the role of the arts in improving health and well-being? A scoping review. Copenhagen: WHO Regional Office for Europe; 2019 (Health Evidence Network (HEN) synthesis report 67. Report available at: https://iris.who.int/bitstream/handle/10665/329834/9789289054553-eng.pdf

GOLDMAN SACHS (2023): "Artificial Intelligence. Generative AI could raise global GDP by 7%". Report available at: https://www.goldmansachs.com/insights/articles/generative-ai-4could-raise-global-gdp-by-7-percent.html

GORDON, R. (2024): "The Future of U.S. Productivity Growth: A Skeptical View," presented at Symposium: U.S. Productivity Growth – Looking Ahead at the NY Federal Reserve Bank", February 16, 2024. Available at: U.S. Productivity Growth: Looking Ahead – Federal Reserve Bank of New York (newyorkfed.org).

GUPTA, D.; SRIVASTAVA, A. (2024): The Potential of Generative AI: Transforming technology, business and art through innovative AI applications. BPB Online. London (UK).

KEDI, W.E.; EJIMUDA, C.; IDEMUDIA, C.; IJOMAH, T.I. (2024): "AI software for personalized marketing automation in SMEs: Enhancing

customer experience and sales", *World Journal of Advanced Research and Reviews,* 23 (1): 1981-1990.

MOREAU, F. (2013): "The disruptive nature of digitization: The case of the recorded music industry." *International Journal of Arts Management* 15 (2): 18–31.

SYMBOLA (2024): "Io sono Cultura – Rapporto 2024", Fondazione Symbola-Unioncamere.

TEPPER, S.J.; HARGITTAI, E.; TOUVE, D. (2008): "Music, Mavens, and Technology." In *Engaging Arts*, edited by Tepper, S.J.; Ivey, B. 199–220. New York: Routledge, Taylor & Francis Group.

TYKHONOVA, O.; WIDMANN S. (2021): museum inovation barometer, Museum Booster. Report available at: https://cultureactioneurope.org/wp-content/uploads/2021/08/Museum-Innovation-Barometer-2021.pdf

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APPENDIX

Table A1. **EQUALITY TEST MEAN OF AI ADOPTION, IN THE LAST TWO WEEKS, IN THE NON-FARM AND 71 SECTORS**

Variable	Obs (*)	Mean	Std. err.	Std. dev.
Nonfarm_Yes	31	4.906	0.124	0.693
Sector71_Yes	31	4.742	0.200	1.111
diff = mean(Nonfarm_Yes) - mean(Sector71_Yes)				t = 0.6994
Pr(T < t) = 0.7565	Pr(|T| > |t|)[1] = 0.4870		Pr(T > t)[2] = 0.2435	
Nonfarm_No	31	87.232	0.312	1.736
Sector71_No	31	86.248	0.407	2.268
diff = mean(Nonfarm_7No) - mean(S71_7No)				t = 1.9180
Pr(T < t) = 0.9701	Pr(|T| > |t|) = 0.0599		Pr(T > t) = 0.0299	
Nonfarm_Dnk	31	7.865	0.307	1.710
Sector71_Dnk	31	9.003	0.332	1.848
diff = mean(Nonfarm_7DNK) - mean(S71_7DNK)				t = -2.5180
Pr(T < t) = 0.0072	Pr(|T| > |t|) = 0.0145		Pr(T > t) = 0.9928	

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS).
(*) By-weekly means (September 2023 - November 2024).
1 Two-tail test probability. 2 One-tail test probability.

Table A2. **EQUALITY TEST MEAN OF AI ADOPTION, DURING THE NEXT SIX MONTHS, IN THE NON-FARM AND 71 SECTORS**

Variable	Obs (*)	Mean	Std. err.	Std. dev.
Nonfarm_Yes	31	7.171	0.167	0.927
Sector71_Yes	31	6.635	0.268	1.492
diff = mean(Nonfarm_Yes) - mean(Sector71_Yes)				t = 1.6974
Pr(T < t) = 0.9526	Pr(|T| > |t|)[1] = 0.0948		Pr(T > t)[2] = 0.0474	
Nonfarm_No	31	71.374	0.277	1.541
Sector71_No	31	70.077	0.472	2.630
diff = mean(Nonfarm_7No) - mean(S71_7No)				t = 1.9180
Pr(T < t) = 0.9895	Pr(|T| > |t|) = 0.0211		Pr(T > t) = 0.0105	
Nonfarm_Dnk	31	21.465	0.198	1.104
Sector71_Dnk	31	23.274	0.320	1.783
diff = mean(Nonfarm_7DNK) - mean(S71_7DNK)				t = -4.8051
Pr(T < t) = 0.0000	Pr(|T| > |t|) = 0.0000		Pr(T > t) = 1.0000	

Source: Authors elaborations based on Business Trends and Outlook Survey (BTOS).
(*) By-weekly means (September 2023 - November 2024).
[1] Two-tail test probability. [2] One-tail test probability.