# EFFICIENCY OF CULTURAL AND CREATIVE INDUSTRIES: A PREFERRED REPORTING ITEMS FOR SYSTEMATIC REVIEWS AND META-ANALYSIS GUIDED SYSTEMATIC REVIEW OF DATA ENVELOPMENT ANALYSIS APPLICATIONS

**Katerina Fotova Čiković\*, Mario Tomiša and Joško Lozić**

University North
Koprivnica, Croatia

## ABSTRACT

This article identifies and analyses the applications of the main non-parametric Data Envelopment Analysis methodology in the efficiency measurement of the creative and cultural industries and sectors. The overarching goal of this study is to survey all the relevant published studies in this area and present and analyse their results to synthesise the state of knowledge in the creative and cultural industries and sectors. Moreover, another goal is to provide a theoretical background to the creative and cultural industries and the Data Envelopment Analysis methodology.

This article conducts Preferred Reporting Items for Systematic Reviews and Meta-Analysis – a guided systematic review with stringent selection criteria to include relevant Data Envelopment Analysis applications in the creative and cultural industries. The methodology resulted in 13 relevant articles regarding the efficiency of creative and cultural industries and the application of the Data Envelopment Analysis methodology in the creative and cultural industries and sectors. The main findings reveal that there are no studies employing the Data Envelopment Analysis method in the creative and cultural industries and sectors prior to 2012, which raises many issues for future consideration. Moreover, all the different perspectives on the efficiency evaluation of the creative and cultural industries are presented. The ultimate objective is to point out to academic members, researchers and analysts globally to apply the Data Envelopment Analysis methodology more often in the creative and cultural industries and sectors and refer to future research priorities in this field.

## KEY WORDS

## CLASSIFICATION

*Corresponding author, $\eta$: kcikovic@unin.hr; -;
 Trg dr. Žarka Dolinara 1, 48000 Koprivnica

# INTRODUCTION

One of the most popular and commonly used efficiency evaluation methodologies is the Data Envelopment Analysis (DEA). It is a non-parametric methodology that has been primarily developed for the efficiency evaluation of nonprofit organisations (such as the humanitarian assistance organisations in South Korea in [1] and the efficiency evaluation of university departments in [2] but has evolved into one of the most applied non-parametric methodologies in many industries today, such as banking [3, 4], transportation [5], public sector [6], and others. More on the DEA methodology is given in Subsection 2.2. The main objective of this study is to identify all the relevant published studies in this area up to this point, as well as to present, address and analyse their findings as a means for the synthesis of the state of knowledge in the field of the creative and cultural industries and sectors (CCS). For reference, [7] focused on human creativity as the most important economic resource to assess the efficiency of the creative sector, i.e. the production of creative goods in Mexico and examined 36 metropolitan areas in four different periods. For that reason, they implemented the DEA to estimate the static performance of creative industries and the Malmquist productivity index to evaluate the dynamic efficiency of the creative industries. Article [8] highlights corporate social responsibility, i.e. the influence of corporate social responsibility on financial performance in the creative industry in a sample of 53 creative firms in China.

In this article, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines for systematic literature review were applied to summarise relevant past findings regarding the efficiency of creative and cultural industries, focusing on the different applications of the leading non-parametric methodology DEA. The contribution of this article is reflected in the identification and presentation of the different perspectives shown when employing the DEA methodology in CCS, as well as the summing up of the findings and research trends of the field.

Based on the above, the work is structured into 5 sections. In addition to this introduction, the second section provides a literature review of the culture and creative industries and the DEA, addressing the research gap. Section 3 revolves around the methodology. Section 4 presents the results, i.e., the surveyed articles, their used DEA models, the combinations of different methodologies, and their findings. Section 5 opens up a discussion and provides concluding remarks.

# LITERATURE REVIEW

## CREATIVE AND CULTURAL INDUSTRIES

There is no single definition of the term "creativity", and it is studied by different disciplines such as psychology, arts and sociology and creativity "as a concept is subject to a myriad of interpretations" [9; p.3]. It can be defined as "the results of individuals exercising their imagination and exploiting (or preventing others from exploiting) its economic value" [10; p.21]. Moreover, "human creativity is the most important economic resource" [7; p.1] and "the use of creativity, skills and individual talents to create prosperity and employment by generating and exploiting the individual's creative and creative power" is a definition to the creative industry as an economic branch [11; p.1]. Creativity is "a complex and multidimensional phenomenon which includes skills, talent, cultural support, and innovative capacity" [9; p.3].

However, how and when the creative and cultural industries emerged reflects different opinions in the literature. [12; p.30] claim CCS are not new economic industries and have existed "since the early history of mankind". According to [13], the introduction and inception of the creative and cultural industries and sectors date back to the late 1990s, when the Creative Industries Task Force of the Department for Culture, Media and Sport established the CCS's first

definition. Their definition included 13 subsectors of creative industries, including advertising, architecture, arts and crafts, designer fashion, broadcast media, film, games, music, performing arts, publishing and printing, software and computer service. Even though these industries have already been established, their collection "under the umbrella of a single category" was in the late 20th century [14; p.7]. Following its rapid growth and development, the creative and cultural industries have gained huge popularity in the 21st century. Nevertheless, they hold a crucial position in the economy due to their contribution to gross domestic product (GDP), production scale, international trade cooperation and the creation of new jobs "while accomplishing tenable development and high-technology interaction" [15; p.2]. Moreover, they represent "a significant engine of economic growth, job creation, and social cohesion" [16; p.1] as well as "a hub of managerial innovation and experimentation and new organisational and business practice to stimulate innovation and entrepreneurship in other sectors of the economy" [16; p.1].

Therefore, creative and cultural industries attract so much attention from academic members and researchers nowadays. Moreover, the issue of the efficiency of creative and cultural industries has become appealing as the industry's rapid growth continues. There are three most known and used approaches to measure efficiency in the literature, as follows: the ratio indicators, the parametric (Stochastic Frontier Approach – SFA, Thick Frontier Approach – TFA and Distribution Free Approach – DFA) and the non-parametric methodologies (the DEA and Free Disposal Hull – FDH) [17]. The term "creative industries" is a relatively new concept which evolved from the terms *cultural industries* and *creative art* [18]. Even though the creative and cultural industries are a young economic sector and "emerging industries that are still under development" [8; p.256], they are rapidly growing throughout the world and have become one of the most important and innovative economic sectors, as a result of the "rapid development of economic globalisation and the creative economy, as well as the international division of labour and industrial value chain" [19; p.154]. Moreover, scholars claim that these industries "promote human development while promoting economic growth, while maintaining and protecting historical and cultural heritage, improving cultural capital, and fostering communities as well as individual creativity" [11; p.3].

The creative and cultural industries have become the „most dynamic sector of the world trade", growing 12 % faster in Europe than the average rate [20; p.29]. The importance of these industries is reflected as multi-layered. Namely, they increase the cultural and societal force of the societies, they move the creative capital and empower the creative workers, and they originate economic growth (through the "ripple effect") [21; p.31]. The literature thus far has referred to creative and cultural industries as "creative industries, cultural industries, creative economy or cultural economy" [13; p.2]. They have also been regarded as "a means to cure economic stagnation and boost sustainable development", especially in developing countries [22; p.1].

The definition today is much wider. Namely, [12; p.20], classify creative industries into "Arts, Media and Creative business services". Moreover, they claim that "the creative industry is a heterogeneous sector, with a multiplicity of varied branches and firms" [12; p.24] that are different in size, market coverage, labour intensity, productivity and business performance. On the other hand, [23; p.759], refers to Creative industries as "a range of selected economic activities in the sectors of advertising, architecture, arts, culture tourism services, design, fashion, film, R&D, high-tech, games, and media".

The main specifics of the creative industries are that "consumption is taste-driven and thus, products and services derived from these industries are subjective to each individual" [24; p.203], and the diversity of the creative industry's products is due to their origin stemming from "creativity, skill and talent" [24; p.203]. Moreover, they are characterised as industries with "low resource consumption, low environmental pollution, intense creativity, and high added worth" [15; p.1].

The emancipation and modernisation of the creative sector have accelerated the popularity, contribution to the economy and recognition of the creative and cultural industries [12]. Their contribution to regional economic growth, though, has introduced these industries as "the new drivers in economic development" [8; p.274].

Empirical studies on the efficiency and performance of the creative and cultural industry are still scarce, and this systematic review aims to inspire scholars to evaluate different sectors and subsectors of these industries empirically.

## DATA ENVELOPMENT ANALYSIS

DEA is a data-oriented approach and a non-parametric method for linear programming used for evaluating the performance (i.e. the relative efficiency) of a set of units called decision-making units (DMUs), which uses multiple input and output variables in the evaluation.

Since its introduction in 1978 by Charnes, Cooper and Rhodes, researchers in numerous fields have widely applied the DEA methodology. This method is widely recognised as an excellent and easy-to-use method for modelling operational processes for performance evaluation [25].

DEA methodology's main strength over the regression analysis is the unnecessary a priori specification of the model. Instead, it provides information on whether the analysed inputs and outputs of the analysed DMUs lie below or above the efficient frontier. However, it should be considered that it is a method that analyses the relative efficiency within the analysed sample of peer units [26; p.159].

The DEA methodology has two basic models: the CCR model (which got its name from the first letters of the surnames Charnes, Cooper, Rhodes [27] and the BCC model (after Banker, Charnes and Cooper [28]. The main difference between these two models is how they treat returns to scale, i.e. ranking. While the BCC model allows variable returns to rank – the variable returns-to-scale (VRS) assumption, the CCR model assumes that each DMU (homogeneous decision unit) operates with constant returns to the scale used – constant returns-to-scale (CRS), which means that all units operate at their optimum. [28] extended the CRS model to consider VRS probability.

The results obtained from DEA classify the units into efficient and inefficient. Efficient Units (DMUs) are those best-practice banks that score 100 %, while other banks score between 0-100 %.

## RESEARCH GAP

The main purpose of this article is to contribute to the theory regarding the applications of the DEA methodology in CCS. Therefore, the main research question is mirrored in the efforts to identify all the relevant published studies in this area up to this point and to present, address and analyse their findings as a means for the synthesis of the state of knowledge in the field of the CCS. Through the answer to the research question, the primary theoretical contributions are mirrored in summarising the findings and research trends of the field.

## METHODOLOGY

In this research, the PRISMA-guided literature review has been applied as a means to summarise relevant past findings regarding the efficiency of creative and cultural industries, with focused attention to the different applications of the leading non-parametric methodology DEA. The PRISMA guidelines were first introduced in 2009 as a means to "help systematic reviewers transparently report why the review was done, what the authors did, and what they found" [29; p.1] and are very convenient for "syntheses of the state of knowledge in a field, from which future research priorities can be identified" [29; p.1].

The PRISMA-guided review and the research design are presented in Figure 1. Namely, the first step of the research was a survey and exploration of the two selected scientific databases (Scopus and the Clarivate Web of Science) using several keywords and key phrases to encompass all relevant published studies. The selected databases are the most relevant global scientific databases. The studies we wanted to survey are published in Scopus-indexed or Web of Science-indexed peer-review journals. The used keywords are as follows: *data envelopment analysis (dea), creative sector, creative industries, cultural industries, and creative economy*. This resulted in a total of 100 studies.

In the second step, the search was refined, and the focus was set on studies published in English and fully downloadable studies. However, no years of publication were entered as a criterion for this research, which means all the published studies since the introduction of DEA in 1978 have been included. This was done on purpose since all the relevant articles have been included since the introduction of the DEA. Moreover, this also highlighted the research gap in the applications of DEA in the CCS sector. This approach resulted in 85 hits.

In the following steps (screening and eligibility), an exclusion criterion has been applied to duplicate articles (i.e. articles that were indexed in both Scopus and Clarivate Web of Science databases) and to articles that did not concern the creative and cultural sectors (which was decided after the initial screening and manual abstract review). Finally, after applying all of the exclusion criteria, 13 publications remained in the inclusion phase, representing the basis for our further and more qualitative analysis, which is carried out in the next section.
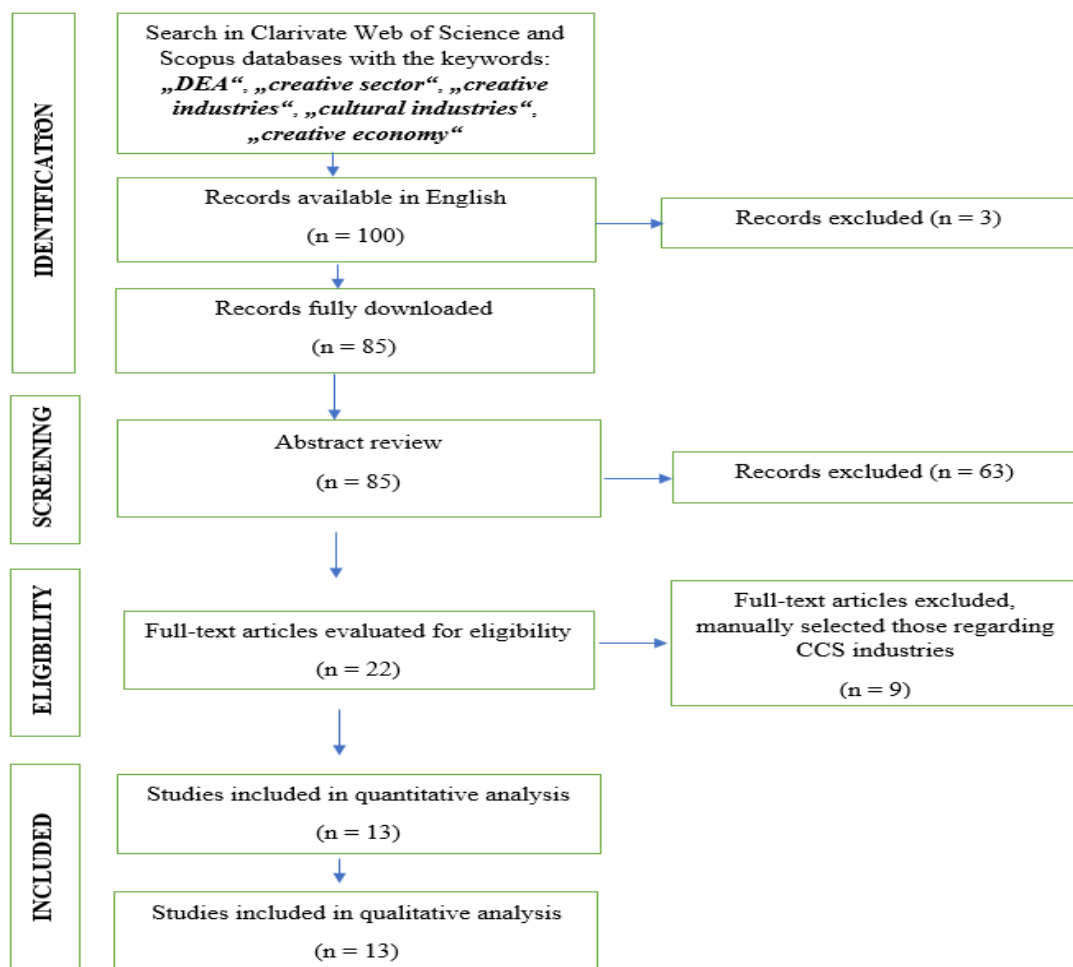


**Figure 1.** The research design and the selection process of the articles for the literature review (PRISMA-guided).

# APPLICATIONS OF DEA IN THE CULTURAL AND CREATIVE INDUSTRIES

This study has surveyed the most relevant scientific databases (i.e. Scopus and Web of Science) in systemising the previous relevant published work regarding the efficiency of the creative and cultural industries and sectors with the application of DEA. The research design makes it evident that the DEA methodology, although very popular in banking, agriculture, supply chain, transportation, and public policy [30], is insufficiently applied to the creative and cultural industries globally.

This section presents a tabular overview of the research results (Table 1), and a qualitative analysis of each of the 13 surveyed articles and their findings has been made after that.

A quantitative analysis of the creative sector has been conducted by [12]. In their study, they investigate the spatial economic nature of the creative sector, with a particular view to both the spatial genesis of this sector in the Dutch economy from 1994 to 2009. Therefore, they explored the role of four large agglomerations in the Netherlands, i.e. Amsterdam, Rotterdam, The Hague, and Utrecht. The findings from their 'Flying Disc' developed model indicate that the level of implementation of SPM (Strategic Performance Management) significantly contributes to the higher super-efficiency of firms and the "access to agglomeration and spatial economies, available resources, knowledge and financial institutions, trade associations, do not dominate in a firm's location in the later stage of the SPM implementation process" [12; p.30].

In the study of [23], an exploration of whether the geographical location of business firms influences the performance of creative high-tech sector firms is performed. They provide a micro-business perspective of business performance and its interrelatedness with spatial entrepreneurship and general economic conditions. Their findings reveal that the adoption of SPM and the geographical position in the country significantly affect the firms' performance. They included performance indicators (e.g., turnover, profit, cost) and relevant background variables (managerial quality, employee satisfaction, innovative milieu, industrial networks, spatial accessibility). The results indicate that implementing SPM provides many financial and non-financial benefits to the firms, "location matters, but not to the same extent for all firms, and distance matters more for some businesses than others" [23; p.773]. This study provides great scientific and practical contributions because it connects location and cultural organisation theories with the SPM model and literature.

The authors [19] employed the DEA methodology to evaluate the efficiency of cultural creative industries in ten cities in China in 2014. In their model, they have applied several cultural creative industries parks, the proportion of cultural creative enterprise, proportion of creative class, proportion of R&D expenditure, quantities of patent application, per capita GDP as inputs and proportion of cultural creative industries in added value as an output. Their findings reveal that Dalian's cultural creative industry parks lack efficient planning, independent innovation and creative talent cultivation mechanisms. The practical contribution of this study is great since they have drawn conclusions and recommendations for the government as follows: „The government should extend the humanistic context of the city, improve the cultural quality of the city, and develop Donggang District into several industrial clusters" [19; p.159].

Lu, W.-M. et al. [31] have implemented DEA methodology and the network-based approach to evaluate the cultural and creative promotion performance of the cities/counties in Taiwan that can be treated as benchmarks. Namely, this study offers the most important input and output variables and identifies cities and counties that could be treated as benchmarks.

**Table 1**: Applications of DEA in the creative and cultural industries.

| Article (Year) | Application | DEA model | Time frame | Country |
|---|---|---|---|---|
| [12] (2012) | Creative firms as change agents in creative spaces | DEA + spatial-econometric approach + 'Flying Disc' model (SEM) | 1994-2009 | Netherlands |
| [23] (2013) | In search of creative champions in high-tech spaces: a spatial application of strategic performance management | DEA + SPM model - 'Flying Disc' model (SEM) + GIS-oriented statistical analysis | 2008 | Netherlands |
| [19] (2017) | Evaluation of cultural creative industry efficiency in Dalian | DEA CCR model + evaluation index system | 2014 | China |
| [31] (2017) | Exploring the cultural and creative promotion performance | DEA and network-based approach | 2008-2012 | Taiwan |
| [7] (2017) | Examination of the efficiency of the production of creative goods | DEA + Malmquist productivity index | 1998, 2003, 2008, 2013 | Mexico |
| [32] (2018) | Creative industries agglomeration and industrial efficiency | VRS model of DEA | 2004-2014 | China |
| [8] (2019) | Influence of corporate social responsibility on corporate performance | Dynamic DEA approach + regression (OLS) | 2010-2013 | China |
| [11] (2020) | Assessing the efficiency of sub-sectors of the creative industry | Output-oriented CRS DEA model | n.d. | Indonesia |
| [9] (2020) | Reliability of Creative Composite Indicators with Territorial Specification in the EU | Principal Component Analysis (PCA), (DEA) and Distance P2(DP2) | 2011, 2012 and 2015 | 20 EU countries |
| [33] (2020) | Measuring European cultural and creative cities efficiency | A meta frontier DEA approach + the composite index (IEC3) | 2017 | European cities |
| [34] (2021) | Measuring and Decomposing SMEs' Productivity in Creative Economic Sector | DEA + Malmquist Total Factor Productivity (TFP) index | 2014-2018 | Indonesia |
| [35] (2021) | Benchmarking culture in Europe: A data envelopment analysis approach to identify city-specific strengths | DEA + BoD approach | n.a. | European cities |
| [15] (2022) | Efficiency Measurement and Heterogeneity Analysis of Chinese Cultural and Creative Industries | A three-stage DEA model + stochastic frontier analysis (SFA) | 2012-2018 | China |

The findings reveal an economic gap between urban and rural areas considering the "promotion and development of the cultural and creative industries in Taiwan" [31; p.1], i.e. the CCI promotions in the urban areas are considered more efficient and successful than those in the rural areas of Taiwan. They also found some geographical differences, stating northern Taiwan as the most efficient area in Taiwan. This study provides crucial practical implications and suggestions for further CCI development that could contribute to worldwide policy-makers and city governments.

The focus on human creativity as "the most important economic resource" [7; p.1] to assess the efficiency of the creative sector, i.e. the production of creative goods in Mexico, is the main concept of the study of [7]. As a result of this, an examination of 36 metropolitan areas in four different periods, 1998, 2003, 2008 and 2013, is conducted. Their findings indicate that "most of the efficient, creative industries in Mexico are to be found in metropolitan areas that are not relatively large" [7; p.1]. Moreover, their results show that a great portion (over three-fourths) of the creative sectors in metropolitan areas are inefficient. This study provides scientific and practical implications since it covers Florida's 3T model to investigate what factors affect these inefficiencies.

An investigation of the agglomeration externalities of creative industries that affect industrial efficiency at the regional and sector levels has been undertaken by [32]. The findings show that "the efficiency of creative industries is relatively low and distributed unequally, not only across different provinces but also among different creative domains in China" [32; p.17]. More importantly, they claim that creative industries' efficiency could improve if a cluster area consists of more small-sized creative firms than larger ones, which is an important input for policy-makers.

The relevant issue of corporate social responsibility, i.e. the influence of corporate social responsibility on financial performance in the creative industry, is the main motivation behind the work of [8]. Their findings indicate that "content media-related businesses, which include motion pictures, publishing, and broadcasting, are the performance growth leaders, and the regression result showed that corporate social responsibility has a significant positive influence on the financial performance of the creative industry" [8; p.269]. Moreover, the results reveal that "risk-taking and capital-oriented characteristics exist within the creative industry" [8; p.255].

Handayani et al. have conducted a study to evaluate the efficiency of 15 Batique enterprises in Semarang, Indonesia, with the application of the output-oriented CRS (Constant Return to Scale) DEA [11]. Their findings indicate that nine Batique firms are considered efficient, while the rest are relatively inefficient. Based on the obtained results of the inefficient DMUs, they propose targets for improvement, which is the greatest scientific contribution of this article.

A synthetic and composite indicator of creativity at a (NUTS 2) regional disaggregation level for a wide sample of 20 EU countries to enhance the assessment of "creative potential and to gain an insight into territorial behaviour" [9; p.1] have been constructed by [9]. The results from their work imply disparities and "inequality in the regional distribution of creativity" [9; p.1] among EU countries. Moreover, they found central and northern Europe, particularly national capital cities, to be the "principal creative clusters" [9; p.1]. These findings provide significant practical implications.

A "benchmark analysis of European cities based on the estimation of a composite index of efficiency from the dimensions of the Cultural and Creative Cities Monitor (CCCM) 2017" has been carried out by [33; p.891]. Interestingly, their study references cities such as Paris, Louvain and Cork as a basis for potential improvements. The benchmark analysis applied in

this article captures these cities with the best practices. It presents the interrelatedness of these three cities as a reference for the rest of the sample.

In the study of [34], the main focus is on measuring the productivity of SMEs in the creative economic sector across 23 districts/cities in Aceh, Indonesia, over the 2014-2018 period. The findings show "a low productivity level SMEs across the province" [34; p.7]. They go one step further and guide SMEs to improve efficiency, i.e., to implement good business governance principles and to extensively use ICT facilities, such as online sales and the Internet of things, in their marketing activities to improve their pure and technical efficiency. They also provide suggestions regarding the future government strategy, i.e. they suggest that a priority for promoting low-productivity SMEs be set with the help of "financial assistance and regular entrepreneurial and managerial training programs" [34; p.8].

The study of [35] examines the cultural sector as "an integral part of a city's quality of life, a driver of urban change, and a genuine economic sector" [35; p.584]. This proposed model provides valuable practical implications for city management due to its recommendations, identification of relative strengths and areas to be improved for each city, and overcoming the models' disadvantages and limitations with fixed weights. Moreover, "this approach allows for a 'fairer' comparison between cities by respecting their different local contexts and policy choices" [35; p.595]. Ultimately, their proposed model could help European cities in the processes toward a "culture-led development" [35; p.584].

A three-stage BCC DEA model for the period 2012 – 2018 was developed by [15] for the purpose of measuring the operating efficiency of 56 cultural and creative enterprises in China. The results show differences between the established efficiencies of the observed enterprises, and they found these differences are impacted by "environmental elements and white noise" [15; p.1]. Moreover, the overall technical efficiency results show that the efficiency of the CCIs is generally low. They propose a better "collaboration, support, and enhancement in the activities of the CCIs to serve as an engine for industrial and economic growth" [15; p.1].

The findings from the 13 qualitatively analysed studies in the inclusion phase of the research process reveal that there is a need for greater promotion and development of the cultural and creative industries in Taiwan, as there is an economic gap between urban and rural areas [36]; there is a need for the use of „approach that allows for a 'fairer' comparison between cities by respecting their different local contexts and policy choices" [35; p.595]. Other studies suggest benchmark analysis of cities with the best practices [33] and claim that corporate social responsibility has a significant positive influence on the financial performance of the creative industry [8]. Many studies provide guidance and suggestions regarding the future government strategy [19; p.159, 34] suggest that „the government should extend the humanistic context of the city, improve the cultural quality of the city, and develop Donggang District into several industrial clusters"; promotion of the development of creative industries agglomeration is initiated as it "can significantly increase the efficiency of creative industries" [32; p.17].

## DISCUSSION AND CONCLUSION

This article employed a PRISMA-compliant systematic literature review of publications that employ DEA methodology in evaluating the efficiency of the creative and cultural industries worldwide. The research design (shown in Figure 1) has been initiated by exploring the two largest and most relevant scientific databases: the Scopus and the Web of Science database, which resulted in 100 studies. The employed PRISMA guidelines have eventually led to a total of 13 studies to be qualitatively analysed. Therefore, this study focuses solely on measuring

the efficiency of CCS industries by applying the non-parametric mathematical programming methodology – the DEA.

This systematic review has revealed that all of the surveyed studies published in the Scopus and/or Clarivate Web of Science database were published between 2012 and 2022. Interestingly, no studies have employed the DEA method in CCS industries before 2012. Three of the studies were published in 2017 and three in 2020. Most of these 13 studies involve China's cultural and creative industries (four out of thirteen); two revolve around the EU cities, two around the Netherlands and two around Indonesia. Two studies [12, 23] have included the Flying Disc model in combination with the DEA. In contrast, [34] and [7] have combined the DEA with the Malmquist index.

The scientific contribution is reflected in the promotion of the DEA methodology among researchers in the creative and cultural industries and scientists in any scientific field. This systematic literature review would significantly contribute to the scholarly literature and is a stepping stone for future work and research on the CCS by implementing the DEA methodology. This study shows all the different perspectives on the efficiency evaluation of the creative and cultural industries. However, this study has several limitations. First, it is intriguing that there is a disproportion between the studies of DEA in CCS and the total number of DEA research. Namely, when exploring Scopus and Clarivate Web of Science databases with the keyword "DEA", 40 768 articles appear. However, the number dramatically goes down to a larger number of studies when combined with the *creative sector, creative industries, cultural industries, and creative economy*. This calls for additional efforts to incorporate the DEA methodology and all of its models in the creative and cultural industries field. Second, possibly not all relevant studies on the efficiency of the CCS industries have been analysed since, in this study, we focus on Web of Science and Scopus.

In future work, the authors plan to focus on the situation in the CCS Industries in Southeast European countries and address their common problems, such as the „brain-drain" phenomenon, the fact that the CCS industries are still developing, the high rate of unemployment, the underdevelopment of the relationships between the public, private and civilian sector, the reduced cultural spending and others. [21]. This scope would require a different approach, such as qualitative research among the cultural workers and operations research experts. Future research could also be directed towards the specific applications relevant to the regional development in Eastern European countries, such as arts in the development of tourist experience [37], as well as broader research areas taking into account specific performance cultures in companies [38]. Since CCS Industries, in some cases, have a significant impact on the environment, the balance between economic development and sustainability should also be the focus of future research [39].

## REFERENCES

[1] Kim, H. and Lee, C.W.: *Efficiency analysis for nonprofit organisations using DEA: Focused on humanitarian assistance organisations in South Korea*.
Asia Pacific Journal of Innovation and Entrepreneurship **12**(2), 165-180, 2018,
http://dx.doi.org/10.1108/APJIE-04-2018-0018,

[2] Gökşen, Y.; Doğan, O. and Özkarabacak, B.: *A Data Envelopment Analysis Application for Measuring Efficiency of University Departments*.
Procedia Economics and Finance **19**, 226-237, 2015,
http://dx.doi.org/10.1016/S2212-5671(15)00024-6,

[3] Cvetkoska, V. and Fotova Čiković, K.: *Assessing the relative efficiency of commercial banks in the Republic of North Macedonia: DEA window analysis*.
Croatian Operational Research Review **11**, 217-227, 2020,
http://dx.doi.org/10.17535/crorr.2020.0017,

[4] Fotova Čiković, K.; Keček, D. and Lozić, J.: *Does Ownership Structure Affect Bank Performance in The Covid-19 Pandemic Period? Evidence from Croatia.*
Yugoslav Journal of Operations Research **33**, 277-292, 2023,
http://dx.doi.org/10.2298/YJOR220615018F,

[5] Assaf, G.A. and Jossiassen, A.: *European vs. U.S. airlines: Performance comparison in a dynamic market.*
Tourism Management **3**(2), 317-326, 2011,
http://dx.doi.org/10.1016/j.tourman.2011.03.012,

[6] Jung, S.; Son, J.; Kim, C. and Chung, K.: *Efficiency Measurement Using Data Envelopment Analysis (DEA) in Public Healthcare: Research Trends from 2017 to 2022.*
Processes **11**, No. 811, 2023,
http://dx.doi.org/10.3390/pr11030811,

[7] Benita, F. and Urzúa, C.M.: *Efficient creativity in Mexican metropolitan areas.*
Economic Modelling **71**, 25-33, 2018,
http://dx.doi.org/10.1016/j.econmod.2017.11.018,

[8] Hou, C.-E.; Lu, W.-M. and Hung, S.-W.: *Does CSR matter? Influence of corporate social responsibility on corporate performance in the creative industry.*
Annals of Operations Research **278** (1-2), 255-279, 2019,
http://dx.doi.org/10.1007/s10479-017-2626-9,

[9] Miguel, B.-S.I. and Herrero-Prieto, L.C.: *Reliability of Creative Composite Indicators with Territorial Specification in the EU.*
Sustainability **12**(8), No. 3070, 2020,
http://dx.doi.org/10.3390/su12083070,

[10] Howkins, J. *The Creative economy. How people make money from ideas.*
Penguin books, 2007,

[11] Handayani, N.U., et al.: *A data envelopment analysis approach for assessing the efficiency of sub-sectors of creative industry: A case study of batik enterprises from Semarang, Indonesia.*
AIP Conference Proceedings **2217**, No. 030038, 2020,
http://dx.doi.org/10.1063/5.0000905,

[12] Kourtit, K. and Nijkamp, P.: *Creative firms as change agents in creative spaces.*
Quaestiones Geographicae **31**(4), 19-31, 2012,
http://dx.doi.org/10.2478/v10117-012-0032-6,

[13] Benita, F.: *On the performance of creative industries: Evidence from Mexican metropolitan areas.*
Papers in Regional Science **98**(2), 1-18, 2018,
http://dx.doi.org/10.1111/pirs.12403,

[14] Tomczak, P. and Stachowiak, K.: *Location patterns and location factors in cultural and creative industries.*
Quaestiones Geographicae **34**(2), 7-27, 2015,
http://dx.doi.org/10.1515/quageo-2015-0011,

[15] Li, M.; Sun, H.; Agyeman, F.O.; Su, J. and Hu, W.: *Efficiency Measurement and Heterogeneity Analysis of Chinese Cultural and Creative Industries: Based on Three-Stage Data Envelopment Analysis Modified by Stochastic Frontier Analysis.*
Frontier in Psychology **27**(12), No. 823499, 2022,
http://dx.doi.org/10.3389/fpsyg.2021.823499,

[16] Li, F.: *The digital transformation of business models in the creative industries: A holistic framework and emerging trends.*
Technovation **92**-**93**, No. 102012, 2020,
http://dx.doi.org/10.1016/j.technovation.2017.12.004,

[17] Fotova Čiković, K.; Lozić, J. and Keček, D.: *The impact of mergers and acquisitions (M&A) on bank efficiency in Europe: a PRISMA-compliant systematic review of DEA applications,*
In: Erceg, A. and Požega, Ž., eds.: *Interdisciplinary Management Research XVIII*, pp.626-644, 2022,

[18] Hartley, J. *Creative industries.*
Wiley-Blackwell, 2007,

[19] Fan, X.N. and Sun, M.M.: *Evaluation of cultural creative industry efficiency in Dalian based on DEA model.*
Proceedings Of The Second International Conference On Economic And Business Management (FEBM 2017) **33**, 154-161, 2017,

[20] UNCTAD: *Creative Economy Report 2008.*
https://unctad.org/system/files/official-document/ditc20082cer_en.pdf, accessed 5th July, 2022,

[21] Goldstein, S.: *Entrepreneurship in creative industries.* In Croatian.
Hrvatska Sveučilišna Naklada, Zagreb, 2016,

[22] Wu, Y.-C. and Lin, S.-W.: *Integrated approach for exploring critical elements that affect sustainable development of cultural and creative industries.*
Journal of Business Economics and Management **22**(3), 596-615, 2021,
http://dx.doi.org/10.3846/jbem.2021.14261,

[23] Kourtit, K. and Nijkamp, P.: *In search of creative champions in high-tech spaces: A spatial application of strategic performance management.*
Journal of Regional Science **53**(5), 749-777, 2013,
http://dx.doi.org/10.1111/jors.12087,

[24] Budnarowska, C. and Marciniak, R.: *Fashion, tourism and the creative industries.*
In: Long; p. and Morpeth, N.D., eds.: *Tourism and Creative Industries. Theories, Policies and Practice.* Routledge, New York, 2016,
http://dx.doi.org/10.4324/9781315735870,

[25] Cooper, W.W.; Seiford, M.L. and Zhu, J. *Handbook on Data Envelopment Analysis.* Second Edition.
International Series in Operations, Research & Management Science **164**, Springer, 2011,

[26] Giustiniani, A. and Ross, K.: *Bank competition and efficiency in the FYR Macedonia.*
South-Eastern Europe Journal of Economics **2**, 145-167, 2008,

[27] Charnes, A.; Cooper, W. and Rhodes, E.: *Measuring the efficiency of decision-making units.*
European Journal of Operational Research **2***, 429-444, 1978,
http://dx.doi.org/10.1016/0377-2217(78)90138-8,

[28] Banker, R.D.; Charnes, A. and Cooper, W.W.: *Some models of estimating technical and scale inefficiencies in data envelopment analysis.*
Management Science **30**(9), 1078-1092, 1984,
http://dx.doi.org/10.1287/mnsc.30.9.1078,

[29] Page, M.J., et al.: *The PRISMA 2020 statement: an updated guideline for reporting systematic reviews.*
Systematic Reviews **10**, No. 89, 2021,
http://dx.doi.org/10.1186/s13643-021-01626-4,

[30] Emrouznejad, A. and Yang, G.: *A survey and analysis of the first 40 years of scholarly literature in DEA: 1978–2016.*
Socio-Economic Planning Sciences **61**, 4-8, 2018,
http://dx.doi.org/10.1016/j.seps.2017.01.008,

[31] Lu, W.-M., et al.: *Exploring the cultural and creative promotion performance in Taiwan: A network-based ranking approach.*
INFOR: Information Systems and Operational Research **56**(1), 115-135, 2017,
http://dx.doi.org/10.1080/03155986.2017.1337417,

[32] Yu, W.: *Creative industries agglomeration and industrial efficiency in China.*
Growth and Change **49**(4), 677-695, 2018,
http://dx.doi.org/10.1111/grow.12255,

[33] Jorge-Moreno, J.D. and Jorge-Huertas, V.D.: *Measuring European cultural and creative cities efficiency: a metafrontier DEA approach.*
Journal of Economic Studies **47**(4), 891-909, 2020,
http://dx.doi.org/10.1108/JES-06-2019-0265,

[34] Majid, M.S.A.; Faisal, F.; Fahlevi, H. and Azhari, A.: *Measuring and decomposing SMEs' Productivity in creative economic sector in Indonesia.*
IOP Conference Series: Earth and Environmental Science **704**(1), No. 012031, 2021,
http://dx.doi.org/10.1088/1755-1315/704/1/012031,

[35] Van Puyenbroeck, T.; Montalto, V. and Saisana, M.: *Benchmarking culture in Europe: A data envelopment analysis approach to identify city-specific strengths.*
European Journal of Operational Research **288**(2), 584-597, 2021,
http://dx.doi.org/10.1016/j.ejor.2020.05.058,

[36] Lu, W.-M.; Kweh, Q.L.; He, D.-S. and Shih, J.-M.: *Performance analysis of the cultural and creative industry: a network-based approach.*
Naval Research Logistics **64**(8), 662-676, 2017,
http://dx.doi.org/10.1002/nav.21777,

[37] Janičić, R.: *Arts in Development of Tourist Experiences*.
ENTRENOVA-ENTerprise REsearch InNOVAtion **6**(1), 1-8, 2020,

[38] Korma, M.; Kolloju, N.; Kummitha, H.R. and Kareem, M.A.*: Impact of Organizational Culture on Organisational Performance: A Study on the Employees in Educational Institutions*
Business Systems Research **13**(1), 138-155, 2022,
http://dx.doi.org/10.2478/bsrj-2022-0009,

[39] Pejić Bach, M.; Žmuk, B.; Kamenjarska, T.; Bašić, M. and Morić Milovanović, B.: The economic and sustainability priorities in the United Arab Emirates: conflict exploration.
Journal of Enterprising Communities: People and Places in the Global Economy **17**(5), 966-998, 2023.
https://doi.org/10.1108/JEC-04-2022-0067.