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CONCEPT OF EFFICIENCY IN THE CREATIVE ECONOMY AND ITS MEASUREMENT METHODOLOGY

Daminova Madinakhon Bahromjon kizi
PhD Researcher at the Department “Econometrics”
Tashkent State University of Economics, Uzbekistan
E-mail: daminovamadina1992@gmail.com

ABSTRACT

The study analyzes various international approaches to defining the sector's scope, including industry-based, occupation-based, and intellectual property-based models. Central to the research is the application of "Frontier Analysis" techniques: Data Envelopment Analysis (DEA) for measuring technical and scale efficiency, Stochastic Frontier Analysis (SFA) for distinguishing between structural inefficiency and random market noise, and the Malmquist Productivity Index (MPI) for tracking dynamic efficiency changes over time.

KEYWORDS

Creative Economy, Technical Efficiency, Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA), Malmquist Index, Productivity Measurement.

Introduction

In the modern global economic landscape, the transition from resource-based industries to knowledge-based systems has elevated the creative economy to a position of strategic importance. Defined by the intersection of individual creativity, skill, and talent, this sector serves as a vital engine for value creation and sustainable development. However, unlike traditional manufacturing, the creative sector is characterized by high levels of intangible assets, "platform economy" dynamics, and complex social externalities.

The core challenge for policymakers and researchers lies in the measurement of efficiency. Because creative products (such as digital content, design, and performing arts) are often unique and non-standardized, traditional productivity metrics frequently fail to capture their true economic and social impact. This article explores the conceptual boundaries of efficiency within the creative industries and proposes a robust methodological framework—integrating frontier analysis techniques—to evaluate the performance of this evolving sector.

Literature Review

The academic discourse on the creative economy has evolved from simple definitions to complex performance metrics. The following key pillars form the basis of current research:

Conceptual Foundations: John Howkins (2001) initially framed the creative economy through the lens of intellectual property. This was further expanded by Richard Florida (2002), whose "Creative Class"

theory shifted the focus toward human capital and the "3T" variables (Technology, Tolerance, and Talent) as drivers of regional efficiency.[1]

Furthermore Farrell, M. J. (1957) studied The Measurement of Productive Efficiency. Charnes, A., Cooper, W. W., & Rhodes, E. (1978) gave more information in their article: "Measuring the Efficiency of Decision-Making Units". As well as Banker, R. D., Charnes, A., & Cooper, W. W. (1984) wrote an article on "Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis". Stolp C(1990), Aigner, D. J., Lovell, C. A. K., & Schmidt, P. (1977), Meeusen, W., & van den Broeck, J. (1977), Caves, D. W., Christensen, L. R., & Diewert, W. E. (1982), Färe, R., Grosskopf, S., Norris, M., & Zhang, Z. (1994), Coelli, T. J. (1995), Kumbhakar, S. C., Parmeter, C. F., & Zelenyuk, V. (2022) did unforgettable share on measuring the efficiency of the economy.

Among the local scholars B.Rustamov and S.Gulyamov did research in data-driven article using DEA and SFA analysis.

Methodology

In this study, methods of systemic approach, comparative analysis, deduction, and induction were utilized to investigate the creative economy. This study adopts a multi-stage econometric approach to measure efficiency It includes the following econometrical approaches:Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA) and Malquist Productivity Index (MPI).

Analysis and results

To effectively manage the creative economy (cultural and creative sectors), ensure strategic planning, and evaluate the effectiveness of public policy, it is essential to accurately measure its size, structure, and dynamics statistically. However, since the creative economy is multi-sectoral, has a high share of services, and includes elements of informal employment and the "platform economy," there is no single universal measurement methodology. Therefore, the following hypotheses regarding the creative economy, efficiency, and measurement methodology are adopted:

1. "Creative Economy" – A complex of activities based on creativity, knowledge, technology, and intellectual property. In practical measurement, it is often operationalized through "creative industries / cultural and creative sectors." UNCTAD emphasizes that there is no single "eternal" definition of the creative economy; it is an evolving concept. [2]

2. "Efficiency" – A category based on the ratio of resources (inputs) to results (outputs). In the creative sector, it is not limited to financial results but also encompasses elements of innovative, social, and cultural value. UNCTAD notes that measuring the creative economy is multidimensional (economic contribution, employment, social participation).[3]

3. Measurement Methodology is viewed at three levels: Micro (enterprise/project), Meso (sector/cluster/city), and Macro (region/country).

Before measuring efficiency, the most critical question is: "What do we include in the creative economy?" Because if the sector boundaries change, results such as "outputs," "inputs," "productivity,"

[1] Kizi, D. M. B. (2025). PERSPECTIVES OF SUPPORTING STRATEGY OF CREATIVE ECONOMY IN INDONESIA. Raqamli iqtisodiyot (Цифровая экономика), (11), 479-491.

[2] UNCTAD. (2024). Creative economy and digital transformation: Analytical materials (Annex 1). United Nations. https://unctad.org/system/files/official-document/ditctsce2024d2_annex1_en.pdf

[3] UNCTAD. (2022). Advancing the measurement of the creative economy: Assessing the contribution of the creative economy to development. United Nations Conference on Trade and Development.

and "GVA/GDP contribution" will also change. Therefore, in our dissertation methodology, defining the sector is the first stage of measurement.

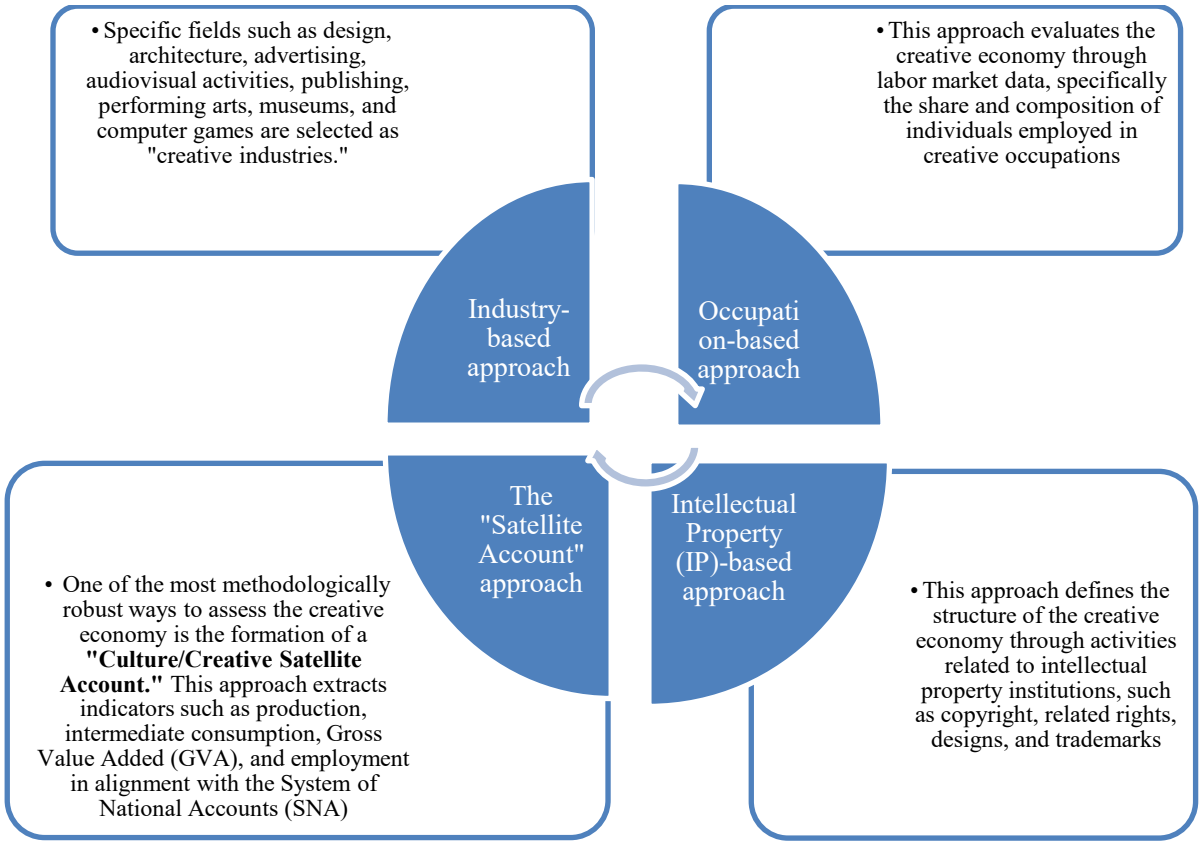

Figure 1. Classification of approaches to measuring the creative sector and their content[4]

In UNCTAD's official approach, the creative economy does not have a single definition; it is presented as a concept that changes over time, based on the interaction of creativity, ideas, intellectual property, knowledge, and technology. In practice, four distinct approaches to measuring the creative economy are identified (see Figure 1).

Thus, the creative sector is measured primarily through approaches based on industrial activity, employment, copyright, and cultural statistics. When determining efficiency, two concepts exist that should not be confused:

Efficiency: Achieving maximum results with given resources or obtaining a given result with minimum resources.

Effectiveness: Whether the goal was achieved (e.g., did a cultural program increase social participation?).[5]

[4] Created by the author.
[5] Drucker, P. F. (2006). The effective executive. HarperBusiness. (Samaradorlik (efficiency) va natijadorlik (effectiveness) o'rtasidagi klassik farqni yorituvchi manba)

In the creative economy, this distinction is critical: for example, a festival may increase social participation (effectiveness), but if the budget expenditure is very high, its efficiency will be low. Here are the main types of efficiency given:

Technical Efficiency: Utilizing resources effectively under given production technology.

Allocative Efficiency: Choosing the right distribution of resources considering price factors.

Cost Efficiency: Achieving the desired result at minimum cost.

Scale Efficiency: Operating at the optimal volume for the firm/sector.

Dynamic Efficiency: Growth in efficiency over time due to innovation, technology, and business model changes. [6]The simplest form of efficiency is expressed mathematically as:

$$Efficiency = \frac{Outputs}{\text{Inputs}}$$

For example, Labor Productivity:

$$LP = \frac{Y}{L}$$

Where: Y – production (or value added), L– labor (number of employees or hours worked). However, creative sectors are "more complex" to measure than traditional industries. The main reasons are summarized in the following steps:

Product Quality and Uniqueness: Creative products (design, content, art, media) are often not "identical"; quality is subjective, and value depends heavily on brand and reputation.

Preponderance of Intangible Assets: Intellectual property, creative capital, audience attention, platform networks, and data – the value of these may not be fully reflected in balance sheets.

Digital Distribution and Platform Economy: Revenue models differ on streaming/marketplace platforms; "views/listens" exist, but their monetization varies.

Informality and Freelancing: The share of freelancers and self-employment is high, creating coverage issues in official statistics.

Social/Cultural Externalities: Creative activities often yield "non-market" results such as social inclusion, identity, tolerance, and urban attractiveness.

Comparability Issues: UNESCO 2009 FCS emphasizes the need for reliable, comparable data based on standardized definitions for evidence-based policy.

In measuring efficiency, we use the activity/sector approach. To perform the measurement, we utilize DEA (Data Envelopment Analysis), SFA (Stochastic Frontier Analysis), and the Malmquist Index.

DEA (Data Envelopment Analysis) — DEA is a non-parametric method based on linear programming used to evaluate the efficiency of Decision Making Units (DMUs) (e.g., sectors, regions). DEA measures efficiency as:

$$Efficiency = \frac{\sum Weights \times Outputs}{\sum Weights \times Inputs}$$

The model identifies optimal weights automatically.

- 1 (or 100%) → Fully efficient.
- < 1 →Relatively inefficient.[7]

[6] Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & Battese, G. E. (2005). An introduction to efficiency and productivity analysis (2nd ed.). Springer Science & Business Media. (Samaradorlik turlari: texnik, taqsimot va masshtab samaradorligi bo'yicha asosiy darslik).

[7] Farrell, M. J. (1957). The Measurement of Productive Efficiency. Journal of the Royal Statistical Society: Series A (General), 120(3), 253–281. https://doi.org/10.2307/2343100

Models based on Scale Returns:

CCR Model (CRS – Constant Returns to Scale): Developed by Charnes, Cooper, and Rhodes (1978). Assumes that if inputs double, outputs also double. It measures Technical Efficiency. [8]

BCC Model (VRS – Variable Returns to Scale): Developed by Banker, Charnes, and Cooper (1984). Assumes variable returns to scale and measures Pure Technical Efficiency and Scale Efficiency. [9]

1. **Orientation:**

Input-oriented: How much can inputs be reduced while keeping output constant? θ=1 → Efficient; θ <1 → Inputs can be reduced.

Output-oriented: How much can output be increased while keeping inputs constant? $\phi = 1 \rightarrow$ Efficient; $\phi > 1 \rightarrow$Output can be increased.[10]

Malmquist Productivity Index (MPI) -The Malmquist Index measures the change in Total Factor Productivity (TFP) over time. It separates changes in production technology from changes in technical efficiency.

$$M_0 = \left[\frac{D_t^o(X_{t+1}, Y_{t+1})}{D_t^o(X_t, Y_t)} \times \frac{D_{t+1}^o(X_{t+1}, Y_{t+1})}{D_{t+1}^o(X_t, Y_t)}\right]^{1/2}$$

- (M_0 > 1) → TFP increased
- (M_0 < 1) → TFP decreased
- (M_0 = 1) → No change[11]

Components:

- Efficiency Change (EC): The "catch-up effect" (approaching the frontier).
- Technical Change (TC): The "frontier shift" (technological progress).

3. Stochastic Frontier Analysis (SFA)

SFA is a parametric econometric method that distinguishes between random error and technical inefficiency. It was proposed by Aigner, Lovell, and Meeusen (1977).[12]

Logarithmic Form:

$$\ln y_i = \beta \ln(x_i) + v_i - u_i$$

(y_i) — Output;
(x_i) — Vector of inputs.;
(β) — parameters;
(v_i) — Symmetric random error (noise);

[8] Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. European Journal of Operational Research, 2(6), 429–444. https://doi.org/10.1016/0377-2217(78)90138-8
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[10] Meeusen, W., & van den Broeck, J. (1977). Efficiency Estimation from Cobb-Douglas Production Functions with Composed Error. International Economic Review, 18(2), 435–444. https://doi.org/10.2307/2525757
[11] . Caves, D. W., Christensen, L. R., & Diewert, W. E. (1982). The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity. Econometrica, 50(6), 1393–1414. https://doi.org/10.2307/1913388
[12] Coelli, T. J. (1995). Recent Developments in Frontier Modelling and Efficiency Measurement. Australian Journal of Agricultural and Resource Economics, 39(3), 219–245. https://doi.org/10.1111/j.1467-8489.1995.tb00552.x

$(u_i \geq 0)$ — One-sided technical inefficiency.
Key Parameter:

$$\gamma = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}$$

$(\gamma \to 0)$: Deviations are mostly random noise;
$(\gamma \to 1)$: Deviations are mostly technical inefficiency.[13]

Conclusion and offers

The methodology for measuring the creative economy requires first defining the scope (activities and occupations), followed by regular statistical monitoring across indicators of economic volume, employment, business demographics, trade, IP, and cultural participation. Integrating these into indices allows for cross-regional comparison, evaluation of policy effectiveness, and justification of strategic decisions. The transition toward a creative economy represents a fundamental shift in how nations generate value, moving from physical labor and raw materials to the exploitation of ideas and intellectual property. However, as this research has demonstrated, the inherent characteristics of the creative sector—such as its reliance on intangible assets, the subjective nature of product quality, and the prevalence of informal digital platforms—necessitate a sophisticated and multi-dimensional approach to measuring efficiency.

Our methodological analysis leads to several key conclusions:

Methodological Integration: No single metric can fully capture the performance of the creative industries. While Data Envelopment Analysis (DEA) provides a robust non-parametric benchmark for technical and scale efficiency, it must be complemented by Stochastic Frontier Analysis (SFA) to account for the high levels of market volatility and "noise" characteristic of creative markets.

The Importance of Dynamic Efficiency: Through the Malmquist Productivity Index, it becomes clear that long-term growth in the creative economy is driven less by the accumulation of traditional inputs and more by "technological shifts" and innovation. Monitoring this "catch-up effect" is vital for developing countries like Uzbekistan to transition from being consumers of creative content to becoming global producers.

In summary, measuring the efficiency of the creative economy is not merely an academic exercise but a strategic necessity. By applying rigorous econometric methods to accurately mapped creative sectors, policymakers can better allocate resources, protect intellectual property, and foster an environment where human creativity becomes a sustainable driver of national prosperity.

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