

Analyzing the Dynamics of Newly Created Jobs and Activity Trends in Traditional Industries: A Time-Series Study (2015–2024)

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تحليل ديناميكيات مناصب الشغل المستحدثة وتطور الأنشطة في الصناعات التقليدية: دراسة زمنية للفترة 2015-2024

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Summary: This study investigates the dynamics of newly created jobs and the evolution of economic activity in Algeria's traditional industries from 2015 to 2024. The sector—comprising artistic crafts, material production, and services—plays a significant role in generating employment, particularly in regions with limited industrial alternatives. However, it faces persistent challenges, including inconsistent institutional support and a lack of reliable time-series data. The analysis utilizes official and academic data sources, applying statistical and econometric tools via the R programming language. Key methods include descriptive statistics, time series visualization, and stationarity testing using Augmented Dickey-Fuller (ADF) and KPSS tests. Findings reveal marked fluctuations in the artistic sub-sector, while services and material production display greater stability. The short duration of some series (2020–2024) limits the robustness of ADF outcomes, though KPSS results suggest partial stationarity. The study underscores the need for stronger data infrastructure and policy continuity. It recommends targeted support for volatile sub-sectors and encourages the use of more advanced models in future research. This work contributes a novel quantitative perspective to the analysis of traditional industries in Algeria.

Keywords: Traditional industries, Job creation, Time series, Algeria, Stationarity

Jel Classification Codes : J23 ; C22; O14

ملخص: تهدف هذه الدراسة إلى تحليل ديناميكيات مناصب الشغل المستحدثة وتطور النشاط الاقتصادي في قطاع الصناعات التقليدية في الجزائر خلال الفترة 2015–2024. يضم هذا القطاع كلاً من الحرف الفنية، وإنتاج المواد، والخدمات، ويلعب دوراً محورياً في خلق فرص العمل، لاسيما في المناطق التي تفتقر إلى بدائل صناعية قوية. غير أن هذا القطاع يواجه تحديات مستمرة، من أبرزها تقلب الدعم المؤسسي ونقص البيانات الزمنية الدقيقة. يعتمد التحليل على مصادر بيانات رسمية وأكاديمية، وتوظف فيه أدوات إحصائية وقياسية باستخدام لغة البرمجة R. وتشمل المنهجية الإحصاء الوصفي، والتمثيل البياني الزمني، واختبارات استقرار السلاسل الزمنية باستخدام اختباري (ADF) وKPSS تكشف النتائج عن تقلبات ملحوظة في فئة الحرف الفنية، مقابل استقرار نسبي في خدمات الصناعات التقليدية وإنتاج المواد. كما حدت قصر بعض السلاسل (2020–2024) من موثوقية نتائج اختبار ADF، في حين أشارت نتائج اختبار KPSS إلى وجود درجة جزئية من الاستقرار، مع ضرورة توخي الحذر في تفسيرها بسبب ضيق الفترة الزمنية. تلخص الدراسة إلى ضرورة تحسين نظم جمع البيانات وتعزيز الاستدامة المؤسسية للقطاع، مع التوصية بتوسيع الدعم الموجه للقطاعات ذات التذبذب المرتفع، وتطوير أدوات تحليلية أكثر تعقيداً مستقبلاً. كما تمثل الدراسة مرجعاً أولياً في التحليل الزمني الكمي الحديث لقطاع الصناعات التقليدية بالجزائر.

الكلمات المفتاح: الصناعات التقليدية؛ مناصب الشغل؛ السلاسل الزمنية؛ الجزائر؛ الاستقرار.

تصنيف JEL: J23 ; C22; O14

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I- Introduction :

Traditional industries and crafts represent a cornerstone of the social economy in Algeria due to their direct connection with cultural heritage, geographic diversity, and job distribution—especially in rural and semi-rural areas. As local development challenges grow, these industries have become a strategic option for generating low-cost employment, strengthening social cohesion, and fostering a degree of economic autonomy for families, particularly in regions lacking major investments.

Over recent decades, significant regulatory efforts have been made to structure this sector, most notably Executive Decree No. 96-01 dated October 10, 1996. This decree provided the first official definition of traditional industries and crafts as any productive, creative, transformative, artistic restoration, or service activity predominantly characterized by manual work. These activities may be practiced individually or through cooperatives or artisanal enterprises. This recognition expanded the legal framework for artisans and established a classification of activities into three categories: traditional artistic industries, traditional material production, and traditional service crafts.

In light of socio-economic transformations, there has been a growing need to study the dynamics of employment in this sector by tracking the evolution of registered artisans and the nature of their activities, while analyzing their impact on the national labor market using quantitative tools. Despite the institutional and conceptual momentum, quantitative studies addressing employment dynamics within this sector remain scarce—highlighting the need for a precise time-based analysis, which this paper aims to deliver.

Recent literature has paid particular attention to the multidimensional nature of traditional industries and crafts, recognizing their economic, cultural, and social value. Scholars define them as activities practiced by individuals or groups to produce goods or provide services using local resources and traditional methods to meet daily needs or fulfill artistic functions, whether permanent or temporary (Benhamouda, 2012; Fatima Bin Abdalaziz, 2017).

In Algeria, these activities have been officially regulated by Ordinance No. 96-01, which defines three main types of practice: traditional artistic industries, traditional material production, and traditional services. It also categorizes artisans into: craftsman, master craftsman, and manufacturer—with the possibility of practicing individually, in cooperatives, or through traditional enterprises (Gassa & Benguettaf, 2024).

The structural characteristics of this sector show a clear focus on individual-based practices, where the success of an artisanal activity is closely tied to the personality of its owner, who often assumes multiple roles: financier, producer, and marketer simultaneously (Tika, 2018). Traditional products serve as cultural imprints, reflecting local environmental elements, social patterns, and community-specific symbols (Jalila, 2012).

Economically, the sector is characterized by low investment costs, ease of project establishment, and wide geographic dispersion—making it an effective tool for tackling unemployment. Moreover, traditional crafts contribute to foreign currency revenues through their ties to tourism and export economies, despite limited production volumes and some products' lack of compliance with international quality standards (Drabal & Amoudi, 2017).

However, the sector still faces several challenges, including weak supply chains, limited technological integration, fragile production structures, weak organization, and difficulties in aligning artisanal products with modern market standards and quality requirements. Several empirical and statistical studies have highlighted these limitations. For instance, Naaimia, Twati, and Hayat (2017) emphasized the sector's limited contribution to domestic demand despite its high potential to absorb unemployment.

From this overview, it becomes evident that traditional industries hold great promise for economic and social development in Algeria. Nevertheless, realizing this potential requires a thorough understanding of the sector's structure and challenges—an endeavor this study undertakes through a time-series statistical approach covering the period from 2015 to 2024.

1. Problem Statement:

Although some sectoral studies have addressed the importance of traditional industries in Algeria, most have been limited to describing their economic impact without relying on precise quantitative analytical approaches. Current literature lacks longitudinal time-series analysis of newly created jobs and emerging activities within this sector, which hinders a comprehensive understanding of its real dynamics over the years. This gap in quantitative analysis limits the ability of policymakers to adopt data-driven policies.

Accordingly, the problem revolves around the following questions:

What are the time trends of newly created jobs and emerging activities in the traditional industries sector during the period 2015–2024? And to what extent are these time series stable?

2. Objectives:

This study aims to achieve the following objectives:

Conduct a descriptive analysis of newly created jobs in the traditional industries sector, categorized by its three main branches.

Calculate annually emerging activities based on cumulative data.

Illustrate trends using time-series graphs to identify patterns of change.

Assess the stability of the time series using unit root tests (ADF and KPSS).

Compare the results across different sub-sectors and extrapolate future development trends.

3. Significance of the Study:

This study derives its significance from being the first to conduct a quantitative time-series analysis based on integrated annual data covering a relatively extended period (2015–2024) for the traditional industries sector in Algeria. The results provide a quantitative reference for policymakers to develop employment strategies and support various activity categories within the sector. Moreover, the study contributes to bridging a gap in economic and developmental literature and encourages the expansion of academic research toward deeper analytical approaches in this field—especially concerning the use of econometric tools and time-series analysis to better understand national economic structures.

4. Literature Review:

Recent literature has highlighted the multifaceted dimensions of traditional industries and crafts, emphasizing their role in reinforcing cultural identity, contributing to local development, and the challenges they face. The study by Gassa and Bengueuttaf (2024) underscored the complex nature of this sector, showing that traditional industries are not merely economic activities, but deeply reflect the cultural and civilizational diversity that characterizes Algerian society—making them key instruments in consolidating national identity.

On another front, the study by Habili and Bouacheche (2024) emphasized the growing importance of these industries in supporting local development, particularly through their interactive relationship with tourism, their contribution to job creation, and their role in achieving

local economic integration. The study demonstrated how traditional crafts serve as strong cultural and touristic attractions, thereby enhancing the sustainability of these activities, especially in tourism-oriented provinces such as Tipaza.

Furthermore, the study by Gherbali and Benelhadjdjelloul (2024) confirmed the effective contribution of traditional industries in reducing unemployment rates and boosting local output, through their analysis of the Traditional Industry and Crafts Chamber of Tiaret Province during the period 2012–2022. However, the study also pointed out several structural and institutional obstacles preventing the sector from reaching its full potential—calling for more efficient management and support approaches.

Additionally, Gassa and Benguettaf's (2024) study of the National Micro-credit Agency (ANGEM) illustrated the persistent misalignment between public policies and the specificities of the traditional industry sector. Their findings revealed several challenges, including poor-quality raw materials, inadequate working conditions, the absence of a suitable accounting system, weak entrepreneurial culture, and marketing and export issues—reflecting the fragility of the sector's surrounding organizational and economic framework.

Based on these findings, the present study seeks to offer a distinctive contribution through an in-depth quantitative analysis of the dynamics of newly created jobs and the evolution of activities in Algeria's traditional industries and crafts sector during the period 2015–2024. By applying time-series analytical tools and stationarity tests (ADF and KPSS), this study aims to provide a deeper understanding of temporal trends and growth determinants within this vital sector—offering insights that can support the design of data-driven, targeted policies.

Accordingly, this research stands as one of the first studies to adopt a time-series statistical approach to analyze the employment structure within the traditional industries sector in Algeria.

II– Methods and Materials:

This study aimed to analyze the dynamics of newly created jobs and the evolution of activity creation in the traditional industries sector in Algeria. A quantitative research approach was adopted, with a focus on longitudinal time-series analysis to understand trends and changes over the years. The methodology was designed to provide a comprehensive overview of the studied phenomena, from data collection and processing to advanced statistical analyses.

1. Data Sources:

The necessary data for this study were collected from multiple sources to ensure comprehensiveness and accuracy. For the dataset on «newly created jobs in the traditional industries and crafts sector,» the primary source was the official website of the Algerian Ministry of Tourism and Traditional Industries. Due to the limited availability of data for the required time period, the time series was supplemented with additional information covering the years 2015 to 2018. These complementary data were extracted from two reliable secondary sources:

- Gherbali Hajar Nawara and Benelhadjdjelloul Yacine's (2022) study titled "The Contribution of Traditional Industries and Crafts to Local Development: A Case Study of the Traditional Industry and Crafts Chamber of Tiaret Province during the Period 2012–2022."
 - Boutouil Rokia's (2021) study titled "The Impact of the Number of Registered Artisans in Traditional Industries on Job Creation in Algeria during the Period 2015–2021."
- These data were carefully integrated to construct a unified time series of newly created jobs.

As for the dataset on «the evolution of newly created activities by sector,» it was directly obtained from the Ministry's official website (<https://www.mta.gov.dz>), where such data were available in cumulative form.

2. Variables:

The study focused on two key variables:

- **Newly Created Jobs in the Traditional Industries and Crafts Sector:**

This includes the total number of newly created jobs in the artistic crafts sector, the material production sector, and the services sector. This variable covers the period from 2015 to 2024.

- **Evolution of Activity Creation by Sector:**

This variable refers to the number of newly created activities recorded annually in the same three sectors. The original data, presented in cumulative form, cover the years 2019 to 2024.

3. Data Preparation:

Prior to analysis, the data underwent meticulous preparation. The cumulative data on «the evolution of activity creation by sector» were converted into annual (non-cumulative) values. This transformation was performed by calculating the first differences between consecutive data points, allowing for the identification of newly created activities per year instead of total cumulative values. This step was essential for enabling an accurate analysis of annual change dynamics.

4. Statistical Tools and Software:

All statistical analyses in this study were conducted using the R programming language, known for its powerful capabilities in data and time-series analysis. Several specialized R packages were employed to streamline analytical processes and present results effectively. These include:

- **ggplot2** for producing high-quality graphical visualizations,
- **tseries** for implementing time series tests,
- **tidyr** and **dplyr** for efficient data manipulation and transformation,
- and **scales** for formatting axes and data within the graphs.

The core R environment was prepared using the following commands:

```
rm(list = ls())  
library(ggplot2)  
library(tseries)  
library(tidyr)  
library(scales)
```

5. Applied Analyses:

A series of statistical and graphical analyses were applied to extract insights from the dataset:

- **Descriptive Analysis:**

Descriptive statistics were computed for both "newly created jobs" and "annually created activities" time series. These included the mean, standard deviation, minimum, and maximum values. These measures provided an initial overview of data distribution, dispersion, and central tendencies.

– **Time Series Plots:**

Time series plots were generated for each of the studied variables. These visualizations helped identify long-term trends, seasonal patterns (if any), and notable shifts over time, offering a clear graphical understanding of the underlying dynamics.

– **Unit Root Tests:**

To assess the stationarity of the time series, two main unit root tests were conducted:

❖ **Augmented Dickey-Fuller (ADF) Test:**

The null hypothesis (H_0) of this test states that the time series contains a unit root (i.e., it is non-stationary), while the alternative hypothesis (H_1) suggests that the series is stationary.

❖ **Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test:**

In contrast to the ADF test, the null hypothesis (H_0) of the KPSS test asserts that the series is stationary, and the alternative hypothesis (H_1) posits that the series is non-stationary.

These tests were applied to both the "newly created jobs" and "annually created activities" series at a significance level of 0.05. It is worth noting that the relatively short length of the available time series may affect the statistical power of these tests, and therefore, the results should be interpreted with caution.

III- Results and discussion :

This section presents the findings derived from the descriptive and graphical analyses, as well as the outcomes of the stationarity tests applied to the time series of newly created jobs and the evolution of activities in the traditional industries sector.

1. Descriptive Statistics:

The descriptive statistics for the newly created job data over the period 2015–2024 reveal significant variations across the three sub-sectors of traditional industries (artisanal, materials production, and services). The **artisanal traditional industry**¹ recorded the highest average of newly created jobs, with approximately **42,059** positions and a relatively high **standard deviation** of **14,597**, indicating considerable fluctuation in performance throughout the study period.

In contrast, the **materials production sector** showed a much lower average of around **12,734** jobs, while the **services sector** reported an average of **29,922** jobs. These differences suggest that the **artisanal traditional industry** serves as the main driver of job creation within the broader sector, followed by the services sector and then the materials production sector.

See the table below for a detailed overview.

Table (1): Descriptive Statistics of Newly Created Jobs in Traditional Industries (2015–2024)

Sector	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum	Standard Deviation
Creative Arts	28,360	32,131	38,175	42,059	44,698	77,932	14,597.51
Materials Production	10,455	11,929	12,488	12,734	13,199	15,882	1,617.82
Services	23,915	25,414	26,581	29,922	30,113	50,276	8,067.36

The The source: Author’s calculations based on R output (Appendix 1)

¹ Creative Arts (Artisanal Traditional Industry – Arts Subsector)

Regarding the annually established activities for the period 2020–2024, the descriptive statistics revealed significant variations across sectors. The services sector recorded the highest average number of newly created activities, with approximately 7,584 activities per year, reflecting strong dynamism in this field. It was followed by the arts sector with an average of 4,511 activities, characterized by substantial year-to-year fluctuations. Meanwhile, the materials sector registered the lowest average, with around 2,705 newly established activities annually. These figures highlight the services sector's dynamism in attracting investment and generating new initiatives. See the table below.

Table (2): Descriptive Statistics of Annually Established Activities in Traditional Industries (2020–2024)

Sector	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum	Standard Deviation
Creative Arts	893	1803	2912	4511	8369	8579	3688.25
Materials Production	1729	2079	2546	2705	3415	3758	863.52
Services	4450	5052	7771	7584	9707	10942	2830.69

The source: Author’s calculations based on R output (Appendix 4)

To complement these insights, Table 3 presents the descriptive statistics of cumulative activities across sectors from 2019 to 2024. Although cumulative data offer a general picture of sectoral growth, they tend to obscure year-to-year variations, which are better captured through first-difference transformations (as shown in Table 2).

Table (3): Descriptive Statistics of Cumulative Activities in Traditional Industries (2019–2024)

Sector	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum	Standard Deviation
Creative Arts (Cumulative)	123456	134127	141306	137869	142877	146012	8493.37
Material Production (Cumulative)	74053	78408	82266	81444	84602	87580	4989.69
Services (Cumulative)	189477	202846	212351	210271	218365	227399	13630.32

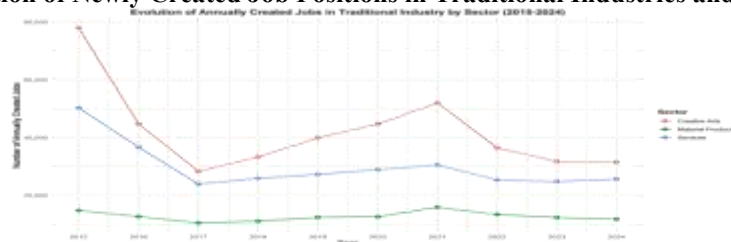
The source: Author’s calculations based on R output (Appendix 5)

2. Time Series Plots:

To enhance the understanding of temporal trends, time series plots were created for both newly created job positions and activities.

Figure 1 illustrates the overall trend of newly created job positions across different sectors, showing the temporal pattern and annual variations. The figure highlights the fluctuations in job numbers, reflecting the dynamic nature of the sector.

Figure (1): Evolution of Newly Created Job Positions in Traditional Industries and Crafts (2015–2024)

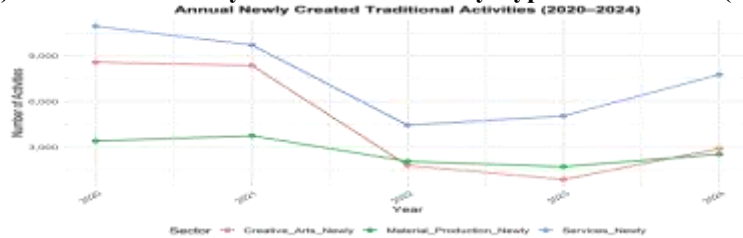


The source:² R Software Output

² All figures were generated using R and the **ggplot2** package.

Figure 2 provides a detailed view of the newly created activities added each year, helping to identify periods of intensified or slowed entrepreneurial activity. These charts highlight development patterns and contribute to identifying the phases of growth or decline in sector indicators.

Figure (2): Evolution of Newly Created Activities by Type of Craft Field (2020–2024)



The source: R Software Output

Figure 3 illustrates the cumulative growth in activities over the period 2019–2024, offering a comprehensive view of long-term sectoral expansion. While cumulative curves emphasize overall progress, they may conceal short-term disruptions or accelerations, which are better observed through the year-on-year breakdown shown in Figure 2. Taken together, these plots contribute to a clearer understanding of the evolution and internal rhythms of Algeria’s traditional industries.

Figure (3): Evolution of Cumulative Activities by Type of Craft Field (2019–2024)



The source: R Software Output

3. Unit Root Test Results (Stability Analysis):

To assess the stability of the time series for newly created jobs and newly initiated activities, Augmented Dickey-Fuller (ADF) and KPSS tests were applied.

The ADF test results for all series examined (whether related to jobs or annual new activities) revealed p-values greater than 0.05. Based on these results, the null hypothesis of the ADF test — which assumes the presence of a unit root (i.e., that the series is non-stationary) — cannot be rejected at the 0.05 significance level. However, this interpretation should be approached with caution, especially for the series of newly initiated activities, given the short time span available (2020–2024), which may reduce the power of the ADF test in rejecting the null hypothesis.

Conversely, the KPSS test results showed p-values equal to 0.1 for all the analyzed series. Since these p-values are higher than the 0.05 significance level, there is no strong statistical evidence to reject the null hypothesis of the KPSS test, which assumes that the series is stationary around a deterministic trend. This suggests that the series tend to be stationary or that there is a limited ability to conclusively identify non-stationarity, especially considering the constraints of data length.

These findings offer preliminary insights into the nature of the time series, but may require further analysis or longer datasets to more definitively confirm their stability. See the table below.

Table (3): Unit Root Test Results (ADF and KPSS) for Newly Created Jobs and Annual Activities

Time Series	Sector	ADF Test Statistic	ADF p-value	KPSS Test Statistic	KPSS p-value	Stability Conclusion
Newly Created Jobs	Creative Arts	-1.8014	0.648	0.27275	0.1	Inconclusive / No strong evidence of non-stationarity
	Materials Production	-1.5116	0.7584	0.096913	0.1	Inconclusive / No strong evidence of non-stationarity
	Services	-1.8942	0.6127	0.34408	0.1	Inconclusive / No strong evidence of non-stationarity
Annually Created Activities	Creative Arts	NaN	NA	0.2901	0.1	Results limited due to short time series; no strong evidence of non-stationarity
	Materials Production	NaN	NA	0.25664	0.1	Results limited due to short time series; no strong evidence of non-stationarity
	Services	NaN	NA	0.23428	0.1	Results limited due to short time series; no strong evidence of non-stationarity

The source: Author’s calculations using R software. (See Appendices 2, 3, 6, and 7)

4. Discussion:

This section aims to deepen our understanding of the findings drawn from the descriptive and graphical analyses, as well as the unit root tests, and to interpret their fundamental implications for the traditional industries sector. It also highlights the potential effects on the sector’s dynamics and its capacity for economic contribution.

The descriptive statistics, graphical trends, and unit root test results (ADF and KPSS) provided valuable insights into the stability characteristics of the time series, which are critically important for guiding future econometric analyses. The results carry significant implications for understanding the dynamic nature of the traditional industries sector and its developmental potential:

– **Challenges of Sustainable Job Creation:**

While the sector demonstrates a tangible ability to generate new employment opportunities, indications of non-stationarity (based on the ADF test) may suggest that this growth is not entirely self-sustaining and requires continuous support. This highlights the need to evaluate the effectiveness of current policies in providing a stable growth environment and potentially to design more sustainable support programs focused on enhancing the sector’s resilience to economic shocks.

– **Vitality of New Activities and Data Limitations:**

The dynamism observed in the newly created activities is a positive indicator of innovation and adaptability within the sector. However, the short time span of the available data limits the ability to conduct in-depth analyses of long-term trends or sustainability. This suggests that policymakers may lack a full picture of this vital dimension, which could hinder the development of effective strategies to support entrepreneurship in traditional industries.

IV- Conclusion:

This study provided an initial analysis of the dynamics of newly created jobs and the development of activities in the traditional industries sector, employing a time series methodology. The findings revealed heterogeneous dynamics across the sub-sectors: the Creative Arts sector exhibited the highest average in job creation, while the Services sector led in terms of newly established activities. This suggests that the drivers of growth and development vary across different domains of the sector. Moreover, significant fluctuations were observed across all series, indicating the sector's sensitivity to external factors.

Regarding stationarity, the results of the unit root tests (ADF and KPSS) presented a complex picture. While ADF test results suggested non-stationarity, the KPSS results supported the assumption of stationarity. This divergence highlights the need for caution when interpreting statistical stationarity, especially given the limitations in data length. The contrast in results may suggest that the series lie on the threshold of stationarity, or that the short time frame reduces the discriminatory power of these tests.

This study represents a valuable contribution as one of the first contemporary analyses to provide a detailed time-series investigation based on integrated and up-to-date data in the traditional industries sector. Despite its limitations, it offers a foundational reference for understanding the dynamics of this vital sector within the national economy and sets the stage for more comprehensive future research.

The study faced several key limitations, most notably the short length of available time series, particularly for newly created activities. This constraint directly affected the strength of the unit root tests, making the conclusions regarding stationarity less definitive. Additionally, the short time span restricted the application of more complex econometric models that require a sufficient number of observations for robust estimation.

Based on the findings and identified limitations, this study offers several recommendations for policymaking and future research:

- **Enhancing Data Collection and Quality:**
It is essential to improve the mechanisms for collecting data on traditional industries to ensure longer, more comprehensive, and accurate time series. This is a critical step toward enabling stronger future analyses and supporting evidence-based decision-making.
- **Targeted Support for Volatile Sub-Sectors:**
Given the significant fluctuations observed in some sectors—particularly the Creative Arts, which showed a high average of job creation but with considerable variability—it is recommended to design flexible and targeted support policies aimed at stabilizing performance and mitigating the effects of external shocks, thereby ensuring sustainable job creation.
- **Applying Advanced Time Series Models:**
When longer and more stable datasets become available, it is recommended to adopt advanced time series models such as Autoregressive Integrated Moving Average (ARIMA) or Vector Autoregression (VAR). These models can help analyze causal relationships, provide accurate forecasts, and offer deeper insights into the interactions between economic variables within the sector.

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- Appendices:

Appendix (1) :Descriptive Statistics of Newly Created Job Positions in the Traditional Industries Sector (2015–2024)

```

RStudio [32-bit] - [R Console]
> print("Descriptive Statistics for Creative Arts (Annually Created):")
> summary(job_data_newly_created_extended$Creative_Arts)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 28388  32131  38178  42059  44888  77932
> mean(job_data_newly_created_extended$Creative_Arts)
[1] 42059.5
> sd(job_data_newly_created_extended$Creative_Arts)
[1] 14597.81
>
> print("Descriptive Statistics for Material Production (Annually Created):")
[1] "Descriptive Statistics for Material Production (Annually Created):"
> summary(job_data_newly_created_extended$Material_Production)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 20455  11929  11485  12754  15199  19982
> mean(job_data_newly_created_extended$Material_Production)
[1] 12754.3
> sd(job_data_newly_created_extended$Material_Production)
[1] 1437.818
>
> print("Descriptive Statistics for Services (Annually Created):")
[1] "Descriptive Statistics for Services (Annually Created):"
> summary(job_data_newly_created_extended$Services)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 23815  25414  26581  29922  30113  80276
> mean(job_data_newly_created_extended$Services)
[1] 29922.4
> sd(job_data_newly_created_extended$Services)
[1] 8067.388
    
```

Appendix (2): ADF Test Results for Newly Created Job Positions (2015–2024)

```

RStudio [32-bit] - [R Console]
Augmented Dickey-Fuller Test

data: creative_arts_ts_ext
Dickey-Fuller = -1.8014, Lag order = 2, p-value = 0.648
alternative hypothesis: stationary

> adf.test(material_production_ts_ext)

Augmented Dickey-Fuller Test

data: material_production_ts_ext
Dickey-Fuller = -1.5116, Lag order = 2, p-value = 0.7888
alternative hypothesis: stationary

> adf.test(services_ts_ext)

Augmented Dickey-Fuller Test

data: services_ts_ext
Dickey-Fuller = -1.8898, Lag order = 2, p-value = 0.6127
alternative hypothesis: stationary

>
> print("KPSS Test Results (Annually Created Data - Extended):")
[1] "KPSS Test Results (Annually Created Data - Extended):"
> kpss.test(creative_arts_ts_ext)

KPSS Test for Level Stationarity
    
```

Appendix (3):KPSS Test for Level Stationarity of Newly Created Job Positions (2015–2024)

```

RStudio [32-bit] - [R Console]
KPSS Test for Level Stationarity

data: creative_arts_ts_ext
KPSS Level = 0.27275, Truncation lag parameter = 2, p-value = 0.1

Message d'avis :
Dans kpss.test(creative_arts_ts_ext) : p-value greater than printed p-value
> kpss.test(material_production_ts_ext)

KPSS Test for Level Stationarity

data: material_production_ts_ext
KPSS Level = 0.096913, Truncation lag parameter = 2, p-value = 0.1

Message d'avis :
Dans kpss.test(material_production_ts_ext) :
p-value greater than printed p-value
> kpss.test(services_ts_ext)

KPSS Test for Level Stationarity

data: services_ts_ext
KPSS Level = 0.34433, Truncation lag parameter = 2, p-value = 0.1

Message d'avis :
Dans kpss.test(services_ts_ext) : p-value greater than printed p-value
>
    
```

Appendix (4): Descriptive Statistics of Annually Created Activities (First Differences) in the Traditional Industries Sector (2020–2024)

```

RGui [32-bit] - [R Console]
> print("-----")
[1] ""
> print("Descriptive Statistics for Annually Newly Created Activities:")
[1] "Descriptive Statistics for Annually Newly Created Activities:"
> for (col in names(activities_newly_created)[-1]) {
+   cat(paste0("---- ", col, " ---- \n"))
+   print(summary(activities_newly_created[[col]]))
+   cat(paste("Standard Deviation:", round(sd(activities_newly_created[[col]]), 2), "\n\n"))
+ }

--- Creative Arts Newly ---
Min. 1st Qu.  Median      Mean 3rd Qu.  Max.
  893   1003   2913      4511   2349   8579
Standard Deviation: 3658.25

--- Material Production Newly ---
Min. 1st Qu.  Median      Mean 3rd Qu.  Max.
 1729   2079   2546      2705   3415   3758
Standard Deviation: 863.83

--- Services Newly ---
Min. 1st Qu.  Median      Mean 3rd Qu.  Max.
 4450   5052   7771      7884   3707  10942
Standard Deviation: 2820.48

> print("-----")
[1] ""
>

```

Appendix (5): Descriptive Statistics of Cumulative Activities in Traditional Industries (2019–2024)

```

RGui [32-bit] - [R Console]
[1] "Descriptive Statistics for Creative Arts (Cumulative Activities):"
> summary(annual_activities_data$Creative_Arts_Cum)
  Min. 1st Qu.  Median      Mean 3rd Qu.  Max.
123456 134567 145678 156789 167890 178901
> mean(annual_activities_data$Creative_Arts_Cum)
[1] 137649
> sd(annual_activities_data$Creative_Arts_Cum)
[1] 2493.367
>
> print("Descriptive Statistics for Material Production (Cumulative Activities):")
[1] "Descriptive Statistics for Material Production (Cumulative Activities):"
> summary(annual_activities_data$Material_Production_Cum)
  Min. 1st Qu.  Median      Mean 3rd Qu.  Max.
 74533  78409  82266  81464  84602  87500
> mean(annual_activities_data$Material_Production_Cum)
[1] 81446.33
> sd(annual_activities_data$Material_Production_Cum)
[1] 4894.687
>
> print("Descriptive Statistics for Services (Cumulative Activities):")
[1] "Descriptive Statistics for Services (Cumulative Activities):"
> summary(annual_activities_data$Services_Cum)
  Min. 1st Qu.  Median      Mean 3rd Qu.  Max.
189477 202446 212283 210273 218385 227399
> mean(annual_activities_data$Services_Cum)
[1] 210270.6
> sd(annual_activities_data$Services_Cum)
[1] 15430.32

```

Appendix (6): ADF Test Results for Annually Created Activities (First Differences) in Traditional Industries (2020–2024)

```

RGui [32-bit] - [R Console]
data: creative_arts_diff_ts
Dickey-Fuller = NaN, Lag order = 1, p-value = NA
alternative hypothesis: stationary

> print("**")
[1] ""
>
> print("Material Production (Newly Created Annually):")
[1] "Material Production (Newly Created Annually):"
> print(adf.test(material_production_diff_ts, alternative = "stationary"))

Augmented Dickey-Fuller Test

data: material_production_diff_ts
Dickey-Fuller = NaN, Lag order = 1, p-value = NA
alternative hypothesis: stationary

> print("**")
[1] ""
>
> print("Services (Newly Created Annually):")
[1] "Services (Newly Created Annually):"
> print(adf.test(services_diff_ts, alternative = "stationary"))

Augmented Dickey-Fuller Test

data: services_diff_ts
Dickey-Fuller = NaN, Lag order = 1, p-value = NA

```

Appendix (7): KPSS Test for Level Stationarity of Annually Created Activities (2020–2024)

```

RStudio Console
Data: constant_diff_ts
KPSS Level = 0.2061, Truncation lag parameter = 1, p-value = 0.1
Message d'avis :
Donc KPSS test (constant_diff_ts, null = "Level") :
p-value greater than printed p-value
> print("")
[1] ""
> print("Services (Newly Created Annually)!")
[1] "Services (Newly Created Annually)!"
> print(kpss.test(constant_diff_ts, null = "Level"))

KPSS Test for Level Stationarity
Data: material_production_diff_ts
KPSS Level = 0.2064, Truncation lag parameter = 1, p-value = 0.1
Message d'avis :
Donc KPSS test (material_production_diff_ts, null = "Level") :
p-value greater than printed p-value
> print("")
[1] ""
> print("Services (Newly Created Annually)!")
[1] "Services (Newly Created Annually)!"
> print(kpss.test(material_production_diff_ts, null = "Level"))

KPSS Test for Level Stationarity
Data: material_production_diff_ts
KPSS Level = 0.2064, Truncation lag parameter = 1, p-value = 0.1
Message d'avis :
Donc KPSS test (material_production_diff_ts, null = "Level") :
p-value greater than printed p-value
> print("")
[1] ""
> print("Services (Newly Created Annually)!")
[1] "Services (Newly Created Annually)!"
> print(kpss.test(material_production_diff_ts, null = "Level"))

KPSS Test for Level Stationarity
Data: services_diff_ts
KPSS Level = 0.2042, Truncation lag parameter = 1, p-value = 0.1
Message d'avis :
Donc KPSS test (services_diff_ts, null = "Level") :
p-value greater than printed p-value
> print("")
[1] ""
> print("Services (Newly Created Annually)!")
[1] "Services (Newly Created Annually)!"
> print(kpss.test(services_diff_ts, null = "Level"))
    
```

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