Time Series Forecasting of Employment in the Crafts and Handicrafts Sector in the Wilaya of Blida for the period 1999-2022: An Application of the TRAMO-SEATS Method

التنبؤ بالسلاسل الزمنية للعمالة في قطاع الحرف والصناعات التقليدية في ولاية البليدة للفترة 1999-2022: تطبيق لطريقة SEATS-TRAMO

HAMADOUCHE Aicha 1*
Ecole Supérieure de Commerce, Algeria
a_hamadouche@esc-alger.dz

AZZAZI FARIDA 2
Ali LOUNICI university Blida2, Algeria
azzazifarida1@gmail.com

Received: 03rd/11/2023; Accepted: 29th/12/2023

Abstract

This research paper aims to forecast employment trends in the crafts and handicrafts sector of Blida, Algeria, using the TRAMO-SEATS method. The crafts and handicrafts sector plays a significant role in the local economy of Blida, making it crucial to understand the employment patterns and make informed decisions. The TRAMO-SEATS method is a widely used technique for time series analysis and forecasting, specifically designed for dealing with seasonal and trend components in the data. By applying this method to the employment data, using R program, we can generate accurate forecasts, enabling stakeholders to make strategic decisions and develop effective policies to promote growth in the crafts and handicrafts sector.

Keywords: Modelling; Forecasting; ARIMA Models; Crafts and Handicrafts Sector; TRAMO-SEATS.

Jel Classification Codes : C19 ; C22

ملخص

تهدف هذه الورقة البحثية إلى التنبؤ باتجاهات التوظيف في قطاع الحرف والحرف اليدوية في البليدة، الجزائر، باستخدام طريقة SEAT-TRAMO. يلعب قطاع الحرف والحرف اليدوية دورا مهما في الاقتصاد المحلي للبليدة، مما يجعل من الضروري فهم أنماط التوظيف واتخاذ قرارات مستنيرة. طريقة SEATS-TRAMO هي تقنية مستخدمة على نطاق واسع لتحليل السلاسل الزمنية والتنبؤ بها ، وهي مصممة خصيصا للتعامل مع البيانات التي تحتوي على المركبات الموسمية. من خلال تطبيق هذه الطريقة على بيانات الوظائف المستحدثة في هذا القطاع و باستخدام برنامج R ، يمكننا

* Correspondent author's.

وضــع نموذج مناســب ومن ثم توليد تنبؤات دقيقة، مما يمكن أصــحاب المصــلحة من اتخاذ قرارات استراتيجية ووضع سياسات فعالة لتعزيز النمو في قطاع الحرف والحرف اليدوية.

الكلمات المفتاحية: : النمذجة؛ التنبؤ؛ ARIMA ؛ الحرف والصـــناعات التقليدية؛-TRAMO SEATS

تصنيف JEL: .C19؛ C22

Introduction

The handicrafts and crafts Industry has long been recognized as a significant contributor to local economies, enriching cultural heritage and providing employment opportunities to numerous communities. In the city of Blida, this sector holds a special place, fostering artistic traditions and showcasing skilled craftsmanship passed down through generations. As the city's economy evolves, understanding the historical dynamics of job creation in the handicrafts and crafts sector becomes imperative for effective policymaking and sustainable development.

This article presents a comprehensive study on the modeling of jobs created in the handicrafts and crafts industry of the city of Blida over an extensive time, spanning from January 1999 to July 2021(271 Observations). To analyze the intricate employment patterns and forecast future trends, we employ the TRAMO-SEATS method, " TRAMO: Time series Regression with ARIMA noise, Missing values, and Outliers, SEATS: Signal Extraction in ARIMA Time Series " . The TARAMO-SEATS is a powerful econometric technique that accounts for seasonality, irregular variations, and structural breaks in time series data.

The overarching goal of this research is twofold: firstly, to gain valuable insights into the historical growth patterns of job creation within the handicrafts and crafts industry, and secondly, to provide evidence-based predictions for the future trajectory of employment in this vital industry. By bridging the gap between past performance and future projections, we aim to furnish policymakers, investors, and stakeholders with critical knowledge for formulating targeted strategies and policies that will foster the sustained development of the handicrafts and crafts industry in Blida. Through this study, we endeavor to shed light on the underlying factors that have influenced job creation in the sector over the years, examining the impact of past values, past residuals, seasons impact and any outliers' points. Moreover, the future predictions derived from the TRAMO-SEATS method will offer valuable foresight into the potential growth opportunities and challenges that lie ahead, empowering stakeholders to make informed decisions and seize the full potential of the handicrafts and crafts industry.

In the subsequent sections, we delve into the methodological approach, data collection, and analysis process undertaken for this study. We also present the findings, discuss their implications for policy and economic growth, and conclude with a reflection on the significance of sustaining and nurturing the handicrafts and crafts industry in the city of Blida for its continued prosperity and cultural enrichment.

1. Literature review

The crafts and handicrafts industry are a vital contributor to employment in many regions worldwide, providing opportunities for both skilled artisans and unskilled laborers, particularly the youth. Various studies have highlighted the economic, social, and cultural importance of this sector, emphasizing its potential for fostering sustainable livelihoods and boosting local economies. Accurate employment forecasting in this sector can assist policymakers in formulating effective labor market policies and support mechanisms.

Previous studies on employment forecasting in various sectors have provided valuable insights into the methods and techniques that can be used to forecast employment trends. These studies have explored different approaches, such as econometric models, ARIMA models, and machine learning algorithms, to predict employment levels based on historical data. The findings of these studies have highlighted the importance of considering relevant economic indicators, when forecasting employment. Additionally, researchers have emphasized the need for accurate and reliable data collection methods, as well as robust model evaluation techniques, to ensure the validity and usefulness of employment forecasts. Overall, the existing literature on employment forecasting provides a foundation for this study and offers valuable guidance for applying the TRAMO-SEAT method to forecast employment in the crafts and handicrafts sector of Blida.

(Terry, 1999) The thesis aims to assess the economic, financial, social, and cultural importance of the handicraft industry in Botswana at both individual and national levels. As the significance of the handicraft sector for development in Africa is often overlooked, the study aims to determine if handicraft production in Botswana is as crucial as other non-farm, small-scale industries. The study found that the handicraft industry has a positive overall impact on individuals, their families, and communities, especially in rural areas and among individuals with limited formal education and marginalized populations. Rural producers and enterprises benefit more than their urban counterparts, particularly those with consistent purchasing from formal craft organizations or tourists.

Additionally, the social and cultural benefits derived from craft activities surpass those from non-craft activities, while the income of craft producers is comparable to that of non-craft producers. Nationally, both sectors provide financial and economic net benefits, but the non-craft sector generates more income due to its larger size. Nonetheless, the craft sector demonstrates higher economic efficiency despite the higher average profitability of the non-craft sector.

The research in Botswana aligns with similar studies in other developing countries, emphasizing the significance of off-farm incomes and income diversification in rural and urban livelihoods. These findings underscore the importance of government and non-governmental support in enhancing the handicraft sector's positive impact on poverty reduction, employment creation, social welfare, cultural preservation, and the overall economies of Botswana and other African countries.

(Elbachir Omar & Bouchama, 2020), Determinants of Labor Demand in Blida Craft Sector: A Multinomial logit Analysis, this research focuses on the employment patterns in Blida's craft sector, which is the most dominant domain attracting labor, particularly among the youth. The main objective is to analyze the determinants of employment within this sector, specifically investigating the demand for craft workers in relation to their educational level, age, and gender.

The results of the study indicate that age, gender, and education significantly influence the probability of employment status within Blida's craft sector. These factors play a crucial role in shaping the distribution of craft workers across different areas of employment, including production, services, and artistic roles.

(Rabiae, 2022) this research focus on the new strategy to reposition the products of the traditional industry which Algeria has implemented. This strategy includes providing opportunities for craftsmen to participate in important international exhibitions, ensuring the supply of raw materials, and supporting the manufacturing process of their products. Financial support and guarantees are also provided to achieve product quality and promote the Algerian brand. Additionally, qualified labor is supported to enhance various craft activities in Algeria.

(Maravall, 2006) this research applied the ARIMA-model-based methodology of programs TRAMO and SEATS for seasonal adjustment and trend-cycle estimation of the exports, imports, and balance of trade Japanese series. The programs are used in an automatic mode. It is shown how the SEATS output can be of help when discriminating among competing models.

(Bruno, 2001)This paper analyses the use of TRAMO-SEATS to seasonally adjust Italian industrial production index. The problem of preliminary transformation of the series is illustrated, together with the way to deal with this issue with TRAMOSEATS. The subject of the revisions and, in general, of the use of seasonally adjusted and trend data is addressed, with some suggestions for the final user of these data**.**

2. Methodology

The methodology of this study relies on rigorous data collection regarding jobs created in the handicrafts and crafts sector of the city of Blida over a 23-year period, spanning from January 1999 to July 2021. The collected data includes the number of jobs created monthly during this period. Special efforts were made to ensure the reliability and consistency of the data to guarantee the quality of the subsequent analysis.

The method used is TRAMO-SEATS: it is a widely method used approach for analyzing time series data characterized by seasonal effects, irregular variations, and structural breaks. This technique allows the data to be decomposed into different components, enabling a better understanding of underlying trends and forecasting future developments. The first step involves deseasonalization, which aims to remove seasonal effects and isolate irregular variations. Subsequently, the method identifies structural breaks that may have had a significant impact on the time series, such as economic changes or major political events.

Before applying the TRAMO-SEATS method, the data underwent preprocessing to eliminate any outliers or missing values and to check the stability of the time series. Necessary adjustments were made to ensure data coherence and homogeneity, which are crucial for obtaining reliable results during analysis.

The TRAMO-SEATS methodology was applied to the collected data on jobs created in the handicrafts and crafts sector in Blida over the study period. Deseasonalization revealed underlying job creation trends, while the identification of structural breaks helped determine events or factors that significantly influenced employment developments in this sector.

Based on the results of the TRAMO-SEATS analysis, a forecasting model was constructed to project future employment trends in the handicrafts and crafts sector in Blida. However, it is important to interpret the forecasts with caution, as they are subject to the inherent uncertainty of any economic modeling.

It is essential to note that despite all efforts made to collect and analyze data rigorously, this study has some limitations. Forecasts are based on past trends and do not account for unforeseen events or radical changes that may occur in the handicrafts and crafts sector in Blida.

Finally, the technique used to write this article attempts to present a thorough study of the employment generated in the arts and crafts industry in Blida over a period of more than 20 years. By adopting the TRAMO-SEATS method, we intend to promote the long-term growth of this key sector of the local economy and provide decision-makers, investors, and other stakeholders with useful information.

3. The reality of handicrafts and crafts industry in the Blida region and their role in creating job opportunities

The sector of traditional industries and crafts possesses significant capacity to drive economic and social development by contributing to job creation, production, and investment. Consequently, it enhances economic and competitive capabilities, enabling exports and attracting foreign currency. Within the framework of monitoring the concerns and interests of artisans, the Chamber of Traditional Industries and Crafts strives to develop the sector. This is part of the tasks entrusted to it by the state to serve artisans and promote their activities at the local and international levels, as it represents the true and effective support for craftsmen. Additionally, the chambers of traditional industries represent industrialists, traditional industry entrepreneurs, and cooperatives within their territorial jurisdiction, in coordination with national, regional, and local authorities.

Analysis of Newly Created Positions in all Sectors of Traditional Industries and Crafts Based on the records of artisans in the chamber, we can determine the number of newly created positions in each sector, as shown in the Table1.

Through Table 1, we note that the service handicraft sector is the most active, where the total net registration in this sector reached 6028 craftsmen, through which 11453 jobs were created due to the expansion of this area and the facilities available (the availability of support structures in addition to the fact that craftsmen do not need large capital, but the percentage of craftsmen that were removed from the register of craftsmen reached 48%, due to: Lack of public procurements offered in favor of craftsmen, high taxes, high prices of raw materials, high rents for shops, high prices of imported products, deficit in institutions, demand for social housing, lack of training and experience in setting up institutions.

The most job-creating activities in this field are women's barbering with 1468 positions, followed by construction activity with 1434 jobs, and this sector contributed to the creation of jobs by 47% and this is the result of the chamber's organization of several short-term training courses, this is evidence of the importance of this sector and its role in creating jobs.[1]

As for the productive industries sector, it is considered the least job creation compared to the services sector and the technical sector due to the intense competition for foreign products, especially China, in addition to the high costs of raw materials used in production, and this led to the creation of more than 5097 jobs, while 1015 registered employees were written off, an estimated 33%, and more than 2537 workers lost their position. The craft of tailoring and sewing clothes is the most registered in this field, creating 476 jobs, this sector contributed to the creation of jobs estimated at 21%.

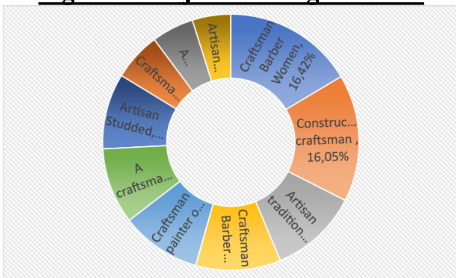
As for the technical handicraft, it is considered less registered, but it is the most created job after the service with more than 7699 jobs, as it contributed to the creation of jobs estimated at 32%, and this is due to its high and highest employment rate in the sector with a write-off rate estimated at25%, and it is the least written off in the sector and the traditional confectionery industry is the most registered in this field, as this sector recorded more than 1997 jobs.

[1]The Ministry has established the decision to establish training schools approved by the General Assembly on June 09, 2022

Table 1: Registrations of artisans in the three sectors of the Chamber of Handicrafts and Crafts of Blida in 2021

	Sector of Traditional Artisan Industries	Sector of Traditional Service Industries	Sector of Traditional Production Industries	Total
Registrations	2787	8277	3054	14118
Deletions	706	2249	1015	3970
Net Registrations	2081	6028	2039	10148
Newly Created Positions	7699	11453	5097	24249

Fig. 1: More job-creating activities



Source: Chamber of Handicrafts and Crafts of the wilaya of Blida

4. Data collection and preprocessing

To conduct our analysis, we gathered historical data on job creation in the handicrafts and crafts sector of Blida from January 1999 to July 2021. This dataset includes the number of jobs created on a monthly of basis, as well as any significant events or policy changes that might have influenced the sector's growth.

Fig. 1 shows that there is a high demand for positions in the traditional confectionery industry, construction, and barbering, while tailoring and sewing clothing is the least popular activity by 4%. Although the Chamber sponsors several training workshops to promote this craft, the real cause is the fierce competition from imported clothing, especially cheap Chinese clothing.

4.1.Data collection

To forecast employment in the crafts and handicrafts sector of Blida, a comprehensive data collection process was undertaken. The data collected included historical employment data from January 1999 to July 2021. The employment data was sourced from Chamber of Handicrafts and Crafts of the wilaya of Blida.

The study variable, which we have designated as Emp, is the number of jobs created by the handicrafts and crafts industry each month. It is utilized to estimate the model and use it to make predictions.

This variable reflects the total number of jobs that can be created by the handicrafts of the wilaya of Blida in the three sectors: the technical sector, the production sector, and the service sector. The value of this variable is determined by the number of registrants in the Chamber of Handicrafts and Crafts of the wilaya of Blida, as the Chamber defines:

- Each registered as a craftsman in the technical sector can create an average of 3.7 jobs.
- Each registered as a craftsman in the production sector can create an average of 2.5 jobs
- Each registered in the service sector can create 1.9 jobs

Therefore, the number of jobs created through handicrafts and crafts per month is equal to the sum of the number of people registered in the technical sector per month * (3.7), the number of people registered in the production sector per month *(2.5) and the number of people registered in the services sector per month* (1.9) .
To provide a complete representation of the handicrafts and crafts industry in Blida, a systematic approach to data collecting was used. To capture the complexities of the sector and lessen the impact of data restrictions, other data sources were examined. Techniques for data validation and cleansing were also used to make sure the accuracy and consistency of the data obtained. The basis for precise and dependable time series forecasting of employment in the crafts and handicrafts industry of Blida was created by this meticulous data gathering approach.

4.2.Data preprocessing

Time series forecasting requires careful data preparation. In this part, we'll go over the procedures used to get the employment data from Blida's sector of crafts and handicrafts ready for analysis using the TRAMO-SEATS technique. First, we cleaned the data to get rid of any errors or missing numbers. Then, we looked over the data for any abnormalities or outliers and dealt with them. After that, we checked the time series for stationarity and, if necessary, performed the proper transformations. In addition, we considered the data's seasonality and used the TRAMO-SEATS approach to make seasonal adjustments. Finally, we made sure the data was organized in a way that the TRAMO-SEATS program could read it. Our goal is to increase the accuracy and reliability of the data by properly preprocessing it.

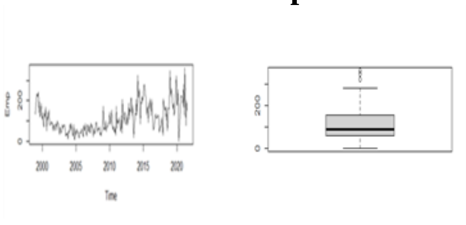
a. Description of Data

The evolution of the Emp series in Fig. 2 shows the changes in "Emp" values between 1999 and 2021. It appears to follow a cycle since peaks and troughs occur at regular periods. This may suggest that the data have a seasonal impact.

From the boxplot in Graph 2, we can see that there are certain points that are classified as outliers and are significantly higher than the rest of the data, and are hence "Emp" values, that are located above the top whisker. These outliers may significantly affect the data's mean and may point to unique reasons or circumstances that merit additional research.

Recall that in a boxplot, the box represents the interquartile range (IQR), which is the space between the first quartile and the third quartile (first percentile = 25th percentile) (75th percentile). The median is the line inside the box (50th percentile). The whiskers show the data range within 1.5 times.

Fig. 2: The evolution and the boxplot of the Emp series



Source: Prepared by the researchers(R program outputs)

Table 2 display statistics which provide a comprehensive summary of the 'Emp' series, including measures of central tendency (mean and median), dispersion (standard deviation, min, and max), and the quartile values. We show that the min value is zero Which represents the number of jobs created in April 2020 corresponding to the closure of the wilaya of Blida and the imposition of quarantine on it following the outbreak of the Corona virus 2019. The average value of the 'Emp' is approximately 112.7 jobs created per month which represent a significant mean but the standard deviation, which measures the amount of variation or dispersion of the set of values, is approximately 70.01 which indicates a relatively high level of dispersion.

Table 2: Descriptive statistics

Min	1st Qu	Median	Mean	3rd Qu	Max
0.0	58.0	89.0	112.7	155.0	363.0

Source: Prepared by the researchers(R program outputs)

b. Time series analysis

From the Fig. 3 shows the ACF of Emp series, we observe If you observe positive autocorrelations at positive lags (lags > 0), it may indicate the presence of a trend in the data. This suggests that there's a systematic pattern in the data that repeats with each time period. We also observe periodic spikes in the ACF plot at regular intervals and significant autocorrelation at lags of 12,24 ,36... These spikes indicate the seasonality component.

Fig. 3: The simple autocorrelation function of Emp series

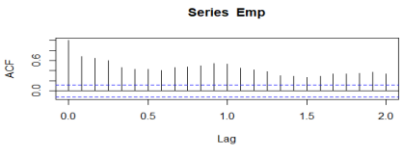
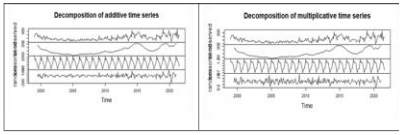


Fig. 4: The decomposition of the Emp series



Source: Prepared by the researchers(R program outputs)

The results in the Fig. 4 are supported by the graph4, which displays the original "Emp" data together with the trend component, seasonal component, and residuals (noise) using additive and multiplicative decomposition. Therefore, it affirms the existence of:

- The underlying trend of the data is shown by the trend component, which over time appears to be relatively stable.
- The seasonal component shows the consistent pattern that recurs over time and appears to be part of a yearly cycle.
- The data that remains after subtracting the trend and seasonal components are referred to as the residuals. This is the part of the time series that is noisy or irregular.

This decomposition allows us to observe the different Emp series components individually, which is useful for analyzing and forecasting the behavior of the data.

5. Modelling and Forecasting

Before developing the appropriate time series model to represent the series of jobs created by the handicrafts and handicrafts sector of the wilaya of Blida in order to predict its future, we must first study the stability of the chain and then determine the appropriate model.

5.1.Stationary study

The Augmented Dickey-Fuller (ADF) test may be used to validate the findings of the time series analysis of the Emp series, which show that the series is nonstationary. The ADF test is a type of statistical test called a unit root test. The intuition behind a unit root test is that it determines how strongly a time series is defined by a trend. The null hypothesis of the ADF test is that the time series is non-stationary. So, if the p-value of the test is less than the significance level (0.05), we reject the null hypothesis and infer that the time series is indeed stationary.

Differentiating can be used to make the Emp series stationary because it was determined that it was nonstationary after failing the ADF test. Let's first examine if first order differencing makes the series stationary.

Table 3 presents the results of the first order differencing-based Augmented Dickey-Fuller test. Additionally, we can see how the p-value has dropped to below 0.05. Thus, the null hypothesis may be rejected, leading us to the conclusion that the differenced series is stationary.

Table 3: Results of ADF test on the first difference of Emp, dEmp

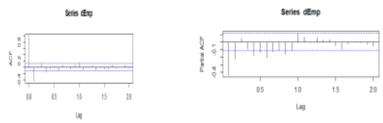
Augmented Dickey-Fuller Test

data: dEmp

Dickey-Fuller = -10.63, Lag order = 6, p-value = 0.01

alternative hypothesis: stationary

Fig. 5: The ACF and PACF plots for the differenced



Source: Prepared by the researchers(R program outputs)

Fig. 5 shows the ACF plot which displays the series' correlation with its own delays and the PACF plot displays the correlation of the series with its own lags after excluding the impact of earlier delays.

The ACF plot exhibits a progressive decline, indicating the presence of a moving average (MA) component within the series. There appears to be an autoregressive (AR) component in the series, as shown by the abrupt decline in the PACF plot following the first lag.

We may begin with an ARIMA model with p=1, d=1, and q=0 or 1 based on these charts. This model should fit the "Emp" series.

5.2.Modeling

Once the stationarity of the Emp series has been established, and the orders of the AR and MA components has been determined, we can use ARIMA models to build a model that can predict the series' future.

a. Modelling using ARIMA models:

At the first we have used the direct ARIMA modelling using the autorima function of the R program.

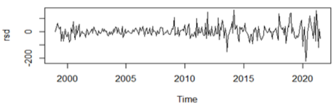
The results of modeling the ARIMA(0,1,1)(1,1,0) are shown in Table 4, which enables the following interpretation:

- The coefficient of the MA term (ma1) is -0.7141, which is significant as its p-value is less than 0.05. and the coefficient of the seasonal Autoregressive sar is 0.311wich is also significant and it confirm the existence of seasonality in the Emp series.
- The Box-Pierce test (Q) checks for remaining autocorrelation in the residuals. The p-value of this test is 0.40, which is greater than 0.05, indicating that the residuals are independent at all lags.
- The Jarque-Bera test checks whether the residuals have the skewness and kurtosis matching a normal distribution. The p-value of this test is < 2.2e-16, indicating that the residuals are not normally distributed.
- The Heteroskedasticity test (H) checks for changing variance in the residuals. The p-value of this test is 3.192e-06, indicating that the variance of the residuals changes over time.
- These diagnostic tests suggest that the model could be improved. However, let’s proceed with this model for now and check the residuals to further validate the model.

Table 4: The summary of the ARIMA (1,1,0) model fitted, and the diagnostic of the residuals' model fitted to the Emp series

Series: Emp ARIMA(0,1,1)(1,0,0)[12] Coefficients: mal sar1 -0.7141 0.3116 s.e. 0.0577 0.0631	Box-Pierce test X-squared = 0.70004, df = 1, p-value = 0.4(Jarque Bera Test X-squared = 121.51, df = 2, p-value < 2.2e- ARCH LM-test; Null hypothesis: no ARCH Chi-squared = 47.947, df = 12, p-value = 3.

Fig. 6 : Residuals from ARIMA model



Source: Prepared by the researchers(R program outputs)

The residuals display a variance that changes over time, a shift in the rate of fluctuation, and what seems to be asymmetrical fluctuation. It's likely that the residuals do, however, contain outliers, which would indicate that the model would benefit from being enhanced by applying different modeling techniques. Notably, despite our efforts to modify the ARIMA(0,1,1)(1,1,0) model to account for the Arch effect, the residuals continued to have an atypical distribution and the Arch effect persisted. This might be explained by the seasonal component, many outliers, and level shift effect.

b. Modelling using the TRAMO-SEATS method

The TRAMO-SEATS method is a widely used time series analysis technique for seasonal adjustment and forecasting. In this study, the TRAMO-SEATS method is applied to analyze and forecast employment trends in the crafts and handicrafts sector of Blida.

There are various phases in the application procedure, first, any anomalies or outliers are eliminated from the original Emp data through preprocessing. The seasonal component of the data is then removed by seasonal adjustment utilizing the Tramo-Seats approach, this makes it possible to grasp the underlying Emp patterns better. Next, a forecasting model is constructed using the deseasonalized data.

Making use of the "seas" function in the R program, which allows the estimated model to be automatically calculated while taking into consideration parameters that affect the series' trajectory, the level shifts (LS), outliers (AOs), seasonal component, moving averages (MA), and autocorrelation (AR).

Table 5 presents the outcomes that were obtained. The results of the model were significant through the p-values of the estimated coefficients, which were all less than 1%. From the results obtained (Table 5), the model is of type ARIMA (1,1,1)(1,1,1) and its components are:

- Leap year: This dummy variable calculates how a leap year affects the quantity of new employment generated. It's important to note that leap years have 366 days, one extra day than non-leap years. In our model, its coefficient is both significant and positive. This variable's impact in our model is correlated with seasonality.
- Trending days: dummy variables are used to quantify the impact of each day; only the effects of Monday and Friday are noteworthy; the effects of

the other days are not. We see that Friday has a negative impact, indicating that Emp tends to be lower, while Monday has a positive effect, suggesting that Emp tends to be greater on that specific day.

- Easter(15) : Easter is a moveable festival, which means that its date varies year. It measures the impact seven days before and seven days after the day of Eid which may coincide with a religious holiday (this explains the number 15). It has a negative effect on our statistics, meaning that the closure of the chamber's officers during the religious holidays season lowers the demand for registration in the crafts and handicrafts sector, which in turn lowers the number of jobs created.
- Ten(10) additive outliers: AO2009.Feb, AO2011.Dec, AO2012.Aug, AO2012.Nov, AO2017.Dec, AO2019.Jan, AO2020.Apr, AO2020.May, AO2021.Feb, AO2021.Feb , we notice that an additive outlier is one extreme observation. The reason might be strikes, bad weather, or uncontrollable circumstances. Finding additive outliers is essential since the seasonal adjustment depends on moving averages and is thus susceptible to extreme results. The outliers in our model are all statistically significant; while most of them are negative, several are positive. In our model, we note that the first four additive outliers are all positive, which means that their impact was positive, recording a significant increase in the number of jobs created in the periods February 2009, December 2011, August 2012 and November 2012, which is generally due to the increase in the number of jobs created in the service sector and the synchronization with the establishment of national agencies to support youth.
- Four level Shifts, LS2014.Mar, LS2019.Nov, LS2020.Jan, LS2020.Jul: A time series model's level shift is crucial because it might indicate a sudden and dramatic change in the underlying process under observation. The estimated model shows 4 states of level shift, three of which are positive, and one is negative. The positive signal for the level shift for March 2014 shows the transition of the level of changes in the increase in the number of jobs created to decreasing rates compared to previous years, while the transition level to November 2019 shows the transition of changes in the number of new positions to increasing rates compared to previous years, that the transition of the level in January 2020 with a negative signal is explained by the beginning of the Covid crisis and the decline in all economic activities until July 2019, where individuals began to strongly

switch to crafts to compensate for the closure of all economic facilities in the state of Blida.

- There are two non-seasonal components: a positive and statistically significant MA-Nonseasonal-01, this indicates that just the immediate past prediction inaccuracy is taken into account, and a positive and significant AR-Nonseasonal-01, that an increase in the value of the previous time period corresponds to an increase in the present time period.
- There are two seasonal components: the MA-seasonal-12 and the AR-seasonal 12. Any lingering seasonal dependencies in the data are intended to be captured by the SMA component. It is positive and statistically significant in our model, which suggests that the model tends to underpredict for that particular season when positive prediction errors for the same seasonal time point in the prior season correlate to an increase in the present value. Because of the positive and statistically significant SAR, the present value increases in relation to previous values at the same seasonal time points.

Table 5 : Modelling results using the TRAMO-SEATS method

Coefficients	Estimate	Std, Error	z value	Pr(>|z|)
Leap Year	23,32056	11,24066	2,075	0,038018 *
Mon	10,20486	3,63518	2,807	0,004997 **
Tue	0,79865	3,65353	0,219	0,826964
Wed	3,53175	3,64908	0,968	0,333121
Thu	-6,29543	3,74047	-1,683	0,092363
Fri	-11,11653	3,72748	-2,982	0,002861 **
Sat	2,98043	3,65497	0,815	0,414817
Easter[15]	-21,9764	7,32084	-3,002	0,002683 **
AO2009,Feb	104,34678	25,59311	4,077	4,56e-05 ***
AO2011,Dec	164,06818	25,55761	6,42	1,37e-10 ***
AO2012,Aug	105,12521	25,61474	4,104	4,06e-05 ***
AO2012,Nov	109,27084	25,84023	4,229	2,35e-05 ***
LS2014,Mar	81,23072	20,33877	3,994	6,50e-05 ***
AO2017,Dec	-111,6934	25,86034	-4,319	1,57e-05 ***
AO2019,Jan	100,26947	26,24247	3,821	0,000133 ***
LS2019,Nov	80,74598	23,63669	3,416	0,000635 ***
LS2020,Jan	-160,5336	24,69068	-6,502	7,94e-11 ***
AO2020,Apr	-153,1723	28,04773	-5,461	4,73e-08 ***
AO2020,May	-107,3256	30,96184	-3,466	0,000528 ***
LS2020,Jul	96,24063	23,33761	4,124	3,73e-05 ***
AO2021,Feb	-126,3715	29,60268	-4,269	1,96e-05 ***
AO2021,May	-177,0118	32,66821	-5,418	6,01e-08 ***
AR-Nonseasonal-01	0,07628	0,09014	0,846	0,397433
AR-Seasonal-12	0,31578	0,08184	3,859	0,000114 ***
MA-Nonseasonal-01	0,72259	0,06261	11,542	< 2e-16 ***
MA-Seasonal-12	0,81704	0,05622	14,533	< 2e-16 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

Source: Prepared by the researchers(R program outputs)

Table 6 shows the diagnostic tests of the model on testing and evaluating the residuals to see how well the model fits the data. Through diagnostic tests of our model, we obtained the following:

- Test of Box-Pierce (Q): The residuals by this test are independent at all lags, according to the p-value of 0.9321 for the statistic of this test, which is more than 0.05.
- The Jarque-Bera test : This test's p-value of 0.2526 shows that the residuals are normally distributed.
- The Heteroskedasticity test (LM): According to the p-value of this test, which is 0.1311, the variance of the residuals does not change over time.

Table 6: Diagnostic test results of the residuals

Box-Pierce test
X-squared = 0.007249, df = 1, p-value = 0.9321
Jarque Bera Test
X-squared = 2.7523, df = 2, p-value = 0.2526
ARCH LM-test; Null hypothesis: no ARCH effects
hi-squared = 17.518, df = 12, p-value = 0.1311

Source: Prepared by the researchers(R program outputs)

6.3. Forecasting

a. Evaluation of the forecasting model:

To project the future generation of jobs in the arts and crafts industry for the forthcoming period, we use the TRAMO-SEATS model in Table 5, which its residuals demonstrated to be white noise. First, however, we performed a predictive evaluation of the model using the projection period of January 2021 to July 2021, which gives us an accurate estimate of the actual number of employments generated by the crafts and handicrafts industry. The outcome is displayed in Figure No 6. In general, the forecasting model's assessment revealed a good degree of precision and dependability. With little inaccuracy and a consistent portrayal of the underlying patterns and oscillations in the employment trends in Blida's crafts and handicrafts sector, the predicted employment trends closely matched the actual data. We notice that all predicted values fall within the confidence interval with the exception of the July value, which deviated slightly from the confidence interval's minimum value. This is unavoidably because of the anomalous points noted in May 2021, which, as the estimated model in Table 5 demonstrates, had a negative effect on the number of positions created.

The results of this evaluation provide confidence in the effectiveness of the TRAMO-SEATS method for time series forecasting of employment in the crafts and handicrafts sector, highlighting its potential for informing policy and decision-making in this sector.

Fig. 6: Evaluation of the forecasting model

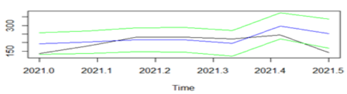
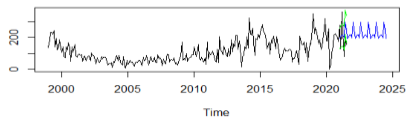


Fig. 7: Forecasting result(in blue)



b. Forecasting result

The one-year forecast results outside of the value range show that the traditional crafts sector can create an average of 240 jobs per month, considering all exceptional circumstances that could impact this process, like the possibility of level changes, additive outliers, and seasonal variations. However, it is essential to acknowledge that predictions are subject to uncertainty, especially in an ever-changing economic landscape.

Conclusion:

The study findings reveal several key points regarding employment in the crafts and handicrafts sector of Blida. Firstly, the TRAMO-SEATS method was successfully applied to forecast employment trends in the sector. The forecasted results were compared with actual data, indicating a high level of accuracy.

The interpretation of the forecasted employment trends suggests that there are certain factors influencing employment in the sector. These factors could include changes in seasons, economic conditions, and the habits of people. It is important to consider these factors when formulating policies and making decisions related to the crafts and handicrafts sector.

The implications for policy and decision-making highlight the need for targeted interventions to support and promote employment in this sector. Policymakers should prioritize initiatives that enhance the skills and capacity of craft workers, foster innovation, and provide market opportunities for artisans.

In conclusion, this study provides valuable insights into the employment dynamics of the crafts and handicrafts sector in Blida. The findings offer a reliable basis for policy formulation and decision-making, aiming to support the growth and sustainability of the sector in the future. It is important to acknowledge the limitations of this study and identify potential areas for further research to enhance the accuracy and applicability of the TRAMO-SEATS method in forecasting employment trends in similar sectors.

The handicrafts and crafts sector of Blida have been a vital contributor to the local economy and employment opportunities. Through the TRAMO-SEATS analysis and forecasting, we have gained insights into its historical trends and potential future trajectories. As the city looks ahead, policymakers and stakeholders must take advantage of this information to ensure sustainable growth and prosperity in the handicrafts and crafts sector.

Bibliography :

1. Athanasopoulos, R. J. (2018). Forecasting: Principles and Practice. Australia: OText.
2. Bruno, G. (2001). Seasonal Adjustment of Italian Industrial Production Index using Tramo-Seats. Research Papers in Economics, pp. 1-31.
3. Elbachir Omar, A., & Bouchama, M. (2020, Octobre). Determinants of Labor Demand in Blida Craft Sector : A Multinomial logit Analysis. مجلة االقتصاد والتنمية البشرية، pp. 419-430.
4. George E. P. Box, G. M. (2015). Time Series Analysis: Forecasting and Control, 5th Edition. John Wiley & sons,Fifth Edition.
5. Maravall, A. (2006). An application of the TRAMO-SEATS automatic procedure; direct versus indirect adjustment. Computational Statistics & Data Analysis, pp. 2167-2190.
6. Rabiae, G. (2022, septembre 24). The Reality of the Handicrafts and Crafts Sector in Algeria and its Promotion Strategy: Tipaza State as a Model. Finance and Business Economies Review, , pp. 171–203.
7. Terry, M. E. (1999). The Economic and Social Significance. University of London: The School o f Oriental and African Studies.