International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Time Series Forecast of Deployment Trends Among Overseas Filipino Workers Using ARIMA

Dether John Gorre[1], Florence Jean B. Talirongan[2]

[1]College Instructor, Department of Computer Science, Christ the King College de Maranding, Inc., Philippines
[2]College Professor, Department of Computer Studies, Misamis University, Philippines

Abstract

Overseas Filipino Workers (OFWs) have long been a vital lifeline for the Philippine economy, especially highly skilled professionals whose work abroad sustains millions of Filipino families through their remittances. In this study, The Autoregressive Integrated Moving Average (ARIMA) model to forecast how deployment trends might change for ten key OFW professions - including nurses, engineers, IT specialists, accountants, and teachers - from 2019 up to 2030. This forecast draws on actual deployment data between 2019 and 2024, which clearly shows the impact of events like the COVID-19 pandemic that temporarily disrupted overseas work. By applying ARIMA, the research uncovers patterns and provides practical estimates for future demand. Notably, nurses remain the most in-demand, but trends hint that demand may stabilize by 2030. Meanwhile, IT professionals and engineers are expected to maintain steady deployment, while roles like accountants and architects show moderate, stable numbers. These insights are meant to help policymakers, educators, and aspiring OFWs plan ahead, adapt skills training, and strengthen the Filipino workforce's competitiveness in a changing global job market. Future work may explore combining ARIMA with other methods and economic indicators for even better forecasts. This study aims to support stakeholders who navigate the complex reality of sending Filipino talent overseas - a reality that touches countless Filipino households, including my own community.

Keywords: Overseas Filipino Workers, OFW deployment, ARIMA forecasting, professional occupations

1. Introduction

Overseas Filipino Workers (OFWs) have been subsidizing the Philippine economy for decades. Every year, thousands of skilled professionals make the tough choice to leave the country in search of better opportunities and out of sheer necessity. These professionals - nurses, engineers, teachers, computer scientists, accountants, and health care personnel - remain in high demand around the world. Their remittances don't just sustain millions of Filipino households; they're a backbone of our country's revenue.

As a researcher from Mindanao, It has been observed firsthand how vital OFW remittances are to local communities like mine. Families build homes, send children to college, and put food on the table because someone brave enough works abroad. This reality inspired me to understand how deployment trends change over time - and how data can help us prepare for what's ahead.

In recent years, the volume of deployed professional OFWs has shifted dramatically. When the COVID-19 pandemic hit in 2020, deployment numbers dropped sharply as borders closed and global travel came to a halt. But by 2023, deployment not only bounced back - it even set new records [2], [3]. This quick recovery shows how resilient both Filipino workers and the global labor market really are.

It's clear that understanding these patterns is essential for smart policy-making and better decisions at all levels. Good forecasts mean the government, recruitment agencies, and even aspiring workers themselves can plan more wisely. One of the most trusted tools for this kind of forecasting is the Autoregressive Integrated Moving Average (ARIMA) model. ARIMA has been proven effective for spotting trends in health, economics, and migration [1], [5], [11]. It's especially useful for revealing time-based patterns and generating reliable short- to medium-term projections from historical data.

This study focuses on predicting the deployment patterns of ten key professional OFW occupations: nurses, engineers, IT specialists, accountants, teachers, medical technologists, architects, pharmacists, physicians, and financial analysts. These roles were chosen because they often appear in deployment reports and are critical to both our local workforce and the international job market.

By applying ARIMA modeling to actual deployment data from 2019 to 2024, this research hopes to offer insights that can guide better policies and ensure that the country's top talent stays protected, equipped, and ready to succeed in a changing global labor environment.

2. Theoretical Framework

Review of related literature: Various studies establish the applicability of the ARIMA (Autoregressive Integrated Moving Average) model as an effective forecasting tool, especially in forecasting time-based patterns for different socio-economic and demographic contexts.

Talirongan et al., [1] applied ARIMA to describe national health trends in the Philippines, proving its efficiency in generating forecasts with accuracy from the past. Rufino [4] used SARIMA, a seasonal ARIMA, to model monthly arrivals of tourists in the Philippines and demonstrated the model's ability to accommodate complicated seasonality in actual data.

Likewise, Sangco and Vienes [5] contrasted various methods of forecasting with ARIMA in projecting skilled emigration from the Philippines and defined the model's good performance in migration research. Khan and Gunwant [6] used ARIMA to predict remittance inflows, heavily linked to OFW deployment, emphasizing its relevance in economic modeling. Manayaga and Ceballos [16] utilized ARIMA to specifically predict Overseas Filipino Workers' remittances, further indicating its suitability in OFW-specific forecasting.

Furthermore, Angco et al. [11] applied ARIMA in modeling and forecasting the economic engagement of Filipinos in the three biggest sectors, which are overseas labor, demonstrating the strength of the model in dealing with economic and labor-related time series. Parreño [14] contrasted ARIMA and Holt-Winters models to use for agricultural forecasting and concluded that ARIMA was suitable to use for stable, non-seasonal series.

Worldwide, Wang et al. [13] investigated distributed ARIMA models for ultra-long time series data, showing its scalability and applicability to big data environments. Ghosh et al., [12] implemented hybrid ARIMA-based models with neural networks to predict disease outbreaks, demonstrating the versatility of ARIMA when paired with up-to-date machine learning methodologies.

Finally, Estoque et al., [20] applied ARIMA in forecasting urban population growth in the Philippines, an indirectly related variable to labor migration and employment patterns. Once more, their results help to so

lidify the credibility of ARIMA in socio-economic forecasting in a Philippine context.

These publications prove that the ARIMA model remains to be the most widely accepted statistical technique used for forecasting in many disciplines. Its ability to capture short-run variation and long-run patterns from past observations makes it an influential model. In this research, ARIMA is a valid model to explain and predict Overseas Filipino Professional Worker deployment trends of 2019 through 2024.

3. Materials and Methods

3.1. Materials

The data employed in this research are overseas deployment figures of Overseas Filipino Workers (OFWs), more particularly professional workers. They are yearly deployment figures from 2019 to 2024 and were derived from a synthesized dataset that reflects trends seen from official government documents like the Philippine Overseas Employment Administration (POEA) and the Philippine Statistics Authority (PSA) supplemented with publicly available articles and migration-related research [2], [3], [5].

Professions targeted under the study are identified based on the top ten overseas in-demand jobs: Registered Nurses; Civil, Electrical, and Mechanical Engineers; Information Technology (IT) Specialists / Software Developers; Accountants / Auditors; Teachers / Lecturers; Medical Technologists / Laboratory Technicians; Architects / CAD Designers; Pharmacists; Physicians / Healthcare Specialists; and Finance / Business Analysts. They were selected because they are regularly represented in OFW deployment reports and are very much in demand internationally.

The data was organized in annual terms and utilized in analyzing trends prior to, at, and following the COVID-19 pandemic. The trends in the data from 2019 to 2024 served as the foundation of the time series forecasting model. Data organization and preprocessing were carried out in Microsoft Excel prior to analysis.

3.2. Methods

The research utilized the Autoregressive Integrated Moving Average (ARIMA) model to make the projection of the deployment trends of professional OFWs during the period 2019-2024. ARIMA is frequently used in time series-based data forecasting and is also famous for its ability to describe trend and noise components of a time series [1], [11], [13].

ARIMA model is represented as ARIMA(p, d, q), where:

- **p** is the number of autoregressive terms,
- **d** is the number of differences needed to make the data stationary,
- **q** is the number of lagged forecast errors in the prediction equation.

The general form of the ARIMA model is as follows:

$Xt = \Phi_1 Xt\text{-}1 + \ldots + \Phi_p Xt\text{-}p + at - \Theta_1 at\text{-}1 - \ldots - \Theta q\ at\text{-}q$

Where:

- Xt is the original time series,
- Autoregressive coefficients are represented by Φ's,
- Moving average coefficients are denoted by Θ's,
- White noise or random error is represented by at.

The steps involved in modeling were three in number:

1. Model Identification: Identification of the stationarity of the time series and determination of p and q's possible values by employing autocorrelation (ACF) and partial autocorrelation (PACF) plots.

2. Parameter Estimation and Diagnostic Checking: Various ARIMA models were estimated and tested based on criteria like the Akaike Information Criterion (AIC). Residuals were also checked to confirm white noise properties.
3. Forecasting: The ultimate ARIMA model was utilized to forecast deployment patterns for chosen professional categories of OFWs.

The software used for analysis and forecasting was GRETL (Gnu Regression, Econometrics, and Time-series Library), which provided tools for time series analysis and visualization of trends. This methodology allowed the researcher to estimate future deployment levels based on past behavior, which can support policy formulation, labor planning, and international labor negotiations.

4. Results and Discussion

In the trend analysis of the deployment of professional Overseas Filipino Workers (OFWs), GRETL software was utilized to analyze historical patterns and forecast future movements. Table 1 presents the raw data on the number of deployed professional OFWs in ten job categories from 2019 to 2024.

4.1 Forecasting

To understand how the demand for Filipino workers in different professions might change in the coming years, we used the ARIMA model to make forecasts from 2025 to 2030.

These projections are based on actual deployment data from 2019 to 2024 for ten in-demand jobs abroad. The graphs in Figures 2–4 show the forecasted trends along with a 95% confidence interval, which helps us see how certain or uncertain the predictions are.

For nurses, the forecast shows a steady upward trend from 2019 to 2024, followed by a slight leveling off by 2030. This means that while the demand for Filipino nurses is still strong, it may start to stabilize in the coming years. Nurses continue to be the most in-demand profession among OFWs, and this is expected to remain the case moving forward.

Engineers and IT specialists also show stable trends in their deployment. The forecasts suggest that these professionals will continue to be needed abroad, although we're not seeing a big increase or decrease. It reflects a steady demand for skilled workers in technology and infrastructure.

Accountants, architects, and financial analysts are forecasted to follow a steady but less intensive pace regarding foreign deployment. The figures do not really swing back and forth, which indicates these professions are quite stable, maybe because there are already constraints in employment opportunities or competition for that particular field.

Teachers and medical technologists exhibit less vigorous trends. Their projected deployment still increases moderately, which may indicate increasing demand for teachers and health-related professionals overseas, particularly in countries with aging populations or increasing school systems.

Pharmacists and doctors are also expected to be in demand, albeit in reduced numbers to other occupations. This might be because of the increased licensing requirements and other impediments that influence the extent to which they can practice abroad.

Overall, the projections indicate that although there are some occupations that are increasing steadily, there are those which are already starting to plateau. The findings can inform policymakers and educational institutions to better equip workers for demands in the future. Providing access to skills training, certification, and support systems for OFWs will be important in ensuring that they remain competitive in the international labor market.

Table 1. Raw data on deployment of professional OFWs

Deployment of professional OFWs	2019	2020	2021	2022	2023	2024
Nurses	18245	13982	15536	17040	20005	21485
Medical Technologists	5114	4177	4692	4996	5691	6012
Pharmacists	2807	2101	2308	2529	2853	3101
Physicians	1956	1506	1652	1789	2050	2203
Engineers	12131	9486	10499	11483	12985	13995
IT Specialists	8045	7020	7502	8196	8993	9492
Accountants	6035	4985	5470	5811	6485	6987
Teachers	10126	7981	8464	9472	10995	11489
Architects	3520	2788	2998	3216	3793	3989
Financial Analyst	4013	3197	343	3799	4283	4492

The raw data in Table 1 shows how many Overseas Filipino Workers (OFWs) were deployed in ten different professions from 2019 to 2024. While these numbers give us a good picture of what's happened in the past, they don't tell us what might happen next. That's where forecasting comes in.

To help understand future trends, this study used the ARIMA model to predict the demand for these professions up to the year 2030. Forecasting isn't just about numbers—it's about helping people make better decisions. Whether you're a student thinking about what course to take, a government agency planning training programs, or a jobseeker looking for opportunities abroad, knowing where demand is likely headed can be incredibly helpful.

The following sections provide a detailed discussion of the forecasted trends for each of the ten professions, highlighting both the predicted values and their implications based on the data.

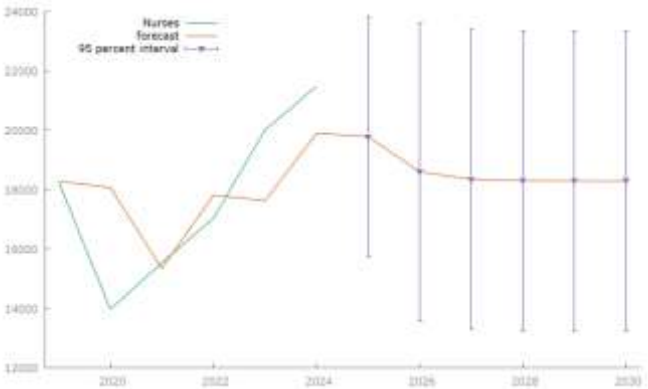

Figure 1. Forecasted deployment of professional OFWs - Nurse from 2019 to 2030.

The forecast data indicates a steady increase from 2019, with a notable rise reaching around 21,480 in 2024, before slightly decreasing and stabilizing at approximately 18,285 by 2030. The wide confidence intervals reflect some uncertainty in future numbers but suggest overall demand will remain strong. This pattern may reflect ongoing healthcare needs and workforce adjustments, emphasizing the importance of continued support and training in the nursing sector to meet future healthcare demands.

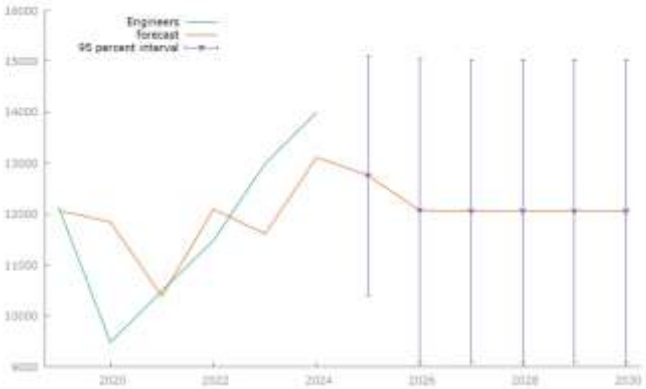

Figure 2. Forecasted deployment of professional OFWs - Engineer from 2019 to 2030.

For Engineers, the forecast shows an initial increase in numbers from 2019, peaking around 13,995 in 2024, followed by a decline and stabilization near 12,000 by 2030. The confidence intervals suggest moderate variability in the predictions. This trend could indicate a growing demand for engineering professionals in the short term, likely driven by infrastructure and development projects, but a potential leveling off in the longer term as market needs stabilize or technology changes the skill requirements.

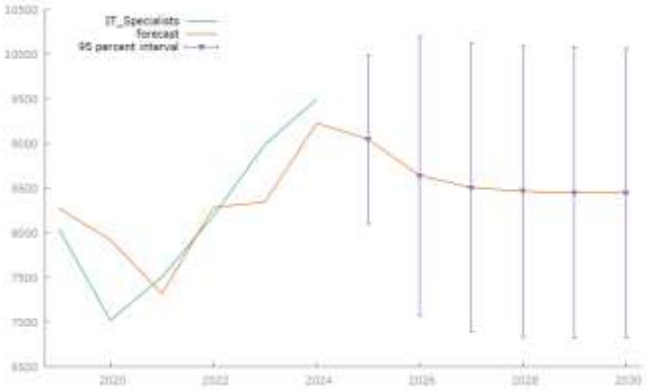

Figure 3. Projected deployment of professional OFWs - IT Specialists from 2019 to 2030.

The projected figures of IT Specialists from 2019 to 2030 depict a consistent increase until 2024 at about 9,492 professionals, then a steady decline and stabilization at around 8,440 to 9,000 by 2030. The 95% confidence intervals exhibit a moderate range, which implies certain uncertainty but generally a stable trend. This trend could be indicative of the changing character of the IT sector, where the demand increases with technological growth but could level off once the market is filled or as automation and outsourcing affect the demand for manpower.

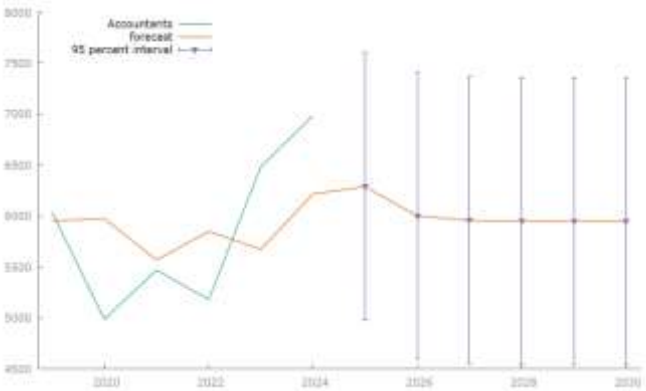

Figure 4. Projected deployment of professional OFWs - Accountants from 2019 to 2030.

The projected figures for Accountants from 2019 to 2030 show a relatively stable pattern in the strength of numbers, with projections at around 6,000 professionals every year. The confidence intervals show moderate volatility, but no growth or decline is anticipated. This stability translates to a steady demand for accounting professionals throughout the forecast horizon.

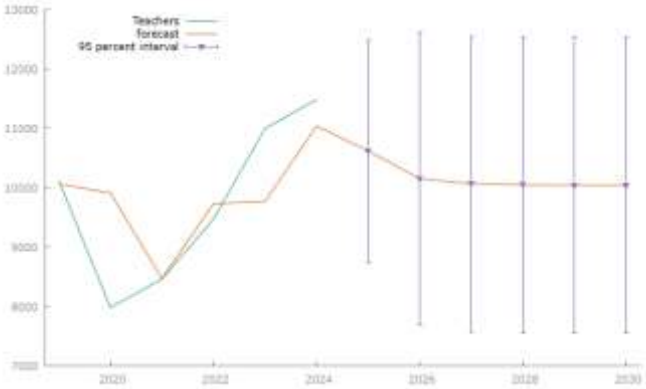

Figure 5. Projected deployment of professional OFWs - Teachers from 2019 to 2030.

The projected Teachers from 2019 to 2030 trend exhibits a constant workforce level, with projected figures at around 10,000 per year. The 95% confidence intervals reflect variation, yet in general, there are no significant increases or drops. This would imply that demand for teachers should be constant over the projection period.

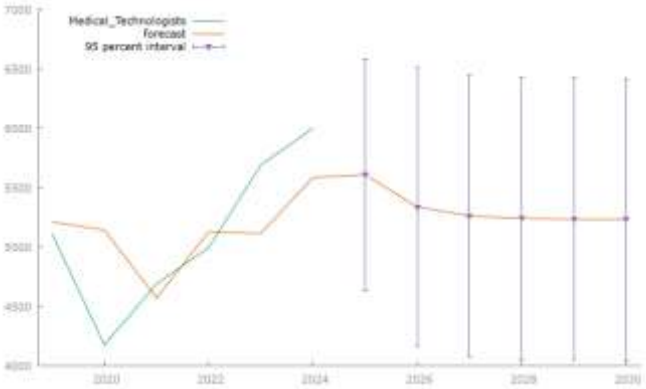

Figure 6. Projected deployment of professional OFWs - Medical Technologist from 2019 to 2030.

The projected figures from 2019 to 2030 for Medical Technologists reflect a relatively stable trend, with projected figures always within 5,200 to 5,600 professionals. The confidence intervals also reflect moderate variability, but no identifiable upward or downward movement is anticipated. This stability reflects an even demand for Medical Technologists in the next few years.

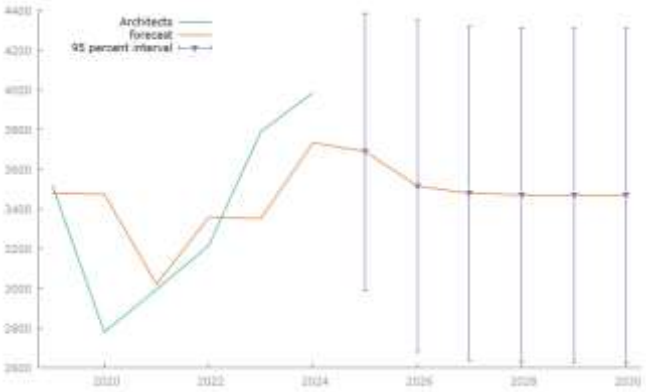

Figure 7. Projected deployment of professional OFWs - Architects, 2019-2030.

The projection of Architects from 2019 to 2030 exhibits a fairly flat trend, with values forecasted at around 3,400 to 3,700 professionals. The 95% confidence intervals reflect moderate uncertainty but there will not be any notable growth or decline. This implies that the market demand for architects will continue to be stable during the projection period.

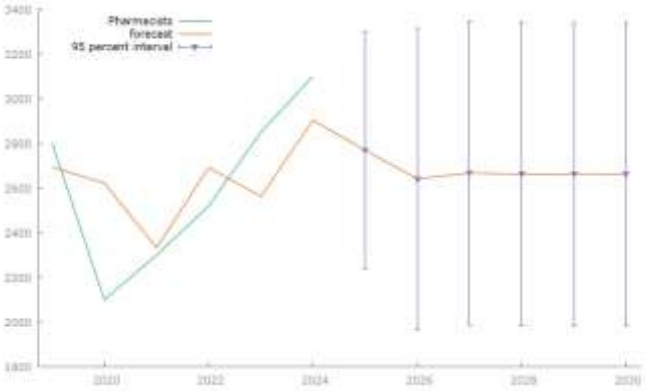

Figure 8. Projected deployment of professional OFWs - Pharmacist from 2019 to 2030.

The projected figures for Pharmacists from 2019 to 2030 show a steady rise in numbers, with projections rising from approximately 2,600 to close to 2,800. The 95% confidence intervals demonstrate moderate volatility but collectively project a gradual increase in the demand for pharmacists across the projection period.

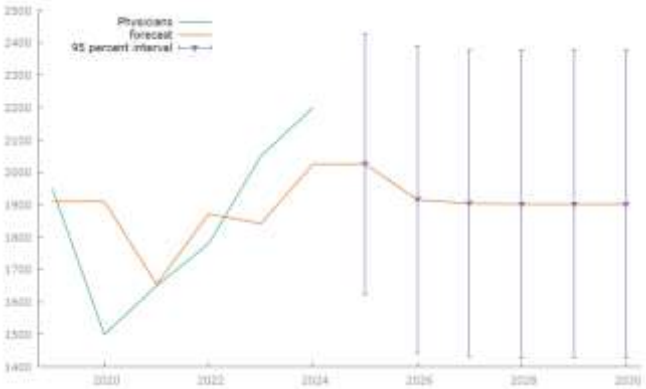

Figure 9. Projected deployment of professional OFWs - Physicians from 2019 to 2030.

Using the projected data of Physicians from 2019 to 2030, the projected figures indicate a moderate increase at the beginning followed by leveling off at 1,900 professionals. The intervals for confidence indicate some fluctuation but, in general, the projection has a fairly consistent level of demand for physicians throughout. This consistent trend might be indicative of stable health needs without much fluctuation.

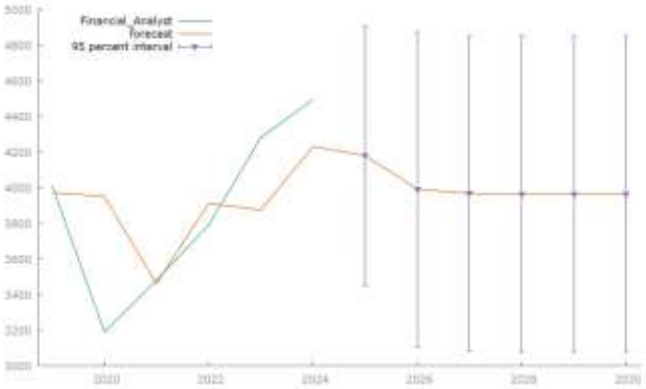

Figure 10. Projected deployment of professional OFWs – Financial Analyst from 2019 to 2030.

According to the projected figures for Financial Analysts from 2019 to 2030, the projection is a slow rise in figures up to 2024, the highest at around 4,495, with a decline and leveling off at 3,960 to 4,180 towards 2030. The confidence ranges register some fluctuation but generally depict a relatively constant demand. This trend could be an indicator of economic and market conditions affecting the need for financial analysts, thus emphasizing the need to track these for workforce planning. Conclusion and Recommendations.

5. Conclusions and Recommendations

Forecasting the deployment trends of Overseas Filipino Professional Workers (OFPWs) provides crucial insights for anticipating future labor market demands and shaping policies that protect and empower our workforce. By applying the ARIMA model to data from 2019 to 2024, this study has shown that demand for key professionals especially nurses, engineers, and IT professionals - remains steady and is likely to stay resilient up to 2030. While some occupations may experience slight slowdowns or plateaus, overall, Filipino professionals continue to be among the most sought-after talents worldwide.

This study reflects more than just statistical trends; it represents the socioeconomic realities and sacrifices made by countless families, including those in my own community, whose futures often rely on the income sent by loved ones working far from home. Understanding these deployment patterns can help policymakers design better support systems, guide educational institutions in aligning training programs with real-world demands, and empower Filipino workers to stay globally competitive despite changing market conditions.

Future research is encouraged to refine forecasting models by combining ARIMA with other methods but also examine how factors like new labor agreements, global economic shifts, and technological advancements may affect overseas job opportunities for Filipinos. Continuous collaboration among government agencies, educators, and recruiters will be vital to make sure that our country's professionals remain adaptable, protected, and ready to thrive anywhere in the world.

References

1. F.J.B. Talirongan, H. Talirongan, M.Y. Orong, "Modeling National Trends on Health in the Philippines Using ARIMA," Journal of Health and Medical Informatics, 2020, 11, doi: 10.37421/jhmi.2020.11.342.
2. Philstar, "Historic 2023 OFW Deployment Moves Philippines' Labor Migration Forward from Pandemic," 2024. Available: https://www.philstar.com/headlines/2024/04/12/2347168/historic-2023-ofw-deployment-moves-philippines-labor-migration-forward-pandemic
3. Philstar, "Return of OFW Deployment to Pre-COVID Level Shows Lack of Quality Local Jobs," 2024. Available: https://www.philstar.com/headlines/2024/01/06/2323900/return-ofw-deployment-pre-covid-level-shows-lack-quality-local-jobs
4. C.C. Rufino, "Forecasting Monthly Tourist Arrivals from ASEAN + 3 Countries to the Philippines for 2015–2016 Using SARIMA Noise Modeling Forecasting," ResearchGate, 2018. Available: https://www.researchgate.net/publication/323870557
5. R.M.R. Sangco, F.J. Vienes, "Predicting the Number of Skilled Emigrants in the Philippines: Comparison of Probabilistic Forecasting Methods," Multidisciplinary Science Journal, 2025, 7 (6), doi: 10.31893/multiscience.2025292.
6. I. Khan, D.F. Gunwant, "'Revealing the Future': An ARIMA Model Analysis for Predicting Remittance Inflows," Journal of Business and Socio-economic Development, 2024, 5 (2), 155–170. doi: 10.1108/jbsed-07-2023-0055.
7. R.J. Deluna, S. Pedida, "Overseas Filipino Workers Remittances, Inequality and Quality of Life in the Philippines," Munich Personal RePEc Archive, 2014, No. 56070. Available: http://mpra.ub.uni-muenchen.de/56070/
8. D.S. Mapa, M.C. Simbulan, "Analyzing and Forecasting Movements of the Philippine Economy Using the Dynamic Factor Models (DFM)," MPRA Paper, 2014, No. 54478.
9. G. Lapid, A.J. Lugtu, E. Dela Cruz, "Macroeconomic Determinants of International Migration of Overseas Filipino Workers," Journal of Economics, Finance and Accounting Studies, 2022, 4 (1), 492–515. doi: 10.32996/jefas.2022.4.1.30.
10. N. Golenvaux, P.G. Alvarez, H.S. Kiossou, P. Schaus, "An LSTM Approach to Forecast Migration Using Google Trends," arXiv, 2020. Available: http://arxiv.org/abs/2005.09902
11. R.J.N. Angco, L.D. Timtim, M.P. Ando, C.L. Leyson, C.R.P. Villasin, "Time Series Approach on Philippines' Three Economic Participation Using ARIMA Model," Technium Social Sciences

Journal, 2022, 7, 592–624. Available: https://techniumscience.com/index.php/socialsciences/article/view/332/124
12. I. Ghosh, S. Gupta, S. Rana, "Anticipating Dengue Outbreaks Using a Novel Hybrid ARIMA-ARNN Model with Exogenous Variables," arXiv, 2023. Available: http://arxiv.org/abs/2312.15270
13. X. Wang, Y. Kang, R.J. Hyndman, F. Li, "Distributed ARIMA Models for Ultra-long Time Series," International Journal of Forecasting, 2023, 39 (3), 1163–1184. doi: 10.1016/j.ijforecast.2022.05.001.
14. S.J.E. Parreño, "Forecasting Quarterly Rice and Corn Production in the Philippines: A Comparative Study of Seasonal ARIMA and Holt-Winters Models," International Journal of Soft Computing, 2023, 13 (6), 3224–3231. doi: 10.21917/ijsc.2023.0449.
15. L. Zhang, Y. Chen, O. Lyulyov, T. Pimonenko, "Forecasting the Effect of Migrants' Remittances on Household Expenditure: COVID-19 Impact," Sustainability, 2022, 14 (7). doi: 10.3390/su14074361.
16. M.C.E. Manayaga, R.F. Ceballos, "Forecasting the Remittances of the Overseas Filipino Workers in the Philippines," arXiv, 2019. Available: http://arxiv.org/abs/1906.10422
17. K.M.U. Konarasinghe, "Hybrid Trend–ARIMA Model for Forecasting Employment in Tourism Industry in Sri Lanka," Journal of Tourism Economics, 2020. Available: https://www.researchgate.net/publication/342839684
18. Ü.Ç. Büyükşahin, Ş. Ertekin, "Improving Forecasting Accuracy of Time Series Data Using a New ARIMA-ANN Hybrid Method and Empirical Mode Decomposition," Neurocomputing, 2019, 361, 151–163. doi: 10.1016/j.neucom.2019.05.099.
19. H. Hewamalage, C. Bergmeir, K. Bandara, "Recurrent Neural Networks for Time Series Forecasting: Current Status and Future Directions," International Journal of Forecasting, 2021, 37 (1), 388–427. doi: 10.1016/j.ijforecast.2020.06.008.
20. L.N.C. Estoque, L.M.D. Dela Fuente, R.C. Mabborang, M.G. Molina, "Forecasting Urban Population Growth in the Philippines Using Autoregressive Integrated Moving Average," EPRA International Journal of Multidisciplinary Research, 2020, 2, 198–210. doi: 10.36713/epra2013.
21. J.D.U.A. Atienza, M.A.J.B.E. Atienza, "Forecasting Philippines Imports and Exports Using Bayesian," 2025. (To be published)