

# Development of a **Labor Market Intelligence System** (LMIS) using **Big Data:** The **Philippine** Case

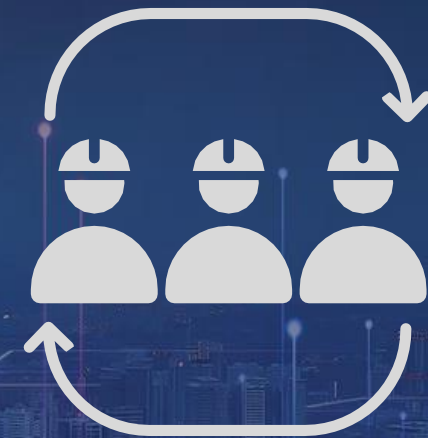
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\*The views expressed herein are those of the author and do not necessarily reflect those of the BSP.





# BACKGROUND



**Publication lags** of official  
statistics (e.g., **Unemployment**  
**Rate** from Labor Force Survey)

**Overcast**  
Labor Market





# OBJECTIVES OF THE STUDY



## Labor Market Tightness Ratio

Can **Labor Market Tightness Ratio**  
[number of job vacancies  
available per job seeker]  
determine **slack in the  
Labor Market**?



## Nowcasting Model for the Unemployment Rate

Can the use of **online  
job portal data** in  
Nowcasting Models  
**accurately predict the  
Unemployment Rate**?

Can it **supplement** the  
BSP models?





# DATA



Position/Ad Title



Work Location



Views



Industry



Company Name



Specialization Name

Data Source

**Jobstreet.com**



Max Monthly Salary Offer



Position Description



Ad Posting Date



Ad Expiration Date



Years of Experience



Employment Type



Qualification Name

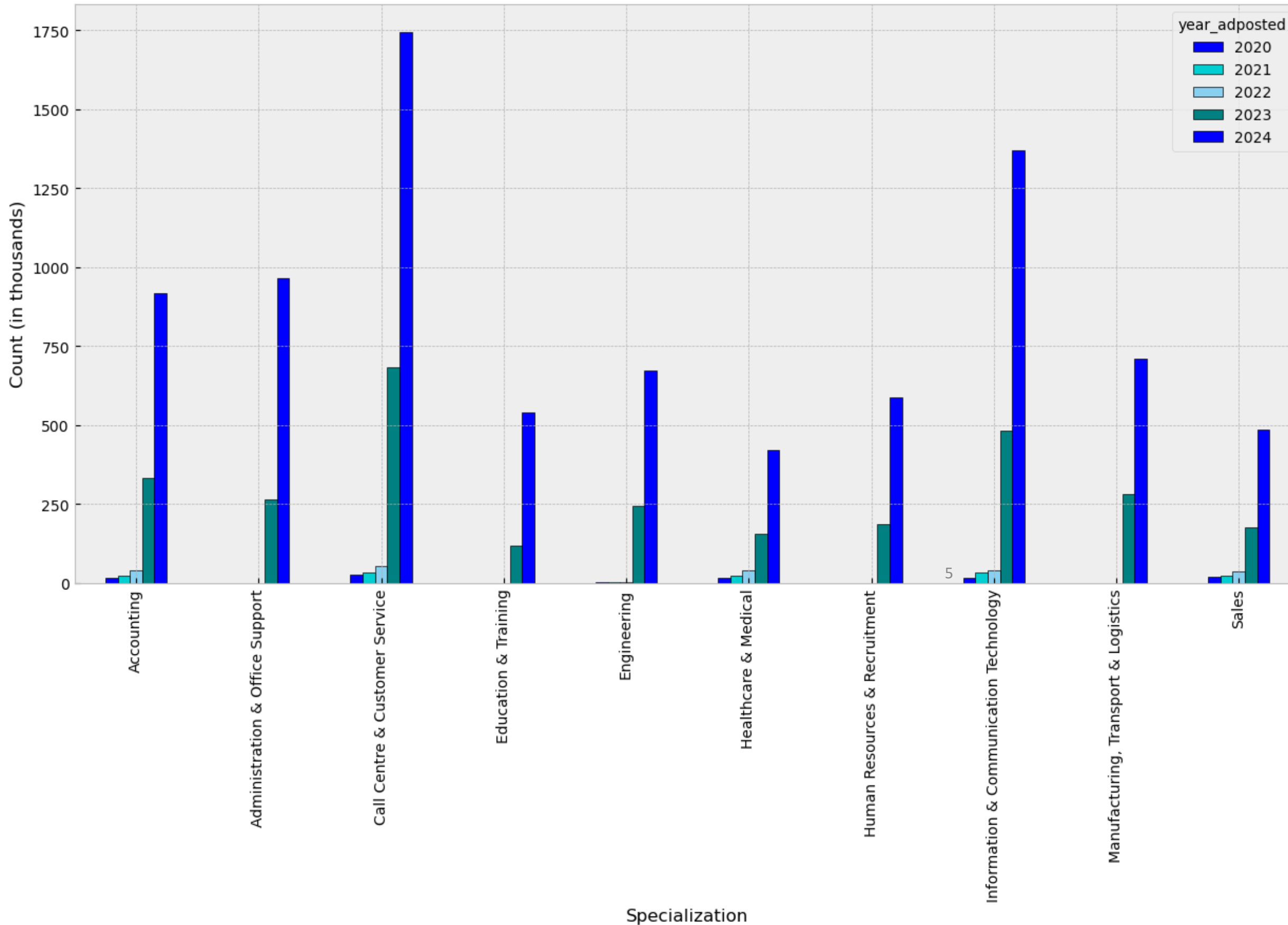




# DATA

**EMPLOYERS** are looking for applicants with **specialization** in:

- 1 Call Centre & Customer Service
- 2 Information & Communication Technology
- 3 Administration & Office Support
- 4 Accounting
- 5 Manufacturing, Transport & Logistics





# DATA

**JOB SEEKERS** are looking for jobs in the following **industries:**

1.

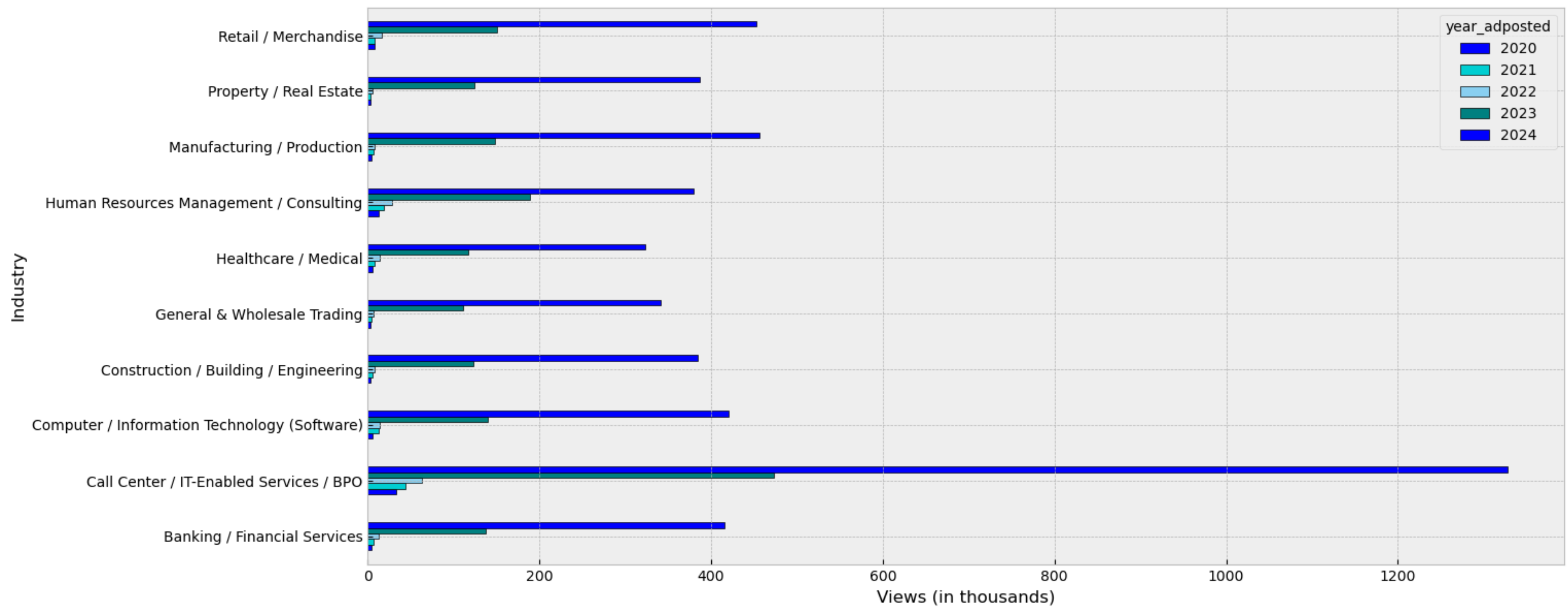
Call Center / IT-Enabled Services / BPO
2.

Manufacturing / Production
3.

Retail / Merchandise
4.

Computer / IT (Software)
5.

Banking / Financial Services





# METHODOLOGY

## LABOR MARKET TIGHTNESS RATIO



**Tight**  
Labor Market  
 $LD > LS$



**Signals no  
slack**  
↓  
**UE Rate**

**Equilibrium = 1**



**Loose**  
Labor Market  
 $LS > LD$



**Signals  
slack**  
↑  
**UE Rate**

**Tightness Ratio** = Labor Demand (LD) / Labor Supply (LS)

\*LD: number of job vacancies

LS: number of online active job seekers

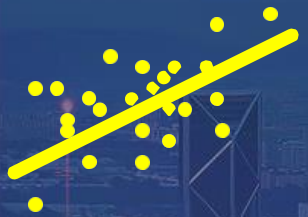




# METHODOLOGY


## NOWCASTING MODELS Unemployment Rate

**CROSS-PANEL DATASET**  
**Jobstreet**  
+  
**Official Economic Indicators**  
from  
**Philippine Statistics Authority**




**Linear Regression**  
(baseline model)  
(with LASSO L1 and  
Ridge L2)

Analyze predictions  
based on **relationships**  
**between variables**




**Long Short-Term  
Memory –Artificial  
Neural Network  
(LSTM-ANN)**

Ability to handle large  
numbers of input  
features in **variety of  
frequencies**



**Dynamic  
Factor Model  
(DFM)**

A large number  
of economic or  
observable  
variables are  
**described by a  
small number of  
common factors**

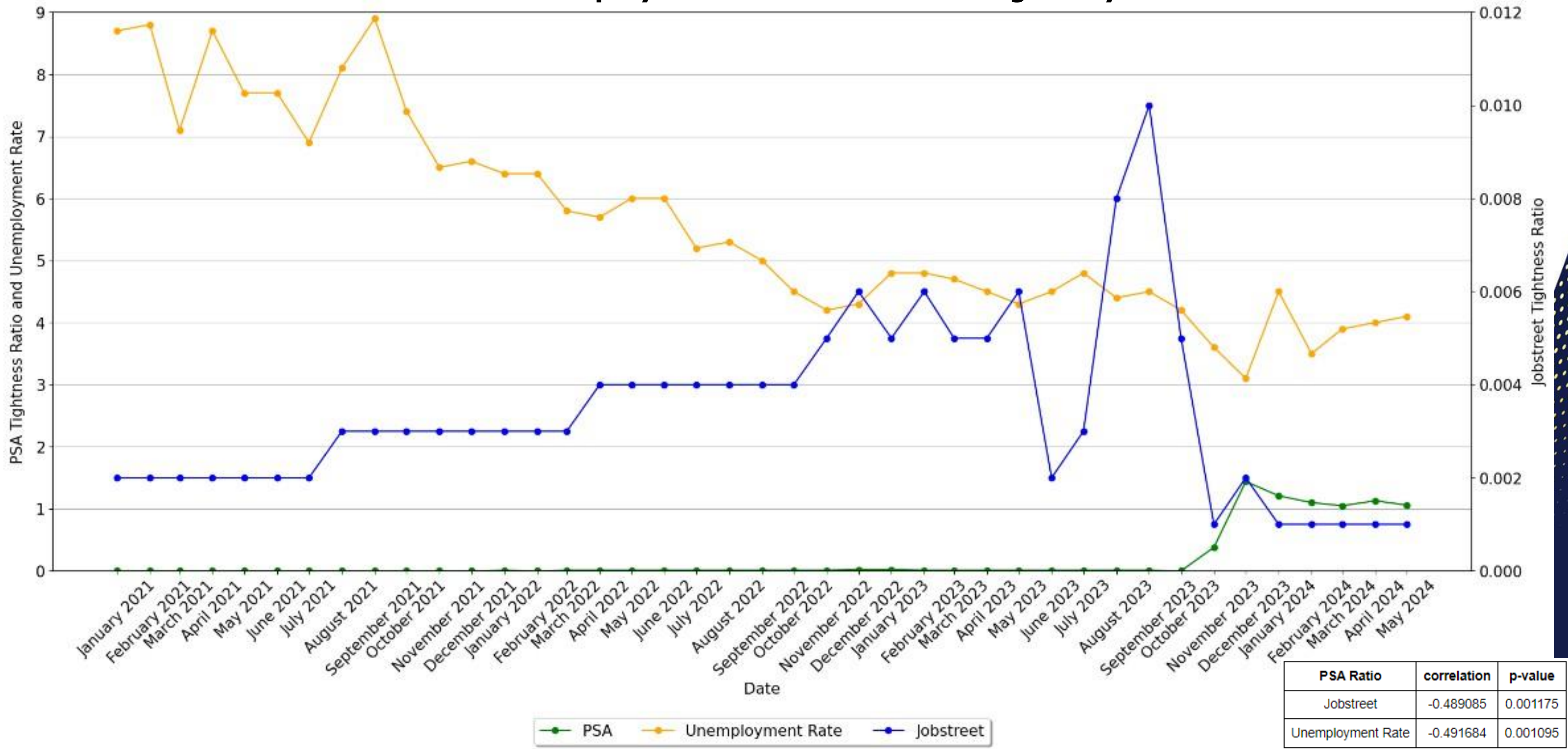




# RESULTS

May 2024

- **PSA Ratio is 1.06, nearing equilibrium level**
- **JTR below equilibrium level**
- **Unemployment Rate and JTR are negatively correlated with PSA Ratio**





# RESULTS

**DFM has the lowest RMSE.**

**LSTM-ANN is consistently within the tolerance level.**

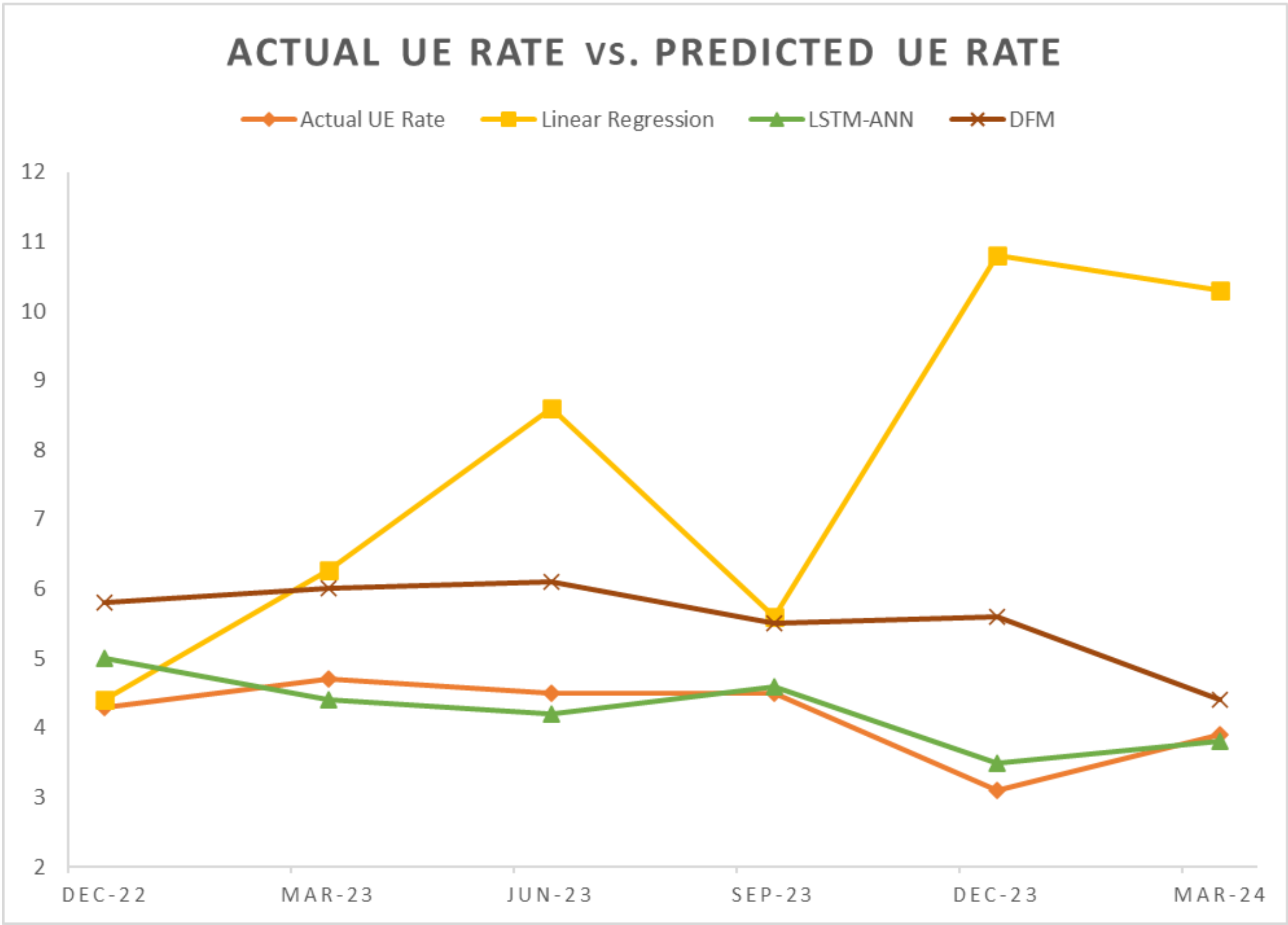
Date	Models	RMSE	Tolerance Level ( $\pm 1$ ) from the Actual UE Rate (Predicted - Actual)	
March 2024	LSTM-ANN	0.5480	-0.10	within
	DFM	0.0427	0.49	within
	Linear Regression	0.7307	6.35	higher
December 2023	LSTM-ANN	0.5480	0.40	within
	DFM	0.0427	2.51	higher
	Linear Regression	0.7307	7.72	higher
September 2023	LSTM-ANN	0.5480	0.10	within
	DFM	0.0427	1.04	higher
	Linear Regression	0.7307	1.09	higher
June 2023	LSTM-ANN	0.5480	-0.30	within
	DFM	0.0427	1.64	higher
	Linear Regression	0.7307	4.09	higher
March 2023	LSTM-ANN	0.5480	-0.32	within
	DFM	0.0427	1.30	higher
	Linear Regression	0.7307	1.57	higher





# RESULTS

**LSTM-ANN produces the most accurate prediction.**





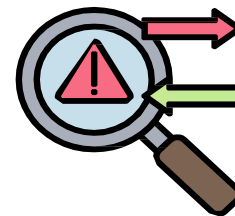
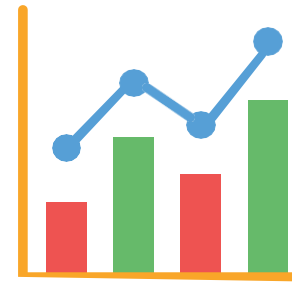
# RECOMMENDATION FOR FUTURE RESEARCH

## EXPANSION OF DATA SOURCES

- Include other online job portals:
  1. Department of Labor and Employment – PhilJobNet
  2. LinkedIn

## MODEL IMPROVEMENT

- Test the model's performance on a wider series and various frequencies



# KEY TAKEAWAYS

**Deep learning models are efficient in handling large datasets and missing data**

**Generate insights from unstructured and non-traditional data**

**Track labor market conditions more frequently**

**Early Warning System**

**Better policy actions and data-driven informed decisions**





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# Thank you!

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