

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026

TIME SERIES FORECASTING IN E-COMMERCE: A SYSTEMATIC LITERATURE REVIEW OF METHODS, DATA, EVALUATION METRICS, AND FUTURE DIRECTIONS (2021–2026)

Vania Putri Minarso^{1*}, Roni Setyawan¹, and Mahmud Zunus Amirudin¹

¹ University of Slamet Riyadi, Surakarta, Central Java, Indonesia

*Corresponding Author: vaniaputri430@gmail.com

ORCID: <https://orcid.org/0009-0003-1186-8104>

ABSTRACT

The rapid growth of e-commerce has increased the need for accurate forecasting of product demand and sales to support data-driven business decisions. This study aims to systematically review recent research on time series forecasting in e-commerce and synthesize the forecasting methods, dataset characteristics, evaluation metrics, and future research directions. A Systematic Literature Review (SLR) was conducted using Google Scholar, Scopus, ScienceDirect, IEEE Xplore, SpringerLink, and ACM. The search was limited to English-language journal articles, conference papers, and preprints published between 2021 and 2026. After title, abstract, and full-text screening, 15 studies were included in the final analysis. The studies were analyzed descriptively based on four research questions. The results show that the reviewed forecasting approaches can be grouped into hybrid models, deep learning models, and comparison-based methods, with hybrid approaches being the most frequently identified (9 of the 15 studies, 60%), followed by deep learning models (4 studies) and comparison-based methods (2 studies). Dataset sources varied across studies, while daily data were used in 12 studies (80%). MAE and RMSE were the most frequently reported evaluation metrics, although differences in datasets, forecasting tasks, and evaluation procedures limited direct comparison across studies. Five main future research directions were identified: broader data coverage, richer contextual information, improved model architectures, wider forecasting scope and efficiency, and more consistent evaluation procedures. Overall, the review provides a structured overview of recent e-commerce forecasting research and identifies areas for further investigation.

Keywords: Time series, e-commerce, systematic literature review, sales forecasting, machine learning

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
**“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026**

INTRODUCTION

The rapid growth of e-commerce platforms in recent years has significantly transformed transaction patterns and consumer behavior, as companies increasingly leverage various online platforms to enhance marketing efficiency and expand their global market reach (Homburg & Wielgos, 2022). This growth has, in turn, driven a substantial increase in the volume and volatility of demand and sales data in the e-commerce sector, making accurate forecasting essential for enterprises to support capacity planning, target setting, and business decision-making. This condition has subsequently encouraged the development of various forecasting models and methods designed to address the dynamic and fluctuating characteristics of e-commerce data.

Consumers increasingly prefer online shopping because of its ease of access, wide product variety, and flexible payment and delivery options. This shift in consumer behavior has led to a growing body of research applying forecasting techniques, particularly deep learning-based models, to improve the effectiveness of online sales strategies and support data-driven decision-making (Ahmadov & Helo, 2023). Beyond supporting operational planning, accurate forecasting can also support data-driven decision-making in e-commerce (Taylor & Letham, 2018).

In recent years, research on demand, sales, and price forecasting in the retail and e-commerce sectors has grown rapidly. However, systematic literature reviews specifically addressing forecasting for e-commerce products remain limited. Previous literature reviews have tended to focus on broader domains or on specific areas outside e-commerce. For instance, sales forecasting techniques for the restaurant industry have been classified (Lasek et al., 2016), while machine learning approaches for food product sales forecasting have also been reviewed (Tsoumakas, 2019). More recent reviews have also examined demand forecasting from broader supply chain and product-specific perspectives, such as machine learning and deep learning for supply chain demand forecasting (Douaioui et al., 2024) and demand forecasting for fashion products (Swaminathan & Venkitasubramony, 2024). However, these reviews do not specifically integrate forecasting methods, dataset characteristics, evaluation metrics, and future research directions within the e-commerce context. Therefore, this review focuses on recent e-commerce forecasting research published between 2021 and 2026 and examines these four aspects in an integrated manner.

This review makes four main contributions to the e-commerce forecasting literature. First, it classifies the forecasting methods used in recent studies into clear categories, making it easier for future researchers to understand the development of existing approaches. Second, it characterizes the data used for forecasting based on data sources and frequency, providing an overview of the types and availability of data commonly used in the e-commerce context. Third, it consolidates the evaluation metrics used to measure model accuracy, offering a reference for researchers in selecting

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary Perspective on Economics, Business, Education, Law, Agriculture, Food Technology, Politics and Society” July 30th, 2026

appropriate metrics. Fourth, it formulates future research directions based on a synthesis of the reviewed studies, to support the development of more adaptive and accurate e-commerce forecasting models going forward.

METHODS

1.1 Review Method

This study employed a Systematic Literature Review (SLR) to identify and synthesize previous research on time series forecasting for e-commerce products. The review process was conducted systematically through several stages, including formulation of the research questions, development of the search strategy, study selection, and data extraction and synthesis.

The research questions were used as the basis for determining the information to be collected from each study. Predefined inclusion and exclusion criteria were then applied consistently to identify studies relevant to the research objectives.

1.2 Research Questions

Four research questions were formulated to guide the review process and organize the analysis. The questions were developed according to the objective of identifying forecasting approaches and understanding the characteristics of forecasting studies in the e-commerce context.

RQ1: What are the proposed methods for forecasting in e-commerce from 2021 to 2026?

RQ2: What are the characteristics of the data used for e-commerce forecasting?

RQ3: What metrics are used to evaluate the performance of forecasting methods in e-commerce?

RQ4: What future research directions are proposed for e-commerce forecasting?

These research questions were used to determine the information extracted from the selected studies, including forecasting methods, data characteristics, evaluation metrics, and future research directions.

1.3 Search Strategy

The literature search was conducted using six academic databases and search platforms: Google Scholar, Scopus, ScienceDirect, IEEE Xplore, SpringerLink, and ACM. The final search was conducted on July 17, 2026.

The search was limited to publications written in English and included journal articles, conference papers, and preprints. For the final analysis, studies published between 2021 and 2026 were considered eligible.

The search keywords covered terms related to forecasting and e-commerce. The Boolean search string used was:

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary Perspective on Economics, Business, Education, Law, Agriculture, Food Technology, Politics and Society” July 30th, 2026

(“forecasting” OR “prediction” OR “sales forecasting”) AND (“e-commerce” OR “online shop”)

The string used the broader term “forecasting” rather than “time series”. The time series scope was therefore applied during screening, by retaining studies that forecast future sales or demand values from historical time-ordered data.

The publications retrieved from the different platforms were collected and examined to identify potentially relevant studies. The studies were subsequently screened based on their titles, abstracts, and full texts.

1.4 Study Selection

The study selection process consisted of three stages: title screening, abstract screening, and full-text screening. First, the titles of the retrieved publications were examined to identify potentially relevant studies. The abstracts were then reviewed to determine whether the studies addressed forecasting in the e-commerce context. Finally, the full texts were examined to confirm their relevance and the availability of sufficient information for the review.

Duplicate publications identified during the search process were removed before further screening.

Studies were included if they proposed or applied forecasting methods for products in the e-commerce context. Studies were excluded if they were survey articles or literature reviews, were not related to forecasting, or did not provide sufficient information relevant to the research questions.

After the search and selection process, 15 studies published between 2021 and 2026 were included in the final analysis.

1.5 Data Extraction and Synthesis

Data were extracted from each selected study using an extraction form developed based on the four research questions. The extracted information included forecasting methods, data characteristics, evaluation metrics, and future research directions.

Data extraction was performed by one reviewer. Therefore, no inter-reviewer disagreement resolution procedure was applied. No formal quality assessment of the included studies was performed, so the findings describe what the studies report and do not weigh the evidence by methodological quality. Preprints, which may not have completed peer review, were also included, so their findings should be read with additional caution.

The extracted data were then organized and synthesized descriptively. Forecasting methods were grouped according to the approaches used, while data characteristics were analyzed based on data sources and data frequency. Evaluation metrics were identified according to the metrics reported in each study. Future research directions were categorized based on the themes identified across the analyzed studies.

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026

The synthesized findings were used to address the four research questions and provide the basis for discussing the development of time series forecasting research in the e-commerce context.

2. Results and Discussion

This systematic literature review identified 15 studies published between 2021 and 2026 that discuss time series forecasting in e-commerce. The reviewed studies were analyzed based on four research questions: the forecasting methods used, the characteristics of the datasets, the evaluation metrics, and the future research directions. The results are presented according to these four aspects.

2.1 Forecasting Methods Used in E-Commerce

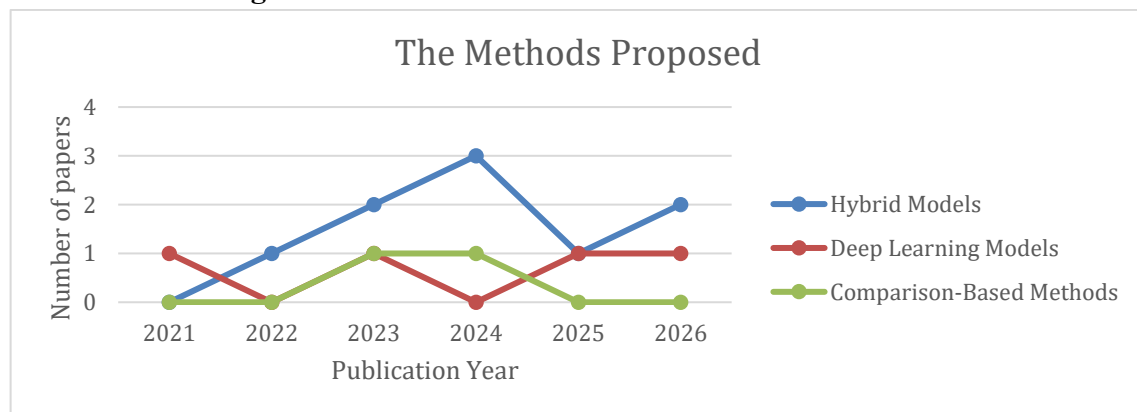


Figure 1. The Methods Proposed for E-commerce Forecasting

The reviewed studies applied several forecasting approaches, which were grouped into three main categories: hybrid models, deep learning models, and comparison-based methods. Each study was assigned to one primary category. Hybrid models combine two or more techniques or processing stages; deep learning models rely mainly on a neural network or foundation model architecture; and comparison-based methods benchmark several existing models rather than proposing a new one. Table 1 lists the studies in each category. Hybrid models were the most frequently identified approach (9 of 15 studies, 60%), followed by deep learning models (4 studies, 27%) and comparison-based methods (2 studies, 13%).

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026

Table 1. Mapping between Methods and Reference Papers

Method Category	Studies	n (%)
Hybrid Models	Zhang et al. (2022); Gan et al. (2023); T. Zhou (2023); Chen et al. (2024); Li (2024); Zhao (2024); Huizi et al. (2025); Hu et al. (2026); Nadia et al. (2026)	9 (60%)
Deep Learning Models	Dai & Huang (2021); S. Zhou (2023); Du & Li (2025); Sui et al. (2026)	4 (27%)
Comparison-Based Methods	Ecevit et al. (2023); Trisolvena et al. (2024)	2 (13%)
Total		15 (100%)

Hybrid Models

Hybrid models combine two or more forecasting techniques or processing stages. The reviewed studies used different combinations depending on the characteristics of the forecasting problem and the available data.

For example, Zhang et al. (2022) proposed FS-LSTM, which integrates feature selection with an LSTM-based forecasting model. Gan et al. (2023) combined empirical mode decomposition with LSTM to develop an EEMD-integrated forecasting approach. T. Zhou (2023) combined trend and seasonality decomposition with LightGBM, while Chen et al. (2024) developed a GRU-LightGBM approach for forecasting sales of short-shelf-life products. Li (2024) proposed a cascaded hybrid of BiLSTM and BiGRU networks that integrates historical order information with product review sentiment data to forecast commodity demand on e-commerce platforms.

Zhao (2024) combined SARIMA with K-means clustering, and Huizi et al. (2025) combined ARIMA and SES methods for e-commerce demand forecasting. Other studies investigated combinations involving newer model architectures and external information. Nadia et al. (2026) investigated a hybrid deep learning approach for demand forecasting and supply chain optimization. Hu et al. (2026) introduced a hybrid demand forecasting approach using LLM-based event knowledge.

The reviewed studies therefore show that hybrid approaches are used in different ways, including feature selection, decomposition, model combination, clustering, and the integration of additional information.

Deep Learning Models

Deep learning was another important approach identified in the reviewed studies. LSTM-based models were particularly common because they can be applied to sequential and time-dependent data.

Dai & Huang (2021) proposed an LSTM-based sales prediction method combined with hyperparameter search. S. Zhou (2023) investigated e-commerce sales forecasting using a neural network based on LSTM. Du & Li (2025) also studied e-commerce sales forecasting using a deep learning algorithm.

Sui et al. (2026) investigated the use of foundation models for retail demand forecasting.

These studies indicate that deep learning approaches have been applied to both traditional e-commerce sales forecasting and more recent retail forecasting problems.

Comparison-Based Methods

Some studies evaluated multiple forecasting methods rather than proposing a single new model. Trisolvena et al. (2024), for example, analyzed product demand forecasting on the Temu marketplace platform using several predictive and time series forecasting algorithms, including ARIMA, SARIMA, Prophet, and LSTM.

Ecevit et al. (2023) also compared LSTM, Prophet, and SARIMA for short-term hourly sales forecasting using real-life data from an e-commerce site. Such studies provide comparisons between traditional statistical models and machine learning or deep learning approaches.

Overall, the reviewed studies show that forecasting methods in e-commerce include both traditional statistical techniques and machine learning or deep learning approaches. The use of hybrid models is particularly visible in the reviewed literature. However, because the studies were conducted using different datasets and experimental settings, the findings do not provide a basis for declaring one method universally superior to the others.

2.2 Dataset Characteristics

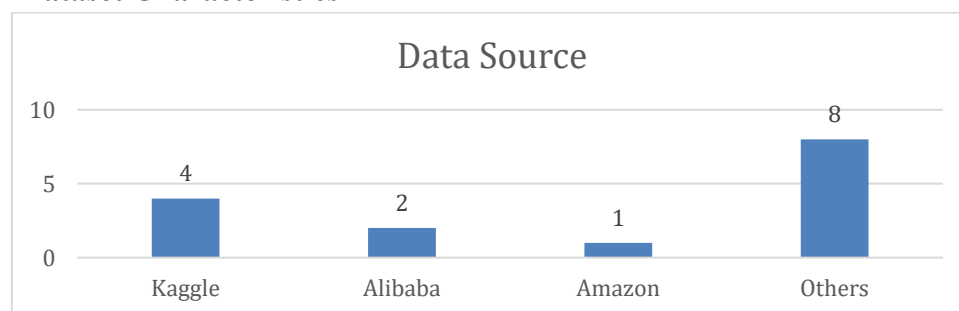


Figure 2. Data Source for E-commerce Forecasting

The reviewed studies used datasets from different sources. Based on the extracted data, the sources were grouped into four categories: Kaggle, Alibaba, Amazon, and Others. The “Others” category includes datasets obtained from sources that did not belong to the other predefined categories.

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary Perspective on Economics, Business, Education, Law, Agriculture, Food Technology, Politics and Society” July 30th, 2026

Among the 15 reviewed studies, datasets categorized as Others were the most common, accounting for 8 studies (53%). Kaggle was used in 4 studies (27%), while Alibaba was used in 2 studies (13%). Amazon was used in 1 study (7%).

The reviewed datasets also differed in terms of data frequency. Daily data were the most frequently used, appearing in 12 of the 15 studies (80%). The remaining studies used other data frequencies according to their respective forecasting problems.

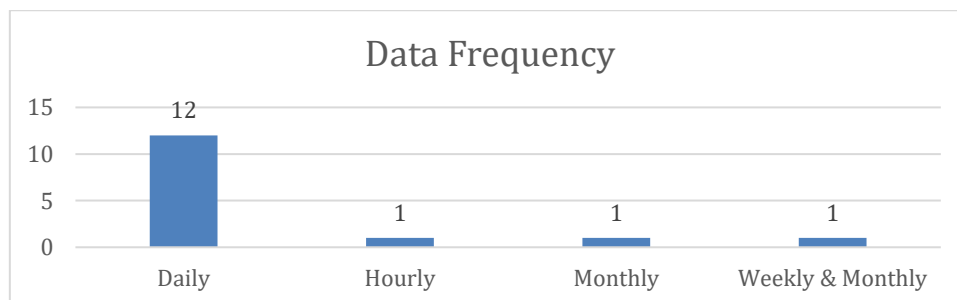


Figure 3. Data Frequency for E-commerce Forecasting

The diversity of data sources indicates that e-commerce forecasting research uses datasets with different characteristics and collection contexts. Some studies rely on publicly available datasets, while others use datasets associated with particular platforms or applications. This variation is important when interpreting forecasting results because model performance may depend on the characteristics of the underlying data.

The dominance of daily observations also suggests that daily demand and sales forecasting is a common focus in the reviewed literature. However, the limited representation of other data frequencies indicates that further investigation may be useful for forecasting problems involving different time scales.

2.3 Evaluation Metrics

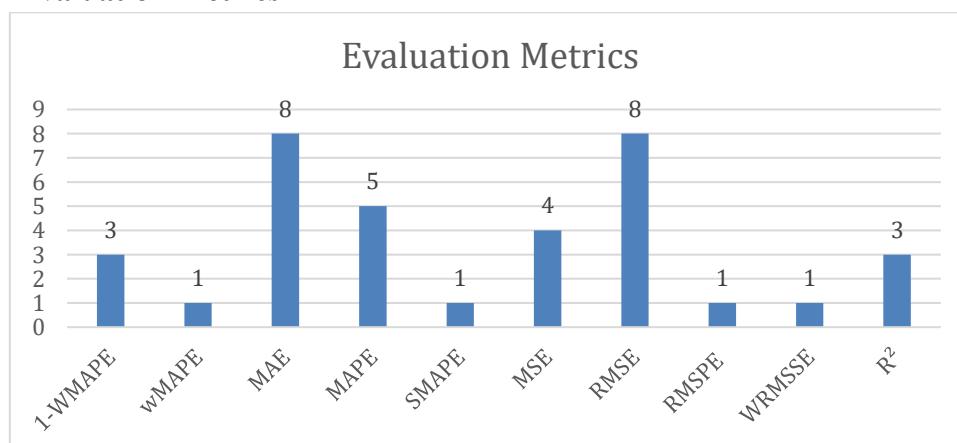


Figure 4. Evaluation Metrics Used for E-commerce Forecasting

The reviewed studies used several evaluation metrics to measure forecasting performance. The most frequently reported metrics were Mean Absolute Error (MAE),

Root Mean Square Error (RMSE), and Mean Absolute Percentage Error (MAPE). Other metrics included Mean Squared Error (MSE), Weighted Forecast Accuracy (1-WMAPE), Symmetric Mean Absolute Percentage Error (SMAPE), coefficient of determination (R^2), Weighted Mean Absolute Percentage Error (wMAPE), Root Mean Square Percentage Error (RMSPE), and Weighted Root Mean Squared Scaled Error (WRMSSE).

MAE was reported in 8 studies (Chen et al., 2024; Du & Li, 2025; Gan et al., 2023; Hu et al., 2026; Li, 2024; Nadia et al., 2026; Trisolvena et al., 2024; Zhang et al., 2022). RMSE was reported in 8 studies (Du & Li, 2025; Ecevit et al., 2023; Gan et al., 2023; Huizi et al., 2025; Li, 2024; Nadia et al., 2026; Trisolvena et al., 2024; Zhao, 2024). MAPE was used in 5 studies (Chen et al., 2024; Dai & Huang, 2021; Du & Li, 2025; Nadia et al., 2026; Trisolvena et al., 2024). MSE appeared in 4 studies (Chen et al., 2024; Hu et al., 2026; Zhang et al., 2022; S. Zhou, 2023).

Other metrics were used less frequently. 1-WMAPE was reported in three studies (Huizi et al., 2025; Sui et al., 2026; Zhao, 2024), while SMAPE was reported in one study (Nadia et al., 2026). R^2 was reported in three studies (Ecevit et al., 2023; Gan et al., 2023; Sui et al., 2026). wMAPE was used in one study (Ecevit et al., 2023), RMSPE in one study (Dai & Huang, 2021), and WRMSSE in one study (T. Zhou, 2023).

The use of multiple metrics reflects the different evaluation requirements of e-commerce forecasting studies. MAE and RMSE provide measures based on forecasting errors, while percentage-based metrics such as MAPE and SMAPE express errors relative to actual values. Weighted metrics can also be used when different observations or product groups have different importance.

Because the reviewed studies did not consistently use the same set of metrics, direct comparison of reported performance across studies is limited. Therefore, evaluation results should be interpreted within the context of each study's dataset, forecasting task, and evaluation procedure.

2.4 Future Research Directions

These differences in datasets, forecasting tasks, and evaluation procedures also motivate several directions for future research. The reviewed studies identify five main directions for future research in e-commerce forecasting: broader data coverage, richer contextual information, improved model architectures, wider forecasting scope and efficiency, and more consistent evaluation procedures. First, regarding broader data coverage, future studies can use more diverse datasets from different e-commerce platforms, product categories, regions, and market conditions to examine whether forecasting approaches remain applicable across different environments.

Second, regarding richer contextual information, forecasting models can incorporate additional information beyond historical sales or demand, such as events, product characteristics, promotions, and other contextual factors; the use of event-related

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary Perspective on Economics, Business, Education, Law, Agriculture, Food Technology, Politics and Society” July 30th, 2026

information is also reflected in recent work involving LLM-based event knowledge (Hu et al., 2026).

Third, regarding improved model architectures, future research can investigate hybrid models, deep learning architectures, foundation models, and other approaches that combine different modeling techniques, as reflected in recent studies on foundation models and LLM-based forecasting (Hu et al., 2026; Sui et al., 2026).

Fourth, regarding wider forecasting scope and efficiency, forecasting can be extended beyond individual demand or sales series to include multi-product forecasting, supply chain-related forecasting, and approaches that can efficiently process larger datasets, as illustrated by research connecting demand forecasting with supply chain optimization (Nadia et al., 2026).

Finally, regarding more consistent evaluation procedures, future studies can apply multiple complementary metrics and consistent evaluation procedures to facilitate comparisons between forecasting approaches.

CONCLUSION

This systematic literature review examined recent research on time series forecasting in e-commerce based on four aspects: forecasting methods, dataset characteristics, evaluation metrics, and future research directions. A total of 15 studies published between 2021 and 2026 were analyzed using a descriptive synthesis.

The findings show that the reviewed e-commerce forecasting studies applied several types of approaches, which can be grouped into hybrid models, deep learning models, and comparison-based methods. Hybrid approaches were the most frequently identified among the 15 reviewed studies (9 studies, 60%), followed by deep learning models (4 studies, 27%) and comparison-based methods (2 studies, 13%). However, this finding should be interpreted within the scope of the selected studies and should not be considered evidence of a field-wide shift toward hybrid approaches. Differences in datasets, forecasting settings, and evaluation procedures also limit the generalization of these findings to all e-commerce forecasting situations.

The reviewed datasets came from different sources and showed considerable variation across studies, indicating substantial variation in the data used for e-commerce forecasting research. Daily data were used in 12 of the 15 studies (80%), while other data frequencies were less represented. The studies also used various evaluation metrics, with MAE and RMSE among the most frequently reported. Because datasets, forecasting tasks, and evaluation metrics were not consistently aligned across studies, direct comparison of forecasting performance remains limited.

Five main future research directions were identified: broader and more diverse data coverage, incorporation of additional contextual information, development of improved model architectures, expansion of forecasting scope and computational

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026

efficiency, and more consistent evaluation procedures. These findings suggest a need for more consistent evaluation procedures and standardized benchmarking settings, including clearer dataset descriptions, common evaluation protocols, and comparable forecasting metrics, to improve the comparability of future studies.

Overall, this review provides a structured overview of the forecasting methods, data characteristics, evaluation metrics, and research directions identified in the 15 included studies. The findings should therefore be interpreted within the scope and limitations of the reviewed literature. Future research can build on these findings by addressing variation in dataset sources, improving contextual data integration, and establishing more standardized benchmarking practices for e-commerce forecasting.

REFERENCES

- Ahmadov, Y., & Helo, P. (2023). Deep learning-based approach for forecasting intermittent online sales. *Discover Artificial Intelligence*, 3(1). <https://doi.org/10.1007/s44163-023-00085-1>
- Chen, Y., Xie, X., Pei, Z., Yi, W., Wang, C., Zhang, W., & Ji, Z. (2024). Development of a time series e-commerce sales prediction method for short-shelf-life products using GRU-LightGBM. *Applied Sciences (Switzerland)*, 14(2). <https://doi.org/10.3390/app14020866>
- Dai, Y., & Huang, J. (2021). A sales prediction method based on LSTM with Hyper Parameter Search. *Journal of Physics: Conference Series*, 1756(1). <https://doi.org/10.1088/1742-6596/1756/1/012015>
- Douaioui, K., Oucheikh, R., Benmoussa, O., & Mabrouki, C. (2024). Machine learning and deep learning models for demand forecasting in supply chain management: A critical review. *Applied System Innovation*, 7(5), 93. <https://doi.org/10.3390/asi7050093>
- Du, C., & Li, Y. (2025). E-commerce sales forecasting based on deep learning algorithm. *Procedia Computer Science*, 261, 1157–1164. <https://doi.org/10.1016/j.procs.2025.04.699>
- Ecevit, A., Öztürk, İ., Dağ, M., & Özcan, T. (2023). Short-term sales forecasting using LSTM and prophet based models in e-commerce. *Acta Infologica*, 7(1), 59–70. <https://doi.org/10.26650/acin.1259067>
- Gan, Y., Ma, J., & Xu, K. (2023). Enhanced e-commerce sales forecasting using EEMD-integrated LSTM deep learning model. *Journal of Computational Methods in Engineering Applications*, 1–11. <https://doi.org/10.62836/jcmea.v3i1.030109>
- Homburg, C., & Wielgos, D. M. (2022). The value relevance of digital marketing capabilities to firm performance. *Journal of the Academy of Marketing Science*, 50(4), 666–688. <https://doi.org/10.1007/s11747-022-00858-7>

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026

- Hu, C., Shi, Y., Huang, F., Xiang, Y., Ye, Z., Jin, M., & Wang, S. (2026). *EventCast: Hybrid demand forecasting in e-commerce with LLM-Based Event Knowledge*. <http://arxiv.org/abs/2602.07695>
- Huizi, S., Guo, S., & Wu, H. (2025). E-commerce demand forecasting with ARIMA And SES methods. In *Highlights in Science, Engineering and Technology MMML* (Vol. 2025).
- Lasek, A., Cecone, N., & Saunders, J. (2016). Restaurant sales and customer demand forecasting: Literature survey and categorization of methods. *ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2016*, 166(October), 23–43. https://doi.org/10.1007/978-3-319-33681-7_40
- Li, C. (2024). Commodity demand forecasting based on multimodal data and recurrent neural networks for E-commerce platforms. *Intelligent Systems with Applications*, 22, 200364. <https://doi.org/10.1016/j.iswa.2024.200364>
- Nadia, N. Y., Arif, M. H., Rabby, H. R., Tanvir, M. I. M., Hossen, Md. J., & Mridha, M. F. (2026). *Hybrid deep learning approach for coupled demand forecasting and supply chain optimization*. <http://arxiv.org/abs/2604.21567>
- Sui, Y., Xiao, C., Xin, L., Yang, J., Huang, D., & Cao, L. (2026). *A bitter lesson for retail demand forecasting: Evidence from fine-tuning foundation models*.
- Swaminathan, K., & Venkitasubramony, R. (2024). Demand forecasting for fashion products: A systematic review. *International Journal of Forecasting*, 40(1), 247–267. <https://doi.org/10.1016/j.ijforecast.2023.02.005>
- Taylor, S. J., & Letham, B. (2018). Forecasting at scale. *American Statistician*, 72(1), 37–45. <https://doi.org/10.1080/00031305.2017.1380080>
- Trisolvena, M. N., Masruroh, M., & Ginting, Y. M. (2024). Product demand forecast analysis using predictive models and time series forecasting algorithms on the temu marketplace platform. *International Journal Software Engineering and Computer Science (IJSECS)*, 4(2), 430–439. <https://doi.org/10.35870/ijsecs.v4i2.2774>
- Tsoumakas, G. (2019). A survey of machine learning techniques for food sales prediction. *Artificial Intelligence Review*, 52(1), 441–447. <https://doi.org/10.1007/s10462-018-9637-z>
- Zhang, H., Yinji, J., & Yongli, Z. (2022). FS-LSTM: Sales forecasting in e-commerce on feature selection. *Journal of China Universities of Posts and Telecommunications*, 29, 92–98.
- Zhao, Y. (2024). E-commerce demand forecasting using SARIMA model and k-means clustering analysis. *Journal of Innovation and Development*, 7(1), 1–6.
- Zhou, S. (2023, July 28). E-commerce sales forecast based on neural network LSTM. *Proceedings of the 2nd International Conference on Mathematical Statistics and Economic Analysis (MSEA 2023)*. <https://doi.org/10.4108/eai.26-5-2023.2334251>
- Zhou, T. (2023). Improved sales forecasting using trend and seasonality decomposition with LightGBM. *2023 6th International Conference on Artificial Intelligence and*

PROCEEDING

The 8th International Conference on Technology, Education, and Social Science
**“Navigating Global Transformation in an Uncertain World: Interdisciplinary
Perspective on Economics, Business, Education, Law, Agriculture, Food
Technology, Politics and Society” July 30th, 2026**

Big Data, ICAIBD 2023, 656–661.
<https://doi.org/10.1109/ICAIBD57115.2023.10206380>