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Artificial Intelligence Modelling of Package Tour Revenues in Türkiye

Dr. Cagatay Tuncsiper

Ege University, Cesme Faculty of Tourism, Department of Tour Guidance, Izmir, Türkiye.

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ABSTRACT

Package tours in Türkiye offer a convenient way for tourists to explore the country's rich history, diverse landscapes, and cultural sites without the hassle of planning each detail. They often provide cost savings by bundling accommodations, transportation, and guided tours, making popular attractions like Istanbul, Cappadocia, and Ephesus more accessible. Additionally, package tours help boost local economies by promoting regional tourism, supporting local businesses, and creating jobs. Package tours significantly contribute to Türkiye's economy by driving revenue through tourism-related services such as hotels, transportation, and local attractions. They also generate employment opportunities across various sectors, from hospitality to guiding services, supporting both urban and rural communities. The revenues of package tours in Türkiye are modelled in this work. The quarterly package tour revenues between 2012Q1 to 2024Q3 are taken from official sources and plotted to observe the seasonality of these revenues. Then, a deep learning model for modelling these revenues are developed in Python programming language. The developed deep learning model has three hidden layers each of which include fifteen neurons. The lagged values of the package tour revenue data are fed as inputs to the developed deep learning model efficiently making the model to be an autoregressive model. The 70% of the available data are chosen as the training data whereas the remaining 30% of the data are used as the test data. The actual package tour revenue data and the model results are plotted on the same axis pair implying the accuracy of the developed deep learning model. Furthermore, the accuracy metrics such as the coefficient of determination, mean absolute error, mean absolute percentage error and root mean square error are also computed verifying the precision of the developed model.

Keywords: package tours, tourism revenue, artificial intelligence, modelling.

INTRODUCTION

Package tours hold significant value for travellers by offering structured and convenient travel experiences. They combine essential elements, such as transportation, accommodation, and occasionally meals and excursions, into a single package, simplifying the planning process. Through bulk purchasing, tour operators are able to negotiate discounted rates, making package tours an economically attractive option. This approach allows travellers to benefit from a seamless experience, as itinerary logistics and details are professionally managed, allowing them to focus entirely on their journey. Additionally, package tours facilitate cultural engagement through carefully curated activities that might otherwise be difficult for individuals to arrange independently. Such tours also enhance safety, particularly in unfamiliar settings, as professional guides provide local expertise and support. Furthermore, group tours promote social interaction, offering travellers opportunities to connect with

others who share similar interests. They often grant access to unique experiences or exclusive locations that would be challenging to arrange without professional assistance. Catering to diverse interests- such as adventure, heritage, or culinary tourism - package tours can be tailored to a wide range of preferences. Ultimately, these tours allow travellers to experience a comprehensive and enriching vacation with reduced stress and optimized value.

Beyond convenience and cost-effectiveness, package tours contribute positively to both the travel industry and local economies. Tour operators work closely with local vendors, guides, and service providers, which generates revenue and creates job opportunities within communities. This collaboration often supports small businesses, promoting sustainable tourism practices that prioritize responsible engagement with local cultures and environments. Moreover, package tours can help distribute tourism traffic more evenly, guiding visitors to lesser-known destinations and reducing overcrowding in popular areas. For travellers, the structured nature of package tours offers predictability and assurance, particularly in regions where language barriers or complex infrastructure could hinder independent travel. These tours also provide educational benefits, as experienced guides often share insights into the historical, environmental, and cultural aspects of the destinations, fostering a deeper understanding and appreciation. In addition, package tours are adaptable and can be customized to fit various demographic groups, such as families, seniors, or adventure-seekers, ensuring that each group's unique needs and preferences are met. The increasing popularity of package tours highlights their role in promoting accessible, enjoyable, and meaningful travel experiences while fostering positive impacts on both travellers and local communities.

Tourism holds a crucial position in Türkiye's economy, representing a primary source of foreign revenue. With its rich historical heritage and diverse landscapes, Türkiye draws millions of international visitors annually, generating significant foreign exchange for the country. This steady flow of tourists directly supports employment across multiple sectors, including hospitality, transportation, and retail, providing essential income for local communities nationwide. Key tourist regions, such as Istanbul, Cappadocia, and the coastal areas along the Aegean and Mediterranean, gain considerable economic benefit from tourism activities. By promoting its cultural and historical assets, Türkiye sustains the preservation of its historical landmarks and traditional art forms, fostering national heritage appreciation. The tourism sector further contributes to infrastructure development, prompting investments in airports, transportation networks, and public facilities that serve both residents and visitors alike. Additionally, tourism enhances Türkiye's international reputation and facilitates cultural exchange, strengthening relationships and understanding between Türkiye and other countries. Embracing sustainable tourism practices enables Türkiye to safeguard its natural and cultural resources, supporting a balance between economic growth and conservation. Moreover, tourism encourages regional development by drawing attention to less-visited areas, which helps mitigate economic disparities. Thus, tourism is vital for Türkiye's economic resilience, cultural preservation, and international engagement.

Package tours are of considerable importance to Türkiye's tourism industry, providing a structured and accessible means for international visitors to engage with the country's cultural heritage and natural landscapes. By integrating accommodation, transportation, and guided experiences, these packages streamline travel planning, making Türkiye a more attractive destination to a broader range of tourists. Popular sites, such as Istanbul's Hagia Sophia, the distinctive landscapes of Cappadocia, and the historical ruins along the Mediterranean coast, are frequently featured in package tours, channelling tourism revenue into local

economies. Additionally, package tours support sustainable tourism by managing visitor flows, alleviating pressure on popular destinations, and promoting travel to less-visited regions. This consistent influx of tourists benefits local businesses—ranging from hotels and restaurants to craft and souvenir shops—thereby stimulating economic activity. Employment opportunities are also enhanced for local guides, drivers, and hospitality workers, contributing to regional economic growth. Package tours provide safety and comfort for international tourists unfamiliar with the Turkish language or customs, facilitating a more accessible and enjoyable travel experience. Their structured itineraries allow tourists to interact meaningfully with Türkiye's culture, history, and cuisine, deepening cultural appreciation. Such tours also bolster Türkiye's international image by highlighting its diverse cultural and historical assets. In sum, package tours contribute significantly to Türkiye's tourism revenue, cultural promotion, and local economic support, fostering both economic and social benefits.

This study aims to model the package tour revenues using deep learning networks considering the importance of contribution of package tours to the economy of the tourism sector in Türkiye. Quarterly package tour revenue data from 2012Q1 to 2024Q3 were sourced from official records and plotted to examine seasonal patterns in these revenues. A deep learning model was then created in Python to analyse and forecast this data. The model architecture consists of three hidden layers, each containing fifteen neurons. Lagged values of package tour revenue data were used as inputs, effectively making the model autoregressive. For training and testing, 70% of the dataset was designated as training data, while the remaining 30% was used for testing. The actual revenue data and model predictions were plotted together on the same axis to visually assess the model's accuracy. Additionally, performance metrics such as the coefficient of determination, mean absolute error, mean absolute percentage error, and root mean square error were calculated, further confirming the model's precision.

LITERATURE REVIEW

There is large amount of research on the contribution of package yours to the tourism sector and the economic revenue. Valissariou et al. have studied the effects of group packages to the hotel revenues in Skiathos and they have shown that package tours increase hotel revenues.[1] Ji et al. have investigated the Chinese package tours to the UK and have concluded that product homogeneities depend on multiple factors.[2] Gunduz have indicated the revenue contribution of package tours and proposed a halal package tour concept for Türkiye.[3] You et al. have also studied the tourism economics of package tours and have presented a group package tour bus scheduling system for increasing the revenue.[4] Avci has investigated the tourist guide performance on the package tour perceptions and have discussed the positive and negative points of the guide performance on the package tours in Istanbul.[5]

The positions and roles of travel agencies included in package tour networks are studied by Chang where they have found out that active and complementary relationship of travel agencies should be planned effectively.[6] Liao et al. have investigated the attributes of tourism package tours used by Taiwanese tourists and have concluded that attraction, accommodation, length of stay and price are the major factors for package tour revenues.[7] Zhu et al. have proposed a travel package recommendation tool using neural-network based methods which uses short-term and long-term tourist behaviours for package tours.[8] Krisnatalia et al. have proposed a green-centric approach for tourism package development in Kertayasa, Indonesia in which environmental award-based marketing strategies are discussed for potential revenue increments.[9] Lv et al. have studied package tour supply strategies and the package tour quality using evolutionary game and stochastic processes and have

recommended package tour quality control for increasing revenues.[10]

Cheng et al. have studied the group package tours from the hassles viewpoint and applied attribution theory to the concept of member hassles and have analysed these hassles using qualitative and quantitative methods due to the group package revenues.[11] Scale and development of group tour packages are investigated in another work using data of 350 tour members and have indicated hints to improve playfulness climate.[12] Nangong has studied the package tours of China, South Korea and Japan and have concluded that package tours are planned by wholesalers considering the combination of markets for revenue management.[13] In another work, Wahyutame and Hwang have compared the machine learning methods used for the planning of optimal package tour durations and have shown that K-nearest neighbour (KNN) networks perform better compared to other included methods.[14] The same researchers analysed the details of KNN method for the package tour swelling time prediction in another work implemented in Python with data pulled from the servers using RESTful application programming interface and have concluded that KNN can achieve high prediction accuracy.[15]

Gul Yilmaz has studied the analyses on the planning and revenue management of package tours at an international scale and have shown that most of these studies employ quantitative methods.[16] Yagcioglu has investigated the changes of the package tour prices before the departure of the tour from law review viewpoint and has stated that only the tour organizer is authorized to make price changes that disadvantage the consumer, a flaw that deserves attention.[17] Atsiz et al. have explored how various dimensions of package tour experiences—namely educational, entertainment, escapism, and aesthetic experiences—impact tour satisfaction and behavioural intentions, with a comparison between first-time and repeat package tourists.[18] Fadilla and Aprianingsih have explored the business-to-business buying process for group package tours in institutional organizations by conducting in-depth interviews with respondents from educational and governmental institutions.[19] Hwang and Lee have examined the formation of brand prestige in the senior tourism industry's package tours by proposing and testing a conceptual model using data from 331 senior tourists in Korea, revealing that four aspects of tour service performance—tourist attractions, tour guide services, food services, and accommodations—significantly enhance package tour prestige.[20]

In another work, based on a questionnaire investigating practitioners' perspectives on competitive behaviour in the UK tourism industry, reveals evidence of oligopoly behaviour among both large corporate groups and small enterprises, emphasizing the importance of understanding the behavioural dynamics shaping such market structures for package tours.[21] In another analysis, questionable behaviours by tour group leaders, tour guides, travel agency reception staff, and other tourists in group package tours are identified, explored how tourists perceive these actions, with data collected from participants of Taiwanese group package tour revealing that behaviours such as damaging property, violating information-sharing principles, engaging in inappropriate voluntary actions, and straying from the pre-set itinerary were mostly seen as inappropriate.[22] Chiang and Chen have examined the impression management behaviours of tour leaders through five techniques—ingratiation, self-promotion, exemplification, supplication, and intimidation—revealing that tourists' perceptions of these impressions can influence the quality of personal interactions.[23] Lee et al. have used structural equation modelling (SEM) to explore the positive impact of novelty, flexibility, and synergy in package tours on tourist satisfaction in the Taiwanese package tour industry, revealing that enhancing these factors can improve overall satisfaction.[24]

Lin and Kuo have introduced a two-

dimensional evaluation model for package tours, considering diverse resources and transportation options, to assess tourists needs and suggests that mass-customized tours, based on the Value Satisfaction Index (VSI) and Price Satisfaction Index (PSI), can improve traditional tour planning methods by incorporating a portfolio of diverse tourism resources.[25]

In another study, Cheng et al. have explored the impact of tour leader attachment on customer citizenship behaviours (CCBs) and examines how customer commitment mediates this relationship, with survey data from 459 tourists showing a positive association between tour leader attachment and CCBs, and customer commitment acting as a mediator.[26] Jin et al. have studied how option framing influences travellers decision-making in package tour customization, finding that more consumers prefer upgrading to downgrading when both options are available and that downgrading leads to higher total prices, that option framing impacts peripheral services more than core services.[27] In another work, Alao and Batabyal have presented a first contract-theoretic analysis of how to sell package tours to diverse tourists in an environment with asymmetric information, highlighting that such information asymmetry tends to hinder package tour sales.[28] Guo and He have investigated the cooperation issue between a tour operator and a tourism hotel regarding luxury and economy tour packages, analysing how basic utilities and prices influence demand, and using a sequential Stackelberg game model to reveal that the tourism hotel earns more revenue than the tour operator due to its stronger bargaining power.[29] Filimonau et al. have studied a new approach for comprehensively assessing GHG emissions, enhancing existing evaluation techniques, and applied it to tourism by conducting a thorough analysis of a standard holiday package to Portugal, focusing on the British tourism market.[30] In another work, group package tour itineraries are examined using a comparative risk methodology with the fuzzy Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE), integrating fuzzy set theory to represent uncertain information in intrinsic risks, and identifies key intrinsic risk factors through in-depth interviews with 40 GPT leaders to increase revenue.[31] Huang et al. have investigated tour guide performance and its impact on tourist satisfaction in Shanghai's package tours, proposing a multilayer framework that conceptualizes satisfaction as comprising three aspects: satisfaction with guiding services, satisfaction with tour services, and satisfaction with the overall tour experience for package tour improvements.[32]

As it can be seen from the literature analysis, there are various studies on package tours from different viewpoints such as the package tour satisfaction, package tour management, planning and development where the ultimate aim is to increase the number of package tour members and revenues. Therefore, it is important to model the package tour revenue for both independent tour companies and the related countries. Therefore, modelling the package tour revenues in Türkiye is chosen as a crucial component of the tourism economics in Türkiye as it is explained in detail in the following section.

MATERIALS & METHODS

First of all, package tour revenues in Türkiye are gathered from Turkstat which is the official statistical data source where the quarterly package tour data are given in the range of 2012-2024.[33] The gathered package tour revenue data is plotted as shown in Figure 1.

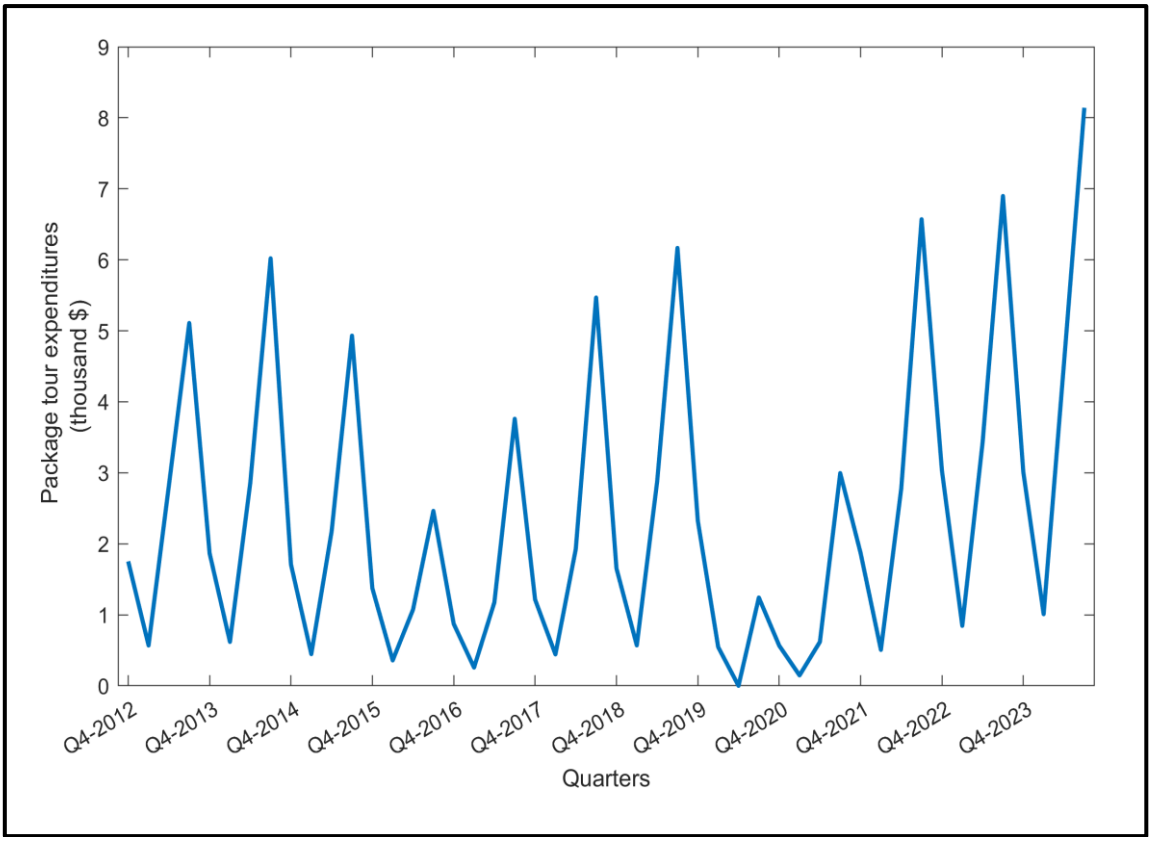

Figure 1. Quarterly package tour revenue in Türkiye for 2012Q1-2024Q3

In order to model the package tour revenue data in Türkiye, a deep learning model with three hidden layers each consisting of fifteen neurons is developed using Python programming language, leveraging the `MLPRegressor` class from the SciKit-Learn (SKLearn) library [34]. The study aims to model the package tour revenues through autoregressive deep learning networks requiring past values of the data as inputs. Therefore, the package tour data is split as illustrated in Figure 2.

The data splitter machine is implemented as a single-input, dual-output function in Python programming language. There is obviously a trade-off between the number of input lags and the amount of training data available for the deep learning network. The number of lags, and consequently the number of inputs to the network, can be chosen for different range of problems. In this study, the lags are set to three, considering the limited data length of 51 samples of the quarterly data of package tour revenues in the range of 2012Q1-2024Q3. Following the data splitting machine, the lagged data are fed as inputs into the deep learning network which is developed in Python as depicted in Figure 3.

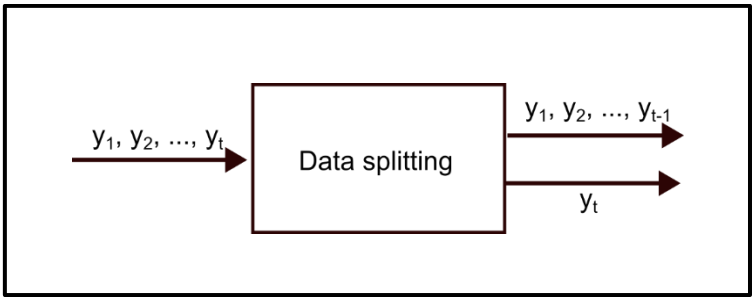

Figure 2. Splitting the available data as the input and the output of the model

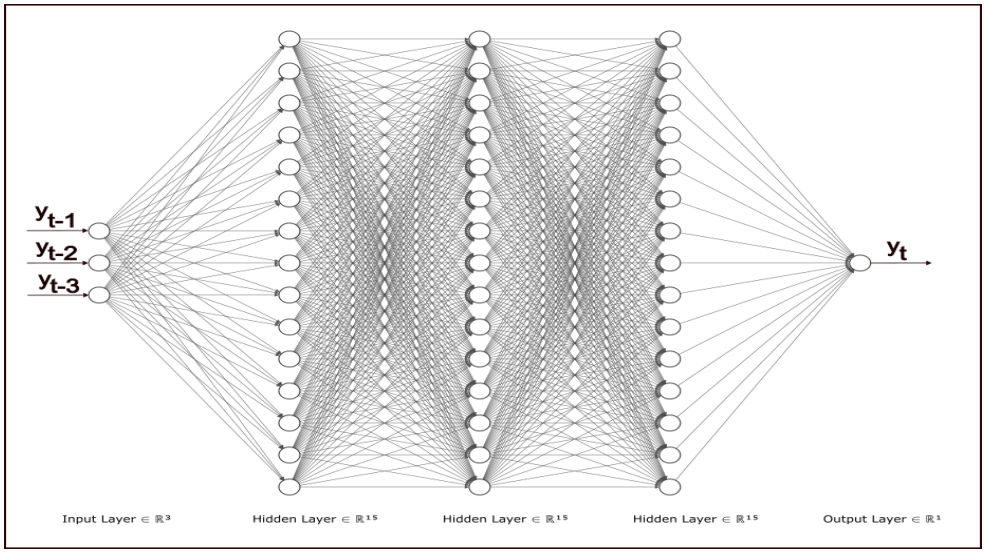

Figure 3. The developed deep learning model for the package tour revenue data modelling

As shown in Figure 3, the developed deep learning network consists of three hidden layers, each with fifteen neurons. The number of hidden layers and neurons can be optimized for specific applications. This network takes three inputs, representing the three previous values of the package tour revenue, making it an autoregressive deep learning network. It is important to note that the data separation algorithm in Figure 2 should be used alongside the network since it provides the required previous values of the package tour revenue data as illustrated in Figure 3.

The developed network employs the hyperbolic tangent function as the activation function for its neurons, while the solver used is limited memory Broyden-Fletcher-Goldfarb-Shanno (L-BFGS). [34, 35] Among the available data, 70% is used for training, and 30% is allocated for testing. The `train_test_split` function from the SKLearn library is used for this random data splitting. The results of the developed deep learning model and its performance metrics are discussed in the Results and Discussion section.

RESULTS AND DISCUSSION

The developed multilayer deep learning network is trained by the 70% of the data and the loss curve of the training phase is given in Figure 4. It can be seen from Figure 4 that the developed deep learning model converges rapidly in 2550 epochs which implies that the developed deep learning network is an appropriate model for modelling the package tour data.

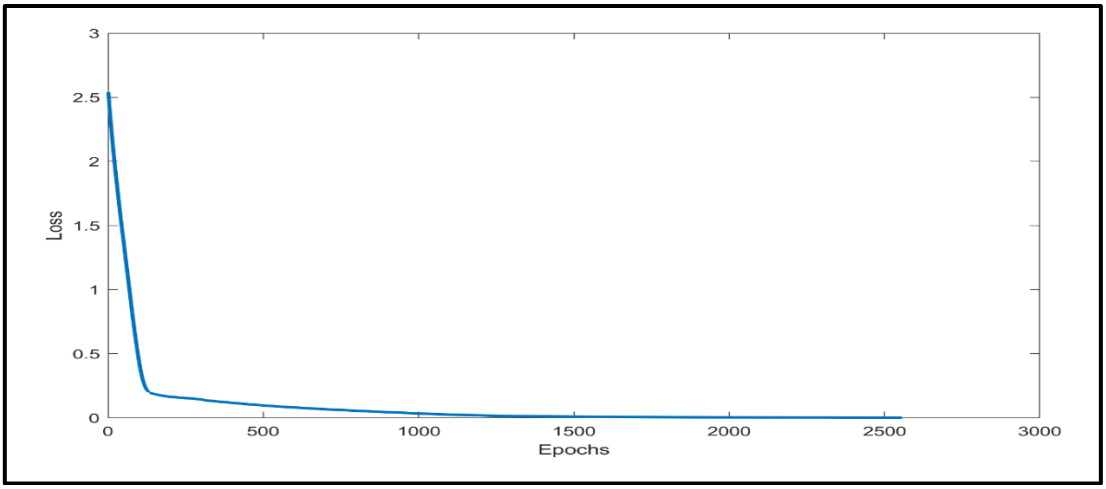

Figure 4. Training performance of the developed deep learning model

The actual package tour revenue and the deep learning modelling results are plotted on the same axis in Figure 5. The developed deep learning model accurately models the package revenue data as it can be observed from Figure 5. In order to quantitatively assess the performance of the model, the coefficient of determination (R^2), root mean square error (RMSE), mean absolute error (MAE) and mean absolute percentage error (MAPE) are computed in Python environment using the libraries of SK-Learn class using the equations given in Eqs. (1)-(4).[36]

$$R^2 = \frac{\sum_1^d (O-avg(O))^2 - \sum_1^d (O-M)^2}{\sum_1^d (O-avg(O))^2} \quad (1)$$

$$RMSE = \sqrt{\frac{\sum_1^d (O-M)^2}{d}} \quad (2)$$

$$MAE = \frac{\sum_1^d |O-M|}{d} \quad (3)$$

$$MAPE = \frac{100}{d} \sum_1^d \left| \frac{O-M}{M} \right| \quad (4)$$

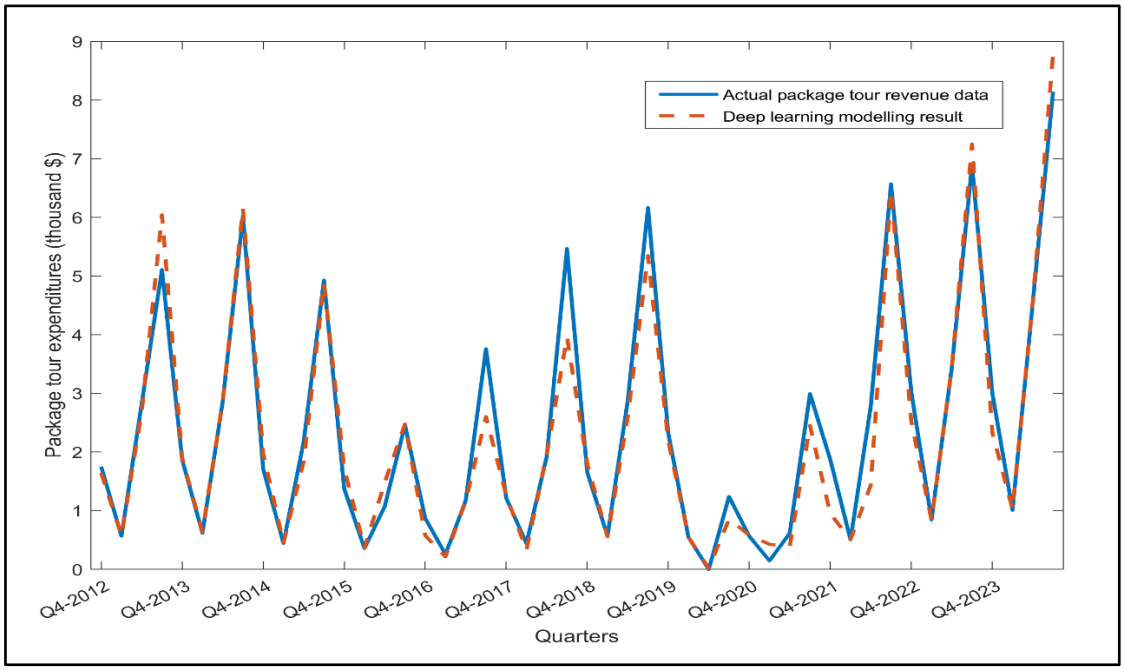

Figure 5. Actual package revenue data and the deep learning modelling result

Table 1. The performance metrics of the developed deep learning model

Model	R^2	MAE	MAPE	RMSE
Autoregressive deep learning model	0.913	0.347	0.742	0.596

Equations (1) to (4) define *O* as the actual data, *M* as the model output, and *d* as the data length. Table 1 presents the computed R^2, MAE, MAPE, and RMSE values for the developed package tour revenue model. The R^2 value in Table 1 is above 0.90 indicating the high accuracy of the developed autoregressive deep learning model.

CONCLUSION

This study highlights the critical role of package tours in Türkiye's tourism sector, emphasizing their economic contributions through increased accessibility to cultural and historical sites, support for local businesses, and job creation in both urban and rural areas. By modelling quarterly package tour revenues from 2012Q1 to 2024Q3, this research provides insights into revenue patterns and seasonality in the industry. The developed deep learning model, designed as an autoregressive framework with three hidden layers of fifteen neurons each, effectively predicts package

tour revenues based on lagged data inputs. With 30% of the data used for testing and 70% for training, the model demonstrates high accuracy, as confirmed by its performance metrics, including the coefficient of determination, mean absolute error, mean absolute percentage error, and root mean square error. The alignment of the model's results with actual revenue data further validates its reliability, offering a robust tool for forecasting and decision-making in Türkiye's dynamic tourism industry.

Declaration by Author

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REFERENCES

1. Valissariou E, Dimitrios B, Lazaros R. Advantages disadvantages of all-inclusive holidays for tourist and Hotels: Case study in all-inclusive Hotel-resorts in the island of Skiathos, Greece. Ottoman Journal of Tourism and Management Research 2020; 3: 717–731.
2. Ji M, Zeng CYH, King B, et al. Why Have Package Tour Itineraries Been Homogeneous? Insights From Industry Subgroup Relations. Journal of Travel Research 2022; 62: 1819–1831.
3. Gündüz C. Halal Concept Package Tour Recommendation for Travel Agencies and Tour Operators: Example of Turkey. Journal of Tourism and Gastronomy Studies. Epub ahead of print March 28, 2022. DOI: 10.21325/jotags.2022.980.
4. You P-S, Chen M-H, Su C-H (Joan). Travel agent's tour selection and sightseeing bus schedule for group package tour planning. Tourism Economics 2019; 27: 220–242.
5. Avci E. The Evaluation of the Perceptions of Tourists Participated in A Package Tour within the Scope of Tourist Guide Performance. Journal of Tourism and Gastronomy Studies 2020; 8: 17–28.
6. Chang Y. Identifying positions and roles of travel agencies based on relationship redundancy in a package tour network. Heliyon 2020; 6: e03227.
7. Liao C-S, Chuang H-K. Tourist preferences for package tour attributes in tourism destination design and development. Journal of Vacation Marketing 2019; 26: 230–246.
8. Zhu G, Wang Y, Cao J, et al. Neural Attentive Travel package Recommendation via exploiting long-term and short-term behaviors. Knowledge-Based Systems 2021; 211: 106511.
9. Krisnatalia H, Prasetyo N, Ainan M. Creating A Green Tourism Experience Through Development of Tourism Package As A Tourism Destination Marketing Strategy: the Case of Kertayasa Tourism Village. International Conference On Research And Development (ICORAD) 2022; 1: 217–223.
10. Lv W-Q, Wang Y-J, Su C-H (Joan), et al. A comprehensive analysis of package tour quality: A stochastic evolutionary game. Tourism Management 2022; 91: 104478.
11. Cheng T-M, Lien W-H, Chang Y-L. Causes of group package tour member hassles (GPT-MHs): Scale development and validation. Tourism Management Perspectives 2024; 53: 101272.
12. Cheng T-M, Lien W-H. Group Package Tour Playfulness Climate: Scale Development and Validation. Journal of Travel Research. Epub ahead of print July 29, 2024. DOI: 10.1177/00472875241266611.
13. Nangong Z, Yokoyama S. Package Tour Distribution Channels of Major Japanese, Chinese, and South Korean Travel Agents. Journal of Quality Assurance in Hospitality & Tourism 2023; 1–23.
14. Wahyutama AB, Hwang M. Comparison of machine learning algorithms to predict optimal dwelling time for package tour. Electronics Letters 2022; 58: 902–904.
15. Wahyutama AB, Hwang M. Optimal dwelling time prediction for package tour using K-nearest neighbor classification algorithm. ETRI Journal 2023; 46: 473–484.
16. Gul Yilmaz E. Paket Tur Konusunda Yapılan Araştırmaların Bibliyometrik Analizi: Web of Science Örneği (Bibliometric Analysis of Research on Package Tour: A Web of Science Example). Journal of Tourism and Gastronomy Studies. Epub ahead of print September 30, 2023. DOI: 10.21325/jotags.2023.1298.
17. Yağcıoğlu B. Paket Tur Başlamadan Önce Tur Fiyatinin Değiştirilmesi. Dokuz Eylül

Üniversitesi Hukuk Fakültesi Dergisi 2024; 26: 413–466.
18. Atsiz O, Akova O, Gurel C. Examining package tourists' experience on overall package tour satisfaction and behavioral intentions: First-time versus repeat package tourists. Anais Brasileiros de Estudos Turísticos 2022; 05: 1-18.
19. Fadilla F., Aprianingsih A. Institution Buying Process in Purchasing Group Package Tour. Asian Journal of Research in Business and Management. Epub ahead of print March 1, 2023. DOI: 10.55057/ajrbm.2023.5.1.8.
20. Hwang J, Lee J (Jay). Antecedents and consequences of brand prestige of package tour in the senior tourism industry. Asia Pacific Journal of Tourism Research 2019; 24: 679–695.
21. Davies B, Downward P. Exploring price and non-price decision making in the UK package tour industry: Insights from small-scale travel agents and tour operators. Tourism Management 2007; 28: 1236–1261.
22. Tai C-L. Tourists' Perceptions of Group Package Tour Relative Parties' Questionable Tour-Related Behaviors. Contemporary Management Research 2012;8: 45-48.
23. Chiang C-Y, Chen W-C. The Impression Management Techniques of Tour Leaders in Group Package Tour Service Encounters. Journal of Travel & Tourism Marketing 2014; 31: 747–762.
24. Lee Y-I, Chang C-H, Chen Y-S. The influence of novelty, flexibility, and synergy of package tours on tourist satisfaction: an analysis of structural equation modeling (SEM). Quality & Quantity 2011; 47: 1869–1882.
25. Lin C-L, Kuo C-L. A service position model of package tour services based on the hybrid MCDM approach. Current Issues in Tourism 2018; 22: 2478–2510.
26. Cheng J-C, Wu C-S, Yen C-H, et al. Tour Leader Attachment and Customer Citizenship Behaviors in Group Package Tour: The Role of Customer Commitment. Asia Pacific Journal of Tourism Research 2015; 21: 642–657.
27. Jin L, He Y, Song H. Service customization: To upgrade or to downgrade? An investigation of how option framing affects tourists' choice of package-tour services. Tourism Management 2012; 33: 266–275.
28. Alao O, Batabyal AA. Selling Package Tours to Tourists: A Contract Theory Perspective. SSRN Electronic Journal. 2013;13-1-18.
29. Guo X, He L. Tourism Supply-Chain Coordination: The Cooperation between Tourism Hotel and Tour Operator. Tourism Economics 2012; 18: 1361–1376.
30. Filimonau V, Dickinson J, Robbins D, et al. The role of 'indirect' greenhouse gas emissions in tourism: Assessing the hidden carbon impacts from a holiday package tour. Transportation Research Part A: Policy and Practice 2013; 54: 78–91.
31. Hsu T-H, Lin L-Z. Using Fuzzy Preference Method for Group Package Tour Based on the Risk Perception. Group Decision and Negotiation 2012; 23: 299–323.
32. Huang S, Hsu CHC, Chan A. Tour Guide Performance and Tourist Satisfaction: A Study of the Package Tours in Shanghai. Journal of Hospitality & Tourism Research 2009; 34: 3–33.
33. Turkstat package tour revenue data, source: https://data.tuik.gov.tr/Bulten/Index?p=Turizm-Istatistikleri-I.-Ceyrek:-Ocak-Mart,-2024-53657, accessed on 09.11.2024.
34. Liu DC, Nocedal J. On the limited memory BFGS method for large scale optimization. Mathematical Programming 1989; 45: 503–528.
35. Tong DL, Mintram R. Genetic Algorithm-Neural Network (GANN): a study of neural network activation functions and depth of genetic algorithm search applied to feature selection. International Journal of Machine Learning and Cybernetics 2010; 1: 75–87.
36. Mombeini H, Yazdani-Chamzini A. Modeling Gold Price via Artificial Neural Network. Journal of Economics, Business and Management 2015; 3: 699–703.

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