ISSN: 2667-6125

JOMAES

JOURNAL OF MANAGEMENT AND ECONOMIC STUDIES

Volume 8
Issue 1
Year 2026

www.jomaes.org

JOMAES JOURNAL OF MANAGEMENT AND ECONOMIC STUDIES

2026, Vol.8, Issue.1

JOMAES JOURNAL OF MANAGEMENT AND ECONOMIC STUDIES

2026, Vol.8, Issue.1

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JOMAES JOURNAL OF MANAGEMENT AND ECONOMIC STUDIES

Contents

2026, Vol.8, Issue.1

Journal of Management and Economic Studies
2026, Vol.8, No.1, 1-19
http://doi.org/10.26677/TR1010.2026.1633

Ecological Footprint Efficiency of G7 Countries: An Integrated Slack-Based Measure Data Envelopment Analysis and ROC Analysis

Aydın ÖZDEMİR
Adiyaman University, Faculty of Economics and Administrative Sciences, Department of Business Administration, Türkiye. aozdemir@adiyaman.edu.tr
https://orcid.org/0000-0002-2413-9440

Abstract

The objectives of this study are to assess the efficiency of the ecological footprint of seven G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States), and to test the diagnostic performance of input and output variables in determining the efficiency status of the seven G7 countries. For these purposes, the study has a two-stage analysis design. In the first stage, the Input Orientation Slack-Based Data Envelopment Analysis (DEA) model was employed using three input variables (Investment by Asset, Labour Force Participation Rate and Total Energy Consumption) and two output variables (Ecological Footprint (undesirable) and Gross Domestic Product). In the second stage, ROC Analysis was conducted to assess the diagnostic performance of the input and output variables in determining the Efficiency Status of G7 countries. The dataset belongs to 2025 or the nearest year, and it is gathered from Enerdata.net, Global Footprint Network, and OECD. While the first stage of analysis design was conducted using the deaR package in the R project, the second stage was carried out using Inonu University Faculty of Medicine, Department of Biostatistics and Medical Informatics, Diagnostic Tests and ROC Analysis Software. According to the first stage of analysis design, it was determined that 4 out of 7 G7 countries are efficient (Germany, Italy, the United Kingdom and the United States), while the remaining three countries (Canada, France and Japan) were found to be inefficient. Besides, all four efficient G7 countries rank first, while Japan ranks last among the seven G7 countries. According to the second stage of analysis design, it was determined that i1: Investment by Asset input variable could distinguish the Efficiency Status with the cutoff points (21.723). Given that the ecological footprint efficiency of G7 nations has not been extensively investigated in current literature, this research is notable for utilising the Slack-Based Measure Data Envelopment Analysis and ROC Analysis to address this knowledge gap.

Keywords: Data Envelopment Analysis, ROC Analysis, Ecological Footprint, G7 Countries

1. INTRODUCTION

United Nations Sustainable Development Goal-7 (SDG 7) aims to ensure access to affordable, reliable, sustainable and modern energy for all (United Nations Department of Economic and Social Affairs Sustainable Development, 2021). In achieving SDG 7, it is imperative to acknowledge that upgrading renewable energy performance is fraught with uncertainty (J. Li et al., 2024). Environmental efficiency plays a crucial role in achieving SDG 7 (Mamghaderi et al., 2023).

Environmental sustainability refers to the combination of several perspectives, procedures, and paths to accomplish that goal, such as growing crops, self-sustaining agriculture and food, well-structured governance, technological developments, use of recyclable materials as well as

renewable fuels, construction of additional communities inside a previously rural region without demolishing the ecosystems or causing environmental harm and so forth (Saif-Alyousfi & Alshammari, 2025).

Since understanding the impact of environmental sustainability practices is a complex task due to the multifaceted nature of sustainability itself, impact assessments must consider ecological, economic, and social dimensions, as well as long-term and short-term effects (Tennakoon et al., 2024).

Ecological footprint is the representation of environmental sustainability, and it is a comprehensive concept that assesses forests, water, clean air, grazing, and farming areas (Zhao et al., 2024). Many human activities place demands on the planet's capacity, including the provision and processing of food, the construction and maintenance of housing, transportation, and the consumption of goods and services (Wackernagel & Kitzes, 2008). Ecological footprint measures the amount of area, that is, land or sea, which is required to absorb the waste generated through human activities or to support the production of resources consumed by populations, and includes six dimensions: cropland, forestland, carbon, fishing grounds, grazing land, and built-up area (Akpanke et al., 2024).

Data Envelopment Analysis (DEA) method is behind linear mathematical programming, which is a decision-making tool used to measure the relative production efficiency between decision-making units (DMUs), estimate production boundaries, and evaluate the efficiency of DMUs, and can also be used to evaluate the efficiency analysis of multiple inputs and outputs in a decision unit (Hsu et al., 2023).

One way to assess the accuracy of a decision-making process is to compare the organisation's decision to the option that would optimise its benefits (Wang, 2014). In addition to being frequently used in medical decision-making, Receiver Operating Characteristic (ROC) graphs—a curve that plots a diagnostic test's sensitivity against its false positive rate across all possible threshold values for defining positivity—have also become more and more popular in business optimisation analysis, health policy making, clinical studies, and health economics in recent years (Fawcett, 2006; Kampfrath & Levinson, 2013; Wang, 2014). It is a tool for evaluating an instrument's performance (e.g. G. As part of a measurement system used for classification in an entity test, "true positive rates" (TPR, sensitivity) are plotted against decision risks like "false positive rates" (FPR, fall-out) using a testing device or machine-learning algorithm (Pendrill et al., 2023).

Therefore, the G7 economies include economically developed countries on a global scale; the high economic complexity and ecological behaviour of these countries have led to increased concern in other countries within the context (Balsalobre-Lorente et al., 2024). The ecological footprint is one way of measuring sustainability on a country level (Khaddour et al., 2024).

In this context, the study has two objectives: (i) to assess the efficiency of the ecological footprint of seven G7 countries *(Canada, France, Germany, Italy, Japan, the United Kingdom and the United States)*, (ii) to test the diagnostic performance of input and output variables in determining the efficiency status of the seven G7 countries. For these purposes, the study has a two-stage analysis design. In the first stage; Input Orientation Slack-Based DEA model (SBM-DEA) was conducted using three input variables (Investment by Asset, Labour Force Participation Rate and Total Energy Consumption) and two output variables (Ecological Footprint (undesirable) and Gross Domestic Product). In the second stage, ROC Analysis was conducted to assess the diagnostic performance of the input and output variables in determining the Efficiency Status of G7 countries.

2. CONCEPTUAL FRAMEWORK

This one, which also employs the Slack-Based Measure, is particularly valuable because it fills a research gap on the efficiency of the environmental footprints of the G7 nations, even if there are some studies on the relevant fields.

Since determining the relationship between the G7 countries' ecological footprint and natural resources is crucial (Zhao et al., 2024); an important instrument within these countries' environmental management is the measurement of ecological efficiency (Dyckhoff & Allen, 2001) , and Data Envelopment Analysis (DEA) can be regarded as a measuring tool of productivity in several research fields, including environmental, business, healthcare, public administration, etc. (Charles & Kumar, 2012; Emrouznejad & Cabanda, 2014; Gregoriou & Zhu, 2005). Table 1 lists some studies that used Data Envelopment Analysis in the area of ecological efficiency.

Table 1. Literature Summary

Title	Author(s)	Input(s)	Output(s)	DMUs	Analysis Procedure
Assessing the environmental efficiency of OECD countries through the lens of ecological footprint indices	(Mamghaderi et al., 2023)	- Net Capital Stock - Labour Force - Energy Consumption	-Ecological Footprint (Undesirable) -GDP	27 OEC Countries	SBM-DEA
Comprehensive Environmental Assessment Index of Ecological Footprint	(Khezri et al., 2023)	- Energy Consumption - Labour Force - Capital Stock	-GDP -Ecological Footprint (Undesirable)	27 OEC Countries	SBM-DEA
Evaluating Greenhouse Gas Emission Reduction Efficiency of OECD Countries Using Two-Stage Data Envelopment Analysis	(Hsu et al., 2023)	- Population - Labour Force - Gasoline Consumption -Coal Consumption - Electricity Consumption	- CO_2 Emission -GHG Emission	38 OECD Countries	Two-Stage DEA
Evaluation of National Environmental Efficiency Under Uncertainty Using Data Envelopment Analysis	(Grigoroudis & Petridis, 2019)	-Labour force -Population -Gross Capital Formation -Primary Energy Supply Production	-Gross Domestic Product -CO_2 Emissions (Undesirable) - SO_2 Emissions (Undesirable) -NO_2 Emissions (Undesirable)	108 Countries	SBM-DEA
Environmental performance in OECD countries: A non-radial DEA approach	(Gavurova et al., 2018)	- Primary Energy Consumption	-GDP -CO_2 (Undesirable) -SO_X (Undesirable) NO_X (Undesirable)	22 OECD Countries	SBM-DEA

Evaluating and Analyzing Renewable Energy Performance in OECD Countries Under Uncertainty: A Robust DEA Approach with Common Weights	(J. Li et al., 2024)	-Gross Fixed Capital Formation -Labour Force Primary Energy Supply	-GDP -Renewable Energy Consumption -CO_2 Emissions (Undesirable) -Municipal Waste (Undesirable)	38 OECD Countries	Robust DEA and CCR DEA
An Evaluation of Selected Environmental Indicators by Using Data Envelopment Analysis (DEA): OECD Performance Review	(Özkan & Özcan, 2018)	-Urban Population -Energy Usage Per Capita -Forest Land Percentage -Environmental Expenditure Development Ratios within the Total Budget -Total Greenhouse Gas Emissions as a Percentage of GDP -Fossil Fuel R&D Budget Ratio within the Total Public Energy Budget	-Per Capita Greenhouse Gas Emissions -Respirable Particulate Matter Concentration Relieving Percentage of the Average Population -Per Capita CO_2 Emission Rate from Transportation	34 OECD Countries	Input-Oriented CCR-DEA

According to Table 1, SBM-DEA is used to evaluate the efficiency of G7 countries in relation to the ecological footprint, and ROC Analysis is used to test the diagnostic performance of input and output variables in determining the efficiency status of G7 countries. The analysis's three input variables and two output variables are explained in detail in the sections that follow.

3. METHODOLOGY

3.1. Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA) is a nonparametric technique for evaluating and contrasting the efficiency of decision-making units (DMUs), which include businesses, governments, and nations, and share input and output factors (Ray, 2004; Tone, 2017).

There are two types of models in data envelopment analysis (DEA): radial and nonradial (Tone, 2017).

The most basic Radial DEA model is the Constant Returns to Scale (CRS), also known as the CCR (Charnes-Cooper-Rhodes) model, and it was initially introduced by Charnes et al. in 1978 (Charnes et al., 1978). The CCR (CRS) model does this by estimating the number of inefficiencies, identifying their sources, and producing an objective evaluation of overall efficiency (Charnes et al., 1994).

Variable Returns to Scale (VRS), also referred to as the BCC (Banker-Charnes-Cooper) model, was subsequently created by Banker et al in 1984 as a representative extension of Radial DEA(Banker et al., 1984). The BCC (VRS) model estimates pure technical efficiency and identifies potential increasing, decreasing, or constant returns to scale to differentiate between technical and scale inefficiencies (Charnes et al., 1994). Whereas the CCR efficiency scores are regarded as technical efficiency, the BCC efficiency scores are regarded as pure technical efficiency (Ozcan, 2014).

Output-oriented DEA seeks to maximise output production, subject to the specified resource level, whereas input-oriented DEA seeks to produce the observed outputs with the fewest inputs (Ramanathan, 2003).

Efficiency scores of one point are considered efficient in both models; those between zero and one point are considered inefficient in input-oriented models, and those greater than one are considered inefficient in output-oriented models (Ozcan, 2014).

Proposed by (Tone, 2001) SBM-DEA, as a Non-Radial DEA, is able to deal directly with the input excesses and the output shortfalls of the DMU under evaluation, since it satisfies the properties Units Invariant, Monotone, and Reference-Set Dependent, which are not satisfied by CCR and BCC models.

The fractional programming formulas of CCR-Input Orientation (1), CCR-Output Orientation (2), BCC- Input Orientation (3), BCC- Output Orientation (4), SBM-CRS-Input Orientation (5), SBM-CRS-Output Orientation (6), SBM-VRS-Input Orientation (7) and SBM-VRS-Output Orientation (8) are as follows (Emrouznejad & Cabanda, 2014; Ozcan, 2009, 2014; Tone, 2001, 2017);

$$
\begin{aligned}
Eff &= \min_{u_r v_i} \sum_{\mathrm{i}} V_{\mathrm{i}}\, X_{\mathrm{i}J_0} \\
&\text{s.t.} \\
&\sum_r u_r y_{rj} - \sum_i v_i x_{ij} \le 0 \quad ; \forall j \\
&\sum_r u_r y_{rj_0} = 1 \\
&u_r, v_i \ge 0 \quad ; \forall r, \forall i.
\end{aligned}
\tag{1}
$$

$$
\begin{aligned}
Eff &= \max_{u_r v_i} \sum_r u_r y_{rj_0} \\
&\text{s.t.} \\
&\sum_r u_r y_{rj} - \sum_i v_i x_{ij} \le 0 \quad ; \forall j \\
&\sum_i v_i x_{ij_0} = 1 \\
&u_r, v_i \ge 0 \quad ; \forall r, \forall i.
\end{aligned}
\tag{2}
$$

$$
\begin{aligned}
&\min_{\lambda, \emptyset, S_i^-, S_r^+} \emptyset \\
&\text{s.t.} \\
&\sum_j \lambda_j x_{ij} + S_i^- = \emptyset x_{ij_0} \quad \forall i \\
&\sum_j \lambda_j y_{rj} - S_r^+ = y_{rj_0} \quad \forall r \\
&\sum_j \lambda_j = 1 \\
&s_i^-, s_i^+ \ge 0 \quad \forall i, \forall r \\
&\lambda_j \ge 0 \quad \forall j.
\end{aligned}
\tag{3}
$$

$$\max_{\lambda,\theta,s_i^-,s_r^+} \theta$$
s.t.
$$\sum_j \lambda_j x_{ij} + s_i^- = x_{ij_o} \ \forall i$$
$$\sum_j \lambda_j y_{rj} - s_r^+ = \theta y_{rj_o} \ \forall r$$
$$\sum_j \lambda_j = 1$$
$$s_i^-, s_i^+ \geq 0 \quad \forall i, \forall r$$
$$\lambda_j \geq 0 \quad \forall_j.$$

(4)

$$\rho_{\mathrm{I}}^* = \min_{\boldsymbol{\lambda},\mathbf{s}^-,\mathbf{s}^+} 1 - \frac{1}{m}\sum_{i=1}^{m} \frac{s_i^-}{x_{ih}}$$
subject to
$$x_{ih} = \sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- \quad (i = 1, \ldots, m)$$
$$y_{rh} = \sum_{j=1}^{n} y_{rj}\lambda_j - s_r^+ \quad (r = 1, \ldots, s)$$
$$\lambda_j \geq 0 \ (\forall j), \ s_i^- \geq 0 (\forall i), \ s_r^+ \geq 0 (\forall r)$$

(5)

$$1/\rho_{\mathrm{O}}^* = \max_{\boldsymbol{\lambda},\mathbf{s}^-,\mathbf{s}^+} 1 + \frac{1}{s}\sum_{r=1}^{s} \frac{s_r^+}{y_{rh}}$$
subject to
$$x_{ih} = \sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- \quad (i = 1, \ldots, m)$$
$$y_{rh} = \sum_{j=1}^{n} y_{rj}\lambda_j - s_r^+ \quad (r = 1, \ldots, s)$$
$$\lambda_j \geq 0 \ (\forall j), \ s_i^- \geq 0 \ (\forall i), \ s_r^+ \geq 0 \ (\forall r)$$

(6)

$$\rho_{\mathrm{I}}^* = \min_{\boldsymbol{\lambda},\mathbf{s}^-,\mathbf{s}^+} 1 - \frac{1}{m}\sum_{i=1}^{m} \frac{s_i^-}{x_{ih}}$$
subject to
$$x_{ih} = \sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- \quad (i = 1, \ldots, m)$$
$$y_{rh} = \sum_{j=1}^{n} y_{rj}\lambda_j - s_r^+ \quad (r = 1, \ldots, s)$$
$$\sum_{j=1}^{n} \lambda_j = 1, \ \lambda_j \geq 0 \ (\forall j), \ s_i^- \geq 0 \ (\forall i), \ s_r^+ \geq 0 \ (\forall r)$$

(7)

$$\rho_{\mathrm{I}}^* = \min_{\boldsymbol{\lambda},\mathbf{s}^-,\mathbf{s}^+} 1 - \frac{1}{m}\sum_{i=1}^{m} \frac{s_i^-}{x_{ih}}$$
subject to
$$x_{ih} = \sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- \quad (i = 1, \ldots, m)$$
$$y_{rh} = \sum_{j=1}^{n} y_{rj}\lambda_j - s_r^+ \quad (r = 1, \ldots, s)$$
$$\sum_{j=1}^{n} \lambda_j = 1, \ \lambda_j \geq 0 \ (\forall j), \ s_i^- \geq 0 \ (\forall i), \ s_r^+ \geq 0 \ (\forall r)$$

(8)

3.2. ROC Analysis

ROC analysis was first used during World War II to assist radar operators in distinguishing whether a blip on the radar indicated a solid object or just noise, and later, this method was utilised in diagnostic statistical research (Roumeliotis et al., 2024). The ROC curve serves as an essential method for exploring the balance between sensitivity and specificity at various thresholds for classifier outcomes (Tec, 2025). A technique for visualising, categorising, and selecting classifiers based on their effectiveness is known as a receiver operating characteristic (ROC) graph (Fawcett, 2006).

The Area Under the Curve (AUC) values are a frequently used statistic that summarises an index test's diagnostic performance, and Table 2 shows the classification table of AUC values along with their usefulness (Çorbacıoğlu & Aksel, 2023).

Table 2. Area Under the Curve Values and Their Interpretation (Çorbacıoğlu & Aksel, 2023).

AUC Value	Interpretation Suggestion
0.9 ≤ AUC	Excellent
0.8 ≤ AUC < 0.9	Considerable
0.7 ≤ AUC < 0.8	Fair
0.6 ≤ AUC < 0.7	Poor
0.5 ≤ AUC < 0.6	Fail

The Confidence Interval (CI) of 0 to 100 per cent is another commonly used scale. A CI of 0 makes the observer certain that the disease of interest is not present, while a CI of 100 makes the observer convinced that the disease of interest is there (Obuchowski, 2005). Since sample data are not fixed values and are susceptible to statistical mistakes, the AUC is often displayed alongside a 95% CI, which provides a range of possible values surrounding the actual value (Nahm, 2022).

Specificity, also known as the true negative fraction (TNF), describes the likelihood that someone who is not sick will have a negative test result, and the resulting sensitivity and specificity are both 100%, whereas sensitivity, also referred to as the true positive fraction (TPF), describes the proportion of sick patients who actually have a positive test result (Van Erkel & Pattynama, 1998).

It is crucial to establish a cut-off value with the right amount of sensitivity and specificity because lowering the standards to raise sensitivity leads to a trade-off where specificity falls (Nahm, 2022). ROC analysis enables the evaluation of many cut-off points by establishing the sensitivity and specificity of each one (He et al., 2025).

The Youden index, which is calculated as sensitivity + specificity – 1, determines the threshold value that maximises both sensitivity and specificity and aids in selecting a threshold where both metrics achieve their maximum (Çorbacıoğlu & Aksel, 2023). When moving the 45° diagonal, which is a straight line with a slope of 1, in the (0, 1) direction, Youden's J statistic is the distance between the diagonal and the ROC curve (Nahm, 2022). The optimal cut-off value was established using the Youden index test, which finds the threshold value that corresponds to the curve's point closest to the upper left corner (100 per cent sensitivity and 100 per cent specificity) (Roumeliotis et al., 2024).

3.3. The Sample and Dataset

The G7 (the United States, the United Kingdom, Germany, France, Japan, Italy, and Canada) collectively play the world leadership role (K.-W. Li, 2017). Decision Making Units (DMUs) are such units that utilize same inputs to produce the same outputs (Cooper et al., 2006).

The sample of the study consists of seven G7 countries and is presented in Table 1.

Since the sample of the study consists of all G7 countries, the following three conditions related to the homogeneous group of DMUs are met (Golany & Roll, 1989);

- The DMUs in evaluation have similar goals and carry out the same tasks,
- Every DMU operates in the similiar set of market circumstances,
- All of the DMUs in the group have similar inputs and outputs for describing their performance.

Efficiency evaluation depends on how the feasible set of input–output bundles is specified (Ray, 2004). There are three input variables and two output variables as the primary variable framework. Inputs are i1: Investment by Asset, i2: Labour Force Participation Rate and i3: Total Energy Consumption. Output is o1: Ecological Footprint (undesirable output) and o2: Gross Domestic Product.

The inputs and outputs are in line (Gavurova et al., 2018; Grigoroudis & Petridis, 2019; Hsu et al., 2023; Khezri et al., 2023; J. Li et al., 2024; Mamghaderi et al., 2023; Özkan & Özcan, 2018), as depicted in Table 2.

The dataset, which belongs to 2025 or the nearest year, is shown in Table 3 and was gathered from (Enerdata.net, 2026; Global Footprint Network, 2026; OECD, 2026).

The number of DMUs is expected to be larger than the product of the number of inputs and outputs (Ramanathan, 2003). Since there are five variables in all—three input variables and two output variables—to evaluate the efficiency of the seven G7 countries in this study, this requirement is satisfied.

Table 3. The Dataset

DMU Name	Inputs			Output	
	i1	**i2**	**i3**	**o1(ud)**	**o2**
Canada	22.910160	79.820000	302.000000	8.105368	65,441.307967
France	22.096847	74.532000	218.000000	4.770337	62,524.223344
Germany	20.460317	80.226000	242.000000	4.176634	73,956.620229
Italy	22.152328	66.607000	134.000000	4.396695	62,219.871146
Japan	26.084090	81.525000	386.000000	4.036034	52,129.995115
United Kingdom	18.670312	78.465000	145.000000	3.809503	62,872.450290
United States	21.349834	74.923000	2,180.000000	7.477144	86,116.863206
Min	*18.670312*	*66.607000*	*134.000000*	*3.809503*	*52,129.995115*
Max	*26.084090*	*81.525000*	*2,180.000000*	*8.105368*	*86,116.863206*
Mean	*21.960555*	*76.585429*	*515.285714*	*5.253102*	*66,465.904471*
Median	*22.096847*	*78.465000*	*242.000000*	*4.396695*	*62,872.450290*

According to Table 3;

- ***i1: Investment by Asset*** refers to gross fixed capital formation broken down by the type of fixed assets acquired within the economy, and relevant data is gathered from the OECD Data (OECD, 2026).

- ***i2: Labour Force Participation Rate*** is the ratio of the total labour force divided by the total working-age population, and relevant data is gathered from the OECD Data (OECD, 2026).
- ***i3: Total Energy Consumption*** includes coal, gas, oil, electricity, heat, biomass, etc. and is measured in Million Tonnes of Oil Equivalent (MTOE), and relevant data is gathered from the World Energy & Climate Statistics – Yearbook 2025 (Enerdata.net, 2026).
- ***o1: Ecological Footprint (undesirable output) i***s a measurement that calculates the extent of biologically productive land and water required by a person, group, or activity to produce all the resources it consumes and to handle the waste produced, using existing technology and resource management practices, and it is usually represented in global hectares (GHA) per individual, and relevant data is gathered from the Global Footprint Network Data (Global Footprint Network, 2026).
- ***o2: Gross Domestic Product*** is the common metric for the value added generated from the production of goods and services within a country over a specific timeframe, typically represented in US dollars as well as in US dollars per capita (current PPPs), and relevant data is gathered from the OECD Data (OECD, 2026).

3.4. Analysis Design

The study has a two-stage analysis design. In the first stage, the Input Orientation SBM-DEA model was employed using three input variables *(Investment by Asset, Labour Force Participation Rate and Total Energy Consumption)* and two output variables *(Ecological Footprint (undesirable output) and Gross Domestic Product)*. In the second stage, ROC Analysis was conducted to assess the diagnostic performance of the input and output variables in determining the Efficiency Status of G7 countries.

During the SBM-DEA Stage;

- Because inputs are more under the managers' control than outputs in the DMUs (Ozcan, 2014), SBM- DEA directly addresses both input excess and output deficiency (Tone, 2001). The Input-Oriented SBM-DEA model was used in this study.
- Every inefficient DMU was given a reference set to help it become more efficient, and options for improvement (lowering inputs or raising outputs) were computed.
- The R project's deaR package was used (Coll-Serrano et al., 2018).

During the ROC Analysis Stage;

- ROC analysis was used for evaluating for evaluating the accuracy of the DEA, which classifies G7 countries into 1 of 2 categories: efficient or inefficient (Zou et al., 2007).
- The AUC value was used for evaluating the test's ability to distinguish between efficient and inefficient G7 countries (Çorbacıoğlu & Aksel, 2023).
- For any test to be statistically significant, the lower 95% CI value of the AUC must be >0.5 (Nahm, 2022).
- The optimal cut-off value for the test that maximises sensitivity and specificity was identified (Roumeliotis et al., 2024).
- The Youden index was used to identify the optimal cutoff value (Çorbacıoğlu & Aksel, 2023).
- ROC Analysis was performed using the Inonu University Faculty of Medicine, Department of Biostatistics and Medical Informatics, Diagnostic Tests and ROC Analysis Software (Yaşar et al., 2025).

4. RESULTS

4.1. The Results of the DEA Stage

Table 4 displays the DMUs' efficiency scores, slacks (input excesses and output shortfalls), and ranking based on efficiency scores.

Table 4. Efficiency Score, Ranking, and Slacks of DMUs

DMU	Efficiency Score	Efficiency Status	Rank	s_1^-	s_2^-	s_3^-	s_1^-	s_2^+
Canada	0.789937	Inefficient	6	21.687914	70.345066	163.643232	4.336294	65,441.307967
France	0.842174	Inefficient	5	22.096847	66.998186	136.817718	4.389019	62,524.223344
Germany	1.000000	**Efficient**	1	20.460317	80.226000	242.000000	4.176634	73,956.620229
Italy	1.000000	**Efficient**	1	22.152328	66.607000	134.000000	4.396695	62,219.871146
Japan	0.679426	Inefficient	7	20.013629	73.890338	140.756343	4.036034	62,620.693760
United Kingdom	1.000000	**Efficient**	1	18.670312	78.465000	145.000000	3.809503	62,872.450290
United States	1.000000	**Efficient**	1	21.349834	74.923000	2,180.000000	7.477144	86,116.863206

Table 4 shows that four DMUs *(Germany, Italy, the United Kingdom, and the United States)* achieve a score of 1, indicating their relative efficiency by eliminating input surpluses and increasing output deficiencies. Moreover, all four effective DMUs placed first, whereas Japan was positioned last among the ten DMUs. Furthermore, Table 4 gives each DMU the input and output slack it needs to eliminate excess inputs and supplement outputs in order to reach efficiency status.

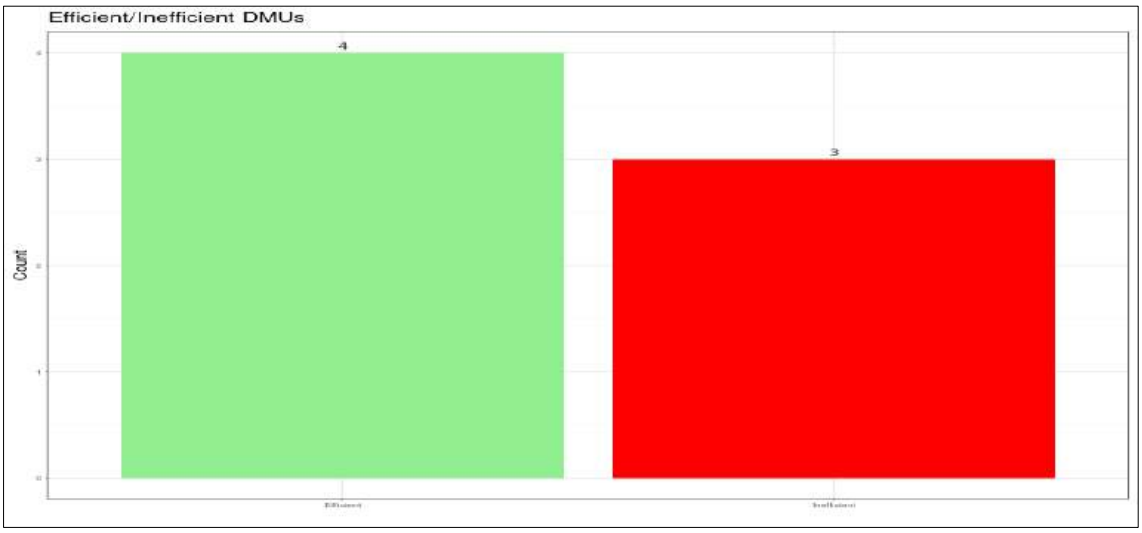

Figure 1. Efficiency Distribution

Figure 1 shows that three of the seven DMUs are inefficient (red column) and four are efficient (yellow column).

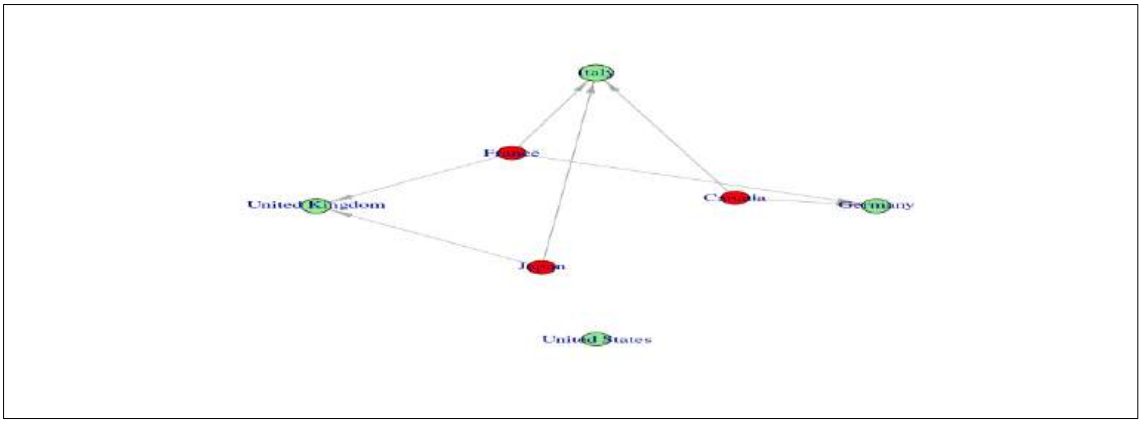

Figure 2. Network Graph

Figure 2 presents Reference Sets established to enable the three inefficient DMUs to achieve efficiency. The green circles in Figure 2 represent the efficient DMUs, while the red circles represent the inefficient ones.

Table 5 demonstrates the reference set weights, also known as Lambda -λ- values, which define the components of other producers used to construct the virtual producer (Anderson, 2003), of the Reference Set so that the two inefficient DMUs can become efficient.

Table 5. References Set of Inefficient States (λ)

DMU	Germany (λ)	Italy (λ)	United Kingdom (λ)
Canada	0.2745	0.7255	0.0000
France	0.0257	0.9708	0.0034
Japan	0.0000	0.3858	0.6142

According to Table 5;

The reference set of,

- Canada consists of Germany (λ=0.2745) and Italy (λ=0.7255).
- France consists of Germany (λ=0.0257), Italy (λ=0.9708) and the United Kingdom (λ=0.0034).
- Japan consists of Italy (λ=0.3858) and the United Kingdom (λ=0.6142).

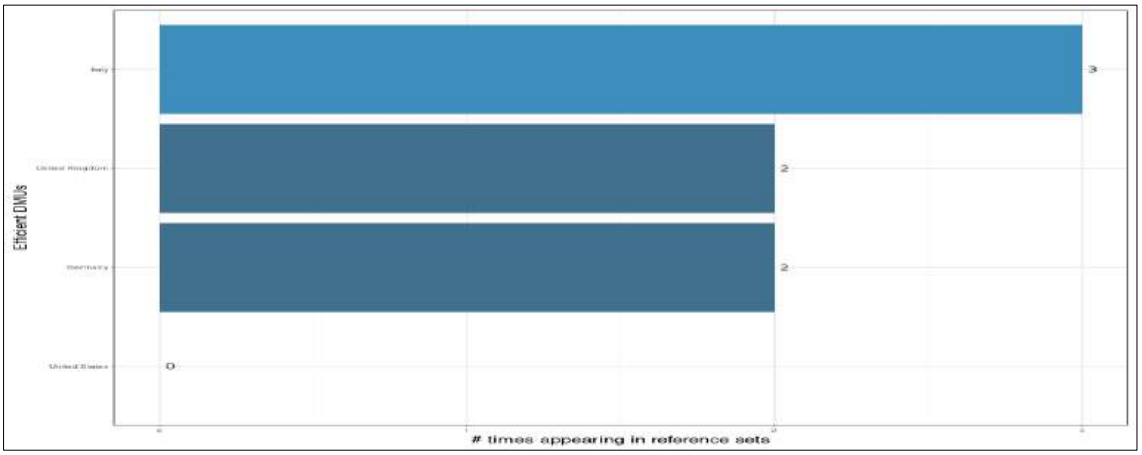

Figure 3. Reference (Peer) Counts

According to Figure-3, Italy are the most appeared DMU in the reference sets with three peer counts. Besides, although the United States is efficient, it does not appear in the reference sets.

Improvement options (reducing the inputs or increasing the outputs) for inefficient DMUs are shown in Table 6.

Table 6. Improvement Options for Inefficient Decision-Making Units (DMUs)

DMU	i*1	i*2	i*3	o*1	o*2
Canada	-1.222245	*-9.474934*	-138.356768	*-3.769074*	0.000000
France	0.000000	-7.533814	-81.182282	-0.381319	0.000000
Japan	*-6.070462*	-7.634662	*-245.243657*	0.000000	*10,490.698645*

According to Table 6;

- DMU that needs the most improvement in terms of ***i1: Investment by Asset*** is ***Japan*** with i*1 *(-1.222245)*.
- DMU country that needs the most improvement in terms of ***i2: Labour Force Participation Rate*** is ***Canada*** with i*2 *(-9.474934)*
- DMU country that needs the most improvement in terms of ***i3: Total Energy Consumption*** is ***Japan*** with i*3 *(-245.243657)*.
- DMU country that needs the most improvement in terms of ***o1: Ecological Footprint (undesirable output)*** is ***Canada*** with o*1 *(-3.769074)*.
- DMU country that needs the most improvement in terms of ***o2: Gross Domestic Product*** is ***Japan*** with o*1 *(10,490.698645)*.

4.2. The Results of the ROC Analysis Stage

The results of the ROC Analysis for the diagnostic performance of the input and output variables in determining the Efficiency Status of DMUs are presented in Table 7.

Table 7. Diagnostic Performance in Determining the Efficiency Status of Input and Output Variables

Variables	Groups	Median (IQR)	AUC (%95 CI)	Z- Test	p	Youden Index	Cut- off Value	Sensitivity (%)	Specificity (%)
i1: Investment by Asset	Efficient	20.9051 (1.5376)	0.917 (0.686-1)	3.536	**<0.001**	0.75	21.723	1	0.75
	Inefficient	22.9102 (1.9936)							
i2: Labour Force Participation Rate	Efficient	76.694 (6.0613)	0.667 (0.159-1)	0.643	0.52	0.417	79.142	0.667	0.75
	Inefficient	79.82 (3.4965)							
i3: Total Energy Consumption	Efficient	193.5 (584.25)	0.667 (0.177-1)	0.667	0.505	0.5	181.5	1	0.5
	Inefficient	302(84)							
o1: Ecological Footprint	Efficient	4.2867 (1.082)	0.667 (0.159-1)	0.643	0.52	0.417	4.584	0.667	0.75
	Inefficient	4.7703 (2.0347)							
o2: Gross Domestic Product	Efficient	68414.5353 (14287.3755	0.75 (0.328-1)	1.162	0.245	0.5	6,9698.964	1	0.5
	Inefficient	62524.2233 (6655.6564)							

AUC; Area Under Curve, CI; Confidence Interval

According to Table 7;

It was determined that the *i1: Investment by Asset* input variable *(AUC=0.917 [95%CI: (0.686-1)]; p<0.001; Figure 4.)* could distinguish the Efficiency Status. In this input variable, sensitivity *(1)* and specificity *(0.75)* were calculated for the cutoff point *(21.723)* determined by the Youden index *(0.75)*.

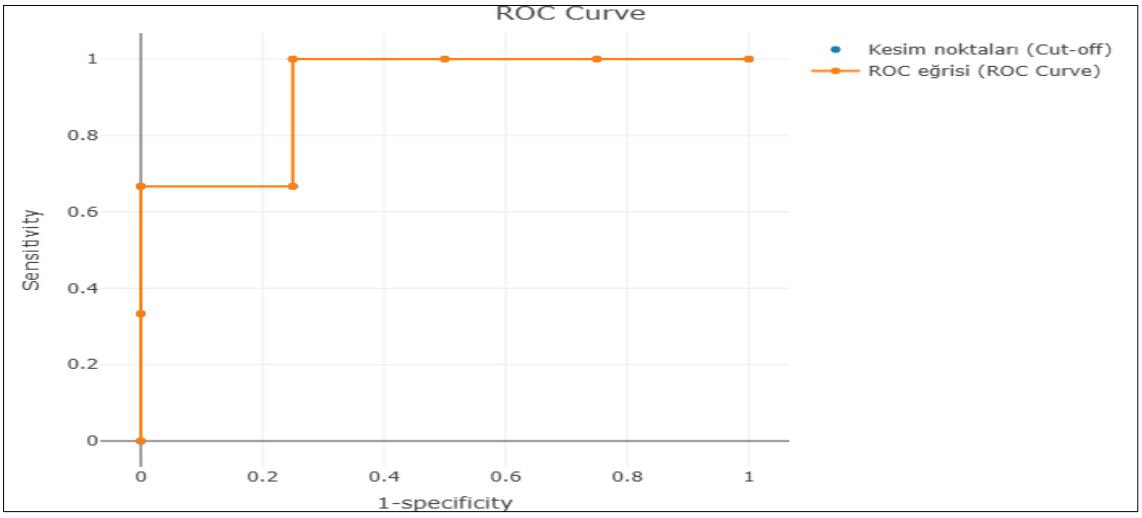

Figure 4. ROC Curve in Determining the Efficiency Status (for i1: Investment by Asset Input Variable)

Sensitivity *(0.667)* and specificity *(0.75)* were found for the cutoff point *(79.142)* determined by the Youden index *(0.417)* in the *i2: Labour Force Participation Rate* input variable. However, this input variable was not identified as the diagnostic factor in determining Efficiency Status *(p=0.52; Figure 5).*

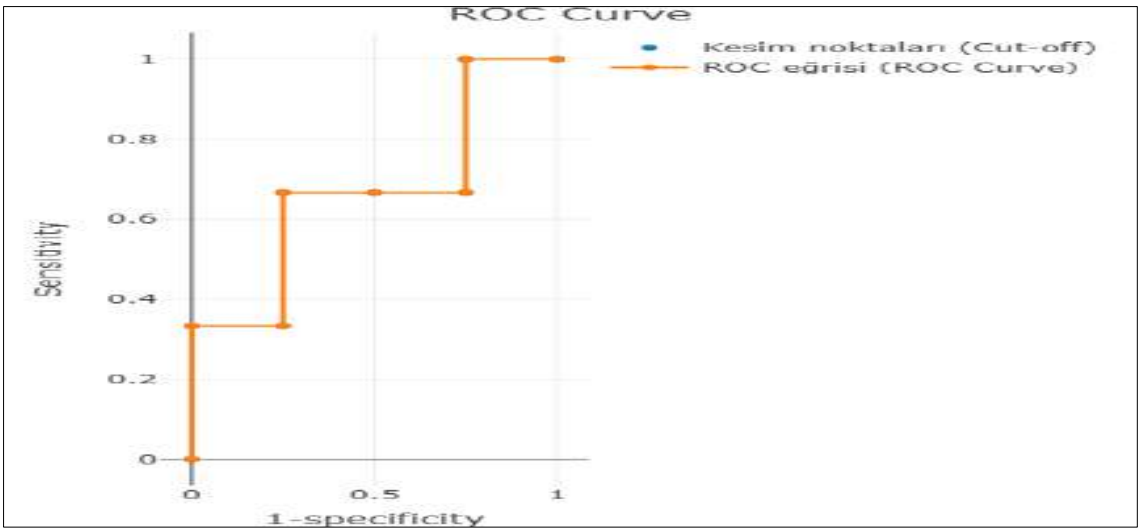

Figure 5. ROC Curve in Determining the Efficiency Status (for i2: Labour Force Participation Rate Input Variable)

Sensitivity *(1)* and specificity *(0.5)* were found for the cutoff point *(181.5)* determined by the Youden index *(0.5)* in the *i3: Total Energy Consumption* input variable. However, this input variable was not identified as the diagnostic factor in determining Efficiency Status *(p=0.505; Figure 6).*

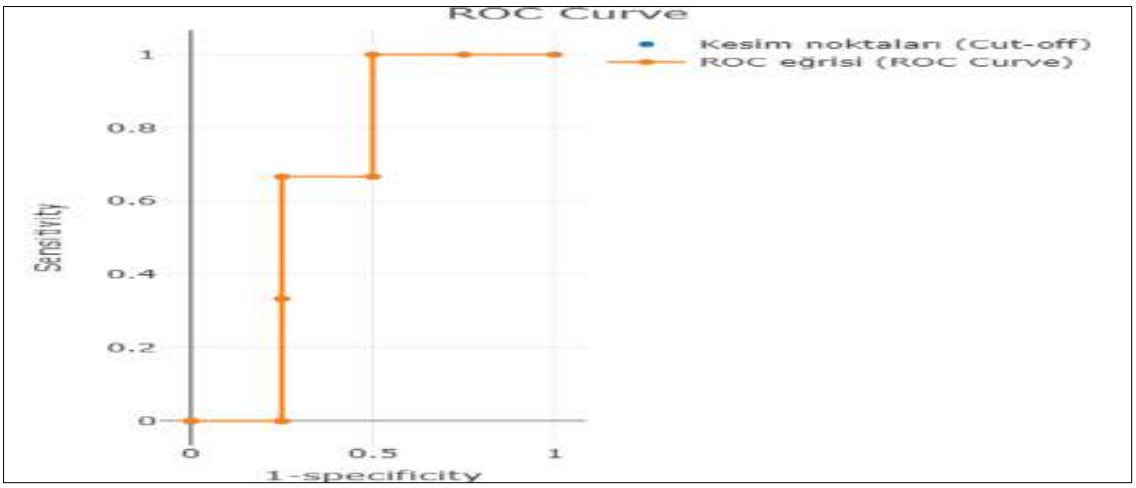

Figure 6. ROC Curve in Determining the Efficiency Status (for i3: Total Energy Consumption Input Variable)

Sensitivity *(0.667)* and specificity *(0.75)* were found for the cutoff point *(4.584)* determined by the Youden index *(0.417)* in the *o1: Ecological Footprint* input variable. However, this output variable was not identified as the diagnostic factor in determining Efficiency Status *(p=0.52; Figure 7).*

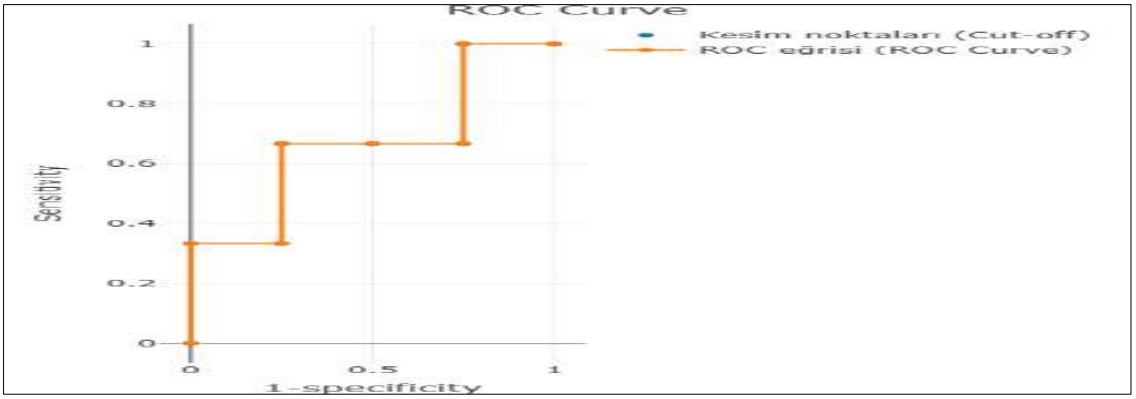

Figure 7. ROC Curve in Determining the Efficiency Status (for o1: Ecological Footprint Output Variable)

Sensitivity *(1)* and specificity *(0.5)* were found for the cutoff point *(69,698.964)* determined by the Youden index *(0.5)* in the *o2: Gross Domestic Product* input variable. However, this output variable was not identified as the diagnostic factor in determining Efficiency Status *(p=0.245; Figure 8).*

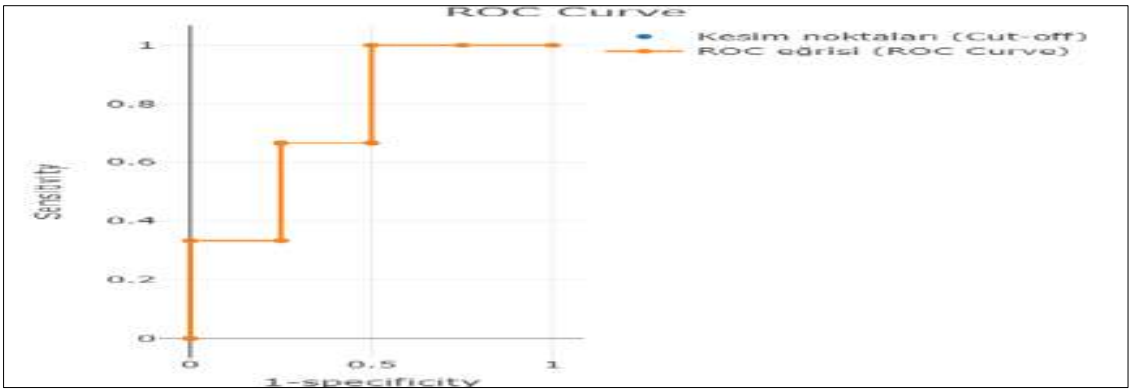

Figure 8. ROC Curve in Determining the Efficiency Status (for o2: Gross Domestic Product Output Variable)

5. DISCUSSION AND CONCLUSION

The study has two main objectives: (i) to assess the efficiency of the ecological footprint of seven G7 countries *(Canada, France, Germany, Italy, Japan, the United Kingdom and the United States)*, (ii) to test the diagnostic performance of input and output variables in determining the efficiency status of the seven G7 countries.

The study has a two-stage analysis design:

- In the first stage, the Input Orientation Slack-Based Data Envelopment Analysis (DEA) model was employed using three input variables (Investment by Asset, Labour Force Participation Rate and Total Energy Consumption) and two output variables (Ecological Footprint (undesirable) and Gross Domestic Product).
- In the second stage, ROC Analysis was conducted to assess the diagnostic performance of the input and output variables in determining the Efficiency Status of G7 countries.

According to the first stage of the analysis design;

- Four G7 countries (Germany, Italy, the United Kingdom and the United States) have a score of 1, and they are relatively efficient. This finding is in line with (Gavurova et al., 2018), in terms of Germany, Italy, and the United Kingdom, in line with (Khezri et al., 2023; Mamghaderi et al., 2023) in terms of the United Kingdom and in line with (Özkan & Özcan, 2018), in terms of Italy, the United Kingdom, and the United States. However, three G7 countries (Canada, France and Japan) are inefficient. This finding is in line with (Hsu et al., 2023; Khezri et al., 2023) in terms of all inefficient DMUs and in line with (Özkan & Özcan, 2018) in terms of France and Japan.
- All four efficient G7 countries rank first, while Japan ranks last among the seven G7 countries. This finding is in line with (Grigoroudis & Petridis, 2019; J. Li et al., 2024).
- Italy are the most appeared DMU in the reference sets with three peer counts. This finding confirms that Italy was marked as efficient during the wholly analysed period finding determined by (Gavurova et al., 2018).
- Besides, although the United States is efficient, they have not appeared in the reference sets. This finding confirms that the United States has the lowest environmental and ecological footprint efficiencies finding determined by (Khezri et al., 2023).
- When improvement options (reducing the inputs or increasing the outputs) for inefficient G7 countries are examined;
    - ✓ DMU that needs the most improvement in terms of i1: Investment by Asset input variable is Japan. The fact that Japan has the highest i1: Investment by Asset value in our dataset is believed to be the cause of this.
    - ✓ DMU that needs the most improvement in terms of i2: Labour Force Participation Rate input variable is Canada. It is thought that this situation is resulting from Canadas has more women working than ever before and high levels of immigration (Bank of Canada, 2026).
    - ✓ DMU that needs the most improvement in terms of i3: Total Energy Consumption input variable is Japan. This is assumed to be caused by Japan having the highest value of i3: total energy consumption (excluding the United States, which is an efficient DMU) in our data.
    - ✓ DMU that needs the most improvement in terms of o1: Ecological Footprint (undesirable) output variable is Canada. This issue is believed to be brought on by Canada's high o1: Ecological Footprint (undesirable) value in our dataset.
    - ✓ DMU that needs the most improvement in terms of o2: Gross Domestic Product output variable is Japan. According to our dataset, Japan's Gross Domestic

Product output variable value is the lowest in the dataset, which is believed to be the reason for this.

According to the second stage of the analysis design;

- It was determined that i1: Investment by Asset input variable could distinguish the Efficiency Status with the cutoff points (21.723).
- i2: Labour Force Participation Rate, i3: Total Energy Consumption input variables, and o1: Ecological Footprint and o2: Gross Domestic Product output variables were not identified as the diagnostic factor in determining Efficiency Status.

It is hoped that the findings of this study will help G7 countries' environmental management institutions and organisations implement more effective ecological footprint policies, at least partially. The most significant of these benefits is believed to be the chance for inefficient G7 countries to improve their ecological footprint and environmental management policies, including the financial and non-financial expenditures in terms of national accounts, by closely examining, contrasting, and modelling the practices of G7 countries in the reference sets identified for them. Furthermore, for the relevant organisations of inefficient G7 countries to reorganise their ecological footprint policies, the cut-off values of Investment by Asset input variables are essential. It is therefore advised that researchers in the areas of ecological footprint and environmental management use ROC analysis and integrated Network Data Envelopment Analysis to evaluate performance on larger samples using various input/output bundles.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 20-37
http://doi.org/10.26677/TR1010.2026.1634

A Digital Maturity Model for Turkish Universities, Reflections from YÖKAK Institutional Self-Evaluation Reports

Elmira IRAJI
Atılım University, School of Business, Ankara, Türkiye.
iraji.elmira@student.atilim.edu.tr
https://orcid.org/0009-0009-6980-2451

Gonca GÜZEL ŞAHİN
Atılım University, School of Business, Ankara, Türkiye
gonca.guzel@atilim.edu.tr
https://orcid.org/0000-0002-3632-9946

Ceyhan ÇİĞDEMOĞLU
Atılım University, School of Business, Ankara, Türkiye
ceyhan.cigdemoglu@atilim.edu.tr
https://orcid.org/0000-0001-5389-5790

Abstract
This study proposes a digital maturity (DM) model and delves into its reflections from Institutional Internal Evaluation Reports (KIDR) from Turkish Universities. The objectives are to: identify the dimensions relevant to a DM model for Turkish HEIs, extract DM indicators from KIDR reports, assess institutions' DM levels based on indicators, and determine whether DM differs across the four domains; Leadership & Governance, Teaching & Learning, Research & Development, and Service to Society. We employed a mixed method design consisting of qualitative content analysis and descriptive survey design. The study generates a DM model based on qualitative content analysis of already developed models. Using a 1–5-point rubric, all KİDR 2024 reports were analyzed with MAXQDA Analytics Pro. The maturity scores were entered into SPSS for descriptive and inferential statistics. The level of maturity on Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society were compared statistically.

Keywords: Digital transformation; digital maturity; Digital Maturity Index (DMI); YÖKAK; KİDR

1. INTRODUCTION

The 21st century has introduced both significant opportunities and complex challenges for higher education institutions (HEIs), shaped by rapid technological advancements and globalization. As universities play a vital role in building society's future, they are compelled to rethink and adjust their educational strategies (Özcan et al., 2022). COVID-19 pandemic accelerated the digital transformation of higher education, with digitalization emerging as a key strategy to address persistent barriers to student participation and enhance the flexibility and appeal of higher education systems (OECD, 2023). Pressures in Türkiye have spurred the rise of new-generation universities, which prioritize interdisciplinary programs, tech-focused

curricula, and industry links to ready students for a complex future. These institutions aim to build adaptable, student-centric learning environments that develop knowledge and skills by creating high-quality digital processes.

Quality assurance is vital for maintaining standards and boosting global competitiveness; furthermore, its comprehensive nature often coincides with digitalization models offered for HEIs. Consequently, it may be an inquiry to reveal how digital maturity indicators align with institutional quality assurance aspects. Aligning higher education institutions (HEIs) with traditional quality frameworks is particularly complex due to their inherent flexibility, which challenges compliance (ISER/KIDR Guide, Section 3.2.1) (YÖKAK, 2025). Besides, Türkiye's specific higher education conditions—including rising demand for skilled professionals, digitally literate student populations, and specific regulatory expectations—exacerbate the challenges of implementing effective quality assurance systems (Durmuş Şenyapar & Bayındır, 2024). As institutions work through the complexities of digital transformation, identifying the factors that shape successful technology integration becomes increasingly important (Nielsen, 2024).

Technological developments continue to reshape nearly every aspect of daily life (Díaz-García et al., 2022). The current societal and educational changes, accelerated by emerging technologies, further influence how education systems evolve (Kupilas et al., 2022). Digital transformation, a defining component of the Fourth Industrial Revolution, has the potential to redefine the future landscape of education significantly (Marks et al., 2020). To better understand and evaluate digital maturity within HEIs, researchers have introduced various conceptual models. Assessing digital maturity involves using indicator systems to help institutions track their digital progress and inform decision-making. Digital maturity is widely recognized as a valuable tool for benchmarking, enhancing quality, and measuring advancement toward established best practices (Alfirević, 2025).

Despite numerous studies on digital transformation and digitalization, there is limited scholarly work on the level of digital maturity indexes (DMI) within HEIs. Specifically, the indicators of digital maturity in nationwide institutional self-evaluation reports have not yet been investigated. Therefore, this study was conducted to propose a digital maturity model, and to reveal its alignment with key indicators of organizational performance outputs reported in institutional self-evaluation reports (KIDR) of Turkish higher education system. To achieve this goal, first, digital maturity is conceptualized based on available frameworks, and then, using the newly developed framework, key operational indicators were constructed. After that, the institutional self-evaluation reports (KIDR) for the year 2024 were analyzed to assess the digital maturity based on KIDR.

2. LITERATURE REVIEW AND CONCEPTUAL BACKGROUND

2.1. Digital Transformation in Higher Education

HEIs worldwide are undergoing profound transformation driven by globalization, rapid technological improvements, shifting learner expectations, and increasing societal demands for equitable access and participation (Özcan et al., 2022). Organization evolves through a series of evolutionary (Alfirević et al., 2025) stages, digital transformation (DT), once perceived primarily as the adoption of new technologies, now represents a strategic redefinition of institutional processes, a critical factor for organizational success (Hlel et al., 2025), organizational culture, and value creation mechanisms (Williams et al., 2019). In this context, DT emphasizes institutional evaluation, accountability, and the delivery of value across all levels of the organization (Mabić & Praničević, 2023; Fuster-Guillén et al., 2025). Effective transformation necessitates adaptive governance that can proactively address emerging priorities, national strategies, and stakeholder expectations. Effective transformation demands adaptive governance that proactively addresses

emerging priorities and stakeholder expectations, supported by mechanisms like change management, benchmarking, and innovation practices (ISER/KIDR Guide, Section 3.2.1) (YÖKAK, 2025). Digital leadership, therefore, plays a pivotal role, requiring sophisticated competencies to guide technological innovation and integrate digital practices in both academic and administrative domains (Altbach & de Wit, 2018; Habeeb & Eyupoglu, 2024). As institutions increasingly integrate digital capabilities across teaching, research, governance, and societal engagement, assessing their progression becomes crucial for understanding their readiness to navigate and sustain transformation.

2.2 Digital Maturity Models (DMMs) in HEIs

DM represents the extent to which an institution has embedded digital transformation principles into its structures, processes, and organizational culture (Kampylis et al., 2015; EDUCAUSE, 2022). It reflects not only technological adoption but also the strategic and cultural integration of digital capabilities that enable continuous improvement, accountability, and long-term institutional effectiveness. Maturity theory conceptualizes organizational progress as a staged evolution in which institutions develop increasingly sophisticated digital capabilities over time (North et al., 2019). DMMs support this process by identifying capability gaps, prioritizing development areas, and guiding transformation pathways (Berghaus & Back, 2016; Anderson & Ellerby, 2018; Teichert, 2019; Ochoa-Urrego & Peña Reyes, 2021). Several established frameworks shape current understanding of digital maturity in higher education. The DigCompOrg Framework highlights leadership, digital pedagogy, infrastructure, professional development, and data-driven improvement as central maturity domains (Kampylis et al., 2015; EDUCAUSE, 2022). The EDUCAUSE Dx Framework emphasizes leadership, institutional culture, technological foundations, and analytics capability as key enab.lers of transformation (EDUCAUSE, 2020, 2022). Jisc's digital capability and assessment models extend this perspective by focusing on staff and student competencies, curriculum innovation, learning analytics, and digital assessment (Jisc, 2020, 2023, 2025). Similarly, the Digital Maturity Framework for Higher Education Institutions identifies strategy, governance, teaching, research infrastructure, ICT services, and collaboration as essential domains (Đurek et al., 2017). Collectively, these frameworks establish a set of core maturity dimensions that guide the conceptualization of this study.

2.3. The Turkish Higher Education Quality Assurance System (THEQC/YÖKAK)

The Turkish Higher Education Quality Council (THEQC/YÖKAK) administers a national quality assurance system grounded in institutional evaluation, accreditation, and continuous improvement. Its Institutional Self-Evaluation Report (ISER/KIDR) framework (see Appendix A) comprises 14 criteria and 46 sub-criteria organized into four major domains: Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society. These domains embody a holistic perspective of institutional functionality and strategic development within Türkiye's HEIs. The ISER/KIDR documents serve as comprehensive self-assessment reports in which universities provide evidence of performance, stakeholder engagement, quality assurance mechanisms, and strategic alignment. They also serve as the basis for external evaluation processes conducted by YÖKAK. Because these sub-criteria include governance, management systems, teaching processes, research performance monitoring, and community engagement mechanisms, they provide a meaningful foundation for examining digital maturity within the national context (YÖKAK, 2025).

2.4. Intersection Between Digital Maturity and Quality Assurance

DM and institutional quality assurance are interconnected concepts that mutually support each other in HEIs. Digital maturity indicates how well digital capabilities are systematically

incorporated into institutional strategies, decision-making, and organizational culture (North et al., 2019; EDUCAUSE, 2020). Meanwhile, quality assurance assesses how effectively an institution plans, executes, monitors, and enhances its functions according to established standards (YÖKAK, 2025). Advanced digital systems improve the reliability, transparency, and efficiency of quality processes, allowing for stronger evidence-based governance and ongoing improvement. Conversely, solid internal quality assurance mechanisms—such as stakeholder feedback cycles, data-driven monitoring, and performance evaluations—support digital transformation by establishing structured processes and fostering a culture of continuous improvement (Kampylis et al., 2015; Jisc, 2025).

International digital maturity models (DMMs), like DigCompOrg, EDUCAUSE, and Đurek et al.'s framework, explicitly include elements such as governance, analytics capabilities, professional development, and continuous improvement, showing that digital maturity is fundamentally a quality function. DM is a critical element that strengthens quality assurance (QA) systems in higher education by making teaching, assessment, and management processes more flexible, accessible, and measurable (Talu & Tezci, 2025). Thus, the alignment between digital maturity and quality assurance provides the theoretical foundation for integrating international maturity dimensions into Türkiye's national quality assurance system. Accreditation processes in Turkish higher education increasingly rely on digital systems for documentation, monitoring, and evidence-based evaluation. Agencies such as THEQC/YÖKAK and program-specific accreditation bodies require institutions to demonstrate transparent data management, systematic performance monitoring, and continuous improvement—elements that closely align with the digital maturity dimensions. On the other hand, accreditation is essentially the outcome of a strong quality assurance system, as institutions that consistently meet high-quality standards are most likely to achieve accredited status.

2.5. Institutional Quality Dimensions Relevant to Digital Maturity

2.5.1. Leadership, Governance, and Quality Assurance

Leadership, governance, and quality assurance form the core of institutional digital maturity, as acknowledged across various digital transformation frameworks (EDUCAUSE, 2020). Digitally advanced institutions implement agile, proactive governance systems that adapt to technological changes, align transformation efforts with national and global priorities, and embed a strategic digital vision across institutional functions (Kampylis et al., 2015; EDUCAUSE, 2020). Effective governance entails strategic clarity, stakeholder-informed decision-making, and continuous improvement driven by structured quality assurance processes such as the Plan-Do-Check-Act (PDCA) cycle (Deming, 1986). Institutions that establish clearly articulated mission, vision, and policy frameworks—supported by transparent information management systems—are better equipped to utilize digital capabilities for planning and decision-making. Documented workflows, clear accountability mechanisms, internationalization strategies, and stakeholder involvement further demonstrate higher levels of digital maturity (ISER/KIDR Guide, Section 3.2.1)(YÖKAK, 2025). Digital leadership also demands advanced competencies to integrate technological innovation into both academic and administrative practices, shaping institutional culture and enabling sustainable transformation (Altbach & de Wit, 2018; Habeeb & Eyupoglu, 2024).

2.5.2. Learning and Teaching

Learning and teaching are key aspects of a university's digital maturity. Universities need to design and implement programs aligned with national qualification standards and changing societal demands. DM in this area includes student-centered teaching methods, competence-based learning, flexible learning options, and innovative assessment methods supported by

digital tools (Özdemir et al., 2023; Alfirević, 2025). To facilitate effective digital teaching, institutions need strong infrastructure, comprehensive learning resources, robust student support systems, and ongoing professional development for faculty (ISER/KIDR Guide, Section 3.2.1)(YÖKAK, 2025). International frameworks emphasize the importance of developing digital skills, adopting flexible teaching practices, and creating technology-rich learning environments that boost student engagement and achievement (Yulin & Danso, 2025; Jisc, 2023). Aligning institutional structures and processes is crucial to ensuring continuous improvement in program quality, course design, and teaching effectiveness (European University Association, 2015). Ultimately, high-quality teaching depends on faculty expertise, well-organized course materials, and motivation for independent learning (Szymenderski et al., 2015).

2.5.3. Research and Development

Research and development (R&D) is another key aspect of digital maturity, as universities are responsible for creating knowledge, fostering innovation, and advancing societal progress (Nkosi & Mutula, 2021). Digital transformation allows for better assessment of research processes and helps institutions identify performance gaps, improve workflows, and adopt new technologies (Cram & Michalak, 2019; Kupilas et al., 2022; Pinheiro et al., 2023). Mature research environments need strong physical and digital infrastructure, platforms for interdisciplinary collaboration, secure funding sources, and ongoing training for researchers. Institutions also must implement rigorous systems to track research outputs, analyze performance metrics, and use data to guide strategic decisions (ISER/KIDR Guide, Section 3.2.1) (YÖKAK, 2025).

2.5.4. Service to Society

The Service to Society dimension emphasizes universities' duty to generate societal value through community engagement, digital outreach, and knowledge transfer. Digitally advanced institutions use digital tools and platforms to coordinate community programs, improve accessibility, and deliver services aligned with broader development objectives (Pasichnyi et al., 2024). Ongoing monitoring and assessment ensure that societal efforts stay true to the university's mission and positively impact public welfare (YÖKAK, 2025). Digital transformation greatly influences societal engagement by boosting employability skills, enhancing institutional credibility, supporting national digital initiatives, and lowering educational barriers (Bravo-Jaico et al., 2025). Human resources are essential in driving this transformation by fostering adaptable curricula, developing digital skills, and encouraging community-based innovation (Castro Benavides et al., 2020).

3. ANALYTICAL/OPERATIONAL FRAMEWORK

3.1 Integrating International Digital Maturity Models with the Turkish Quality Assurance Structure

Study develops a Digital Maturity Index (DMI) specifically designed for the Turkish higher education context. It builds on well-established digital maturity and transformation models in higher education (Kampylis et al., 2015; EDUCAUSE, 2020; Đurek et al., 2017). The framework implements the DMI by combining global concepts of digital maturity with Türkiye's national quality assurance structure. This approach is commonly used in higher education maturity assessments to ensure both theoretical grounding and contextual relevance (Berghaus & Back, 2016; Teichert, 2019; EDUCAUSE, 2020). The integration is guided by THEQC's four core quality areas: Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society. These areas align closely with the maturity dimensions identified in international frameworks, which include strategic leadership, digital pedagogy, research infrastructure, collaboration, and community engagement (Kampylis et al., 2015; EDUCAUSE,

2020; Đurek et al., 2017). Each domain in the DMI is represented by indicators derived from YÖKAK sub-criteria. These indicators reflect key components of institutional digital transformation, such as the implementation of digital strategies, information management, data-informed decision-making, innovation in teaching and learning, and digital research capacity, as highlighted in previous digital maturity models (Kampylis et al., 2015; Jisc, 2023; EDUCAUSE, 2020). This alignment enables the assessment of digital maturity within a nationally recognized quality assurance framework, ensuring consistency with international maturity standards and a staged development logic (North et al., 2019; Teichert, 2019). The resulting composite DMI provides an overall measure of institutional digital maturity. Additionally, the domain-specific indicators highlight strengths and areas for improvement across the core functions of higher education institutions (Đurek et al., 2017; EDUCAUSE, 2020).

***Research Objectives*;** this study aims to develop and apply a Digital Maturity Index (DMI) to evaluate the level of digital transformation in Turkish HEIs. Guided by international digital maturity frameworks and grounded in empirical evidence from KIDR reports, the study examines digital maturity at both the dimensional and indicator levels. The research questions (RQ) are: **RQ1** *What dimensions should be included in a digital maturity model for Turkish universities?* **RQ1.1** *Which digital maturity indicators can be extracted from KIDR reports as evidence of institutional digital maturity?* **RQ2** *What are the digital maturity scores of universities based on KIDR reports?* **RQ3** *Do digital maturity scores differ across four institutional dimensions (1) Leadership & Governance, (2) Teaching & Learning, (3) Research & Development, and (4) Service to Society?*

4. METHODOLOGY

4.1 Research Design

This study utilizes a mixed-method research design that combines descriptive content analysis with quantitative scoring to evaluate the digital maturity of Turkish HEIs. The analytical process is based on internationally recognized digital maturity frameworks—DigCompOrg, the EDUCAUSE Framework, and Jisc digital capability models (Kampylis et al., 2015; EDUCAUSE, 2020; Jisc, 2023)—and aligns with the four domains of the YÖKAK ISER/KIDR structure. Narrative evidence from the 2024 KIDR reports was systematically extracted, coded, and categorized under 18 predefined digital maturity sub-criteria. This qualitative coding was then transformed into quantitative measures using a standardized 1–5 scoring rubric derived from international models and mapped to corresponding YÖKAK sub-criteria.

4.2 Sample, Data Sources and Materials

The study sample consisted of 205 Institutional Self-Evaluation Reports (ISERs) submitted to the Higher Education Quality Council of Türkiye (YÖKAK, 2025) during the 2024 evaluation cycle. These reports cover the full population of Turkish state and foundation universities. The ISER reports were used solely as sources of narrative evidence reflecting institutional structures, digital practices, and maturity levels. The analytical framework applied to these reports was based on the 18 DMI sub-criteria developed in Section 2, which were constructed by extracting internationally recognized digital maturity dimensions and identifying how they manifest within the narrative content of institutional reports. Each ISER was downloaded, reviewed, and coded to identify textual evidence corresponding to the 18 sub-criteria, which then formed the basis for DMI scoring.

All data used in the study were obtained from publicly available secondary sources. The primary materials comprised the 205 ISER 2024 reports, which document institutional processes, practices, and quality assurance activities. The digital maturity indicators informed the coding structure

used during analysis. Python scripts were used for automated text extraction, MAXQDA for qualitative coding, Excel for data organization, and SPSS Version 27 for quantitative analysis.

4.3 Data Collection Procedure

Data collection followed a structured multi-stage workflow. First, all ISER 2024 reports were downloaded from the official YÖKAK website and converted into machine-readable formats. Python was used to extract text segments based on keyword sets aligned with the 18 digital maturity indicators. These extracted text blocks were then imported into MAXQDA for qualitative coding. Each text segment was assigned to one of the four DMI domains: Leadership and Governance, Learning and Teaching, Research and Development, and Service to Society. After coding, each sub-criterion was evaluated and scored on a 1–5 maturity scale based on the clarity, depth, and institutionalization of the evidence. The scores were then exported to Excel and SPSS for descriptive and inferential analyses, including comparisons across the four domains.

4.4 Measurement Framework (DMI Rubric)

The measurement framework used in this study is grounded in the Higher Education Quality Council of Türkiye (YÖKAK, 2025) guidelines, which are structured according to the Plan–Do–Check–Act (PDCA) cycle (Deming, 1950; Kupilas et al., 2022). Digital Maturity Levels (DML) were assessed using a five-point rubric, with 1 indicating the absence of formalized processes and 5 representing fully institutionalized, systematically implemented, and continuously improved practices. The Digital Maturity Index (DMI) consists of four domains—Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society—each evaluated through YÖKAK's sub-criteria. Keyword lists and indicator sets were developed for each domain to guide evidence extraction from ISER 2024 reports (YÖKAK, 2025).

4.5 Validity and Reliability

In qualitative studies, the concept of validity is defined as the ability to present the researched subject impartially and accurately (Kirk & Miller, 1998). Data consistency was verified, and consensus among coders was reached (Best & Khan, 2003). To establish the transferability of the research, the methods for validity and sample selection, along with the reasons for choosing them, were explained in detail in accordance with the literature (McMillan & Schumacher, 2010). In scientific research, reliability is defined as the reproducibility of results within the study's scope (Merriam, 1998). Content validity was ensured by grounding scoring decisions in the YÖKAK rubric. Construct validity was supported through rubric-aligned keyword extraction and domain-based coding. Reliability was further strengthened through manual re-checking of data from 10 randomly selected universities, repeated coding cycles in MAXQDA, cross-comparison of extracted evidence, and SPSS-based checks for scoring consistency.

4.6 Data Analysis

Qualitative evidence extracted from the ISER reports was converted into quantitative scores using a rubric-based maturity assessment approach. Each coded segment related to one of the 18 digital maturity sub-criteria was assigned a score between 1 and 5 based on the maturity of the described practice. Domain-level DMI scores were calculated as the mean of the sub-criteria within each domain, and the overall institutional DMI was computed as the average of the four domain scores. Descriptive statistics were used to determine the overall digital maturity levels of universities (addressing RQ2), and inferential statistics (one-way ANOVA) were used to examine differences across the four domains (addressing RQ3). This systematic scoring and analysis procedure ensured methodological transparency and interpretive rigor.

4.7 Ethical Considerations

The study relied solely on publicly accessible institutional documents, so ethical approval was unnecessary. No personal or confidential information was involved. Analyses were carried out responsibly, following academic integrity standards.

5. RESULTS AND DISCUSSION

This section presents the consensus model, aligning ISER/KIDR aspects, and empirical findings of the digital maturity assessment conducted on 205 Turkish universities based on their 2024 Institutional Self-Evaluation Reports (ISER). The results include a proposed conceptual model, descriptive and inferential statistics. The distribution of Digital Maturity Index (DMI) scores across the four domains, and key differences observed between public and foundation universities. The discussion links these findings to the YÖKAK digital evaluation framework and broader international literature on digital transformation in higher education.

5.1 The Proposed Consensus Model for Digital Maturity

The developed model in this study is based on eight core dimensions commonly identified across major international digital maturity frameworks, including DigCompOrg (Kampylis et al., 2015), the EDUCAUSE Framework (2020), and Jisc's digital capability models (2020, 2023, 2025). These frameworks consistently highlight leadership, digital infrastructure, innovative teaching, staff competence, student experience, data governance, institutional collaboration, and ethical and secure digital engagement as essential elements of digital transformation. By synthesizing these shared dimensions into a unified structure, the model provides a concise and theoretically grounded foundation for assessing institutional digital maturity in higher education. See Table 1 for the details.

Table 1. The Conceptual Model for Digital Maturity

Dimension	Indicators	Description / Evaluation Criteria	Source
1. Leadership & Governance	• Strategic alignment •Governance structure • Policy integration	Existence of an institutional digital transformation strategy aligned with mission and vision; leadership commitment; integration of policies on inclusion, ethics, and sustainability.	DigCompOrg framework Kampylis et al., 2015; EDUCAUSE, 2020; Jisc, 2025
2. Digital Infrastructure & Resources	• Infrastructure maturity • Cloud & data services •Accessibility & sustainability	Robust ICT infrastructure; cloud adoption and interoperability; compliance with accessibility standards; environmentally sustainable technology.	EDUCAUSE, 2020; Knight & Birkett, 2023 *Jisc, 2023*, 2025
3. Teaching & Learning Innovation	• Digital pedagogy • Learning analytics •Assessment innovation	Integration of digital tools and analytics into teaching; innovative digital assessments; pedagogy informed by evidence and feedback.	Fernández-Miravete & Prendes-Espinosa, 2022. DigCompOrg framework Kampylis et al., 2015; Jisc, 2023, 2025
4. Staff & Faculty Digital Competence	•Professional development •Competence frameworks	Structured digital-skills programs for staff; use of frameworks like DigCompEdu; incentives and	Jisc, 2020; DigCompOrg framework Kampylis et al., 2015; EDUCAUSE, 2020

	•Incentives and recognition	recognition for digital innovation.	
5. Student Digital Experience	•Engagement and feedback • Digital inclusion •Co-creation in learning	Mechanisms for student feedback on digital tools; ensuring equitable access; involving students in co-designing digital experiences.	Jisc, 2023; EDUCAUSE, 2020; DigCompOrg framework Kampylis et al., 2015
6. Data & Evidence-Based Decision-Making	• Data governance • Analytics capability • Continuous improvement	Secure, ethical data governance; data dashboards for learning and operations; continuous improvement loops.	EDUCAUSE, 2020; Đurek et al., 2017; Jisc, 2025
7. Culture of Innovation & Collaboration	• Innovation processes •Collaboration networks • Change readiness	Presence of innovation units, cross-departmental collaboration, and institutional agility and openness to change.	DigCompOrg framework Kampylis et al., 2015; Knight & Birkett, 2023; EDUCAUSE, 2020
8. Security, Ethics & Well-being	• Cybersecurity management • Digital ethics • Digital well-being	Institutional cybersecurity framework; policies on responsible tech use; promoting healthy and balanced digital engagement (sustainability and accessibility).	EDUCAUSE, 2020; Jisc, 2025; OECD, 2023

International maturity frameworks, including DigCompOrg, the EDUCAUSE Framework, Jisc models, and the Digital Maturity Framework for HEIs (Đurek et al., 2017), combine governance, data management, continuous improvement, and capacity-building, demonstrating that digital maturity is mainly a quality function. Therefore, institutional maturity indicates the extent to which digital processes are integrated into the overall quality cycle, providing the foundation for aligning international maturity dimensions with YÖKAK's evaluation criteria in this study. Building on the theoretical basis and conceptual model from the previous section, the following Analytical Framework operationalizes the Digital Maturity Index (DMI) for practical assessment.

5.2 Alignment Between Conceptualized DM and YÖKAK/KIDR Domains

A structured comparison (Table 2) demonstrates a high degree of alignment between the proposed DM and the quality assurance domains used in the KIDR.

Table 2. Integration of YÖKAK Evaluation Criteria Into The DM Framework

YÖKAK Heading	Sub-Criteria	Short Rationale / Link
A. Leadership, Governance & Quality	A.1 Institutional Transformation Capacity	Evaluates how the institution manages change and innovation, which is also essential for leading digital transformation.
	A.2 Internal Quality Assurance Mechanisms	Focuses on systematic monitoring and improvement, directly related to data-driven and evidence-based digital management.
	A.3 Mission, Vision, and Policies	Requires clear strategic direction, like defining a digital vision and aligning policies for digital development.
	A.4 Information Management System	Involves collecting, securing, and using data, which aligns with core functions of digital data governance.

	A.5 Process Management	Looks at improving workflows and efficiency, reflecting the role of digital tools and automation in institutional processes.
	A.6 Stakeholder Involvement	Encourages participatory and collaborative practices, like co-creation and digital collaboration cultures.
	A.7 Internationalization	Digital tools support virtual mobility and global cooperation, strengthening internationalization efforts.
B. Learning and Teaching	B.1 Program Design & Approval	Integrates blended and digital learning, matching principles of digital pedagogy and innovative program design.
	B.2 Course Objectives Alignment	Ensures learning outcomes fit digital and hybrid delivery, linking to modern digital teaching design.
	B.3 Student Workload-Based Design	Balances workload across modalities and supports accessible, student-centered digital learning.
	B.4 Program Follow-up & Update	Use data and feedback from digital learning systems for continuous improvement.
	B.5 Management of Learning & Teaching	Requires coordinated management of technologies and learning environments used in digital education.
C. Research and Development	C.1 Internal & External Resources	Digital and technical infrastructure are essential for supporting research activities.
	C.2 Joint Programs & Research Units	Collaboration relies on shared digital platforms and online communication tools.
	C.3 Research Performance Evaluation	Involves analytics and KPIs, aligning with data-based research performance monitoring.
	C.4 Staff Performance Evaluation	Includes assessment of digital skills and professional development related to digital research practices.
D. Service to Society	D.1 Resources for Service to Society	Digital systems and tools enhance outreach, access, and community engagement.
	D.2 Service Performance Evaluation	Monitoring societal impact often uses digital data, ethical standards, and responsible technology use.

Leadership, Governance, and Quality measures how digital strategies are integrated into institutional governance, information management, and quality assurance processes, including transformation capacity and stakeholder involvement. The second domain, Learning and Teaching, evaluates the digitalization of the educational mission through indicators related to digital pedagogy, learning management systems, learning analytics, program oversight, and innovative assessment methods (Jisc, 2023). The third domain, Research and Development, assesses the maturity of digital research infrastructure, performance monitoring systems, and platforms that support collaborative knowledge creation. The fourth domain, Service to Society, considers how digital tools and platforms are used to improve community engagement, societal outreach, and performance tracking of service activities. Together, these four domains create a comprehensive and contextually relevant DMI model that aligns YÖKAK's sub-criteria with international digital maturity concepts, enabling a strong evaluation of digital transformation efforts in Turkish HEIs.

5.3 Descriptive Results

Digital Maturity Index (DMI) were calculated on a five-point scale, ranging from 1 (no defined digital practice) to 5 (fully institutionalized and systematically applied practice). The sample included 205 higher education institutions—167 state universities (81.5%) and 38 foundation universities (18.5%)—reflecting the overall structure of the Turkish higher education system. The results show that universities generally exhibit moderate to advanced levels of digital maturity, with scores ranging between Level 3 and Level 5. Most institutions (77.6%) were categorized at

Level 4, indicating that digital processes are structured, established, and consistently applied. A smaller proportion (14.6%) was at Level 3. Also 7.8% reached Level 5, indicating that fully optimized DM remains relatively rare. Across institutional types, state universities showed a similar pattern: 76% were at Level 4, 15% at Level 3, and 9% at Level 5. Foundation universities showed an even stronger concentration at Level 4 (84.2%), although very few achieved Level 5 (2.6%) and 13.2% remained at Level 3. Table 3 summarizes the distribution of digital maturity levels across university types.

Table 3. Distribution of overall digital maturity levels by university type

Category	Group / Level	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
University Type	Foundation	38	18.5	18.5	18.5
	State	167	81.5	81.5	100.0
	Total (Type)	**205**	**100.0**	**100.0**	—
Overall Digital Maturity Scores	Level 3.00	30	14.6	14.6	14.6
	Level 4.00	159	77.6	77.6	92.2
	Level 5.00	16	7.8	7.8	100.0
	Total, Overall DMI	**205**	**100.0**	**100.0**	—
State Universities (n = 167)	Level 3.00	25	15.0	15.0	15.0
	Level 4.00	127	76.0	76.0	91.0
	Level 5.00	15	9.0	9.0	100.0
	Total (State)	**167**	**100.0**	**100.0**	—
Foundation Universities (n = 38)	Level 3.00	5	13.2	13.2	13.2
	Level 4.00	32	84.2	84.2	97.4
	Level 5.00	1	2.6	2.6	100.0
	Total (Foundation)	**38**	**100.0**	**100.0**	—

To address the research question concerning the relative emphasis placed on the digital maturity indicators, descriptive statistics were computed for all 18 indicators across the four domains. Mean scores were used to identify which indicators appeared most prominently in the institutional reports. As shown in the table, indicator **C.1** (within the Research and Development domain) received the most significant emphasis, with a mean score of **4.48**, suggesting a well-developed and consistently implemented practice in this area. Several indicators from the Learning and Teaching domain—especially **A.6** (M = 4.31) and **A.4** (M = 4.02)—also ranked highly, indicating strong institutional focus on pedagogical digital integration.

Table 4. Descriptive Statistics of the Main Indicators (18 indicators)

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
A.1	Total	205	3.33	1.298	.091	3.15	3.51
A.2	Total	205	3.67	.921	.064	3.55	3.80
A.3	Total	205	3.63	1.375	.096	3.44	3.82

A.4	Total	205	4.02	1.022	.071	3.88	4.17
A.5	Total	205	3.43	1.495	.104	3.22	3.64
A.6	Total	205	4.31	1.014	.071	4.17	4.45
A.7	Total	205	3.20	1.731	.121	2.97	3.44
B.1	Total	205	3.93	1.251	.087	3.76	4.10
B.2	Total	205	4.31	1.084	.076	4.16	4.46
B.3	Total	205	4.23	1.090	.076	4.08	4.38
B.4	Total	205	4.42	.985	.069	4.28	4.56
B.5	Total	205	4.40	1.059	.074	4.25	4.54
C.1	Total	205	4.48	.953	.067	4.35	4.61
C.2	Total	205	3.71	1.634	.114	3.48	3.93
C.3	Total	205	3.22	1.461	.102	3.02	3.43
C.4	Total	205	3.98	1.238	.086	3.81	4.15
D.1	Total	205	3.37	1.768	.123	3.12	3.61
D.2	Total	205	3.93	1.649	.115	3.70	4.16

In contrast, indicator **A.7** (Leadership and Quality domain) received the lowest mean score of **3.20**, reflecting comparatively limited attention or inconsistent development in this dimension. Other lower-scoring indicators included **C.3** (M = 3.22) and **D.1** (M = 3.37), suggesting these areas may represent early-stage or unevenly implemented digital practices across institutions.

Overall, the results illustrate considerable variation in the emphasis on digital maturity across domains. Indicators associated with structured operational and pedagogical practices tended to score highest, whereas indicators linked to strategic leadership or early-stage digital capabilities scored lower. These findings point to a strong institutional focus on technology-supported teaching and research processes, accompanied by weaker development in leadership-driven or foundational digital competencies.

5.4 Statistical Result

To address the research questions concerned with digital maturity levels and differences across dimensions, parametric inferential tests were employed. The distribution of the Digital Maturity Index (DMI) was first examined. A one-sample Kolmogorov–Smirnov (K–S) test was conducted on the overall mean DMI score derived from the 18 indicators to assess whether the data followed a normal distribution—an essential assumption for applying parametric statistical procedures. The results given in Table 5 indicated no significant deviation from normality, thereby supporting the use of parametric tests.

Following the confirmation of normal distribution, a one-sample t-test was used to address research question which examine the overall level of digital maturity reflected in the KIDR reports. This test evaluated whether the overall mean DMI score was significantly higher than the neutral midpoint of the scale. To explore next research question which investigates whether digital maturity scores differ across institutional dimensions, additional inferential analyses were conducted. Collectively, these analyses provide a more comprehensive understanding of how digital maturity is represented within the university reports and how it varies across the different institutional dimensions.

Table 5. Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test		
		TOTAL
N		205
Normal Parameters[a,b]	Mean	3.8649
	Std. Deviation	.37131
Most Extreme Differences	Absolute	.059
	Positive	.059
	Negative	-.034
Test Statistic		.059
Asymp. Sig. (2-tailed)[c]		.076

Based on the table above, the sample comprised 205 universities, and the descriptive statistics included a mean score of 3.86 (standard deviation = 0.37). The K–S test statistic was 0.059, with a significance level of 0.076. Since the p-value is greater than 0.05, the distribution of the data can be considered normal. This result indicates a relatively homogeneous level of digital maturity across the KIDR reports of the universities examined, and minor deviations (such as the positive difference of 0.059) can be interpreted as natural fluctuations. Overall, the normal distribution of the data provides a solid foundation for addressing the study's research questions.

To address *digital maturity scores of universities based on KIDR reports*—a one-sample t-test was performed on the overall DMI score, calculated from the 18 indicators. This test assessed whether the overall mean DMI score differed significantly from the neutral midpoint value of 3 on the 1–5 scale. Table 10 presents the results of this analysis

Table 6. One-Sample Test

One-Sample Test						
	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TOTAL	33.350	204	.000	.86488	.8137	.9160

The one-sample t-test results showed that the mean DMI score differed significantly from the neutral midpoint value of 3. The test produced a t-statistic of 33.350 with 204 degrees of freedom, and the significance level was $p < .001$, indicating a highly significant deviation from the test value. The mean difference of 0.8649, with a 95% confidence interval ranging from 0.8137 to 0.9160, was entirely positive. These results demonstrate that the overall mean DMI score (3.865) is significantly above the midpoint, suggesting that digitalization-related practices are clearly and consistently represented in the KIDR reports. Overall, the findings indicate a medium-to-high level of digital maturity across the universities in the samples.

Table 7. Descriptives Based on Categories

Categories	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
LeadGovQual	205	2.00	5.00	3.6571	0.58194	-0.062	-0.309
LearnTeach	205	2.60	5.00	4.2566	0.51897	-0.679	0.249
ResearcDev	205	1.75	5.00	3.8476	0.66807	-0.394	-0.051

Categories	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
ServSoc	205	1.00	5.00	3.6488	1.12505	-0.236	-0.815
Valid N (listwise)	205	—	—	—	—	—	—

Results show that universities have highest maturity scores on learning and teaching dimension, and the lowest form service to society. We may attribute this to previous experiences of HEIs, from past to today majority of their activities are about teaching and learning, and service to society dimension was the latest aspect added to KIDR aspects. This implies that the HEIs have not yet possesses enough experience about digital process of service to society.

5.5 Interpretation of Findings

The results show that digital maturity in Turkish universities is generally moderate to high, with most institutions positioned at Level 4, indicating structured and consistently implemented digital practices. The one-sample t-test confirmed that digitalization is emphasized above the neutral level in KIDR reports. However, no significant differences were found between state and foundation universities, suggesting similar levels of digital engagement across institution types. At the indicator level, maturity is strongest in teaching and program management, while areas such as community engagement remain less digitally developed.

6. CONCLUSION, IMPLICATION, AND LIMITATION

6.1 Conclusion

This study assessed the digital maturity of 205 Turkish universities using the ISER 2024 reports and the YÖKAK Digital Maturity Rubric (3.2.1). The analysis demonstrates that digital maturity across the sector is generally moderate, with most institutions at Level 4, indicating managed and systematically implemented digital practices. However, only a small proportion of universities have reached fully optimized, continuously improving digital systems. State universities show slightly higher maturity levels than foundation universities, reflecting differences in institutional capacity and resources. Across domains, Learning and Teaching achieved the highest maturity scores, supported by widespread digital pedagogy and monitoring tools. Leadership demonstrates moderate integration, with variability across sub-indicators, while Research and Development presented uneven progress. The lowest maturity appeared in the Service to Society domain, indicating limited digitalization of outreach activities. Overall, the findings suggest that Turkish universities have made meaningful advances in digital transformation, but further development—particularly in research infrastructure, community engagement, and integrated digital governance—is required to achieve higher levels of maturity.

6.2 Implications

6.2.1. Practical Implications for Universities

The results indicate that universities should strengthen their digital strategies by extending efforts beyond teaching. Conceptually, the results show that KIDR covers core structural aspects of digital maturity but does not yet reflect newer global dimensions such as cybersecurity, digital well-being, accessibility, and advanced data governance. Recognizing these gaps helps indicate where Türkiye's quality model can further align with international digital transformation standards which shows the highest maturity to areas such as research infrastructure and community engagement, where digitalization remains limited. Investing in integrated information systems, improving data governance, and enhancing digital competencies among staff and students will help institutions move beyond moderate maturity levels. Coordinating

digital initiatives with institutional goals and fostering cross-unit collaboration are essential for achieving more advanced and sustainable digital transformation.

6.2.2 Implications for Policy and Governance

At the national level, the results highlight the importance of ongoing guidance and capacity-building by YÖKAK and related organizations. Policymakers might consider creating targeted digital transformation support programs, especially for lower-capacity institutions like foundation universities. Improving national digital-readiness standards and promoting collaboration between universities can help ensure more consistent sectoral growth.

6.2.3 Implications for Research

The study advances existing literature by showing how self-evaluation reports can be systematically analyzed to assess digital maturity. It also demonstrates that qualitative institutional narratives can be converted into measurable indicators, providing a repeatable model for future national and international digital maturity evaluations. Additionally, the study offers a conceptual contribution by introducing a digital maturity model specifically adapted to the Turkish higher education context and integrating international maturity dimensions with YÖKAK's quality assurance structure through measurable indicators.

6.3. Limitations

There are some limitations to the proposed approach. First, the study relies solely on secondary data from ISER 2024 reports; therefore, the findings reflect how universities choose to present their digitalization efforts rather than direct observations of practice. Second, although the scoring system is based on validated rubric, it must also be evaluated by more field experts.

6.4 Recommendations for Future Research

Future studies may incorporate mixed data sources—including surveys, interviews, and system-level digital-usage data—to more comprehensively triangulate institutional performance. Longitudinal analyses could also track institutional progress in digital maturity over multiple years, while comparative studies across countries may reveal broader regional or global patterns. In addition, future research would benefit from expanding the evaluation framework to include internationally recognized dimensions such as Sustainability & Accessibility and Security, Ethics & Well-being, which are increasingly considered essential components of digital transformation in higher education. Integrating these additional domains would provide a more holistic understanding of institutional digital capacity and align the assessment with emerging global standards.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 38-52
http://doi.org/10.26677/TR1010.2026.1635

Solo Tourists' Experience-Sharing Tendency: Its Role on Well-Being

Yeliz GÜLER
Dokuz Eylül University, yelizglr@gmail.com
https://orcid.org/0000-0002-9916-2629

Abstract

This study aims to address a gap in the literature by examining how individuals with solo travel experience interpret their tendency to share experiences, the role of such sharing in others' decisions to travel solo, and its contribution to their well-being within the framework of modern well-being theories. Adopting a phenomenological qualitative research design, the study focuses on Turkish tourists with solo travel experience. Data were collected through in-depth interviews with 22 participants and analyzed using descriptive analysis. Findings indicate that experience-sharing behavior supports the positive relations dimension of Ryff's psychological well-being theory, as well as the social contribution, social integration, and social acceptance dimensions of Keyes's social well-being theory. The results demonstrate that sharing solo travel experiences holds deeper meaning for the sharer and positively contributes to both individual well-being and others' solo travel decisions, extending the solo travel experience beyond the journey itself.

Keywords: Solo Travel; Solo Holiday; Solo Tourist; Experience Sharing; Well-being.

1. INTRODUCTION

In the tourism sector, new travel behaviors have emerged as a result of digitalization and individualization. As an alternative to mass tourism, solo travel behavior has shown a significant increase in recent years. Individuals who have solo holiday experiences are classified into four categories based on their typological characteristics: leisure-oriented solo travelers, social solo travelers, exploration-oriented solo travelers, and escape-oriented solo travelers (Zhang et al., 2024).

Various factors such as changes in individuals' educational levels, demographic characteristics, relaxation preferences, the search for freedom and flexibility, increasing environmental awareness, and the desire for exploration influence the decision to travel alone. Studies on solo travel have primarily focused on motivations for traveling alone, communication during the trip, safety, risk, planning, food and beverage, accommodation, socialization, and entertainment experiences. These areas mainly explain the first two stages of the tourist experience: decision making/planning and on-site experiences. However, the third stage of the tourist experience posttravel experiences is a process that increases satisfaction, reinforces the experience, and influences repurchase decisions. Post-travel experiences constitute a phase in which the tourist experience gains meaning at cognitive, emotional, and social levels (Larsen, 2027).

Research indicates that the motivations of Turkish solo travelers for sharing their travel experiences are primarily related to identity, followed by intrinsic factors such as entertainment, relationships, and personal benefits (Arslan & Şimşek, 2022). Another key component of post-travel experience is the sharing of acquired experiences. Experience sharing after travel increases

the social value of the trip and strengthens social ties with others. According to Su et al. (2021), sharing positive tourism experiences contributes to well-being.

It has been observed that solo travel behavior has increased significantly in recent years. In parallel with this increase, solo travel and solo tourists have been examined in the literature from various perspectives. However, a review of the relevant literature reveals a lack of studies examining the tendency to share solo travel experiences, the role of experience sharing in others' decisions to travel alone, and the impact of such sharing behavior on the sharer's well-being. Within this framework, the aim of this study is to determine the role of solo travel experience-sharing behavior in the well-being of the individual who shares the experience. Accordingly, this study seeks to answer the following research question: How do individuals with solo travel experience perceive their tendency to share experiences, how do they interpret the role of experience sharing in others' decisions to travel alone, and what is the role of experience-sharing behavior in the sharer's well-being?

The researcher participated externally in the participant profile; however, the author has twenty years of professional experience in the tourism sector, specifically in travel agency operations, as well as formal education in tourism management. While this background facilitated effective communication with participants and contributed to conducting interviews within the framework of the research problem, the study findings were analyzed by two experts to maintain objectivity during the data analysis stage. The researcher's role, tendencies, and perspective in this study have been transparently presented above. The sections of the study shaped by this perspective are examined in detail below.

2. LITERATURE REVIEW

2.1 Solo Travel and Well-Being

Travel behavior has been present since ancient times, serving different purposes throughout history. In Antiquity, travel primarily served religious or military purposes, while in Ancient Greece it was preferred by philosophers for philosophical development (Seyhan, 2010: 94). During the Middle Ages, travel increased not only for trade but also to religious centers. In the Enlightenment period, with the growing importance of exploration and invention, new forms of social life and thought emerged, giving rise to the idea of "self-reconstruction." Advances during the Industrial Revolution increased transportation opportunities and enabled the emergence of tourism-oriented travel (Çallı, 2015).

As an alternative to mass tourism, solo travel has gained momentum and has attracted attention due to its rapid growth in the global tourism market (Otegui Carles et al., 2022). Rising educational levels, technological developments, environmental awareness, the desire to experience different cultures, and increasing individualization in social life have all contributed to the emergence of solo travel as a viable alternative to mass tourism (Kaba & Emekli, 2018).

Although there is no universally agreed-upon definition of "solo travel" in the literature, it is most commonly defined as "an individual setting out alone to experience a destination and arriving there independently" (Yang, 2021). Despite being described as "traveling alone," studies by Zhang et al. (2024) and Yang (2021) emphasize that solo travelers commonly interact with locals or other tourists at the destination, form temporary social connections, and participate in activities together, without these interactions altering their identity as solo travelers. Although solo travel has often been associated with backpacking and adventure tourism, it has evolved into a more inclusive experience characterized by meeting locals and other tourists, forming friendships, and participating in spontaneous activities. This evolution has led to the concept of being "alone but not lonely." Ultimately, solo travel refers to a process that begins with an

individual's intention to visit a destination alone and involves independently assuming responsibility for transportation, accommodation, and travel planning (Osman et al., 2019).

Solo travel, a significant component of the tourism sector, is experienced by individuals with diverse demographic characteristics, including age, gender, education, and economic status (Ejupi et al., 2022). Motivations for solo travel include personal development, relaxation, escape, self-discovery, environmental exploration, socialization, freedom, and the desire for new experiences (Nguyen & Hsu, 2023; Teng et al., 2023). These motivations are closely linked to expectations of personal growth and change and are considered intrinsic motivations. Since intrinsic motivations are associated with fulfilling personal needs, they are closely related to the concept of well-being (Somasiri et al., 2023).

The concept of well-being is rooted in the philosophies of Aristippus and Aristotle and is addressed through two main philosophical dimensions: hedonic well-being and eudaimonic well-being. While hedonic well-being focuses on short-term pleasure, eudaimonic well-being adopts a holistic perspective oriented toward living a meaningful life (Tekin, 2023).

Within this framework, well-being encompasses all aspects of life (Işık, 2023). Solo travel experiences are reported to create meaningful value in individuals' lives, indicating that solo travel extends beyond being merely a leisure activity and functions as a form of experience through which individuals realize and enhance their well-being. Research demonstrates that solo travel leads to positive changes in individuals' well-being (Hamid et al., 2021). According to modern approaches, well-being is explained through psychological, social, and subjective well-being theories.

Psychological well-being refers to an individual's ability to cope with life challenges, sustain personal development, and establish meaningful relationships. It comprises self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth (Bulut, 2018).

Social well-being relates to how individuals perceive their lives at a societal level. Conceptualized by Keyes, it emphasizes that well-being is connected to social context and consists of five dimensions: social contribution, social actualization, social coherence, social integration, and social acceptance (Keyes, 1998).

Subjective well-being refers to an individual's evaluation of their own life and the positive emotional state resulting from this evaluation (Gencer, 2018). It involves both cognitive evaluations (life satisfaction) and affective components, including high positive affect (e.g., happiness, peace, enjoyment) and low negative affect (e.g., fear, anxiety, guilt) (Doğan & Eryılmaz, 2013; Morales & Ramos, 2025).

2.2 Theoretical Approaches to the Concept of Well-Being

The concept of well-being has historically been a central topic of inquiry in philosophy and psychology. In the literature, well-being is primarily examined through two fundamental approaches: hedonic and eudaimonic well-being (McMahan & Estes, 2011). These approaches evaluate individuals' lives in relation to pleasure. While the hedonic approach focuses on immediate and short-term pleasure experiences, the eudaimonic approach emphasizes a holistic state of well-being that renders life meaningful (Deci & Ryan, 2008). The hedonic approach is rooted in the philosophy of Aristippus, whereas the eudaimonic approach is grounded in Aristotelian philosophy. Accordingly, the hedonic perspective conceptualizes happiness as the experience of pleasure, whereas the eudaimonic perspective argues that happiness is associated with leading a meaningful life. Hedonic well-being is linked to short-term pleasures, whereas

eudaimonic well-being focuses on self-realization throughout the life course (Thorsteinsen & Vitterso, 2018).

From a modern perspective, the concept of well-being plays a critical role in understanding individuals' welfare levels and life satisfaction. Accordingly, various approaches have been proposed to conceptualize and define well-being (Heshmati et al., 2023). These approaches examine well-being from different perspectives while emphasizing its association with leading a meaningful life (Samman, 2007; Camfield et al., 2008; Das et al., 2020). Within contemporary frameworks, well-being is addressed through three main theoretical approaches: psychological well-being, social well-being, and subjective well-being.

Psychological well-being was conceptualized by Carol Ryff as a modern interpretation of eudaimonic well-being and theorized across six core dimensions. These dimensions include autonomy, environmental mastery, self-acceptance, personal growth, positive relations with others, and purpose in life (Revelia, 2019). Autonomy refers to individuals' ability to regulate their lives independently in accordance with their own values, whereas environmental mastery denotes the capacity to manage environmental factors in line with personal needs. Self-acceptance involves embracing all aspects of oneself and being satisfied with one's life choices. Personal growth reflects a life oriented toward realizing one's potential through openness to change and development. Positive relations represent the presence of deep, satisfying social bonds, while purpose in life refers to sustaining life with beliefs and goals aligned with meaning and direction (Ryff, 2019).

Another dimension of well-being, social well-being, was theorized by Keyes and explained through five sub-dimensions: social contribution, social actualization, social coherence, social integration, and social acceptance. This framework argues that well-being is shaped not only by individuals' internal states but also by their relationship with the social environment. Social contribution refers to the belief that one's abilities add value to society. Social actualization reflects an optimistic perspective regarding society's capacity for growth and progress, while social coherence denotes perceiving the social environment as understandable, orderly, and predictable. Social integration involves feeling like a meaningful part of one's community and sharing common values with others, whereas social acceptance relates to perceiving society as trustworthy and accepting individuals with a positive outlook. Well-being is thus defined as the totality of cognitive judgments and emotional responses individuals form toward their lives (Keyes, 1998).

Subjective well-being is a theory introduced by Ed Diener in 1984. It focuses on individuals' evaluations of their quality of life from their own perspectives and the positive states they experience as a result of these evaluations. Subjective well-being comprises two dimensions: cognitive and affective components. The cognitive component, life satisfaction, relates to the alignment between individuals' current life conditions (e.g., work, economic status, health) and their desired standards of living (Diener & Oishi, 2018; Morrison et al., 2011). The affective component is classified into high positive affect and low negative affect. High positive affect encompasses emotional experiences such as joy, enthusiasm, happiness, peace, and pleasure, whereas low negative affect includes emotions such as fear, anger, anxiety, guilt, and sadness. In this context, minimizing negative experiences and maximizing positive affect are emphasized. It is also suggested that high positive affect and low negative affect may coexist simultaneously in individuals' lives (Chamberlain, 1988).

Within the theoretical framework, studies examining the role of experience sharing on individuals' well-being indicate that sharing experiences influences well-being for both the sharer and the recipient. Li et al. (2022) found that sharing positive experiences with others increased

individuals' positive emotions associated with those experiences. Similarly, Su et al. (2021: 10) demonstrated that the type of tourism activity experienced influences sharing decisions, with eudaimonic experiences exhibiting a higher tendency to be shared. Cerna et al. (2023) reported a positive relationship between experience sharing via social media and individuals' travel decision-making processes. Ghaderi et al. (2024) emphasized that experience sharing through social media plays a significant role in fostering a sense of community, memory accumulation, empathy development, and the strengthening of personal bonds. Furthermore, Munar and Jacobsen (2014) identified differences in motivations for content creation on social media, highlighting the importance of social and emotional support in sharing behaviors. Yu et al. (2021), likewise found that sharing travel experiences contributes positively to tourists' well-being.

In conclusion, experience sharing is closely associated with well-being, and existing research largely supports this relationship. However, previous studies have primarily focused on the experiential dimension of social media sharing, while research addressing experience sharing through alternative channels remains limited. Moreover, existing studies generally examine vacation experiences within the context of general tourism, with little attention given to the role of solo travel experience sharing in well-being. Considering that motivations for solo travel are shaped by expectations of psychological, social, and subjective experiences, it is essential to investigate both the tendency to share solo travel experiences and their role in well-being. Accordingly, this study examines the role of solo travel experience sharing in well-being within the framework of modern well-being theories.

3. METHOD

3.1 Research Design

This study aims to determine the tendency of tourists with solo travel experience to share their travel experiences with others, the role of experience sharing in well-being, and the influence of shared experiences on other individuals' decisions to engage in solo travel. To achieve this aim, the study was conducted using a qualitative research approach based on a phenomenological design. Phenomenology seeks to reveal the shared meanings of experiences related to a particular phenomenon among a specific group of individuals and to uncover how these experiences are perceived and interpreted (Groenewald, 2004).

3.2 Development and Validation of the Interview Questions

The interview form was developed through a comprehensive review of the relevant literature and a six-month preliminary observation of social media posts shared by individuals with solo travel experience. During this period, publicly available content related to solo travel experiences was systematically examined. The interview questions were designed to align with participants' tendencies to share their solo travel experiences and to address the theoretical gaps identified in the literature. As a pilot phase, a focus group discussion was conducted with seven individuals who had prior solo travel experience to assess the clarity, relevance, and comprehensiveness of the initial interview questions. Based on the feedback obtained from this focus group, the interview questions were revised and refined. Subsequently, the revised interview questions were tested through individual pilot interviews with three participants who had solo travel experience. This two-stage pilot process contributed to enhancing the validity, reliability, and overall quality of the interview form.

3.3 Population and Sample

The population of the study consists of Turkish tourists who have experience in solo travel. Due to the large size of the population, participants were selected using purposive sampling, and the selection process was carried out through criterion sampling.

In purposive sampling, it is assumed that participants meet the requirements relevant to the research topic, while criterion sampling requires participants to fulfill predetermined criteria (Palinkas et al., 2015). Accordingly, the sample comprises a total of 22 individuals (14 women and 8 men) who are aged 18 or older, are citizens of the Republic of Türkiye, have undertaken at least three solo trips within the past five years, and have stayed a minimum of four nights on each trip.

3.4 Data Collection

The data for this study were obtained from responses to a question included in in-depth interviews conducted for a doctoral dissertation titled "A Study on Solo Travel Experience and Well-Being." The interviews were carried out between 21 June 2023 and 9 December 2024 via an online meeting platform. While the overall duration of the interviews ranged from 45 to 60 minutes, the response time for the specific question forming the dataset of this study averaged approximately 5–10 minutes.

Interviews were conducted with 25 participants; however, 22 participants provided responses to the interview question relevant to this study. An examination of the data obtained from these 22 participants with solo travel experience revealed that no new themes or concepts emerged. The interviews provided sufficiently rich and diverse information and reached data saturation.

Ethical approval for the study was obtained from the Dokuz Eylul University Social and Human Sciences Scientific Research and Publication Ethics Committee (Decision No. 10, dated 21/03/2023).

3.5 Data Analysis

Data analysis in this study was conducted within the framework of the phenomenological design using descriptive analysis and was carried out in four stages: bracketing, intuition, analysis, and description (Groenewald, 2004). During the bracketing stage, audio recordings obtained from the interviews were transcribed into written documents. In the intuition stage, the transcripts were read three times to gain an in-depth understanding and interpretation of the phenomena experienced by the participants, thereby completing the preparation phase for analysis. Subsequently, during the analysis stage, participants' statements were extracted, coded, and organized into themes. In the description stage, the phenomena related to the study were identified based on the emerging themes. These phenomena were then categorized and explained in detail.

In addition, direct quotations from participants were included to present their views as objectively as possible. Participants were coded according to the order of the interviews as K1, K2, K3, …, K22.

3.6 Validity and Reliability

Scientific research must meet criteria of validity and reliability. Accordingly, this study was guided by Guba's model of trustworthiness, which includes credibility, dependability, transferability, and confirmability (Guba, 1981). To ensure credibility, participation was strictly based on voluntariness. Prior to the interviews, participants were informed about the purpose of the research, provided with the ethics committee approval document, and asked to sign informed consent forms. Participants were explicitly informed that the data obtained from the interviews would be used solely for scientific purposes and that their identities would remain confidential. Permission was obtained from participants to conduct interviews via video conferencing and to record audio using a recording device. All participants consented to audio recording.

Dependability was ensured by having the data analyzed independently by two researchers. To enhance transferability, detailed information regarding participants' demographic

characteristics, the number of participants, and the data collection technique was provided. Confirmability was achieved by having the research findings coded, thematically analyzed, and categorized independently by two researchers.

3.7 Limitations of the Study

Participants were selected from among volunteers who responded to a call published on the social media platform X (formerly Twitter) on 19 November 2024 as part of the process of determining the sample group for a doctoral dissertation titled "A Study on Solo Travel Experience and Well-Being." Although the aim was to reach individuals with diverse social characteristics, the participant group was limited to users of the X platform. Additionally, the assumption that participants had solo travel experience was based solely on their self-reported statements.

4. FINDINGS

In order to determine how individuals with solo travel experience perceive their tendency to share travel experiences with others, how they interpret their well-being, and how they understand their role in influencing others' decisions, interviews were conducted with the participants. Initially, participants were asked the following question to determine their demographic characteristics: "Could you provide information about your age, gender, educational background, occupation, and the city you live in?"

After identifying participants' demographic profiles, two research questions related to the study problem were posed. First, participants were asked: "Do you share your solo holiday experiences with other people?" Second, they were asked: "Do you think you have influenced another person's decision to travel alone positively or negatively? If so, how many individuals' decisions to travel alone do you think were influenced by your experiences, either positively or negatively?" The findings obtained from the interviews are presented in this section.

4.1 Demographic Characteristics of the Participants

The participants of the study consist of a total of 22 individuals, including 14 women and 8 men. The ages of the participants range between 27 and 62 years. In terms of educational background, 14 participants hold a bachelor's degree, 6 hold a master's degree, and 2 have a doctoral degree, indicating a relatively high level of education among the sample.

The participants reside in various cities across Türkiye, including Istanbul, Ankara, İzmir, Muğla, Bursa, Edirne, Eskişehir, Hatay, and Isparta. Their occupations vary, encompassing employment in both the public and private sectors. Detailed demographic characteristics of the participants are presented in Table 1.

Table 1. Demographic Profile of Respondents

Participant	Gender	Age	Education Level	Occupation	City
K1	Male	40	Master's Degree	Engineer	İstanbul
K2	Male	27	Master's Degree	Engineer	Ankara
K3	Female	47	Bachelor's Degree	Manager	İzmir
K4	Female	62	Doctoral Degree	Academic	İzmir
K5	Female	41	Bachelor's Degree	Assistant Director	Muğla
K6	Female	42	Bachelor's Degree	Private Sector Employee	Bursa
K7	Female	36	Bachelor's Degree	Birdwatcher	Edirne

K8	Female	39	Bachelor's Degree	Teacher	Eskişehir
K9	Male	31	Bachelor's Degree	Cybersecurity Specialist	İstanbul
K10	Female	44	Master's Degree	Nurse	Hatay
K11	Male	35	Bachelor's Degree	Content Creator	İstanbul
K12	Female	27	Bachelor's Degree	Unemployed	Ankara
K13	Male	48	Bachelor's Degree	Journalist	İstanbul
K14	Male	39	Bachelor's Degree	Migration Specialist	İstanbul
K15	Female	38	Bachelor's Degree	Sales Representative	İzmir
K16	Female	31	Master's Degree	Clinical Psychologist	İstanbul
K17	Female	27	Master's Degree	Theatre Production Supervisor	İstanbul
K18	Female	45	Doctoral Degree	Academic	Isparta
K19	Female	30	Bachelor's Degree	Art Historian	İstanbul
K20	Male	44	Bachelor's Degree	Computer Engineer	Antalya
K21	Male	32	Master's Degree	Lawyer	İstanbul
K22	Female	35	Bachelor's Degree	Digital Marketing Analyst	Bursa

4.2 Tendency to Share Solo Travel Experiences

Based on participants' responses to the question aimed at identifying their tendency to share solo travel experiences, it was found that all 22 participants shared their solo travel experiences to some extent. Eighteen participants stated that they shared their experiences only within their social circles, while two participants indicated that they shared their experiences both with their social circles and with others via social media. The remaining two participants reported that they shared their experiences only when specifically asked. Selected illustrative participant statements are presented below:

> I often try to encourage people—especially younger individuals—by sharing my solo travel experiences. Sometimes I also share my experiences with friends in my own age group. In doing so, I try to motivate them as well. Since I have not had any negative experiences, I particularly emphasize my positive experiences, especially when talking to young people. (K18, Academic, Female)

> Yes, I always share my solo holiday experiences and even emphasize them strongly. I can say that I have inspired many of my female friends to think differently about this issue and to travel alone. (K15, Sales Representative, Female)

A statement from a participant who shares solo travel experiences only upon request is presented below:

> If someone asks me if they are considering such an experience and want advice, I gladly take a lot of time to explain everything, even down to how to find maps and information. But only if they ask. (K3, Manager, Female)

4.3 The Role of Experience Sharing in Others' Decisions to Travel Alone

In order to understand how participants interpret the role of their solo travel experiences in others' decisions to travel alone, as well as the impact of experience sharing on their own well-being, participants were asked the following question: "Do you think you have influenced

another person's decision to travel alone positively or negatively?" Responses were coded and categorized accordingly.

Based on the findings, eight participants described their experience-sharing behavior as inspirational, nine participants defined it as encouraging, and three participants characterized it as memory sharing. Two participants who shared experiences only when asked stated that they adopted a cautious approach due to concerns about being misunderstood. In line with the coded responses, four distinct phenomena were identified: encouragement, inspiration, memory sharing, and cautious approach.

The percentage distribution of these phenomena is as follows: Encouragement (40.91%), Inspiration (36.36%), Memory Sharing (13.64%), and Cautious Approach (9.09%). Selected illustrative quotations for each phenomenon are provided below.

4.3.1 Encouragement

According to the interview findings, nine participants stated that sharing solo travel experiences served as an encouraging factor in others' decisions to travel alone. Statements from K13 and K19, who reported that people in their social circles decided to travel alone after hearing about their experiences, are presented below:

> I always sincerely share my solo travel experiences with people around me. I think I encouraged some of them—friends who first asked, 'Wouldn't you get bored traveling alone?' and then decided to try it. Hearing them later say, 'I went after listening to your stories, and I'm so glad I did,' makes me happy. (K13, Male, Journalist)

> I share my solo travel experiences with others. I can recall several cases where I positively influenced someone's decision to travel alone. Of course, this wasn't because I said, 'You must try this,' but rather because after hearing my stories, people felt more excited and courageous. (K19, Female, Art Historian)

4.3.2 Inspiration

Eight participants stated that sharing solo travel experiences was inspiring for others. Statements from K15 and K21, who indicated that others traveled alone after being inspired by their shared experiences, are presented below:

> Yes, I always share my solo holiday experiences and emphasize them. I can say that I have inspired many of my female friends to think differently about this and to travel alone. (K15, Female, Sales Representative)

> Whenever it comes up in social settings, I always encourage people to travel alone. I don't know exactly how many people were inspired by me, but my closest friend did it and told me how much she enjoyed it. (K21, Male, Lawyer)

4.3.3 Memory Sharing

Findings indicate that although some participants shared their solo travel experiences with friends, family, and close social circles, this sharing did not have a positive or negative influence on others' decisions to travel alone. Three participants described their experience sharing as remaining at the level of memory sharing. Statements from K6 and K16 are presented below:

> I'm someone who shares almost everything with my friends and family. But whether I influenced anyone positively or negatively… No, there hasn't been anyone so far. (K6, Female, Private Sector Employee)

> I talk about it and praise it, but I guess I haven't managed to motivate anyone. (K16, Female, Clinical Psychologist)

4.3.4 Cautious Approach

The findings also indicate that two participants refrained from sharing their solo travel experiences. These participants reported concerns about their experiences being misinterpreted as promoting luxury consumption or appearing boastful. Statements from K2 and K3 reflecting this concern are presented below:

> I'm not very eager to talk about it. I generally don't like sharing good things I've experienced without being asked. Traveling abroad has started to feel like a luxury, and talking about it feels like showing off. So unless someone asks, I prefer not to talk about it. (K2, Male, Engineer)

> I used to share more enthusiastically, but I realized that it sometimes made people feel worse—especially if they didn't have that kind of courage. Others perceived it as showing off. So I mention it when it comes up, but if it doesn't, I don't push it. (K3, Female, Manager)

Participants' responses to the question "How many people do you think you have positively or negatively influenced in their decision to travel alone?" varied. Thirteen participants reported positively influencing between 1 and 4 people, three participants reported influencing 5 to 10 people, and one participant reported influencing 15 to 20 people. Four participants stated that they had not played any positive role in others' decisions to travel alone. Notably, none of the participants reported having a negative influence on anyone's decision.

Based on the data obtained from all participants, 77.3% stated that sharing solo travel experiences had an influence on others' decisions to travel alone. The arithmetic mean of the number of individuals influenced to travel alone was 3.3 persons. The number of individuals reported to have been influenced by participants' experience sharing is presented in Table 2.

Table 2. Count of Individuals Influenced to Travel Solo

Participant	Positively Influenced Individuals	Negatively Influenced Individuals	Participant	Positively Influenced Individuals	Negatively Influenced Individuals
K1	3-4 persons	0	K12	2-3 persons	0
K2	0	0	K13	2-3 persons	0
K3	5-6 persons	0	K14	5 persons	0
K4	3 persons	0	K15	3 persons	0
K5	2 persons	0	K16	0	0
K6	0	0	K17	2 persons	0
K7	1 person	0	K18	1 persons	0
K8	0	0	K19	2 persons	0
K9	15-20 persons	0	K20	10 persons	0
K10	3-4 persons	0	K21	1 person	0
K11	2 persons	0	K22	1 person	0

5. DISCUSSION AND CONCLUSION

This study aimed to examine solo travelers' tendencies to share their travel experiences, the contribution of these shared experiences to the well-being of the sharer, and the role of such sharing in influencing others' decisions to travel alone. The findings were analyzed under four categories: inspiration, encouragement, memory sharing, and cautious approach. Within this framework, it was found that individuals with solo travel experience tend to share their experiences with others and that these shared experiences play a positive role in others' decisions to travel alone. Individuals perceive the effects of sharing solo travel experiences as meaningful and rewarding (Kang & Schuett, 2013).

The way participants interpreted their influence on others' decisions to travel alone—as inspiring or encouraging—as well as the presence of different motivations underlying memory sharing and cautious approaches, indicates that experience-sharing behavior has a deeper significance for the sharer. These findings are consistent with previous research (Çiçek & Aşan, 2023; Chen et al., 2025; Dewi et al., 2025).

Studies by Li et al. (2022) demonstrate that experience sharing contributes to well-being and enhances life satisfaction, while sharing positive experiences significantly increases individuals' positive emotional states and happiness. Furthermore, research by Ghaderi et al. (2024) and Su et al. (2021) reveals that such sharing strengthens social bonds and fulfills the need for social approval.

Within this context, the findings related to the identified phenomena were categorized and analyzed according to Ryff's Psychological Well-Being Theory, Keyes' Social Well-Being Theory, and Diener's Subjective Well-Being Theory. The results indicate that the meanings attributed to sharing solo travel experiences and influencing others' decisions to travel alone support the positive relations dimension of Ryff's psychological well-being theory and the social contribution and social approval dimensions of Keyes' social well-being theory. However, no findings directly supporting Diener's subjective well-being theory were obtained. Accordingly, the results related to psychological and social well-being are discussed below.

Psychological well-being consists of six dimensions: autonomy, environmental mastery, self-acceptance, personal growth, positive relations, and purpose in life. Based on the findings related to the encouragement and inspiration categories, individuals play an inspiring and encouraging role for others through experience sharing, contributing to the establishment of trust-based, satisfying, and positive relationships. Conversely, findings related to the cautious approach category reveal concerns about sharing experiences, rooted in the perception that solo travel may be associated with luxury consumption or interpreted as bragging, potentially discouraging those who lack similar opportunities. This cautious behavior reflects an attempt to protect social relationships and, in doing so, supports psychological well-being. These findings support the positive relations dimension of Ryff's psychological well-being theory. Consistent with previous literature (Kang & Schuett, 2013; Akova et al., 2019; Li et al., 2022; Fan et al., 2024), the results confirm that experience-sharing behavior is closely related to individuals' psychological well-being.

Another dimension of well-being, social well-being, is explained through five sub-dimensions: social contribution, social actualization, social coherence, social integration, and social acceptance. According to the findings related to the encouragement and inspiration categories, individuals gain social acceptance and approval by making solo travel behavior socially acceptable through experience sharing. Simultaneously, they fulfill the social contribution dimension by developing a strong belief that their experiences add value to society. The finding that the average number of individuals positively influenced to travel alone after experience sharing is 3.3 provides strong evidence of perceived social approval and contribution. These

results support the social contribution and social approval dimensions of Keyes' social well-being theory. Similar relationships between experience sharing and social well-being have also been identified in studies by Arewasikporn et al. (2019) and Jolly et al. (2019), indicating consistency with the existing literature.

When examining the findings of the memory-sharing category, individuals tend to interpret their experience sharing as repeated memory sharing aimed at maintaining and strengthening social bonds. According to Keyes (1998), this behavior contributes to social integration and social acceptance within society. Accordingly, these findings support the social integration and social acceptance dimensions of Keyes' social well-being theory. In line with previous studies (Su et al., 2021; Ghaderi et al., 2024), the results confirm that experience-sharing behavior is positively associated with individuals' social well-being.

Overall, this study demonstrates that sharing solo travel experiences supports the positive relations dimension of Ryff's psychological well-being theory and the social contribution and social approval dimensions of Keyes' social well-being theory.

5.1 Theoretical Contribution

The increasing prevalence of solo travel has attracted the attention of both the tourism industry and researchers. Previous studies on solo travel have predominantly focused on experiences during the travel process itself.

However, research addressing the post-travel phase-particularly experience sharing-remains limited. There is a lack of studies examining solo travelers' post-experience sharing tendencies and how this behavior contributes to the sharer's well-being. By addressing this gap, the present study aims to contribute to the existing literature in tourism marketing, tourism psychology, and tourism sociology by revealing how solo travelers' experience-sharing tendencies and their influence on others' decisions to travel alone contribute to the sharer's well-being.

5.2 Practical Implications

This study demonstrates that solo travelers' tendencies to share their experiences and their influence on others' decisions to travel alone contribute positively to their well-being. Previous research indicates that individuals tend to share positive experiences with others and that such sharing plays a significant role in travel planning and destination choice. While this behavior fulfills the sharer's need for social approval, it also serves as a valuable source of information for potential solo tourists.

In this context, understanding the role of solo travel experience sharing in well-being may provide valuable insights for tourism stakeholders. The findings suggest practical implications for the development of new tourism products and the formulation of innovative marketing strategies targeting the growing solo travel market.

5.3 Limitations and Suggestions for Future Research

The primary limitation of this study is that participants' solo travel experiences are based solely on self-reported data. Additionally, the study was conducted exclusively with Turkish citizens; therefore, the findings reflect the well-being of Turkish travelers and cannot be generalized due to potential cultural differences. Future research may adopt a comparative approach by examining differences between individuals who share solo travel experiences and those who share group travel experiences in terms of well-being outcomes. Furthermore, the extent to which experience sharing actually influences others' decisions to travel alone and its impact on well-being could be examined from the perspective of those influenced by such sharing. Future studies may also explore the role of experience sharing in well-being based on different sharing channels and gender perspectives. Such research would contribute to a deeper understanding of the role of solo travel experience sharing in well-being across diverse variables.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 53-65
http://doi.org/10.26677/TR1010.2026.1636

One Plate Two Times: A Creative Fusion Between Tradition and Future

Hilal KESKİN

Istanbul Kent University, Gastronomy and Culinary Arts, Kagıthane Campus, Istanbul.

hilal.keskin@kent.edu.tr,

https://orcid.org/0000-0003-4366-8177

Abstract

This study explores the impact of digitalization on local culinary cultures through the lenses of *creative destruction* and *planned obsolescence*. Utilizing a qualitative research design, semi-structured interviews were conducted with 10 participants from diverse age and gender groups. The collected data were analyzed using thematic content analysis via ATLAS.ti software. Six main themes emerged: The Meaning of Traditional Food, Perceptions of Technology, Planned Obsolescence and Creative Destruction, Manual Labor and Cultural Value, Fears about the Future of Digitalization, and the Coexistence of Tradition and Technology. Findings reveal that participants are not categorically resistant to technological transformation; rather, they emphasize the need to preserve emotional bonds, cultural memory, and traditional practices throughout the digital transition. The study argues that technological integration in the field of gastronomy should not be limited to functional efficiency but must also address sociocultural and ethical dimensions. The concept of *creative synthesis* is proposed as an alternative paradigm that promotes the coexistence of tradition and innovation, offering a sustainable path forward for safeguarding culinary heritage in the digital age.

Keywords: Digital Gastronomy, Creative Destruction, Planned Obsolescence, Culinary Heritage, Tradition And İnnovation, Creative Synthesis, Food Culture

1. INTRODUCTION

Technological developments not only transform instrumental processes but also profoundly affect everyday life practices, value systems, and forms of cultural identity. In this respect, digitalization transforms a wide range of areas — from individuals' consumption habits to forms of social interaction, and even their sensory experiences. Gastronomy is one of the fields where this transformation can be observed in the most tangible and symbolic way. For food is not merely a biological necessity but also a historical, emotional, and cultural narrative.

In this context, concepts such as creative destruction (Schumpeter, 1942) and planned obsolescence (Packard, 1960) provide important theoretical tools for understanding how technological innovations threaten cultural continuity. Especially in today's era of accelerated digitalization, traditional culinary knowledge, labor-based production, and social belonging have become increasingly invisible, replaced by algorithms, automation systems, and platform-based consumption models.

This study aims to understand the effects of digitalization on local culinary cultures through individuals' experiences and perceptions. Drawing upon multi-layered theoretical perspectives such as Schumpeter's *creative destruction*, Packard's *planned obsolescence*, Weber's *rationalization*, Bauman's *liquid modernity*, and Latour's *actor-network theory*, it traces the signs of cultural transformation through food production and consumption. In this study, the concept of creative fusion is proposed as an alternative approach to this process of transformation.

2. CONCEPTUAL FRAMEWORK

Technological progress is considered one of the main driving forces behind social transformation and societal change. The technological determinism approach argues that technology is not merely a tool but also a determinant of social structure and cultural values. The ideas of Thorstein Veblen, one of the pioneers of this approach, were later developed by Marshall McLuhan in the field of communication. McLuhan (1964), with his famous statement "the medium is the message," emphasized that it is the form of technology—rather than its content—that shapes society.

In modern capitalist systems, destruction and renewal are intertwined processes. Joseph Schumpeter referred to this cyclical structure as creative destruction, noting that while old structures collapse, innovative enterprises reshape the economic field (Szanto, 2011). Creative destruction became one of the fundamental economic concepts associated with the Austrian-born American economist Joseph Schumpeter from the mid-20th century onward. Inspired by Karl Marx's understanding of historical materialism, Schumpeter developed this concept into a theory explaining the cyclical impact of economic innovation. According to him, creative destruction represents an "industrial mutation" process in which the economic structure continuously eliminates existing systems and replaces them with new ones through internal evolution (Schumpeter, 1942; Nolan and Croson, 1995).

Since the early 2000s, this process has accelerated; the lifespan of innovations has shortened, and technological and economic developments have profoundly changed the nature of competition (Schumpeter, 1942; Bauman, 2000; Edgerton, 2006). Creative destruction refers to the replacement of existing products and methods with more efficient alternatives to enhance productivity and improve processes with higher-quality outputs (Mckeown, 2008). Thus, competence in the business world is elevated, and the continuity of innovation is ensured.

During this transformation, enterprises not only produce innovations but also deliberately render existing products obsolete, directing consumers toward new ones. This strategy is defined in the literature as planned obsolescence and is a widespread practice particularly in consumer societies. The concept of planned obsolescence was first introduced by Bernart London in his 1932 article titled *"Ending the Depression Through Planned Obsolescence."* It is defined as inducing consumers to purchase new products slightly earlier than necessary (Dannoritzer, 2010). Planned obsolescence means designing a product with a predetermined lifespan so that once this period ends, the product becomes unusable (Smeels & Stevels, 2003). The shortening of product life cycles is carried out according to a specific program, thereby paving the way for repeated purchases (Kadıoğlu, 2014, p. 62). The concept was later popularized by Packard (1960), who defined it as "the deliberate reduction of product life cycles" (p. 62).

Packard (1960) explains planned obsolescence as the acceleration of the consumption cycle through the deliberate limitation of product lifespans or by presenting existing technologies as "outdated." In this sense, planned obsolescence demonstrates that creative destruction is not merely a natural outcome of competition but also a systematically designed economic strategy.

Such dynamics of change play a central role in the functioning of capitalism. The continuous evolution of new resources, production methods, markets, and industrial structures constitutes the core elements that keep the system alive. Creative destruction serves as the driving force of this movement and forms the foundation of economic growth. Aghion et al. (2016) conceptualize creative destruction as the "sum of job creation and job destruction," emphasizing its direct connection to economic vitality.

For instance, Henry Ford's introduction of the assembly line system for mass automobile production created a major transformation in transportation, rendering professions such as horse-drawn carriage making and blacksmithing obsolete within a short time. Similarly, the spread of digital streaming platforms has pushed traditional media tools into the background; analog systems such as CDs, DVDs, and televisions have been replaced by digital content consumption (Schumpeter, 1942; Nolan and Croson, 1995; Ritzer, 1993). As Schumpeter (1968) asserted, these examples clearly illustrate that the essence of the capitalist system lies in the principle of progress through the destruction of the old by the new (Nolan & Croson, 1995).

The food and beverage sector is a dynamic field with high human intensity in both production and consumption processes. Therefore, in this sector, where consumer expectations rapidly change, innovation has become inevitable. The structure of the global consumer society constantly forces businesses to bring new products to the market, leading creative destruction to emerge not only as a form of competition but also as a necessity. Particularly with the transformation of eating and drinking into sociological experiences, it has become unavoidable for technological innovations to surpass traditional methods. Developments such as refrigerators replacing pantry cupboards or the shift from wood-fired cooking to convection ovens are concrete examples of creative destruction (Appadurai, 1988; Edgerton, 2006).

The influence of technology in this transformation is not limited to the kitchen but is also evident in the service domain. In recent years, service robots have become one of the notable innovations in the industry. While Choi et al. (2020) state that people perceive human employees more positively than service robots, Seyitoğlu and Ivanov (2020) emphasize that robots create a physical distance between customers and employees. Considering the importance of human relationships in the service sector, this situation can directly affect customer satisfaction. Although robots can recognize personal preferences through big data, being remembered by a human still generates higher satisfaction.

On the other hand, the integration of technologies such as artificial intelligence, digital menus, automation systems, and virtual reality into kitchen, service, and bar areas is becoming increasingly widespread. Ivanov & Webster (2019) state that these technologies not only reduce costs but also diversify customer experiences and decrease dependence on human labor.

Technological developments in the food and beverage sector have led to profound changes, particularly in cooking techniques and equipment. Individuals who cooked exclusively over wood fires in the 1800s would likely perceive today's AI-assisted smart ovens as science-fiction objects (Negüzel & Mil, 2021). Digitalization offers significant advantages toward goals such as increasing efficiency in kitchen operations, ensuring standardization in cooking processes, and reducing waste and energy consumption (Grimes & Harper, 2008). However, despite these technical advances, the kitchen is not merely a site of production but also a space where cultural narratives and individual creativity are expressed. Therefore, some researchers criticize the high technical capacity brought by digitalization, arguing that it carries a reductionist risk that overlooks the qualitative depth of traditional culinary cultures (Mizrahi et al., 2016).

Culinary cultures are not merely practices of nourishment; they are among the fundamental cultural elements that transmit a society's historical memory, lifestyle, and value system from one

generation to the next. The food production and consumption methods adopted by local communities over many years have transformed into traditional knowledge over time, gaining the status of cultural heritage. Local dishes not only reflect geographical diversity but also create a shared sense of belonging among individuals and communities. In this regard, culinary culture makes a significant contribution to the preservation of local identity and the maintenance of cultural continuity (Akgül & Önçel, 2024).

Throughout all stages of human development, the perception of a local food culture has always existed. Culinary culture originates from a community's place of origin and is shaped by factors such as available resources, religious beliefs, education level, ethnic background, and patterns of technological use. Indigenous and traditional food cultures possess strong connections to locality, which makes them an essential component of cultural identity (Wahlqvist, 2007; Trubek, 2008).

Much of human history has been shaped by processes ranging from foraging and hunting-gathering to animal husbandry, subsistence agriculture, and fishing (Wahlqvist, 2007). Although the ongoing process of digitalization in gastronomy has the potential to transform these deeply rooted local cuisines, it is of great importance that this transformation occurs without undermining traditional values or local identity. Digitalization must become a tool that preserves and strengthens local culinary cultures rather than eroding them.

3. METHOD

This research was conducted using the semi-structured interview technique, one of the qualitative research methods. The study aims to interpret how digitalization and the use of technology in the food and beverage sector are perceived, within the framework of creative destruction and planned obsolescence. In this context, interview questions derived from the survey scale developed in *[Author]*'s (2023) doctoral dissertation were utilized. This study received ethical approval from the Istanbul Kent University Ethics Committee on April 25, 2025.

The interview form used in the study is reflective in nature, prioritizing participants' subjective interpretations and personal sense-making of their experiences with digitalization (Creswell, 2013).

The study population consists of individuals aged 18–60 living in different regions of Turkey whose professional fields are not directly related to the food and beverage sector. The dataset was created from the responses of 10 participants—six women and four men. This number was determined based on the criterion of thematic saturation, as recommended in qualitative research. Creswell (2013) states that a sample size between 5 and 25 participants is generally sufficient in qualitative studies, provided that thematic saturation is achieved.

The sample was selected using the purposeful sampling method, and interviews were conducted between April 2025 and July 2025. The interview form was developed through a five-stage systematic process:

1. Literature review
2. Development of a preliminary guide
3. Pilot testing
4. Content refinement
5. Implementation of the final guide

The collected data were analyzed using content analysis with the qualitative data analysis software ATLAS.ti 23. The interviews were transcribed by the researcher, and the written

transcripts were uploaded to ATLAS.ti. An open coding process was applied to the textual data, and similar contents were grouped into categories to form themes.

An inductive analysis approach was adopted in the identification of themes; codes were derived directly from participants' statements. Relationships between codes were established, and highly representative quotations were labeled under each theme. To ensure the reliability of the thematic structure, the analysis process was cross-checked with a second researcher.

4. FINDINGS

In this study, participants' views on the effects of digitalization on local culinary cultures were evaluated through thematic analysis. Within the scope of the research, 147 quotations, 24 sub-themes, and 6 main themes were identified. Table 1 presents the Code Network and the Codebook.

Table 1. Code Network and Codebook

Code Name	Theme	Quotation Count	Participant Distribution
Past and Cultural Memory	Meaning of Traditional Food	12	P1, P3, P4, P6
Motherhood, Festivities, and Family Bonds		9	P2, P5, P6, P9
Alienation and Coldness	Perception of Technology	10	P1, P7, P8, P10
Functional Convenience		8	P3, P4, P6, P9
Perception of Planned Forgetting	Planned Obsolescence / Creative Destruction	11	P1, P2, P7, P10
Influence of the Capitalist Market		7	P3, P5, P8
Handcraft and Spiritual Fulfillment	Craftsmanship and Value	14	P2, P3, P7, P10
Mastery, Patience, and Temporality		10	P4, P6, P9
Fear of Robots and the Kitchen of the Future	Fears of Digitalization	11	P1, P5, P8, P10
Synthesis of Tradition and Technology	Coexistence of Tradition and Technology	15	All participants

Code Co-occurrence

Cases where codes co-occurred within the same quotations were analyzed. The highest co-occurrence rate was observed between "Handcraft and Spiritual Fulfillment" and "Past and Cultural Memory" (n = 6). This finding indicates that participants perceive traditional food not merely as a recipe but as a transfer of memories and emotions.

Table 2. Relationships Between Codes

Code 1	Code 2	Co-occurrence Count
Handcraft and Spiritual Fulfillment	Past and Cultural Memory	6
Fear of Robots	Perception of Planned Forgetting	4

Code 1	Code 2	Co-occurrence Count
Technological Convenience	Tradition + Technology Synthesis	5

In the coding process, participants' statements were first assigned open codes based on meaning units, followed by axial codes through thematic grouping. During the coding process, some codes (for instance, *"dystopia"* and *"fear of robots"*) naturally clustered together, revealing the tension between emotional themes and technological advancement.

The most frequently occurring codes were identified as "Handcraft and Spiritual Fulfillment" (n = 14), "Tradition + Technology Synthesis" (n = 15), and "Past and Cultural Memory" (n = 12).

Below is a table presenting the main themes and their corresponding sub-themes.

Table 3. Main Themes and Sub-Themes

Theme	**Sub-Theme**
Meaning of Traditional Food	Past and Cultural Memory Motherhood, Festivities, and Family Bonds Emotional Transmission Social Unity
Perception of Technology	Alienation and Coldness Convenience and Speed Loss of Communication Functional Benefit
Planned Obsolescence and Creative Destruction	Devaluation of Traditional Methods Standardization vs. Diversity Anonimization Influence of the Capitalist Market
Craftsmanship and Value	The Spirit Labor Adds to Food Sensation Beyond Taste Traditional Mastery and Patience
Future of Digitalization and Related Fears	Fear of Robotic Kitchens Loss of the Human Element Distopian Kitchen Scenarios Disappearance of Creativity
Coexistence of Tradition and Technology	Hybrid Kitchens Supportive Usage Emphasis on Balance Technology as a Tool

The data obtained in this research were categorized under six main themes:
(1) Meaning of Traditional Food,

(2) Perception of Technology,

(3) Planned Obsolescence and Creative Destruction,

(4) Craftsmanship and Value,

(5) Future of Digitalization and Related Fears, and

(6) Coexistence of Tradition and Technology.

Each theme was analyzed with supporting participant quotations and relevant sociological theories.

Theme 1: Meaning of Traditional Food

Participants defined traditional dishes not merely as a form of nourishment but as carriers of cultural continuity and social memory. Particularly among older participants, traditional foods were associated with collective rituals such as *"trotter soup on holiday mornings"* or *"meat pilaf served at engagement ceremonies,"* emphasizing the emotional and symbolic connections established with the past. In this context, traditional dishes represent not only the traces of the past but also the cultural continuity between the present and the future.

"Traditional food is our past. If it disappears, we disappear too." (P1)

This approach aligns with Bourdieu's (1984) concept of *habitus*, which defines internalized patterns of behavior shaped by an individual's historical and class position, reflected in everyday practices. Within this framework, food practices are not merely acts of consumption but also manifestations of social belonging and identity. Bourdieu's theory is particularly valuable for understanding the link between food, social capital, and cultural status (Bourdieu, 1984).

Similarly, Appadurai (1988) defines food as a *"carrier of memory,"* emphasizing that kitchens are not only physical but also symbolic spaces. According to him, food both nourishes individual belonging and reproduces collective memory within a society. Thus, cooking and sharing practices can be interpreted as contemporary expressions of the connection with the past.

Additionally, Sutton (2001) highlights the intertwining of food and memory, arguing that taste and smell trigger memory more powerfully than other senses. This phenomenon manifests when traditional dishes evoke nostalgia for childhood, family members, or specific times. Especially in the face of transformation processes such as migration, modernization, and digitalization, the meaning of traditional food is reinforced through a nostalgic and preservative perspective (Holtzman, 2006).

Traditional food practices serve not only as cultural transmission tools but also as symbolic spaces through which individuals construct their identities and strengthen collective belonging. Against the threats of digitalization and standardization brought by modernization, traditional cuisines are positioned as points of resistance.

Theme 2: Perception of Technology

Participants' perceptions of technology reveal a dual structure situated between benefit and loss. On one hand, technological tools—particularly digital menus, payment systems, and automation—were evaluated positively due to their practicality, speed, and convenience. On the other hand, they were criticized for reducing human interaction, replacing face-to-face communication, and weakening emotional bonds. Participants expressed feeling "trapped between comfort and coldness" brought about by digitalization.

"I ordered from a kiosk menu, but since there was no waiter, I couldn't even make eye contact with a human being." (P9)

This finding parallels Simmel's (1903) concept of "the loneliness of the modern individual." Simmel argued that in urban modernity, individuals form superficial and anonymous relationships, reinforcing feelings of isolation. Similarly, digital ordering systems increase the physical and emotional distance between customers and service providers, creating a comparable form of alienation.

Bauman's (2000) concept of liquid modernity also elucidates this phenomenon. According to Bauman, modern life is characterized by impermanence and transient relationships. The rise of technological interfaces in service delivery transforms the roles of employees and customers, weakening the sense of connection and belonging. Particularly in the service industry, the replacement of "human warmth" with "cold automation" reflects this liquidity within the field of gastronomy.

Comparable findings appear in Pine and Gilmore's (1999) experience economy theory. They argue that consumers today purchase not only products but also experiences. However, the proliferation of digital systems diminishes the human-touch dimension of experience, reducing customers' emotional attachment to the venue and the service itself (Pine & Gilmore, 1999).

Furthermore, Turkle (2011) asserts that individuals in the digital age are "alone together," appearing constantly connected yet struggling to establish deep relationships. Participants' expressions of communication gaps and alienation resulting from the spread of digital systems align with this perspective.

Overall, perceptions of technology emerge within a tension between utility and alienation. Gastronomic spaces, while driven toward automation under the pressure of digital transformation, simultaneously face the necessity of responding to individuals' emotional and social needs.

Theme 3: Planned Obsolescence and Creative Destruction

Participants frequently emphasized that traditional knowledge, skills, and methods have gradually been devalued, a process largely stemming from the consumption-oriented dynamics of the capitalist system. Particularly, the constant pressure for innovation in technological products weakens individuals' connections to the past and causes the value of "novelty" to overshadow cultural heritage.

"Every year a new kitchen appliance comes out; when I keep using the old ones, my daughter calls me 'old-fashioned.'" (P8)

This critical perspective aligns with Schumpeter's (1942) concept of creative destruction, which explains the developmental mechanism of capitalism. According to Schumpeter, the driving force of the capitalist system is its ability to build the new by destroying the old. However, this transformation is not always constructive; when traditional production methods, cultural practices, and forms of labor are systematically excluded, cultural continuity and collective memory are endangered. In this sense, food practices are not merely instrumental but also symbolic, making them directly vulnerable to this destructive process.

Packard's (1960) concept of planned obsolescence further illustrates how, in order to sustain economic growth, not only products but also forms of knowledge are deliberately rendered temporary and obsolete. This strategy operates not only on a material level but also on a cultural level, where traditional knowledge is devalued, labeled as "old-fashioned," and presented as outdated.

In this context, Baudrillard's (1970) consumer society theory also provides a valuable lens. According to Baudrillard, people no longer consume needs but symbols and images. Newly released kitchen appliances or digitized recipe platforms are consumed not only for their functionality but also as symbols of modernity, stigmatizing traditional methods as "old" and "inefficient."

Within gastronomy, this phenomenon becomes visible despite the rise of the slow food and local production movements, as traditional methods are increasingly marginalized in industrial

kitchens. In particular, the replacement of traditional knowledge with technological competencies amid intergenerational conflicts leads to significant transformations in cultural identity (Trubek, 2008; Jaffe & Gertler, 2006).

Creative destruction and planned obsolescence strategies thus operate not only on economic but also on cultural and sociological levels. Traditional culinary culture forms a line of resistance against these forces; however, the sustainability of this resistance depends directly on social awareness and cultural ownership.

Theme 4: Craftsmanship and Value

Participants regarded handcraft not merely as a mode of production but as an expression of spirit, emotion, and social connection. Especially female participants associated craftsmanship with patience, care, and love, emphasizing that such practices not only enhance the meaning of food but also strengthen social bonds.

"...yes, but for example, making sarma requires patience. If someone sits down and makes Boşnak böreği from scratch for you, you can't help but love that person." (P10)

Such expressions evoke Weber's (1905) concepts of rationalization and the iron cage. According to Weber, modern society operates within a system driven by efficiency and calculability. In this process, sacredness, meaning, and traditional values are pushed into the background, replaced by instrumental rationality. This transformation is clearly visible in food production: as ready-made foods, measurable standards, and digital recipe systems become widespread, traditional methods produced by handcraft are increasingly regarded as "time-consuming" or "inefficient" (Ritzer, 1993).

However, participants' understanding of craftsmanship extends beyond the physical dimension of production to encompass emotional and symbolic aspects. In this sense, handcraft can be interpreted as part of a "sensory heritage." Sutton (2001) and Classen (1997) argue that the tactile, visual, and olfactory dimensions of cooking processes leave lasting impressions in memory and play a crucial role in connecting with the past. Multi-step and patience-driven actions—such as rolling börek dough or wrapping sarma—are examples that both produce and carry this sensory memory.

Moreover, the social meaning of hand-prepared food is significant. Ingold (2013) views craftsmanship not merely as production but as a form of learning, transmission, and relationship-building. From this perspective, time spent in the kitchen transcends labor and becomes a space of connection. Participants' tendency to associate hand-prepared dishes with "love" reflects this socio-emotional dimension.

Additionally, feminist gastronomy literature highlights this issue. Women's domestic culinary labor has historically been rendered invisible, yet it has simultaneously functioned as a binding element that sustains the emotional unity of the family (Avakian & Haber, 2005). Therefore, craftsmanship is not only a skill but also an act of care, belonging, and identity formation.

Theme 5: Future of Digitalization and Related Fears

Participants, particularly those from middle and older age groups, described a fully automated kitchen of the future as "cold," "soulless," and "dehumanized." The increasing dominance of digital tools has led to growing concerns about a culinary vision in which human labor and intuitive knowledge are disregarded.

"Full automation feels like a dystopia to me." (P10)

"Robots are going to cook—what will happen to our hands?" (P7)

These fears recall Postman's (1993) cultural critique of technology. Postman argues that technology is not merely a tool for progress but an ideology that transforms cultural structures, emotions, and meaning-making processes. According to him, technological advancements are often presented as "inevitable" and "neutral"; however, individuals risk submitting to these artificial systems without questioning their own cultural values. The participant's question—"What will happen to our hands?"—captures this anxiety, reflecting the fear of the disappearance of the human bodily, sensory, and creative role.

Heidegger's critique of technology is also illuminating in this context. Heidegger views modern technology as a mode of seeing the world as a "resource to be exploited." This perspective disrupts the meaningful relationship between humans and the world. He explains this process through the concept of "Gestell" (enframing): technology acknowledges existence only insofar as it can be processed and calculated. Consequently, humanity's poetic relationship with the world is replaced by a technical and instrumental one (Heidegger, 1954/1977).

A world where only functionality, efficiency, and calculability dominate the kitchen signifies a system that excludes emotion, memory, and human labor. These anxieties have become increasingly tangible today with the rise of artificial intelligence, robotic kitchens, and algorithmic recipe systems. For instance, the fully automated kitchen system developed by Moley Robotics can analyze a recipe video and reproduce the dish identically. Yet, such systems overlook the fact that cooking is not merely a productive process, but also an act of sharing, storytelling, and identity creation.

Participants' fears underscore the need to rethink the place of technology in human life. Gastronomy is not only about satisfying hunger; it is a form of narrative, a practice of connection, and a performance of cultural identity. Full automation carries the danger of erasing these human touches that make food meaningful.

Theme 6: Coexistence of Tradition and Technology

One of the most constructive and future-oriented themes of this study is the emerging consensus that traditional knowledge and digital technologies can coexist. Most participants argued that technology should not replace traditional methods but rather support and enhance them, suggesting that the kitchen can simultaneously open toward both the past and the future.

"The best is when both exist together. I take my mother's recipe and pair it with coffee." (P10)

This perspective directly relates to Bruno Latour's (2005) Actor–Network Theory (ANT). According to Latour, the social world is shaped not only by humans but also by non-human entities such as machines, software, and objects. Therefore, social reality is constructed within heterogeneous networks composed of both human and non-human actors. In the kitchen, technological tools (e.g., smart coffee machines, digital recipe applications) interact with traditional recipes and human labor to create new hybrid experiences. In this interaction, no single actor holds an absolute central position; what matters is how the network is constructed and functions (Latour, 2005).

Participants' tendency to assign technology a role as a "supporting actor" reflects an approach that instrumentalizes technology while positioning the human at the center. This indicates a form of "new kitchen citizenship," in which individuals do not submit to technology but instead consciously govern and integrate it.

This type of coexistence aligns with David Edgerton's (2006) emphasis on reuse and local technologies. Edgerton argues that technological innovations do not always erase what came before; instead, they are often used alongside traditional practices across various contexts. In

gastronomy, preserving traditional recipes while digitizing and sharing them (for example, turning grandmothers' handwritten recipe notebooks into PDFs) exemplifies such hybridization.

Moreover, this finding points beyond the binary distinction between "digital natives" and "digital immigrants." When younger individuals make traditional culinary knowledge visible on digital platforms—by sharing local recipes on TikTok or Instagram—it demonstrates that gastronomic culture is being transmitted through transformation.

Tradition and technology, therefore, need not exist in conflict; rather, they can function as complementary dynamics. This approach shows that digital transformation in gastronomy represents not a rupture but the creation of new integrations and hybrid cultures—a process that embodies the very essence of creative fusion.

5. CONCLUSION AND RECOMMENDATIONS

The findings of this research reveal that participants do not adopt a purely reactive stance toward digitalization and technological transformation; rather, they develop a selective, critical, and culturally sensitive attitude. Participants did not entirely reject the presence of technology in the kitchen; however, they emphasized that it should not weaken human relationships, erase traditional production forms, or undermine cultural belonging. This perspective clearly demonstrates the need for a balance between technological progress and cultural heritage.

Particularly, the emphasis on viewing food not merely as a "recipe" but as a ritual, narrative, and setting is highly significant in terms of cultural sustainability. Bourdieu's concept of *habitus*, Appadurai's notion of kitchens as *"carriers of memory,"* and Sutton's approach to *"sensory memory"* collectively provide the theoretical framework for this interpretation. Participants' narratives point to a multidimensional perception of gastronomy—one that encompasses not only taste but also emotion, history, and identity.

In this context, it becomes evident that technological integration within the gastronomy sector is a multilayered process that must be addressed not only at the hardware level but also at cultural, emotional, and social levels. Theoretical perspectives such as Weber's rationalization, Bauman's liquid modernity, Heidegger's critique of technology, and Latour's actor-network theory offer valuable analytical tools for understanding the complexity of this transformation.

Within this framework, the concept of creative fusion can be interpreted as an alternative paradigm in which the traditional knowledge and experiences of the past are symbiotically blended with the digital possibilities of the future. Proposed as a response to Schumpeter's *creative destruction*, creative fusion serves as a transitional strategy through which the traditional is not destroyed but defunctionalized.

This approach presents a sustainable vision for ensuring that cultural identity and local cuisines remain visible and influential in the digital age. It emphasizes harmony rather than rupture—transforming destruction into coexistence, and innovation into continuity.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 66-84
http://doi.org/10.26677/TR1010.2026.1637

The Impact of Organizational Justice on Intention to Leave and Organizational Health: An Application in Five-Star Hotel Businesses in Istanbul[1]

Tuna DEMİRAY
Eskişehir Osmangazi University, Institute of Social Sciences, Tourism Management Department, Türkiye. tunademiray@hotmail.com
https://orcid.org/0000-0003-3532-2424

Cüneyt TOKMAK
Eskişehir Osmangazi University, Faculty of Tourism, Tourism Management Department, Türkiye. ctokmak@ogu.edu.tr
https://orcid.org/0000-0003-1377-3531

Abstract

This study aims to determine the effects of employees' perceptions of organizational justice on their intention to leave and organizational health in five-star hotel businesses in Istanbul. Organizational justice, developed on the basis of Adams' (1965) equity theory and conceptualized by Colquitt (2001) in three dimensions—distributive, procedural, and interactional justice—reflects employees' perceptions of being treated fairly, impartially, and respectfully in the workplace. Organizational health is considered an indicator of the overall functioning of the business, employee well-being, and sustainable performance. A correlational survey method was used in the research. The research population consists of employees working in five-star hotels operating in Istanbul. The sample consisted of 401 employees selected from this population using a convenience sampling method. Data were collected through a questionnaire form comprising scales for organizational justice, intention to leave, and organizational health; analyses were performed using correlation and simple linear regression analysis in the SPSS program. The research results show that as employees' perception of organizational justice increases, organizational health significantly improves and intention to leave decreases. The findings reveal that organizational justice has positive effects on employee commitment and job satisfaction; and that fair management practices strengthen the workplace climate and organizational health. Accordingly, it is recommended that hotel managers develop fair, transparent, and employee-centered management policies.

Keywords: Organizational Justice, Turnover Intention, Organizational Health, Five-Star Hotels

1. INTRODUCTION

Organizational justice is a multi-dimensional construct encompassing distribution, procedure, and interaction—depending on how outcomes are shared within the organization, the extent to which decision-making processes are consistent, impartial, and transparent, and whether managers approach employees with courtesy, respect, and honesty, justifying decisions in a

[1] This study is derived from the doctoral thesis entitled "The Effect of Organizational Justice on Intention to Leave and Organizational Health: An Application in Five-Star Hotel Businesses in Istanbul" written by Tuna DEMİRAY

timely and accurate manner (Colquitt, 2001; Greenberg & Colquitt, 2005). This framework extends from Adams' (1965) equity theory to Greenberg's (1987) classification of justice and Colquitt's (2001) construct validity studies. The literature consistently shows that perceptions of justice increase job satisfaction, organizational commitment, and organizational citizenship behaviors, while decreasing absenteeism, apathy, and especially intention to leave the job (Colquitt et al., 2013; Cropanzano & Ambrose, 2015). Justice strengthens the psychological safety of employees, reduces stress and burnout, thus supporting individual well-being and team collaboration, which in turn reflects on organizational performance (Greenberg, 1987; Colquitt et al., 2013). Therefore, organizational health (the combination of employee well-being and organizational effectiveness) is closely related to justice. Fair wages/promotions/task allocation and mechanisms for dissent/participation improve health indicators and reduce burnout; transparent and consistent managerial communication fosters a positive climate (Cropanzano & Ambrose, 2015).

The specific conditions in tourism and hospitality make this relationship even more critical. High employee turnover rates, intense and irregular work, seasonal employment fluctuations, and the need for emotional labor transform equitable practices into a strategic tool (Karatepe & Uludağ, 2007; Demir, 2020). Fair compensation and shift/leave scheduling, performance-based and transparent promotion systems, visible recognition of seasonal effort, and equity in rehiring all contribute to sustainable loyalty and service quality, while reducing the costs of errors and inefficiencies. However, two significant gaps are highlighted in the literature. The first is the direct impact of fairness on organizational health; this has been studied less extensively compared to the individual outcome-oriented job satisfaction/commitment/stress axis (Colquitt et al., 2013; Cropanzano et al., 2017). Secondly, in the Turkish context, particularly in five-star hotels in Istanbul, studies testing justice, intention to leave, and organizational health using the same model are limited (Yıldız & Arslan, 2019). This study aims to fill these gaps by analyzing the effects of perceived organizational justice on intention to leave and organizational health in the context of luxury hotels in Istanbul using a holistic theoretical model. Thus, the impact of justice not only on individual attitudes but also on organizational vitality and effectiveness will be examined. The academic contribution is to validate the theoretical framework of Colquitt, Greenberg, and Cropanzano in the high-stress conditions of the tourism sector and to provide evidence relevant to the local context. The practical significance lies in the fact that justice-oriented human resources and communication policies (transparency in wages/promotion, fair processes/appeal channels, equitable workload, and work-life balance practices) will have the potential to reduce turnover rates, increase motivation and well-being, and consequently improve organizational health and competitiveness, resulting in actionable recommendations for managers.

2. ORGANIZATIONAL JUSTICE

The concept of justice is a fundamental value that has been addressed by different thinkers and periods throughout human history. It has a broad historical background, stretching from the Code of Hammurabi in antiquity to the definitions of justice by Plato and Aristotle, the understanding of "justice as the will of God" in the Old Testament, and the approaches of Enlightenment thinkers Rousseau and Kant based on equality and the will of the people (Erdinieva, 2012; Kabadayı, 2013; Radonova, 2016; Edor, 2020; Cooke, 2014). In the modern era, Rawls (1971) defined justice through the principle of equity, arguing that individuals should be treated equally. When this historical development process is applied to the organizational context, the concept of organizational justice, put forward by Greenberg (1990), aims to explain employees' perceptions of equality and fairness in the work environment. Based on Adams' (1965) Equity Theory, this approach suggests that employees evaluate fairness by comparing their

own efforts and results with those of others (Robbins and Judge, 2013). Greenberg & Cropanzano (2001) emphasized that organizational justice plays a critical role in both individual satisfaction and organizational effectiveness. In the literature, organizational justice is generally discussed in three dimensions. Distributive justice refers to the fairness of outcomes; procedural justice, focusing on the consistency and transparency of decision-making processes; and interactional justice, focusing on managers treating employees with courtesy and respect (Colquitt et al., 2001; Cohen-Charash & Spector, 2001; Bakhshi et al., 2009).

Distributive Justice: This refers to how employees perceive the balance between the rewards they receive for their labor and is based on Adams' (1965) Equity Theory. According to this theory, individuals evaluate fairness by comparing their own gains with those of others (Colquitt et al., 2001). Fair distribution of resources such as wages, promotions, and rewards increases employees' job satisfaction, commitment, and trust; while the perception of injustice leads to negative consequences such as loss of motivation and intention to leave the job (Bostan & Kılıç, 2017; Kumari, 2013). Distributive justice is critical for a healthy work environment in organizations and, together with procedural and interactional justice, completes the holistic structure of organizational justice (Norema, Kurniawan, & Na'imah, 2023).

Procedural Justice: A fundamental dimension of organizational justice, it focuses on ensuring that decision-making processes are conducted fairly, consistently, and transparently (Leventhal, 1980; Thibaut & Walker, 1980). Developed to assess the fairness of processes, this concept emerged as an inadequacy of distributive justice, which focuses solely on outcomes (Nowakovski & Conlon, 2005). Procedural justice includes elements such as impartiality, adherence to ethical values, and employee participation in decision-making (De Cremer, 2005; Saunders, 2006). Research shows that this type of justice increases employee trust in the organization, organizational commitment, and voluntary acceptance of decisions; it also has positive effects on job satisfaction and well-being (Pareke, 2018; Serinkan & Mengüloğlu, 2021). When considered together with distributive and interactional justice, it contributes to the formation of a comprehensive perception of justice within the organization (Moorman, 1991; Choi, 2024).

Interactional Justice: This dimension of organizational justice refers to the level of respect, courtesy, and honesty employees experience in their interactions with managers and colleagues (Cole, 2004; Nabatchi et al., 2007). Developed in the 1980s, this concept encompasses how employees are treated in decision-making processes, managers' communication styles, and the transparency of information processes (Ambrose and Schminke, 2003; Stinglhamber et al., 2006). Respectful and open communication increases employee trust and commitment, creating a positive work climate (Yeniçeri et al., 2009; Rai % Agarwal, 2020). Research shows that interactional justice plays a decisive role in motivation, commitment, and overall job satisfaction (Kobayashi & Kondo, 2019). When considered together with distributive and procedural justice, this dimension contributes to the formation of a holistic perception of justice within the organization. Theoretical foundations regarding the concept of justice were laid by Homans (1961), Adams (1965), and Walster et al. (1974). Greenberg (1987) classified these approaches into reactive-proactive and process-content dimensions. Accordingly, reactive theories focus on responses to injustice, proactive theories on how to ensure fair practices, process theories on the fairness of decision-making mechanisms, and content theories on resource and reward distribution (Greenberg, 1987; İçerli, 2010). Table 1 shows how justice theories are classified within the framework of reactive-proactive and process-content dimensions.

Table 1. Theories of Justice Consisting of Reactive-Proactive and Process-Content Dimensions

Reactive-Proactive Dimension	Content-Process Dimension Content	Process
Reactive	Reactive-Content Equity Theory (Adams, 1965)	Reactive-Process Procedural Justice Theory (Thibaut & Walker, 1975)
Proactive	Proactive-Content: Justice Theory (Leventhal, 1976, 1980)	Proactive-Process Distribution Choice Theory (Leventhal, Karuza & Fry, 1980)

Sources: (Adams, 1965, Thibaut ve Walker, 1980, Leventhal, 1976, Leventhal, Karuza ve Fry, 1980)

As summarized in Table 1, according to Greenberg's (1987) classification, reactive-content theories address responses to unfair distribution, proactive-content theories address efforts to ensure fair distribution; reactive-process theories address responses to decision-making processes, and proactive-process theories emphasize the fairness of these processes. In general, organizational justice encompasses employees' perceptions of fairness and equality in the workplace and affects important outcomes such as job satisfaction, commitment, and performance (Lambert et al., 2020; Supriya & Dadhabai, 2024). Ensuring fairness in distribution, procedure, and interaction increases trust, commitment, and civic behavior, while perceptions of unfairness lead to low productivity, absenteeism, and negative attitudes (Beugre, 2003; Phuong and Le, 2023). Therefore, fair practices are considered a critical element supporting both individual well-being and organizational sustainability (Cohen-Charash & Spector, 2001).

3. ORGANIZATIONAL HEALTH

The concept of organizational health was first introduced by Argyris in the 1950s in the context of the cultural development of organizations, and Miles (1969) used it to describe organizations that develop and grow by adapting in the long term. Later research considered organizational health as a holistic construct encompassing problem-solving ability, employee well-being, and organizational effectiveness (Cheng and Tsui, 1999; Ardıç and Polatçı, 2007). Researchers such as Parsons, Hoy, and Miskel linked organizational health to an organization's capacity to adapt to its environment, build unity, and achieve its goals. In this context, three fundamental organizational health theories developed by Miles, Hoy-Feldman, and Lyden-Klingele stand out in the literature.

Table 2. Differences Between a Healthy Organization and an Unhealthy Organization

Features	**Healthy Organization**	**Unhealthy Organization**
Long-Term Effectiveness	It works effectively in the long term.	It cannot function effectively in the long term.
Innovation and Development	It is open to innovation and development.	It is resistant to innovation and development.
Decision-Making Process	Employees participate in decision-making processes.	Decisions are made by senior management.

Organizational Commitment	High levels of organizational commitment are observed.	There is low organizational commitment.
Responsibility	It is responsible towards the environment and its	It is irresponsible towards the environment and its employees.
Proactivity	It takes preventive measures.	It is reactive and only takes
Work Stress	There is low job stress.	There is high job stress.
Job Satisfaction and Peace	It provides high job satisfaction and a positive workplace	It offers low job satisfaction and workplace harmony.
Valuing Employees	Employees are valued.	Employees are not valued.
Employment Continuity	There is a low absenteeism rate and a low employee turnover	There is a high absenteeism rate and a high employee turnover rate.
Communication	There is strong communication between individuals and with	Communication is weak between individuals and with upper
Employee Safety	Workplace safety measures are in place, and workplace	Workplace safety measures are inadequate, and workplace
Motivation and Performance	Employees demonstrate high motivation and performance.	Employees show low motivation and performance.
Environmental Conditions	It is not affected by adverse environmental conditions.	It is affected by adverse environmental conditions.
Team Spirit	Team spirit is well-developed, and employees act with a sense	Team spirit is underdeveloped, and employees act in their own self-
Perception of Security	Employees feel safe.	Employees do not feel safe.
Information Flow	Information flow is reliable and timely.	Information flow is weak and delayed.
Strategy Implementation	The strategies are implemented successfully.	The strategies cannot be implemented successfully.
Organizational Culture	It has an open, trust-based, and encouraging culture.	It has a closed, punitive, and unfair culture.
Problem Solving	It intervenes by getting to the root of the problems.	It only deals with the symptoms of problems.
Productivity and Effectiveness	It is efficient and effective.	It is inefficient and ineffective.

Source: (Ardıç & Polatçı, 2007: 148-149).

Healthy organizations create a productive and effective work environment by increasing employee job satisfaction, motivation, and commitment, while unhealthy organizations can

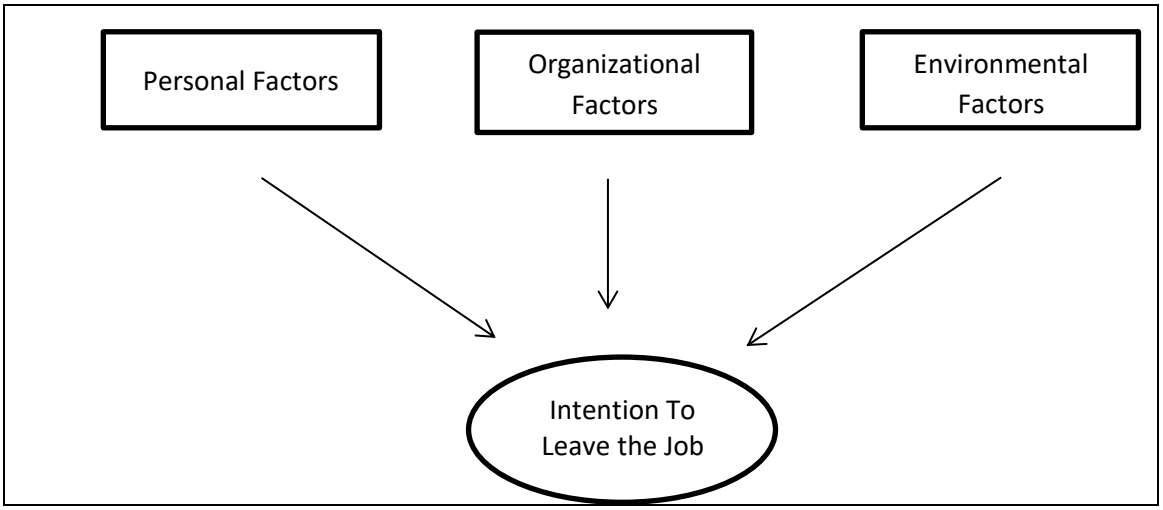
negatively impact organizational success by creating stress and insecurity among employees. Effective communication, an open organizational culture, teamwork, and strong leadership are fundamental components of organizational health and are critical for sustainable success. Therefore, organizations need to adopt innovative and proactive approaches to create a healthy work environment.

4. INTENTION TO LEAVE THE JOB

Turnover intention is a concept that refers to an employee's conscious intention to leave their current job (Tett & Meyer, 1993). This intention often stems from job dissatisfaction, low motivation, and unfavorable organizational conditions (Onay & Kılcı, 2011). Turnover intention is a harbinger of negative consequences such as absenteeism and poor performance, creating significant costs for organizations (Avcı and Küçükusta, 2009). Mobley et al. (1979) divided turnover into voluntary and involuntary; however, research generally describes voluntary turnover as the situation where the employee leaves of their own accord. Therefore, it is crucial for human resources departments to develop strategies to understand and reduce the reasons for employee turnover (Barutçugil, 2004).

Factors influencing the intention to leave a job encompass multifaceted elements such as personal characteristics, organizational culture, leadership style, salary, work-life balance, and career opportunities (Smith & Johnson, 2020). Low wages, inadequate leadership, and a negative work climate increase this intention, while a supportive organizational culture, fair management, and development opportunities strengthen the desire to stay in the job. Furthermore, individuals with high employee satisfaction, commitment, and perceived organizational support tend to have a lower tendency to leave their jobs. In this context, organizations creating a fair and balanced work environment that considers the psychological and social needs of employees reduces the intention to leave and supports long-term employment.

Figure 1. Factors Influencing Intention to Leave a Job



The intention to leave a job is shaped by the interaction of individual, organizational, and environmental factors. While this intention decreases with increasing age, seniority, and family responsibilities, it tends to increase with higher levels of education and career expectations (Cotton & Tuttle, 1986; Şimşek et al., 2011). Young employees are more open to new opportunities, while low wages, negative management, lack of communication, and inadequate working conditions strengthen the tendency to leave (Ökten, 2008). Furthermore, external factors such as economic fluctuations, job insecurity, and technological changes also influence this process (Hayta, 2019). To reduce the intention to leave a job, businesses need to adopt a holistic

strategy that includes fair compensation, appropriate working conditions, effective communication, and strong management policies.

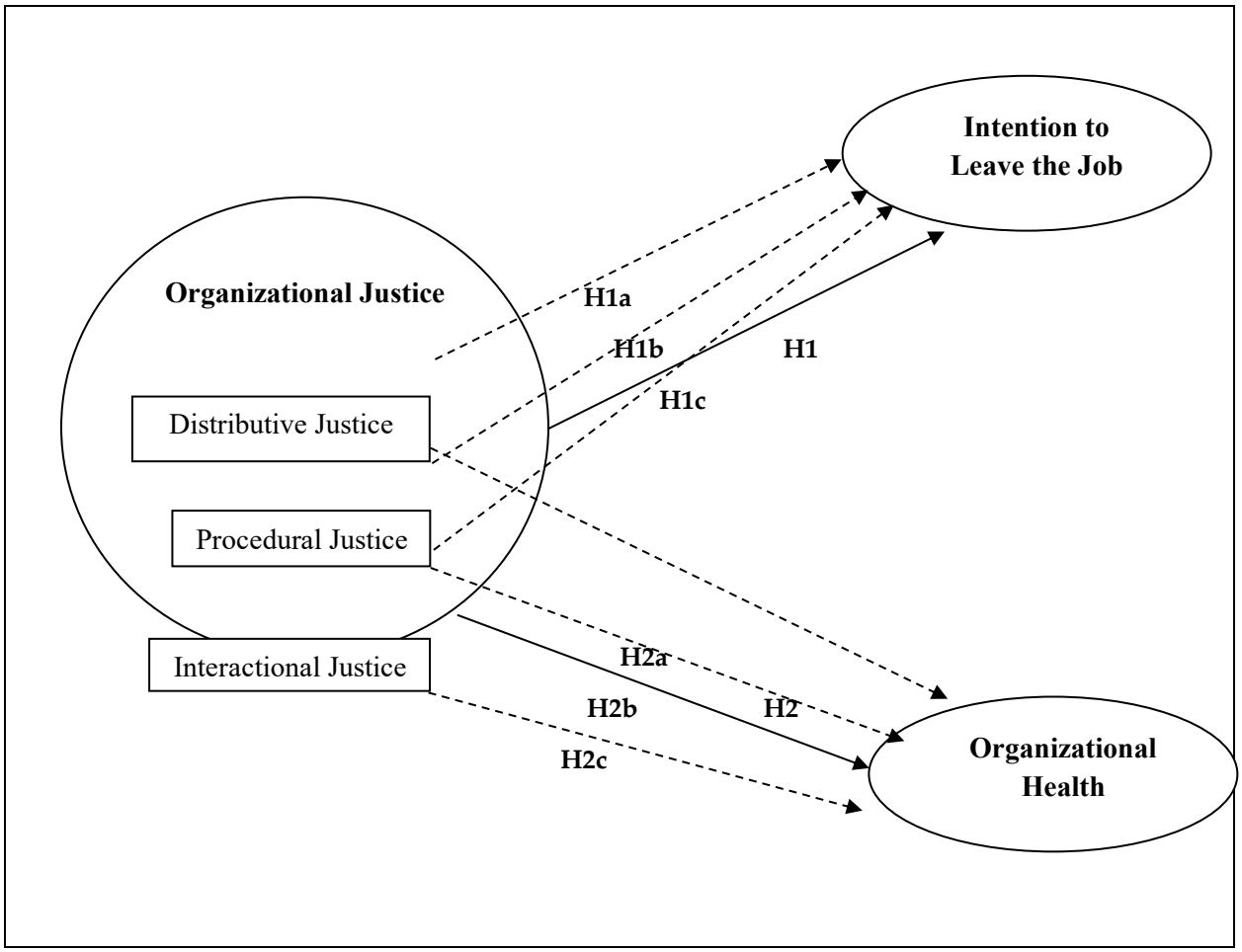
5. METHODOLOGY

This research was conducted using a quantitative research approach within the framework of correlational survey methodology. The main objective of the study is to determine the relationships between organizational justice, organizational health, and intention to leave. In this context, firstly, the relationship between organizational justice and its sub-dimensions with organizational health was examined; then, the effects of the sub-dimensions of organizational justice on intention to leave were evaluated; and finally, the relationship between organizational health and intention to leave was analyzed.

The questionnaire used in this study was developed based on previously validated scales widely used in the literature. The organizational justice scale was adapted from the scale developed by Moorman and Niehoff (1993), which measures distributive, procedural, and interactional justice perceptions. The turnover intention scale was developed based on studies examining employees' intention to leave their jobs, particularly drawing on the conceptual framework proposed by Mobley et al. (1979) and Tett and Meyer (1993). In addition, the organizational health dimension was constructed based on the theoretical and empirical frameworks presented in the studies of Miles (1969) and Lyden and Klingele (2000). All items were measured using a five-point Likert-type scale ranging from "1 = Strongly Disagree" to "5 = Strongly Agree".

The research population consists of employees working in five-star hotel businesses operating in Istanbul. Convenience sampling was used to determine the sample to represent the population. This method was chosen considering the ease of access and time constraints for the researcher. Accordingly, human resources managers of hotel businesses in Istanbul were contacted, the purpose of the research was explained, and survey forms were distributed to each business. A total of 450 surveys were distributed; after eliminating incomplete, erroneous, or inconsistent forms, 401 valid surveys were included in the analysis. The research model created based on the relationships between the determined variables is shown in Figure 2.

Figure 2. Research Model



The hypotheses formulated to support the research objective are presented below.

H1: Organizational justice has a significant and negative impact on the intention to leave the job.

H1a: The distributive justice dimension of organizational justice has a significant and negative impact on the intention to leave the job.

H1b: The procedural justice dimension of organizational justice has a significant and negative impact on the intention to leave the job.

H1c: The interactional justice dimension of organizational justice has a significant and negative impact on intention to leave the job.

H2: Organizational justice has a significant and positive impact on organizational health.

H2a: The distributive justice dimension of organizational justice has a significant and positive impact on organizational health.

H2b: The procedural justice dimension of organizational justice has a significant and positive impact on organizational health.

H2c: The interactional justice dimension of organizational justice has a significant and positive impact on organizational health.

To provide a general overview of the research population, data from the General Directorate of Investments and Operations of the Ministry of Culture and Tourism of the Republic of Turkey was used. According to this data, there are a total of 112 five-star hotels in Istanbul. 83% of these establishments are located on the European side (93 hotels), and 17% are on the Anatolian side (19 hotels). Similarly, 83% of the total room and bed capacity is concentrated on the European side. This distribution shows that hotels on the European side have a dominant position in the research population and clarifies the spatial distribution of the sample.

The survey form, developed as a data collection tool, consists of four sections. The first section includes the demographic characteristics of the participants (gender, age, marital status, income, education, title, length of service in the institution and sector). The second section contains the Organizational Justice Scale developed by Moorman & Niehoff (1993), which consists of three dimensions: distributive, procedural, and interactional justice. All scales consist of five-point Likert-type statements rated from "1=Strongly Disagree" to "5=Always Agree".

Data were analyzed using the statistical analysis program. Descriptive statistics were calculated first, followed by correlation and simple linear regression analyses to determine the relationships between variables. The reliability levels of the scales were tested using Cronbach's Alpha coefficients; these were found to be 0.967 for the organizational justice scale, 0.926 for the intention to leave scale, and 0.954 for the organizational health scale. These results indicate that the scales used in the study have a high level of reliability.

6. FINDINGS

The demographic information of the participants is shown in Table 3. Of the 401 participants in the study, 184 were women (45.89%) and 217 were men (54.11%). The age distribution of the participants was as follows: 83 were 18-26 years old (20.70%), 78 were 27-34 years old (19.45%), 88 were 35-42 years old (21.95%), 68 were 43-50 years old (16.96%), and 84 were 51 years and older (20.95%). Regarding the marital status of the participants, 185 were married (46.13%) and 216 were single (53.87%). In terms of income distribution, 82 participants were in the 17,000-25,000 TL income group (20.45%), 92 in the 25,001-32,000 TL income group (22.94%), 75 in the 32,001-40,000 TL income group (18.70%), 59 in the 40,001-48,000 TL income group (14.71%), and 93 in the 48,001 TL and above income group (23.19%). In terms of education level, 58 are primary school graduates (14.46%), 160 are high school graduates (39.90%), 90 are associate degree holders (22.44%), 81 are bachelor's degree holders (20.20%), and 12 are postgraduate degree holders (2.99%). The departments where the participants worked were as follows: 92 in front office (22.94%), 60 in kitchen (14.96%), 57 in housekeeping (14.21%), 61 in food/beverage (15.21%), 59 in sales/reservations (14.71%), and 72 in other departments (17.96%). The distribution according to length of service was as follows: 147 (36.66%) employees with 1 year or less of service, 85 (21.20%) with 2-3 years, 81 (20.20%) with 4-5 years, 25 (6.23%) with 6-7 years, and 63 (15.71%) with 8 years or more of service. The distribution of employees in the sector by length of service is as follows: 8 with 0-1 years of service (2.00%), 70 with 2-3 years of service (17.46%), 39 with 4-5 years of service (9.73%), 66 with 6-7 years of service (16.46%), and 218 with 8 years or more of service (54.36%).

Table 3. Findings Regarding the Demographic Characteristics of Participants

Variable	Groups	f	%
Gender	Female	184	45,89
	Male	217	54,11
Age	18-26	83	20,70
	27-34	78	19,45

	35-42	88	21,95
	43-50	68	16,96
	51+	84	20,95
Marital Status	Married	185	46,13
	Single	216	53,87
Education	Primary Education	58	14,46
	High School	160	39,90
	Associate Degree	90	22,44
	Bachelor's Degree	81	20,20
	Postgraduate Degree	12	2,99
Income Level	17.000 - 25.000	82	20,45
	25.001 - 32.000	92	22,94
	32.001 - 40.000	75	18,70
	40.001 - 48.000	59	14,71
	48.001+	93	23,19
Department	Front Office	92	22,94
	Kitchen	60	14,96
	Housekeeping	57	14,21
	F&B	61	15,21
	Reservation	59	14,71
	Other	72	17,96
Employment Period at the Company	0-1 year	147	36,66
	2-3 years	85	21,20
	4-5 years	81	20,20
	6-7 year	25	6,23
	8 years and older	63	15,71
Employment Period in the Tourism Sector	0-1 year	8	2,00
	2-3 years	70	17,46
	4-5 years	39	9,73
	6-7years	66	16,46
	8 years and older	218	54,36
Total Number of		**401**	**100.0**

In terms of gender distribution, 45.89% of the participants are women and 54.11% are men. This ratio indicates a relatively balanced representation between genders in the sample and parallels general employment trends in the tourism sector (predominantly male employees).

When the age variable is examined, it is seen that employees are represented from almost every age group, with the highest proportion being in the 35-42 age range at 21.95%. This finding indicates that a significant portion of the workforce in hotel businesses consists of middle-aged and experienced individuals, thus showing that the sector is dominated by individuals who have reached a certain level of maturity.

According to the marital status variable, 53.87% of the participants are single and 46.13% are married. This suggests that the demanding and flexible working conditions in the hotel industry may be limiting for married individuals, and that single employees are relatively more represented in the sector. In terms of educational level, it was found that 39.90% of the employees were high school graduates, 22.44% were associate degree holders, and 20.20% were bachelor's degree holders; the percentage of those with postgraduate education remained at 2.99%. This finding indicates that a workforce with a moderate level of education (high school and associate degree) is dominant in hotel businesses, while those with higher education degrees occupy management or specialist positions.

When the income level variable is examined, it is seen that the highest percentage of participants (23.19%) are concentrated in the income group of 48,001 TL and above. This result shows that the high rate of qualified personnel and senior employees in the sector is reflected in the income level; however, it also reveals that lower income groups have a significant representation in the research.

In terms of the department worked in, it was determined that the highest percentage of participants worked in the front office unit (22.94%), followed by food and beverage (15.21%), kitchen (14.96%), sales/reservations (14.71%), housekeeping (14.21%), and other departments (17.96%). This distribution shows that the sample covers all units of hotel businesses and that a functionally balanced distribution has been achieved.

According to the variable of length of service in the business, 36.66% of employees have been working for 0-1 years. This finding indicates that employee turnover rates may be high in hotel businesses and that short-term employment is common. In contrast, when the total experience duration in the tourism sector is examined, it is seen that 54.36% of the participants have 8 years or more of experience. This situation shows that employees have been working in the sector for many years, but continuous employment at the same company is more limited.

Relationships Between Organizational Justice, Organizational Health, and Turnover Variables

Although the primary aim of the research is to investigate the effect of organizational justice on organizational health and intention to leave, a correlation analysis was conducted to observe the relationship between these variables within the context of the sample.

Table 4. Correlation Coefficients for the Relationship Between Organizational Justice and its Dimensions, Organizational Health, and Intention to Leave.

Variables	Distributive Justice	Procedural Justice	Interactional Justice	Intention to Leave	Organizational Health
Distributive Justice	1	0,744*	0,699*	-0,253*	0,745*
Procedural Justice	0,744*	1	0,865*	-0,267*	0,793*
Interactional Justice	0,699*	0,865*	1	-0,351*	0,867*
Intention to Leave	-0,253*	-0,267*	-0,351*	1	-0,444*
Organizational	0,745*	0,793*	0,867*	-0,444*	1

**p<0,001 r: Pearson Correlation Coefficient*

Perceptions of distributive justice have positive and significant relationships with procedural justice ($r = 0.744$, $p < 0.01$), interactional justice ($r = 0.699$, $p < 0.01$), and organizational health ($r = 0.745$, $p < 0.01$). Furthermore, a negative correlation was found between perceived distributive justice and intention to leave the job ($r = -0.253$, $p < 0.01$). This relationship indicates that as the perceived distributive justice increases, the intention to leave the job decreases.

The perception of procedural justice shows positive and significant correlations with interactional justice ($r = 0.865$, $p < 0.01$) and organizational health ($r = 0.793$, $p < 0.01$). However, a negative correlation was found between procedural justice and intention to leave the job ($r = -0.267$, $p < 0.01$). This correlation indicates that the intention to leave the job decreases when the perception of procedural justice is high.

Perceptions of interactional justice have strong positive correlations with perceptions of organizational health ($r = 0.867$, $p < 0.01$), procedural justice ($r = 0.865$, $p < 0.01$), and distributive justice ($r = 0.699$, $p < 0.01$). Furthermore, there is a negative correlation between perceptions of interactional justice and intention to leave the job ($r = -0.351$, $p < 0.01$). This correlation indicates that perceptions of interactional justice have a negative effect on intention to leave the job.

Intention to leave the job has significant negative correlations with all perceptions of justice (distributive justice: $r = -0.355$, $p < 0.05$, procedural justice: $r = -0.303$, $p < 0.05$, interactional justice: $r = -0.350$, $p < 0.05$). It also shows a negative correlation with perceived organizational health ($r = -0.481$, $p < 0.05$). These results indicate that as perceptions of justice and organizational health increase, the intention to leave the job decreases.

The perception of organizational health has positive and significant relationships with all dimensions of justice (procedural justice: $r = 0.755$, $p < 0.05$, interactional justice: $r = 0.845$, $p < 0.05$, distributive justice: $r = 0.736$, $p < 0.05$). Furthermore, a negative relationship was found between the perception of organizational health and intention to leave the job ($r = -0.481$, $p < 0.05$). These results indicate that as the perception of organizational health increases, the intention to leave the job decreases.

Research findings indicate that employees' perceptions of fairness and organizational health play a decisive role in their intention to leave. As perceptions of organizational health increase, employees' tendency to leave decreases; employee commitment strengthens in environments where social support, trust, open communication, and well-being are felt. Similarly, in organizations with a high perception of fairness, employees feel valued and equal, increasing their trust in the organization and demonstrating a desire to stay in their jobs in the long term. Furthermore, a strong positive relationship was found between perceptions of fairness and organizational health; it was determined that fair practices make the organization healthier and more reliable. Overall, the positive relationships between all dimensions of organizational justice and organizational health, and the negative relationships with intention to leave, reveal that a fair and supportive work environment increases employee commitment and satisfaction, thereby reducing turnover rates.

The Impact of Organizational Justice on Intention to Leave and Organizational Health

The results of the regression analyses conducted to determine the effects of organizational justice and its sub-dimensions on intention to leave and organizational health are summarized in the table below.

Table 5. Findings of Linear Regression Analysis on the Effects of Organizational Justice and Its Dimensions on Intention to Leave and Organizational Health

Model	Independent Variable	Dependent Variable	bj	S(bj)	t	p	F
1	Organizational Justice	Intention to Leave	-0.425	0.062	-6.885	0.000*	47.408
2	Distributive Justice	Intention to Leave	-0.324	0.062	-5.215	0.000*	27.193
3	Procedural Justice	Intention to Leave	-0.319	0.058	-5.533	0.000*	30.613
4	Interactional Justice	Intention to Leave	-0.414	0.055	-7.485	0.000*	56.023
5	Organizational Justice	Organizational Health	0.779	0.021	36.931	0.000*	1363.906
6	Distributive Justice	Organizational Health	0.649	0.029	22.304	0.000*	497.472
7	Procedural Justice	Organizational Health	0.644	0.025	26.030	0.000*	677.539
8	Interactional Justice	Organizational Health	0.695	0.020	34.730	0.000*	1206.191

A regression analysis conducted to examine the effect of organizational justice on intention to leave the job revealed a significant model ($F=47.408$; $p<0.05$). This finding supports hypothesis H1, which states that organizational justice has a significant and negative effect on the intention to leave the job (**ITL=4,887-0,425.OJ).** According to this model, a one-unit increase in organizational justice leads to a 0.425-unit decrease in intention to leave. The explanatory power of the model ($R^2=0.11$) indicates that organizational justice explains 11% of the variation in intention to leave.

A regression analysis conducted to determine the effect of distributive justice on intention to leave the job revealed a significant model ($F=27.193$; $p<0.05$). This result supports hypothesis H1a, which states that distributive justice has a significant and negative effect on the intention to leave the job (**ITL=4,460−0,324.DJ).** According to this model, a one-unit increase in distributive justice results in a 0.324-unit decrease in the intention to leave the job. The model's explanatory power ($R^2=0.064$) is low, indicating that approximately 6% of the variation in the intention to leave the job is explained by distributive justice.

The model established to investigate the effect of procedural justice on intention to leave the job was found to be significant ($F=30.613$; $p<0.05$). This finding supports hypothesis H1b, which states that procedural justice has a significant and negative effect on the intention to leave the job **(ITL=4,511−0,319.PJ).** According to this model, a one-unit increase in procedural fairness results in a 0.319-unit decrease in intention to leave. The explanatory power of the model ($R^2=0.071$) indicates that 7.1% of the variation in intention to leave is explained by procedural fairness.

The analysis conducted to determine the effect of interactional justice on intention to leave the job revealed that the model was significant ($F=56.023$; $p<0.05$). This result supports hypothesis H1c, which states that interactional justice has a significant and negative effect on intention to leave the job **(ITL=4,982−0,414.IJ).** According to this model, a one-unit increase in interactional fairness results in a 0.414-unit decrease in intention to leave. The model's explanatory power

(R^2=0.123) is higher than other sub-dimensions, with interactional fairness explaining 12.3% of the variation in intention to leave.

A regression analysis conducted to examine the effect of organizational justice on organizational health revealed that the model is significant (F=1363.906; p<0.05). This finding supports hypothesis H2, which states that organizational justice has a significant and positive effect on organizational health **(OH=0,816+0,779.OJ).** According to this model, a one-unit increase in organizational justice creates a 0.779-unit increase in organizational health. The model's explanatory power (R^2=0.774) is quite high, with 77% of the variation in organizational health explained by organizational justice.

The analysis conducted to determine the effect of distributive justice on organizational health revealed a significant model (F=497.472; p<0.05). This result supports hypothesis H2a, which states that distributive justice has a significant and positive effect on organizational health **(OH=1,450+0,649.DJ).** According to this model, a one-unit increase in distributive justice creates a 0.649-unit increase in organizational health. The explanatory power of the model (R^2=0.555) indicates that 55% of the variation in organizational health is explained by distributive justice.

The regression analysis conducted on the effect of procedural justice on organizational health revealed a significant model (F=677.539; p<0.05). This finding supports hypothesis H2b, which states that procedural justice has a significant and positive effect on organizational health (**OH=1,333+0,644.PJ).** According to this model, a one-unit increase in procedural fairness creates a 0.644-unit increase in organizational health. The explanatory power of the model (R^2=0.629) shows that 62.9% of the variation in organizational health can be explained by procedural fairness.

The analysis of the effect of interactional justice on organizational health revealed that the model is significant (F=1206.191; p<0.05). This finding supports hypothesis H2c, which states that interactional justice has a significant and positive effect on organizational health **(OH= 0,859 + 0,695.IJ).** According to this model, a one-unit increase in interactional justice creates a 0.695-unit increase in organizational health. The model's explanatory power (R^2=0.751) is quite high, indicating that 75% of the variation in organizational health is explained by interactional justice.

7. CONCLUSION AND RECOMMENDATIONS

The concept of justice is one of humanity's oldest issues, debated for millennia since Ancient Greece. Achieving a level of justice that satisfies all parties is, of course, highly improbable. This situation, both in perception and practical application of justice, means that research on the subject is always necessary. This study is considered valuable because it relates organizational justice, a much more controversial concept in the tourism sector, to organizational health and turnover intention, which can also be considered as existential justifications for the organization.

This study, which examines the relationships between organizational justice perceptions, organizational health, and turnover intentions among employees of five-star hotels in Istanbul, largely confirms the existing literature. The findings show that high perceptions of organizational justice in all dimensions—distributive, procedural, and interactive—positively affect organizational health and reduce turnover intentions. The strongest relationship was found between interactional justice and organizational health, indicating that employees experiencing fair treatment in interpersonal relationships supports organizational well-being. On the other hand, significant and negative relationships were found between all dimensions of justice and turnover intentions, and it was determined that positively perceived organizational health also reduces turnover intentions. The study results reveal that organizational justice and a healthy organizational climate play a critical role in increasing employee commitment and satisfaction,

and reducing turnover intentions. Similarly, Karavardar's (2015) study found that all dimensions of organizational justice significantly affected job satisfaction; and Yiğitol and Balaban's (2025) study found that it affected employee satisfaction. In the study by Sarrafoğlu and Günsay (2020), the significant effect of organizational justice on both job satisfaction and intention to leave the job was revealed. Based on the research findings, the following recommendations were developed:

- Especially given the strong impact of interactional justice, managers should adopt a transparent, respectful, and supportive approach in communicating with employees; increase information sharing; and encourage employee participation in decision-making processes.
- Because procedural fairness contributes to employee commitment, impartiality, consistency, and transparent criteria should be adopted in processes such as promotion, reward, and task assignment.
- A work environment should be provided that supports the psychological and physical well-being of employees, focusing on trust and teamwork; workloads should be balanced, and work-life balance should be considered.
- To increase employee satisfaction and reduce turnover, fair compensation, development opportunities, career planning, and social support mechanisms should be strengthened.
- The importance of the perception of justice should be emphasized through regular training programs for managers and employees, and an organizational justice culture should be reinforced.

This study tested the relationships between variables using correlation and regression analyses. Further research is recommended to test causal relationships, conduct comparative studies across different sectors, and examine demographic variables in greater depth. The perception of justice is, by its nature, a subjective form of perception. In-depth research that goes beyond quantitative measurement and adopts mixed-methods approaches as a research strategy for concepts such as organizational justice, intention to leave, and organizational health can contribute to understanding these classic topics from different perspectives.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 85-94
http://doi.org/10.26677/TR1010.2026.1638

Why Do Gen Z Consumers Buy Green? The Roles of Environmental Concern, Skepticism, and Social Norms

Sri Astuti Pratminingsih
Department of Management, Faculty of Economics and Business, Universitas Widyatama, Indonesia. sri.astuti@widyatama.ac.id
https://orcid.org/0000-0002-7919-7656

Sunardi Sembiring Brahmana
Department of Management, Faculty of Economics and Business, Universitas Widyatama, Indonesia
https://orcid.org/0009-0000-4277-781X

Meriza Hendri
Department of Management, Faculty of Economics and Business, Universitas Widyatama, Indonesia

Abstract

Drawing on a behavioral marketing perspective, this study examines the effects of environmental concern, green skepticism, and social norms on green purchase intention among Gen Z consumers. This study employs a quantitative research design using survey data collected from Gen Z consumers in Indonesia who have purchased or considered purchasing eco-friendly personal care products. Data were analyzed using multiple regression analysis with SPSS 25 to test the proposed hypotheses. The results indicate that environmental concern has a positive effect on green purchase intention, while green skepticism negatively influences consumers' intention to purchase eco-friendly personal care products. In addition, social norms are found to positively influence green purchase intention. This study contributes to the green marketing literature by integrating positive, negative, and social factors. Practically, the findings highlight the need for firms to strengthen environmental communication and social influence to enhance green purchase intention among young consumers.

Keywords: environmental concern; green skepticism; social norms; green purchase intention; Gen Z

1. INTRODUCTION

Environmental issues such as pollution, climate change, and excessive waste generation have increased public awareness of sustainable consumption (Maduku, 2024; Putra & Wijaya, 2024; Saari et al., 2021). In response, many firms have introduced eco-friendly personal care products, including skincare, shampoo, and hygiene items that claim to be environmentally responsible. These products are particularly relevant for younger consumers, especially Generation Z, who are often portrayed as environmentally conscious and socially responsible (Lin & Niu, 2018; Wang & Chou, 2021). However, despite increasing awareness and market availability, consumers' intention to purchase eco-friendly personal care products remains inconsistent (Newton et al., 2015; Nguyen et al., 2019; Sinha & Annamdevula, 2022).

From a behavioral marketing perspective, this inconsistency suggests that green purchase intention is not solely driven by positive environmental attitudes (Banytė et al., 2023; Youn et al., 2021). While some consumers express strong concern for environmental protection, others remain hesitant due to doubts regarding the authenticity of green claims or uncertainty about the actual environmental benefits of green products (Khandai et al., 2025; Promalessy & Handriana, 2024; Zaid et al., 2025). In addition, social influence plays an important role in shaping consumption decisions, particularly among Gen Z consumers who are highly exposed to peer opinions and social media norms (Mason et al., 2025; Wang & Chu, 2021).

Environmental concern has long been recognized as a key driver of pro-environmental behavior. Consumers who are more concerned about environmental issues tend to feel a moral responsibility to support environmentally friendly products and brands (De Canio et al., 2020; Lopes et al., 2024). In the context of personal care products, environmental concern may encourage consumers to consider the ecological impact of their daily consumption choices, thereby increasing their intention to purchase eco-friendly alternatives (Malhotra & Shaiwalini, 2024; Yang et al., 2024).

Nevertheless, growing attention to sustainability has also been accompanied by increasing consumer skepticism toward green marketing practices. Green skepticism reflects consumers' doubts regarding the credibility of environmental claims made by companies (Khan et al., 2022; Saraireh, 2023; Syadzwina & Astuti, 2021). The widespread use of vague or misleading green messages may reduce consumer trust and weaken the influence of environmental concern on purchase decisions (Leonidou & Skarmeas, 2015; Skarmeas & Leonidou, 2013). For Gen Z consumers, who are often highly informed and critical of marketing communication, skepticism may serve as a psychological barrier that discourages green purchase intention.

Beyond individual attitudes and skepticism, social norms also shape green consumption behavior. Social norms refer to perceived social expectations regarding appropriate or desirable behavior (Belgiawan et al., 2017; Zahid et al., 2023). When environmentally friendly consumption is perceived as socially accepted or encouraged, consumers may be more inclined to align their behavior with these expectations (Belgiawan et al., 2017; Wang & Chou, 2021). This effect may be particularly salient among Gen Z consumers, whose purchasing decisions are often influenced by peer behavior, online communities, and social media discourse.

Taken together, green purchase intention can be understood as the result of a complex interaction between positive environmental motivation, psychological resistance, and social influence. However, prior research has often examined these factors in isolation (Pristl et al., 2021; Sivapalan et al., 2024), providing a fragmented understanding of green consumption behavior. This study addresses this gap by examining the effects of environmental concern, green skepticism, and social norms within a single behavioral model, and focusing on eco-friendly personal care products among Gen Z consumers in Indonesia. By integrating positive, negative, and social drivers of green purchase intention, this study contributes to the green marketing literature by offering a more balanced perspective on sustainable consumption behavior. Practically, the findings are expected to provide insights for firms in designing credible green marketing strategies that resonate with young consumers while addressing skepticism and leveraging social influence.

2. METHODOLOGY

This study adopts a quantitative, cross-sectional research design to examine the effects of environmental concern, green skepticism, and social norms on green purchase intention. A survey method was employed to collect data from Gen Z consumers who have experience with or interest in eco-friendly personal care products. The target population of this study consists of

Gen Z consumers in Indonesia, defined as individuals aged approximately 18 to 26 years. Respondents were required to have purchased or considered purchasing eco-friendly personal care products (such as skincare, shampoo, or personal hygiene products) within the past six months.

Data were collected using an online questionnaire, which was distributed through social media platforms and university networks. A purposive and convenience sampling approach was employed to ensure that respondents met the study criteria. After data screening, a total of 110 valid responses were retained for analysis. All constructs were measured using previously validated scales adapted to the context of eco-friendly personal care products. Responses were recorded using a five-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Environmental Concern was measured using four items adapted from Goh & Balaji (2016) and Pagiaslis & Krontalis (2014), which reflect individuals' awareness of and concern for environmental issues. Green Skepticism was measured using four items adapted from Leonidou & Skarmeas (2015) and Skarmeas & Leonidou (2013), capturing respondents' level of doubt regarding the credibility of environmental claims made by companies. Social Norms were measured using four items adapted from Lin & Niu (2018), assessing perceived social pressure or expectations to engage in environmentally friendly consumption. Green Purchase Intention was measured using three items adapted from Chen & Chang (2012) and Goh & Balaji (2016), which reflecting respondents' willingness and intention to purchase eco-friendly personal care products in the future.

Data analysis was conducted using statistical software (e.g., SPSS). Descriptive statistics were first examined to describe respondent characteristics. The reliability of the measurement scales was assessed using Cronbach's alpha. Subsequently, multiple regression analysis was employed to test the effects of environmental concern, green skepticism, and social norms on green purchase intention.

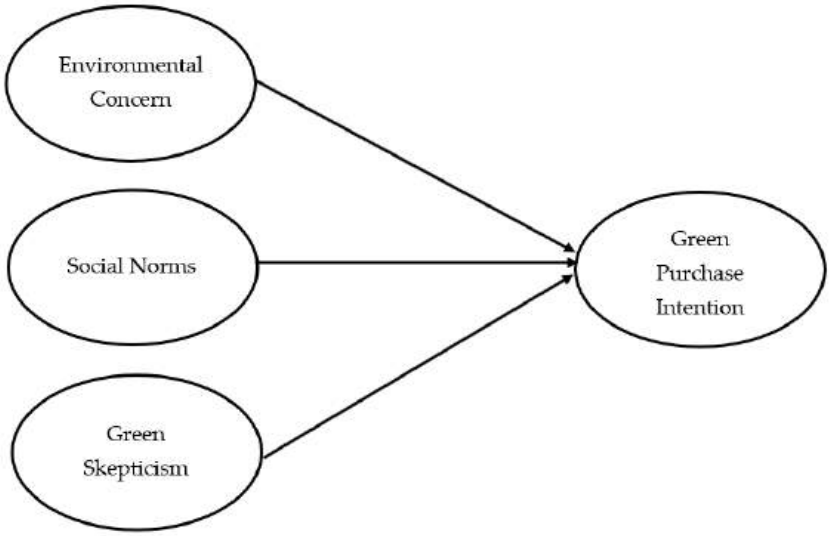

Figure 1. Conceptual Framework

3. RESULTS

3.1 Respondent Profile (n = 110)

A total of 110 Gen Z respondents participated in this study. Most respondents were female (70.9%) and fell within the 21–23 age group (45.5%), followed by 18–20 (38.2%). In terms of status,

the sample was dominated by university students (67.3%), with the remaining respondents being early-career employees (32.7%). The majority reported living in urban areas (78.2%). Regarding eco-friendly personal care products, 65.5% of respondents reported having purchased such products within the last six months, while 34.5% indicated they had considered purchasing but had not done so. Among purchasers, most reported buying eco-friendly personal care products 1–2 times (44.5%), and the most common purchase channel was online marketplaces (56.4%), highlighting the importance of digital retail environments for green product discovery and purchase among Gen Z consumers.

Table 1. Respondent Profile

Profile	Category	n	%
Gender	Female	78	70.9
	Male	32	29.1
Age	18–20	42	38.2
	21–23	50	45.5
	24–26	18	16.4
Status	University student	74	67.3
	Early-career employee	36	32.7
Residence	Urban/City	86	78.2
	Suburban/Peri-urban	24	21.8
Product purchase (last 6 months)	Purchased at least once	72	65.5
	Considered but not purchased	38	34.5
Purchase frequency	1–2 times	49	44.5
	3–4 times	16	14.5
	5+ times	7	6.4
	Not purchased (considered only)	38	34.5
Main purchase channel	Marketplace (e.g., Tokopedia/ Shopee)	62	56.4
	Brand official store/website	20	18.2
	Offline store (drugstore/ supermarket)	28	25.5

3.2 Descriptive Statistics

Table 2. Descriptive Statistics of the Variables

Variable	Mean	SD
Environmental Concern	4.12	0.61
Green Skepticism	2.89	0.73
Social Norms	3.76	0.65
Green Purchase Intention	3.94	0.68

Table 1 presents the descriptive statistics of the study variables. Overall, respondents reported a high level of environmental concern (M = 4.12), indicating strong awareness and concern for environmental issues. Green skepticism was moderate (M = 2.89), suggesting that while respondents were not highly skeptical, doubts regarding green claims were still present. Social norms related to eco-friendly personal care products were relatively high (M = 3.76), reflecting perceived social encouragement toward green consumption. The mean score for green purchase intention was also high (M = 3.94), which indicates a generally positive intention among Gen Z consumers to purchase eco-friendly personal care products.

3.3 Reliability Analysis

Table 3. Reliability of Measurement Scales

Construct	Cronbach's Alpha
Environmental Concern	0.86
Green Skepticism	0.83
Social Norms	0.88
Green Purchase Intention	0.85

As shown in Table 2, all constructs demonstrated good internal consistency, with Cronbach's alpha values ranging from 0.83 to 0.88, exceeding the recommended threshold of 0.70. These results indicate that the measurement scales used in this study are reliable.

3.4 Correlation Analysis

Table 3. Correlation among Variables

Variable	1	2	3	4
Environmental Concern	1			
Green Skepticism	−0.32**	1		
Social Norms	0.45**	−0.28**	1	
Green Purchase Intention	0.52**	−0.41**	0.56**	1

The correlation results indicate that environmental concern and social norms are positively correlated with green purchase intention, while green skepticism is negatively correlated with green purchase intention. None of the correlation coefficients exceed 0.70, suggesting that multicollinearity is not a concern.

3.5 Multiple Regression Analysis

Table 4. Results of Multiple Regression Analysis

Predictor	β	t-value	p-value
Environmental Concern	0.29	3.42	< 0.01
Green Skepticism	−0.21	−2.87	< 0.01
Social Norms	0.37	4.56	< 0.001
Model Statistics:			
$R^2 = 0.48$			
Adjusted $R^2 = 0.46$			
$F = 32.18$, $p < 0.001$			

Table 4 presents the results of the multiple regression analysis examining the effects of environmental concern, green skepticism, and social norms on green purchase intention. The overall model is statistically significant ($F = 32.18$, $p < 0.001$), as it explains 48% of the variance in green purchase intention.

Environmental concern has a positive and significant effect on green purchase intention ($\beta = 0.29$, $p < 0.01$), which indicates that consumers who are more concerned about environmental issues are more likely to intend to purchase eco-friendly personal care products. Green skepticism shows a negative and significant effect ($\beta = -0.21$, $p < 0.01$). It suggests that doubts toward green claims reduce consumers' purchase intention. Social norms exhibit the strongest positive effect on green purchase intention ($\beta = 0.37$, $p < 0.001$), which highlights the important role of perceived social influence in shaping green consumption behavior among Gen Z consumers.

4. DISCUSSION

This study examined how environmental concern, green skepticism, and social norms shape green purchase intention toward eco-friendly personal care products among Gen Z consumers in Indonesia. Overall, the findings support a balanced behavioral view of green consumption: intention is jointly driven by internal motivation (environmental concern), constrained by psychological resistance (green skepticism), and reinforced by external social influence (social norms). The relatively strong explanatory power of the model suggests that these three factors capture key elements of Gen Z decision-making in green personal care—where "doing good" competes with "doubting claims" while being continuously shaped by peer and online environments.

First, the positive effect of environmental concern indicates that Gen Z consumers who care more about environmental issues are more likely to intend to purchase eco-friendly personal care products. This result is consistent with the idea that sustainable consumption in everyday categories can be motivated by a sense of responsibility and perceived personal relevance of environmental conditions (Cruz & Manata, 2020; Peisker, 2023). In the personal care context, the decision is especially meaningful because these products are purchased frequently and used directly on the body; therefore, environmentally concerned consumers may interpret routine consumption choices (e.g., selecting "eco-friendly" packaging or "responsibly sourced" ingredients) as a practical way to align daily habits with broader environmental values (Jain, 2025; Lin & Niu, 2018). For Indonesian Gen Z, who are increasingly exposed to sustainability narratives through digital media, environmental concern may serve as a stable internal driver that makes green product options feel more personally consistent and socially desirable.

Second, green skepticism was found to negatively influence green purchase intention, confirming that doubt toward environmental claims can reduce willingness to buy (Khan et al., 2022; Nguyen et al., 2019; Syadzwina & Astuti, 2021) eco-friendly personal care products even when green options are available. This finding is particularly relevant for personal care markets where "natural," "organic," "eco," and "clean" claims are common and sometimes ambiguous. Because personal care products are often marketed through influencer content and brand storytelling, Gen Z consumers may become more alert to exaggerated messaging, vague certifications, or inconsistent brand behavior. In this situation, skepticism functions as a behavioral barrier: consumers may hesitate (Nguyen et al., 2019; Saraireh, 2023; Syadzwina & Astuti, 2021), delay purchase, or choose familiar mainstream brands rather than taking perceived risks on products whose "green" attributes are not clearly verifiable. The result highlights that green consumption is not simply about pro-environmental attitudes; it is also shaped by consumers' credibility judgments and perceived authenticity of green marketing communication.

Third, social norms emerged as the strongest positive predictor of green purchase intention, indicating that perceived expectations from peers and the broader social environment strongly shape Gen Z's intention to purchase eco-friendly personal care products. This pattern is highly plausible given the social nature of Gen Z consumption, where product discovery and evaluation are often mediated by social media, peer reviews, and community preferences (Banytė et al., 2023; Mason et al., 2025). In personal care categories, where products are closely tied to identity, self-presentation, and lifestyle, normative influence may be especially powerful. When eco-friendly personal care is seen as "what people like me do," green purchase intention becomes easier and more socially rewarding. In an Indonesian setting, where trends can spread rapidly via online communities and marketplace ecosystems, social norms may also reduce the perceived effort of going green by making eco-friendly personal care products more visible, more familiar, and more acceptable as default choices.

Taken together, these findings imply that green purchase intention among Indonesian Gen Z is best understood as a combination of value-driven motivation, trust-related resistance, and social reinforcement. The results also help explain why green intention may remain inconsistent in real markets: even with high environmental concern, skepticism can weaken intention, while social norms can either amplify or stabilize intention depending on what is socially encouraged in a given peer group or online community. In other words, intention increases not only when consumers care about the environment, but also when they trust green claims and perceive that green purchasing is socially supported.

Importantly, the context of eco-friendly personal care products clarifies why these relationships are meaningful. Unlike durable green products, personal care purchases are frequent and relatively low-to-mid cost, making them a realistic "entry point" for sustainable consumption among young consumers. At the same time, the category is saturated with marketing claims, which increases the likelihood of skepticism. This tension makes personal care an ideal setting to observe the behavioral balance found in this study—where concern encourages, skepticism restrains, and norms propel green purchase intention among Gen Z consumers in Indonesia.

5. CONCLUSION

This study examined the behavioral determinants of green purchase intention toward eco-friendly personal care products among Gen Z consumers in Indonesia, focusing on the roles of environmental concern, green skepticism, and social norms. The findings demonstrate that green purchase intention is shaped by a combination of internal values, psychological resistance, and social influence. While environmental concern and social norms positively influence intention, green skepticism serves as a barrier that weakens consumers' willingness to engage in green consumption. These results highlight that green purchase intention cannot be explained solely by pro-environmental attitudes, particularly in product categories where marketing claims are highly prevalent.

From a theoretical perspective, this study contributes to the green marketing and consumer behavior literature by integrating positive, negative, and social drivers of green purchase intention within a single, parsimonious behavioral model. By examining these factors simultaneously, the study offers a more balanced understanding of why environmentally aware consumers may still hesitate to purchase green products. The findings also extend existing research by contextualizing green consumption within the eco-friendly personal care category, which represents a frequent, identity-relevant consumption domain for Gen Z consumers.

Practically, the results suggest that firms marketing eco-friendly personal care products should not rely solely on consumers' environmental concern. Efforts to reduce green skepticism—such as transparent communication, credible certifications, and consistent environmental practices—are essential to strengthen purchase intention. In addition, leveraging social norms through peer influence, community engagement, and social media visibility may be particularly effective in encouraging green consumption among Gen Z consumers, who are highly responsive to social cues and collective behavior.

Despite its contributions, this study has several limitations. First, the use of a cross-sectional survey design limits causal interpretation. Second, the sample was restricted to Gen Z consumers in Indonesia, which may limit the generalizability of the findings to other age groups or cultural contexts. Future research could employ longitudinal or experimental designs to better capture causal mechanisms, extend the model to other product categories, or compare different generational cohorts. Additionally, future studies may incorporate moderating or mediating variables, such as trust, perceived authenticity, or price sensitivity, to further enrich understanding of green purchase behavior.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 95-114
http://doi.org/10.26677/TR1010.2026.1639

Iuliopolis: Religious, Commercial, and Social Life in the Byzantine Era

Durmuş GÜR
Asst. Prof. Dr. Durmuş GÜR, Head of the Department of Handicrafts, Karabük University, Türkiye, durmusgur@gmail.com
https://orcid.org/0000-0002-9945-8825

Tolga ÇELİK
Expert Archaeologist Tolga ÇELİK, Ankara Museum of Anatolian Civilizations, Türkiye, arktolgacelik@gmail.com
https://orcid.org/0009-0009-7769-2045

Abstract

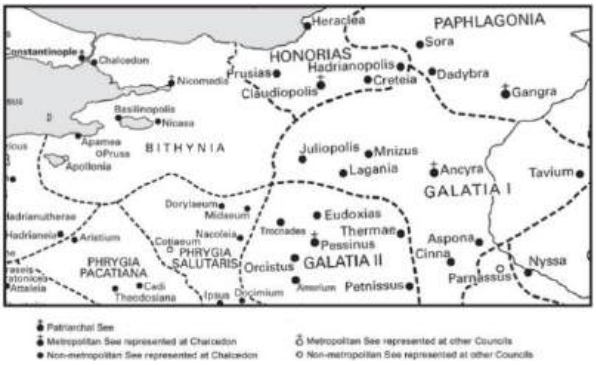
The ancient city of Iuliopolis, located in proximity to the Nallıhan district of Ankara and now largely submerged, has been subject to archaeological excavations between 2009 and 2025. Specifically, Church No. 1, the Eastern Necropolis, and the Larder structure have played a pivotal role in deciphering the multilayered structure of this era. The pithoi, a type of storage vessel, are indicative of the urban organisation of agricultural production, including viticulture and grain cultivation. Furthermore, the presence of African Red Slip Ware ceramics recovered from the fill layers provides further evidence for Iuliopolis's integration into the Mediterranean trade network, a phenomenon comparable to that observed in other major cities in and around Ankara. Collectively, these findings confirm that Iuliopolis was a developed city characterised by local production, extensive trade, and powerful religious authority, and that it was strategically located on an important transportation route.

Keywords: Iuliopolis, Church, Larder, Socio-Economics.

1. INTRODUCTION

Anatolia has hosted numerous civilizations throughout history, serving as a stage for the interaction of different cultures. The Late Antique and Early Byzantine Periods, represent a transitional phase marked by major political, religious, and economic transformations (French, 1981: 38-39). During the Byzantine era, the use of Roman roads and infrastructure was maintained in Iuliopolis, while the rise of Christianity led to the construction of new religious structures and the re-functioning of old pagan artifacts.

The ancient city of Iuliopolis presents a significant example of this transformation. Located in the Gülşehri locality near the Nallıhan district of Ankara, the city offers an opportunity to observe the fluidity between the Roman and Byzantine periods. Iuliopolis was one of the strategically important cities of this era, frequently mentioned in ancient sources due to its position at the intersection of critical transportation networks. However, the city was submerged under water in the 1950s following the construction of the Sarıyar Dam. Although this situation complicated archaeological research concerning the city, rescue excavations conducted by the Ankara Museum of Anatolian Civilizations since 1991 and 2009 have shed light on the history of Iuliopolis (Arslan et al., 2011: 271-304; Arslan et al., 2012: 169-188) (Map 1).



Map 1. The Location of Iuliopolis in the Byzantine Era (Price-Gaddis 2005: 231-232; Onur, 2014a: 80)

Rescue excavations at Iuliopolis have been carried out by the Ankara Museum of Anatolian Civilizations with a large team since 2009. Archaeological work from 2012 onwards concentrated on Church No. 1, while studies conducted after 2022 focused on the larder area and its surroundings. These investigations on the larder were concluded as of November 2025, with plans to resume in future years.

Within the scope of these ongoing efforts, orthophoto studies were conducted in areas encompassing the city's Eastern Necropolis, Church No. 1, and the city walls. In 2013, georadar surveys were performed in the Necropolis by Anadolu Yerbilimleri Ltd. Şti., and excavation work was subsequently carried out in line with the identified anomalies (Sağır et al., 2014: 154). It was determined that grave structures were constructed closely side-by-side in the Necropolis, leaving almost no empty space. Furthermore, as part of the "Safeguarding Juliopolis–Initial Phase" project, implemented under the scientific consultancy of Assoc. Prof. Dr. Ali Metin Büyükkara and supported by the U.S. Embassy in Ankara, 3D modeling and LiDAR scans of the existing city structures have been completed.

2. METHODOLOGY

This research employs an interdisciplinary archaeological and comparative approach, synthesizing data from rescue excavations (2009–2025) at Iuliopolis. The study integrates stratigraphic analysis of key structures (Church No. 1, the larder, and the Eastern Necropolis) with typological and analogical examinations of material finds (e.g., storage *pithoi*, Roman-era *patera*, and North African Red Slip Ware). Furthermore, the methodology incorporates archaeobiological data (resveratrol and sulcatone analysis from hair samples) and remote sensing technologies to reconstruct the city's transition from a Roman pagan settlement to a complex Early Byzantine socio-economic and religious hub.

3. IULIOPOLIS IN THE EARLY BYZANTINE PERIOD

Archaeological evidence in the region suggests that the settlement has existed since prehistoric times. The city was initially known as Gordiokome/Gordiou Kome (the Village of Gordion) but was referred to as Iuliopolis during the Roman Period (Belke & Restle, 1984: 181; Arslan & Zoroğlu, 2011: 12). The name Juliopolis/Iuliopolis was given to the city in the Early Roman Imperial Period, in dedication to the Julio-Claudians (Arslan & Zoroğlu, 2011: 12). Archaeological work carried out at Iuliopolis has identified extensive data spanning the Hellenistic, Roman, and Byzantine periods.

Iuliopolis was cited as one of the twelve cities of Bithynia during the Roman Period, but it was subjected to boundary changes between Bithynia and Galatia over the course of history. Researchers have offered various suggestions regarding where its borders were situated (Perrot, et al., 1872: 94, 153-156, 219). One of the military roads connecting İznik (Nicaea) to Ankara (Ankyra) during the Roman Period passed through Iuliopolis. Furthermore, Pliny the Younger's official correspondence with Emperor Trajan, in which he suggested establishing a *centurio regionarius* in Iuliopolis due to its location, indicates that the city occupied a militarily and strategically important position (Marek, 2003: 58).

Iuliopolis was incorporated into the territory of Galatia with the advent of the Early Byzantine Period (late 3rd–4th century) (Ramsay, 1890: 195-196). The city is situated on the Pilgrim's Road route, which was used by emperors such as Macrinus, Arcadius, and Honorius. This route, upon which Iuliopolis is also located, was utilized for transport by emperors, pilgrims, soldiers, and the populace during both the Roman and Byzantine periods (French, 1981: 38-39, 51; Walker, 2003: 107, fig. 1) (Map 2).

Map 2. The Pilgrim's Road Between Constantinople and Antioch (Walker, 2003: 107, fig. 1)

Beginning in the 4th century, Iuliopolis is listed among the summer palace settlements of Ankara (Aydın, et al., 2005: 88). During this period, the city was one of the smaller urban centres near the main settlement of Ankara. Iuliopolis was represented by its clergy at synods and councils throughout the Early Byzantine Period. The name of Iuliopolis, which was one of the episcopal centres in the province of Galatia I, appears in church records starting from the 4th century (Price & Gaddis 2005: 231-232; Onur, 2014a: 80). The city was listed as an episcopal see within Galatia I, under the jurisdiction of the Diocese of Pontica. Administratively, Iuliopolis witnessed several changes: it was incorporated into the Opsikion Theme starting from the 7th century, and subsequently into the borders of the Boukellarion Theme from the 8th century onwards (Belke & Restle, 1984: 62; Eyice, 1996: 255).

Iuliopolis, a city that maintained its clergy at the Synod of Ankyra (314) and the Council of Nicaea (325), was represented during these periods by Bishop Philadelphus as one of the five episcopal centres of Galatia (Belke & Restle, 1984: 181-182). At the Council of Chalcedon (451), the city was represented by Meliphthongus, who was referred to as "the bishop of the holy church of God in Iuliopolis" (Price & Gaddis 2005: 126, 146; Onur, 2014a: 69). Bishop Proclianus represented the city at the Synod of Galatia I (458), and Bishop Pantoleon represented Iuliopolis at the Synod of Constantinople (536) (Belke & Restle, 1984: 181-182; Onur, 2014a: 70).

Between the 4th and 6th centuries, Iuliopolis was recognized as a Byzantine city. By the 6th century, during the reign of Justinian I (AD 527–565), it is known that the city walls were reinforced and a church was constructed in the city (Kaya, 2020: 259; Gür, et al., 2025a: 54-55). The repair of the city walls in the 6th century was an effort to take permanent measures against flooding. The Emperor also commissioned the construction of a bridge and a church within the city (Prokopius, 1941: 331-333; Procopius, VII/V). It is appropriate to associate this church with some of the contemporary religious figures of the time. Pantoleon, Martyrios, Ioannes, Theodoros,

and Theodotos are only some of the respected clergymen whose names are known in the city after the 6th century (Mitchell, 1982: 139; Belke & Restle, 1984: 181-182; Onur, 2014a: 70). Finally, the names of Bishop Martyrios are mentioned in the Third Council of Constantinople (680-681) and Bishop Ionnaes in the Quinisext Council (Penthekte Synod) (692) (Belke & Restle, 1984: 181-182).

The *Vita* of Saint Theodore of Sykeon, who was born during the reign of Justinian and died during the reign of Heraclius (613), mentions Iuliopolis. It was rumored among the public that Theodore had wasted church funds by giving large amounts of alms during his time as Bishop of Anastasioupolis (Lagania). Consequently, Theodore travelled to Ankyra (Ankara) to submit his resignation to the emperor. Following the Emperor's instructions, his resignation was accepted and reported to Patriarch Cyriacus. Upon the advice of Patriarch Cyriacus, Saint Theodore stayed away from the vicinity of Anastasiopolis (Lagania) and came to the Church of the Archangel Michael (a small church) in Acreina, located on the slopes of Iuliopolis. It is recounted that Solomon, a resident of Iuliopolis, and his wife, who visited Saint Theodore (believed to dispense healing), were cured by being freed from evil spirits (Onur, 2014a: 70).

The name of Iuliopolis was later changed to Basilaion, Basileon, or Basileion in honor of Emperor Basil I (867-886). The city's name first appears as *Basileion* in records from 869-870, although it is highly significant that the name *Iuliopolis* continued to appear in official records (Ramsay, 1890: 244-245; Belke & Restle, 1984: 181-182; Onur, 2014a: 70). The name *Basilium/Basileion*, used for Iuliopolis at the Fourth Council of Constantinople (869-870), is stated to have been dedicated in honor of Emperor Basil I (867-886). This information is also included in the *Notitiae Episcopatuum* (Walker, 2003: 102; Onur, 2014a: 70, Dip. 30).

Although the latest dating of the existing finds detected during the work carried out in the Eastern Necropolis is the 9th century, which is thought-provoking for the historical process, written sources demonstrate the continuation of Byzantine political and religious dominance in the city (Dolmuş, et al., 2024: 56). The expression Bishop Theodotos in an inscription detected during research around Sarılar has been associated with Iuliopolis by researchers (Mitchell, 1982: 139). Furthermore, the edicts of Emperor Alexios Komnenos (1086) record that the church of *Basilaion* was subordinate to the Bishopric of Ankyra (Ankara) (Onur, 2014a: 70). This situation indicates that the church and religious building activity in the city were still active in the last quarter of the 11th century. On the other hand, some studies suggest that Ankara was incorporated into Seljuk rule in 1073 following the control of Kutalmışoğlu Mansur (Erdoğan, 2004: 101). However, the knowledge that Ankara remained politically subordinate to the Byzantines in the 11th century (Akyol, 2016: 757) and that the city was recorded as belonging to the Bishopric of Ankyra in 1086 raises doubts about the accuracy of this view (Onur, 2014a: 70; Akyol, 2016: 757). It is known that a clergyman named Symeon was born in *Basileion* (another name for Iuliopolis) in Galatia in 949 and lived until 1022 (Turner, 1990: 16-18). Symeon was temporarily elevated to the rank of Metropolitan to honour the acting bishop of Emperors Constantine X Doukas and Michael VII Doukas, but he is stated to have remained permanently in the position (Belke & Restle, 1984: 182). This demonstrates that clergymen were still influential in the city in the 11th century. It is noted that the city's name was completely erased from the stage of history at an unknown date after this period, a process clearly visible in literary texts (Walker, 2003: 102).

The detection of Seljuk Period ceramics during archaeological research in the city suggests the existence of commercial relations or the influence of Turkic rule in the city by the 12th century (Gür, et al., 2025a: 58). Ankara is stated to have been incorporated into Turkic territories in 1127 by the Danişmend ruler Emir Gazi (Özdemir, 1986: 21). Although Ankara was first besieged during the reign of Orhan Bey in 1354, it completely passed into Ottoman rule in 1362 during the reign of Murad I (1362-1363) (Oygür, 2020: 16-17). With the second half of the 14th century,

Byzantine control around Iuliopolis came to a complete end (Beyoğlu, 2023: 1). The official Byzantine records last shed light on the city in the 11th century; from this date until the 14th century, Dark Age is evident (Figure 1).

Figure 1. Areas of Concentration of Early Byzantine Structures and the Modern Settlement Area (2025)

Concrete architectural structures dating to the 14th–15th centuries around Nallıhan indicate the presence of Turkic construction in the city's later history (Toraman, 2012: 348; Çerkez, 2013: 319).

This article focuses on the previously unknown Early Byzantine Period structures—namely the necropolis, city walls, a religious building, a larder, architectural plastic works, and small finds—that were uncovered during the excavation campaigns conducted between 2009 and 2025. The study aims to examine the architectural and socioeconomic structure of Iuliopolis during this critical period (Figure 2).

Many new data, evaluated together with the finds obtained from Church No. 1, the city walls, the larder, and the graves in the necropolis area, offer important clues regarding the city's religious and socioeconomic life. This comprehensive study aims to provide an extensive overview of Iuliopolis's Byzantine Period socioeconomics, including the function of the aforementioned architectural structures, the typological and analogical evaluation of the recovered finds, and the city's religious, social, local production, and storage activities during the Early Byzantine Period.

Figure 2. The City Walls of Iuliopolis (2025)

4. RELIGIOUS, COMMERCIAL, AND SOCIAL LIFE

Iuliopolis was a highly active centre in terms of architecture and socioeconomics during the Late Roman and Early Byzantine periods. Church records and epigraphic data indicate that the city was an episcopal see and was represented repeatedly by its clergy at important councils (Onur,

2014a: 69). As of 2025, more than 800 graves have been identified in the necropolis, where excavations have been ongoing since 1991. These graves provide valuable information about the city's burial traditions and socioeconomic structure (Arslan, et al., 2013: 2-3).

The city's necropolis is situated on the eastern and western slopes of the Aladağ Stream. The deep valley between these two areas, particularly the settlement area from the Ottoman Period that lay within the valley, is currently submerged under the dam waters. Examinations carried out in the Eastern Necropolis have revealed numerous grave structures dating to the Hellenistic, Roman, and Byzantine periods. The Byzantine Period grave structures comprise types such as simple earth graves, cist graves, sarcophagi, and chamber tombs.

The graves were primarily constructed through the re-functionalization of grave structures previously used during the Hellenistic and Roman periods, or by rebuilding them with *spolia* (reused architectural stones). In addition to this, it is worth noting that a small number of grave structures were entirely built by being carved directly into the bedrock (*ana kaya*). Particularly, the rock-cut grave structures from the Early Byzantine Period are clearly distinguishable from Roman structures by their location, architecture, material-technique, style, and iconographic features.

The transformation in belief systems accompanying the rise of Christianity in the region is directly reflected in burial practices and grave goods. The Abraxas ring recovered from Grave No. 148 in the Necropolis serves as a small but significant piece of evidence regarding the Christianization process in Anatolia. Although not definitive, this suggests that Iuliopolis was either Christianized or adapted to this religious change during the Late Antique–Early Byzantine Period (Arslan & Zoroğlu, 2011: 12-13). Furthermore, researchers stating that the earliest and first churches in Galatia were located in "Ancyra, Juliopolis, Tavium, and Pessinus" supports the early establishment of religious structures in Iuliopolis (Ramsay, 1893: 82; Serin, 2014: 66). While a large portion of the Roman Imperial Period graves in some cities were located outside the city walls, this situation fundamentally changed during the transition to the Byzantine Period. Burial practices were now shifted inside the city walls, particularly favouring areas surrounding churches and other sacred spaces (Steskal, 2011: 246; Dolmuş, et al., 2024: 42). In Iuliopolis, archaeological studies support that burials during the Byzantine Period were carried out inside the church, around its vicinity, and within the necropolis area (Dolmuş, et al., 2024: 42).

The chamber tomb belonging to Presbyter Paulos, discovered in the necropolis and dated to the 6th–7th centuries, points to the art sensibility of the period and the spread of Christianity within the elite and religious strata (Cinemre, 2014: 410; Gür, et al., 2024: 231-248). Furthermore, numerous graves dating to the Late Antique–Early Byzantine Period have been identified during the research conducted in the necropolis. Most of these graves dated between the 5th and 7th centuries. Aside from the chamber tombs, rectangular graves constructed along an east-west orientation feature reused lid stones (spolia). Some of the graves have plastered interiors, and *in situ* cist grave fragments have been identified. Notably, in grave JLP_M447, which had plastered walls and contained fragments of a wooden coffin, inscribed marble pieces and marble fragments with cross depictions were recovered. These finds are dated to the 5th–6th centuries.

Graves, which include types such as the chamber tomb and the cist grave, the inhumation burial rite was preferred, oriented east-west with the head placed towards the west. In the cist graves, which were carved into local limestone (Ulusoy et al., 2024: 82-83, Figures 2-3), the individuals were interred in an east-west orientation with their heads facing west. In the Byzantine Period graves, lid stones consisting of two to five pieces were utilized, and it has been determined that some of these lid stones were made of sedimentary rock types transported to the city from external sources (Ulusoy et al., 2024: 86). Grave goods recovered from some of the graves include:

JLP_M14: a bronze cross; JLP_M163: a gold hair ornament, a terracotta single-handled jug, a ring setting; JLP_M204: fragments of marble with a cross depiction and inscribed fragments; JLP_M211: a gold ring, a terracotta oil lamp, a terracotta plate fragment with a cross depiction; JLP_M215: a pair of gold earrings, a bronze coin, a terracotta bowl, a terracotta plate fragment with a cross depiction, two single-handled terracotta jugs, a bronze key, a bronze bell, and two glass beads; JLP_M262: bronze necklace fragments; JLP_M270: an inscribed stele; JLP_M275: an inscribed stele fragment with a cross; JLP_M321: an inscribed stele on the lid stone; JLP_M347: a bronze ring; JLP_M392: religious symbols and an inscription; JLP_M414: a terracotta bowl fragment with a cross depiction; JLP_M447: a fragmentary cross-depicting plaque along with an inscribed plaque fragment and wooden coffin pieces; JLP_M450: a bronze wire earring; JLP_M452: a marble lid stone with a cross depiction and a bronze ring; JLP_M461: an iron nail; JLP_M484: a broken iron ring; JLP_M524: a hair ornament; JLP_M541: a terracotta bowl, two bronze bracelets, a bronze earring; JLP_M608: terracotta bowl fragments; JLP_M610: a broken iron bracelet, a bronze ring, and terracotta ceramic fragments; JLP_M743: a bronze tintinnabulum and a bronze belt buckle were found as burial offerings (Figure 3).

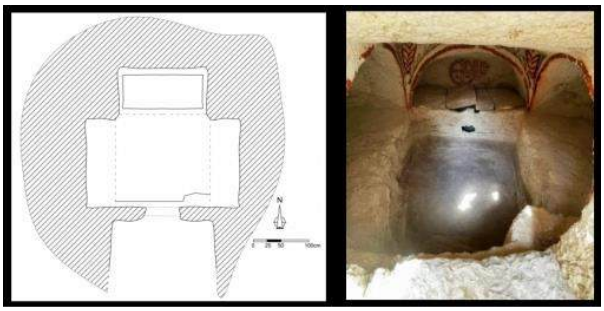


Figure 3. The Iuliopolis Necropolis, Chamber Tomb JLP_392 (Gür, et al., 2024: 231-248)

Figure 4. Tomb Stelae from the Eastern Necropolis, JLP_M270 (left) and JLP_M275 (right) (2011)

Fragments of inscriptions and stelae recovered from the graves offer insights into the religious beliefs and professions in Iuliopolis during the Early Byzantine Period (Onur, 2014b: 105-108, fig. 6-11) (Figure 4).

Church No. 1, one of the city's religious centers, began as a chapel dating to the 4th–5th centuries and is stated to have been converted into a large three-aisled basilica in the 6th–7th centuries (Sağır et al., 2014: 154). The examinations carried out confirm that the construction of this development was completed before the 7th century, specifically during the 5th–6th centuries. This architectural evolution parallels the official recognition and power gained by Christianity in the city. Procopius's accounts indicate that Emperor Justinian commissioned the construction of

a church and a bridge in the city (Procopius, *VII/V*). The graves belonging to the clergy who served in the church, and the remains identified inside the structure, reinforce the thesis that Iuliopolis was situated on a religious pilgrimage route (Sağır et al., 2016: 668).

In the graves, which contain burials of one or more individuals, various grave goods belonging to women, men, and children have been recovered alongside skeletal remains. Finds such as terracotta, glass, metal, and coins exhibit coarser workmanship compared to Hellenistic and Roman finds.

Literary reviews and archaeological data suggest that Christian religious life in Iuliopolis continued until the 12th century (Figure 5). The small finds detected in the necropolis and literary texts are indicators of this continuation (Walker, 2003: 102-103). The presence of clergy in the city in the 11th century is further evidence (Belke & Restle, 1984: 182). Moreover, inspections carried out within the scope of the Tahirler Project (https://courses.washington.edu/tahirler/reports.html) indicated the Roman road was located south of the modern road between Iuliopolis and Anastasiopolis, thus proving the existence of Early and Middle Byzantine Period religious structures in the vicinity. The presence of churches and rock-cut structures in Karadağ, a storage *pithos* and a late 12th-century Seljuk coin in the Uyku settlement, ceramics from the Early and Middle Byzantine Periods in Pınarcık near Fasıl Village north of the Kirmir River, an 11th–12th century column capital inscribed with "... Theod(ore-?), servant of God to thee," and the remains of a Middle Byzantine religious church with geometric and cross-depicting architectural fragments at Dikmen Höyük (Anastasiopolis) (Walker, 2003: 102-110), along with known settlements around Iuliopolis in the 6th–7th centuries (Barchard, 2003: 175-179; Akyol, 2023: 1033-1034; Akyol, 2024: 546), demonstrate that the religious construction in some of the *chorai* between Iuliopolis and Anastasiopolis persisted until the 12th century.

Figure 5. Necropolis, Bronze Cross Ring (Circa 1100) (Arslan et al., 2013: 29)

4.1. 1 Church No. 1

To fully comprehend the function and contextual significance of the larder structure in Iuliopolis, it is essential to define the spatial and chronological framework within which it is situated. Church No. 1, located south of the excavation area and previously identified, is one of the most crucial components of this framework. Positioned approximately 750 meters northeast of the larder structure and immediately south of the necropolis area, this church reveals both the religious and civil dimensions of the Early Byzantine urban fabric.

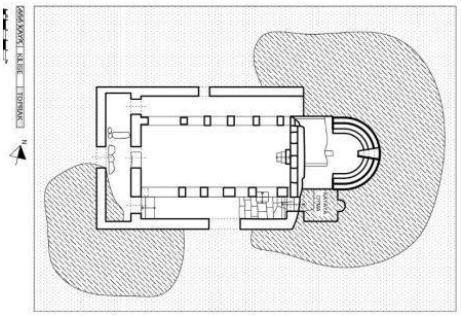
Church No. 1 is rectangular in form, oriented along an east-west axis, and consists of a single central apse on the east, a three-aisled naos, and a single rectangular narthex oriented north-south on the west. The original name and exact construction date of this basilical plan church, which is dated between the 5th and 6th centuries, remain unknown. The dating of Church No. 1 has not been definitively established by a direct inscription or concrete evidence. However, its relationship with the nearby graves and the recently discovered larder structure provides a crucial chronological context. The dating of the larder structure to the 5th–6th centuries through its finds (Latin cross, ceramics, etc.) supports the contemporaneity of Church No. 1 with this

period. The church, presumed to have been built during the Early Byzantine Period when the city's Christian population was at its densest, underscores its central role in religious life.

In summary, Church No. 1 is not merely a place of worship but also an indicator of the city's social and economic organization. The figure of the Latin cross on one of the *pithoi* and the larder's function for liquid food storage suggest that this church was likely part of a monastery complex and served as a religious center overseeing the city's agricultural economy. Thus, when considered alongside the larder, the church represents a holistic structure that catered to both the spiritual and temporal needs of Iuliopolis (Gür, et al., 2025: 118-121) (Figure 6-7, Drawing 1).

Figure 6. Southeast of Church No. 1, Rock-Cut Structure (2012)

Figure 7. Church No. 1, View from West to East (2025)



Drawing 1. Church No. 1, Measured Plan (D. Gür and V. Tokdemir, 2026)

Numerous fragments of imported red-slipped ceramics were identified in the floor fill of the church apse. On the surface of some of the terracotta fragments, which are dated between the 5th and 7th centuries, depictions of the Latin cross along with fragments of religious inscriptions are visible in the legends (Figure 8-9).

Figure 8. Imported Ceramic Fragments Identified from the Church No. 1, Apse Floor (2025)

Figure 9. Imported Ceramic Fragments Identified from the North Aisle Floor of the Church No. 1 (2025)

The data indicate that the religious structure constructed in the 5th–6th centuries continued to be utilized throughout the 7th century and beyond. Furthermore, the existence of a religious structure dating earlier than the one built during the reign of Justinian (Iustinianus) in the 6th century (Prokopius, 1941: 331-333; Procopius, VII/V) is known. Specifically, the fact that Meliphthongus, referred to at the Council of Chalcedon (451) as "the bishop of the holy church of God in Iuliopolis," represented Iuliopolis (Price & Gaddis 2005: 126, 146; Onur, 2014a: 69), and that the religious structure he served was dedicated to God, is known.

The mention of the *Basilaion* church being subordinate to the Bishopric of Ankyra (Ankara) in the edicts of Emperor Alexios Komnenos (1086) (Onur, 2014a: 70) suggests that the religious structure in the city was in use between the 5th and 11th centuries, and that the Christian presence weakened or vanished religiously with the cessation of Byzantine rule in the city by the 12th century.

During the evaluation of small finds from the archaeological work between 2012 and 2025, wall painting fragments belonging to the church were identified. Apart from fragments assessed as brown and red borders, no other pictorial representations have survived to the present day. Upon examining the existing walls and the finds, it is posited that the structure was decorated with wall paintings in the 5th–6th centuries and was subsequently destroyed (Figure 10).

Figure 10. Church No. 1, Fragmentary Wall Paintings (2025)

5. THE LARDER

During the 2023–2025 excavation season, an investigation was carried out on a previously unknown Early Byzantine Period larder structure located south of the necropolis. Specifically, during the 2024 excavations, a rectangular-planned larder structure extending along an east-west axis was identified within a three-phased building complex belonging to the Late Antique and Early Byzantine Periods, situated south of the necropolis area. The structure consists of two connected/adjoining rooms (Rooms 1 and 2) and continues towards the east. This structure, determined to have been used for storage purposes, offers new and significant data regarding the city's socioeconomic life (Gür, et al., 2025: 811-814) (Figures 11-15).

Figure 11. The Larder, Aerial View (2025)

Figure 12. The Larder, Aerial View, and Pithoi Identified in the Larder (2024)

Figure 13. Pithoi Identified in the Larder (2024) and Patera (2024)

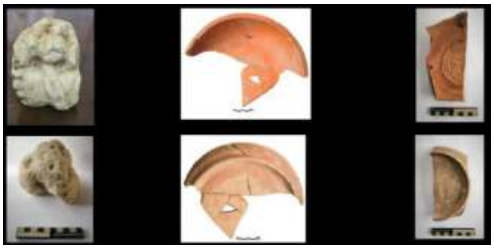


Figure 14. Small Finds Identified from the Larder (2024)

Figure 15. Imported Ceramic Fragment Identified from the West of the Larder, with the Legend ΕΥΛΟΓΙΑ ΚΥΡΙΟΥ (The Blessing of the Lord) (2025)

The most prominent architectural feature of the larder structure is the reuse of materials dating from the Roman period. Spolia elements such as a marble column drum, a column base, and an altar fragment were identified in the floor fill of Room 1. This reflects the Byzantine practice of utilizing former pagan structures, either by dismantling or transforming them, for new construction. Such use of material may have resulted both from economic necessity and from the desire to eliminate the remnants of the old belief system. In addition to spolia, the walls of the larder were constructed using mortar and rough-hewn stones, indicative of the practical construction techniques of the period.

The finds recovered from within and the filling of the larder structure are of great importance, both functionally and symbolically. Five *pithoi* (large storage jars) were identified side-by-side in the southwest corner of Room 2. These *pithoi* were carefully secured to the floor due to their large volume and to ensure their stability. *Pithoi* were vessels widely used during the Byzantine period for storing products such as wine, olive oil, grain, and water (Fidancı, 2016: 9). The most striking of these *pithoi* is the one bearing a depiction of a Latin cross, created using the punctate (dotting) technique on its shoulder. This symbol suggests that the larder was not merely a storage area but was also associated with a religious institution (likely a monastery). Such symbolic marks emphasize that the stored products served a sacred or religious purpose (Fidancı, 2016: 9). The plain appearance of the other *pithoi* suggests that the *pithos* with the cross may have been reserved for a specialized product.

The five baked clay *pithoi* lined up inside the larder were used for storing agricultural products such as grain, olive oil, or wine, providing direct evidence of the city's agricultural economy and local production capacity. The depiction of a Latin cross on one of the *pithoi* clearly demonstrates the structure's connection with Christianity. This situation suggests that the larder complex was either part of a monastery complex or belonged to a church wakf. A bronze patera found inside another *pithos* indicates that, in addition to storage and commercial activities, the structure may also have been connected to religious rituals. The terracotta, glass, stone, marble, and metal find recovered from the larder fill attest to the diversity of the city's craft and import networks (Avcu, 2020: 165-172). Typological and analogical studies conducted on these finds, along with stratigraphic examinations, have enabled the larder structure itself to be dated to the 6th–7th centuries. The discovery of the larder provides strong evidence that the city was not only a religious centre but also an economic hub where agricultural products were stored and traded. The storage of surplus products in the city supports the idea that Iuliopolis was in a strong economic position during the Late Roman–Early Byzantine Period (Arslan et al., 2011: 273).

The bronze patera recovered from inside Pithos No. 4 is the most striking find of the article. This vessel, which has a dolphin-figured handle, is typologically dated to the 3rd century. The discovery of a Roman-era artifact in a Byzantine structure approximately 2–3 centuries later indicate cultural continuity. While the *patera* was used in Roman rituals to make offerings to the gods, it gained a different function in Christianity, such as being used by priests for washing their hands during ceremonies (Öz, 2021: 159). This demonstrates how a pagan-era object was re-functionalized within a religious and practical context. The *patera*'s discovery inside a storage jar suggests that it was used for a daily function, such as transferring liquids.

Tools such as a baked clay spindle whorl and an iron axe recovered from the larder fill provide information about the city's daily life and local craft activities. The spindle whorl indicates that textile production was carried out, while tools like the axe point to artisanal activities. Furthermore, the fragments of North African Red Slip Ware ceramics found in the larder prove that Iuliopolis was integrated into the Mediterranean commercial network and had access to imported luxury goods. These findings demonstrate that the city had both a self-sufficient local economy and established commercial relations with distant regions.

6. THE SOCIOECONOMIC STRUCTURE OF THE CITY

Considering the Byzantine Period, numerous finds dating between the 4th and 9th centuries have been identified in the city. Most of these were uncovered because of studies carried out in the Larder, Church No. 1, the city walls, and the Eastern Necropolis (Dolmuş, et al., 2024: 56). Additionally, it has been determined that the Byzantine Era graves in Iuliopolis, compared to previous periods, were concentrated southeast of Church No. 1 and were poor in terms of finds (Güleryüz & Sökmen-Adalı, 2024: 72-73).

Upon examining the existing archaeological finds in Iuliopolis, in addition to the riches submerged beneath the dam waters, the tomb finds from the Eastern Necropolis that have survived to the present day offer concrete data on the city's Byzantine-era socioeconomics. However, the validity of the idea that the richness in the graves directly reflects social status is debatable. This is because these finds can be misleading; they may have belonged to the deceased, or they may have been left as a gift for the afterlife by someone else or simply purchased for the funeral ceremony and placed in the grave (Güleryüz & Sökmen-Adalı, 2024: 74-75). From this perspective, it would be more accurate to assess the city's socioeconomics through tomb finds, the graves themselves, and other concrete data identified.

The larder and its finds in Iuliopolis reveal that the city had a strong socioeconomic structure during the Early Byzantine Period. Elements such as the transportation network and bridge, walls, necropolis, Church No. 1, and the larder structure prove that Iuliopolis was a vibrant centre both religiously and commercially. The use of *spolia* materials, the religious symbols on the *pithoi*, the bronze patera, and the re-functionalization of various architectural plastic works clearly show the city's transition from a Roman pagan heritage to a Christian identity. These findings prove that Iuliopolis was not just a settlement but also a city where agricultural production was organized, trade was actively conducted, and religious institutions played a decisive role in economic life.

The presence of a larder, in addition to the church and graves, indicates that the city's religious structure was at the centre of social and economic life. The control of agricultural production and storage by monasteries can be interpreted as a sign of social order and prosperity. The use of the *pithoi* for storing liquid foods suggests that the city was self-sufficient in viticulture and other agricultural products. The city's location on an important route like the "Pilgrim's Road" (French, 1981: 38-39; Walker, 2003: 102-102, 107, fig. 1) suggests that the stored products may have been part of a commercial activity aimed at external trade, not just local consumption.

It is known from texts related to the life of Theodore of Sykeon that viticulture was common in the settlements around Iuliopolis in the 6th–7th centuries. Viticulture was extremely important for social life as well as for the monasteries.

"Periodically during the vintage season, the people of Apukumeos (Απουκούμεως) village suffered from severe hailstorms. They applied to Theodore to be protected from this disaster, and through Theodore, they were saved from this disaster, and hail never struck their vineyards again. In return, they donated a vineyard to the monastery" (Akyol, 2023: 1036-1037).

This situation shows that the monasteries in the region also had their own vineyards and that naturally, surplus wines from the harvests might have been stored. The reuse of old Roman materials demonstrates that Byzantine society utilized resources efficiently and shaped the legacy of the ancient civilization according to new needs. This is a result of both economic practicality and cultural adaptation.

The city has been located on the route of military, civil, and religious transportation networks since the Roman Period. This made the city important politically, religiously, and strategically. Notably, the Iuliopolis-inscribed milestones detected by researchers on the Roman road connecting İznik to Ankara showed that the city was situated on the main road route (Belke & Restle, 1984: 181-182; French, 1981: 36-38, 41-47; French, 2012: 11, 20, 174, 182; French, 2016: 18-19, 79, 83-86). To ensure the strong defense of a city located on such an important route, during the reign of Justinian I, the military road going from Ankara to the border was repaired, a stone bridge was built over the Siberis River, and the walls of Iuliopolis were strengthened. It is also assumed that the pilgrim Theodosius used this road when travelling to Jerusalem around 530 AD (Foss, 1977: 55-56). This information sheds light on the city during the Late Antique–Early Byzantine period.

It is thought that the river route was actively used in Iuliopolis during the Byzantine Period. This suggests that the water level was high in the 6th century, possibly to the extent of causing floods, indicating a powerful and effective water source (Prokopius, 1941: 331-333; Procopius, VII/V). The Byzantine bridge (Sarılar Bridge, over the Skopas River), which currently divides the city into east and west and is submerged beneath the Sarıyar Dam waters, is now under water (Belke & Restle, 1984: 182). Remains belonging to water structures were identified within the city during the 2023–2025 period. The detection of wastewater channels associated with these structures suggests a connection to the city's sewerage or water systems. The Byzantine historian Michael Psellos mentions the presence of baths and natural thermal springs in or around Iuliopolis, which he refers to as Basileion (Belke & Restle, 1984: 182). This suggests that the city, located on the Pilgrim's Road and the route between Iznik and Ankara, may have served as a healing and rest center.

Historically, the economy of Ankara is known to have been based on agriculture and animal husbandry (Beyoğlu, 2023: 1, 11). Mohair goat breeding (tiftik) is particularly important for Ankara (Eyice, 1996: 243-244). The *sof* fabric produced from the wool of the mohair goat holds significant economic value (Beyoğlu, 2023: 1, 11). Animal husbandry around Iuliopolis today is known to be based on mohair and ordinary goat breeding (Aksoy & Tekkılıç, 2024: 250). Given the region's geography, it is believed that this production extends back to historical times.

Research on the *Vita* of Theodore of Sykeon has shown that agriculture and animal husbandry were influential in the region's economy. In the 6th–7th centuries, it is known that oxen were raised in the nearby settlements, peasants transported goods using ox-carts, oxen were used in agricultural activities, and whips used for punishment were made from ox-hide. The breeding of oxen and its agricultural impact on the region were determined to have continued until the 20th century. During this period, camels were also raised in the region, used for transportation, and even in entertainment and acrobatics (Akyol, 2022: 251; Akyol, 2024: 554). Furthermore, wild horses and mules were harnessed to carts and used for transportation, and some horses were used in horse race betting (Akyol, 2024: 554). All this data provide important information about the agricultural activities, leisure, and means of transport in the region.

Throughout history, a type of grain that was resistant to harsh and adverse weather conditions is known to have been cultivated in Iuliopolis. This grain was also cultivated in various parts of Bithynia; it was considered lower quality than naked wheat but superior to the rye grown in Thrace. Moreover, the bread made from this grain was said to be better than rye bread from Thrace and Macedonia but lower quality than wheat bread (Onur, 2014a: 67, 73).

Fishing is thought to have held an important place in the city, as the river stands out in historical sources for its fish diversity (Devecioğlu, 2024: 18). Five baked clay *pithoi* were identified in the area designated as the larder in the city during the 2023–2025 period. It is assumed that these *pithoi* constituted a storage area belonging to a monastery, church, or other structure. It is thought that water, wine, or various grain products were stored in these containers.

Research conducted on hair samples from graves in the city's necropolis detected resveratrol. The identification of resveratrol, a phytoalexin found in grapes and a component of red wine, is interpreted as evidence that the individual consumed red wine in daily life (Büyükkara, et al., 2024: 242). This suggests that the *pithoi* in the larder may have been used for storing wine consumed for religious or health purposes.

Examinations conducted on the existing hair samples of an individual from Grave No. JLP_M196 in the necropolis revealed that wine and lentils held an important place in their daily diet. Based on both the analysis of the hair samples and the skeletal remains, this individual was determined to have held a high social status, similar to other members of their community. The presence of

sulcatone in the hair samples indicates that the ancient individual consumed products like mint, ginger, or watermelon. Furthermore, findings related to chemical components supporting the consumption of rice and cloves suggest that the individual may have used medicinal plants during the last periods of their life (Büyükkara, et al., 2024: 245). This suggests that the populace of the city had a qualitative diet.

In Iuliopolis, as in the Roman Period, importance was attached to necropolis craftsmanship during the Early Byzantine Period, and the region's local material was used in the construction of the graves. The wooden coffin fragments and finds identified in Grave No. JLP_M447 are dated to the 5th–6th centuries. This indicates that the fragrant juniper wood used for coffin construction in Roman Period graves (Akkemik & Metin, 2011: 105-111) continued to be used during the Byzantine Period.

The bronze *patera* recovered from inside Pithos No. 4 in Room 2, manufactured in the 3rd century, is assumed to have been used for serving water and wine during religious ceremonies and evening meals that took place between the 6th and 7th centuries. This bronze *patera*, identified *in situ* inside the *pithos*, has existing parallels made from various materials, including terracotta, glass, clay, bronze, and silver. A large number many bronze *paterae* are known, particularly from the Roman and Byzantine periods. The fact that the bronze *patera* found in Iuliopolis was identified *in situ* inside the *pithos* suggests that it was used during the process of transferring or decanting water or wine from the container. A dolphin-figured *patera* handle (REDMG: 1981.40.59), dated to the 3rd century and housed in a museum collection (although its bowl has not survived), exhibits characteristics like the example found at Iuliopolis.

The larder's location, south of the necropolis and approximately 750 meters southwest of the Church, suggests that this wide area was used as a continuous settlement zone from the Early Byzantine Period onwards. The city's placement on the Pilgrim's Road route indicates that it was constantly engaged in commercial relations with other cities.

The depiction of the Latin cross along with geometric and floral decorations on one of the *pithoi* in the larder strengthens the possibility that the artifact may have been produced in a local workshop. Furthermore, the simple appearance, fabric structure, color, and similar wall characteristics of *pithoi* numbered 2 through 5 support the idea that these vessels belong to the same period. Should future research identify ceramic or amphora workshops in the city, these findings would provide definitive answers to questions concerning whether the existing amphorae were made within the city or at another production centre.

Animal husbandry and fish consumption are considered important in Iuliopolis. The riverbed was significant for both transportation/carriage and fishing. Ancient sources mention a rich variety of fish in the riverbed (Devecioğlu, 2024: 18). This suggests that the Sakarya River was utilized by the city for both transport and as a source for the food chain.

It is known that basic education in the villages, *chorai*, and settlement areas around Iuliopolis was provided in local schools (Akyol, 2024: 555). Considering that these basic trainings were carried out in monasteries and other educational institutions (Akyol, 2023: 1032), it is believed that religious education in Iuliopolis during the Early Byzantine Period was provided by the clergy at the church.

In the settlement areas around Ankara, it is known that some women, including the mother of Theodore of Sykeon, engaged in prostitution. Some of these women are documented to have later left the profession, sought God's forgiveness, and chose a life of piety (Akyol, 2024: 555). The region also included blacksmiths and cooks (Akyol, 2023: 1031-1032; Akyol, 2024: 555). Additionally, some inscriptions identified in Iuliopolis prove the existence of professionals such

as a coppersmith (Onur, 2014b: 105-106, fig. 6), priest (presbyter) (Onur, 2014b: 108, fig. 10-11), deacon/deaconess (Onur, 2014b: 106, fig. 7), and demarch (mayor/city administrator) (Onur, 2014b: 107, fig. 9) in the city.

7. CONCLUSION

Although Iuliopolis is described as a small and unremarkable city, its geographical location and its function on the main Roman road allowed it to maintain its significance throughout history. Similar to the general region of Ankara, Iuliopolis experienced its most prosperous years during the 2nd–3rd centuries. Available data confirms that the city experienced an economic decline starting from the 3rd century. It is known that Sasanian and Gothic raids affected Ankara during the 3rd century. The city, which never completely lost its significance, maintained its strategic position due to its location on the transportation network, its proximity to natural water sources, and its fertile land structure, ensuring that it remained an active settlement during both the Roman and Byzantine periods.

The archaeological studies carried out in the Ancient City of Iuliopolis between 2009 and 2025 have illuminated the city's multi-layered transformation and strategic importance during the Late Roman and Early Byzantine Periods (4th–9th centuries). Although the city experienced a relative economic weakening following its peak in the 2nd–3rd centuries, its geographical location and function on the main Roman road allowed it to preserve its strategic superiority and scope of activity.

The uncovered key structures—such as the city walls, the necropolis, Church No. 1, and the newly discovered Larder—have been decisive in understanding the complex religious, architectural, and socioeconomic dynamics of Iuliopolis during the Byzantine Period. Specifically, the city's identity as an episcopal center is confirmed by the size of Church No. 1 and church records; this spiritual authority is further substantiated as a concrete piece of evidence that it was also at the heart of economic life, as demonstrated by the function of the larder.

The larder structure and the *in situ* pithoi found within it indicate that the city's agricultural production (viticulture, grain, etc.) and storage activities were carried out in an organized manner. The Latin cross depiction on one of the *pithoi* suggests a strong link between this storage area and a religious institution such as a monastery or church endowment, supporting the view that religious centers controlled and directed economic activities. The combination of this organization with the city's location on the Pilgrim's Road, a major transportation and trade route, suggests that the stored products may have been involved in an active commercial cycle beyond local consumption.

The in-depth analysis of archaeological and epigraphic data supports the complex social and economic structure of Iuliopolis under three main headings:

1.Religious and Cultural Continuity The reuse of Roman materials (altar, column, column base) as spolia in the larder and the discovery of a dolphin-figured bronze patera from the Roman Period inside an Early Byzantine pithos clearly demonstrate the re-functionalization of the pagan heritage within the context of Christian belief in Byzantine society. This reflects both economic practicality and cultural adaptation.

2.Trade and Production Capacity North African Red Slip Ware ceramics recovered from Church No. 1 and the larder fill prove Iuliopolis's integration into the Mediterranean commercial network and its access to imported luxury goods. Conversely, the similar fabric structure of the pithoi, along with local craft tools such as the terracotta spindle whorl and iron axe, indicates that the city possessed a self-sufficient local economy and active artisanal activities. The use of juniper wood for coffins, and local and imported spolia stones in graves, are evidence of urban

production in Iuliopolis. Furthermore, the construction of various structures (public, civil, and social), including the church, bridge, city walls, larder, and graves, provide evidence of local construction activities. The finds identified in the graves offer crucial information regarding both locally manufactured products and imported goods.

3.Social Structure and Dietary Culture The detection of components such as resveratrol (wine) and sulcatone (mint, ginger, watermelon) in the hair samples of individuals from the necropolis supports the city's socioeconomic vitality with archaeobiological data. This points to the populace's qualitative diet, possible consumption of wine for religious or medicinal purposes, and the presence of individuals of high social status. Excavation work around the larder also identified sections interpreted as rooms and water channels. These remains, along with the city walls ensuring the social security of its citizens and the wastewater channels, support the notion of dedicated spaces for individual use in the city.

In conclusion, these comprehensive studies conducted in Iuliopolis definitively prove that during the Late Antique and Early Byzantine Periods, the city was not merely a military or transportation post, but rather an important centre where religious institutions organized economic life, local production and craftsmanship were active, commercial relations with distant regions were established, and a complex social structure sustained an advanced urban life. Future research is expected to uncover additional structures beneath the dam waters, offering more comprehensive details regarding Iuliopolis's flourishing period during the Byzantine Era.

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Journal of Management and Economic Studies
2026, Vol.8, No.1, 115-126
http://doi.org/10.26677/TR1010.2026.1640

The Influence of Brand Personality on Purchase Intention: The Case of Belcholat Premium Chocolate

Minh Thu Bui
School of Interdisciplinary Sciences and Arts, Vietnam National University, Hanoi, Vietnam
buiminhthuthubui@gmail.com
https://orcid.org/0009-0004-1880-2834

Thi Thu Huong Nguyen (corresponding)
School of Interdisciplinary Sciences and Arts, Vietnam National University, Hanoi, Vietnam
huong1485.sis@vnu.edu.vn
https://orcid.org/0000-0002-7735-3272

Thi Yen Kieu
School of Interdisciplinary Sciences and Arts, Vietnam National University, Hanoi, Vietnam
kieuyen@vnu.edu.vn
https://orcid.org/0009-0004-7280-6713

Abstract

The modern consumers no longer base their purchasing decisions solely on taste or packaging; they also expect brands to embody personalities that resonate with their own identities. This expectation is especially pronounced in the premium food sector, where emotional experiences and intangible values play a pivotal role. Most chocolate brands in Vietnam have yet to fully recognize the strategic importance of brand personality in fostering emotional connections with consumers. This study aims to analyze the impact of brand personality dimensions tested through Aaker's five-dimensional brand personality framework on consumers' purchase intentions toward the Belcholat chocolate brand. The research adopts both qualitative and quantitative methodologies, grounded in Aaker's brand personality model and the self-congruity theory. Findings reveal that all five brand personality traits exert a positive influence on purchase intention, with Sincerity and Competence emerging as the most influential dimensions. This study contributes empirical evidence to the theoretical discourse on brand personality within the premium food industry and offers strategic implications for building high-end chocolate branding in the Vietnamese market.

Keywords: brand personality, purchase intention, premium chocolate, self-congruity.

1. INTRODUCTION

In contemporary marketing research, brand personality is regarded as one of the core instruments enabling firms to create emotional differentiation and achieve sustainable positioning in the minds of consumers (Nguyen et al., 2023). In the context of a rapidly growing and increasingly competitive chocolate market, building a strong brand requires more than just product quality; it relies significantly on the ability to craft a compelling brand image and foster emotional bonds with consumers.

According to Aaker (Aaker, 1997), brand personality not only enhances brand positioning but also facilitates emotional connection, thereby strengthening customer loyalty. Research by Su and Reynolds (Su & Reynolds, 2017) demonstrated that when consumers perceive brand personality

as congruent with their self-image, they tend to develop stronger affective responses, leading to increased repeat purchase intentions. Similarly, the study by Toldos-Romero and Orozco-Gómez (Toldos-Romero & Orozco-Gómez, 2015) confirmed that brand personality, brand equity, and brand authenticity all positively influence purchase intention. Furthermore, research by Nguyen et al. (Nguyen et al., 2023) showed that brand personality has a positive impact on tourists' revisit intentions, mediated by the congruence between self-image and brand image. Therefore, a comprehensive understanding of the role of brand personality in shaping consumer purchase intention and the development of an appropriate branding strategy becomes indispensable.

However, Aaker's (Aaker, 1997) the five-dimensional brand personality model was predominantly developed within a Western cultural context. This underscores the need for empirical validation of how each brand personality dimension influences purchase intentions in new cultural settings, especially in Asian markets such as Vietnam, where consumer behavior is heavily shaped by emotional resonance, symbolic value, and self–brand congruity. In Vietnam, previous research has primarily focused on sectors such as services, tourism, or fashion, while premium consumer products like chocolate remain underexplored. Domestic academic studies have largely adopted Aaker's conceptualization of brand personality, with limited efforts to localize or adapt the framework to the Vietnamese cultural context.

In practice, most local chocolate brands continue to struggle with establishing a distinct brand personality and fostering long-term emotional engagement with consumers. Therefore, examining the relationship between brand personality and purchase intention in the context of premium domestic chocolate brands in Vietnam is both theoretically significant and practically urgent. Addressing these research gaps, this paper aims to empirically examine the extent to which each brand personality dimension in Aaker's (Aaker, 1997) model influences consumers' purchase intentions, using the Belcholat brand as a case study.

2. LITERATURE REVIEW AND HYPOTHESES

2.1. Brand personality theory

The theory of brand personality is grounded in the psychological foundations of human personality, in which brands are attributed human-like characteristics. According to Aaker (1997), "brand personality is the set of human characteristics associated with a brand" (Aaker, 1997). Based on a quantitative study conducted with U.S. consumers, Aaker developed a model comprising five core dimensions representing brand personality: Excitement, sincerity, sophistication, competence, and ruggedness. This theoretical framework has been widely applied in previous studies to assess the influence of brand personality on various consumer behaviors (Akin, 2011; Bairrada et al., 2019). For instance, the study by Rao et al. (2024) found that the dimensions of Sincerity and Competence positively affect customer loyalty (Rao et al., 2024). Similarly, Yuanita and Marsasi (2022) examined how brand attachment, brand experience, and self-image congruence shape purchase intention toward luxury brands (Yuanita & Marsasi, 2022). In this paper, brand personality theory serves as the primary conceptual foundation and measurement framework for the research model.

2.2. Self-congruity theory

Self-congruity theory posits that consumers tend to select and develop favorable attitudes toward brands that reflect their own self-image (Sirgy, 2018). According to Sirgy (2018), the congruence between self-image and brand image generates a sense of identity alignment, enhances emotional attachment, and positively influences both attitudes and purchase behaviors. Research conducted by Mrad et al. (2025) demonstrated that the degree of congruence between brand personality and consumers' self-image positively influences brand love, which in turn enhances purchase

intention (Mrad et al., 2025). Similarly, the study by Tseng and Wang (2023) found that when consumers perceive a brand as embodying Sincerity or Competence, they develop more favorable attitudes toward the brand, and such attitudes act as antecedents that drive purchase intention (Tseng & Wang, 2023).

2.3. Hypotheses

2.3.1. The relationship between sincerity and purchase intention

Brand personality with the characteristic of sincerity is described through attributes such as: down-to-earth, family-oriented, small-town, honest, sincere, real, original, cheerful, sentimental, friendly (Aaker, 1997).

The personality traits belonging to the sincerity factor are all good characteristics, which are common social moral values. In general, most of these personality traits are considered positive. According to Self-congruity theory, consumers tend to be attached to and prefer brands that reflect their ideal or actual self-values (Sirgy, 1982). Therefore, if consumers perceive the brand to possess these personality traits, they will have a self-identification with their own personality or the personalities they aspire to or pursue – when reflected through the brand, this can create a sense of resonance. Thus, if the brand possesses these personality traits, it can increase consumer purchase intentions.

Several previous studies have confirmed the positive relationship between genuine brand personality and purchase intentions: Hu and Shi (2020) explored the psychological mechanisms explaining the difference in consumer purchase intentions for brands with genuine compared to enthusiastic personalities (Hu & Shi, 2020). The results showed that genuine brands were perceived as more psychologically close, thus leading to higher purchase intentions. The research focused on consumer brands with high emotional interaction, where trust and attachment to the brand played a decisive role in driving customer purchasing decisions. The study by Kukreti and Yadav (2025) focused on analyzing the influence of brand personality aspects, especially sincerity, on factors such as brand love, perceived quality, and purchase intention in the e-commerce field (Kukreti & Yadav, 2025). The results showed that sincere brand personality has a positive and strong influence on brand love and perceived quality of customers. Brand love and perceived quality positively impact purchase intention, respectively. Thus, brand sincerity plays an important mediating role in promoting purchase intention through enhancing emotional experience and quality assessment.

Previous studies have shown a positive and significant relationship between sincere brand personality and purchase intention, thereby confirming the important role of sincerity in building trust, enhancing emotional experience, and promoting customer engagement with the brand. However, the majority of these studies focus on the fast-moving consumer goods (FMCG) or service industries, primarily conducted in developed markets such as China and India – where consumer behavior and perceptions of sincerity may differ significantly from those in developing markets like Vietnam. Based on the above analysis, the study proposes the following hypothesis:

H1: Sincerity has a positive effect on consumers' purchase intention.

2.3.2. The relationship between competence and purchase intention

Brand personality, as expressed by Aaker (1997), includes: reliable, hard-working, secure, intelligent, technical, corporate, wholesome, successful, leader, and confident (Aaker, 1997). The characteristics of the competence factor reflect the operational capacity and professional reputation of the brand. This group of characteristics is often associated with large brands, those with a strong market position and the ability to fulfill commitments to customers. Therefore, if a

brand is highly rated in terms of competence, it will gain customer trust, thereby increasing purchase intention.

Previous studies have shown the positive influence of "Competence" on consumer behavior. According to Aaker (1997), in many product categories, "Competence" is a highly valued factor in building trust (Aaker, 1997). Research of Mamangkey et al. (2018) about the influence of brand personality factors (sincerity, competence, ruggedness) on purchase intention for Nike sports products at Manado, Indonesia (Mamangkey et al., 2018). The results show that competence is the most influential factor on purchase intention, surpassing sincerity and strength. Consumers trust the brand and see Nike as a successful brand, therefore, maintaining competence is an important factor that helps this brand continue to attract customers. Similarly, Satchapappichit's (2020) study on the influence of brand personality and online word-of-mouth (eWOM) on customer purchase intentions at Thai restaurant chains in Bangkok concluded that three brand personality factors: Competence, excitement, and sincerity had a positive and significant influence on purchase intentions. Of the three factors, competence had the strongest influence on purchase intentions (Satchapappichit, 2020).

The research gap lies in the fact that few studies assess the impact of “Competence” in the high-end food industry, where emotional and artistic factors are often prioritized. It is necessary to examine whether in the high-end chocolate industry – with handcrafted and highly creative products – “Competence” still retains a strong influence on purchase intentions. Based on the theories and empirical evidence above, it can be seen that competence has a positive impact, helping to promote consumer purchase intentions. Therefore, this study proposes the hypothesis:

H2: Competence has a positive effect on purchase intention.

2.3.3. The relationship between excitement and purchase intention

Excitement personality is described by attributes such as daring, trendy, exciting, inspired, cool, young, imaginative, unique, up-to-date, independent, and contemporary (Aaker, 1997). Brands with these characteristics often create a sense of novelty, arouse curiosity, and provide an exciting experience for consumers.

From the perspective of Self-congruity theory, consumers with dynamic, adventurous personalities are more likely to feel a connection with brands that have a vibrant, modern style. When a brand exhibits the characteristics of excitement, consumers tend to identify the brand with their lifestyle or personal values, thereby increasing their level of liking and purchase intention.

Riaz et al. (2017), a study in the alcoholic beverage industry, focused mainly on young consumers there. The study concluded that when a beverage brand brings joy, excitement and appeal, consumers feel excited, attracted and tend to make purchase decisions faster (Riaz et al., 2017). Or, the study by Nguyen et al. (2023) aimed to explore how the brand personality of tourist destinations (such as Hoi An, Ha Long, Sapa…) influences tourists' intention to return, through the congruity factor between self-image and destination brand (Nguyen et al., 2023). The results showed that the Excitement factor significantly influences consistent self-perception, meaning that when the destination brand is perceived as exciting, dynamic, and inspiring, tourists will feel that they fit that image.

The gap that needs to be filled is to examine the influence of excitement in the high-end chocolate industry, where traditional values, sophistication, and emotion are often prioritized. Previous studies have focused on the food, beverage, tourism, or other industries, but there has been no in-depth research on the high-end chocolate industry. Combining the element of excitement with a food product, especially one with strong emotional connotations like chocolate, could it make

customers feel excited and increase their intention to buy? However, these are positive characteristics, and based on previous studies, this research proposes the following hypothesis:

H3: Excitement has a positive effect on purchase intention.

2.3.4. The relationship between sophistication and purchase intention

Sophistication in brand personality reflects the level of luxury, class, and style of the brand expressed in characteristics such as: upper class, glamorous, good-looking, charming, feminine, and smooth (Aaker, 1997). Brands with this personality are often associated with trendiness, aesthetic beauty, and differentiation in consumer experience (Keller, 2013). High-end brands in the fashion, cosmetics, jewelry, and high-end food industries often emphasize sophistication to attract target customers (Phau & Prendergast, 2000). Especially for chocolate products, the above personality traits are even more important because, being primarily used as gifts, they greatly influence purchase intentions.

According to the theory of self-consistent personality, customers will choose brands with a high degree of similarity to their own personality. The product studied is high-end chocolate, and the target customer group is also high-end customers; they demand not only quality but also other external and emotional values. In addition, according to the extended TAM (Technology Acceptance Model) (Venkatesh et al., 2003), an important factor influencing purchasing behavior is the perceived value and brand image (Venkatesh & Davis, 2000). When customers appreciate the sophistication of the brand, they tend to trust the product quality and feel that the product is worth the cost, thereby promoting the intention to purchase.

A study by Hagtvedt and Patrick (2008) also indicated that brand sophistication not only affects customers' perceptions of product quality but also impacts their desire to express themselves through that product (Hagtvedt & Patrick, 2008). Consumers in the middle class or above, or those who want to express themselves through consumption, will be particularly interested in the brand sophistication factor. When a brand accurately reflects the ideal self that consumers aspire to, they will tend to appreciate, remember, and choose that brand. A study by Adis Puška et al. (2018) showed that positive brand image, especially sophistication and high quality, has a strong impact on customer loyalty in the chocolate industry (Puška et al., 2018). A study by Clarence and Keni (2022) in Jakarta, Indonesia, showed that sophistication in brand personality has a positive influence on purchase intention, especially when combined with premium brand perception and social influence (Clarence & Keni, 2022). Based on theories and empirical research, it can be seen that brand sophistication has a significant influence on customers' purchase intentions. A sophisticated brand not only attracts attention but also helps customers feel they are choosing a product with high value in terms of image and experience. Therefore, this study proposes the hypothesis:

H4: Sophistication has a positive effect on purchase intention.

2.3.5. The relationship between ruggedness and purchase intention

According to Self-congruity theory, consumers tend to choose and be loyal to brands that they feel reflect their self-image, or the ideal self-image they want to achieve. Therefore, if a brand is associated with traits such as ruggedness, courage, and masculinity – this can create visual compatibility between the individual and the brand for consumers who love independence, adventure, or want to assert their distinct personality. The alignment between brand personality and ideal self-image will promote positive emotions, thereby increasing purchase intention.

Several studies have addressed this personality factor. For example, in the study by Sung et al. (2015) in Korea, the authors developed a new scale to assess luxury brand personality, identifying

six dimensions: Excitement, Sincerity, Sophistication, Professionalism, Attractiveness, and Materiality (Sung et al., 2015). The results showed that ruggedness is one of the important factors in building luxury brand image, especially in the fashion, automotive, and retail industries. Bian and Forsythe (2012) compared the influence of brand personality on purchase intention between American and Chinese consumers (Bian & Forsythe, 2012). The results showed that ruggedness has a strong influence on attitudes and purchase intentions towards luxury brands in both countries. From the studies above, it can be seen that ruggedness plays a crucial role in building trust, demonstrating superior value, and driving customer purchase intentions. When a brand demonstrates strength, customers tend to feel more secure in making purchasing decisions and are willing to pay more to own products from that brand. Previous studies rarely focused on this factor, mainly concentrating on the other four factors. There are not many studies focusing on this ruggedness factor, especially in the high-end food industry like chocolate. Similarly, studies focusing on foreign markets have almost completely neglected this personality factor in the Vietnamese market. Therefore, examining the role of ruggedness in the high-end chocolate industry in Vietnam is a valuable and entirely reasonable area to highlight the novelty of this research. Based on the above, this study proposes the hypothesis:

H5: Ruggedness has a positive effect on purchase intention.

The research model of the study is presented in Figure 1.

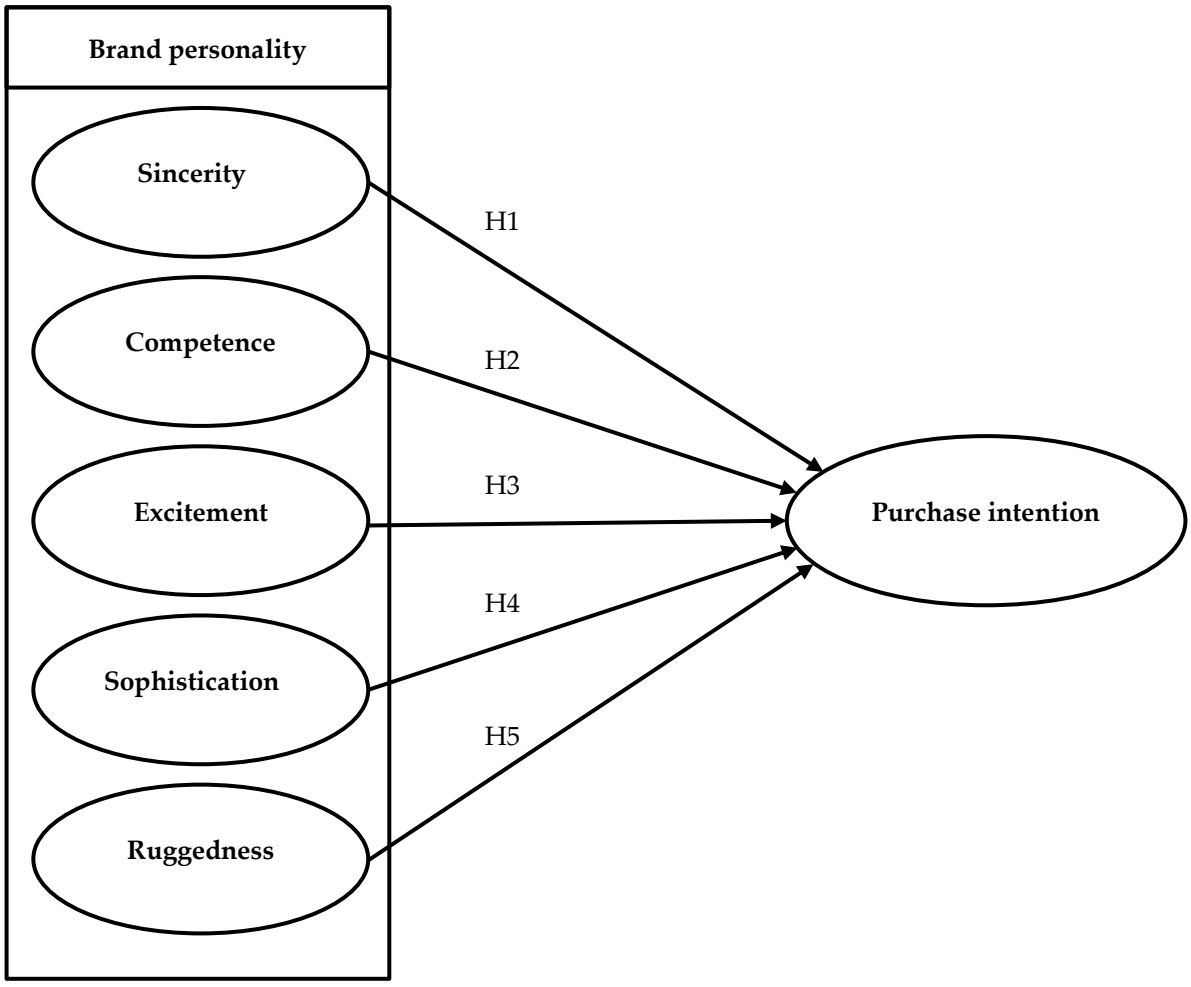

Figure 1. Research Model

3. METHODOLOGY

3.1. Research design

According to Aaker's Brand Personality framework (Aaker, 1997), the five dimensions encompass 42 personality traits, which were translated into Vietnamese to align with the research context and the focal brand. However, after evaluating the characteristics of the premium chocolate category in the Vietnamese market, several traits were deemed unsuitable due to contextual and cultural misalignment. Specifically, the traits small-town, wholesome, corporate, and western were removed. Consequently, the original 42-item scale was reduced to 38 personality items, all measured using a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." The questions are indicated, which include 42 personality traits from Huang and Sarigöllü (2012) and a four-item purchase intention scale adopted from Bian and Forsythe (2012) (Bian & Forsythe, 2012; Huang & Sarigöllü, 2012).

A mixed-methods approach was adopted:

1. Desk Research: Collection and synthesis of relevant domestic and international studies to establish the theoretical foundation.
2. Qualitative Research: Expert interviews and refinement of measurement scales.
3. Quantitative Research: A structured survey using a 5-point Likert scale questionnaire.

Data were entered and analyzed using SPSS version 27. The study applied the following analytical techniques: descriptive statistics, exploratory factor analysis (EFA), reliability assessment using Cronbach's alpha, and multiple linear regression analysis.

3.2. Sample and data collection

Sample Size: A total of 455 responses were collected. After screening and removing invalid questionnaires such as those with uniform responses or inconsistent response patterns, 388 valid responses remained for analysis.

1. Data Collection Method: Online survey.
2. Sample Characteristics: The sample corresponds to the target customer group (ages 18–35) who are familiar with the Belcholat brand.

Table 1. Demographic Profile of Respondents

		Sample	**Rate (%)**
Gender	Male	194	50
	Female	186	47,94
	Not specified	8	2,06
Total		**388**	**100**
Age	<18 years	28	7,2
	18 - 24 years	73	18,8
	25 - 34 years	198	51

	35 - 44 years	73	18,8
	> 45 years	16	4,1
Total		**388**	**100**

4. RESULTS

After running reliability tests and removing problematic items while retaining those with high reliability, the Cronbach's alpha coefficients for the measurement scales were as follows: Sincerity = 0.832; Competence = 0.879; Excitement = 0.752; Sophistication = 0.717; Ruggedness = 0.727; and Purchase Intention = 0.803.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.793[a]	0.629	0.624	0.47381	1.861
a. Predictors: (Constant), R, SO, E, C, S					
b. Dependent Variable: PI					

The model summary indicates an adjusted R^2 of 0.629, meaning that the model explains approximately 62.9% of the variance in the dependent variable (purchase intention) through the independent variables. The correlation coefficient (R) is 0.793, suggesting a fairly strong relationship among the variables. Additionally, the Durbin-Watson statistic is 1.861, which falls within the acceptable range (1.5–2.5), suggesting the absence of serious autocorrelation in the residuals.

Table 3. Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145.504	5	29.101	129.626	.001[b]
	Residual	85.758	382	0.224		
	Total	231.262	387			
a. Dependent Variable: PI						
b. Predictors: (Constant), R, SO, E, C, S						

Based on the ANOVAa table, the multiple linear regression model yields an F-value of 129.626 with a significance level of 0.001, indicating that the model is statistically significant and appropriate for analysis.

Table 4. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-0.62	0.18		-3.446	0.001		
	S	0.355	0.041	0.312	8.597	0	0.738	1.356
	C	0.307	0.04	0.273	7.66	0	0.762	1.312
	E	0.118	0.038	0.108	3.08	0.002	0.789	1.267
	SO	0.241	0.038	0.226	6.369	0	0.768	1.301
	R	0.221	0.037	0.212	6	0	0.775	1.291

a. Dependent Variable: PI

In the coefficients table, all variables have positive standardized Beta coefficients and are statistically significant (Sig. < 0.005), indicating that they exert a positive and meaningful impact on purchase intention. Sincerity (S) has the strongest influence (Beta = 0.312), followed by Competence (C) (0.273) and Sophistication (SO) (0.226), while Excitement (E) has the weakest effect (0.108). Additionally, all VIF values are below 2, indicating no serious multicollinearity issues in the model.

The Unstandardized Regression Equation is:

PI= 0,355*S + 0,307*C + 0,241*SO + 0,221*R + 0,118*E+ e

During the study, the initial measurement included 42 observed variables based on Aaker's model to assess the five brand personality dimensions. However, after a preliminary survey, reliability testing, and exploratory factor analysis (EFA), only 24 observed variables were retained to ensure relevance and applicability within the specific research context. The analysis results indicate that all five brand personality dimensions positively influence consumers' purchase intentions. Among them, Sincerity and Competence exert the strongest effects, reflecting the tendency of the Vietnamese. Consumers prefer brands perceived as trustworthy, approachable, honest, and professional. These two dimensions also facilitate self–brand congruity, a core element explained by self-congruity theory.

5. DISCUSSION and CONCLUSION

The results indicate that brand personality serves as a strategic positioning tool for emotionally rich products such as chocolate. The congruence between consumers' self-image and the brand's personality constitutes an important mechanism that drives purchase intention (Toldos-Romero & Orozco-Gómez, 2015; Tseng & Wang, 2023). This finding aligns with self-congruity theory and reinforces previous research in the premium consumer goods sector (Nguyen et al., 2016; Yuanita & Marsasi, 2022).

A notable finding in this study is that while the ruggedness dimension does have a positive and significant impact on Belcholat's purchase intention (Sig. = 0.000), its magnitude is the second weakest (Beta = 0.212), suggesting its role is less prominent compared to Sincerity or Competence. This contrasts with earlier studies, such as (Puligadda & VanBergen, 2023; Su & Tong, 2015), which suggested that ruggedness could contribute to brand differentiation in certain industries. This discrepancy can be explained by the nature of the premium chocolate category, where traits

such as sophistication, sincerity, and competence, which convey trustworthiness and luxury, are prioritized by consumers over the "rugged, edgy" image associated with ruggedness.

Finally, excitement has the weakest effect on Belcholat's purchase intention. This is understandable, as the traits associated with Excitement are often less emphasized in the premium chocolate context or are less aligned with the typical values sought by Vietnamese consumers in this category. However, excitement still positively contributes to purchase intention.

The study confirms that brand personality is a key driver of purchase intention in the premium chocolate sector. Sincerity and competence emerge as the most influential dimensions, indicating that consumers highly value trustworthiness and expertise in the product. From a practical perspective, companies need to develop consistent brand messaging, optimize emotional experiences, and reinforce a professional brand image to enhance purchase intention.

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