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DEMARKETING AS A DEMAND MANAGEMENT STRATEGY: A FUZZY COGNITIVE MAPPING APPROACH

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ABSTRACT

This study aims to examine the literature on demarketing strategies by analysing their potential integration within the framework of If-Then relationships in sustainable tourism and tourist demand management. 39 individuals responsible for the tourism industry were interviewed, and respondents were asked about the impact of tourism on Cappadocia's economy, culture, and society. Cognitive maps were then created according to the responses, and a list of variables was compiled. These maps were subjected to analysis on a computer using the technique of fuzzy cognitive mapping, with outputs generated based on a structural analysis of variables and an examination of the relationships between them, using a method known as 'if-then' reasoning. Structural analysis identified 114 variables and 841 connections. The initial 10 central variables were included in the study. The most central variables were demand growth, destruction, income growth and investment opportunities. Furthermore, simulations based on if-then relationships have demonstrated that there are both positive and negative outcomes in the relationship networks of variables with one another. This finding serves to illustrate the dual nature of tourism growth. This study introduces a measurement technique to demand management and demarketing in tourism. Demarketing represents an effective instrument for achieving equilibrium in the context of intense demand in tourist destinations, thereby ensuring sustainability.

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INTRODUCTION

Tourism has always been a popular and attractive industry, creating a basis for human mobility by revitalizing tourism activities worldwide (Armstrong & Kern, 2011). Indeed, the data published annually by the United Nations World Tourism Organization (UNWTO) lends support to this viewpoint. In 2023, the number of international tourists reached 1.3 billion individuals (UNWTO, 2024). Indeed, the current state of mass tourism is giving rise to a number of adverse consequences (Gössling et al., 2024). The negative impact of tourism on destinations is exemplified by several factors, including overtourism, exceeding carrying capacity, pollution, and the degeneration of the very places that attract tourists (Hall, 2010; Sard & Valle, 2024). In recent years, there has been a growing awareness of the environmental and social impacts of tourism, which has led to the concept of sustainable tourism becoming a prominent issue in the field. The term "sustainable tourism" is defined as a tourism approach that aims to protect natural and cultural resources, enhance the well-being of residents, and ensure visitor satisfaction. It is, thus, anticipated that the implementation of sustainable tourism practices and diversification within the aforementioned scope will prove beneficial for all segments (Hall et al., 2015).

The growth of culture and nature-based tourism, a distinct form of tourism, has been exponential, and it is now evident that this sector is conferring considerable advantages upon both tourists and the residents (Zhang & Xu, 2020). The most significant elements of culture and nature-based tourism are unspoiled natural areas, national parks and unique structures (Karhu et al., 2022). It is therefore evident that there is a delicate equilibrium to be struck between the protection of World Heritage Sites and their utilisation for the purposes of tourism. However, it is acknowledged that impacts such as over-tourism, carrying capacity, uncontrolled visitor experiences, and crowding occur in protected areas (Wearing & Archer, 2005). While it is important for destinations to attract visitors and generate income from tourism, it is also necessary to consider the impact of tourism on natural resources and the environment (Ciesielski & Stereńczak, 2021). For this reason, it is very important to realise tourism activities in a sustainable manner in culture and nature-based destinations and protected areas. Because excessive demand, especially in popular touristic destinations, can lead to the deterioration of local ecosystems and social structure (Dodds & Butler, 2010).

The selection of appropriate strategies to achieve a balance in visitor numbers in cultural and nature-based destinations is a matter of considerable importance (Taecharungroj et al., 2024). It becomes evident that demand control strategies are a necessity for effective sustainable tourism management. One of the most prominent approaches in the literature on demand management is demarketing. Demarketing can be defined as a marketing approach that is employed with the intention of limiting the demand for a given product or service (Kotler & Levy, 1971). This strategy represents a significant instrument for the administration of sustainable tourism, particularly for the mitigation of the detrimental effects of tourism (Medway et al., 2011). The existing literature indicates that demarketing strategies have the potential to be an effective means of reducing tourism demand and stabilising visitor flows in crowded destinations (Beeton & Benfield, 2002; Wearing & Archer, 2005). Nevertheless, the analysis of the impact of demarketing strategies on sustainable tourism demand and the prediction of their effects under different conditions represents a challenging undertaking. In this study, the Fuzzy Cognitive Mapping (FCM) method is used to model and analyse these relationships. FCM is a technique for analysing complex systems (Kosko, 1986). It is an effective tool for understanding the causal relationships between demarketing and tourism demand (Pai et al., 2014). Furthermore, the use of FCM in tourism management and sustainability policies is acknowledged as a method to support strategic decision-making (Özesmi & Özesmi, 2004; Papageorgiou & Kontogianni, 2012).

Studies have investigated the impacts of culture and nature-based tourism, as well as the importance of sustainable tourism practices. This has been achieved through surveys, interviews and geo-located route techniques (Carvache-Franco et al., 2022; da Mota & Pickering, 2020; Whiting et al., 2017). Nevertheless, a restricted number of studies (Taecharungroj et al., 2024) have concentrated on the distinctive attributes of particular cultural and nature-based tourism destinations and the ways in which they can efficiently manage visitor demand by concentrating on the adverse effects of tourism. Furthermore, it has been determined that there is a paucity of empirical research on sustainable tourism, demarketing and FCM methodologies. The extant studies are largely confined to the theoretical framework (Medway et al., 2011; Papageorgiou & Kontogianni, 2012). Accordingly, the objective of this study is to address this gap in the existing literature by integrating the concepts of demarketing, demand management, and FCM within the context of sustainable tourism and demand management. Furthermore, this study seeks to offer a novel

perspective on the existing literature by examining the potential applications of demarketing strategies in sustainable tourism and demand management contexts, within the framework of If-Then relationships. Furthermore, the results of this study will inform destination management practices regarding the integration of demarketing strategies to enhance the effectiveness of sustainable tourism and demand management.

LITERATURE REVIEW

The concept of sustainable tourism aims to achieve a balanced management of environmental, social, and economic factors. This concept represents the triangular relationship between the protection of natural and cultural resources, the welfare of residents and visitor satisfaction (Hall et al., 2015). The existing literature emphasises the difficulties in defining sustainable tourism and how this definition varies among different stakeholders. Restricting the consequences of overtourism and aligning tourism operations with destination carrying capacity are pivotal components of sustainable tourism policies (Rodríguez-López et al., 2019). Tourist destinations must regulate the influx of tourists and their behaviour to ensure long-term sustainability. Demand management is a strategy to organise tourist activities in a way that does not exceed the carrying capacity of a destination. It is a fundamental tenet of sustainable tourism (Dodds & Butler, 2010). Demand management must be employed to forestall the over-exploitation of tourism destinations and to attain the objectives of sustainable development (Buckley, 2012). Butler (1980) said the final stages of a destination's life cycle may be characterised by environmental and social degradation as a result of overtourism. Demand management strategies are vital to avoiding this. Strategies must limit the number of visitors, direct tourists to less intensive areas and guarantee the sustainability of the destination. This approach safeguards the environment and enhances the well-being of residents (Kastenholz, 2004).

In the extant literature, demand management strategies are also associated with demarketing. Demarketing is a strategy for reducing tourist demand in destinations that are particularly popular with visitors. The goal is to direct tourists to less popular locations, thereby promoting environmental and social sustainability in tourism (Medway et al., 2011). In the context of sustainable tourism, demarketing encompasses strategies such as demand reduction and visitor flow diversion, which are designed to conserve tourism resources (Hardy et al., 2002). The implementation of demarketing strategies in the context of sustainable tourism represents a

significant instrument for the sustainable management of demand within the tourism industry (Hall & Wood, 2021; Mihalic, 2022). Demarketing is used to reduce tourism in over-touristed destinations (Hall, 2014). Demarketing can help control the use of destinations (Medway et al., 2011). This strategy can regulate visitor numbers to crowded tourist destinations. It can improve the well-being of residents and facilitate sustainable tourism. It can also play a role in averting the destruction and mitigating the effects of overtourism (Elmi, 2019). However, research into using demarketing to advance sustainability in tourism is scarce.

Papageorgiou and Kontogianni (2012) posited that the FCM method can be employed to elucidate the multidimensional factors (environmental, social, and economic) that contribute to sustainable tourism practices and the relationships among these factors. In point of fact, FCM represents a method of modelling cause-effect relationships between complex and uncertain systems, thereby enabling more effective modelling of decisions within the context of the tourism demand management process. FCM allows decision-makers to more accurately assess and anticipate the impact of demarketing strategies on destinations. This offers a more precise understanding of the impacts and consequences of demarketing in the pursuit of sustainable tourism. FCM helps anticipate the immediate and long-term consequences of demarketing decisions. These include short-term outcomes like a decline in tourists and long-term impacts on sustainability. It also helps understand tourism demand and how demarketing strategies affect it (Medway et al., 2011; Papageorgiou & Kontogianni, 2012; Rodríguez-López et al., 2019).

A review of the literature shows few studies on the usability of demarketing as a demand management strategy in tourism. Medway et al. (2011) investigated the potential of demarketing as a tool for destination management, focusing on strategies to regulate tourist numbers in areas experiencing overtourism. The study concluded that demarketing can be an efficacious instrument within the context of demand management. Beeton (2003) explored the potential of demarketing for the conservation of natural resources. It is asserted that demarketing strategies can be employed to curtail demand, particularly in destinations that cater to nature tourism and ecotourism, where excessive tourist demand can result in the degradation of the environment. Similarly, Soliman (2010) proposed the use of demarketing strategies to reduce excessive tourist pressure in Egypt. The study examined the ways in which local governments intervene with pricing and promotional strategies with the objective of limiting the number of tourists. Nevertheless, despite the fact that FCM has yet to be widely

adopted in the field of tourism, it has been employed in a limited number of studies to examine decision-making processes in sustainable tourism and demand management strategies. Papageorgiou and Kontogianni (2012) examined the role of FCM in environmental decision-making processes and explored its potential for analysing impacts in complex systems, such as sustainable tourism. In this study, the intricate interrelationships between environmental sustainability and demand management are modelled. Nozari et al. (2021) employed a FCM to elucidate the causal relationships between variables influencing sustainability in the context of the sharing economy. Kok (2009) used the FCM method to analyse the impact of sustainable tourism management policies. He highlighted the method's potential for modelling complex systems and posited that it could be used to analyse demarketing strategies' impact on tourism. This study differs from existing literature in that it attempts to demonstrate the efficacy of demarketing as a demand management strategy through the use of the FCM method. Indeed, we believe that FCM is a valuable tool for more accurately predicting the outcomes of demarketing strategies.

METHODOLOGY

Study Area

The study area was Cappadocia, in Nevsehir, Türkiye. Cappadocia is a global destination for culture and nature-based tourism, celebrated for its natural splendour, distinctive topography and rich cultural heritage. However, tourist numbers have recently risen, leading to challenges in managing them and ensuring the region's attractions remain sustainable. In 2023, approximately five million tourists visited Cappadocian archaeological sites (Nevşehir Provincial Directorate of Culture and Tourism, 2024). Furthermore, the inclusion of Göreme National Park and Cappadocia Rocky Sites on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site list (UNESCO, 2024) serves to underscore the significance of the region and the necessity for sustainable conservation measures. Furthermore, Yıldırım and Eren (2024) have determined that certain archaeological sites within the Cappadocia region are approaching their carrying capacity. It is therefore proposed that potential issues and outcomes associated with unplanned visitor flows in the region should be identified, and that suitable demarketing strategies should be formulated. The lack of a visitor management and action plan in the region, essential for ensuring an effective demand management process, highlighted the need for conducting this study in Cappadocia.

Fuzzy Cognitive Mapping

The FCM technique is obtained in four distinct ways: surveys, written texts, data showing causal relationships, and interviews with people who draw them directly. In this study, the method of interviews with the people who directly drew the maps, defined by Carley and Palmquist (1992), was used as the data collection technique. This technique involves defining the concepts (variables and factors) used by the participant regarding the research question and the relationships between these concepts. Concepts and inter-conceptual relationships are indicated by directional arrows (see Figure 1). Relationships between concepts are expressed in how a person describes the problem in their daily life. Figure 1 shows a simple FCM example. According to Figure 1, E1, E2..., and E5 in circles represent concepts/variables, while directional arrows express the relationship between concepts.

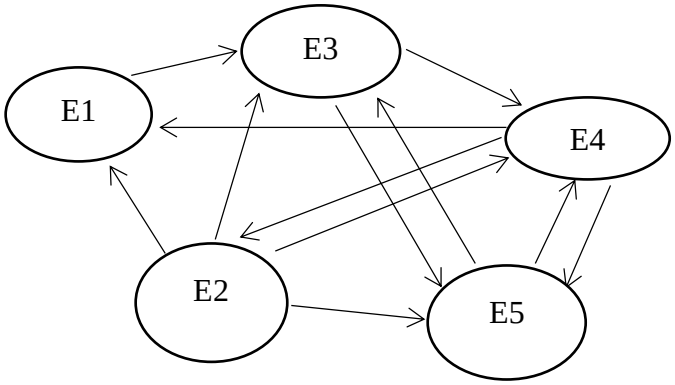

Figure 1. *An example of a simple FCM*
Source: Uygun et al., 2017, p. 28.

Within the method's scope, the participant is first explained why and how the FCM will be drawn. After the cognitive map drawing process is explained, the research question regarding the research subject is asked, and the people are expected to create their own maps. The research question is usually open-ended. This study's research question was determined as, "*Assuming that there is a continuous increase in tourists in the Cappadocia region, what effects will occur in the economic, environmental, and sociocultural context in the region*?". Using open-ended questions allow participants to express their thoughts as they wish without restricting their opinions and looking for right or wrong answers. After the research question is determined, participants are determined. Participants in the scope of this study were selected from among the stakeholders who have a say in the tourism industry and generally communicate and interact with each other. These stakeholders consist of academics who are knowledgeable in the field of

tourism, industry experts, and government experts who have a say in the field of tourism and relatively direct tourism. The people to be interviewed were contacted by phone, brief information was given about the purpose and method of the study, an appointment was requested, and interviews were conducted appropriately. The demographic information of the participants is presented in Table 1.

Table 1. *Demographics of study participants*

	Gender	Age	Title	Number of Variables
R 1	Male	50	Academic	12
R 2	Male	41	Industry Expert	13
R 3	Male	46	Academic	14
R 4	Male	37	Academic	12
R 5	Male	45	Industry Expert	16
R 6	Male	46	Industry Expert	10
R 7	Male	53	Academic	12
R 8	Male	55	Industry Expert	14
R 9	Male	35	Industry Expert	7
R 10	Male	53	Academic	10
R 11	Male	35	Academic	21
R 12	Female	42	Academic	11
R 13	Male	39	Industry Expert	16
R 14	Male	53	Industry Expert	10
R 15	Male	35	Industry Expert	18
R 16	Female	45	Industry Expert	11
R 17	Male	35	Industry Expert	8
R 18	Male	46	Government Expert	11
R 19	Male	50	Government Expert	21
R 20	Male	55	Government Expert	11
R 21	Male	38	Academic	13
R 22	Male	37	Industry Expert	8
R 23	Male	53	Industry Expert	16
R 24	Female	37	Industry Expert	16
R 25	Male	36	Government Expert	16
R 26	Female	39	Government Expert	16
R 27	Male	40	Academic	10
R 28	Female	37	Academic	17
R 29	Female	49	Academic	18
R 30	Female	53	Academic	16
R 31	Male	38	Government Expert	8
R 32	Male	39	Government Expert	21
R 33	Male	49	Government Expert	10
R 34	Male	51	Government Expert	14
R 35	Female	48	Academic	14
R 36	Male	37	Government Expert	12
R 37	Female	40	Academic	23
R 38	Female	47	Academic	22
R 39	Male	42	Government Expert	20

Drawing cognitive maps begins by writing the research question. Participants are reminded that there is no right or wrong answer to the question asked, and they are expected to express any positive or negative words or phrases that can come to their mind within the scope of the question. The cognitive map is drawn on 35x50 cm paper. In addition, for

the reliability of the interview, information including the location of the interview, date, how long the interview lasted, name, surname, age, gender, and profession of the participants are written on the cognitive maps. Interviewers expect their participants to write down all the variables that come to their mind on paper and then to establish connections between these variables with lines or arrows. Participants are also asked to explain the connections they make between variables, with positive or negative values and values in the range of -1 to +1 (-low, -medium, -low, zero, +low, +medium, +high). These values correspond numerically to "-1, -0.50, -0.25, 0, +0.25, +0.50, +1", respectively. During the interview process, participants can add other variables and connections between variables to the map. The interview ends when the participants complete the map and state that they have nothing more to add. FCM method is considered proper because it ensures that people do not get stuck within the framework of predetermined questions and allows them to reflect their subjective views as they are. Unlike other methods, it is not restrictive, directive, or hypothesis-testing. This method is generally aimed at identifying and solving a problem. With its active drawings, the cognitive mapping technique makes it easy to work without boring the participant. It allows holistic comparisons on the subject and helps to obtain data by establishing cause-effect connections (Çoban & Seçme, 2005).

Sample Size and Accumulation Curve

In the FCM method, enough sample is determined by looking at the saturation analysis of the maps. In the saturation analysis, which expresses the relationship between the number of maps and the number of variables, it is determined that enough for the sample is reached when the increase in the number of variables begins to slow down, and the number of newly added variables decreases to 1. In addition to the number of new variables added per interview, the accumulation curves of the total number of variables versus the number of interviews are also examined to determine whether sufficient sample have been reached. Average accumulation curves are constructed using Monte Carlo techniques. This technique randomly selects the order of interviews many times (i.e., 100 or 200) and determines how the variables stack up. Accumulation curves based on Monte Carlo techniques can be obtained with a spreadsheet or a program such as EstimateS (Colwell, 2013). The sample accumulation curve is shown in Figure 2 which shows the change in the total number of variables versus the number of maps/participants.

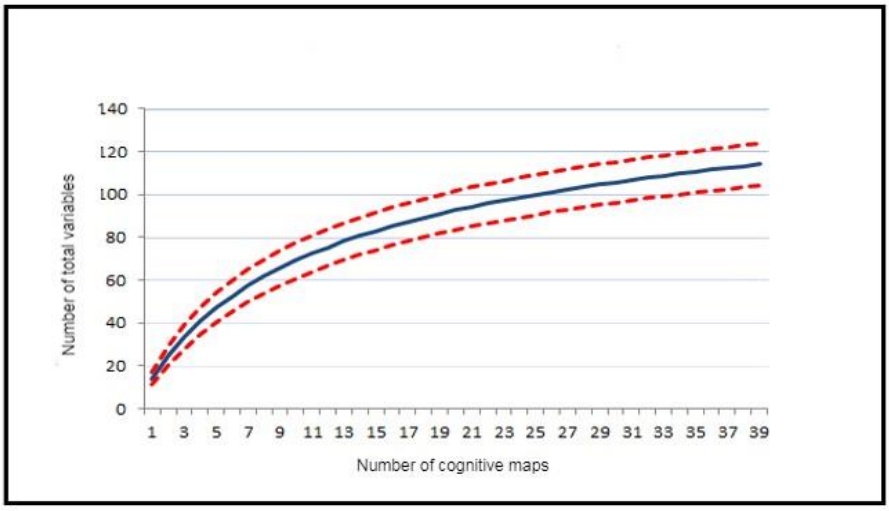

Figure 2. *Total number of variables with a progressively slower rate of increase depending on the sample size*

Figure 3 shows the number of new variables added in each interview. According to the graph, the number of added variables decreases as the number of interviews increases. In summary, the slow accumulation of variables may be due to the similar and limited vocabulary of the participants on the subject. The fact that people have common concepts brings the rate of increase in the total number of concepts close to zero. However, no matter what, one or two new and different variables are expected to be expressed in each new conversation (see Figure 3).

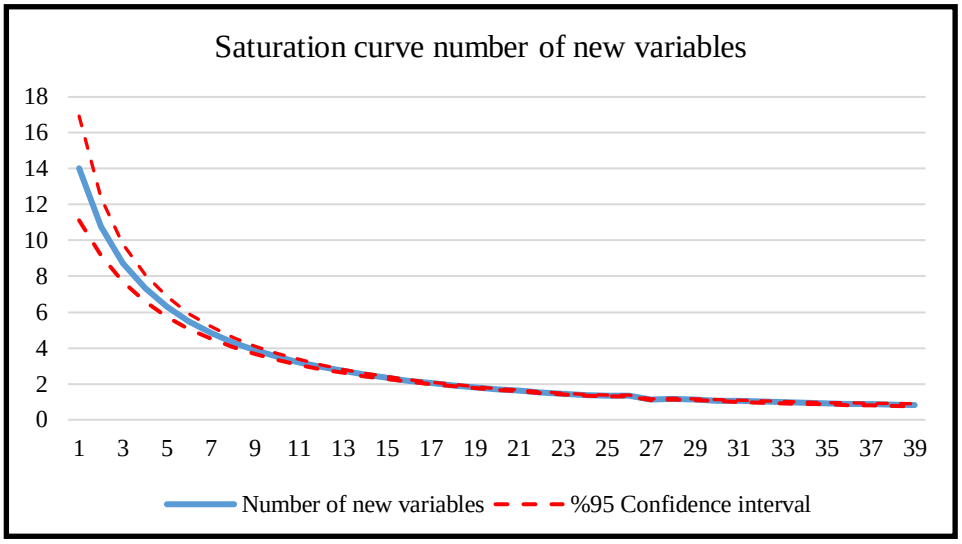

Figure 3. *The number of variables added and gradually decreasing depending on the sample size*

When the number of new variables decreases to 1, it indicates that enough sample size has been reached. Since the newly added variables will be individual-specific, extreme issues after this point, the results are likely

to reflect important desires generally. As seen in Figure 3, according to the results of the accumulation analysis performed in this study with a 95% confidence interval, the number of newly added variables decreased to 1 as of the 34th map.

Data Analysis Procedure

FCM is based on graph theory. Graph theory was first formulated by Euler in 1736. Later, this formulation was developed comprehensively and used in many areas today (Çoban & Seçme, 2005). Methods developed within the scope of graph theory analyse the structural properties of cognitive maps. In this context, two different methods are used to analyse cognitive maps. The first method is aimed at performing structural analysis of cognitive maps, is based on graph theory, and includes comparative statistical techniques, enabling the calculation of index values such as centrality, receptivity, density, and hierarchy. Thanks to this method, the ordering of the variables in the maps according to the degree of centrality, the other variables that affect the variables the most, the other variables that are most affected by the variables, the relationship between all the variables, their structural features such as density and hierarchical order are determined from the eyes of the participants. The second method is neural network simulations, which were first used by Kosko (1992) in FCM. In this method, predictions for the future are developed by performing scenario analysis (Kosko, 1997; Özesmi & Özesmi, 1999) with neural network simulations of social cognitive maps obtained by collecting cognitive maps on top of each other. This study aims to make predictions for the future by examining the effects that will occur if the increase in the number of tourists in the relevant region is continuous, with (If-Then) scenarios established as "Which factors change and how if the factor or variable … is improved/strengthened?"

Structural Analysis of Fuzzy Cognitive Maps

The connection index, as a ratio of the number of connections between variables in FCM, expresses the density of cognitive maps and is denoted by (D). D is a link index. In density equations, (C) refers to the number of connections, while (N) refers to the number of variables. As seen below, the density equation formula is the ratio of the number of connections to the maximum number of connections between the variables. If the variables have causal effects on each other, then the maximum number of connections is expressed as N^2 (Çoban & Seçme, 2005).

$$D = \frac{C}{N \times (N-1)} \qquad \text{or} \qquad D = \frac{C}{N^2}$$

Eden et al. (1998) stated that the analysis of cognitive maps can be done by finding transmitter, receiver, and ordinary variables independent of the number of variables and connections. These variables are defined according to the degree of both outdegree $od(V_i)$ and indegree $id(V_i)$. The outdegree is the row sum of the absolute values of the variables in the neighbourhood matrix and shows the total size of the links a_{ij} originating from the variable.

$$od(V_i) = \sum_{k-1}^{N} \overline{a}_{ik}$$

The indegree is the column sum of the absolute values of the variables in the neighbourhood matrix and shows the total magnitude of incoming connections to the variable.

$$id(V_i) = \sum_{k-1}^{N} \overline{a}_{ki}$$

The sum of the centrality of the variables is the absolute sum of the row (outdegree) and the absolute sum of the column (indegree). The contribution of variables to cognitive maps can be understood by calculating the degree of centrality (c) of the variable. The centrality of a variable (c) is also called the total degree of the variable $(td(V_1))$ (Harary et al., 1965);

$$C_1 = td_{(V1)} = od_{(V1)} + id_{(V1)}$$

Transmitter variables are variables with row absolute sums $od(V_1)$, different from zero and column absolute sums $id(V_1)$, zero. Receiver variables are variables with row absolute sums $od(V_1)$, zero and column absolute sums $id(V_1)$, positive. The other variables, i.e. variables whose row $od(V_1)$ and column $id(V_1)$ absolute sums are non-zero, are called ordinary variables (Bougon et al., 1977).

Another structural analysis used in the FCM method is the hierarchy (h) index developed by MacDonald (1983). The hierarchy index, which can vary between [0, 1], is equal to 1, which means that the map is entirely hierarchical, and equal to 0 means that the map is completely democratic.

$$h = \frac{12}{(N-1)N(N+1)} \sum_i \left[od(v_i) - \left(\sum od(v_i) \right) / N \right]^2$$

By combining individual cognitive maps, a general map is obtained. This general map is called the social cognitive map and may differ depending on individual cognitive maps. Social cognitive maps, also called "team maps", represent the area subject to research (Kosko, 1986, 1997; Özesmi & Özesmi, 1999; Özesmi et al., 2007). By aggregating the individual cognitive maps obtained within the scope of the study, a joint team map was obtained on the factors that may arise if the increase in the number of tourists in the relevant areas continues.

The variables defined by the participants consist of words or phrases related to the research question. The number of times the variables defined in individual cognitive maps are repeated in all maps is considered an indicator of variable importance. The first ten variables defined by the participants according to the number of iterations in the cognitive maps are listed in Table 2.

Table 2. *The first ten variables identified in FCM and the number of repetitions*

Number	Variable	Definition of the Variables	Number of Iterations
1	Destruction	Damage to the touristic area	29
2	Revenue Growth	Increase in income from tourism	26
3	Demand Increase	Increase in the number of tourists/visitors	19
4	Lack of Infrastructure	Systems to meet basic and special needs in settlements	16
5	Employment Opportunities	New business and work areas	16
6	Investment Opportunities	New entrepreneurial activities	14
7	Pollution	Factors threatening daily life and human health in settlements	14
8	Touristic Product Development	Diverse and diversified tourist product supply	13
9	Inflation	Increase in the general level of prices due to tourism	12
10	Low Service Quality	Unsatisfactory elements in destinations or touristic enterprises	11

Frequency values showing the number of iterations of variables in cognitive maps are not sufficient on their own to understand the importance of the variables. In this regard, the relationships, and interactions of variables with each other are also an important detail. Another indicator explaining the importance of variables consists of how much input they receive (indegree) and how much output they give (out-degree). This type of sign refers to the way people think. At the same time, the degree of centrality, which is the sum of how much input and output a variable receives and shows to what extent the variable is at the centre of the subject, is considered the third indicator that shows the interaction between variables and the importance of the variables.

The degree of centrality shows the type of variables and the interaction of the variables with each other (Özesmi & Özesmi, 1999). Centrality expresses the importance of the cognitive map within the whole structure by showing how much a variable is connected to other variables within the cognitive map and the total strength of its connections. If a variable affects other variables without being affected by any variable, it is called a transmitter. It is called a receiver if it is affected by other variables but does not affect any variable. It is called an ordinary variable if it is both affected by other variables and affects other variables. Table 3 presents the top ten centrality variables and variable type information.

Table 3. *The top ten variables according to centrality, variable type, indegree and outdegree*

Number	Variable	Indegree	Outdegree	Centrality	Variable Type
1	Demand Growth	11.75	114.25	126	Ordinary
2	Destruction	58	44.5	102.5	Ordinary
3	Revenue Growth	48	33.75	81.75	Ordinary
4	Investment Opportunities	27.25	40	67.25	Ordinary
5	Lack of Infrastructure	26.5	23.25	49.75	Ordinary
6	Employment Opportunities	31.5	15.25	46.75	Ordinary
7	Pollution	33.75	12.5	46.25	Ordinary
8	Inadequate Planning and Management	10	36	46	Ordinary
9	Inadequate Tourism Enterprises	13.75	31	44.75	Ordinary
10	Regional Development	22.75	20	42.75	Ordinary

Table 3 shows that *"demand growth"* is the most central variable. In addition, *"destruction"*, *"income growth"*, *"investment opportunities"* and *"insufficient infrastructure"* are other central variables. Therefore, these variables have the most connections with other variables. The least connected variables are "*supply-demand balance*", "*intra-regional and extra-regional differences*" and "*environment and cleanliness*".

The variables defined as factors related to the research question and the interactions of these variables with each other reveal the structural features of cognitive maps. This study includes results regarding the social cognitive map. The average number of variables (N), number of ordinary variables, number of receiver variables, number of transmitter variables, hierarchy (h), number of connections (C), density (D) and connection/variable (C/N) ratios of each of the 39 individual cognitive maps obtained within the scope of the study are shown in Table 4.

According to Table 4, the average number of variables identified in individual cognitive maps was 14.41±4.25*ss* (minimum 8, maximum 23 variables). Eden (2004) stated that the average number of variables identified in studies using the FCM method was between 12-20.

Accordingly, it is seen that the participants defined the factors with a relatively average number of variables. In addition, the correlation between the number of variables identified by the participants and the duration of the interview was examined, and it was found that there was no relationship between them (r=0.291, p<0.5). The correlation result shows that there will not be any difference in the number of variables even if the interview time with the participants is extended.

Table 4. *Graph theory (structural analysis) indices of individual cognitive maps*

	Individual Cognitive Maps	
	Avg.	*Sd.*
Variables (N)	14.41	4.25
Transmitter	1.87	1.57
Receiver	3.58	3.02
Ordinary	8.94	3.69
Hierarchy (h)	0.28	0.54
Connections (C)	28.48	9.83
Density (D)	0.002	0.000
Connections/Variables (C/N)	2.02	0.58

For each map, the average number of transmitter (influencing) variables was calculated as 1.87±1.57*ss*, the average number of receiver (influenced) variables as 3.58±3.02*ss* and the average number of ordinary (both influencing and influenced) variables as 8.94±3.69*ss*. The mean hierarchy (h) value of the individual cognitive maps was found to be 0.28±0.54*ss*. This value indicates that the maps were drawn in a relatively democratic structure [h=0.1]. Again, for each map, the number of connections (C) was defined as 28.48±9.83*ss* on average, and the density (D) of the maps was found to be in the range of 0.02±0.00*ss* on average. The density index in the structural analysis of cognitive maps expresses the average density of the maps. The values obtained indicate maps that are not very dense, which is clearly seen when we look at the number of links per variable. On average, the number connections/variables (C/N) were calculated as 2.02±0.58*ss* in each map. As this number increases, it is thought that the degree to which variables affect and are affected by each other will increase. Graph theory indices of social cognitive maps are given in Table 5.

According to Table 5, only three variables in the social cognitive map are transmitter variables affecting other variables, while the number of receiver variables affected by other variables is 11. In this case, the remaining 100 variables are ordinary variables that affect other variables and are affected by other variables. In addition, this situation shows that variables that interact with each other are more effective on the subject

rather than both external and internal factors. The hierarchy index showing the hierarchy level of the social cognitive map was calculated as (h) 0.151. As stated before, the hierarchy index of the cognitive maps being close to zero indicates a less hierarchical and more democratic structure. Therefore, it is possible to say that the social cognitive map has a democratic structure. This shows that the maps have a higher openness and adaptability to change. The total number of connections (C) (841) in the social cognitive map indicates the number of interactions between variables. While 7.37 connections were made per variable, the density of the social cognitive map was realized as 0.064. The low density indicates that the variables in the social map are not concentrated at a single point, but an interaction spread throughout the map.

Table 5. *Graph theory (structural analysis) indices of the social cognitive map*

	Social Map
Variables (N)	114
Transmitter	3
Receiver	11
Ordinary	100
Hierarchy (h)	0.151
Connections (C)	841
Density (D)	0.064
Connections/Variables (C/N)	7.37

Cognitive Map Neural Network Simulations and Predictions

Another method used in the analysis of cognitive maps is neural network simulations. Kosko (1986, 1997) and Dickerson and Kosko (1994) provide detailed information in their studies about the use of neural network simulations in cognitive maps. Neural network simulations, which are described as one of artificial intelligence applications, are generally included in theoretical and applied studies in the engineering discipline (Çoban & Seçme, 2005; Özesmi & Özesmi, 2004). Therefore, this study uses neural network simulations to add diversity to the tourism literature. For the applicability of this method, cognitive maps are first converted into neighbourhood matrices. The social cognitive map neighbourhood matrix is obtained by adding the neighbourhood matrices on top of each other. A new state vector is determined by multiplying the 114 variables defined in the social cognitive map with the initial state vector of size 114x1, in which all variables are given equal weight in a neighbourhood matrix of size 114x114. The values in this vector are reduced to the interval [0,1] by the logistic function $[1/(1+e^{-0,1*a})]$, which is determined according to the purpose.

The causality of variables was comprehended by leveraging the adjacency matrix of a social cognitive map. A logistic function was used along with multiplication with the initial state vector to convert the information into an interval of [0,1]. The activation levels of various variables were examined, and their causal outputs were contrasted. The procedure was iterated until a stable state was attained. The process performed is called iteration, and in each iteration step, the value of the relevant variable is increased, and the changes in the values of other variables are monitored. In the neural network simulations performed in this study, the change in the values of the variables in the social cognitive map decreased to the level of 0.00...01 from approximately the tenth iteration, and in total, approximately 13 iterations were performed for each scenario. An independent variable was chosen while making iterations. This independent variable is the variable that is deemed appropriate for the scenario, and its value is increased to 1. In this way, by establishing an If-Then relationship, it is observed how and relatively how much change the improvement in the value of the variable creates on other variables. In selecting the independent variables whose effects will be examined, variables with a high degree of centrality were prioritized as they offer more interaction than other variables. Thus, the values of the dependent variables against each independent variable became observable. The simulations obtained as a result of the iterations performed within the scope of the study are as follows.

Synergetic Effects of Some Variables in Social Cognitive Maps

Synergetic effects of demand growth (Scenario 1):

The first scenario examines the demand growth which is the most central variable. The change in the values of other variables was observed with the developed or improved (strengthened) demand growth in the social cognitive map. In other words, for the social cognitive map, Figure 4 shows which variable values will change when the number of tourists continues to increase.

Since demarketing is based on developing measures for increasing demand, it is not surprising that this variable is the most repeated central variable. As seen in Figure 4, the increase in demand may cause undesirable consequences in destinations. Destinations may be inadequate to cope with the increase in demand and may not be able to cope with the problems. This situation may cause the destination to face the risk of losing its attractiveness. Marketing strategies are thought to allow destinations to

turn a crisis into an opportunity. According to Figure 4, overcapacity, lack of planning and wrong management choices, traffic and parking problems, and an increase in pollution and destruction in the region may occur when there is a continuous increase in demand. However, despite all these negativities, it can produce some positive results. There will be an increase in the number of tourism businesses and tourism revenues of the region, investments will be strengthened, new accommodation investments may occur, and there may be development and diversification of touristic products.

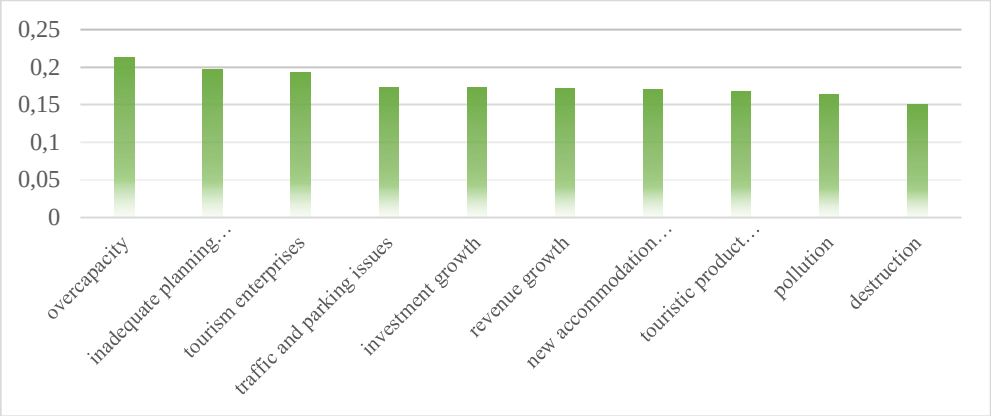

Figure 4. *Synergetic effect of demand growth in social cognitive maps*

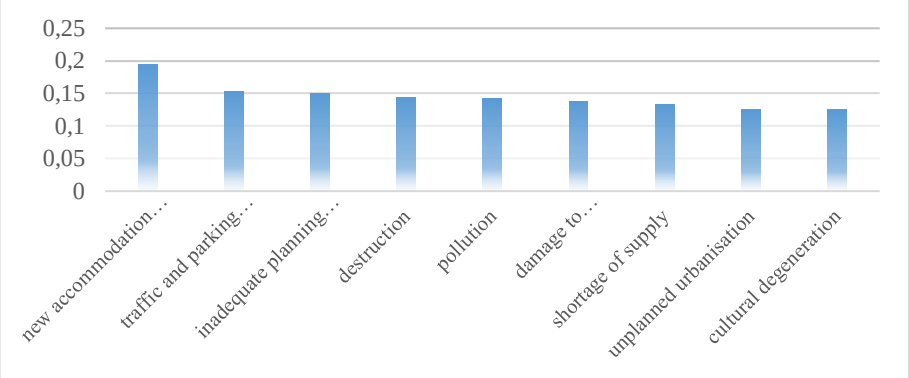

Figure 5. *Synergetic effect of overcapacity in social cognitive maps*

Synergetic effect of overcapacity (Scenario 2):

In the scenario created for the social cognitive map, the first variable that emerged with the development and improvement of the demand growth variable, which is the most central variable, was the overcapacity variable. Overcapacity, one of the factors caused by excessive demand, is one of the biggest problems of both sustainable tourism and demand management. Therefore, the impact of the development and improvement of this variable

on other variables is considered necessary for the social cognitive map and is shown in Figure 5.

A careful examination of Figure 5 reveals that the overcapacity can trigger some initiatives in the region. Accordingly, it is thought that some undesirable negativities will occur. Unlike the demand growth variable, it is thought that there will be consequences such as damage to agricultural areas, insufficient supply, unplanned urbanization, and cultural degeneration.

Synergistic effect of destruction (Scenario 3):

The social cognitive map in Figure 6 includes how other variables will be affected due to strengthening the destruction variable. According to the social cognitive map, positive and negative consequences will occur when the destruction variable is strengthened. In fact, an increase in income due to an increase in the destruction of the region cannot be entirely out of the question. However, as shown in Figure 6, there is a positive "income growth" variable. This is likely to be due to the wording. Therefore, it is thought that the question "Which variables will be affected by strengthening or improving the "destruction" variable and how?" was understood by some participants as "Which variables will be affected by eliminating or preventing destruction and how?". As stated before, the researcher does not intervene in drawing the maps and considers the subjective opinions and thoughts of the participants without looking for right/wrong. Therefore, Figure 6 can be considered as a reflection of the fact that the researcher did not jeopardize the reliability of the research. In addition, the occurrence of the "destruction" variable in the relevant areas will bring migration, employment, and regional development problems, change in population structure, and a decrease in the number of overnight stays.

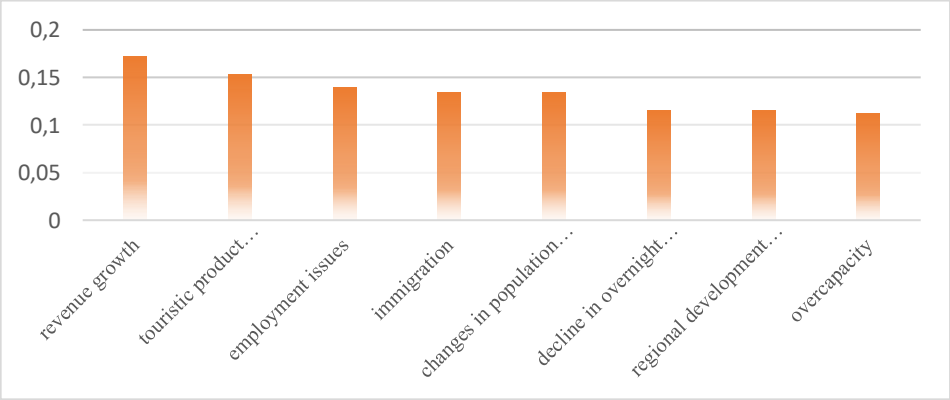

Figure 6. *Synergetic effect of destruction in social cognitive maps*

Synergistic effect of income growth (Scenario 4):

One of the study's top ten most central variables is income growth (see Table 2). In this context, the changes in other variables due to strengthening the income growth variable are presented in Figure 7.

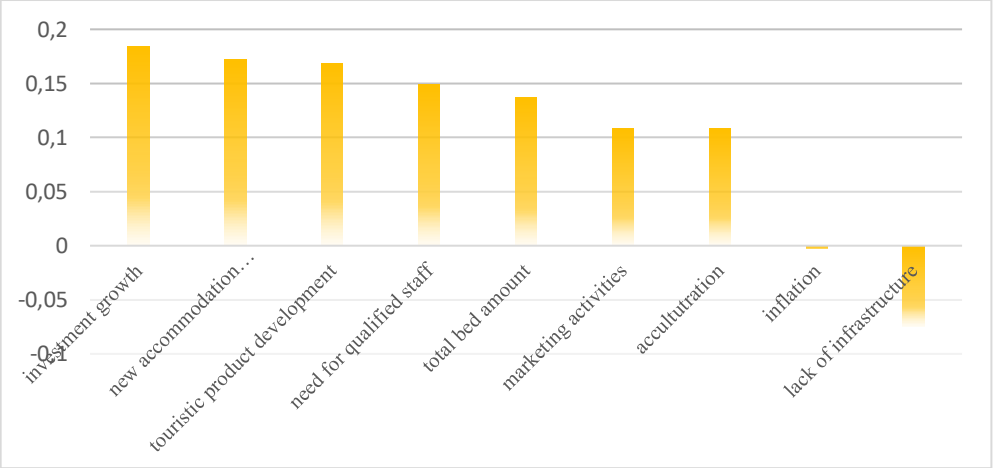

Figure 7. *Synergetic effect of income growth in social cognitive maps*

According to Figure 7, strengthening the income growth variable will primarily increase the number of regional investments and investors. Related to this, new accommodation investments will be realized, and the need for qualified personnel will increase. Moreover, an increase in tourism revenues in the region will also affect marketing activities. In addition, a closer examination of Figure 7 reveals that strengthening the income growth variable will reduce infrastructure both inadequacy and inflation, albeit to a lesser extent.

Synergistic effect of investment (Scenario 5):

Another variable among the top ten most central variables of all interest groups is the "investment" variable. Figure 8 below shows what kind of developments and/or changes will occur in the region due to strengthening or improving this variable.

Figure 8, which reflects the relative impact of the investment variable in the social cognitive map, includes both positive and negative variables. With the increase in investments in the region, it is thought that problems will arise primarily due to incomplete planning and mismanagement. This situation can be associated with economic carrying capacity. The increase in investments is basically considered a situation that may arise due to the continuous flow of tourists in the region. Therefore, this raises the

possibility that the regional economy may be overly dependent on tourism, leading to overcapacity problems. In addition, the number of tourism enterprises is expected to increase. This is clearly observed in the social cognitive map, as investment growth will undoubtedly lead to employment opportunities. Moreover, an improvement in the investment variable will also reduce the inadequacy of superstructure and demand shifts.

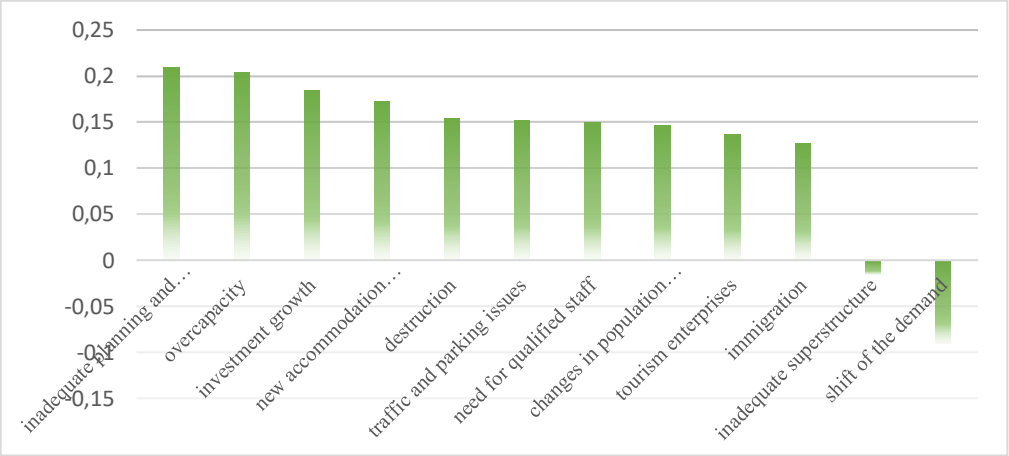

Figure 8. *Synergetic effect of investment in social cognitive maps*

DISCUSSION AND CONCLUSION

Discussion

The results of this study align with and contribute to the growing body of literature on sustainable tourism and demand management, particularly in the areas of demarketing and FCM. This study indicates that demarketing as a demand management strategy has the potential to mitigate the adverse effects of tourism and to ensure destination sustainability. Demarketing is critical, particularly in regions such as Cappadocia, characterised by a continuous increase in visitor numbers. Previous research on demarketing strategies has demonstrated their efficacy in regulating overtourism, particularly in contexts where environmental and social sustainability are vulnerable (Beeton, 2003; Medway et al., 2011). As highlighted by Beeton (2003) and Medway et al. (2011), the implementation of effective marketing strategies can serve as a potential solution to problems of exceeding the carrying capacity in tourist destinations. This is achieved by regulating visitor flows and ensuring a sustainable balance between supply and demand. This perspective aligns with the results of this study, which indicate that an increase in demand can result in a range of adverse effects, including overcapacity, environmental degradation, and inadequate

infrastructure. Indeed, destinations such as Cappadocia can avert these adverse consequences by employing a strategic demarketing approach and safeguarding the natural and cultural assets that render the region attractive.

The synergistic impact of growth in tourism demand, identified in this study, lends support to the results of previous research which emphasise the interdependence of tourism demand variables (Abdeljalil & Ezzat, 2016). The FCM analysis utilized in the study indicates that demand growth can result in a multitude of unfavourable consequences, including congestion, pollution, and resource depletion. On the other hand, investment growth has favourable outcomes, too. The results align with those of Mai et al. (2020) and Thuy and Thu (2024), indicating that investment growth engenders positive effects, including tourism income growth and the development of new facilities. This highlights the dual nature of tourism growth, whereby the sector can simultaneously stimulate local economies while also threatening the resources that sustain it. The increase in demand can lead to a number of undesirable consequences, including traffic congestion, pollution and resource depletion. This study employs FCM to model tourism demand dynamics, thereby extending previous applications of FCM in tourism research. The method has been demonstrated to be effective in visualising complex systems (Papageorgiou & Kontogianni, 2012) and in elucidating the interrelationships between variables such as demand growth, capacity, and environmental impact. The current results corroborate the notion that demand growth and overcapacity exert a pivotal influence on the generation of both favourable and unfavourable outcomes. This is consistent with the proposition that FCM has the capacity to elucidate hitherto obscured synergies and feedback loops within tourism systems (Khaidi et al., 2019).

Conclusion

This study employs FCM to examine the impact of a demarketing strategy on sustainable tourism demand management. The results demonstrate that demarketing represents an effective instrument for achieving equilibrium in peak demand within tourist destinations, while simultaneously ensuring the sustainability of such destinations. Conversely, the results indicate that an increase in demand may result in overcapacity within the region. The phenomenon of overcapacity can give rise to a number of problematic consequences, including the depletion of natural resources, traffic congestion, environmental pollution and the inadequate provision of infrastructure. In this context, the flow of tourists can be regulated in a

controlled manner through the implementation of demarketing strategies within the framework of demand management. This is of critical importance in ensuring the long-term attractiveness and sustainability of the destination (Dodds & Butler, 2010). Despite the fact that demarketing strategies are designed with the objective of reducing demand, they can nevertheless contribute to the regional economy. As evidenced by the FCM scenarios, it is feasible for new tourism investments and innovations to emerge as a consequence of reduced demand. This may result in an increase in tourism revenues and a diversification of the region's tourist product. However, this growth must be sustainable. Otherwise, negative impacts may be encountered, including a lack of infrastructure and environmental destruction (Rawat et al., 2024). The results provide a more nuanced understanding of the impact of demarketing strategies on destinations, facilitated by the capacity of social cognitive maps to represent intricate networks of relationships. This study examines the interrelationships between variables such as destruction, revenue growth and investments through the use of FCM-based scenarios. The results may facilitate more informed decision-making in the field of destination management and enable a broader evaluation of destination management strategies.

Theoretical Implications

This research makes a significant contribution to the literature on sustainable tourism by integrating demarketing strategies into this field of study. Although the concept of demarketing has been the subject of study in a number of different fields, including healthcare and social marketing (Beeton, 2003; Medway et al., 2011), its application in the context of tourism, particularly as a demand management tool, is still in its infancy (Dodds & Butler, 2010). This study demonstrates how demarketing can help to mitigate the negative impacts of overtourism in regions such as Cappadocia. It builds on and extends existing theoretical frameworks by linking tourism management to sustainability. The research addresses a significant gap in the existing literature by offering a comprehensive and systematic understanding of the role of demarketing in supporting sustainable tourism in high-demand destinations.

The study advances the use of FCM as a methodological tool to explore the complex interactions between variables in the field of tourism demand management. Although FCM has been employed in environmental management and decision-making (Papageorgiou & Kontogianni, 2012), its utilisation in tourism remains a relatively novel phenomenon. This research employs FCM to model the interrelationships

between variables, including demand growth, overcapacity and destruction. This approach offers a novel perspective on the dynamic and non-linear nature of tourism systems. Another significant contribution is the conceptualisation of synergistic effects within tourism systems. In particular, it is evident that growth in specific variables, such as demand and investment, can yield both positive and negative outcomes. This dichotomy is consistent with the results of previous studies on the relationship between tourism growth and sustainability (Abdeljalil & Ezzat, 2016; Asadi et al., 2020; Nozari et al., 2021), However, this study provides more profound insights into the relationships between variables through the application of FCM. The identification of overcapacity and destruction as central nodes in the system that trigger both social and environmental problems contributes to the development of a more detailed theoretical framework for the sustainability of tourism. Ultimately, this study underscores the necessity for a proactive rather than a reactive approach. It proposes that demarketing should be incorporated into comprehensive policy frameworks to regulate demand growth, safeguard environmental assets, and guarantee economic sustainability. This study builds on and extends the theories on destination lifecycle models (Butler, 1980) by incorporating contemporary challenges such as overtourism and capacity limits. This study not only demonstrates the practical utility of marketing and FCM in managing tourism demand, but also contributes to the theoretical discourse around sustainable tourism, complex systems theory and destination management. Furthermore, it establishes a foundation for future research to investigate the broader applicability of these tools in other high-demand tourism regions.

Practical Implications

One of the principal practical contributions of the research is to demonstrate how demarketing strategies can be employed as an efficacious instrument for the management and regulation of tourism demand in destinations that are experiencing overtourism. By reducing excessive demand, demarketing can assist in the protection of Cappadocia's natural and cultural resources, thereby ensuring the long-term sustainability of the destination. This provides tourism managers and policymakers with a strategic approach to prevent problems such as overcrowding, destruction and infrastructure inadequacy, thus ensuring the continuity of tourism without complete cessation. In this context, the study lends support to the implementation of measures such as seasonal pricing, marketing during low seasons, or

limiting promotional efforts during peak seasons, which may prove effective in regulating visitor flows.

The utilisation of FCM offers a data-driven perspective for policymakers and stakeholders to visualise and simulate intricate relationships between assorted variables, including demand growth, overcapacity, and environmental impacts. By identifying the manner in which alterations in one variable (for example, the number of tourists) affect other factors (for example, pollution and economic benefits), FCM can assist managers in making more informed decisions regarding the allocation of resources, investment planning, and infrastructure development. The practical application of FCM enables destination managers to adopt a proactive approach to policy design, addressing both the potential benefits and risks associated with tourism growth. By identifying the potential negative consequences of uncontrolled tourism demand (such as overcapacity, pollution and infrastructure problems), the study emphasises the necessity for destinations such as Cappadocia to develop crisis mitigation strategies. The practice of demarketing offers a viable method for mitigating the risk of destination decline or environmental destruction. By ensuring that the destination does not exceed its carrying capacity, demarketing provides a practical solution for safeguarding the sustainability of tourism development. This approach encourages the adoption of sustainable tourism practices by ensuring a balance between visitor numbers and the capacity of existing resources and infrastructure. Although demarketing may result in a reduction of tourist numbers in the short term, the study indicates that this strategy can facilitate the development of more sustainable tourism movements and enhance visitor experiences. The study indicates that by focusing on attracting a smaller number of higher-spending visitors, destinations will consequently host a more qualified tourist cohort. This shift towards quality over quantity is also reflected in the study's results on investment synergies. Indeed, investments in higher-level accommodation, services and attractions can facilitate diversification and revitalisation of the local economy through the promotion of sustainable growth.

The insights provided into the synergistic effects of demand growth and overcapacity have practical implications for urban planning and infrastructure development in regions with high tourism demand, such as Cappadocia. The study emphasises the necessity of forward planning to accommodate future growth, emphasising the importance of avoiding overbuilding and ensuring that infrastructure expansion or improvement is only undertaken when it is essential for the sustainable development of

tourism activities. This proactive approach guarantees that the destination is aligned with its long-term sustainability objectives and tourist capacity. The results and practical implications of this study are not limited to Cappadocia; they can also be applied to other destinations facing similar challenges resulting from rapid tourism growth. The demarketing strategies and FCM methodology can be adapted for use in the assessment of tourism demand in other culturally or environmentally sensitive regions. This provides destination managers and policy makers with a transferable framework that can be used to ensure sustainable tourism practices globally. This research offers a practical framework for the management of tourism demand, the protection of local resources and the promotion of sustainable growth through the innovative use of demarketing and FCM.

Limitations and Future Research

Although this study significantly contributes to tourism literature, it has some limitations. First, the scope of this study only covers the Cappadocia region in Nevsehir province, Türkiye. Further research could examine the potential for the implementation of demarketing strategies in culturally and environmentally sensitive tourist destinations, such as Venice, Barcelona, and Machu Picchu. By undertaking comparative studies, researchers can ascertain whether the results of this study (e.g., balancing demand and preventing overcapacity) are applicable on a universal scale or whether regional differences impact the efficacy of demarketing strategies. The principal limitation of the method employed in the study is that only one question was posed to the participants. Nevertheless, as this approach provides a proactive outlook on any given situation, the study has addressed the recently prominent issue of demand management in tourism. In this context, the sample comprises only those with a stake in destination management, including academics, industry experts and government experts. Subsequent researchers may define the research problem and the sample in different ways and provide proactive insights and contributions to both the tourism industry and tourism literature. This study underscores the significance of synergistic effects (for example, demand growth that gives rise to both positive and negative outcomes). Further research could employ the use of FCM to examine the intricate interactions between a broader range of variables within the tourism ecosystem. To illustrate, researchers might consider how factors such as climate change, government policy, and tourist satisfaction interact with demand growth and destination management. The incorporation of additional variables could facilitate the expansion of the FCM, thereby enhancing the availability of

comprehensive decision-making tools for stakeholders in the tourism sector. Furthermore, while demarketing has been regarded as a means of addressing overtourism in popular tourist destinations, the economic consequences of such strategies in developing regions that rely heavily on tourism revenue have not been adequately investigated. Further research could investigate the economic viability of demarketing strategies in regions where tourism is a significant driver of economic development.

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