

# An Interaction of Observation and Artificial Intelligence Approaches—Motivations, Strategies and Tradition of B&B Operators in the Netherlands

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Manuscript received July 31, 2024; revised August 12, 2024; accepted August 25, 2024; published September 20, 2024.

**Abstract**—This study investigates the Dutch Bed and Breakfast (B&B) industry, focusing on operational philosophies and consumer preferences. Despite its importance, this area remains under-researched. Using firsthand data from in-depth interviews with Dutch B&B operators, online consumer reviews from Airbnb, and data-driven methodologies incorporating Artificial Intelligence (AI)-based models, we identify key factors that influence customer preferences, including location, hospitality and the quality and convenience of amenities, and their links to operators' philosophies. The findings provide strategic recommendations to improve the operational effectiveness and competitiveness of Dutch B&Bs, offering practical insights for enhancing customer satisfaction and contributing to the broader tourism and hospitality industry.

**Keywords**—bed and breakfast, business management, in-depth interview, artificial intelligence, natural language processing, strategic recommendation

## I. INTRODUCTION

A Bed and Breakfast (B&B) is typically a private home where guests are provided accommodation for the night, playing a significant role in the hospitality sector (Tao *et al.*, 2023). Traditionally, bathrooms in B&Bs are shared with the host family or other guests. Originating in Europe, the B&B industry has become a well-established segment of the hospitality sector in the Netherlands. In this context, the term “Bed and Breakfast” retains its literal meaning—a bed and a breakfast—often considered synonymous with lodgings that provide a guestroom or a guesthouse (Hsieh *et al.*, 2010).

Despite the prominence of B&Bs in the Netherlands, there has been limited research focusing on their operational philosophies and how these are connected to consumer preferences. This study seeks to bridge this gap by examining the motivations of B&B operators, their marketing strategies, cultural influences, and consumer preferences. Combining firsthand data from in-depth interviews with Dutch B&B operators, consumer reviews from Airbnb, and employing data-driven methodologies and Artificial Intelligence (AI) approaches (Hnaien *et al.*, 2015), we uncover pivotal factors driving customer preferences.

The findings offer strategic recommendations to enhance the operational effectiveness and competitiveness of B&B operators in the Netherlands. This research aims to make significant theoretical contributions to the literature on operational strategies within the tourism and hospitality sectors in the Netherlands.

## II. LITERATURE REVIEW

### A. Bed and Breakfast Industry in the Netherlands

The Bed and Breakfast (B&B) industry in the Netherlands predominantly consists of establishments operated by owners within their residential homes. Typical Dutch B&Bs are often located in historic monumental houses or farmhouses, adding a unique cultural and historical dimension to their offerings. As of 2016, the total number of B&Bs in the Netherlands reached approximately 5,000 (Bayraktaroğlu, 2023).

### B. Motivation, Marketing Strategies and Meaning of Tradition-for Operators in the Netherlands

Studies on lifestyle entrepreneurship in countryside hospitality have highlighted significant motivating factors such as increased family time and the allure of specific locations (Shaw & Williams, 2004). Lynch (2005) emphasizes that emotional motivations such as enjoying interactions with guests, the satisfaction of cooking for them, and personal fulfillment are often more significant to B&B hosts than purely economic motives. This underscores the importance of examining small-scale hospitality businesses in contributing to a nuanced understanding of the hospitality industry's dynamics. These insights are crucial for comprehending the motivations and strategies employed by B&B operators in the Netherlands, particularly in preserving and leveraging traditional values amidst contemporary hospitality practices.

### C. Application of Artificial Intelligence in the Hospitality Industry

Recent advancements in Artificial Intelligence (AI), particularly Natural Language Processing (NLP), have revolutionized the analysis of customer reviews in the hospitality industry. AI-based models offer sophisticated tools to extract valuable insights from large volumes of unstructured data (Wu *et al.*, 2024), such as online reviews from platforms like Airbnb.

By applying NLP techniques, researchers can uncover nuanced aspects of customer satisfaction, sentiment analysis, and thematic patterns within reviews (Xiang *et al.*, 2015). This approach enables a deeper understanding of consumer preferences, perceptions of service quality, and factors influencing guest experiences in Bed and Breakfast establishments.

In this study, AI-based models will be employed to analyze

a dataset comprising customer reviews from B&Bs in the Netherlands. This methodology not only enhances the rigor of our research but also provides actionable insights for B&B operators aiming to improve their service offerings and customer satisfaction levels.

### III. MATERIALS AND METHODS

#### A. In-depth Interview

This study employs a qualitative research design, utilizing observation and in-depth interviews with B&B owners in the Netherlands. Given the scarcity of literature on the operational philosophies of B&B operators in Leeuwarden, the qualitative approach is deemed appropriate for uncovering patterns and theories (Bryman, 2012).

To begin, the researcher must acquire sufficient knowledge about Leeuwarden and the Dutch B&B industry. Observation, a fundamental method in psychological research, involves watching behaviors within different observational categories: controlled, natural, and participant observation. Researchers may adopt either a covert role, posing as genuine group members, or an overt role, revealing their identity and purpose (Liamputtong, 2023).

In-depth interviews, a key qualitative technique, involve conducting intensive individual interviews with a small number of respondents. This method is ideal for exploring perceptions, thoughts, and attitudes on specific issues, offering a comprehensive understanding with fewer participants. Widely used in various fields, including healthcare, in-depth interviews provide structured guidance while allowing for deep exploration of new issues (Liamputtong, 2023). Given the flexibility of interview formats—from unstructured to formal interactions via phone, in-person, or mail—interviews are a suitable method for this research.

#### B. Sentiment Analysis Using Natural Language Processing (NLP)

Natural Language Processing (NLP) is an interdisciplinary field within Artificial Intelligence (AI) that aims to enable computers to understand, interpret, and generate human language effectively (Xiang *et al.*, 2015). It encompasses a variety of techniques and methodologies designed to extract valuable insights from textual data sources, such as customer reviews and social media posts. One prominent application of NLP is sentiment analysis, which focuses on identifying and categorizing the sentiment expressed in text—whether it is positive, negative, or neutral (Mihalcea *et al.*, 2006). This computational approach helps in understanding the attitudes, opinions, and emotions conveyed by individuals through their written expressions.

Customer reviews on platforms like Airbnb serve as a rich source of textual data reflecting guests' experiences and perceptions of Bed and Breakfasts (B&Bs). By applying sentiment analysis techniques to Airbnb review data, researchers can extract and analyze the sentiments expressed in these reviews (Cheng & Jin, 2019). This analytical approach aims to provide actionable insights for B&B operators in Leeuwarden, the Netherlands, helping them improve customer satisfaction and competitiveness based on a deeper understanding of customer preferences. Furthermore,

these findings contribute to advancing knowledge in tourism and hospitality research by shedding light on consumer behaviors and expectations in the context of accommodation services.

#### C. Data Collection

In this study, a mixed-methods approach was employed to comprehensively investigate the Bed and Breakfast (B&B) industry in Leeuwarden, the Netherlands.

Data collection began with natural observation methods, including literature reviews from libraries, news articles, and online advertisements (Bakeman & Quera, 2023), to gather general knowledge about the B&B industry in Leeuwarden. Specific information about B&Bs was obtained through participant observation, where the researcher engaged with platforms like TripAdvisor, Google, Booking.com, and local websites to select four B&Bs with the highest reviews. Permissions were sought from the owners for further investigation.

During participant observation, the researcher immersed themselves in the social milieu of these B&Bs while fulfilling their role as a researcher. This involved taking detailed notes, recording audio-visual material, and posing targeted questions to elucidate underlying motivations and operational strategies (Hurst, 2023). Additionally, the researcher captured photographs of the décor, rooms, and surroundings, noting the atmosphere and personal experiences.

To gather firsthand insights, in-depth interviews were conducted with the owners of the selected B&Bs. Communication was facilitated through phone calls and emails to arrange face-to-face interviews, which lasted between one to one and a half hours each. The interviews were structured around key themes such as motivations for entrepreneurship, marketing strategies, and the preservation of traditions within their establishments. A total of four interviews were conducted in Leeuwarden, the Netherlands, in July 2016. All interviews were conducted in English, and the researcher, equipped with professional interview skills, ensured rigorous data collection practices. Each session was audio-recorded and subsequently transcribed to form a qualitative dataset for analysis.

Additionally, to complement the qualitative data from interviews, Airbnb reviews spanning from 2014 to 2016 were collected, totaling 41,012 reviews (Ansari, 2023). This dataset served to address the potential limitations of a small sample size, facilitate comparative analysis, and validate findings derived from natural and participant observations.

#### D. Data Analysis

In qualitative research, coding is the process of categorizing and interpreting data to uncover underlying themes and patterns. This study employed a systematic coding process, starting with open coding to initially categorize the collected data. Axial coding followed, which involved grouping similar responses to consolidate information (Gibbs, 2007). Finally, selective coding was employed to distill the data into major themes, guided by the key themes of motivations and marketing strategies (Holton, 2007). These coding stages facilitated a thorough analysis of the motivations and marketing approaches among B&B operators in Leeuwarden, the Netherlands.

Furthermore, a sentiment analysis is performed on Airbnb reviews, each review is assigned a sentiment score within the range of -1 to 1, where 1 represents highly positive sentiment, -1 means highly negative sentiment, and a value proximate to 0 indicates a neutral sentiment. This analysis aims to identify key features that significantly impact customers' experiences, thereby validating operators' operational and marketing approaches. Additionally, it provides the basis for strategic recommendations tailored for operators.

IV. RESULTS

A. Major Motivations for Operators

Table 1. Major motivations for operators in the Netherland

Theme	Coding	Quotation Examples (Dutch)
Space Usage	Part of the resident home	We built this new house two years ago. We think about how we could do with these big houses; We found that it is even a better idea to run a hostel instead of just live.
	A space for another job	I want to set up a studio to make handicraft or draw for sell; We think this is the best house for my tattoo shop.
Support	Inheritance	My father bought this house. my father started to do his medicine business since 1947.
	Family's supports	My husband very supports me, if he is free, he also does it; My wife bought this house and then I moved here from 2007. We run this house together.
	Friends' supports	We have some friends who work in the restaurant and hotel, and they know how to manage a hotel, so they know how to manage a bed and breakfast; I turn studio into bed and breakfast according to suggestion from my friends
Interests	Meeting with different people	I think it's interesting, the different thought of people, and their stories. I know the characteristic of Dutch; I am willing to share with all the people.
	City preference	Why I choose to come back because I like the city and I like the space. But we found out the view from this place is really attractive; The cultural and natural environment of the city are both good for the B and B business.
	Career goal	It is a dream to one day have a bed and breakfast. We always plan for this B&B business.
Uniqueness	House re-design	I did this house now for two years ago. And we built this new house; I bought this house 15 years ago, it took me 2 years to restructure this house.

Emotion	Special former usage	Many years ago there was a farm; It was a hospital before.
	Special Location	And this is one of the richest parts of Leeuwarden and people trade here and live here.
	Hometown	I was born here, in Leeuwarden, and we start our B&B one month ago; I was born in Rotterdam, Netherlands, it is not far from Leeuwarden.
	Old house keeping and maintenance	I want to keep this house, as same as the day before my father passed away.

Table 1 summarizes major motivations for operators in Leeuwarden, the Netherlands to operate a B&B. The five dominant themes extracted from the interview notes. The space usage, support, interests, uniqueness, emotion are the participations main motivations for them to utilize the properties in an efficient way from their family members support and host the tourists.

B. Major Operational Marketing Strategies

Table 2. Major operational marketing strategies for operators in the Netherland

Theme	Coding	Quotation Examples (Dutch)
Word-of-mouth	Guests' recommendations	I have the internet and of course I have the website on bed and breakfast. But a lot of them just from people to tell other people; I do not make any advertisement at all. The only advertisement was from my guests.
	Friends' recommendations	Oh cool so sweet! My fiend he just lived at the corner of the street and we sometimes drink coffee together; In the later time, we find that word-of-mouth is an intelligent way to attract people and friends.
Traditional media	News paper	Yeah it's a paper(newspaper) it's nearby; We made ads on the local newspaper.
	To make some posters/Brochures	We are on the second page (Brochure). And this is the advertisement; I put up hand-made posters on my door in the early time.
Digital media	Official Website	And we have our own website we can also advertise; We also advertise on our website.
	To buy key words top searching	We have bought the internet advertisement such as on Yahoo, Google key words searching.
	Some travel websites	Advertisement in internet is important. Since young generation likes to search in internet, like

		booking.com; The booking.com is really big and we have to pay them but of course on the other hand it's really convenient.
	To use social media	Blog used to be an important advertisement agency.
Cooperation	Travel agent	Some people ask the tour guide where they can stay so have the whole list; We have cooperation with tourist agent from China also.
	Official Local Department	And we also put it on the vvv.Leeuwarden, you know the big tower? The information area: Local tourist office also made some advertisements.

	Typical house locations	And this is one of the richest parts of Leeuwarden and people trade here and live here; This house is very steadily since it is built with the rocks.
	Mixed décor styles	We are very happy that they didn't change it. But the color is renewed, the color is the Friezen color, and mixed with some Germany style.
Protection orientated	Not profit but protection	It built in 900s. The city Leeuwarden is a traditional city, the government don't let you rebuilt it; That's true, and also not allowed to destroyed the architecture rom government. It is also not allowed to change it, for example if it is the red, you can't change it to blue.

Table 2 summarizes the major marketing strategies that operators in Leeuwarden, the Netherlands usually adopt. A total of four strategies were identified, including word-of-mouth, traditional media, digital media and cooperation. Those marketing strategies become the most important and efficient ways for most of the B&B hosts' promotions, which are very different from traditional hotel advertisements.

C. The Meaning of Tradition

Table 3. Major meaning of tradition for operators in the Netherland

Theme	Coding	Quotation Examples (Dutch)
History	Local background identifications	Leeuwarden will be the European Culture centre in 2018; It is the provincial capital city and seat of the Provincial Council of Friesland.
	The houses background identifications	Originally the house is from 700s, it's quite big house in the center; This house was built for the company club in 1927.
Culture	Local culture	In the kitchen the original Friezen style, and also the glasses inside you can see it's really old. We have our own language; We feel that we are protecting the history for our children.
	Semi-colony culture	It was occupied by German.
Architecture	Local typical roofs	It's traditional style with a roof and it is the same form as when we turned it down. Like straw, it's come from here and the lakes and water, it's dry and now it's a roof; It is very difficult to find the proper carpenter. I paid more than normal price for a 70-year-old experienced carpenter.

According to the interviews, the researcher concluded four themes of meaning of tradition, which is shown on Table 3. This theme is the most important character for Bed and Breakfast, the entrepreneurs are not only for operational profit, but also for history, culture, architecture, protection orientated aims, for instance, to protect historical remains and local culture—"Leeuwarden will be the European culture center in 2018".

D. Customer Sentiment Analysis Using Airbnb Review Dataset

Digital media is as an effective marketing strategy for expanding the scope of potential customer outreach (Bhandari & Sin, 2023). Airbnb stands out as one of the most data-rich resources, containing a wealth of information derived from customer reviews. Here, we conducted a comparative analysis from customers' perspective utilizing Natural Language Processing (NLP)-based sentiment analysis to extra key words that significantly impact customers' reviews (Aldahmani, 2024). Subsequently, we compare these findings with strategies adopted by operators. This analysis aims to validate the strategies employed by operators and offer recommendations for both marketing and operations. Using data from 2014 to 2016, we obtained 41012 reviews (Ansari, 2023), and each review was subjected to preprocessing procedures, including the removal of punctuations, stop words and special characters, lemmatization, spelling correction, prior to sentiment analysis (Pradha *et al.*, 2019). The sentiment analysis was implemented by Valence Aware Dictionary for Sentiment Reasoning (VADER) model, a bag-of-words-based approach available in the Natural Language Toolkit (NLTK) within the Python programming language (Loper & Bird, 2002). Each review was assigned a sentiment score within the range of -1 to 1, where 1 denotes highly positive sentiment, -1 signifies highly negative sentiment, and a value proximate to 0 indicates a neutral sentiment (Sun *et al.*, 2024). The results are presented in Fig. 1.



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