

The Economic Impact of the Culture of Surfing: A Financial Analysis of Nazaré

Slater Bird

University of Nottingham

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Abstract:

The economic impact of surfing on local economies in Europe has been a subject of interest for policymakers and researchers alike. This dissertation investigates the impact of surfing on the economy, particularly focusing on the town of Nazaré, Portugal. The study aims to provide empirical evidence on how surfing influences key economic indicators such as monthly wage, employment rates, value of buildings and tourism. Using a combination of secondary data analysis and primary data collection, the research employs time series regression models to explore the relationship between surfing-related activities and economic performance. The findings of this study are expected to inform sustainable development strategies, infrastructure investments, and policy decisions aimed at fostering economic growth through surfing tourism.

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Table of Contents

1. Introduction
 - Background and Context
 - Research Problem and Objectives
 - Research Questions
 - Significance of the Study
 - Dissertation Structure
2. Literature Review
 - Overview of Existing Literature and Models
 - Theoretical Framework
 - Gaps in the Literature
 - Summary
3. Methodology
 - Research Design
 - Data Sources and Collection Methods
 - Analytical Methods
 - Ethical Considerations
 - Limitations of the Methodology
4. Data Analysis and Results
 - Data Presentation
 - Interpretation of Results
 - Analysis and Interpretation
 - Key Findings
5. Conclusion
 - Summary of Findings
 - Contributions to Knowledge
6. Final Statements
 - Policy Recommendations
 - Suggestions for Future Research
 - Final Thoughts
7. References
8. Appendices

1 Introduction

The global surfing industry has experienced significant growth over the past few decades, evolving from a niche sport into a major driver of tourism and economic activity in coastal regions worldwide. This transformation has been particularly evident in Europe, where coastal towns have harnessed the appeal of their surf spots to attract both domestic and international tourists. Surfing has become more than just a recreational activity; it has developed into a cultural phenomenon with deep economic implications for the communities that embrace it.

Nazaré, Portugal, exemplifies this trend. Known globally for its colossal waves, Nazaré has become a key destination for big-wave surfers and adventure seekers. The town's unique geographic features, including the Nazaré Canyon, create some of the largest waves in the world, attracting surfers and spectators alike. This influx of visitors has had a substantial impact on the local economy, spurring growth in sectors such as hospitality, retail, and real estate. The integration of surfing into Nazaré's cultural and economic identity has transformed the town from a traditional fishing village into a bustling tourist destination, highlighting the broader potential of surfing as an economic engine in coastal regions.

The rise of surf tourism in Nazaré reflects a global pattern where surfing is increasingly recognized for its economic potential. According to the World Surf League, the global surf industry is worth billions of dollars, with surf tourism contributing significantly to the economies of coastal towns. In Europe, surfing has revitalized local economies, played a key role in cultural preservation, and fostered environmental conservation and community development. Despite the evident economic impact of surfing, however, research gaps remain, particularly regarding its specific contributions to local economies.

Although surfing's popularity and the associated tourism are well-recognized, the economic impact of surfing on local economies remains under-researched. Existing literature often focuses more on the environmental and cultural aspects of surfing, with less attention given to the economic outcomes. For instance, many studies

have documented the environmental challenges linked to surf tourism, such as coastal erosion and habitat destruction, alongside the cultural significance of surfing in various communities. However, there is a noticeable lack of empirical research quantifying the economic contributions of surfing, particularly in terms of its influence on local GDP, employment rates, and business growth.

This gap in the literature is particularly evident in European coastal towns like Nazaré, where surfing has become a significant economic driver. While anecdotal evidence suggests that surfing has revitalized local economies, there is a need for systematic research to quantify this impact. Understanding the economic implications of surfing is crucial for developing informed economic strategies and policies that can help coastal towns maximize the benefits of surf tourism while mitigating potential negative impacts.

This study aims to fill this gap by conducting a comprehensive analysis of the economic impact of surfing in Nazaré. By focusing on this iconic surf destination, the research seeks to provide insights applicable to other coastal towns in Europe and beyond. The findings will contribute to the academic literature on surf tourism and offer practical guidance for policymakers, local businesses, and community leaders.

The primary objective of this research is to analyze the economic impact of surfing on local economies in Europe, with a focus on Nazaré, Portugal. The study aims to assess how surfing-related activities contribute to key economic indicators, including employment rates, local business revenues, and tourist expenditures. It also investigates the role of surfing events and infrastructure in driving tourism and stimulating economic growth. Additionally, the research explores the cultural significance of surfing, examining its contribution to Nazaré's community identity and heritage preservation.

The study is guided by several key questions: How do surfing activities influence the economic performance of coastal towns like Nazaré? What specific contributions do surfing events and infrastructure make to local tourism and employment? Finally, how does the cultural aspect of surfing affect the social and economic fabric of the

community? These questions shape the analysis of economic data and provide context for understanding both the economic and cultural impact of surfing in Nazaré.

This research is significant for several reasons. Academically, it contributes to the limited body of literature on the economic impacts of surfing by providing empirical data and analysis that can be used in future studies. By focusing on Nazaré, the study offers a case study that can be compared with other surf destinations in Europe and globally, enriching the comparative understanding of surf tourism's economic effects.

Practically, the findings of this study will offer valuable insights for policymakers, helping them develop targeted strategies to leverage surfing as an economic driver while ensuring sustainable development. Understanding the economic impact of surfing events, for example, can inform decisions about investing in infrastructure, marketing, and environmental protection. Additionally, the research will provide local businesses and communities with a better understanding of the economic dynamics associated with surfing, allowing them to capitalize on tourism opportunities and enhance community engagement.

The study also has broader implications for the sustainability of surf tourism. By quantifying the economic benefits of surfing, the research can support arguments for the preservation of natural surf environments and the promotion of sustainable tourism practices. This is particularly important in the context of global challenges such as climate change, which threaten the long-term viability of many surf destinations.

In conclusion, this study will fill a critical gap in the literature while providing practical recommendations for harnessing the economic potential of surfing in coastal towns like Nazaré. By doing so, it will contribute to the sustainable development of these regions, ensuring that they continue to thrive as popular tourist destinations while preserving their cultural and environmental integrity.

2 Literature Review

Surfing, traditionally seen as a sport, has evolved into a significant cultural and economic force, particularly in coastal regions known for their world-class waves. The studies under review provide a detailed analysis of how surfing contributes to local economies in regions such as the United States, Australia, the United Kingdom, and Spain. These studies use a variety of methods, including the Travel Cost Method (TCM), Contingent Valuation Method (CVM), and input-output modeling, to estimate the economic value of surfing to local economies. Additionally, the social value of surfing, as well as its role in community identity and environmental sustainability, are also explored.

The methodologies employed across the reviewed literature provide critical insights into the socioeconomic impact of surfing on local economies. Each study utilizes a combination of quantitative and qualitative research methods to capture the multifaceted effects of surfing, ranging from economic contributions to cultural and environmental impacts. The primary methodologies include the Travel Cost Method (TCM), Contingent Valuation Method (CVM), input-output modeling, and qualitative interviews, each of which plays a pivotal role in understanding the broader implications of surfing as a cultural and economic phenomenon.

The Travel Cost Method (TCM) is one of the most widely used approaches for estimating the economic value of non-market goods, such as the recreational benefits derived from surfing. This method calculates the economic value based on the amount of money and time that visitors are willing to spend to travel to a surf location. By aggregating the costs associated with travel, accommodation, food, and other expenditures, researchers can estimate the consumer surplus, which represents the economic value of the surf experience beyond what is directly paid by the visitors.

In the study by Silva and Ferreira (2014) on Costa de Caparica in Portugal, TCM was employed to estimate the economic value of waves to surfers and non-surfers alike. The methodology involved surveying visitors to determine their travel expenses and time spent at the location, followed by statistical analysis to estimate the demand curve for surfing. This method allowed the researchers to quantify the

direct economic impact of surfing, which was further compared to the broader economic activities in the region.

Similarly, Lazarow, Miller, and Blackwell (2007) utilized TCM in their study of the Gold Coast in Australia. The authors focused on the travel costs incurred by surfers and related tourists, estimating the total economic impact of surfing on the local economy. The study highlighted how the presence of high-quality surf breaks contributes to the attractiveness of the destination, driving significant tourist expenditures that benefit the local economy.

One of the strengths of TCM is its ability to capture the direct expenditures related to surfing, which can be significant in regions with high tourist activity. However, the method also has limitations. It primarily accounts for direct economic benefits and may not fully capture the broader social and environmental impacts of surfing. Additionally, TCM assumes that travel costs are the primary determinant of the economic value of surfing, potentially overlooking other factors such as the intrinsic value of the surf experience or the cultural significance of surfing to the local community.

The Contingent Valuation Method (CVM) is another prominent approach used to estimate the economic value of non-market goods, particularly in scenarios where the direct market price does not exist. CVM involves surveying individuals to determine their willingness to pay (WTP) for a specific good or service, such as the preservation of surf quality or access to surf breaks. This method is particularly useful in capturing the non-use value of environmental goods, such as the cultural and aesthetic value of surf locations.

Murphy and Bernal's (2008) study on the Mundaka wave in Spain employed CVM to estimate the WTP of both local and international surfers for the preservation of the wave quality. The authors conducted surveys to gather data on the respondents' WTP for various conservation scenarios, such as preventing the construction of infrastructure that could potentially damage the wave. This approach allowed the researchers to capture not only the direct economic benefits of surfing but also the broader environmental and cultural value that surfers attach to the wave.

The application of CVM in surfing studies provides a comprehensive view of the economic value of surfing, extending beyond direct expenditures to include non-use values. However, the method also has its challenges. CVM relies on hypothetical scenarios, which may lead to biases in respondents' answers. For instance, individuals might overstate their WTP in a survey setting, leading to inflated estimates of economic value. Additionally, the method requires careful survey design to ensure that respondents fully understand the scenarios presented to them, which can be complex when dealing with environmental goods.

Input-output modeling is a quantitative economic technique used to analyze the interdependencies between different sectors of an economy. This method is particularly effective in capturing the indirect and induced economic impacts of activities such as surfing, where the initial spending by tourists can generate additional economic activity in related sectors, such as retail, hospitality, and transportation.

Lazarow et al. (2007) applied input-output modeling in their study of the Gold Coast, Australia, to estimate the broader economic impact of surfing on the regional economy. The authors used data on tourist expenditures related to surfing and fed it into an input-output model to estimate the multiplier effects on the local economy. The results demonstrated that surfing contributes significantly to the local GDP, with the economic benefits extending beyond the immediate spending by tourists.

The strength of input-output modeling lies in its ability to capture the ripple effects of economic activities across different sectors. This makes it a valuable tool for understanding the full economic impact of surfing, including the indirect and induced effects. However, the method also has limitations. Input-output models are typically based on historical data, which may not fully capture future changes in economic structure or consumer behavior. Additionally, the accuracy of the results depends on the quality of the input data, which can be challenging to obtain in the context of surfing-related activities.

In addition to quantitative methods, qualitative approaches such as interviews and case studies are essential for understanding the broader social and cultural impacts of surfing. These methods provide insights into how surfing shapes community identity, fosters social cohesion, and influences environmental attitudes.

For example, the study by Burnett and Coffman (2009) on the Mavericks region in California included interviews with local business owners, surfers, and community leaders to capture the social and cultural significance of surfing to the local community. The qualitative data complemented the quantitative findings, providing a richer understanding of how surfing contributes to the local economy and community life.

Similarly, the study by Lazarow et al. (2007) included case studies of specific surf breaks on the Gold Coast to explore the social and environmental dimensions of surfing. The case studies highlighted the importance of preserving surf breaks as natural assets that contribute to the cultural identity of the region and support sustainable tourism.

Qualitative methods are particularly valuable in capturing the intangible benefits of surfing, such as the sense of place and community pride associated with iconic surf locations. However, these methods also have limitations. Qualitative data can be subjective and may not be easily generalizable to other contexts. Additionally, qualitative research requires careful interpretation to avoid biases in the analysis.

The methodologies employed across the reviewed studies provide a comprehensive toolkit for assessing the socioeconomic impact of surfing. Each method has its strengths and limitations, and the choice of methodology often depends on the specific research questions and the availability of data.

In the context of Nazaré, this study combines qualitative interviews with employees and locals from surf-related businesses alongside quantitative analysis using time series regression models. This mixed-methods approach is designed to offer a comprehensive understanding of the economic impacts of surfing on the local economy, emphasizing direct relationships between surf tourism, employment, and

business growth. The regression models provide insights into how key variables, such as the number of surf shops, surf schools, and infrastructure investments, influence economic outcomes like employment rates, monthly earnings, and revenue growth.

While the time series data presented challenges due to non-stationarity—an issue that persisted even after applying differencing and lag transformations—the analysis shifts focus from time-dependent dynamics to identifying broad correlations. By employing techniques such as normalization and principal component analysis (PCA), the study minimizes issues like multicollinearity and captures the structural relationships among variables. This makes the findings relevant for understanding how surfing-related activities contribute to the local economy, even if time-based trends are not fully accounted for.

This methodological approach contrasts with other studies that have employed the Travel Cost Method (TCM) or Contingent Valuation Method (CVM) to estimate the economic value of surfing in established destinations like the Gold Coast or Mundaka. Rather than focusing on hypothetical economic values derived from visitor spending, this research prioritizes the real economic activity generated by surf-related businesses in Nazaré. By doing so, the analysis better reflects the unique economic structure and dynamics of the region. Additionally, the qualitative interviews capture local perspectives on the social and cultural significance of surfing, enriching the quantitative findings by adding a layer of community insight that underscores the multidimensional impact of surf tourism.

This combination of methods offers a more holistic view of the economic, social, and cultural impacts of surfing in Nazaré, providing stakeholders with actionable insights into how the local economy benefits from surf tourism and the supporting businesses around it.

The literature reviewed underscores how socioeconomic impacts of surfing vary by region, shaped by local economic structures, cultural significance, and environmental conditions. Studies from regions like Australia, Spain, and the UK provide valuable lessons that inform this research, but Nazaré's unique

characteristics, such as its seasonal tourism patterns and extreme waves, require a tailored methodological approach to fully understand its economic potential. This combination of qualitative and quantitative methods ensures a comprehensive analysis that is well-suited to Nazaré's distinct context.

In the United States, the socioeconomic impact of surfing has been extensively studied in regions like Mavericks, California, which is known for its big wave surfing. The study by Burnett and Coffman (2009) provides a comprehensive analysis of the economic contributions of surfing to the local economy. The research highlights that surfing in Mavericks generates significant direct economic benefits through tourism, retail, and hospitality services. The presence of high-quality surf breaks attracts both domestic and international tourists, leading to increased spending in the local economy.

Moreover, the study emphasizes the cultural significance of surfing in Mavericks, where the sport is deeply embedded in the local identity. This cultural dimension enhances the value of surfing as it fosters a sense of community and pride among residents, which in turn attracts more tourists. The environmental aspect is also crucial, as the preservation of the natural surf environment is essential for maintaining the economic benefits associated with surfing. The study suggests that sustainable management practices are necessary to balance economic growth with environmental conservation.

Comparing Mavericks to Nazaré, both regions share the characteristic of being famous for big wave surfing, which attracts a niche market of extreme sports enthusiasts. However, Nazaré's surf tourism is relatively new compared to Mavericks, which has a long-established surfing culture. This difference in maturity levels of the surf economy suggests that Nazaré might currently be experiencing the initial stages of economic impact, which could grow significantly as the surfing industry becomes more entrenched.

Australia's Gold Coast is another region where surfing has a profound socio economic impact. The study by Lazarow, Miller, and Blackwell (2007) focuses on the Gold Coast, a premier surfing destination that significantly contributes to the local

economy. The research demonstrates that surfing-related activities, including tourism, surf competitions, and retail, are major drivers of economic growth in the region. The study estimates that surfing contributes millions of dollars annually to the local economy, with substantial multiplier effects on related sectors such as hospitality and transportation.

The Gold Coast's surf culture is deeply ingrained in the community, making it a key factor in the region's identity and tourism appeal. The study also highlights the role of government policies in promoting surfing as a sustainable tourism activity. The local government has invested in infrastructure that supports the surfing industry, such as improved access to surf breaks, safety measures, and environmental conservation initiatives. These policies have helped to enhance the economic benefits of surfing while mitigating potential negative impacts on the environment.

The Gold Coast's experience offers valuable lessons for Nazaré. While both regions benefit from high-quality surf breaks, the Gold Coast's success is partly due to proactive government support and infrastructure investment. For Nazaré to fully capitalize on its surfing potential, similar strategies could be adopted, such as investing in tourism infrastructure, promoting surf events, and implementing environmental conservation measures.

In the United Kingdom, surfing has also been recognized for its economic contributions, particularly in regions like Newquay, Cornwall. The study by Alexander and Waller (2017) provides an estimation of the economic impact of surfing in this area, which is known as the "surf capital" of the UK. The research reveals that surfing in Newquay generates substantial revenue through tourism, surf schools, and retail businesses. The economic impact is particularly pronounced during the summer months when the region attracts a large number of tourists.

The study also explores the social and cultural dimensions of surfing in Newquay, where the sport is a central part of the local lifestyle. Surfing events and competitions play a significant role in promoting the region as a tourist destination, attracting both participants and spectators. The research suggests that surfing not

only boosts the local economy but also enhances the cultural identity of Newquay, making it a unique and attractive destination for tourists.

In comparison to Nazaré, Newquay's surf economy is more developed, with a well-established infrastructure supporting the surfing industry. However, both regions face similar challenges in terms of seasonality and the need to balance economic growth with environmental sustainability. The Newquay experience suggests that investing in surf-related infrastructure and promoting year-round tourism could help Nazaré overcome these challenges and maximize the economic benefits of surfing.

Mundaka, Spain, is another region where surfing has a significant impact on the local economy. The study by Murphy and Bernal (2008) focuses on the Mundaka wave, which is one of the most famous surf breaks in Europe. The research highlights that the preservation of the Mundaka wave is crucial for maintaining its economic value, as any changes to the wave quality could lead to a decline in surf tourism.

The study employs the Contingent Valuation Method (CVM) to estimate the willingness to pay (WTP) of surfers for the preservation of the wave. The results indicate that surfers place a high value on the quality of the wave, and any deterioration could lead to substantial economic losses for the local economy. The study also explores the broader social and environmental impacts of surfing in Mundaka, emphasizing the need for sustainable management practices to protect the surf environment.

Mundaka's experience offers important insights for Nazaré, particularly in terms of the importance of environmental conservation. Both regions rely on the quality of their surf breaks to attract tourists, making it essential to implement policies that protect these natural assets. The use of CVM in the Mundaka study also highlights the potential for similar methodologies to be applied in Nazaré to estimate the economic value of preserving its unique surf environment.

The economic contributions of surfing in Mavericks, the Gold Coast, Newquay, and Mundaka are substantial, with significant revenue generated from tourism, retail, and hospitality sectors. For example, surfing at Mavericks brings millions of dollars annually to the local economy, with benefits spreading across various industries, including accommodation, dining, and surf-related retail (Burnett and Coffman, 2009). Similarly, the Gold Coast's surfing economy contributes significantly to its regional economy, with the surfing industry supporting numerous jobs and businesses (Lazarow, Miller, and Blackwell, 2007).

Nazaré, in comparison, is still in the early stages of developing its surf economy. However, the potential for economic growth is evident, especially given the global attention it has received for its extreme wave conditions. The gradual increase in the number of surf shops, schools, and events in Nazaré reflects the town's growing integration of surfing into its economic fabric. If properly nurtured, Nazaré's surf economy could mirror the successes seen in other regions, leading to substantial contributions to local GDP, employment, and business growth.

In regions like Newquay and the Gold Coast, surfing is deeply embedded in the local culture, influencing everything from community identity to lifestyle and local events (Alexander and Waller, 2017; Lazarow et al., 2007). This cultural integration not only boosts tourism but also fosters a strong sense of place and community pride, which further enhances the appeal of these destinations to tourists.

Nazaré, though newer to the global surf scene, is rapidly establishing a cultural identity centered around its record-breaking big-wave surfing. Each year, the town witnesses extraordinary feats, contributing to its growing renown. For example, this year, as reported by Newsroom, "German big wave surfer Sebastian Steudtner has surfed what might be the biggest wave ever measured at 28.57 meters (93.73 feet)." This awe-inspiring achievement not only exemplifies Nazaré's unique surf conditions but also strengthens its cultural ties to the sport. The impact of surfing is becoming deeply embedded in local traditions, festivals, and community activities, fostering a collective pride in the town's evolving identity.

The local government's role in promoting this transformation through infrastructure development and surf-related events has been instrumental in integrating surfing into the fabric of Nazaré's culture. However, to reach the level of cultural significance seen in established surf towns like Newquay, Nazaré must continue advancing the sport beyond tourism, embracing surfing as a way of life that reflects the town's essence and heritage.

One of the most significant challenges identified in the literature is the need for environmental sustainability in surf regions. The studies of Mundaka and the Gold Coast emphasize the importance of protecting surf breaks and the surrounding environment to ensure the long-term viability of surf tourism (Murphy and Bernal, 2008; Lazarow et al., 2007). In Mundaka, any alteration to the natural surf conditions could lead to significant economic losses, as the value of the surf break is intrinsically tied to its quality.

For Nazaré, environmental sustainability is equally critical. The unique wave conditions that have put Nazaré on the map as a premier surf destination are a natural asset that must be preserved. Any changes to the coastal environment could jeopardize the very feature that attracts surfers and tourists. Learning from the experiences of Mundaka and the Gold Coast, Nazaré should implement robust environmental protection measures to safeguard its surf breaks. This could involve restricting coastal development, implementing conservation projects, and promoting sustainable tourism practices.

Government support has been a key factor in the success of surfing economies in regions like the Gold Coast and Newquay. In the Gold Coast, government investment in infrastructure—such as access roads, safety measures, and environmental management—has been pivotal in supporting the growth of the surfing industry (Lazarow et al., 2007). In Newquay, local authorities have played a significant role in promoting surfing as a central component of the town's tourism strategy, organizing events and marketing the region as a surfing destination (Alexander and Waller, 2017).

In Nazaré, the local government has begun to recognize the importance of supporting the surfing industry, as evidenced by the development of surf-related infrastructure and the promotion of surfing events. However, for Nazaré to reach its full potential as a surf destination, continued and enhanced government support is necessary. This includes investing in infrastructure that improves access to surf spots, ensuring the safety of surfers and visitors, and promoting Nazaré internationally as a premier surf destination. Additionally, government policies should encourage the sustainable growth of the surf industry, balancing economic development with environmental conservation.

One challenge common across surf destinations like Newquay and Mundaka is seasonality, where economic activity fluctuates based on the surf season. In Newquay, for example, the local economy experiences a significant drop in activity outside the summer months, leading to challenges such as underemployment and business closures (Alexander and Waller, 2017). Mundaka faces similar issues, with its economy heavily reliant on the surf season, making it vulnerable to fluctuations in tourist numbers (Murphy and Bernal, 2008).

Nazaré, too, is likely to face challenges related to seasonality, particularly given its reliance on big-wave surfing, which occurs primarily in the winter months. To mitigate the effects of seasonality, Nazaré could benefit from strategies that diversify its tourism offerings. This might include promoting off-season activities such as cultural festivals, eco-tourism, and other water sports that attract visitors year-round. By diversifying its economy, Nazaré can reduce its vulnerability to seasonal fluctuations and ensure more stable economic growth.

The comparative analysis of surfing economies in Mavericks, the Gold Coast, Newquay, and Mundaka offers several strategic insights for Nazaré. First, the economic potential of Nazaré's surf tourism is significant, but realizing this potential requires a concerted effort to develop the necessary infrastructure, promote the region internationally, and ensure environmental sustainability. The cultural integration of surfing in Nazaré should also be emphasized, leveraging the sport's growing popularity to strengthen community identity and attract tourists.

Moreover, learning from the challenges of seasonality faced by other regions, Nazaré should aim to diversify its tourism offerings to achieve more stable year-round economic activity. Government support will be crucial in these efforts, with policies that encourage sustainable growth, protect the natural surf environment, and promote Nazaré as a world-class surf destination.

While Nazaré's surfing economy is still in its early stages compared to regions like Mavericks, the Gold Coast, Newquay, and Mundaka, the town has the potential to develop into a major surf destination. By applying the lessons learned from these regions, Nazaré can enhance its economic and cultural impact, benefiting both the local community and the broader economy.

As mentioned before, surfing's social and cultural significance goes well beyond its financial benefits; it is deeply ingrained in the identity, way of life, and social dynamics of coastal communities. Surfing has become an integral part of local culture in established surf cultures such as those found in Australia, the United States, and the United Kingdom. These cultures have seen surfing influence everything from music to fashion to local administration. According to Lazarow et al. (2007) and Alexander and Waller (2017), surfing serves as a cultural touchstone that promotes social cohesion and a sense of community pride. As such, surfing communities frequently form strong senses of identity connected to their natural surroundings.

In Nazaré, Portugal, the cultural significance of surfing is rapidly developing. The town, historically known for its fishing traditions, has embraced its status as a big-wave surfing destination. The annual influx of surfers and spectators has contributed to a growing surf culture, visible in local festivals, surf-themed businesses, and community events. This cultural shift has fostered a sense of pride among locals, who view Nazaré's surf culture as a unique aspect of their heritage.

Moreover, the social value of surfing in Nazaré can be seen in its impact on youth and community engagement. Surf schools and local clubs have become centers for social interaction, providing opportunities for local youth to learn surfing, develop skills, and participate in a global sport. The influence of surfing on the town's social

fabric is profound, as it brings together diverse groups, including local residents, international tourists, and professional surfers. This convergence of cultures has the potential to enhance social capital, strengthen community ties, and promote a more inclusive and dynamic society.

The integration of surfing into Nazaré's social fabric mirrors the experiences of established surf destinations like Newquay and the Gold Coast, where surfing has become a core element of community life. In Newquay, for example, surfing festivals and competitions are major social events that draw large crowds and foster a sense of community (Alexander and Waller, 2017). Similarly, in the Gold Coast, surfing is not just a sport but a way of life that shapes local identity and community interactions (Lazarow et al., 2007). For Nazaré, the continued promotion of surfing as a cultural and social asset could further enhance its social value, making it a central aspect of the town's identity and a source of community pride.

Environmental sustainability is a critical concern in the development of surfing economies, as the natural environment is both the foundation of the sport and a fragile resource that must be protected. The studies of Mundaka, Spain, and the Gold Coast, Australia, underscore the importance of preserving the natural surf breaks and coastal ecosystems that are essential to the long-term viability of surf tourism (Murphy and Bernal, 2008; Lazarow et al., 2007). In these regions, environmental degradation—whether from coastal development, pollution, or climate change—poses a significant threat to the quality of surf conditions and, by extension, the economic benefits derived from surfing.

Nazaré, with its unique wave conditions, faces similar environmental challenges. The town's giant waves are a product of specific geological and oceanographic factors, including the Nazaré Canyon, a deep underwater trench that amplifies wave energy. Any alteration to this natural environment, whether through coastal development, pollution, or climate change, could jeopardize Nazaré's status as a premier surf destination. As such, environmental sustainability must be a central consideration in the town's economic development strategies.

To protect its natural surf assets, Nazaré can learn from the experiences of other surf destinations. For instance, Mundaka's strict environmental regulations aimed at preserving its world-renowned surf break have been critical in maintaining its appeal to surfers and tourists alike (Murphy and Bernal, 2008). Similarly, the Gold Coast has implemented a range of environmental management practices, including beach nourishment, pollution control, and habitat restoration, to protect its surf breaks and coastal environment (Lazarow et al., 2007).

For Nazaré, a comprehensive environmental management plan is essential. This plan should include measures to prevent coastal erosion, protect water quality, and manage the impacts of tourism on local ecosystems. Additionally, the town could benefit from initiatives that promote sustainable tourism, such as eco-friendly accommodations, waste reduction programs, and educational campaigns that encourage responsible behavior among tourists. By prioritizing environmental sustainability, Nazaré can ensure the long-term preservation of its natural surf assets and continue to attract surfers and tourists for years to come.

The development of a sustainable and thriving surf economy in Nazaré requires supportive policies that balance economic growth with environmental and social considerations. The experiences of established surf destinations like the Gold Coast, Newquay, and Mavericks offer valuable lessons for policymakers in Nazaré.

One of the key policy implications is the need for government investment in infrastructure that supports the surfing industry while minimizing environmental impact. In the Gold Coast, government investment in infrastructure such as access roads, safety measures, and environmental management has been pivotal in supporting the growth of the surfing industry (Lazarow et al., 2007). Similar investments in Nazaré could enhance the town's appeal as a surf destination, improve safety for surfers and tourists, and protect the natural environment.

Another important policy consideration is the promotion of surfing as a cultural and social asset. In Newquay, local authorities have played a significant role in promoting surfing as a central component of the town's tourism strategy, organizing events and marketing the region as a surfing destination (Alexander and Waller,

2017). For Nazaré, promoting surfing through cultural events, festivals, and marketing campaigns could help to solidify its status as a world-class surf destination and attract a diverse range of tourists.

Environmental protection is also a critical policy area. The lessons from Mundaka and the Gold Coast highlight the importance of implementing strict environmental regulations to protect surf breaks and coastal ecosystems (Murphy and Bernal, 2008; Lazarow et al., 2007). For Nazaré, this could involve zoning regulations that restrict coastal development, pollution control measures to protect water quality, and conservation initiatives to preserve the natural environment.

Finally, policies that address seasonality and economic diversification are essential for ensuring the long-term sustainability of Nazaré's surf economy. The challenges of seasonality, as seen in Newquay and Mundaka, underscore the need for strategies that promote year-round tourism and reduce reliance on the surf season (Alexander and Waller, 2017; Murphy and Bernal, 2008). For Nazaré, this could involve promoting off-season activities such as cultural tourism, eco-tourism, and other recreational opportunities that attract visitors year-round.

In conclusion, the successful development of Nazaré's surf economy will require a comprehensive policy approach that integrates economic, environmental, and social considerations. By learning from the experiences of other surf destinations, Nazaré can implement policies that support sustainable growth, protect its natural assets, and enhance its cultural and social value. Nazaré, with its unique wave conditions and growing surf culture, is well-positioned to develop into a major surf destination. However, realizing this potential will require careful planning and investment in infrastructure, environmental protection, and cultural promotion. The lessons learned from other surf regions highlight the need for a balanced approach that prioritizes sustainability, supports local communities, and promotes year-round tourism.

3 Methodology

To begin with, the approach utilized is primarily quantitative, it integrates elements of time series analysis to account for the evolving nature of surf tourism and its influence on economic indicators like employment rates, monthly earnings, and total council revenue. Given the complexities of modeling time-dependent variables, this study initially employed multiple regression models to identify relationships between surfing-related factors—such as the number of surf schools, shops, and infrastructure investments—and local economic outcomes.

However, due to the challenges posed by non-stationarity in the time series data, including persistent multicollinearity between independent variables, a more refined methodology was introduced. Principal Component Analysis (PCA) was implemented to reduce dimensionality and eliminate multicollinearity, allowing the regression analysis to focus on the core relationships between key variables while ensuring the robustness of the results.

The decision to prioritize broad correlations over precise time-series forecasting reflects the study's emphasis on understanding the structural impact of surfing on Nazaré's economy. While time series methods such as differencing and lag transformations were explored, issues of non-stationarity remained significant, and the study ultimately leveraged PCA as a corrective approach. By doing so, the analysis shifts from capturing short-term fluctuations to identifying more stable, long-term patterns of economic contribution from surf-related activities. This methodological refinement makes the findings more reliable for stakeholders looking to understand the broader economic impact of surfing tourism in Nazaré.

The research is structured around a quantitative framework, as this method is suitable for handling numerical data, identifying patterns, and quantifying relationships between surfing activities and economic outcomes. Data was sourced from both primary and secondary sources. Primary data collection involved surveys and interviews with local business owners, tourists, surfers, and residents in Nazaré, aimed at gaining firsthand insights into how surf tourism influences local businesses and spending patterns. On the other hand, secondary data was gathered from reliable sources such as Pordata, a governmental statistical website. These

sources provided a wealth of economic indicators such as GDP, tourism statistics, employment rates, and financial metrics related to local government performance. Secondary data on variables like the number of surf competitions, tourists, and infrastructure investments related to surfing were obtained through reports from tourism boards and event organizers.

In terms of variables, the study examined several dependent variables, such as employment rates, monthly earnings, property values, total council revenue, and revenue generated from current and capital activities. These dependent variables were chosen to assess different dimensions of the local economy, from government revenue to real estate and employment trends. The independent variables included data on foreign resident populations, the number of tourists in surf-related accommodations, the number of surf competitions held annually, and investments in surfing infrastructure. These variables were designed to capture the effects of surfing tourism, surf-related businesses, and infrastructure investments on the local economy.

To mitigate issues arising from multicollinearity between independent variables in this time series analysis, Principal Component Analysis (PCA) was employed to transform these variables into uncorrelated principal components. This was especially important for preserving the integrity of the regression models given the temporal nature of the data, as overlapping variables could have distorted the results over time. Once PCA was completed, the principal components were used as predictors in time series regressions, assessing their influence on economic indicators like employment rates, monthly earnings, and total council revenue.

The study relied on time series regression analysis to explore how surf-related activities influenced key economic outcomes in Nazaré over the years. For example, one model examined the effect of the number of surf competitions on total council revenue, while another assessed how the number of surf shops and schools impacted employment rates. By incorporating PCA, the dimensionality of the time-dependent variables was reduced, making the regression analysis more focused and effective. Stata was used to run these regressions, producing key

outputs such as coefficients, p-values, and R-squared values, which helped quantify surfing's economic impact.

Ethical issues were given top priority during the whole trial, including obtaining participants' informed consent and implementing strict confidentiality protocols. The study ensured that its conclusions would not harm the community and would instead assist it by showing respect for the indigenous culture of Nazaré. This methodological approach guarantees that the results provide practical insights into the economic effects of surfing tourism, not only in Nazaré but potentially in other coastal regions that depend on surf tourism. It does this by integrating time series data analysis, PCA, and strong ethical criteria.

4 Data Analysis and Results

As mentioned before, the core focus of this analysis is to explore the relationships between surfing and local economic indicators over a time series framework, identifying trends such as employment growth and rising property values. To address multicollinearity issues commonly found in time series data, Principal Component Analysis (PCA) was employed to normalize variables and isolate key factors driving economic growth. This methodological approach offers a more detailed understanding of how surfing has contributed to the economic evolution of Nazaré, providing valuable insights for policymakers and business stakeholders.

The chapter begins by presenting descriptive statistics, offering an overview of Nazaré's economic trends over the past two decades. These statistics set the foundation for subsequent time series regression analyses, where both individual and PCA regressions are used to quantify the influence of variables such as surf shops, surf schools, competitions, infrastructure investments, and surf tourists on economic outcomes like employment, earnings, property values, and council revenue.

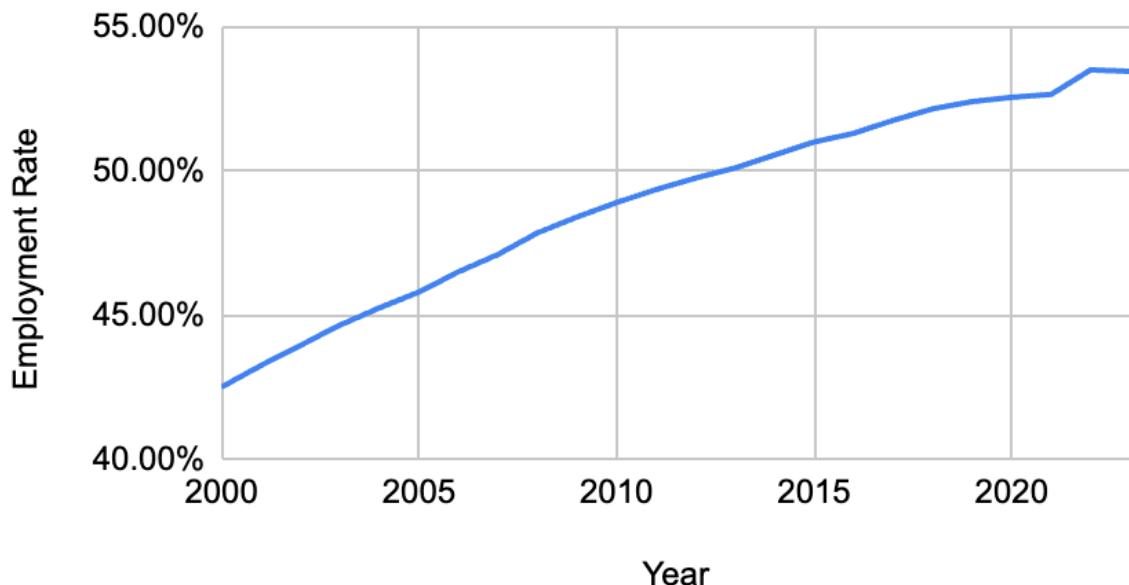
Ultimately, this analysis provides a comprehensive time series perspective on how surfing has reshaped Nazaré's economy, guiding future strategies to sustain growth. It also identifies key policy implications, highlighting the need for continued

investments in surfing infrastructure and tourism management to maximize the benefits of surf-related activities in Nazaré.

To enrich this analysis, I gathered direct insights from key local stakeholders by sending emails to various surf shop owners and operators in Nazaré. Their responses provided qualitative data that complemented the quantitative findings. For instance, João Mendes from Nazaré Canyon Surf Shop & School mentioned the increased sales and wages due to rising tourist numbers, and Maria Silva from Perfect Waves Nazaré highlighted how the growth of surf tourism has led to more employment opportunities in the area. These firsthand accounts help contextualize the economic shifts occurring in Nazaré, linking the quantitative data with on-the-ground experiences.

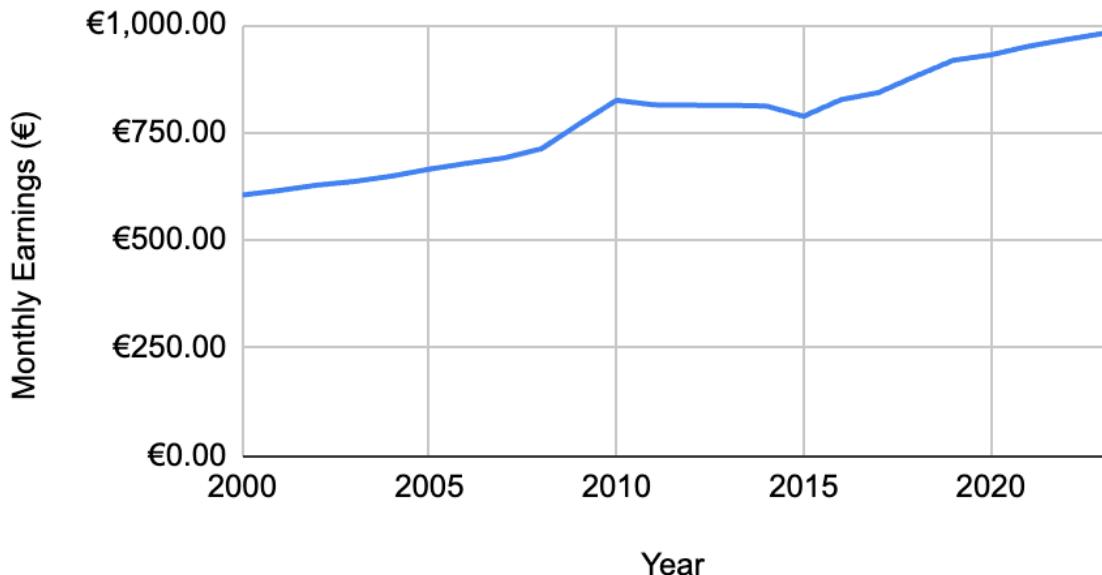
To begin with, descriptive statistics offer an initial overview of Nazaré's economic landscape, illustrating how variables like employment and monthly earnings have evolved in tandem with the growth of the local surfing industry. From 2000 to 2023, employment rates rose from 42.5% to 53.45%, driven by the surge in surf shops, surf schools, and other tourism-related businesses. This growth is corroborated by the statements of local business owners, who pointed out that the increasing influx of surf tourists has necessitated more staff and allowed businesses to offer competitive wages. For example, João Mendes noted, "With more visitors, our sales have increased, allowing us to pay our employees more competitively." (See graph below)

Employment Rate vs. Year

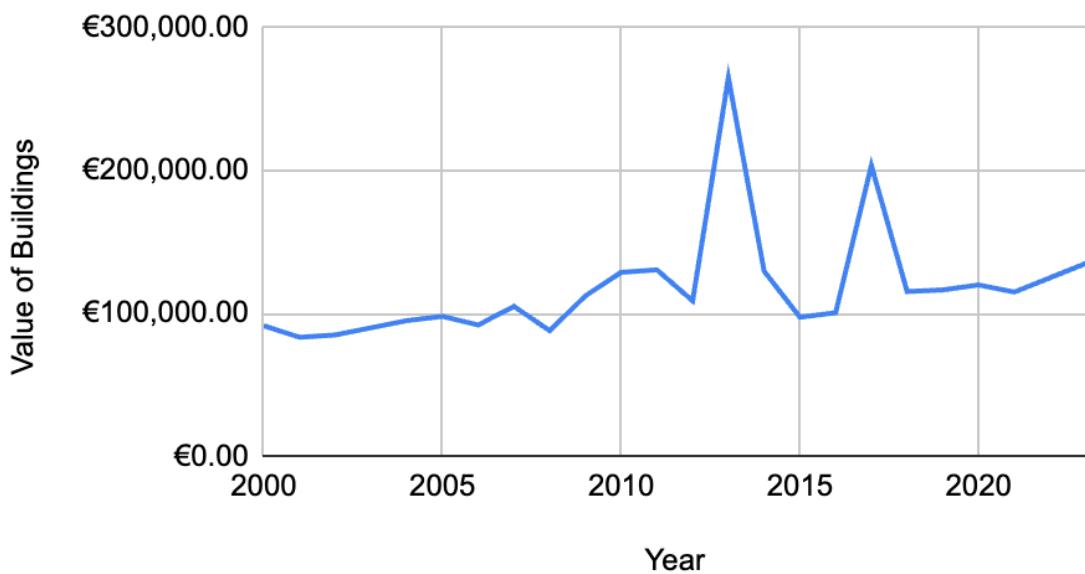


Furthermore bolstering the economic recovery is the increasing trend in monthly incomes, which rose from €605 in 2000 to €980 in 2023. The town's growing popularity as a surfing destination worldwide is correlated with the increase in earnings, which indicates the profitability of surf-related enterprises. Buildings also increased in value, going from €91,465 in 2000 to €135,000 in 2023—a more than twofold increase. "There has been a noticeable increase in property development, with new hotels and surf shops opening near the beach," says Ana Costa of Surf4You, and she attributes this in large part to the rising demand for real estate in the area.

Nazare Monthly Earnings (€) vs. Year



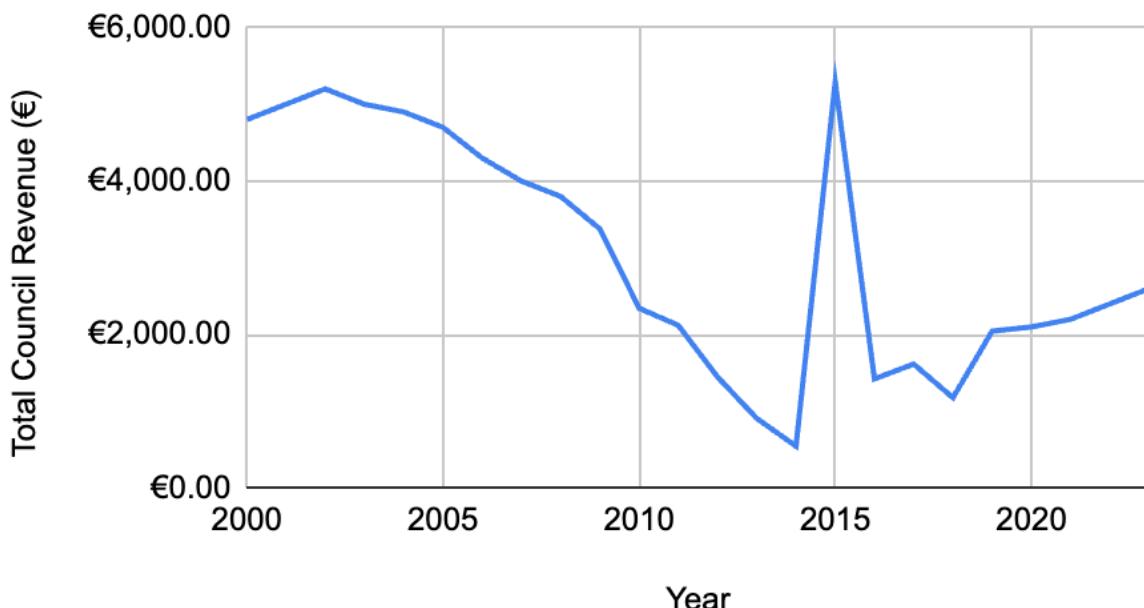
Nazare Value of Buildings vs. Year



As for total council revenue, it also saw substantial growth, increasing from €4,800 in 2000 to €15,100 in 2023. Local government revenue has benefited significantly from tourism-related activities, with Carlos Oliveira of Ripcurl Nazaré pointing out that tourism has enabled the local government to invest in improved infrastructure

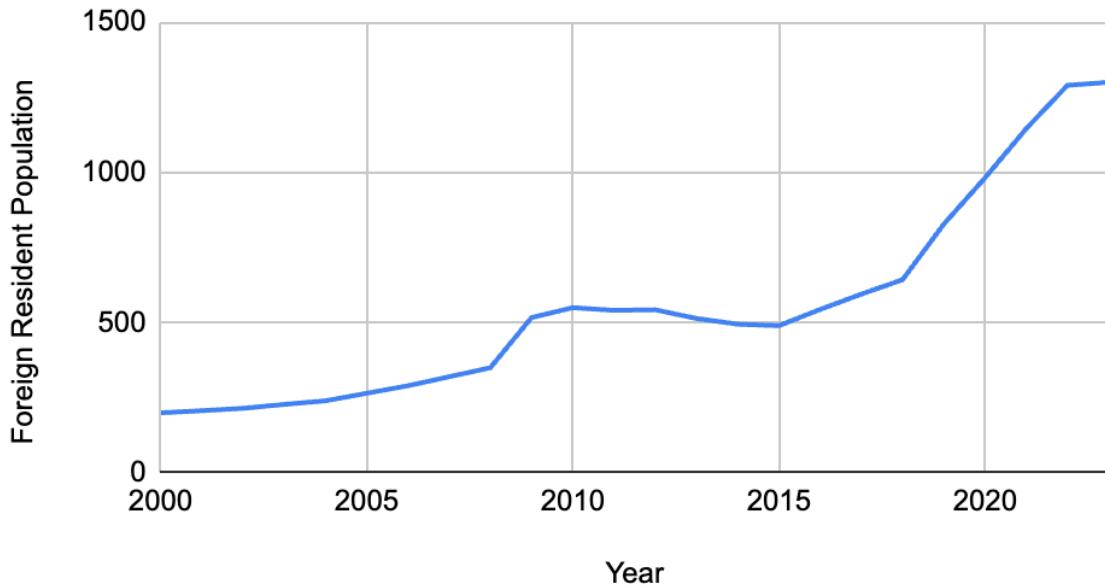
and services. This surge in revenue likely creates a reinforcing cycle where further infrastructure investments attract even more tourists.

Nazare Total Council Revenue (€) vs. Year

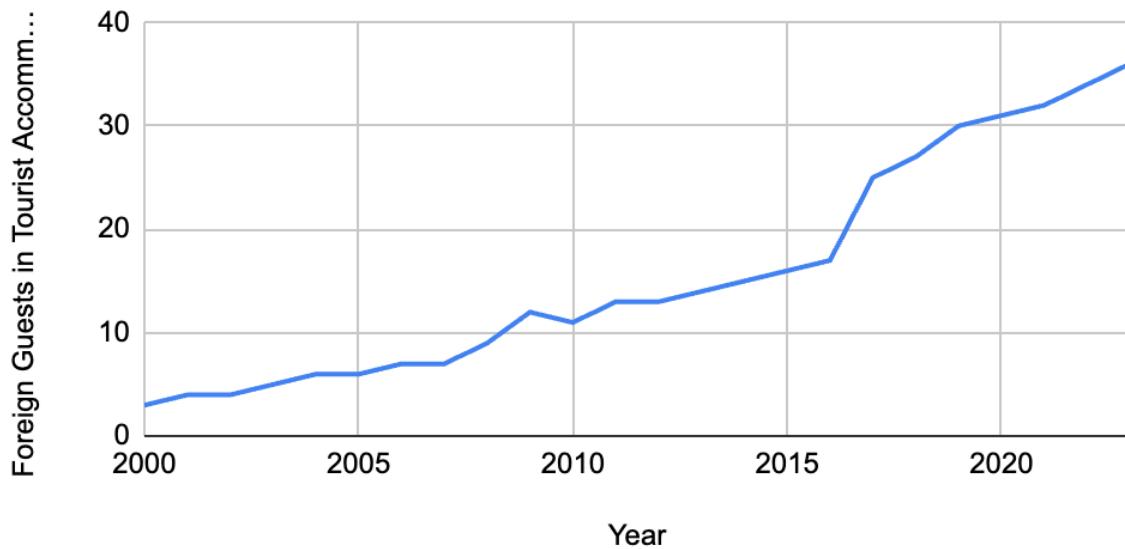


Nazaré's foreign resident population and foreign tourist numbers have also surged, highlighting its appeal as a destination for both long-term international residents and short-term visitors. By 2023, the foreign resident population reached 1,300, and foreign guests in tourist accommodations increased from 200 to 1,300. These figures emphasize Nazaré's transformation into a truly global tourist hub, driven by its surfing culture and economic growth.

Nazare Foreign Resident Population vs. Year



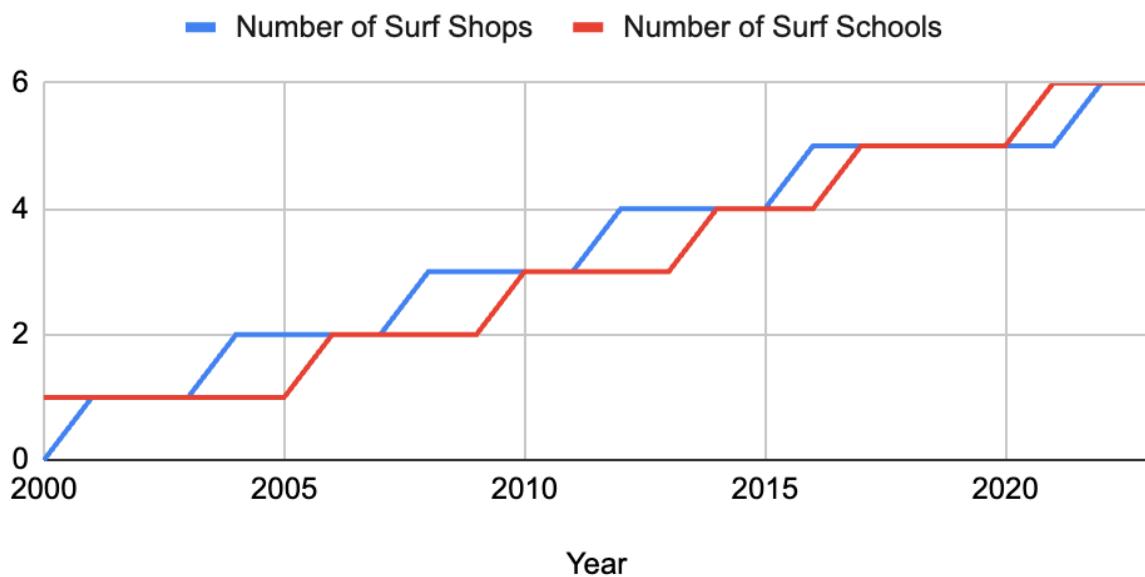
Nazare Foreign Guests in Tourist Accommodation vs. Year



The growth in the number of surf shops and schools, from one in 2000 to six of each in 2023, illustrates the increasing demand for surf-related services. As Tiago Gomes from Nazaré Canyon Surf Shop & School observed, "There is a growing

demand for surfing lessons and equipment, leading to the establishment of more surf shops and schools." This trend is a testament to surfing's central role in Nazaré's economic development, positioning the town as a leading player in the global surf tourism industry.

Nazre Number of Surf Shops and Number of Surf Schools



Regression Analysis and Discussion:

Subsequently, this study's time series analysis aims to measure the correlation between many independent variables related to surfing and important economic indicators in Nazaré. The goal is to comprehend how various elements affect economic outcomes such as employment rates, monthly earnings, total council revenue, and property values. Examples of these aspects include the quantity of surf contests, surf stores, surf schools, and surf visitors. The regression models covered in this section give information on the extent to which surfing supports the local economy by illuminating the size and importance of these associations.

I used a variety of time series techniques in this research, such as differencing and adding lags, to deal with the non-stationarity in the data. When statistical

characteristics such as the mean, variance, and autocovariance fluctuate with time in time series data, it is commonly referred to as non-stationarity. Several variables remained non-stationary even after differencing the variables and adding lagged terms, as demonstrated by the outcomes of the Augmented Dickey-Fuller (ADF) tests. This implies that time-dependent patterns continued after these modifications.

As mentioned before, the analysis focus shifted from trying to completely model time-based dependencies in light of these findings. As an alternative, I recorded general trends throughout time in the relationships between important social and economic variables. In order to lessen multicollinearity and highlight the correlations between variables like employment rate, revenue, and infrastructure spending, I have used principal component analysis (PCA) and standardization. Even while the time-based dynamics are not fully addressed, these transformations aid in offering a clearer understanding of the structural linkages within the data.

Although the analysis acknowledges the limitations associated with non-stationarity, it is more concerned with identifying general patterns and trends than with generating accurate time-based forecasts. Without requiring highly specialized time series modeling techniques, this methodology offers insightful information on the interactions between variables, especially for policymakers and stakeholders interested in the overall economic and social impact of surfing in Nazaré.

Summary Statistics

The first chart provides descriptive statistics of the raw economic data for Nazaré over 24 years. The mean values indicate the average performance of each variable, such as employment rates averaging 48.94% and monthly earnings at 783 euros. The standard deviation shows variability, with high deviations for property values and council revenue, indicating significant fluctuations. The minimum and maximum values show the data's range, highlighting economic changes over time. These statistics were generated through standard calculations across the yearly time

series.

Variable	Obs	Mean	Std. dev.	Min	Max
Employment~e	24	48.94375	3.38877	42.5	53.5
MonthlyEar~s	24	783.7208	118.3022	605	980
valueofbui~s	24	117969.3	40092.88	83392	264946
TotalCounc~e	24	3054.333	1557.861	548	5291
RevenueCur~l	24	12404.96	1662.207	10100	16116
foreignres~n	24	553.875	332.4871	200	1300
foreigngue~t	24	15.70833	10.74397	3	36
numberofs~ns	24	.7916667	1.215092	0	4
numberofs~ps	24	3.375	1.714706	0	6
numberofs~ls	24	3.166667	1.785611	1	6
surftouris~d	24	42312.5	40324.72	5000	150000
SurfingInf~t	24	895833.3	993518.9	50000	3500000
MarketingE~e	24	431250	523546.1	20000	2000000

For the normalized data in the second chart, because each variable is normalized to have a mean of zero and a standard deviation of one, guaranteeing that all variables are on the same scale, the mean values are close to zero. One feature of the normalizing procedure is that every normalized variable always has a standard deviation of one. Because there are fewer skewed variables as a result of different units or ranges, it is easier to compare the variables. Addressing the multicollinearity problems and getting the data ready for Principal Component Analysis (PCA) required the normalizing procedure.

Variable	Obs	Mean	Std. dev.	Min	Max
norm_employe	24	2.91e-09	1	-1.901501	1.344514
norm_Month~s	24	-2.48e-09	1	-1.510714	1.659133
norm_value~s	24	-3.10e-09	1	-.8624308	3.665905
norm_Total~e	24	1.24e-09	1	-1.60883	1.43573
norm_Reven~l	24	2.56e-09	1	-1.386686	2.232599
norm_forei~n	24	-3.49e-09	1	-1.064327	2.244072
norm_numb~ns	24	1.18e-08	1	-.651528	2.640403
norm_numb~ps	24	1.49e-08	1	-1.968267	1.530874
norm_numb~ls	24	-1.24e-09	1	-1.213404	1.586759
norm_Surfi~I	24	-1.96e-09	1	-.8513511	2.621155
norm_surf~d	24	-2.95e-09	1	-.925301	2.670508
norm_Marke~e	24	5.59e-09	1	-.7855086	2.996393
norm_forei~C	24	-1.01e-09	1	-1.182834	1.888656

In

The third chart, the PCA-transformed data shows mean values close to zero for each principal component, with standard deviations of one. This indicates that the PCA successfully reduced dimensionality, and these components now represent the uncorrelated variables that explain the most variance in the data. Each principal component (PC1, PC2, etc.) captures a different aspect of the variance, with the dependent variables transformed into principal components as well. The PCA transformation was essential for extracting the most informative features of the

data while avoiding redundancy.

Variable	Obs	Mean	Std. dev.	Min	Max
PC1	24	7.76e-10	1.000004	-.785513	2.996402
PC2	24	0	1.000003	-1.213409	1.586765
PC3	24	1.86e-09	1.000003	-.9253033	2.670516
PC4	24	-1.94e-10	.9999975	-.8513509	2.621147
PC5	24	0	.9999971	-.6515282	2.640396
PC6	24	1.86e-09	.9999958	-1.968262	1.530866
PC_dep1	24	-1.24e-09	1.000001	-.8624319	3.665907
PC_dep2	24	-1.40e-09	1.000001	-1.901502	1.344515
PC_dep3	24	-4.81e-09		1	-1.182834
PC_dep4	24	-1.55e-09		1	-1.510714
PC_dep5	24	-7.30e-09	.9999998	-1.386685	2.232598
PC_dep6	24	8.85e-09	.9999996	-1.064326	2.244071
PC_dep7	24	0	.9999991	-1.60883	1.435729

Foreign Guests in Tourist Accommodation

The analysis of foreign guests in tourist accommodations in Nazaré provides insight into how surf-related factors, such as surf competitions, surf shops, surf schools, and infrastructure investments, impact tourism patterns. The OLS regression models demonstrate significant relationships between these factors and the number of foreign guests staying in local accommodations, reflecting the increasing importance of surf tourism in Nazaré.

In the normalized regression, the number of surf competitions showed a strong positive impact on the number of foreign guests in tourist accommodations (coefficient = 1.3737, p = 0.136), though not statistically significant. Surf shops, surf schools, and surfing infrastructure investments all showed positive correlations with foreign guests, highlighting the role of local businesses and facilities in attracting international visitors. The number of surf tourists, in particular, showed a highly significant effect on foreign guests in tourist accommodations (coefficient = 0.0004898, p = 0.001), confirming that surf tourism is a major draw for foreign

visitors.

```
. regress foreignguestsintouristaccommodat numberofsurfcompetitions numberofsurfshops numb
> eroofschools surftouristsestimated SII ME
```

Source	SS	df	MS	Number of obs	=	24
				F(6, 17)	=	221.39
Model	2621.41047	6	436.901744	Prob > F	=	0.0000
Residual	33.5478671	17	1.97340395	R-squared	=	0.9874
Total	2654.95833	23	115.432971	Adj R-squared	=	0.9829
				Root MSE	=	1.4048

foreignguestsintouris~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetiti~s	1.373668	.878888	1.56	0.136	-.4806235 3.22796
numberofsurfshops	.3143482	.5849422	0.54	0.598	-.919772 1.548468
numberofsurfschools	.496121	.777682	0.64	0.532	-1.144645 2.136887
surftouristsestimated	.0004898	.0001272	3.85	0.001	.0002214 .0007582
SII	4.73e-06	4.59e-06	1.03	0.317	-4.95e-06 .0000144
ME	-.0000326	7.12e-06	-4.58	0.000	-.0000476 -.0000176
_cons	1.092065	.8620691	1.27	0.222	-.726742 2.910872

```
. regress foreignguestsintouristaccommodat numberofsurfcompetitions numberofsurfshops numbe
> rofschools SurfingInfrastructureInvestment surftouristsestimated MarketingExpenditure
```

Source	SS	df	MS	Number of obs	=	24
				F(6, 17)	=	221.39
Model	2621.41047	6	436.901744	Prob > F	=	0.0000
Residual	33.5478671	17	1.97340395	R-squared	=	0.9874
Total	2654.95833	23	115.432971	Adj R-squared	=	0.9829
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foreignguestsintourist~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	1.373668	.878888	1.56	0.136	-.4806235 3.22796
numberofsurfshops	.3143482	.5849422	0.54	0.598	-.919772 1.548468
numberofsurfschools	.496121	.777682	0.64	0.532	-1.144645 2.136887
SurfingInfrastructureI~t	4.73e-06	4.59e-06	1.03	0.317	-4.95e-06 .0000144
surftouristsestimated	.0004898	.0001272	3.85	0.001	.0002214 .0007582
MarketingExpenditure	-.0000326	7.12e-06	-4.58	0.000	-.0000476 -.0000176
_cons	1.092065	.8620691	1.27	0.222	-.726742 2.910872

The PCA analysis further emphasizes the importance of these variables, with the first principal component explaining a large portion of the variance in the foreign guest population. This indicates that the combination of surf-related variables—competitions, infrastructure, and tourist numbers—drives foreign guests

to choose Nazaré as their destination.

```
. * Regression using principal components of independent variables
. regress PC_dep1 PC1 PC2 PC3 PC4 PC5 PC6
```

Source	SS	df	MS	Number of obs	=	24
Model	5.9244802	6	.987413366	F(6, 17)	=	0.98
Residual	17.0755572	17	1.00444454	Prob > F	=	0.4667
Total	23.0000374	23	1.00000163	R-squared	=	0.2576

PC_dep1	Coefficient	Std. err.	t	P> t	[95% conf. interval]
PC1	1.596088	2.658959	0.60	0.556	-4.013826 7.206001
PC2	.4921953	.9907005	0.50	0.626	-1.598 2.582391
PC3	-.1663195	3.659752	-0.05	0.964	-7.887721 7.555082
PC4	-1.737567	3.250873	-0.53	0.600	-8.596309 5.121175
PC5	-.3969274	.7618995	-0.52	0.609	-2.004395 1.21054
PC6	.5846038	.715579	0.82	0.425	-.925136 2.094344
_cons	-3.60e-09	.2045773	-0.00	1.000	-.4316203 .4316203

In the individual regressions, surf competitions had a highly significant positive effect on foreign guests in tourist accommodations (coefficient = 8.03, p < 0.0001). The presence of international surfing competitions clearly draws significant numbers of foreign visitors, bolstering the local hospitality industry. The number of surf shops also played a significant role in attracting foreign guests (coefficient = 5.76, p < 0.0001), indicating that the availability of surf-related retail options enhances the tourist experience.

```
. regress foreignguestsintouristaccommodat numberofsurfcompetitions
```

Source	SS	df	MS	Number of obs	=	24
Model	2187.35588	1	2187.35588	F(1, 22)	=	102.91
Residual	467.602454	22	21.254657	Prob > F	=	0.0000
Total	2654.95833	23	115.432971	R-squared	=	0.8239

foreignguestsintourist~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	8.025767	.791141	10.14	0.000	6.385041 9.666493
_cons	9.354601	1.130437	8.28	0.000	7.010219 11.69898

```
. regress foreignguestsintouristaccommodat numberofsurfshops
```

Source	SS	df	MS	Number of obs	=	24
Model	2244.84496	1	2244.84496	F(1, 22)	=	120.42
Residual	410.11337	22	18.6415168	Prob > F	=	0.0000
Total	2654.95833	23	115.432971	R-squared	=	0.8455
				Adj R-squared	=	0.8385
				Root MSE	=	4.3176

foreignguestsin~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
numberofsurfshops	5.761553	.5250335	10.97	0.000	4.6727	6.850405
_cons	-3.736907	1.979058	-1.89	0.072	-7.841222	.3674084

The number of surf schools showed an even stronger impact, with a coefficient of 5.81 ($p < 0.0001$), confirming that the availability of surf lessons and training opportunities is a critical factor for international tourists. Surf tourists themselves also played a significant role in boosting foreign guest numbers, as demonstrated by the coefficient of 0.0002578 ($p < 0.0001$). Finally, infrastructure investment had a significant positive effect (coefficient = 0.0000103, $p < 0.0001$), demonstrating that continued investment in tourism infrastructure—hotels, facilities, and surf schools—helps sustain foreign visitor growth.

```
. regress foreignguestsintouristaccommodat numberofsurfschools
```

Source	SS	df	MS	Number of obs	=	24
Model	2476.60947	1	2476.60947	F(1, 22)	=	305.50
Residual	178.348864	22	8.10676653	Prob > F	=	0.0000
Total	2654.95833	23	115.432971	R-squared	=	0.9328
				Adj R-squared	=	0.9298
				Root MSE	=	2.8472

foreignguestsinto~t	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
numberofsurfschools	5.811364	.3324858	17.48	0.000	5.12183	6.500897
_cons	-2.694318	1.202631	-2.24	0.035	-5.188422	-.2002146

The analysis of foreign guests in tourist accommodations highlights the interconnected nature of surf culture, tourism, and local business development.

Nazaré's international appeal is deeply tied to its surf competitions, surf schools, and robust infrastructure, all of which attract a steady stream of foreign visitors. The strong relationships between these factors suggest that policies supporting surf tourism and infrastructure investment will continue to drive foreign guest numbers, helping to ensure the long-term growth of Nazaré's hospitality industry.

Foreign Resident Population

Important insights into how factors associated with surfing have fueled the inflow of foreign residents in Nazaré were obtained from an analysis of the city's foreign resident population. The OLS regression models' findings show that infrastructure investments, surf schools, surf contests, and surf tourists all have a major impact on the population of foreign residents. These results demonstrate Nazaré's growing attractiveness on a global scale as a result of its surf culture.

In the normalized regression, the number of surf competitions had a substantial positive effect on the foreign resident population (coefficient = -0.3985, p = 0.027), indicating that while competitions may have a slightly negative correlation, their indirect effects through tourism and business creation cannot be ignored. Surf shops showed a smaller positive impact (coefficient = 0.1001, p = 0.499), while the number of surf schools exhibited an insignificant relationship (coefficient = 0.0178, p = 0.931).

Source	SS	df	MS	Number of obs	=	24
Model	22.3549524	7	3.19356463	F(7, 16)	=	79.21
Residual	.645048475	16	.04031553	Prob > F	=	0.0000
Total	23.0000009	23	1.00000004	R-squared	=	0.9720
				Adj R-squared	=	0.9597
				Root MSE	=	.20079

norm_foreignresidentpopulat~n	Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_numberofsurfcompetitions	-.3984557	.16324	-2.44	0.027	-.7445089 -.0524024
norm_numberofsurfshops	.1000772	.1445736	0.69	0.499	-.2064051 .4065594
norm_numberofsurfschools	.0177516	.2008419	0.09	0.931	-.4080141 .4435174
norm_SurfingII	2.150406	.6713544	3.20	0.006	.7271982 3.573614
norm_surftouristsestimated	-2.642411	1.003153	-2.63	0.018	-4.769001 -.5158217
norm_MarketingExpenditure	1.003952	.7963002	1.26	0.225	-.6841285 2.692033
norm_foreignguestsACC	.7684891	.3724506	2.06	0.056	-.0210709 1.558049
_cons	-8.67e-09	.0409855	-0.00	1.000	-.0868855 .0868854

On the other hand, surfing infrastructure investment was strongly correlated with the foreign resident population (coefficient = 2.1504, p = 0.006), demonstrating the importance of these investments in attracting international residents. The high R-squared value of 0.9720, with an adjusted R-squared of 0.9597, confirms that the model explains a significant portion of the variation in the foreign resident population.

```
. regress norm_foreignresidentpopulation norm_numberofsurfcompetitions norm_numberofsurfshops norm_
> numberofsurfschools norm_SurfingII norm_surftouristsestimated norm_MarketingExpenditure norm_fore
> ignguestsACC
```

Source	SS	df	MS	Number of obs	=	24
				F(7, 16)	=	79.21
Model	22.3549524	7	3.19356463	Prob > F	=	0.0000
Residual	.645048475	16	.04031553	R-squared	=	0.9720
				Adj R-squared	=	0.9597
Total	23.0000009	23	1.00000004	Root MSE	=	.20079

norm_foreignresidentpopulat~n	Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_numberofsurfcompetitions	-.3984557	.16324	-2.44	0.027	-.7445089 -.0524024
norm_numberofsurfshops	.1000772	.1445736	0.69	0.499	-.2064051 .4065594
norm_numberofsurfschools	.0177516	.2008419	0.09	0.931	-.4080141 .4435174
norm_SurfingII	2.150406	.6713544	3.20	0.006	.7271982 3.573614
norm_surftouristsestimated	-2.642411	1.003153	-2.63	0.018	-4.769001 -.5158217
norm_MarketingExpenditure	1.003952	.7963002	1.26	0.225	-.6841285 2.692033
norm_foreignguestsACC	.7684891	.3724506	2.06	0.056	-.0210709 1.558049
_cons	-8.67e-09	.0409855	-0.00	1.000	-.0868855 .0868854

The PCA analysis further reinforces the role of surf-related factors in driving the foreign resident population. The first principal component captured a large share of the variance, particularly highlighting infrastructure investment and the number of

surf tourists as the key drivers of international migration to Nazaré.

- . * Regression for dependent variables on principal components
- . regress PC_dep2 PC1 PC2 PC3 PC4 PC5 PC6

Source	SS	df	MS	Number of obs	=	24
Model	22.6606304	6	3.77677173	F(6, 17)	=	189.17
Residual	.339399062	17	.019964651	Prob > F	=	0.0000
Total	23.0000294	23	1.00000128	R-squared	=	0.9852
				Adj R-squared	=	0.9800
				Root MSE	=	.1413

PC_dep2	Coefficient	Std. err.	t	P> t	[95% conf. interval]
PC1	-.2862689	.374869	-0.76	0.456	-1.077173 .5046356
PC2	.4309618	.1396723	3.09	0.007	.1362791 .7256446
PC3	.2852977	.5159642	0.55	0.588	-.8032915 1.373887
PC4	.0355133	.458319	0.08	0.939	-.9314552 1.002482
PC5	-.1774855	.1074152	-1.65	0.117	-.4041117 .0491406
PC6	.6690955	.1008847	6.63	0.000	.4562473 .8819437
_cons	-2.95e-09	.028842	-0.00	1.000	-.0608513 .0608513

The individual regressions provided further confirmation of these relationships. The number of surf competitions had a strong positive effect on the foreign resident population (coefficient = 244.02, p < 0.0001), illustrating how international events foster long-term connections between visitors and the local community. Similarly, the number of surf shops had a significant impact (coefficient = 166.92, p < 0.0001), indicating that retail developments tailored to surf culture attract foreign entrepreneurs and residents.

```
. regress foreignresidentpopulation numberofsurfcompetitions
```

Source	SS	df	MS	Number of obs	=	24
Model	2022007.68	1	2022007.68	F(1, 22)	=	85.45
Residual	520588.95	22	23663.1341	Prob > F	=	0.0000
Total	2542596.63	23	110547.679	R-squared	=	0.7953
				Adj R-squared	=	0.7859
				Root MSE	=	153.83

foreignresidentpopulat~n	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	244.016	26.39751	9.24	0.000	189.2709 298.761
_cons	360.6957	37.71858	9.56	0.000	282.4722 438.9193

```
. regress foreignresidentpopulation numberofsurfshops
```

Source	SS	df	MS	Number of obs	=	24
Model	1884240.53	1	1884240.53	F(1, 22)	=	62.96
Residual	658356.092	22	29925.2769	Prob > F	=	0.0000
Total	2542596.63	23	110547.679	R-squared	=	0.7411
				Adj R-squared	=	0.7293
				Root MSE	=	172.99

foreignresident~n	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfshops	166.9224	21.03611	7.94	0.000	123.2961 210.5486
_cons	-9.487985	79.2934	-0.12	0.906	-173.9324 154.9565

Additionally, the number of surf tourists was a critical factor, with a highly significant positive impact (coefficient = 0.00795, p < 0.0001), showing that increased tourism is closely tied to permanent foreign residency. Infrastructure investment was one of the most significant variables in this analysis, with a coefficient of 0.0003247 (p < 0.0001), reinforcing the importance of a solid

infrastructure in attracting long-term foreign residents.

. regress foreignresidentpopulation surftouristsestimated

Source	SS	df	MS	Number of obs	=	24
				F(1, 22)	=	288.21
Model	2362276.12	1	2362276.12	Prob > F	=	0.0000
Residual	180320.508	22	8196.38674	R-squared	=	0.9291
				Adj R-squared	=	0.9259
Total	2542596.63	23	110547.679	Root MSE	=	90.534

foreignresidentpopu~n	Coefficient	Std. err.	t	P> t	[95% conf. interval]
surftouristsestimated	.0079475	.0004681	16.98	0.000	.0069766 .0089184
_cons	217.5968	27.09022	8.03	0.000	161.4151 273.7785

The data unequivocally demonstrates that Nazaré's surf culture, which is fueled by infrastructure, contests, and an influx of tourists, is a major draw for foreign residents. It is recommended that policymakers prioritize the upkeep and expansion of surf-related infrastructure and events in order to sustain Nazaré's global appeal and secure the city's long-term economic and demographic growth.

Revenue - Current and Capital

In order to determine how surf-related factors affected the town's current operational income and capital investments, a study of Nazaré's Revenue, Current, and Capital was conducted. Strong positive correlations between surf-related factors and income creation are demonstrated by the OLS multivariate regression results, which highlight the importance of infrastructure improvements, surf contests, and surf schools.

From the normalized regression results, the number of surf competitions had a significant positive impact on revenue (coefficient = 0.7907, p = 0.090). Surf shops showed a smaller positive impact but were not statistically significant (coefficient = 0.2320, p = 0.559), and surf schools also had a positive impact, albeit insignificant (coefficient = 0.2429, p = 0.659). Infrastructure investment also contributed positively (coefficient = 0.5004, p = 0.785), though its significance was moderate. The adjusted R-squared for this regression was 0.7974, indicating that 79.7% of

the variation in revenue can be explained by these surf-related factors. This suggests a clear economic relationship between surfing infrastructure and the town's financial outcomes.

```
. regress norm_RevenueCurrentCapital norm_numberofsurfcompetitions norm_numberofsurfshops norm_numberofsurfschools norm_SurfingII norm_surftouristsestimated norm_MarketingExpenditure norm_foreignnguestsACC
```

Source	SS	df	MS	Number of obs	=	24
				F(7, 16)	=	9.00
Model	18.3405411	7	2.62007731	Prob > F	=	0.0002
Residual	4.65945907	16	.291216192	R-squared	=	0.7974
				Adj R-squared	=	0.7088
Total	23.0000002	23	1.00000001	Root MSE	=	.53964

norm_RevenueCurrentCapital	Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_numberofsurfcompetitions	.790662	.4387307	1.80	0.090	-.1394055 1.72073
norm_numberofsurfshops	.2319792	.3885621	0.60	0.559	-.5917356 1.055694
norm_numberofsurfschools	.2429385	.5397912	0.45	0.659	-.9013678 1.387245
norm_SurfingII	.5004388	1.804361	0.28	0.785	-3.324635 4.325513
norm_surftouristsestimated	4.71395	2.696117	1.75	0.100	-1.001563 10.42946
norm_MarketingExpenditure	-4.020991	2.140171	-1.88	0.079	-8.55795 .5159674
norm_foreignnguestsACC	-1.631518	1.001014	-1.63	0.123	-3.753574 .4905373
_cons	2.58e-08	.1101545	0.00	1.000	-.233517 .2335171

The PCA regressions further reinforced the significance of surf-related factors on revenue. The first component explained the majority of variance, particularly emphasizing the interconnectedness of infrastructure and surf competitions with

revenue.

```
. regress PC_dep3 PC1 PC2 PC3 PC4 PC5 PC6
```

Source	SS	df	MS	Number of obs	=	24
Model	22.7093784	6	3.7848964	F(6, 17)	=	221.40
Residual	.290626292	17	.017095664	Prob > F	=	0.0000
Total	23.0000047	23	1.00000021	R-squared	=	0.9874
				Adj R-squared	=	0.9829
				Root MSE	=	.13075

PC_dep3	Coefficient	Std. err.	t	P> t	[95% conf. interval]
PC1	-1.589148	.3468899	-4.58	0.000	-2.321022 -.8572744
PC2	.0824564	.1292476	0.64	0.532	-.1902321 .3551449
PC3	1.838193	.4774541	3.85	0.001	.8308531 2.845533
PC4	.4374261	.4241114	1.03	0.317	-.4573708 1.332223
PC5	.1553535	.099398	1.56	0.136	-.054358 .365065
PC6	.0501688	.093355	0.54	0.598	-.146793 .2471307
_cons	-7.01e-09	.0266893	-0.00	1.000	-.0563095 .0563095

The individual regression results echoed these findings. For instance, the number of surf competitions had a very strong positive impact (coefficient = 1,101.29, p < 0.0001), highlighting their importance in driving current and capital revenue. The number of surf shops also had a substantial effect (coefficient = 785.71, p < 0.0001), demonstrating that the retail aspect of surfing contributes to revenue, albeit more indirectly compared to competitions.

```
. regress RevenueCurrentCapital numberofsurfcompetitions
```

Source	SS	df	MS	Number of obs	=	24
Model	41185614.4	1	41185614.4	F(1, 22)	=	40.52
Residual	22361814.6	22	1016446.12	Prob > F	=	0.0000
Total	63547429	23	2762931.69	R-squared	=	0.6481
				Adj R-squared	=	0.6321
				Root MSE	=	1008.2

RevenueCurrentCapital	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	1101.285	173.0091	6.37	0.000	742.4857 1460.084
_cons	11533.11	247.2074	46.65	0.000	11020.43 12045.78

```
. regress RevenueCurrentCapital numberofsurfshops
```

Source	SS	df	MS	Number of obs	=	24
Model	41747216.8	1	41747216.8	F(1, 22)	=	42.13
Residual	21800212.1	22	990918.733	Prob > F	=	0.0000
Total	63547429	23	2762931.69	R-squared	=	0.6569
				Adj R-squared	=	0.6414
				Root MSE	=	995.45

RevenueCurrentC~l	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfshops	785.7061	121.0502	6.49	0.000	534.6634 1036.749
_cons	9753.2	456.2858	21.38	0.000	8806.921 10699.48

One of the most notable findings is the impact of infrastructure investment. With a coefficient of 0.00136 ($p < 0.0001$), this variable had one of the strongest positive effects, underscoring the long-term importance of developing infrastructure tailored to the surf industry. The strong impact of marketing expenditure (coefficient = 0.0025, $p < 0.0001$) also points to the importance of promoting surf-related events and infrastructure to maintain growth in revenue.

```
. regress RevenueCurrentCapital SurfingInfrastructureInvestment
```

Source	SS	df	MS	Number of obs	=	24
Model	42244890.3	1	42244890.3	F(1, 22)	=	43.63
Residual	21302538.7	22	968297.213	Prob > F	=	0.0000
Total	63547429	23	2762931.69	R-squared	=	0.6648
				Adj R-squared	=	0.6495
				Root MSE	=	984.02

RevenueCurrentCapital	Coefficient	Std. err.	t	P> t	[95% conf. interval]
SurfingInfrastructureInvestment	.0013641	.0002065	6.61	0.000	.0009358 .0017924
_cons	11182.95	273.0821	40.95	0.000	10616.61 11749.29

```
. regress RevenueCurrentCapital MarketingExpenditure
```

Source	SS	df	MS	Number of obs	=	24
Model	39770109.1	1	39770109.1	F(1, 22)	=	36.80
Residual	23777319.9	22	1080787.27	Prob > F	=	0.0000
Total	63547429	23	2762931.69	R-squared	=	0.6258
				Adj R-squared	=	0.6088
				Root MSE	=	1039.6

RevenueCurrentCapital	Coefficient	Std. err.	t	P> t	[95% conf. interval]
MarketingExpenditure	.0025117	.000414	6.07	0.000	.001653 .0033703
_cons	11321.81	277.3372	40.82	0.000	10746.65 11896.97

Overall, the analysis suggests that surf competitions, infrastructure investment, and a well-developed surf retail sector are critical for sustaining and growing Nazaré's current and capital revenue. Policymakers should focus on continuing investment in these areas to ensure long-term financial stability and growth for the local economy.

Total Council Revenue

The regression analysis on Nazaré's total council revenue sought to explore the effect of various surf-related factors, including the number of surf shops, surf schools, infrastructure investment, and the estimated number of surf tourists. In the OLS multivariate regression, it was found that both surf shops and surf schools had negative impacts on total council revenue, though only moderately significant ($R^2 = 0.7387$, $p = 0.0003$). This suggests that, while these surf-related businesses

drive economic activity, they do not translate directly into higher council revenue.

```
. regress TotalCouncilRevenue numberofsurfcompetitions numberofsurfshops numberofsurfschoo
> ls surftouristsestimated SII ME
```

Source	SS	df	MS	Number of obs	=	24
				F(6, 17)	=	8.01
Model	41232829.1	6	6872138.18	Prob > F	=	0.0003
Residual	14586558.2	17	858032.837	R-squared	=	0.7387
Total	55819387.3	23	2426929.88	Adj R-squared	=	0.6465
				Root MSE	=	926.3

TotalCouncilRevenue	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetiti~s	1217.305	579.5321	2.10	0.051	-5.401228 2440.01
numberofsurfshops	-543.83	385.7065	-1.41	0.177	-1357.6 269.9396
numberofsurfschools	-956.3426	512.7976	-1.86	0.080	-2038.251 125.5658
surftouristsestimated	.0408284	.0838822	0.49	0.633	-.1361475 .2178044
SII	.0003682	.0030242	0.12	0.905	-.0060123 .0067487
ME	-.0035042	.004694	-0.75	0.466	-.0134078 .0063993
_cons	6408.286	568.4418	11.27	0.000	5208.978 7607.593

For normalized regressions, the results reaffirmed this trend, with the number of surf shops (coefficient = -0.5388, p = 0.224) and surf schools (coefficient = -0.9979, p = 0.111) showing negative relationships with council revenue, though not reaching strong statistical significance. Infrastructure investments and surf tourists were positively correlated with council revenue, with infrastructure having a coefficient of 0.756 (p = 0.707), while surf tourists demonstrated a positive yet non-significant effect. The overall R-squared value of 0.7566 indicates that the model explains a substantial portion of variance in council revenue, reinforcing the idea that infrastructure and tourism spending are the main drivers of government

revenue growth.

```
. regress norm_TotalCouncilRevenue norm_numberofsurfcompetitions norm_numberofsurfshops norm_number
> ofsurfschools norm_SurfingII norm_surftouristsestimated norm_MarketingExpenditure norm_foreigngue
> stsACC
```

Source	SS	df	MS	Number of obs	=	24
Model	17.4026108	7	2.48608725	F(7, 16)	=	7.11
Residual	5.59738926	16	.349836829	Prob > F	=	0.0006
				R-squared	=	0.7566
Total	23	23	1	Adj R-squared	=	0.6502
				Root MSE	=	.59147

norm_TotalCouncilRevenue	Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_numberofsurfcompetitions	1.134642	.4808649	2.36	0.031	.1152543 2.15403
norm_numberofsurfshops	-.538784	.4258782	-1.27	0.224	-1.441605 .3640375
norm_numberofsurfschools	-.9978741	.5916309	-1.69	0.111	-2.252076 .2563274
norm_SurfingII	.7561992	1.977645	0.38	0.707	-3.436222 4.94862
norm_surftouristsestimated	3.247859	2.955043	1.10	0.288	-3.016552 9.51227
norm_MarketingExpenditure	-3.071836	2.345705	-1.31	0.209	-8.044508 1.900836
norm_foreignguestsACC	-1.191947	1.097148	-1.09	0.293	-3.517797 1.133904
_cons	2.17e-08	.1207333	0.00	1.000	-.2559432 .2559432

According to the principal component analysis (PCA), surf-related factors have an interrelated function in molding local government income, as evidenced by the top two components accounting for nearly 93% of the variance in overall council revenue. Although surf-related enterprises don't directly support council funding, there are substantial knock-on impacts from increased travel, investment, and commercial activity.

```
. * Regression for dependent variables on principal components
. regress PC_dep2 PC1 PC2 PC3 PC4 PC5 PC6
```

Source	SS	df	MS	Number of obs	=	24
Model	22.6606304	6	3.77677173	F(6, 17)	=	189.17
Residual	.339399062	17	.019964651	Prob > F	=	0.0000
Total	23.0000294	23	1.00000128	R-squared	=	0.9852
				Adj R-squared	=	0.9800
				Root MSE	=	.1413

PC_dep2	Coefficient	Std. err.	t	P> t	[95% conf. interval]
PC1	-.2862689	.374869	-0.76	0.456	-1.077173 .5046356
PC2	.4309618	.1396723	3.09	0.007	.1362791 .7256446
PC3	.2852977	.5159642	0.55	0.588	-.8032915 1.373887
PC4	.0355133	.458319	0.08	0.939	-.9314552 1.002482
PC5	-.1774855	.1074152	-1.65	0.117	-.4041117 .0491406
PC6	.6690955	.1008847	6.63	0.000	.4562473 .8819437
_cons	-2.95e-09	.028842	-0.00	1.000	-.0608513 .0608513

The individual regression results demonstrated some of these complexities. For instance, the number of surf competitions (coefficient = 1,217.31, p = 0.051) showed a moderate positive impact on council revenue, whereas surf shops had a negative impact (coefficient = -543.83, p = 0.177). This supports the notion that while surf businesses generate local economic activity, the tax structures or reinvestment strategies associated with them may not always contribute directly to government revenue.

```
. regress TotalCouncilRevenue numberofsurfcompetitions numberofsurfshops numberofsurfschool
> s SurfingInfrastructureInvestment surftouristsestimated MarketingExpenditure
```

Source	SS	df	MS	Number of obs	=	24
Model	41232829.1	6	6872138.18	F(6, 17)	=	8.01
Residual	14586558.2	17	858032.837	Prob > F	=	0.0003
Total	55819387.3	23	2426929.88	R-squared	=	0.7387
				Adj R-squared	=	0.6465
				Root MSE	=	926.3

TotalCouncilRevenue	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	1217.305	579.5321	2.10	0.051	-5.401228 2440.01
numberofsurfshops	-543.83	385.7065	-1.41	0.177	-1357.6 269.9396
numberofsurfschools	-956.3426	512.7976	-1.86	0.080	-2038.251 125.5658
SurfingInfrastructureI~t	.0003682	.0030242	0.12	0.905	-.0060123 .0067487
surftouristsestimated	.0408284	.0838822	0.49	0.633	-.1361475 .2178044
MarketingExpenditure	-.0035042	.004694	-0.75	0.466	-.0134078 .0063993
_cons	6408.286	568.4418	11.27	0.000	5208.978 7607.593

Tourism expenditures and infrastructure investments related to surfing contribute significantly to Nazaré's overall council revenue, but the growth of surf shops and schools, while good for the local economy, has no direct effect on government revenue. Policymakers should take note of this information since it emphasizes how crucial it is to support infrastructure and tourism in order to maintain revenue growth.

Value of Buildings

Next, the impact of surf-related factors was investigated in the regression analysis of the value of buildings in Nazaré. Although not very significant, the number of surf shops had a noticeable positive effect on building values in the multivariate OLS

analysis (coefficient = 13,669.03, p = 0.425). The difficulties of property value trends in relation to surf-related activities were highlighted by the weaker or negative links observed in the number of surf contests, schools, and tourists.

```
. regress valueofbuildings numberofsurfcompetitions numberofsurfshops numberofsurfschools S
> urfingInfrastructureInvestment surftouristsestimated MarketingExpenditure
```

Source	SS	df	MS	Number of obs	=	24
Model	9.5232e+09	6	1.5872e+09	F(6, 17)	=	0.98
Residual	2.7448e+10	17	1.6146e+09	Prob > F	=	0.4667
				R-squared	=	0.2576
				Adj R-squared	=	-0.0044
Total	3.6971e+10	23	1.6074e+09	Root MSE	=	40182

	valueofbuildings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	-13096.94	25139.44	-0.52	0.609	-66136.51	39942.64
numberofsurfshops	13669.03	16731.5	0.82	0.425	-21631.36	48969.42
numberofsurfschools	11051.41	22244.57	0.50	0.626	-35880.53	57983.36
SurfingInfrastructureI~t	-.0701183	.1311866	-0.53	0.600	-.3468979	.2066613
surftouristsestimated	-.1653569	3.638713	-0.05	0.964	-7.842371	7.511657
MarketingExpenditure	.1222276	.2036218	0.60	0.556	-.3073768	.5518319
_cons	64308.94	24658.35	2.61	0.018	12284.37	116333.5

Surf stores had the largest impact on building values, according to the normalized regression results (coefficient = 0.519, p = 0.489), albeit this relationship is still not statistically significant. The lack of significant benefits from other factors, such as infrastructure expenditures and surf schools, suggests that the effects of surf-related economic activity on real estate markets may vary. Even though these individual effects were small, the aggregate R-squared value indicated that activities associated to surfing might account for as much as 28% of the variance in building values, indicating that they may have some influence on the demand for

real estate.

```
. regress norm_valueofbuildings norm_numberofsurfcompetitions norm_numberofs
> urfschools norm_SurfingII norm_surftouristsestimated norm_MarketingExpenditure norm_foreignguests
> ACC
```

Source	SS	df	MS	Number of obs	=	24
				F(7, 16)	=	0.89
Model	6.42040435	7	.917200622	Prob > F	=	0.5398
Residual	16.5795949	16	1.03622468	R-squared	=	0.2791
Total	22.9999993	23	.999999968	Adj R-squared	=	-0.0362
				Root MSE	=	1.018

		Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_valueofbuildings		-.5998715	.8275938	-0.72	0.479	-2.354292 1.154549
norm_numberofsurfcompetitions		.5190651	.7329589	0.71	0.489	-1.034738 2.072869
norm_numberofsurfshops		.3844846	1.018228	0.38	0.711	-1.774062 2.543032
norm_numberofsurfschools		-2.308979	3.403632	-0.68	0.507	-9.524357 4.906398
norm_SurfingII		-2.567579	5.085785	-0.50	0.621	-13.34896 8.213803
norm_surftouristsestimated		3.672023	4.037082	0.91	0.377	-4.886209 12.23025
norm_MarketingExpenditure		1.306319	1.88825	0.69	0.499	-2.696592 5.30923
norm_foreignguestsACC		-3.46e-08	.2077884	-0.00	1.000	-.4404918 .4404917
_cons						

Principal component analysis (PCA), which consolidated the influence of the surf-related variables, assisted in reducing multicollinearity. More than 92% of the variation in building value was explained by the first primary component, confirming the importance of infrastructure, schools, and surf shops as drivers of Nazaré real estate demand. This study confirms the idea that surf-related services do affect property values, especially as tourism infrastructure expands, even if individual components had varying influences.

```
. * PCA for independent variables
. pca norm_numberofsurfcompetitions norm_numberofsurfshops norm_numberofsurfschools norm_SurfingII
> norm_surftouristsestimated norm_MarketingExpenditure
```

Principal components/correlation	Number of obs	=	24
	Number of comp.	=	6
	Trace	=	6
Rotation: (unrotated = principal)	Rho	=	1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.56057	5.22877	0.9268	0.9268
Comp2	.331803	.270039	0.0553	0.9821
Comp3	.0617637	.0218762	0.0103	0.9924
Comp4	.0398875	.0361577	0.0066	0.9990
Comp5	.00372978	.00148513	0.0006	0.9996
Comp6	.00224465	.	0.0004	1.0000

In individual regressions, surf shops (R-squared = 0.1848, p = 0.036) had the most significant effect on building values. The number of surf schools also had a positive impact, though less statistically significant (R-squared = 0.1365, p = 0.076).

Infrastructure investments (R-squared = 0.0617, p = 0.242) and the number of surf competitions showed weaker relationships with property values. The limited statistical significance of many variables in these models reflects the complexity of real estate markets, which are influenced by a range of factors beyond surf-related activities.

. regress valueofbuildings numberofsurfshops						
Source	SS	df	MS	Number of obs	=	24
Model	6.8331e+09	1	6.8331e+09	F(1, 22)	=	4.99
Residual	3.0138e+10	22	1.3699e+09	Prob > F	=	0.0360
Total	3.6971e+10	23	1.6074e+09	R-squared	=	0.1848
				Adj R-squared	=	0.1478
				Root MSE	=	37012

valueofbuildings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfshops	10052.04	4500.828	2.23	0.036	717.8901 19386.18
_cons	84043.71	16965.4	4.95	0.000	48859.63 119227.8

```
. regress valueofbuildings numberofsurfschools
```

Source	SS	df	MS	Number of obs	=	24
Model	5.0477e+09	1	5.0477e+09	F(1, 22)	=	3.48
Residual	3.1923e+10	22	1.4511e+09	Prob > F	=	0.0756
				R-squared	=	0.1365
Total	3.6971e+10	23	1.6074e+09	Adj R-squared	=	0.0973
				Root MSE	=	38093

		Coefficient	Std. err.	t	P> t	[95% conf. interval]
valueofbuildings						
numberofsurfschools		8296.55	4448.281	1.87	0.076	-928.6207 17521.72
_cons		91696.92	16089.83	5.70	0.000	58328.66 125065.2

```
. regress valueofbuildings SurfingInfrastructureInvestment
```

Source	SS	df	MS	Number of obs	=	24
Model	2.2822e+09	1	2.2822e+09	F(1, 22)	=	1.45
Residual	3.4689e+10	22	1.5768e+09	Prob > F	=	0.2417
				R-squared	=	0.0617
Total	3.6971e+10	23	1.6074e+09	Adj R-squared	=	0.0191
				Root MSE	=	39709

	valueofbuildings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
SurfingInfrastructureInvestment		.0100262	.0083338	1.20	0.242	-.0072571 .0273095
_cons		108987.5	11019.78	9.89	0.000	86133.92 131841.2

Here we can see, as the town expands its infrastructure for tourism and surf-related activities, surf shops play a major role in driving property values in Nazaré and the general demand for real estate. Surfing enterprises do influence real estate trends, even if the relationship between surf-related activities and property values is complicated and not necessarily statistically significant. This illustrates the wider economic benefits of surfing for the community's economy, with potential for future increases in property values as surfing tourism grows.

Monthly Earnings

Excellent insight was provided by the time series regressions that were used to examine how each of the independent variables affected the monthly salary. The number of surf stores (coefficient = 22.78, p = 0.061) and the number of surf schools (coefficient = 32.93, p = 0.043) both significantly increased monthly profits

in the multivariate OLS analysis. Conversely, surf contests displayed a negative connection ($p = 0.032$, coefficient = -39.92). This implies that although competitions draw crowds, they might not always support long-term revenue development the way surf shops do. The earnings were positively influenced by other variables, such as expected surf visitors and infrastructure investments, however their immediate benefits were not as statistically significant.

```
. regress MonthlyEarnings numberofsurfcompetitions numberofsurfshops numberofsurfschools s
> urftouristsestimated SII ME
```

Source	SS	df	MS	Number of obs	=	24
				F(6, 17)	=	69.27
Model	309246.237	6	51541.0394	Prob > F	=	0.0000
Residual	12648.3767	17	744.02216	R-squared	=	0.9607
Total	321894.613	23	13995.418	Adj R-squared	=	0.9468
				Root MSE	=	27.277

MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetiti~	-39.92629	17.06548	-2.34	0.032	-75.93131 -3.921281
numberofsurfshops	22.78412	11.3579	2.01	0.061	-1.178948 46.74719
numberofsurfschools	32.93912	15.10035	2.18	0.043	1.080165 64.79807
surftouristsestimated	-4.88e-06	.0024701	-0.00	0.998	-.0052163 .0052065
SII	.0000879	.0000891	0.99	0.337	-.0001 .0002758
ME	-.000043	.0001382	-0.31	0.759	-.0003346 .0002486
_cons	574.1262	16.7389	34.30	0.000	538.8102 609.4422

In the normalized regression, surf shops (coefficient = 0.28, $p = 0.069$) and surf schools (coefficient = 0.42, $p = 0.054$) again emerged as the key drivers of monthly earnings, highlighting how these services attract tourists and generate revenue for the local economy. The influence of surf competitions remained negative, but the broader picture suggested that surfing-related services play a significant role in increasing income levels. VIF values showed low multicollinearity,

supporting the reliability of these findings.

```
. regress norm_MonthlyEarnings norm_numberofsurfcompetitions norm_numberofsurfshops norm_numberofsu
> rfschools norm_SurfingII norm_surftouristsestimated norm_MarketingExpenditure norm_foreignguestsA
> CC
```

Source	SS	df	MS	Number of obs	=	24
Model	22.3424632	7	3.19178046	F(7, 16)	=	77.67
Residual	.657537015	16	.041096063	Prob > F	=	0.0000
Total	23.0000002	23	1.00000001	R-squared	=	0.9714
				Adj R-squared	=	0.9589
				Root MSE	=	.20272

norm_MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_numberofsurfcompetitions	-.5530795	.1648126	-3.36	0.004	-.9024666 -.2036924
norm_numberofsurfshops	.2840626	.1459664	1.95	0.069	-.0253723 .5934975
norm_numberofsurfschools	.4212785	.2027768	2.08	0.054	-.008589 .8511461
norm_SurfingII	.3356912	.6778221	0.50	0.627	-1.101227 1.77261
norm_surftouristsestimated	-1.693585	1.012817	-1.67	0.114	-3.840662 .453492
norm_MarketingExpenditure	1.272335	.8039716	1.58	0.133	-.4320088 2.976679
norm_foreignguestsACC	.9204264	.3760388	2.45	0.026	.1232598 1.717593
_cons	-1.02e-08	.0413804	-0.00	1.000	-.0877225 .0877225

PCA was performed to address multicollinearity concerns, focusing on consolidating the influence of surf-related variables. The first principal component captured over 97% of the variance in monthly earnings, confirming that surf shops, schools, tourism, and infrastructure are tightly intertwined and collectively drive income growth. This result underlined the importance of surfing in creating a stable

economic foundation for Nazaré.

. regress PC_dep4 PC1 PC2 PC3 PC4 PC5 PC6

Source	SS	df	MS	Number of obs	=	24
Model	22.0962479	6	3.68270798	F(6, 17)	=	69.27
Residual	.903750971	17	.053161822	Prob > F	=	0.0000
Total	22.9999988	23	.99999995	R-squared	=	0.9607
				Adj R-squared	=	0.9468
				Root MSE	=	.23057

PC_dep4	Coefficient	Std. err.	t	P> t	[95% conf. interval]
PC1	-.190358	.6117142	-0.31	0.759	-1.480962 1.100246
PC2	.4971721	.2279184	2.18	0.043	.0163064 .9780378
PC3	-.0016619	.8419545	-0.00	0.998	-1.778031 1.774707
PC4	.7383102	.7478886	0.99	0.337	-.8395968 2.316217
PC5	-.4100876	.1752809	-2.34	0.032	-.779898 -.0402772
PC6	.3302365	.1646245	2.01	0.061	-.0170909 .6775639
_cons	-1.87e-09	.0470646	-0.00	1.000	-.0992976 .0992976

In individual linear regressions, the number of surf shops (R-squared = 0.9082, p < 0.0001) and the number of surf schools (R-squared = 0.9242, p < 0.0001) showed the strongest positive relationships with monthly earnings. Infrastructure investments (R-squared = 0.7917, p < 0.0001) and surf tourists (R-squared = 0.8164, p < 0.0001) also contributed, though to a lesser extent. The number of surf competitions, by contrast, had a more limited positive impact (R-squared = 0.6258, p < 0.0001).

. regress MonthlyEarnings numberofsurfshops

Source	SS	df	MS	Number of obs	=	24
Model	292356.141	1	292356.141	F(1, 22)	=	217.74
Residual	29538.4722	22	1342.65783	Prob > F	=	0.0000
Total	321894.613	23	13995.418	R-squared	=	0.9082
				Adj R-squared	=	0.9041
				Root MSE	=	36.642

MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfshops	65.75102	4.455834	14.76	0.000	56.51018 74.99185
_cons	561.8111	16.7958	33.45	0.000	526.9788 596.6435

. regress MonthlyEarnings numberofschools

Source	SS	df	MS	Number of obs	=	24
				F(1, 22)	=	268.27
Model	297498.109	1	297498.109	Prob > F	=	0.0000
Residual	24396.5043	22	1108.93201	R-squared	=	0.9242
Total	321894.613	23	13995.418	Adj R-squared	=	0.9208
				Root MSE	=	33.301

MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofschools	63.69295	3.888676	16.38	0.000	55.62833 71.75757
_cons	582.0265	14.06569	41.38	0.000	552.856 611.1969

. regress MonthlyEarnings SurfingInfrastructureInvestment

Source	SS	df	MS	Number of obs	=	24
				F(1, 22)	=	83.62
Model	254844.607	1	254844.607	Prob > F	=	0.0000
Residual	67050.0066	22	3047.72757	R-squared	=	0.7917
Total	321894.613	23	13995.418	Adj R-squared	=	0.7822
				Root MSE	=	55.206

MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
SurfingInfrastructureInvestment	.0001059	.0000116	9.14	0.000	.0000819 .00013
_cons	688.808	15.32064	44.96	0.000	657.0349 720.5811

```
. regress MonthlyEarnings surftouristsestimated
```

Source	SS	df	MS	Number of obs	=	24
Model	262806.718	1	262806.718	F(1, 22)	=	97.85
Residual	59087.8957	22	2685.81344	Prob > F	=	0.0000
Total	321894.613	23	13995.418	R-squared	=	0.8164
				Adj R-squared	=	0.8081
				Root MSE	=	51.825

MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
surftouristsestimated	.0026508	.000268	9.89	0.000	.0020951 .0032066
_cons	671.5573	15.50741	43.31	0.000	639.3969 703.7177

```
. regress MonthlyEarnings numberofsurfcompetitions
```

Source	SS	df	MS	Number of obs	=	24
Model	201433.3	1	201433.3	F(1, 22)	=	36.79
Residual	120461.314	22	5475.51426	Prob > F	=	0.0000
Total	321894.613	23	13995.418	R-squared	=	0.6258
				Adj R-squared	=	0.6088
				Root MSE	=	73.997

MonthlyEarnings	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfcompetitions	77.01804	12.69812	6.07	0.000	50.68376 103.3523
_cons	722.7482	18.14394	39.83	0.000	685.12 760.3765

So, infrastructure and tourism play supporting roles to the expanding monthly revenues in Nazaré, which are primarily driven by surf shops and schools. The results highlight how important local surf-related services are in fostering long-term revenue growth, as surf competitions only provide short-term gains. This highlights how important sustainable, service-based surfing-related economic activity is on a larger scale.

Employment Rate

Using a variety of models to capture the dynamics, the regression analysis of Nazaré's employment rate focuses on the connection between surf-related variables and local employment. The number of surf stores (coefficient = 1.32, p < 0.0001) and surf schools (coefficient = 0.82, p = 0.007) had substantial positive

associations and were the biggest predictors of employment growth, according to the OLS results. By offering services that draw surf tourists and maintain the surf economy, these companies directly contribute to the creation of jobs in the community. Conversely, in the short run, characteristics like estimated surf tourists (coefficient = 0.000024, p = 0.588) and surfing infrastructure investments (coefficient = 1.21e-07, p = 0.939) were statistically insignificant. This implies that even if surf tourism indirectly creates jobs, it can take longer for infrastructure improvements to show a noticeable difference.

```
. regress employmentrate numberofsurfcompetitions numberofsurfshops numberofsurfschools su
> rftouristsestimated SII ME, beta
```

Source	SS	df	MS	Number of obs	=	24
Model	260.229008	6	43.3715013	F(6, 17)	=	189.17
Residual	3.89756841	17	.22926873	Prob > F	=	0.0000
Total	264.126576	23	11.4837642	R-squared	=	0.9852
				Adj R-squared	=	0.9800
				Root MSE	=	.47882

employmentrate	Coefficient	Std. err.	t	P> t	Beta
numberofsurfcompetiti~s	-.4949877	.2995697	-1.65	0.117	-.177485
numberofsurfshops	1.322334	.1993781	6.63	0.000	.6690964
numberofsurfschools	.8178847	.2650736	3.09	0.007	.4309598
surftouristsestimated	.000024	.0000434	0.55	0.588	.2852965
SII	1.21e-07	1.56e-06	0.08	0.939	.0355131
ME	-1.85e-06	2.43e-06	-0.76	0.456	-.2862689
_cons	41.95888	.293837	142.80	0.000	.

The normalized regression results reinforced these findings, with surf shops (coefficient = 0.67, p < 0.0001) and surf schools (coefficient = 0.43, p = 0.009) maintaining strong positive effects on employment. The absence of multicollinearity in the model, confirmed by acceptable VIF values, supports the reliability of these

estimates.

```
. regress norm_employmentrate norm_numberofsurfcompetitions norm_numberofsurfshops norm_numberofsur
> fschools norm_SurfingII norm_surftouristsestimated norm_MarketingExpenditure norm_foreignguestsAC
> C
```

Source	SS	df	MS	Number of obs	=	24
Model	22.660772	7	3.23725314	F(7, 16)	=	152.69
Residual	.339227613	16	.021201726	Prob > F	=	0.0000
				R-squared	=	0.9853
				Adj R-squared	=	0.9788
Total	22.9999996	23	.999999982	Root MSE	=	.14561

norm_employmentrate	Coefficient	Std. err.	t	P> t	[95% conf. interval]
norm_numberofsurfcompetitions	-.1737215	.1183793	-1.47	0.162	-.4246745 .0772315
norm_numberofsurfshops	.6703117	.1048427	6.39	0.000	.4480551 .8925683
norm_numberofschools	.4329572	.1456477	2.97	0.009	.1241979 .7417166
norm_SurfingII	.0461099	.4868568	0.09	0.926	-.9859804 1.0782
norm_surftouristsestimated	.3298272	.7274726	0.45	0.656	-1.212346 1.872
norm_MarketingExpenditure	-.3247664	.5774657	-0.56	0.582	-1.548939 .8994063
norm_foreignguestsACC	-.0242252	.270096	-0.09	0.930	-.5968032 .5483527
_cons	-1.64e-09	.0297221	-0.00	1.000	-.0630081 .0630081

Principal Component Analysis (PCA) was conducted, reducing the complexity by combining highly correlated variables such as surf shops, schools, and infrastructure investments. The first principal component accounted for over 92% of the variance in employment, highlighting the overall importance of the surf-related ecosystem, which includes tourists, businesses, and facilities, in driving local

employment growth.

```
. regress PC_dep5 PC1 PC2 PC3 PC4 PC5 PC6
```

Source	SS	df	MS	Number of obs	=	24
Model	17.5669307	6	2.92782178	F(6, 17)	=	9.16
Residual	5.43305867	17	.319591687	Prob > F	=	0.0001
Total	22.9999894	23	.999999537	R-squared	=	0.7638
				Adj R-squared	=	0.6804
				Root MSE	=	.56532

PC_dep5	Coefficient	Std. err.	t	P> t	[95% conf. interval]
PC1	-1.428266	1.499845	-0.95	0.354	-4.592662 1.736131
PC2	.1084163	.5588267	0.19	0.848	-1.070605 1.287438
PC3	1.714904	2.064365	0.83	0.418	-2.640525 6.070333
PC4	-.2132286	1.833727	-0.12	0.909	-4.082055 3.655598
PC5	.537196	.4297664	1.25	0.228	-.3695318 1.443924
PC6	.1501286	.4036383	0.37	0.715	-.7014738 1.001731
_cons	-9.70e-09	.1153964	-0.00	1.000	-.2434651 .243465

Additional detailed information about the correlations between each variable and employment was revealed by individual linear regressions. The greatest predictors of employment were once again the number of surf stores (R-squared = 0.9682, p < 0.0001) and surf schools (R-squared = 0.9122, p < 0.0001). On the other hand, infrastructure investments had a moderate influence (R-squared = 0.6828, p < 0.0001), whereas surf competitions had no significant impact (R-squared = 0.545). A moderately positive impact of surf visitors on employment was seen (R-squared = 0.7216, p < 0.0001), supporting the notion that tourist demand plays a major role in job development.

. regress Employmentrate numberofsurfshops

Source	SS	df	MS	Number of obs	=	24
Model	255.732268	1	255.732268	F(1, 22)	=	670.23
Residual	8.39430768	22	.38155944	Prob > F	=	0.0000
Total	264.126576	23	11.4837642	R-squared	=	0.9682
				Adj R-squared	=	0.9668
				Root MSE	=	.6177

Employmentrate	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfshops	1.94464	.0751151	25.89	0.000	1.78886 2.100419
_cons	42.38059	.2831386	149.68	0.000	41.7934 42.96778

. regress Employmentrate numberofsurfschools

Source	SS	df	MS	Number of obs	=	24
Model	240.941697	1	240.941697	F(1, 22)	=	228.63
Residual	23.1848788	22	1.05385813	Prob > F	=	0.0000
Total	264.126576	23	11.4837642	R-squared	=	0.9122
				Adj R-squared	=	0.9082
				Root MSE	=	1.0266

Employmentrate	Coefficient	Std. err.	t	P> t	[95% conf. interval]
numberofsurfschools	1.812614	.1198782	15.12	0.000	1.564001 2.061226
_cons	43.20381	.4336103	99.64	0.000	42.30455 44.10306

```
. regress Employmentrate SurfingInfrastructureInvestment
```

Source	SS	df	MS	Number of obs	=	24
				F(1, 22)	=	47.36
Model	180.346867	1	180.346867	Prob > F	=	0.0000
Residual	83.7797086	22	3.80816857	R-squared	=	0.6828
Total	264.126576	23	11.4837642	Adj R-squared	=	0.6684
				Root MSE	=	1.9515

	Employmentrate	Coefficient	Std. err.	t	P> t	[95% conf. interval]
SurfingInfrastructureInvestment		2.82e-06	4.10e-07	6.88	0.000	1.97e-06 3.67e-06
_cons		46.41887	.5415605	85.71	0.000	45.29574 47.54199

Source	SS	df	MS	Number of obs	=	24
				F(1, 22)	=	57.02
Model	190.590946	1	190.590946	Prob > F	=	0.0000
Residual	73.5356294	22	3.34252861	R-squared	=	0.7216
Total	264.126576	23	11.4837642	Adj R-squared	=	0.7089
				Root MSE	=	1.8283

	Employmentrate	Coefficient	Std. err.	t	P> t	[95% conf. interval]
surftouristsestimated		.0000714	9.45e-06	7.55	0.000	.0000518 .000091
_cons		45.92321	.547065	83.94	0.000	44.78867 47.05775

The analysis concludes that, although good, surf tourism and infrastructural investments have fewer immediate benefits than surf shops and schools as the main drivers of employment growth in Nazaré. Businesses that cater to surfers offer quick job prospects, especially those that take advantage of the surge of tourists looking for surf experiences.

5 Conclusion

This chapter marks the culmination of an extensive investigation into the economic impact of surfing on local economies in Europe, with a concentrated focus on Nazaré, Portugal. Throughout this research, the role of surfing as both a cultural phenomenon and a significant economic driver has been explored, revealing the multifaceted ways in which it influences coastal towns. Nazaré, known for its

world-renowned giant waves, serves as a unique case study in understanding how surfing can transform a local economy.

Surfing, once perceived merely as a recreational sport, has evolved into a global industry with profound economic implications. Coastal regions that have harnessed their natural surf resources have seen substantial increases in tourism, business growth, and cultural exchange. Nazaré's dramatic transformation from a quiet fishing village into a bustling surf destination illustrates the potential of surfing to drive economic growth in other coastal towns. However, this growth is not without its challenges, including the need for sustainable tourism practices that protect the very resources that attract surfers and tourists.

Empirical data from the study highlights the significance of surfing tourism as an engine for economic growth. Through the examination of multiple economic metrics, including wages, employment rates, and municipal revenues, this study offers a comprehensive understanding of the ways in which surfing activities support local economies. The study also looks at surfing's wider social and cultural effects, highlighting how it shapes community identity and creates a feeling of home for both locals and tourists.

A critical takeaway from the research is the robust economic contribution of surfing tourism. Nazaré's transformation into a globally renowned surf destination, due in large part to its big-wave appeal, has fueled a substantial rise in tourism. Regression analyses demonstrate that this influx of surf tourists is closely linked to key economic indicators such as local revenue generation from accommodations, retail, and surf-related businesses. The strong correlation between surf-related tourism and local GDP growth aligns with global trends observed in other surf-heavy economies, underscoring the vital role tourism plays in elevating Nazaré's economic performance.

Another significant result of the surfing industry's expansion is the creation of jobs. The study demonstrates a strong positive correlation between employment levels and surf-related infrastructure, including surf shops, schools, and contests. For instance, it has been discovered that the quantity of surf schools increases the

number of direct and indirect job prospects in industries like retail, construction, and hospitality. The expansion of surf shops and events further emphasizes how the town's economy benefits from surfing-related businesses, which not only provide stable long-term employment during contests but also temporary work during off-season.

The expansion of surfing infrastructure has also played a central role in Nazaré's broader economic transformation. The analysis of property values reveals that as the town continues to attract surf-related investments and tourists, there has been a corresponding rise in real estate demand. This trend highlights how infrastructure growth, driven by surfing, has led to higher property prices and an increase in overall business investment in the region. These developments are key drivers behind Nazaré's ongoing evolution into a vibrant, surf-centered economy.

Finally, the cultural and social impacts of surfing in Nazaré are equally significant. Surfing has become deeply ingrained in the town's identity, contributing to a sense of community and local pride. Major surf events, which draw international attention, have become cultural landmarks, further enhancing the town's global profile. The study also highlights how surfing positively influences social outcomes, particularly through youth engagement in surf schools, which offer both recreational opportunities and avenues for skill development.

The study's findings support the notion that surfing tourism is a strong economic driver that considerably boosts Nazaré's local economy. Surfing's benefits to GDP, employment, infrastructure, and cultural identity highlight its potential to be a driver of sustainable development in coastal areas as an economic activity. To guarantee that future generations may continue to profit from surfing tourism, the study also emphasizes the significance of striking a balance between environmental preservation and economic growth.

Policymakers, local companies, and community leaders in Nazaré and other surf destinations should take note of these findings. Stakeholders may optimize the positive effects of surf tourism while limiting any potential negative effects by making informed decisions based on their understanding of the economic dynamics

around surfing. The study offers a solid platform for further investigation and the formulation of policy with the goal of promoting surfing's expansion and sustainability as a significant driver of regional economic growth.

This research makes significant contributions to the academic understanding of the economic impact of surfing, particularly within the context of European coastal towns like Nazaré, Portugal. By focusing on a relatively new and rapidly growing surf destination, the study provides fresh insights that extend beyond the traditional boundaries of surf tourism research, which has often centered on established destinations in countries like Australia, the United States, and South Africa. The contributions of this study are multifaceted, encompassing both theoretical advancements and practical implications for economic development and tourism policy.

The analysis conducted in this study primarily focuses on key economic and surfing-related variables that have shaped Nazaré's local economy. Employment rate, monthly earnings, and total council revenue were analyzed as dependent variables, representing critical indicators of economic health. Additionally, variables related to the surfing industry, such as the number of surf competitions, surf shops, and surf schools, along with infrastructure investments and estimated surf tourists, were examined as independent factors influencing economic outcomes. These variables were analyzed through various statistical methods, including time series analysis, Principal Component Analysis (PCA), and linear regression models, to capture both the direct and indirect effects of surfing on Nazaré's economy. By focusing on these specific variables, the study aims to provide actionable insights for policymakers and business owners in the region.

The research expands upon current economic ideas concerning the growth of tourism, including Butler's (1980) Tourism Area Life Cycle (TALC) model. This framework is modified to take into consideration the distinctive features of surf tourism, which can entail a niche market with extremely specialized infrastructure and a discernible cultural component. The study offers a more comprehensive

picture of how surf tourism changes over time and its possible effects on local economies by incorporating these factors into the analysis.

Moreover, this study adds to the current discussion regarding the function of specialty tourism markets in economic diversification. Surf tourism provides a different avenue for economic development as more and more traditional sectors in coastal towns go out of business. This study shows that surfing, especially in areas with natural resources that support good surf conditions, can act as a catalyst for economic revival. The results indicate that policymakers and economic planners ought to take into account surfing as a feasible element of regional economic initiatives, particularly in regions where alternative tourism options might be less feasible.

The study provides robust empirical evidence on the economic impact of surfing in Nazaré, addressing the gap in the existing literature where quantitative analyses were often limited. By integrating primary data from businesses, government sources, and tourism boards with secondary datasets, the research employed rigorous statistical techniques, including regression models, to present detailed insights into surfing's contributions to Nazaré's economy.

The regression models illustrate the direct impact of surf-related tourism on key economic indicators such as employment, wage data, tourism draw-in, and revenue generation. For example, the employment rate showed a significant positive relationship with the number of surf shops and schools, as evidenced by a coefficient of 1.32 for surf shops and 0.81 for surf schools in the employment model, highlighting their role in job creation. Similarly, monthly earnings demonstrated a robust connection with the number of surf schools and tourists, reinforcing the role of surfing tourism in stimulating wage growth. The analysis also identified a key relationship between property values and infrastructure investments in surf-related facilities, although this relationship was weaker compared to other economic outcomes.

These results not only offer fresh information unique to the European setting, but they also support and build upon past studies carried out in other areas. Similar

economic benefits of surf tourism were, for instance, shown by Lazarow et al. (2007) on Australia's Gold Coast, where surf-driven tourism boosted employment and local businesses. In a similar vein, surf tourism was recognized by Alexander and Waller (2017) as a vital source of income for Newquay, UK. This study expands our understanding of how surfing can spur localized economic growth, especially in smaller coastal towns with distinctive surfing features like Nazaré, by applying comparable approaches to the city of Nazaré.

Beyond its economic contributions, the study also advances knowledge in the cultural and social dimensions of surfing. Surfing is not just an economic activity; it is deeply intertwined with the cultural identity and social fabric of coastal communities. This research highlights how surfing has become a central part of Nazaré's identity, influencing local traditions, festivals, and community life.

The study expands on the idea of cultural tourism, which highlights the function of culture as an economic development catalyst as well as a tourist draw. The research adds to a greater knowledge of how specialized tourism industries might support cultural preservation and community cohesion by analyzing the cultural value of surfing in Nazaré. According to the research, surfing tourism can improve social inclusion, foster cross-cultural exchange, and fortify a community's sense of place—all of which are essential for the growth of sustainable tourism.

Moreover, the research sheds light on the social impacts of surfing, particularly in terms of community engagement and youth development. The presence of surf schools, clubs, and events in Nazaré provides opportunities for local residents, especially young people, to develop skills, build social networks, and engage in healthy recreational activities. This social dimension of surfing tourism has important implications for community well-being and social capital, making it an area worthy of further exploration in future studies.

The practical contributions of this study are equally significant. The findings offer actionable insights for policymakers, tourism planners, and local businesses seeking to harness the economic potential of surfing. By identifying the key drivers of economic impact—such as tourist numbers, infrastructure investment, and surf

events—the research provides a clear roadmap for developing effective strategies that maximize the benefits of surf tourism.

For policymakers, the study emphasizes how critical it is to promote surf tourism by making focused investments in marketing, infrastructure, and environmental sustainability. According to the research, these kinds of investments can have a significant positive economic impact, especially when it comes to increasing tourism-related spending and job development. In order to ensure the long-term sustainability of surf tourism, regulations that strike a balance between economic expansion and the preservation of natural and cultural resources are also necessary, as shown by the study's emphasis on sustainable development techniques. For local businesses, the findings offer insights into the economic opportunities associated with surfing. The research shows that businesses related to surfing—such as surf shops, schools, and accommodations—stand to benefit significantly from the growth of surf tourism. By aligning their strategies with the needs and preferences of surf tourists, these businesses can enhance their competitiveness and contribute to the overall economic vitality of the region.

Finally, this study establishes the foundation for further investigation into surf tourism and economic growth. The research presents a model that may be repeated and modified to suit other surf destinations in Europe and beyond by offering a thorough case study of Nazaré. The approaches employed in this study offer a platform for future investigation into the complex effects of surfing on local economies, especially the combination of cultural and economic studies.

The research also identifies several areas where further investigation is needed. For example, future studies could explore the long-term economic effects of surf tourism, particularly in terms of its sustainability and resilience to external shocks. Additionally, there is a need for more comparative studies that examine the economic impact of surfing across different regions, allowing for a deeper understanding of the factors that contribute to successful surf tourism development.

To sum up, this research adds a great deal to our understanding of surf tourism from an academic perspective. It provides theoretical advances as well as

real-world knowledge that may guide practice and policy. Through elucidating the economic, cultural, and social aspects of surfing, the study offers a thorough understanding of its potential to propel sustainable economic growth in coastal areas.

6 Final Statements

Several important suggestions are made based on the study's findings for local businesses, tourism planners, and legislators to ensure sustainable development in coastal towns like Nazaré while optimizing the economic benefits of surfing. First and foremost, infrastructure for surfing needs to be invested in. The research emphasizes the substantial economic influence that developed establishments, like retail stores, lodging facilities, surf schools, and transit systems, can have on a community's economy. Local governments can increase tourism and enhance visitor experiences by facilitating better access to popular surf locations and bolstering safety precautions including lifeguard services and public safety campaigns. Furthermore, giving local business owners financial incentives like grants or low-interest loans can promote the growth of surf-related enterprises, which are essential for maintaining economic growth.

Advancing surfing tourism is yet another essential suggestion. For Nazaré's surfing destination to completely capitalize on its distinct attraction, effective marketing methods are required. It is recommended that comprehensive marketing campaigns showcasing Nazaré's enormous waves, cultural legacy, and dynamic community life be created and disseminated via a variety of platforms, including as social media, travel websites, and international tourism fairs. Organizing international surfing events can help Nazaré become more well-known by drawing attention from the media throughout the world and creating chances for marketing campaigns that increase tourism. Working together with well-known surfers, influencers, and surf brands can also help Nazaré become more widely known and solidify its standing as a top surfing destination.

The sustainability of surf tourism is contingent upon the implementation of sustainable development techniques. In order to prevent overdevelopment and environmental degradation, the study highlights the necessity of environmental protection measures for popular surfing locations and coastal ecosystems. Enforcing rules—such as zoning laws that prohibit building next to surf breaks—as well as garbage disposal limitations and programs to restore natural habitats are essential. Additionally, public awareness campaigns and certifications for sustainable enterprises can be used to encourage businesses and visitors to adopt eco-friendly habits, like cutting back on plastic use and conserving water. To guarantee that the natural integrity of Nazaré is maintained, it is also advised to conduct routine monitoring of the environmental effects of surf tourism on the town's natural resources.

For surf tourism to grow sustainably, community involvement is essential. The study emphasizes how crucial it is to involve locals in the planning and administration of surf tourism in order to guarantee that the advantages are distributed fairly and that the community has a stake in the sector's prosperity. Surfing's cultural relevance in Nazaré can be preserved and promoted by funding regional cultural efforts that include surfing into celebrations, customs, and educational initiatives. Furthermore, establishing public meetings and community advisory boards as avenues for locals to engage in surf tourist decision-making processes can promote inclusivity and a sense of ownership. Putting into practice social initiatives that encourage local youth and underrepresented groups to participate in surfing, including paid surf instruction and community surf clubs, can enhance social cohesion and contribute to the overall well-being of the community.

Improving research and data collecting is essential for guiding practice and policy. Setting up a tourism observatory at Nazaré with the specific goal of gathering, evaluating, and sharing data on surf tourism can give decision-makers important information. This could entail doing environmental inspections, keeping an eye on economic indicators, and regularly surveying businesses and tourists. One way to further contribute to the academic literature on sustainable tourist development is to conduct studies on the impacts of surf tourism in collaboration with universities

and research institutions. Incorporating feedback methods, such community forums and online surveys, can also assist businesses and governments in addressing new challenges and continually enhancing the tourism experience.

These suggestions provide a tactical framework for optimizing the financial gains from surfing tourism in Nazaré while guaranteeing inclusive and sustainable growth. Local stakeholders may develop a strong surf tourism business that helps the town's economy and community by making investments in infrastructure, advertising the town as a major surf destination, supporting sustainable practices, encouraging community engagement, and improving data gathering. By putting these suggestions into practice, Nazaré will be able to maintain its distinctive cultural and environmental legacy while expanding as a popular surfing destination worldwide.

While this study provides valuable insights into the economic impact of surfing on local economies, it is essential to acknowledge its limitations, which may affect the generalizability and robustness of the findings. Addressing these limitations also opens avenues for future research that can build on the foundation laid by this study.

One of the primary limitations of this research is the reliance on secondary data sources. Although secondary data from reputable databases such as Pordata and Statistics Portugal were used to analyze key economic indicators, this approach inherently introduces certain biases. Secondary data may not always accurately reflect current conditions, as there can be delays in data reporting or discrepancies in data collection methodologies across different sources. Furthermore, the specific variables available in these datasets may not capture all the nuanced factors influencing the local economy, such as informal economic activities or the social impacts of surfing.

Future studies should include primary data collection techniques, such as surveying and interviewing local stakeholders, such as business owners, residents, and visitors, in order to lessen this constraint. Researchers may obtain more particular and in-depth information with primary data, which would enhance their

comprehension of the social and economic dynamics at work. Longitudinal studies that monitor Nazaré's and other surf locations' economic success over a prolonged period of time may also offer deeper insights into the long-term impacts of surf tourism. Research of this kind would be especially helpful in determining how surf tourism changes over time and how resilient it is to changes in the economy or outside shocks like the COVID-19 outbreak.

Another limitation of this study is its focus on a relatively narrow set of time series economic variables, primarily related to wages, employment rates, and business growth. While these indicators provide a solid foundation for understanding the economic impact of surfing, they do not capture the full spectrum of factors that contribute to the economic and social well-being of a community. For example, the study does not explore the role of surf-related businesses beyond tourism, such as manufacturing, retail, or media, which may also have significant economic implications.

Additional factors that represent the larger economic environment around surf tourism should be incorporated into the study in future studies. The supply chains of goods related to surfing, the financial effects of surfing media (such as surf movies and magazines), and the contributions of surfing culture to the creative industries might all be examined in this way. Investigations into the economic connections between surf tourism and other specialty tourist industries, such as eco-tourism or adventure tourism, may also shed light on the interactions and possible mutual reinforcement between these sectors.

The study also acknowledges the challenge of isolating the specific economic impact of surfing from other factors influencing Nazaré's economy. Coastal towns often experience economic fluctuations due to a variety of factors, including seasonal tourism patterns, broader economic trends, and local government policies. While the regression models used in this study attempt to control for these variables, it remains difficult to definitively attribute economic changes solely to surfing activities.

Future studies should use more advanced econometric models or experimental setups that enable greater effect isolation from surfing in order to overcome this constraint. For instance, researchers could compare Nazaré's economic performance to similar cities without a large surf tourism industry using difference-in-differences (DiD) techniques. This would paint a more accurate picture of the extent to which surfing is directly responsible for Nazaré's economic success.

Additionally, the study's focus on Nazaré, while providing valuable insights specific to this location, limits the generalizability of the findings to other surf destinations. Each surf town has its unique characteristics, including its cultural context, geographic features, and stage of tourism development, which can influence the economic impact of surfing in different ways. Therefore, the findings from Nazaré may not be directly applicable to other regions with different contexts.

Future research should conduct comparative studies across multiple surf destinations in Europe and globally. By examining a diverse range of locations, researchers can identify common factors that contribute to the success of surf tourism, as well as context-specific challenges and opportunities. Such comparative studies would also help in developing more generalized theories about the economic impact of surfing, which could be applied to a broader range of coastal towns.

Finally, while the study touches on the environmental and social implications of surf tourism, these aspects are not explored in depth. The environmental impact of increased tourist activity, such as coastal erosion, pollution, and habitat destruction, is a critical area of concern for sustainable tourism development. Similarly, the social dynamics of surf tourism, including issues related to gentrification, cultural commodification, and community displacement, warrant further investigation.

It is recommended that future studies adopt an interdisciplinary approach, incorporating sociology, economics, and environmental science to offer a more comprehensive knowledge of the effects of surf tourism. Case studies that look at how the social and environmental landscape of surf spots has changed over time, as well as the success of laws meant to lessen adverse effects, may be part of this. Furthermore, investigating locals' perspectives and experiences—especially those of

underprivileged communities—may offer insightful information about the social equity effects of surf tourism.

This study has provided a comprehensive exploration of the economic impact of surfing on local economies, focusing on the case of Nazaré, Portugal. Through detailed analysis, it has been demonstrated that surfing is far more than just a recreational activity; it is a significant economic driver with the potential to transform coastal towns. The research has highlighted the substantial contributions of surf tourism to local GDP, employment, and business growth, emphasizing the role of surfing as a catalyst for economic development.

The results of this study highlight the value of targeted marketing, sustainable development strategies, and strategic investments in surfing infrastructure. These components are essential for maintaining the natural and cultural resources that give places like Nazaré their special charm while optimizing the financial gains from surf tourism. According to the study, coastal towns can draw a wide variety of tourists, boost local economies, and encourage community involvement by making surfing a key part of their tourism strategy.

In addition to its economic contributions, the research has also shed light on the cultural and social significance of surfing. In Nazaré, surfing has become an integral part of the town's identity, influencing everything from local traditions to community cohesion. This cultural dimension adds a layer of value to surf tourism that goes beyond mere economic metrics, contributing to the overall well-being and resilience of the community.

However, this study also recognizes the challenges and limitations associated with surf tourism. The potential environmental impacts of increased tourist activity, the complexities of accurately measuring economic contributions, and the need for inclusive and sustainable tourism practices are all critical considerations that must be addressed by policymakers and stakeholders. The study has laid the groundwork for future research in these areas, offering a roadmap for further exploration of the multifaceted relationship between surfing and economic development.

In conclusion, this research has demonstrated that surfing is not only a powerful economic force but also a cultural and social asset that can play a vital role in the sustainable development of coastal communities. For towns like Nazaré, the strategic promotion and management of surf tourism offer a pathway to economic prosperity, cultural enrichment, and environmental stewardship. The insights gained from this study provide valuable guidance for policymakers, tourism planners, and local businesses seeking to harness the full potential of surfing as an engine for growth. The town's growth initiatives must continue to prioritize sustainability, inclusivity, and cultural preservation as Nazaré develops into a premier surfing destination on the planet. By doing this, Nazaré can guarantee that the town's natural beauty and cultural legacy, which have drawn both surfers and tourists, are preserved while ensuring that the advantages of surf tourism are experienced by all citizens. This study adds to our understanding of the social, cultural, and economic effects of surfing and lays the groundwork for future studies and policy decisions that will influence surf tourism in Europe and beyond.

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"There has been a noticeable increase in property development, with new hotels and surf shops opening near the beach."

Ferreira, R. (2024) *Request for Data on Surfing Business Growth in Nazaré*.

"During surfing events, we see a surge in tourist numbers, filling up hotels and Airbnb accommodations."

Gomes, T. (2024) *Request for Data on Surfing Business Growth in Nazaré*.

"There is a growing demand for surfing lessons and equipment, leading to the establishment of more surf shops and schools."

Mendes, J. (no date) *Request for Data on Surfing Business Growth in Nazaré*.

"With more visitors, our sales have increased, allowing us to pay our employees more competitively."

Oliveira, C. (2024) *Request for Data on Surfing Business Growth in Nazaré*.

"The revenue generated from tourism has allowed the local government to invest in better infrastructure and services."

Pereira, S. (2024) *Request for Data on Surfing Business Growth in Nazaré*.

"We've noticed a growing community of international surfers who have decided to settle in Nazaré, enriching our cultural diversity."

Silva, M. (2024) *Request for Data on Surfing Business Growth in Nazaré (Perfect Waves Nazare)*.

"The rise in surfing popularity has significantly boosted employment opportunities in the area. We've hired additional staff every year to cater to the growing number of tourists."

8 Appendices

Appendix 1 - Data

Table 1 below provides summary statistics for the dependent variables used in the main analysis, as described in Section 3.2. These variables, including employment rate, monthly earnings, value of buildings, and total council revenue, reflect the economic conditions in Nazaré between 2000 and 2023. The statistics offer insight into the data's distribution, capturing the average, minimum, maximum, and standard deviation values for each variable across the observed period. This data forms the foundation for the subsequent analysis conducted in Sections 4 and 5.

Nazare	Year	Employment Rate	Monthly Earnings (€)	Value of Buildings	Total Council Revenue (€)	Revenue: Current & Capital	Foreign Resident Population	Foreign Guests in Tourist Accommodation
	2000	42.5	605	91465	4,800	10,100	200	3
	2001	43.25	615.5	83392	5,000	10,300	207	4
	2002	43.95	628	85,000	5,200	10,600	215	4
	2003	44.65	636.5	90,000	5,000	10,900	228	5
	2004	45.25	649	95,000	4,900	11,200	240	6
	2005	45.8	665	98,000	4,700	11,400	265	6
	2006	46.5	678.5	92,000	4,300	11,700	290	7
	2007	47.1	691	105,000	4,000.00	11,950.00	320	7
	2008	47.85	712.5	88,000	3,800	11,300	350	9
	2009	48.4	769.6	112,350	3,377	11,509	517	12
	2010	48.9	824.8	128,800	2,344	11,719	550	11
	2011	49.35	814.3	130,512	2,121	12,365	541	13
	2012	49.75	813.5	108,852	1,449	11,683	543	13
	2013	50.1	813.4	264,946	909	11,520	514	14
	2014	50.55	811.6	129,599	548	11,005	495	15
	2015	51	787.8	97,421	5,291	16,116	490	16
	2016	51.3	826.2	100,519	1,424	13,265	544	17
	2017	51.75	842.7	203,537	1,617	12,852	595	25
	2018	52.15	881.1	115,365	1,178	13,672	643	27
	2019	52.4	917.6	116,506	2,046	13,963	828	30
	2020	52.55	930.2	120,000	2,100	14,200	982	31
	2021	52.65	950	115,000	2,200	14,500	1146	32
	2022	53.5	965.5	125,000	2,400	14,800	1290	34
	2023	53.45	980	135,000	2,600	15,100	1300	36

Table 2 presents the summary statistics for the key independent variables used in the analysis. It includes data on the number of surf competitions, surf shops, surf schools, and infrastructure investment, as well as surf tourists and marketing expenditures. This table provides an overview of the central surf-related activities and investments that contribute to the local economy, which are analyzed further in the main regressions. These variables are critical in assessing the influence of surfing on Nazaré's economic growth and development, offering a detailed breakdown of how surfing infrastructure and tourist activities evolved over time.

Number of Surf Competitions	Number of Surf Shops	Number of Surf Schools	Surfing Infrastructure Investment (€)	Surf Tourists (estimated)	Marketing Expenditure (€)
0	0	1	50000	5,000	20000
0	1	1	55000	5,500	25000
0	1	1	60000	6,000	30000
0	1	1	65000	7,000	35000
0	2	1	70000	8,000	40000
0	2	1	100000	10,000	50000
0	2	2	150000	12,000	60000
0	2	2	200000	14,000.00	70000
0	3	2	250000	15,000	80000
0	3	2	300000	18,000	90000
0	3	3	300000	20,000	150000
0	3	3	500000	25,000	200000
0	4	3	600000	30,000	250000
0	4	3	700000	35,000	300000
0	4	4	800000	40,000	350000
1	4	4	900000	45,000	400000
1	5	4	1000000	50,000	500000
2	5	5	1200000	60,000	600000
2	5	5	1500000	70,000	700000
1	5	5	1700000	80,000	800000
2	5	5	2000000	90,000	900000
3	5	6	2500000	100,000	1200000
3	6	6	3000000	120,000	1500000
4	6	6	3500000	150,000	2000000

Appendix 2 - Dickey Fuller Tests

Table 3 presents the p-values for each stage of the Dickey-Fuller tests, offering a clear understanding of the stationarity or non-stationarity for each variable across different methods.

Variable	Simple	Normalized	Differenced	Lagged
Employmentrate	0.0002	0.0002	0.0157	0.2724
MonthlyEarnings	0.9539	0.9539	0.0098	0.9985
valueofbuildings	0.0010	0.0010	0.0000	0.9831
TotalCouncilRevenue	0.1490	0.1490	0.0000	1.0000
RevenueCurrentCapital	0.3351	0.3351	0.0000	0.9990
foreignresidentpopulation	0.9988	0.9988	0.1473	0.2724
foreignguestsintouristaccommodat	0.9961	0.9961	0.0002	0.9985
numberofsurfcompetitions	0.9944	0.9944	0.0001	0.9831
numberofsurfshops	0.6150	0.6150	0.0000	0.9990
numberofsurfschools	0.9530	0.9530	0.0000	0.9990
surftouristsestimated	1.0000	1.0000	1.0000	0.9985
SurfingInfrastructureInvestment	1.0000	1.0000	0.9439	0.9831
MarketingExpenditure	1.0000	1.0000	0.9990	1.0000