ITU A|Z • Vol 21 No 1 • March 2024 • 133-147

Factors determining the gulet hull form and a look into the morphological development of the first touristic Bodrum Gulet "Botaş"

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Received: September 2023 • Final Acceptance: January 2024

Abstract
This article aims to complete the missing lines in the writing of the history of the evolution of Touristic Bodrum Gulets. Since the early 1960's, sailing and motor boats destined for touristic purposes have been found in Bodrum region. The article defines the origins of gulets and analyses their morphology. It describes the discovery the very first one specifically designed and built for tourism, introduced in 1967. Signs of government planning and financial support schemes for the development of this archetypial model have also been encountered.
Contrary to the story told - that gulets have been in the making since hundreds of years, it has been found that the hull form of gulets is relatively new and consists of rather modern lines, compared to other more traditional, classical boats such as tirhandils. The article relates gulets' hull lines with larger ships according to "the wave-line theory", a theoretical ship design approach put forward by naval engineer John-Scott Russell and influenced ship design globally, beginning in second half of the 19th century and continued to be influential for many decades.

doi: 10.58278/0.2024.42

Keywords
Bodrum Gulet, Morphological analysis, Wave-line theory, Wooden boat building, Yacht design.

1. Introduction

Shipbuilding along the Anatolian coast, in the sense known today, was initiated by the Phoenicians about 3500 years ago (Binder, 2012) . It has been an important economic activity that has continued with cultures who settled along the Anatolian coasts, throughout history. Ship frescoes dating back to the 16th century BC, found on the island of Santorini in the Aegean Sea, indicate that shipbuilding played an active role in the Eastern Mediterranean in the early periods (Köküöz and Örs, 1995). Ship depictions can be seen in the Karatepe (Azativattaya) North Gate reliefs, located within the boundaries of the Kadirli district, dating back to the Late Hittite Kingdom between the 12th and 7th centuries BC. Shipbuilding in Istanbul, which has been a center of trade throughout history, began in the Yenikapı shores during the Byzantine City-State period in the 6th century BC. It continued on different shores of the Golden Horn during the Eastern Roman Empire and Ottoman Empire periods. In recent times, by the end of the 20th century, due to the rapid growth of the city's population in the city center, boatbuilding has moved to Tuzla (Müller-Wiener, 1998), (Can,2013). It is seen that boatbuilding for military and commercial purposes started in very early periods in centers such as İzmir, Bodrum, Alanya on the Aegean and Mediterranean coasts, and in shipyards such as Tekkeönü, Bartın, Sinop, Trabzon on the Black Sea coast (Kademoğlu, 2000).

Wooden boat building is a construction practice still being carried out in most of the centers mentioned above today. This practice is carried out with the extension of traditional methods and knowledge (Kademoğlu 2000). Following the Industrial Revolution, the use of steel and later petrochemical raw materials became widespread in shipbuilding and workboat manufacturing. In industrialized countries, commercial wooden boats and shipbuilding had almost come to an end after World War II. In contrast, during the same period in Turkey's closed economy, the boat and shipbuilding activities based on materials such as steel could not progress due to the limited economic power of the private sector. In this context, wood was the material of choice in commercial boat and shipbuilding until the 1970s, without interruption (Binder 2012; Nutku and Küçük 1963; Kademoğlu 2000).

The early 70's were a period in which many traditional wooden boat builders transitioned from commercial boat production to tourist boat production. This transformation was shaped under the influence of government policies focusing on tourism, which began in the early 1960s and gained momentum from the 1980s onwards. Wooden boat builders were able to create a new and profitable business area by rapidly turning to the construction of sailing boats called "gulet," which became increasingly popular for marine tourism. Thus, a new era began with significant economic and cultural effects on wooden boat building. This period coincides with the changes in the economic, political, and cultural life of the society in the 1980s. Moreover, with the process of joining the European Economic Community, the appropriate environment was created for both quantitative growth and qualitative improvements in design and production practices in wooden boat building. In accordance with these, government incentives for supporting the private sector and regulatory changes in import and export policies have lead the design profession to become an integral part of the competitive toolset for boat manufacturers.

The study primarily focuses on the continuous relationship between the maritime tourism concept called "blue voyage" (Mavi Yolculuk) and the evolution of Bodrum's wooden sailing boat production. It examines BOTAŞ, which was identified as the very first sailing Gulet designed and built for tourism purposes in Bodrum. Based on the data obtained, Botaş has been found to have the characteristics of a typical "blue voyage" gulet and being the actual prototype for thousands of boats produced in the region. Using documents such as hull line drawings, semi-structured oral history studies based on face-to-face interviews, and data collected from construction sites and boatyards, the historical development of the Bodrum Gulet boat type,

and its relationship with Mediterranean gulet boats in general are analyzed. While the horizontal axis of the study focuses on the historical process of traditional wooden boat production, in the vertical axis, a causal relationship is established with the facts in the fields of tourism, design, economics, and government policies.

2. Gulet definition

In academic literature and popular publications, three distinctly different approaches are encountered in defining the Gulet:

- i) a general description of boat typology
- ii) a definition based on sail equipment
- iii) a definition based on a specific hull form

The first approach, which is a general description of boat typology, is used functionally in the tourism industry's popular publications and promotions. Tour operators, with simplicity in their communication with customers, define all types and sizes of wooden sailboats used for charter trips as "gulet". The second approach, which is adopted by boat designers and historians, defines gulets based on sail equipment. According to the second approach, a gulet term indicates a type of boat with two or more masts, parallel sails to the keel, and a mainsail located at the rear mast, with either a gaff (four-sided) or Bermuda (triangular) sail. Finally, the last approach adopted by boat builders defines the term "gulet" as a specific hull form, mostly built in wood but also made of steel, aluminum, and composite materials (Binder, 2015; Ağan, 2015; Köyağasıoğlu, 2014). In this study, the term "gulet" is discussed based on i) the etymological roots of the word, ii) the definition based on sail equipment, and iii) the definition based on hull form.

2.1. General description of the boat typology

The term "Gulet" is believed to have originated from the Dutch trading vessel "Galliot," which means a two-masted ship. Some sources associate the name with a small shark called Galéos or a seabird called Goéland. In Turkish, "Gulet" is synonymous with the French "Goélette," the Spanish "Goleta," and the Italian "Goletta," which are all defined as "Schooner" in English. The first Gulet in the Ottoman Empire built by the American engineer Henry Eckford in 1832 (Güleryüz & Langensiepen, 2007) was initially called "Uskuna" in Turkish, a derivative of the word "Schooner" which refers to the specific schooner rig type and not any of the then constructed hull forms. It is unclear when the term "Gulet" replaced "Uskuna" in Turkish, as the use of the word "Uskuna" decreased with time. According to Google Trends data from 2004-2021, "Gulet" and "Gulet Kiralama" (Gulet rental) are more frequently searched than "Uskuna" in Turkish, indicating that "Gulet" is the more popular. Based on this, it can be seen that in current usage in Turkish, the word "Gulet" is more commonly used than the word "Uskuna".

It is also observed that the combination of "Gulet" and "Gulet Kiralama" are frequently searched, indicating the importance and popularity of gulets for tourism purposes. Therefore, it can be understood that "Gulet" is more widely known as a type of boat used for blue voyage tourism, while there is no clear conceptual relationship between the term "Uskuna" and blue voyage tourism.

Today the word "Gulet" is frequently used and has become the prevailing term to describe wooden sailing boats, especially in the context of blue cruise tourism, in Turkey and worldwide.

2.2. According to the classification based on rigging: The definition of Gulet/Uskuna

Sailing vessels are usually described based on their sail rigging, which generates the mail propelling force of the vessel, such as "Barque", "Barquentine", "Cutter", "Brig", "Brigantine", "Ketch", "Yawl", which all define a specific setup of mast and sail arrangement. Hull form is not always taken into consideration as a defining factor. When researching the Turkish terms "gulet" and its synonym "uskuna", it has been seen that among nautical historians these terms are used to describe a specific rigging with two

or more masts, where the aft mast is either longer or the same length as the others, and the fore and main masts are equipped with Gaff or Bermuda sails. Some gulets also have small "main topsail" sails above the mainsail or are equipped with a square sail called "fore topsail" on the foremast.

In the historical context of shipbuilding, gulet nomenclature is first encountered as the definition of sailing ships of a typical sail equipment, whose examples have a rig with sails that are set along the keel -as opposed to square sails that are set at a right angle to the keel- and are known as "fore-and-aft sails." Gulets/Schooners are large, sailing, fast, highly maneuverable, and fishable boats that can be managed by a small crew and emerged in the early 1800s in the Nova Scotia region of North America (Köyağasıoğlu, 2015).

Between 1825 and 1935, the hull design lines of 137 different boats built in North America were compiled in the book "American Fishing Schooners" written by renowned Nautical Architect Howard I. Chapelle (1973). In this study, it is seen that these boats, called schooners, are generally broader and, have low freeboards, and often have a moveable centerboard for increased stability.

The variety of hull forms designed for American fishing schooners were shaped for navigation to Gloucester Harbor, a fishing trade center with shallow waters in those years, as well as sailing in open seas and in tidal waterways where the depths change frequently due to tides. Each of these hull forms were quite different from gulets that operate in Mediterranean waters where significant oceanic tidal events are not observed and ports and peers have stable depths, which allow deeper hulls. All the boats featured in this reference book refer to double-masted sailing vessels with a large sail area at the back and a smaller one at the front, in accordance with their sail equipment. Not one American Fishing Schooner of the period is seen with a ketch rig, which have the fore mast longer than the aft mast. The nomenclature is strictly rig-based. Accordingly, as it has been found in several dictionaries, the definitions of "Gulet" and "Uskuna" do not specifically refer to a particular hull shape, but rather to the sail equipment, as explained above.

2.3. Definition of gulet according to hull form

Ata Nutku (1963), following Chapelle's work, has performed mathematical calculations on gulets in Turkey. He evaluates that gulets are defined according to their hull form and uses the term "Gulet" to express a distinctive hull form with evident characteristics rather than for a specific sail equipment. He also states that this form is a downsized example of the Mediterranean "Bark" and explains that gulets have a full form due to the restriction of their length, with distinct shoulder widths at both ends joining a long parallel hull (Figure 1).

"Gulet: In fact, the Gulet, which is a Mediterranean structure, is a distorted copy of the "Barco" passed down to

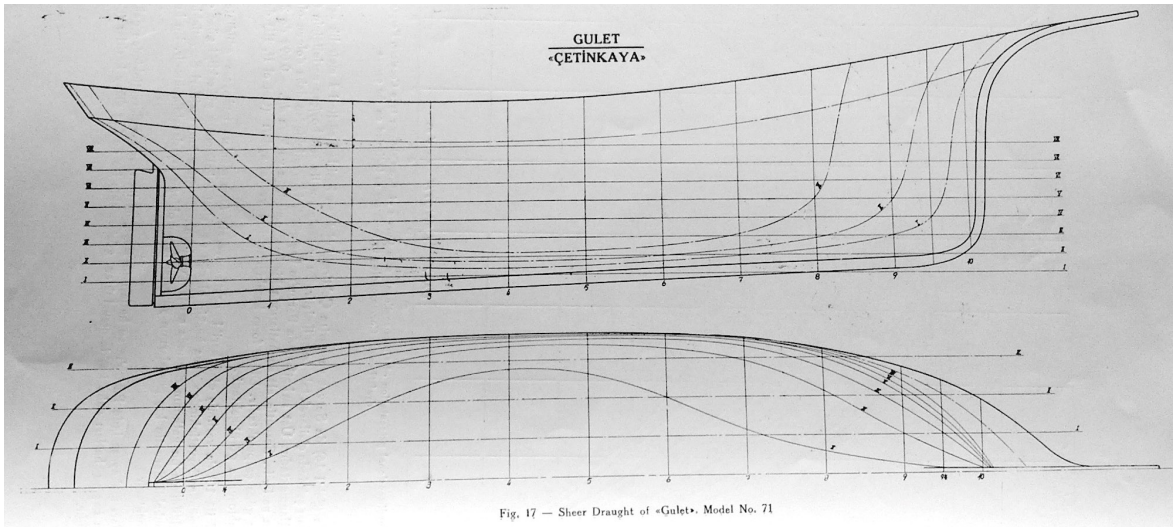

Figure 1. *Hull lines of Gulet "Çetinkaya" (Nutku and Küçük, 1963).*

us by Greek manufacturers, which the French called "Goulette." Its length has been restricted, resulting in a very full form, and both ends have joined a relatively long parallel hull with obvious shoulder widths. As can be seen from the cross-sections in Figure 19 and the hydrostatic curves in Figure 20, the stern is fuller than the bow. The waterlines consist of obvious inward-sloping curves. The bow sections have vertical sides and converge into a sharp corner curve with an increasing deck slope towards the bow. The stern sections resemble a V shape, and their union with the keel occurs with large curved curves.

The Gulet has a spoon-shaped stern. The full waterlines also represent a blunt form with steep buttocks. In both model experiments and sea experiences, the discontinuity of the flow here and the large resistance were observed, so the model's stern was extended with a "Cruiser stern" form, and the front lines were extended so as not to exceed the spoon. The great gain brought about by this can be clearly seen from the diagrams of the experimental results."

"In Turkey, coastal transportation is mostly carried out with wooden barges named after their hull forms, such as <Çektirme>, <Bumbarta>, <Gagalı>, <Gulet>, <Taka>, and <Mavna>."

Similarly, in his research focusing on 19th century mediterranean wooden shipbuilding, A. Delis states that some ships built on the island of Syros were described based on their hull and some on their rigging types. According to Delis (2016), small single-masted boats are generally defined by their hulls, while high-tonnage two or three-masted ships are defined by their rig.

The island of Syros, located approximately 100 nautical miles west of Bodrum, was one of the most important shipbuilding centers in the Mediterranean in the 19th century. More than 1,000 multi-masted gulets and barks were built on this Greek island until the 1850s, which was the birthplace of the low freeboard gulet that could be called the Mediterranean Gulet. As boatbuilding activities based on engineering began to spread in the Aegean, boats with a distinctive hull form, known as "Goletta" or "Goélette" regardless of their rigging, began to be called so. These were mainly used in the Mediterranean and characterized by a clipper-bow and a cruiser or "scoop" stern, beginning from mid-to-late the 19th century and throughout the 20th century.

The fishing gulets produced in Bodrum since 1957, which are the focus of this study, should be considered as derivatives of the Mediterranean Gulets (Figure 8). Although the first boats produced had masts for cargo transportation, they lost their sail rigging entirely with the widespread use of diesel engines. With this development, their hull forms were seen as a differentiating factor in line with the small boat-building practices of their craftsmen, and although produced without sails, they were still referred to as "Gulet".

2.4. Gulet hull design and construction

Wooden Gulets are sailing ships with a skeletal frame system, constructed either with the "Plank-on-Frame" or "Wood-epoxy" construction techniques. "Plank-on-Frame" and "wood-epoxy" are labour-intensive construction techniques that make it possible to construct a ship with limited human resources and primitive tools, providing effective, long lasting, durable results. While "Plank-on-frame" technique can be traced back to the 11th century A.D, the "Wood-epoxy" is only practised since early 1970's, as it relies on the chemical epoxy compound.

A gulet built with the "Plank-on-frame" technique is comprised of a keel, literally the backbone of the ship, a vertical stem which forms the bow, a sternpost forming the aft and a series of parallel transverse frame elements that define the hull form. This construction technique has become widespread over time and is still used in the construction of many types of ships and boats worldwide.

In this technique, design and construction processes can be separately planned ahead or can be carried out simultaneously by skilled craftsmen. As is usually the case, after the main dimensions have been determined based on a defined outline, the remaining dimensions are completed on the

workbench using traditional methods passed down from master to apprentice (Özkeskin, 2016). In the "Plank-on-Frame" technique, after the keel and the middle posts are bolted together, the sheer line and hull shape are determined using thin battens, or slats (Figure 2).

The fitting of the supports for the deck planking follows. The keel, frames, and supports form a strong, durable structure. The next step is to cover the structure with a hull. The inclined surfaces of the hull and deck are covered with solid wood strips (Köküöz and Örs, 1995). This used to be the most commonly used construction technique for tourist wooden boats such as gulets and tırhandils, until late 1990's. "Wood-epoxy" technique has been seen replacing the "plank-on-frame" technique in the last two decades. Due to its efficiency and effectiveness, this new technique is also preferred in new boats designed according to modern engineering principles.

2.4.1. An invalidated but partly effective concept in determining the hull form of gulets: "Wave-Line" theory

"Wave-Line" theory is a ship design methodology developed by British mathematician and shipbuilding engineer John-Scott Russell in the early 19th century, influenced by Isaac Newton's earlier writings (Ferreiro and Pollara, 2016). In late 18th century, Newton showed that the resistance, cross-sectional area, and speed of a three-dimensional shape can be calculated as a function. Taking this into account, Russell began his search for the "least resistant hull form" and began conducting his first pool tests in the first quarter of the 19th century to obtain empirical data on this subject. John Scott Russell tried to shape the hull form that shows the least resistance by formulating a theory called "wave-line theory", explaining the wave model caused by floating objects moving on the water surface.

Russell discovered that when a floating object, such as a ship, moves in water, it creates a complex wave system due to changing pressures underneath the surface of the water around it (Figure 3). Following these observations, he developed a wave formation and pattern theory that was highly influential in naval architecture and shipbuilding from the mid-19th century until the beginning of the 20th century. Although this theory is no longer supported by contemporary shipbuilding engineers, it provided a sound basis for builders of the time (Ferreiro and Pollara, 2016).

According to this theory, the waterline of the ship should follow a sinusoidal curve over a length that corresponds to 53% of the boat's length at the bow. It should flatten in a short section just behind the midship (the keel line) and then take a cycloidal shape at the stern over the remaining length that corresponds to 35% of the boat's length (Figure 3). The same hull design approach and similar properties has also been observed in Gulet hulls.

It was later proven by Froude that resistance is a variable that is proportional to the speed of the hull, and different ships performing different tasks should have different operational speeds, therefore, a single hull type cannot be proposed for all ships. Nevertheless, John Scott Russell's theory remained in the forefront as the only theory that produced partially correct results in the context of designing high-speed, lower-tonnage sailing ships until the 1860s. Other formulas such as the "Admiralty Coefficient" of the British Royal Navy, which were based on the principle of comparing the resistance of ships with other ships, required having a high amount of data. This method adopted by the Navy and major shipbuilders was a method that smaller shipbuilders knew but could not adopt due to the lack of implementation opportunities. The Wave-Line theory, on

Figure 2. *"Plank-on-Frame" technique (Kızılağaç, Bodrum, 2018).*

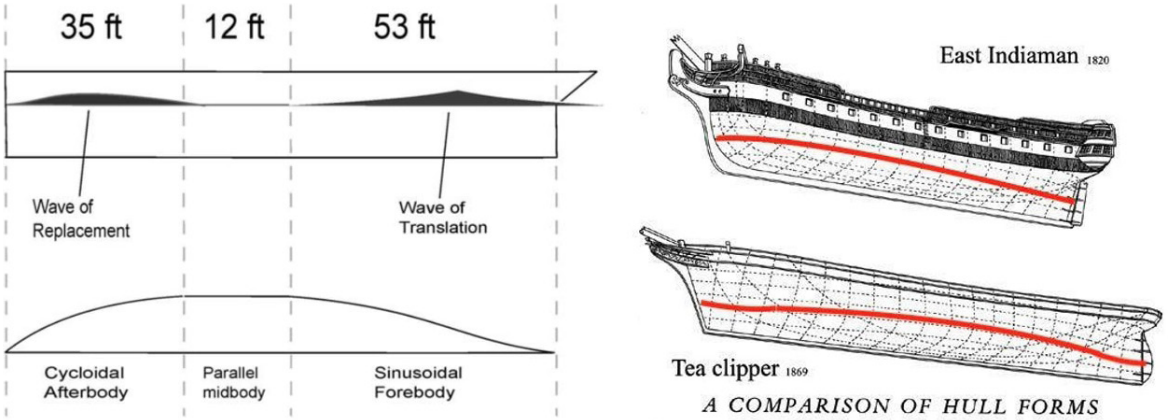

Figure 3. *The wave generation of a hull, shaped according to the Wave-Line Theory (left top) and a half-top view of the waterline (left bottom) An East Indiaman Company Ship (right top), a Tea Clipper (right bottom). (Ferreiro and Pollara, 2016).*

the other hand, has been accepted as a theory that yields "good enough" results, easy to apply by shipbuilders with some knowledge of geometry (Ferreiro and Pollara, 2016).

As seen in Figure 3 (right bottom), Tea Clippers have a bow shape that cuts through the water at a narrower angle and has a sharper entry angle. The shape widens along the waterline for a period, remains parallel for a time, then narrows again toward the stern in order to produce the least possible turbulence in the water. The East Indiaman type of ships, Figure 3 (right top), belong to a period when scientific methods for researching hydrodynamic resistance in shipbuilding had not yet been developed. The designs for these types of ships were produced by imitating the body structures of fast-swimming marine creatures in a technique called biomimicry. This approach, which claimed that the best hydrodynamic performance would be achieved by forms that resembled swimming fish, resulted in forms with the widest part forward of the waterline and a long, slender tail: (Cod's head - Mackerel tail). It was understood from the beginning of the 19th century that this form, which meets the water at a very wide angle, was not in accordance with hydrodynamic principles. This general approach was abandoned starting from the 1830s. (Ferreiro and Pollara, 2016)

The aesthetic quality of hull shapes produced according to the Wave-line theory principles also had a significant impact on popular culture. These enormous sailing vessels, famous for their speed, became the subjects of stories, novels, and films for many years, and during the golden age of seafaring, they became a global phenomenon. Using the scaling method, examples of clipper-type hull shapes developed using the Wave-line theory were produced in different sizes. With this simple parametric formula, it was possible to design fast and resistant boat hulls of the required size and capacity within certain limits. As a result, although the theory lost its name, it continued to be valid.

Through the analysis of hull lines data, it is observed that the masters' methods used to determine the forms of Bodrum gulets overlap with the "wave-line" theory and have influenced the Bodrum-made tourist wooden gulets that follow the Botaş boat. The production methods based on the master-apprentice relationship, which allowed the development of hull forms without complex calculations, have a distinctive position in terms of production techniques. Although the construction technique is the same, gulets differ from tirhandils, another traditional wooden boat type, in terms of the hydrodynamic properties of the advanced hull forms. They should be considered rather newer examples in the evolution of wooden sailing ships.

2.4.2. Early gulet production in Turkey

Due to their functions and needs, wooden gulet tradition has emerged on both the Mediterranean and Black Sea coasts of Turkey. Although

there is no specific boat defined as "Mediterranean or Black Sea Gulet" or "Mediterranean or Black Sea Schooner" in literature, it can be seen that the multi-masted boats such as Brigantino, Bark, and Barkantin, which are frequently encountered on the West and North African coasts, are built in a similar form to each other due to the similarities in their size and functions. Today, it is observed that the tourist types built on the Mediterranean coasts of Turkey are shaped in a similar hull line to them and their superstructures are similar to them.

Wooden gulets began to become widespread in the Mediterranean region after the second half of the 1800s. They are seen as a type of sailing ship that is fast and requires few crew members, usually between 20 and 30 meters in hull length (Delis, 2016). The hull forms of Mediterranean gulets show a great similarity to the fast hull lines of the "Clipper" and "Barque" sailing ships developed in the 19th century with the use of engineering mathematics and the first pool experiments. The hull structures of gulets should be considered as a scaled adaptation of the hull structures of North American 'Clipper' boats. Examples called "Brigantino Goletta" in Italy, "Skuna" and "Goleta" in Greece, and "Pailebot" in Spain have similar lines to gulets.

Clipper ships are trading vessels with a "V" profiled hull, pointed bow, and inclined head slabs that carry less cargo but can go very fast compared to 17th and 18th century galleons. Starting from the 19th century, these ships, which entered the Ottoman Navy and were widely used in trade fleets in the Aegean and Mediterranean, continued their activities with functions such as fishing and cargo transportation in many Mediterranean countries until the mid-20th century. At the same time in Turkey, gulet construction continued on both the Black Sea and Mediterranean coasts during the same period. It is known that gulets for cargo transportation were built in Bartın, İnebolu, Samsun, and Trabzon provinces on the Black Sea coast of Anatolia during the 20th century (Kademoğlu 2000).

The weakness of the Black Sea region's land transportation infrastructure and its unsuitability for cargo transportation required a large proportion of goods and freight to be transported by sea. The fact that the Black Sea coasts are exposed to strong winds from the north and the high waves of the Black Sea has determined the hull structure of the ships operating in this region. In this regard, especially since the beginning of the 20th century, high-tonnage and high-bordered gulets have been built in the Black Sea, unlike those on the Mediterranean coasts. Black Sea gulets are heavy ships with high freeboard and a straighter sheer line, built specifically for cargo transportation. They differ from Mediterranean sponge and fishing gulets in terms of draft, tonnage, bulwark height, and sheer line slope. Mediterranean gulets, with their steeper sheer line, lower structure, and size, are suitable for Trawl fishing in the Aegean Sea.

A photo of a Black Sea gulet taken in Bodrum Harbor in 1959 with the newly constructed "Ege Gülü" trawler on the left, clearly shows the functional and dimensional differences between the two types (Figure 4).

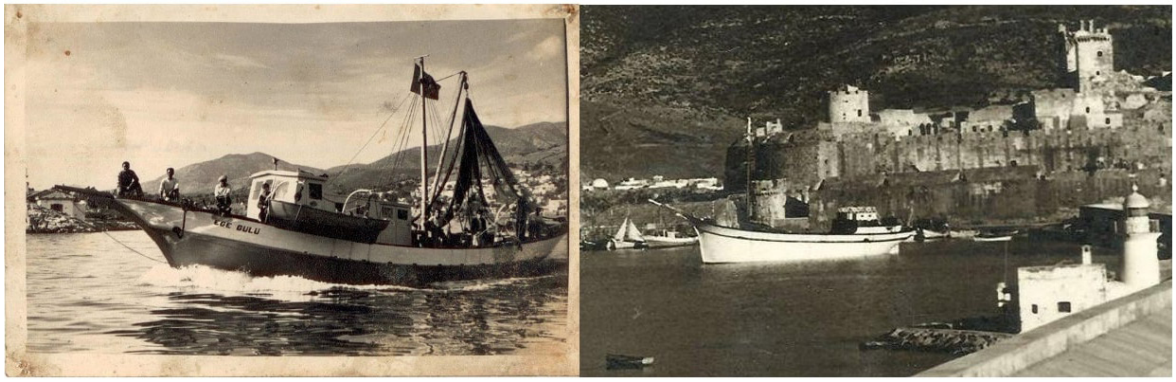

Figure 4. *Ege Gülü (left) and a Black Sea Gulet (right) in Bodrum Harbor, 1959 (Şengün,2017).*

2.4.3. Bodrum's first fisherman gulets "Ege Gülü" and "Mustafa"

1957 is the year when two small wooden boat builders in Bodrum have started to build large motorized gulets for offshore fishing (Binder, 2012). Prior to this, the earliest identifiable motorized fisherman gulet "Zehra", was made in Italy in the 1940s (Kükner et al., 2009). This Italian boat model, which drew the attention of fishermen in western Turkey with its marine features, can be considered as a regional example. It is also known that a research report submitted by prominent nautical arcihtect Howard I. Chapelle to the Turkish Government included wooden fisherman boat designs that could be produced using traditional methods. This report was the result of the research and project development work conducted in Turkey under the FAO (Food and Agriculture Organization of the United Nations) (Popular Boating, May 1959). The well documented research includes plans of a fishing gulet of similar size and lines to the Bodrum ones, built by Durmuş Ali Torlak in Istanbul, in 1955.

In 1957-1958, two craftsmen who were both immigrants from Crete and knew each other well, Güllük's Nami Uyav and Bodrum's Ziya Güvendiren, built a fisherman Gulet each. These boats were launched in Güllük and Bodrum. The first Gulet built by Nami Uyav was called "Ege Gülü", and the first Gulet built by Ziya Güvendiren. was called "Mustafa". (Binder, 2017). In the following period, there was a constant increase in the number of Bodrum's fisherman gulets. These boats, mainly used in trawling, use bottom-scraping net systems in deep waters. Since this fishing technique also includes situations where a large and heavy net must be collected perpendicular to the wave direction from the back of the boat, gulets with a high stern structure, such as a high balcony, are particularly preferred in this fishing technique as they better withstand the incoming wave from the back (Ağan, 2019).

3. The course of yacht tourism and gulet production in Bodrum

The impact of yacht tourism can be examined both from a socio-economic perspective as well as from a socio-cultural perspective. Yacht tourism activities have reached an economic size of around 250 million Euros annually (Deniz Turizmi, 2019). This tourism activity, also known as "Blue Voyage," is currently carried out from the main ports of Muğla province such as Bodrum, Marmaris, and Fethiye. According to the DTO data, as of 2019, more than 3,500 boats, including 1,571 "Yacht-Gulet, etc." and 2,155 "Day Trip Boats," were registered in ports as Maritime Tourism Vehicles in 2018 (Deniz Turizmi, 2019).

Wooden boat production in Bodrum, where more than 1,000 wooden boats have been produced since the 1970s, has started in the region called the Ottoman Shipyard, located downtown. In the late 1970s boat construction activities have moved outside the city center. The first shipyard in İçmeler was established by Erol Ağan with limited facilities. There were no roads or infrastructure. An economic cluster was quickly formed, which provided knowledge transfer, competition, and synergy. Today, Bodrum continues to maintain its effectiveness as one of the leading centers of wooden boat production.

When evaluated in terms of employment, it can be concluded that more than 10,000 sailors work on these 3,500 touristic boats that operate for a 6-month long tourism season between April and October. In addition to this employment, it can be seen that Yacht Tourism has become an industry that serves tens of thousands of people when considering the workers who work in wooden production in shipyards and those who provide services related to cleaning, maintenance, and logistics when the boats dock at the port.

Bodrum, a coastal town with a small population of 10,000, turned into a center of attraction with the popularization of the Blue Voyage concept. The constantly increasing demand for tour boats initially led to the quick conversion of existing fishing and sponge boats into tour boats. This was followed by the idea of developing boats specifically designed for tourism.

3.1. Morphological changes: From fisherman's boat to touristic yacht

Due to emerging developments, gulets which were designed and built for fishing purposes were subject of interest of tourists. The process of gulets being transformed into touristic boats started in Bodrum in the mid-1960s. However, during archivial research, an older visual evidence of a large gulet, albeit italian, transformed into a touristic gulet has been found. In a series of photographs from 1957 a three-masted gulet is seen anchored in front of Bodrum Castle (Figure 5). Sebahattin Efe's archive, who provided the pictures, included no information about the yacht.

The outcomes of an online visual search conducted with the English keywords "triple masted schooner" and Italian keywords "goletta tre alberi", due to the three-masted rigging, indicated that the boat seen in the picture above was the Italian yacht "Francesco Petrarca". The 49 meter vessel, then named "Taitu", was built in 1941 at the Benetti shipyards in Viareggio, Italy and was converted from a cargo ship to a private yacht, using an approach similar to the transformation observed in the evolution of Bodrum Gulets.

In this photo, the aforementioned sailboat is seen anchored right in front of the carpentry shop of master Ziya Güvendiren, adjacent to the castle wall by the seaside. It could be speculated that Ziya Güvendiren, living and working in the same neighborhood (Binder, 2015, Özkeskin 2015), and "Taitu," which was moored right in front of Ziya Güvendiren's workshop in Bodrum for a while, very likely had a direct interaction relationship. Similarly, it is understood that luxury sailing boats of this size and similar structures were coming to Bodrum for tourism activities in those years. Therefore, it is possible to say that this photo series in Sebahattin Efe's archive is an important source and document about the possibility of inspirational interactions.

In the following years, the transformation of fishing boats for tourism purposes has begun. It is known that a gulet (Figure 6) owned by Naci Bey in Kuşadası and approximately 19 meters long, which was used for fishing, was converted into a tourist gulet by adding a cabin and started to be used in long blue voyages in 1961 (Cevat Çapan, 2020). With this Gulet called "Macera", (Adventure in Turkish), Azra Erhat, Sebahattin Eyüboğlu, and Cevat Şakir Kabaağaçlı organized blue voyages with their group of friends (Sözer, 2020).

"Macera" is known to be the first known tourist boat converted from a gulet hull. The deck arrangement and cabin are in a different layout from the archetype Botaş. The captain's cabin is in the middle and high, and there is a closed cabin behind it. The toilets are outside. It does not have the ability to cruise with a sail. Apart from the bow and round stern structure that defines the hull shape, there is almost no visual similarity with today's gulets. It cannot be considered as a typical gulet.

3.2. Critical moment: The adaptation of "davlumbaz" onto the cabin

The primary visual element that defines the tourist gulet archetype is the open-towards-aft pilot house, or "davlumbaz". This is comfort attachment added onto the top of passenger cabins, providing protection from wind gusts, water spray and sun rays. During the evolution of wooden tourist gulets, economic and social factors, as well as technological advancements, have

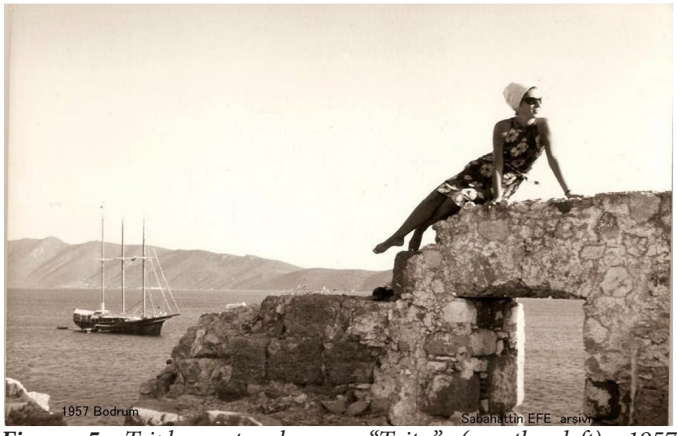

Figure 5. *Triple-mast schooner "Taitu" (on the left), 1957 (Sebahattin Efe Archive, 2017).*

Figure 6. *Reconstructed image of the "Macera" boat in 1961 (Cevat Çapan Archive).*

played a significant role. Although it is a just simple roof structure, the emergence of the davlumbaz (Figure 7) on sailing boats has been possible as a result of technological advancements brought about by the Industrial Revolution. This is due to the fact that, thanks to the easy adaptation of the diesel engine on boats, the importance of sail equipment in commercial shipping has rapidly declined.

In boats equipped with engines and propellers, masts are shortened and components belonging to sail system are removed because there is no longer a need for sail equipment. With no sail equipment that needs to be constantly monitored, the need for the helmsman to steer the boat in the open air has vanished. Thus, the weatherproof pilothouse that can be used by the helmsman and the crew on deck has emerged. This new element which was first seen in motorboats such as "autoboot" in the 1920s was later adopted in motor-driven sailboats after World War II and evolved into a new type of boat called "motorsailer", such as Design 0924 by John G. Alden from 1954, with the typical example of early "pilothouse motorsailer" yachts. The pilothouse, clipper bow and fine sheer line of this yacht are also seen constituting the characteristic design elements on the touristic gulet type that will be examined in the next section.

Figure 7. *Two tirhandils, one open deck and one with cabin and pilot house (Şengün, 2017).*

Figure 8. *BOTAŞ. Life Magazine, May 22, 1970.*

3.3. The birth of the Bodrum Gulet: Haşim Birkan and the 'BOTAŞ'.

The sailboat seen in Figure 8 is the first purpose built tourist gulet in turkish maritime history that the authors were able to identify.

The emergence of the first example of the Touristic Bodrum Gulet, which continues to evolve today, and its transformation into a typology dates back to 1966-1967. Various factors from different fields were effective in shaping the archetype. Botaş, the first boat that could be called the Bodrum Gulet and built from scratch, was launched in 1967.

BOTAŞ was built by Bodrum wooden boat master builder Ziya Güvendiren for Haşim Birkan, an Istanbul-based tourism entrepreneur and owner of a tourism company of the same name as the boat. BOTAŞ is understood to be launched in 1967, thanks to the pictures taken by Prof. Dr. Ömer Yağız in 1967. Despite various visual documents related to BOTAŞ being found in different sources during the research, no written text or any official port record was found about this Gulet.

The name of the boat is also invisible in the current pictures (Figure 9, Figure 10). This article is the first study to examine the BOTAŞ case, which has not been previously reported in the literature, and is based on face-to-face interviews conducted as part of field research carried out between 2015 and 2019 (Binder, 2015, 2017, 2018; E. Ağan, 2017; İ.Ağan, 2017; Demiröz, 2017; Onur, 2017).

Thanks to this research, the history of gulets specially built for Blue Cruise in Turkey can now be dated back to 1965-1967. It is understood that in 1967, the first tourist sailing gulet named BOTAŞ, which has a gulet hull and a gaff sail ketch rig, was launched from the shipyard on the east

side of Kale, where Ziya Güvendiren's shipyard is located in Bodrum. Since the construction of these boats takes an average of 14-18 months, it can be predicted that BOTAŞ was laid down in 1965 or 1966 (Özkeskin, 2017). BOTAŞ bears similarities with Alden's pilothouse motorsailer design no 0924, which is a type of boat with both sail and motor drive. Both have a protected, enclosed pilothouse (davlumbaz) above the deck level.

In various sources, it is seen that classic hull forms such as Tirhandil were combined with a pilot house and high cabin structures in some pre-1967 constructions, such as "Bebek" tirhandil. However, BOTAŞ emerged as the first example in Turkey where the gulet hull form and open pilot house on cabin combination are used together. By combining a relatively modern hull form developed in the late 19th century with a hood, cabin, and several sails, the Gulet, which is the most well-known example of yacht tourism in Turkey, was created.

BOTAŞ was discovered thanks to two photos (Figure 9) uploaded to the "Eski Bodrum" messaging group on Facebook in 2016. These photos, which are in color and dated by the photographer himself were provided by Prof. Dr. Ömer Yağız and belong to a photo series he had taken during a trip to Bodrum in the summer of 1967.

In these two photos, a few newly built boats in front of the "electric generator building" can be seen on the Girit Neighborhood on the east side of the castle. The boats seen in this area where Ziya Güvendiren and Erol Ağan's workshops are located can be examined from the profile and top view. In the top view photo taken from the castle, the date of the photos can be verified thanks to the Aya Yorgi church, known to have been demolished in 1968 (Binder, 2017).

Initially, no clues were available about the names of the boats in Figure 9. However, it was revealed in a series of interviews conducted by the author that the dark boat with a gulet hull form was called "BOTAŞ". For these interviews, the above pictures were printed and shown to interviewees, which were conducted by voice records and later decoded. Master carpenter Hasan Demiröz, who worked with Erol Ağan for many years, Erol Ağan's brother İbrahim Ağan, and Erol Ağan himself were recorded identifying the boat (E. Ağan, 2017; İ.Ağan, 2017; Demiröz, 2017).

In another voice recorded interview, the same photos were shown to Captain Özcan Onur, an early tourism entrepreneur who invested in the "Heyamola" gulet, built by Erol Ağan in 1972. Having started in the tourism sector in the late 60's, Captain Özcan Onur confirms the information given by Erol Ağan and verifies that the boat belonged to Haşim Birkan's BOTAŞ. He states that Haşim Birkan established Bodrum's first tourism enterprise in Bardakçı Bay under the name BOTAŞ Camping, and had other small boats built, all of which had names such as BOTAŞ-1, BOTAŞ-2, etc. He also states that the Gulet in the picture was named BOTAŞ-6. Of particular interest, Onur also expressed that Birkan had them built with the tourism incentive loan received during the time of the first Minister of Tourism, Nihat Kürşad (Onur, 2017).

Several cross-checks have also been made: In a newspaper article from June 1967, famous singer Zeki Müren, who came to Bodrum, states that he took a tour with a boat and its captain, allocated by Haşim Birkan after his arrival to the town. Existing information about Haşim Birkan, who commissioned Turkey's first known purpose-built tourism gulet does not refer to the boat he had built, but rather to his Botaş Camping, established in Bardakçı Bay in 1965 (Gür 2002; Mansur Coşar, 2015).

As the result of subsequent research on Haşim Birkan, a search conducted on the website www.nadirkitap.com on January 23, 2018, revealed that there was an article about his house in Bodrum in the "Ev Dekorasyon" magazine. Upon obtaining and analyzing the 19th issue of the magazine published in March 1978, the same photo of BOTAŞ has been found in the article. The photo (Figure 8) was published in Life magazine in 1971 and was clearly visible in one of the photos in a showcase in the interior (Çetin & Atilla, 1979).

Figure 9. *"A look from Bodrum Castle to the Greek Neighbourhood" (Ömer Yağız, 1967).*

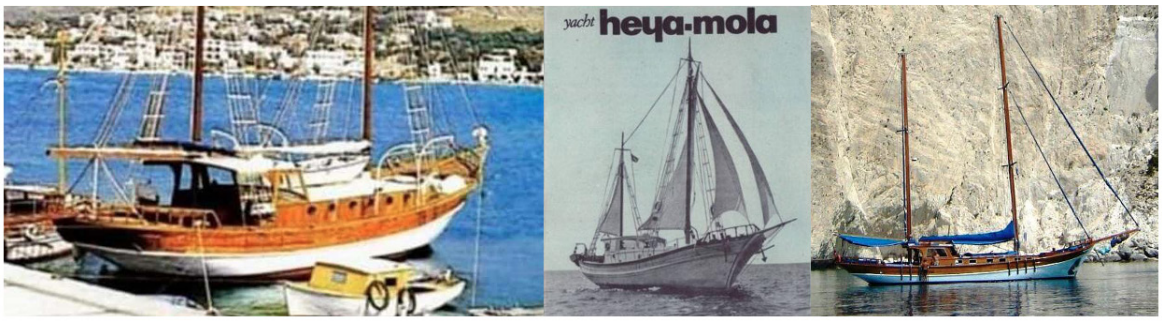

Figure 10. *First gulets built in Bodrum, following BOTAŞ. Left to right: "Balık", 1971, "Heyamola", 1972, "Elpenor", mid 1980's.*

With the first Gulet identified, it has been possible to observe that in the 56-year period from 1967 to the present day, the characteristic features, plan, and aesthetics of BOTAŞ built by Ziya Güvendiren were rapidly embraced by the craftsmen and customers of Bodrum. BOTAŞ should be considered as the archetype of all "Gulet" built in Turkey until today. Some examples such as Erol Ağan's gulets: Balık launched in 1971 and Heyamola built in 1972 after BOTAŞ, and Elpenor built in the 80s, which have a classic gulet hull form, can still be seen in Bodrum harbor (Figure 10).

4. Conclusion

In this article only a specific type of Gulet based on "hull form definition" and its adaptation for tourism are examined. The two other type of boat hulls that are classified as wooden sailboats and called "Gulet" in popular culture are omitted.

The touristic gulets designed under the influence of the technological possibilities and socio-economic developments of the period in Bodrum are not purebred sailboats like their ancestors used for fishing, sponge diving, and transportation, but rather derivatives with cabins and pilot house extensions added on top of their cargo spaces. With this aspect, gulets can be considered closer to the motor-sailor typology. The hull shape of tourism gulets has been continuously optimized for their new functions that require low load, fuel economy, high cruising speed, and comfort.

When the development of wooden tourist gulets is examined, four basic characteristics of the hull shape can be considered as the determining factors. i) The curved aft overhang shape called "round stern". ii) The concave front stem form called "clipper bow" and the long bow spirit iii) The elegant curved sheer line that connects the upper ends of these two curves. These hull lines give a unique character to a gulet and differentiate it from other boats such as tırhandil and Aynakıç. iv) The inseparable part of the identity of a gulet is the pilot house, or "davlumbaz", which is an extension of the passenger cabin that does not depend on the hull shape and rises on the deck. This element, which protects the captain and passengers from spray, wind, and harsh sunlight, albeit a simple roof structure with its front and sides closed with glass and its rear open towards the stern deck, is maybe the strongest visual component. This structural element, built with

wood, has become essential for tourist gulets over time, as it establishes a protective and comfortable relationship with users. While sailing equipment has shrunk and disappeared like the lost limbs of evolving organisms, the pilot house has been developed, expanded, and diversified over time.

In 1971, BOTAŞ and the values it represented, which appeared on the first page of an article in Life Magazine about tourism in Turkey, played a significant role in the tourism history of Turkey. Haşim Birkan, who ordered the first tourism gulet with "davlumbaz", and master Ziya Güvendiren, who designed and built it, together created the first tourist gulet by combining local building knowledge with the needs of the day. By introducing this model to the Blue Voyage / Mavi Yolculuk activity, they provided a unique, comfortable holiday experience and thus created a very strong demand that would last decades, in the same direction.

Research and existing narratives about gulets suggested that these "traditional" boats are an economic value that somehow miraculously emerged as a result of the efforts of free entrepreneurs. Based on the findings, this article disagrees with this narrative in two key points: First, the statal/governmental planning decision for Bodrum Region to become a tourist center was determined at a very early stage, in early 1950's. Although it is claimed that the local pier was built with the aim of mandarin trade and the protection of fishing gulets through the insistence of a local member of the parliament, it has become clear that this protected harbor was actually built as an investment for the region to become a tourism center.

The second finding is that the first tourist boat built in this region, BOTAŞ, was commissioned and operated by Haşim Birkan, an Istanbul-based entrepreneur, through the tourism investment incentives made by the government at that time. According to records, in 1956-57, the government, through FAO, consulted with Howard I. Chapelle for the design of wooden fishing boats. In a separate Milliyet newspaper article from 5th of May, 1960, Prof. Fritz Baade, also a FAO consultant and advisor to Turkish Government, suggests the development of coastal tourism boats, up to 200 tons.

These findings indicate that an organized planning activity focusing on diminishing trade deficit by generating income from fishing and tourism activities has been carefully and consistently implemented over the course of many years. Gulet and Blue Voyage Tourism coupling, which is a perfect example of a Product/Service System Design, has been one of the primary economic activities that is used to promote Turkey's rich natural and historical resources and generate income, since the 1970's. The evolving morphology of gulets and its relation with various business models and the export potential of this product/service system, mainly consisting of a locally designed wooden sailing boat built with vernacular building techniques and additional services regarding luxury accomodation, culinary culture, historical site visits and watersports activities, is a subject of national interest that needs further research from socio-economic, tourism, history and product design perspectives.

Acknowledgements

This research has been financially supported by ITU BAF fundings, as part of a Doctoral Thesis conducted at ITU Department of Industrial Design.

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