

IS TURKEY REALLY A GLOBAL COMPETITOR IN YACHT BUILDING INDUSTRY?

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Abstract: As it is well known, Turkey took place near the top of 24m or longer yacht building countries. In the world there are a few leading countries which dominate both production and other processes. In recent years, Turkey is one of the yacht building centers in the world and attracts not only key players' interest but also tourists' with long and beautiful coastal lines and long sunny season. From this point of view, Turkish yacht building industry investigated in terms of design and engineering, yards locations, yacht types, project length, installed engine, transmission or propulsion systems, navigation and telecommunication systems, generator, hull and superstructure materials and classification in this study. According to the results, it can be said that Turkey has lots of advantages to compete with the leading players of this industry but must be focused on added value activities to increase its share from the market.

Keywords: Yacht, Super or Mega Yacht, Turkish Yacht Building Industry

Introduction

Shipbuilding is one of the essential industries of the industrialized countries and it can be classified as commercial and pleasure in terms of type of vessels such as container ship or yacht, respectively. Both building activities are important due to provided added values. Moreover, shipbuilding industry can be assumed as strategic when high tech buildings such as battleship taken into consideration. This strategic industry not only provides military contributions to national security but also to all partners such as suppliers that established in the regions or countries. Therefore shipbuilding is an industry that creates added value. In the world, there are some long-established firms that manufacture or produce shipbuilding related products, tools, and etc. Therefore shipbuilding is an industry that has inter-linkages. For example design and building activities of projects can be done in different locations. Installations can be supplied from different countries. And, finally projects can be finished in a yard.

Term of yacht explained by Aydın (2015), Göksel (2006, 2003), Dear and Kemp (2005), Atmaca (2007), Akyürek (2013), Simpson and Weiner (2001). Yacht building is sub-branch of shipbuilding industry. But it is utterly different from this industry due to some properties such as added value, building duration, investment, and etc. (Turkish Chamber of Shipping, 2015). Yachts are much more emotional than other types of vessels due to perceptions of the potential user or owner. Also, building processes requires more attention and skill because of the exterior and interior designs, expectations, requirements, etc. Seaworthiness, large cabin accommodations, beauty, and high speed are the general characteristics of yacht design (Skene, 1904). According to Aydın (2015) design phase of the yacht projects has important effects on building processes. And building processes starts with the conceptual designs that performed to reveal demands or requirements. Then following steps take place till the delivery.

- Research and development phase (design detailing and engineering)
- Perfecting or purification phase (layout improvement, 3D modeling and detailed construction drawings)
- Building and installations (hull, superstructure, mock-ups and installations)
- Launch and delivery phase

Because of lots of factor such as limited space, function, environmental and climate conditions, and etc. taken into consideration, interior design of yachts has influences on furniture as construction, functionality and aesthetic shape (Stancu et al. 2006). According to Altın (2014) boats became more qualified and functional when furniture became qualified and yachts have been fitted by fixed or movable unique furniture.

According to Duman (2015) yacht interiors, indeed, did not reflect the architectural design codes to ensure physical and psychological comfort of human on-board. Comfort on board also depends on noise and vibration. Pais et al.

(2017) and Aydin et al. (2015) stated the importance of noise and vibration damping not only to fulfill the class requirements but also ensure comfortable interiors.

Gurler (2013) stated that owner of a yacht has perception or feeling that he or she is the member of a certain social group. Also, showing interest to yachts or taking sea journeys may indicate wealth in social sphere (Ryan, 2006). Boats, historically, are indicators of wealth and social status. And, yachting started in 17th century and divided into two; first period till 1815 and second period from 1815 to 1903 (Clark, 1903). From this date, technological developments alter the yachts as everything. Nowadays, yachting industry has been incomparable expanded and evaluated (Nicolantonio, et al, 2015). Then, bigger, more luxury, faster, more comfortable yachts built thanks to developments. This situation was well-explained by Naujok (2002) as boats which are longer than 11m require lots of technologies. And as Payne and Siohan (2008) stated, customers or potential users demanded or wished comfortable, functional, and aesthetic yachts. Therefore these were resulted increase in costs. According to Newing (2013) building smaller yachts without sacrificing quality is the simplest way to decrease costs and design phase is the beginning of cost control. But, this means limited interior or exterior for everyone and everything. Therefore, wealthy people demand everything larger even if the yacht can accommodate a few instead of tens of guests (Newing, 2013). Another way to reduce the cost of a yacht is chartering but lots of owners do not charter their yachts (Newing, 2013).

Khufu, 4500 years old boat, buried in the Keops pyramid (Göksel, 2006) and Azzam yacht, built by Lürssen in Germany, confirms this wealth and social status case from past to present, respectively. Yachts are vessels associated with wealth and luxury (Tokol, 2010, 2013). Yachts, especially luxury ones, represent the status and high social value (Nicolantonio et al. 2015). According to Göksel (2003, 2004) yachts are getting similar to each other in terms of paint, hull and superstructure due to conservative approach and un-scrutinizing. Customers or builders should reflect their authentications to the projects to eliminate this formation. And, as it is well known custom yachts are the best examples of this. For semi-custom or mass-production yachts, this can be somewhat achieved by individualization of interiors by offering some alternatives.

Turkey is one of the twenty countries which are able to design and build different types of vessels with high quality (Ozturk, 2014). General Directorate of Exports (2016) stated that Turkish yards took a great step in yacht building but especially in mega-yacht. According to Aydin and Yilmaz Aydin (2016) Turkey has achievement on yacht building industry but same was not valid for design activities especially for interior design. There can be lots of factors which result this issue but one of the main ones might be the lack of education in this area. But, in recent years a few universities in Turkey focused on this issue to increase share of design projects. When leading yacht builder countries reviewed, it's seen that they far-back started technical education on engineering and design of yachts as Griffiths (1988) mentioned. And, sufficient and developed yacht building industry and sub-industry were already established in these countries. But regarding Turkey, progress started from 90s and this must be taken into consideration.

In Turkish yacht building industry, share of material and labor force in total cost are 60% and 40%, respectively (BAKA, 2012). According to BAKA (2012) domestic share in yacht production in Turkey was around 30%. But, Aydin (2012, 2015) stated that lots of things are import especially for luxury yacht projects. So, can Turkey be assumed as a global competitor in yacht building when value added components of yacht are imported. From this point of view, the aim of this study is figuring out this issue in terms of design, yard, length over all (LOA), yacht type, engine, hull and superstructure materials.

According to Merendino (2014) Turkey has low-cost labor force to thank for being in competition with the leading yacht builder countries such as Italy, Germany and Holland. When, Global Order Book data evaluated, Turkey took place near the top in terms of total length of yachts which longer than 24m. When location and four season climate of Turkey taken into consideration, this achievement not only be related with only low-cost labor cost but also quality of the craftsmanship. Four season climate and famous long coastline with world-ranking touristic facilities provide opportunities to yacht building industry in Turkey. Tandoğan (1998), Turkish Chamber of Shipping (2015), National Marine Manufacturers Association (2016), Yilmaz and Yetgin (2016), Sevinc and Guzel (2016), Nicolantonio et al. (2015), and Sariisik et al. (2011) mentioned the importance of yacht tourism. Martinez (2009) compared yachts in terms of minimal-space space tourism. Cerveira et al. (2012) draw attention to take into consideration of disabled people in designing of sailing yacht.

According to Balance Technology Consulting GmbH (2014) European builders are still forefront partners in terms of developers of special vessel types such as yachts. And, they presented the key partners of European shipbuilding industry which produces from paintings to complete solutions. According to Balance Technology Consulting GmbH (2014) cost savings are one of the important competitive factors and numerous European firms, supply

shipbuilding industry, has moved to Asia to have advantages of cost savings. Merendino (2014) stated that Azimut-Benetti, one of the Italian leading yacht builders, strengthened the production lines which established in Turkey to overcome crisis or provide cost advantage. Aydin (2015) stated that yacht building is a labor-intensive activity and developed countries dislocating their production activities to the countries that provide low labor-cost. Lots of firms started to produce in Turkey because of not only low labor-cost but also high quality production (National Marine Manufacturers Association, 2016). But, they supply the production with value added activities such as design, electronic tools or equipment, and advanced technologies. Therefore, they gain not only competitive advantages but also dependent partners. Another important issue that must not be ignored is regulations to protect environment. Severe sanctions force lots of builders dislocate their production activities to countries that have no or scarcely any environmental regulations. Celebi et al. (2010) expressed that not only environmental protections should be provided by Turkish yards but also safety and health requirements. Occupational health and safety (OHS) in production period is an important issue and according to firms it is a cost increasing factor. But, this industry poses lots of dangers such as contacting with or inhalation of hazardous fiber reinforced plastic (Frassine et al. 2014). Insufficient and improper working environments also threaten the OHS (Tekin, 2013). Aydin and Koc (2015) investigated yacht interior production in Turkey in terms of compliance with OHS regulations and they stated that it's not a pretty sight.

Builders, designers, suppliers or providers, owners, and operators are the parties on the market but builders act as a node that link all the parties together in yacht market (Johansson et al. 2014). Yan (2008) reviewed Taiwan's yacht industry on the basis of two firms and stated that it is a global competitor in the market since the millennium without receiving insignificant subvention. Boote et al. (2012) mentioned challenging growth of Turkey in the yacht building industry. And, this is true when market share of 24m or longer yachts were taken into consideration. But, yachts, especially big ones and long-running custom projects, attract attention but they take a small share of the whole yacht market (GOB 2014). So, taking place near the top does not prove success on the whole yacht market.

From this point of view, this study tried to investigate Turkish yacht building industry on the basis of built yacht projects which were 24m or longer.

Materials and Methods

This study was conducted as a survey using list of yachts (24 meters and longer) which were ordered from Turkey's yards and started to build. In this study, the term of "yacht" is used to denote a vessel used for pleasure purpose and smaller than 24m yachts were not taken in consideration. List prepared by comprehensive and accurate data of The Global Order Book (GOB) includes the years of 2011 to 2017. According to GOB, data obtained by yards also cross-referenced with other sources. Then, all data was cross-checked before analysis. Obtained data classified by the following topics;

- Design and engineering (Naval Architecture, Exterior and Interior Designs)
- Yards locations
- Yacht types
- Project length
- Engine
- Transmission or propulsion systems
- Navigation systems
- Telecommunication systems
- Generator
- Hull and superstructure materials
- Classification firm and origin

Results and Discussion

Total of 225 projects, built by 57 different builders, were evaluated in this study. 148(66%) and 54(24%) of them are motor yacht (MY) and sailing yacht (SY) respectively. Average LOA (Length Overall) of these projects was 42.75m and maximum and minimum LOA were 24 and 141m respectively. But as seen in Table 1, when 141m projects neglected max and average LOA values were 87m and 42.32m, respectively. Also distribution of the projects length according to design and engineering origin is seen in this table. Projects lengths, exterior and interior design done by domestic designers, were smaller than foreigners. According to results, 115(51%), 123 (55%) and 124 (55%) of 225 projects belongs to foreigners in terms of Naval Architecture, exterior and interior design respectively. Beside data was not available (N/A) for 33(15%), 25(11%), and 32(14%) of 225 yacht projects in terms of naval architecture, exterior and interior design, respectively. According to Cain et al. (2013:10) Turkey

was not listed in top 5 in terms of yacht designs completed in 2012. But according to Mee et al. (2011) Turkey listed as 5th in terms of yacht designs completed in 2010.

Table 1: LOA values according to design and engineering origin.

LOA (m)	Naval Architecture		Exterior Design		Interior Design		Total (225p)
	Foreign (115p)	Domestic (77p)	Foreign (123p)	Domestic (77p)	Foreign (124p)	Domestic (69p)	
Avrg.	43.36	43.8	46.93	37.75	46.95	36.72	42.75*
Min	24.68	24	24.68	24	24.68	24	24
Max	141*	81	141**	67.4	141*	63	141**

*p: projects, *42,32m when 141m project neglected, **87m when 141m project neglected*

Number of yards, just builder of the evaluated projects, in Antalya, İstanbul, Muğla, Kocaeli, Yalova and Zonguldak are 20, 16, 15, 2, 2 and 1 respectively. According to results seen in Table 2, İstanbul, Antalya and Muğla can be assumed as heart of the yacht building industry in Turkey. This may be explained by being an attractive tourism destination, reachability and strong industrial composition. Yachts built in Istanbul are bigger than others when compared with other location and 141m project not taken into consideration. It can be related to length of yards too.

Table 2: Cross tabulation between yard location and LOA values.

LOA (m)	Yard Locations						Total (225p)
	Antalya (77p)	İstanbul (84p)	İzmit (12p)	Muğla (36p)	Yalova (13p)	Zonguldak (1p)	
Avrg.	38.63	46.32	39.97	44.37*	42.9	41.4	42.75***
Min	24.5	25.3	25.2	24	30	41.4	24
Max	70	81	87	141**	58	41.4	141****

*p: projects, *41.61m when 141m project neglected, **77m when 141m project neglected, ***42.32m when 141m project neglected, ****87m when 141m project neglected.*

148 (65.8%), 54 (24%) and 16 (7.1%) of the 225 yacht projects are MY (Motor Yacht), SY (Sailing Yacht) and EX (Explorer) respectively. A great majority of the 224 projects were engineered and designed by foreigners. Engineering and design origin of these projects were classified by yacht types in Table 3. According to this, foreigners have an important impact on yacht building industry in Turkey.

Table 3: Yacht types and their design and engineering properties.

Yacht Type	Naval Architecture			Exterior Designer			Interior Designer		
	Foreign	Domestic	N/A	Foreign	Domestic	N/A	Foreign	Domestic	N/A
Ex	8	6	2	10	5	1	9	4	3
MY	79	48	21	83	49	16	87	43	18
CT	1	1	0	1	1	0	1	1	0
SF	4	0	0	4	0	0	4	0	0
SY	23	22	9	25	21	8	23	20	11
Total	115 (51%)	77 (35%)	32 (14%)	123 (55%)	76 (34%)	25 (11%)	124 (55%)	68 (31%)	32 (14%)

CAT, MTU and MAN are the most preferred engine brands for 159 (71%) yacht projects as seen in Table 4. And, 85.3% of 225 yacht projects' engines are imported and there was no data for 14.7% of them. When marine engine industry of Turkey is taken into consideration, it can be said that probably 100% of them could be imported. This is a global fact because these are the leading engine supplier for lots of vehicle types. According to Global Order

Book (2015) around 50.7%, 33.9% and 8.4% of 513 (24m or longer) yachts' engines are MTU, CAT, and MAN, respectively.

Table 4: Cross-tabulation of yacht type and engine brands.

Yacht Type	Engine Brand										Total
	CAT	Cummins	Iveco	MAN	Mitsubishi	MTU	Scania	Volvo	Yanmar	N/A	
Ex	7	0	0	2	0	2	0	0	1	4	16
MY	60	1	0	16	1	47	0	0	5	18	148
CT	1	0	0	1	0	0	0	0	0	0	2
SF	2	0	0	0	0	0	0	2	0	0	4
SY	14	9	2	6	1	1	7	4	0	10	54
Total	84	10	2	25	2	50	7	6	6	32	224*

*1 missing value

Diesel engines are one of the primary sources of power needed to move vessels. Total power of engine varies according to displacement and hull form. In addition, speed of the vessels not only depends on these parameters but also size, diameter and location of propeller, curve and number of blades.

There are lots of yacht building materials which are differ each other by their advantages and disadvantages such as weigh, usability, bondability, weldability and etc. Wood is one of them and according to Aydın (2015) its importance for building material is reducing day by day while increasing for interior or decorative purpose. Classification of used materials according to yacht type for 224 yacht projects is seen in Table 5. Steel and Aluminum are the most common used material for hull and superstructure not only in general but also for MY and EX yacht projects. Wood is most common used superstructure material for SY.

Table 5: Hull and Superstructure materials of yachts.

Yacht Type	Hull Material					Total	Superstructure Material					Total
	Al	C	S	W	N/A		Al	C	S	W	N/A	
Ex	0	2	13	0	1	16	9	5	1	0	1	16
MY	1	41	82	24	0	148	60	45	17	26	0	148
CT	0	1	1	0	0	2	1	1	0	0	0	2
SF	1	2	0	1	0	4	1	2	0	1	0	4
SY	5	7	23	19	0	54	13	7	12	22	0	54
Total	7	53	119	44	1	224*	84	60	30	49	1	224*

*1 missing value, Al: Aluminum, C: Composite, S: Steel, W: Wood

Geographical location has some influences to both tourism and yacht building industry in Turkey. Muğla and Antalya is one of the coastlines constitute the Turkish Riviera or Turquoise Coast. Blue voyage along the Turkish Riviera, Aegean and Mediterranean seas, is carried out for decades with local gullet schooners. Gulets are traditional sailing vessels that have two or three mast and in general built by wood. This situation is clearly seen in Table 6. Almost half of Sailing Yachts (SY) built or are being built in Muğla. But great majority of these sailing yachts are constructed by steel and aluminum instead of wood as seen in Table 7.

Wood is one of the earliest construction material that human being used but advancing technology provides an opportunity to use different materials that have some better properties than wood. Aluminum, Composites (FRP, GRP, etc.), Steel and wood are the most common used materials for yacht construction. Hull and superstructure material of a yacht can be the same or not. Steel and aluminum are the most preferred construction materials for Hull and Superstructure as seen in Table 5 and 7.

Table 6: Yacht types classified by yard location.

Yacht Type	Yard Location							Total
	Antalya	İstanbul	Kocaeli	Muğla	Yalova	Zonguldak	N/A	
Ex	7	6	1	2	0	0	0	16
MY	55	60	11	10	11	1	0	148
CT	0	2	0	0	0	0	0	2
SF	3	1	0	0	0	0	0	4
SY	12	14	0	24	2	0	2	54
Total	77	83	12	36	13	1	2	224*

*1 missing value

Table 7: Construction material by yard location.

Yard Location	Hull Material					Superstructure Material					Total
	Al	C	S	W	N/A	Al	C	S	W	N/A	
Antalya	5	33	27	11	1	24	37	2	13	1	77
İstanbul	0	9	51	23	0	45	12	1	25	0	83
Kocaeli	0	10	2	0	0	2	10	0	0	0	12
Muğla	2	0	25	9	0	13	0	13	10	0	36
Yalova	0	1	12	0	0	0	1	12	0	0	13
Zonguldak	0	0	1	0	0	0	0	1	0	0	1
Total	7	53	118	43	1	84	60	29	48	1	222*

*3 missing value, Al: Aluminum, C: Composite, S: Steel, W: Wood

Yacht projects must be surveyed by some classification societies to verify conformance with the regulatory standards. These standards, composed by members of Societies, govern the design, construction, maintenance and operation of vessels. There are 12 classification societies According to International Association of Classification Societies Ltd. Some of these members, expect Türk Loydu (TL), is seen in Table 8. Türk Loydu (TL) is an authorized classification institute by EU and according to 94/25/EC directive it is able to evaluate of conformity of manufactured vessels to labeling them with CE sign. There is no data available for 69 (31%) yacht projects and it may seriously affect the share. However, RINA is the most preferred classification societies for yachts built or are being built in Turkey. And, only 7 (3%) of 224 projects are classified by Turkish authorities.

Table 8: Classification properties of yachts.

Yacht Type	Classification										Total
	ABS	BV	CE	CE/RINA	GL	LR	RINA	RINA/TL	TL	N/A	
Ex	3	2	0	0	0	1	4	0	0	6	16
MY	12	11	2	2	4	11	60	0	0	46	148
CT	0	0	0	0	0	0	2	0	0	0	2
SF	0	0	0	0	2	0	0	0	0	2	4
SY	0	0	1	0	0	5	28	1	4	15	54
Total	15	13	3	2	6	17	94	1	4	69	224*

*1 missing value, ABS: American Bureau of Shipping, BV: Bureau Veritas, CE: Conformance Européenne, RINA: Registro Italiano Navale, GL: Germanischer Lloyd, LR: Lloyd's Register, TL: Türk Loydu

Share of labor and material cost for yachts built in Antalya Freezone in 2011 are 40% and 60%, respectively. And engine (25%), furniture (20%), electric & wiring (18%), structural parts (15%), paint and varnish (12%) and deck parts (10%) are shares of material cost of a yacht (BAKA, 2012). Yacht building industry in Turkey is import-weighted in terms of high value added product, material, equipment or machinery usage. And, when compared with the competitors, world class but relatively low-cost labor is the strongest side of the industry (Aydn, 2015). Also Aydn (2012) stated that yards that build luxury yachts prefers to work with world-famous designers or firms

to increase perception of their firm image and quality.

Almost all yachts propulsion and navigation systems were imported and fitted. There are lots of paint or varnish types for yacht painting such as PU, epoxy, synthetic and etc., and almost all projects painted or varnished with imported coating materials.

According to Turkish Chamber of Shipping (2015) followings are advantages of Turkish yacht or boat building industry.

- Educated and skilled labor force
- World class production quality
- Acceptable costs
- Qualified and sufficient sub-industry
- Modern and technologic foundations
- Easy access to worldwide markets
- Favorable climate

It can be mentioned that there is skilled, educated and relatively low-cost labor force but According to Aydin (2012) industry face with the deficiency of enough skilled labor force when new yards or builders take place or business volume increase. This situation is so clear especially at locations that have non-clustered yacht builders and suppliers.

Except qualified and sufficient sub-industry, almost all captions listed above were confirmed by the reviewed literature. Lack or under qualified, interrupted or insufficient supplier is the primary concern of any type of production and as seen in the tables Turkish yacht building industry has this problem and has been fighting with this issue. And, according to National Marine Manufacturers Association (2016) Turkey is one of the boat exporter countries to US boat market and tries to get share in expensive markets with improving its engineering know-how instead of using cheap labor force advantage. Keep in mind that, subsidiary or partners of international companies take position in Turkish yacht building industry that located at Tuzla, Antalya Free Zone and etc. From this point of view, lots of important actor of this industry is in close connection to each other.

Conclusion

Some of the tables clearly express that yacht building sector in Turkey is dependent to the imported raw material, end products or components that required for building process. But, industry exports pretty much of the builds as a final product. Besides, according to results lots of core activities such as design and engineering are being done by foreigners. And value added parts or technical equipment such as engine, communication devices and etc., are being imported while constructing a yacht in Turkey. Maybe it's due to lack of powerful sub-industry of marine industry. And, import based production increase the costs even if Turkey still has low-labor cost advantage. Therefore industry and related sub-industries must be supported by the government to provide much more added value.

Shipbuilding industry of Turkey provided contributions to economy and it looks like it will continue to do this (Anon, 2014). But, from this point of view, it can be said that results presented in this study confirm that yacht building industry in Turkey is a bit foreign dependent about lots of value added things. Thus, economic impact of this industry may not be well understood and it would be unsatisfactory for the local economy.

So, there is an ironic situation for Turkey, when a great majority of value added things are being exported from competitors such as Italy, Holland, Germany, United States, United Kingdom, then can it be said that Turkey is a global competitor in yacht building industry? It makes little sense but we can say yes when industry and sub-industries run with domestic goods, tools, equipment and etc.

In yacht building industry, there are some exceptional cases such as using tropical wood species and it cannot be supplied by the domestic way due to their rarity and endemism. Therefore such materials must be export oriented for lots of leading yacht builder as Turkey.

Consequently, it is obvious that Turkey is one of the center and leading yacht builders in the world in terms of some criteria such as total project length. But, Turkey must be focused on high added value activities.

Concerning with only 24m or longer yacht projects and aforementioned investigation topics are the limitations of

this study. And, it can be though that result of this study may not reflect the whole industry. Therefore, a comprehensive study should be conducted to figure out an extensive structural analysis of industry.

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