THE ROLE OF INDUSTRIAL DESIGN IN PASSENGER BOAT BUILDING: CONCEPT DESIGN OF A FERRY FOR MARINE URBAN TRANSPORTATION IN İZMİR BAY AS A CASE

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by
Halis Haluk BAYKAL

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We approve the thesis of **Halis Haluk BAYKAL**

Date of Signature

……
Assist.Prof.Dr. Yavuz SEÇKIN
Supervisor
Department of Industrial Design
İzmir Institute of Technology

20 April 2006

……
Assoc.Prof.Dr. Önder ERKARSLAN
Department of Industrial Design
İzmir Institute of Technology

20 April 2006

……
Assist.Prof.Dr. Gökdeniz NEŞER
Department of Industrial Design
Institute of Marine Science and Technology
Dokuz Eylül University

20 April 2006

……
Assist.Prof.Dr. Yavuz SEÇKIN
Head of Department
İzmir Institute of Technology

20 April 2006

……
Assoc.Prof.Dr. Semahat ÖZDEMIR
Head of Graduate School

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ABSTRACT

THE ROLE OF INDUSTRIAL DESIGN IN PASSENGER BOAT BUILDING: CONCEPT DESIGN OF A FERRY FOR MARINE URBAN TRANSPORTATION IN İZMIR BAY AS A CASE

The city of İzmir is in a process of rapid growth and there is a great pressure of demand on the urban transportation. The shortage of mass transportation availabilities, together with the recent increases in the economic power of an average customer, has promoted private car ownership and this has resulted in the congestion of intercity traffic; increasing the burden on the existing road system.

Since 1980's, efforts to develop of sea urban transportation have been in the agenda of the city. Privatization of public sea transport network in the Bay, management of this network by the Municipality, hiring a private fleet for transportation by the municipality are some examples of the efforts mentioned. The main problem which the transportation managers meet is old and costly managing sea transportation fleet. To overcome of this problem, there is an intention for renewing the fleet by designing a ferry boat that meets the needs of İzmir's sea transportation system.

In this study, a ferry which can navigate in İzmir Bay environmental conditions and carry enough passengers has been designed by using industrial design criteria. The main steps of the concept design of the ferry have been listed below:

(1) Examples from all over the World have been investigated. (2) Inquires carried on in 1996 and 2004 periods on the passengers demands have been considered to form design criteria. (3) Observations during the trips of current transportation system have been done. (4) Interviews with some experts from the transportation sector have been had.

At the last section of the study, concept design of the ferry has been detailed. Main advantages of this design have been concluded as:

(1) Safe (2) Cost effective (in building and in managing) (3) Comfortable (4) Light and green (less fuel consuming) (5) Fast (during embarkation and debarkation, during the trip) (6) Designed for disabled passenger

ÖZET

YOLCU VAPURU İNŞASINDA, ENDÜSTRİYEL TASARIMIN ROLÜ: İZMİR KÖRFEZİNDE KENTSEL DENİZ ULAŞIMI İÇİN KONSEPT YOLCU FERİBOTU TASARIM ÖRNEĞİ

İzmir şehri hızlı gelişme süreci içindedir ve kentsel ulaşım talebinde büyük baskı vardır. Toplu taşımada elde edilebilirlikteki eksiklikle birlikte ortalama müşterinin ekonomideki artışla özel araç sahip olunması desteklenmiş bu ise şehir içi trafik sıkışıklığıyla sonuçlanmış; var olan ulaşım sistemindeki artan yük artmıştır.

Kentsel deniz ulaşımının geliştirilme çabaları 1980'lerden beri şehir gündemindedir. Körfezdeki umumi deniz ulaşım ağının özelleştirilmesi, ulaşım ağının Belediye tarafından idaresi, ulaşım için Belediye tarafından özel filo kiralanması, sözü edilen çabaların bazı örnekleridir. Ulaşım yöneticilerinin karşılaştığı esas problem eski ve yüksek maliyetle işletilebilen deniz ulaşım filosudur. Bu problemin üstesinden gelmek için Belediyenin İzmir deniz ulaşım sisteminin ihtiyaçlarını karşılayan bir yolcu vapuru tasarımı ile filonun yenilenmesi niyeti vardır.

Bu çalışmada İzmir Körfezi çevresel koşullarında seyir edebilecek ve yeterli miktarda yolcu taşıyan, endüstriyel tasarım kriterleri ile bir vapur tasarlanmıştır. Bu tasarım sürecinin ana aşamaları şöyledir.

(1) Tüm dünya üzerinden örnekler incelenmiştir. (2) 1996 ve 2004 döneminde sürdürülen yolcuların talepleri üzerindeki araştırmalar göz önünde tutularak tasarım kriterleri düzenlenmiştir. (3) Güncel ulaşım sistemindeki yolcululuklar boyunca gözlemler yapılmıştır. (4) Ulaşım sektöründeki bazı bilirkişiler ile görüşme yapılmıştır.

Çalışmanın en son bölümünde konsept yolcu vapuru tasarımı detaylandırıldı. Bu tasarımın başlıca avantajları aşağıdaki gibi sonuçlandırıldı:

(1) Güvenilir (2) Efektif maliyet(üretimde ve yönetimde) (3) Konforlu (4) Hafif ve temiz (az yakıt tüketimi) (5) Hızlı (gemiye biniş ve inişlerde, yolculuk sırasında) (6) Engelli yolcular için, tasarlandı.

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CHAPTER 1

INTRODUCTION

The superiority of the marine transportation is below when it is compared with railway and road transportation. The cost of marine transport is five times less than highway and 2.5 times less than railway. The amount of goods and the number of the passenger carrying are a lot more than highway and railway. ¾ percentage of the world is covered by sea besides there are many lakes, rivers, canals. Sea transport has no area limit contrary to railway and high way transport. Sea transportation cause less environmental pollution. Marine urban transportation is more comfortable. As an example it takes 1 hour from Konak to Karşıyaka in rush-hour by bus but only 15 minutes by ferry. Necessity substructures of marine transportation have more service life (Neşer and Tekoğul1992).

Contrary the some benefits of marine transportation above, there is declined ratio when it is compared to passenger using marine transport with number of citizens in İzmir. Nearly 12 million passengers transported in 1981. While population of İzmir has been increased rapidly, 10.007.001 passenger had been transported in 1989. Number of the passenger transported decreased to 8.997.340 in 1990. According to research was made by İzmir municipality in 1989 marine transportation have a ratio of 2% in all urban transportation in İzmir. This ratio more decreased because of increasing the number of the buses and bus urban transporting. Marine transport promotion was made by İzmir Municipality in 2002. 15.041.123 passenger had been transported with the help of the promotion.

The numbers of the passengers transported were the same in 1981 and 2005, but if we consider the population of İzmir, there was significant decrease at the percentage of the residents of İzmir who use marine transport. There has to take precautions to prevent this decrease and marine transportation has to be promoted to use more often by the residents. City residents can have opportunity of less cost, more safe, and less stressful journey with marine urban transportation. The promotion in 2002 had an improvement in the numbers but the transported passenger number must be increased and sea transportation must be developed for the mutual benefits of Municipality,

residents and environment of İzmir. For increasing the numbers, new passenger boats can be build to be put on service in İzmir bay. The needed financing can be obtained the calculations is explained.

Passenger boat building needs multidisciplinary design study. Passenger boat concept design with the view of industrial design is the core of this study. Industrial design criterion definitions are examined. How passenger boat design can be affected by the criteria of industrial design is explained. Boat is considered as a design object. To be more precise, the criteria of industrial design are adopted for concept boat design.

Human factor is considered important. Also the difference is remarked between mechanical design and industrial design. Human behaviors and mimetic are examined and for the success of the design, passengers' demands are underlined. Questionnaire and study made in 1996 is examined. The demands of İzmir residents and the action plan is sort out. Besides the questionnaire made in 2003 is evaluated to entries of the demands. The difference between the two studies are searched thoroughly and pointed out changes in the demands. Defined demands and results of research, design criteria made for the passenger boat to be in service at the İzmir bay.

After defining design criteria for the boat, design scenario has been presented. Evolution of design and design phases to pass through from the beginning to end specially described. Moreover selections have been made with the view of design criteria. The reasons of the selections are referred to knowledge and experience. The knowledge for understanding the reasons of the selection have been given. Material, boat speed, form selection, engine type operation type, passenger capacity, ease of building have been studied in this chapter. The selection and the reasons of the selections are defined and indicated the taken decisions in meeting with officials of municipality.

A passenger boat for İzmir bay is presented. The concept design of ferry for marine urban transportation in İzmir bay is introduced. The knowledge and results from the previous chapters are used to make the design and to meet the needs of İzmir residents. Differences of the boats in use and proposal design are compared in this chapter. First the boats in use and proposal design are compared and differences are set. Second functions of form are presented and current boat functions are expressed with the help of photos. Finally, functions of the design have been remarked.

Conclusion and the future intentions are determined at the end of study.

1.1. History of Sea Transport in İzmir Bay

İzmir port built in 1875, at Sultan Aziz period since then İzmir has become most important port city in Anatolia. French M.R.Griffre Company had taken permission to build and to run first two quay of İzmir, Konak Quay, Pasaport Quay and breakwater. First quay builds in Karşıyaka in 1880's (Karahan 2000).Below Griffre Maritimes Company photo. (Yılmaz, F. and Yetkin, S. 2003)

Figure 1.1. Griffre Maritimes Company photo
(Source: Yılmaz, F. and Yetkin, S. 2003)

İzmir Quay's from historic postcards.(Yılmaz, F. and Yetkin, S. 2003)

Figure 1.2. Konak Quay
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.3. Pasaport Quay
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.4. Pasaport Quay
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.5. Pasaport Quay
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.6. Konak Quay
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.7. Pasaport Quay entrance
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.8. Bayraklı Quay
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.9. Sea transport on Meles River
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.10. View from Göztepe
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.11. View from Göztepe
(Source: Yılmaz, F. and Yetkin, S. 2003)

Figure 1.12. View from Karataş
(Source: Yılmaz, F. and Yetkin, S. 2003)

In 1883 Turkish and Armenian shareholders' Hamidiye Company had established sea transport at thirteen quay (Karşıyaka, Konak, Karataş, Alaybey, Osmanzade, Bayraklı, Pasaport, Salhane, Hastane, Karantina,Göztepe,Güzelyalı Ve Reşadiye) with eight steamship (Girit, Terrakki, Gülbahçe, Hürriyet, Musavvat, İstanbul, Güzel İzmir, Karşıyaka) (Ürük 2000).

French M.R.Griffre Company had voyaged outer gulf, Urla, Dikili, Foça quays after annulment of Hamidiye Company. After the Independent war (release of İzmir) French M.R.Griffre Company sold to Uşakizade Muammer Bey then Atalay family bought in 1925 (Neşer and Tekoğul 1992). The firm named as İzmir Liman İşletmeleri Umum Müdürlüğü in 1934. Firm becomes a division of Denizcilik Bank after the establishment of bank in 1938. İnciraltı Quay administrated by Devlet Limanları Umum Müdürlüğü and Sur and Efes steamships joined to gulf fleet.

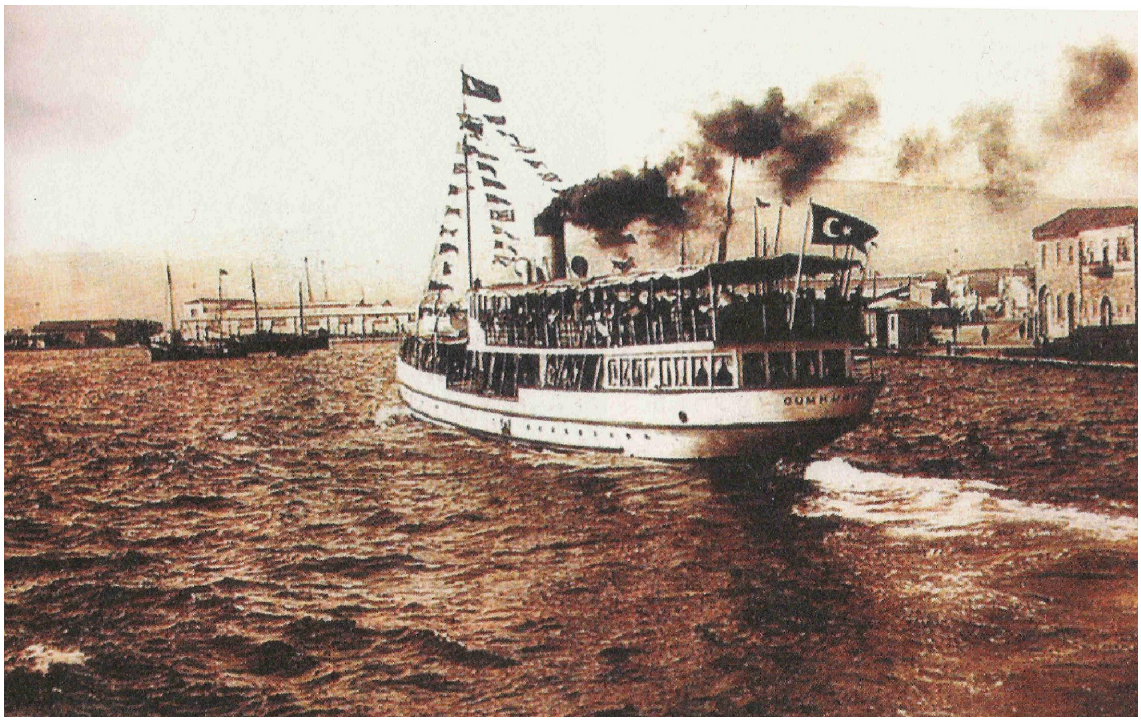

Figure 1.13. Cumhuriyet Ferryboat
(Source: Karahan, A.N. 2000)

İzmir bay transporting rights had given to İzmir Körfez Hattı by Türkiye Denizcilik İşletmeleri in 1964.Alsancak harbor began to build in 1954and was taken in service partially in 1959 and finally in service 1967 (Kayın 2000).

The fleet of Türkiye Denizcilik İşletmeleri had given to İzmir municipality in 2001 and named as İzmir Deniz İşletmeciliği Nakliye ve Turizm Ticaret Anonim Şirketi-İZDENİZ. Transporting rights has become free to any firm since 1986.

1.2. Today's Sea Transport in İzmir Bay

İzdeniz has run sea transport in İzmir Gulf with 105 employees, 8 passenger ships, and 3 ferries since 08.03.2000.

İzdeniz reminded İzmir residents to rediscover doing comfortable and relaxing ship voyage with city lines in daily life. First thing to do in action plan was free ticket passenger transport in March 2000.

İzmir Municipality began a new project named 'ulaşımda dönüşüm-transformation in transportation' to obtain integration in mass transportation. First stage to serve this aim was setting off bus lines to carry passengers to Bostanlı, Üçkuyular,

Karşıyaka ports. Putting this application stage into practice was made to use sea transportation by residents who live 20-30 km away from city coast.As a result of this project 8 passenger ship became not enough because of intensive requests and increased voyage numbers. To meet the intensive requests, 13 passenger ships were hired from Turyol Company to be paid per mile in service in 02.04.2000. Since then İzdeniz serve to İzmir with totally 24 ships included 8 passenger ship and 3 ferry which taken from T.D.I. All the ships appropriate for international standards and annually are dry-docked and serviced. Ships certificated from Class organizations and put in service after that.

'Üçkuyular-Göztepe-Konak-Pasaport–Alsancak' and 'Alsancak-Pasaport-Konak-Göztepe-Üçkuyular' put on service with the requests of İzmir residents. After redesigning Bayraklı port 'Bayraklı-Alsancak-Pasaport-Konak' and 'Konak-Pasaport–Alsancak –Bayraklı' lines has set in 6.06.2001.

1.2.1. Quays

There are 8 quays at the service. These are:

1. Bostanlı
2. Karşıyaka
3. Bayraklı
4. Alsancak
5. Pasaport
6. Konak
7. Göztepe
8. Üçkuyular

1.3. Calculating Annual Maintenance Costs of Ships

The ships which bought from TDI service, fuel and personal costs are very expensive compared to ships hired from Turyol Company

Ship type	fuel cost	dry-docked cost	personal cost
İzmir Municipality Ship	20.0 lt/mile	75,000 tl/year	7,500 tl/month

Turyol ship	13.3 lt/mile	15,000 tl/year	4,000 tl/month

Ships travel 1500 mile/month assumed:

İzmir Municipality Ship 20.0 lt×1500 mile=30,000lt/month

Turyol ship 13.3 lt×1500 mile=19,950lt/month

Fuel Cost (after tax (ötv) discount)

İzmir Municipality Ship 30,000lt/month ×0.655tl/lt=19,650 tl/month

Turyol ship 19,950lt/month×0.655 tl/lt=13,067.250tl/month

	İzmir Municipality ship	Turyol ship
Fuel cost	19.650 tl	13.067,25 tl
Dry-docked cost	6.250 tl	1.250 tl
Personal cost	7.500 tl	4.000 tl
	+_____	+_____
Total	33.400 tl	18.317,25 tl
Difference in a month		15.082,75 tl
Difference in a year		180.993 tl

As a result if low operating cost type ship chosen approximately 181,000 tl will be saved in a year. When 6 ships will build

181,000 ×6=1,086,000 tl

This amount of money will be saved in a year. Also this amount is a ship price. As seen in this calculation 6 years time ships will pay off themselves. (Oğuz and Şan 2004)

In this condition new ship has to be designed with low produce cost and minimum maintenance cost and to be built or bought by municipality. To be successful in economy is not only low produce and maintenance costs also passenger ship has to be liked, preferred, demand by İzmir residents.

1.4. The Method of the Study

The tasks that were proposed to be carried out in this study were the following:

TASK 1: General information and historical overview.

- To explain financial solution for ferryboat project.

TASK 2: Ferry design with the view of Industrial design.

- Review of industrial design criteria.
- To consider ferryboat as a design object and to adapt industrial design criteria for boat.
- To consider and make summary statements of case study and survey made for the municipality in 1996 (Ziya Göksel 1997).
- Questionnaire made in 2003 (İzdeniz 2003).
- To compare the studies of 1996 and 2003 survey. Determining demands tendency.
- To designate design criterion

TASK 3: Making design scenario

- Design phases to pass through
- Examples from abroad
- Giving necessary information for designating the selections
- Determining the main selections of design form
- Ferryboat images from seven seas to form visual awareness

TASK 4: Introducing concept ferry design for İzmir Bay

- Comparing differences with the boats in use
- Innovation

TASK 5: Conclusion and future intentions

1.5. Aim of the Study

The aims and goals of this study were following:

- To emphasize ferryboat design is multidisciplinary.
- To define the role of industrial design in passenger boat building with the perspective of industrial design to add plus values to the passenger boat design such as; human factor, visual awareness and ergonomics

- To bring up the contribution of industrial designer to the design of a ferry boat, human oriented design.
- To make concept ferry boat design for İzmir bay.
- To meet demands and requirements of residents, passenger safety, to meet demand of contemporary designed ships to be built for city lines.
- To reflect beauty of İzmir city to passengers on board. To provide transportation with contemporary and superior municipality understanding. For this reason to design with everything it has a special passenger ship for İzmir.

CHAPTER 2

PUBLIC SURVEY ANALYZE, DESIGN METHOD, CONCEPT AND DESIGN CRITERION WITH THE VIEW OF INDUSTRIAL DESIGN

In this chapter, the general design criteria of industrial products will be examined. The criteria will be subjected for ship design. The topics that will come out at the end of this study and İzmir sea transportation will be explained in this section with the help of thesis, panel discussions and two surveys made in 1996 and 2003 about İzmir inner-city transportation (Ziya Göksel 1997, İzdeniz 2003). With this information, design criteria will be determined. The criteria that are subjected for ship design will show the industrial design and designer's point of view about ship design. Additive values will be brought to engineering design criteria.

For example the base criterion in engineering is "function determining the form". Function is the primitive property in engineering. For passenger ship transportation, the most important factor is carrying maximum passengers in minimum area (Kiss 1980). However this is not valid for industrial design. If a design that is not liked or its service is not sufficient it will not be in demand.

A design can not be considered "good" in means of engineering if only it is liked, confirmed, demanded and used by the user. Industrial designer should add a value to the engineering based approaches. Adding value means putting human factor, esthetical values and visual sensitivity. If the user can not get across with the object, the effort, energy, natural resources and time will be spent in vain. For this reason, designer's point of view to the users is very important. He should care about the cultural values, behaviors and user foresight.

Designer should observe and perceive human nature and behavior. Public transport design properties should include the public habits, behaviors, psychological and sociological criteria.

2.1. Difference between Engineering Design and Industrial Design in Design Concept.

Technology, Science, Functionality, Mechanism, Planning, Efficiency, Benefit and Cost are important in engineering design. According to definition of G.B.R. Fielden "The usage of scientific principles, technical knowledge and thinking in defining a system, machine or mechanical structure which makes the predefined jobs, economically and efficiently." R. E. Parr points at a different important characteristic of the concept with the definition of "Creative feature of engineering" However the limits of this creativity should outlined with the basic characteristics of the discipline. As a matter of fact, it is possible to talk about a more efficient mechanism solution, a more economical montage period design or a more proper production period specification, as examples of creative design engineering.

A closed definition of industrial design: "Industrial designer is the person who is authorized with education, technical knowledge, experience and visional sensitivity to define materials, structures, mechanisms, shapes, colors and ornaments of the objects that are produced by industrial methods in multiple amounts. The responsibilities of designer are varied from uniquely defining the function of the product to detailed formal characteristics and contain the contribution of product's functional, cultural, social and economical properties to amend human environment." (Asatekin1997). It is natural that, mechanism, structure, material, functionality and economy concepts which are seen in the definition of design engineering, and which are directly related with object's physical existence and operation, are valid for both disciplines. Social, cultural, color, ornament and amending the human environment concepts which are seen in the definition that outlines the limits of industrial design, are related to abstract structure of object and are not related with engineering theory and practice. Additionally, education, technical knowledge and experience are required features for both engineer and designer. However visional sensitivity is not such a common feature. It is more likely related to explicating visional artistic structures. The relation of designer with aesthetic values can be seen in the object's aesthetic whole. Visional sensitivity concept is evaluated as the basic difference between two disciplines: design and engineering, which both design objects with functional unity. (Asatekin 1997)

Visional sensitivity and aesthetic factors are important in all design disciplines. The basic requirement for obtaining the design order is to form a system with unity, coherence and clarity and create a vision that owns such a unity itself. This emphasizes the importance of organizing the visual area and visual awareness in architecture education.

2.2. The Design Criteria in Industrial Design

Industrial design has to apply many criteria from various sources. A certain systematic with a holistic approach to design criteria was classified under 4 main and 12 sub titles (Asatekin 1976).

2.2.1. Functional Criteria

The appearance of object is a result of physical necessity. Functional criteria are needed to cover that requirement and optimize the formation of the process.

2.2.1.1. Physiological Criteria

All objects that are developed fro human usage, have a relation with human. This relation can be physical, visual or auditory. In the relation process, the physical existence of the object being suitable to the physical existence to human is realized in physiological criteria which are formulated according to ergonomic data.

2.2.1.2. Physical Environmental Criteria

Objects have relation with other objects and environment. The limit of this relation being suitable is controlled by physical environmental criteria. Car bumpers being located at the same height is a result of these criteria.

2.2.1.3. Communicational Criteria

Their purpose is to transmit the object efficiently to the user. They are separated into two parts as functional and conceptual. In functional criteria, user understands how to use the object by just looking at it. In conceptual criteria, designer takes advantage of natural human tendencies, daily conditionings and graphic symbols.
Formal concept is stored in user's mind as a vision of object and object-function bond. It can be considered as designed product's transmitting itself conceptually.

2.2.2. Psychological Criteria

People continuously perceive and evaluate his/her surrounding. The requirements formed by these evaluations are psychological criteria.

2.2.2.1. Perceptional Criteria

It determines how physical and formal properties of an object will be perceived. It also effects understanding afterwards. It should make sure that the object will be perceived just as it is and it should not create unreliability in psychological deviations during understanding process.

2.2.2.2. Socio-Cultural Criteria

A person should believe that he / she is accepted by the community in order to feel psycho-sociologically secure. A person evaluates if he / she is going to be psycho-sociologically secure when choosing the objects around him / her. The formal and usage properties of the designed object should comply with community value system. Aesthetic criteria should also be under socio-cultural criteria because of the dynamics of the communities within time and each other.

2.2.2.3. Emotional Criteria

There is an emotional evaluation process in the user's approach to a product. It should not be considered as like or dislike only. It can be described as user's identifying himself with that product. Users own conscious and sub-conscious values all through their lives. When there is a stimulus, they evaluate to identify himself with the object or not. Remembered values are particular and can not be explained by logical generalizations so they are described as emotional. They can not be concrete criteria due to being far away from generalization.

2.2.2.4. Expositional Criteria

Forming of an object occurs around a series of purpose determined by the designer. Designer wants to transmit some ideas to users by the object. This kind of communication is the most important purpose of artistic creation. However if the product starts to contain functionality like in architecture and industrial design, artistic exposition is forced by functional purposes. The product's serving both expositional and functional purposes is related with the talent of the designer to choose the physical items of the object in order to transmit these issues in best way. The designer expounding the object can be described as object language. Designer suggests a certain social, psychological and a physiological manner by the object language that he uses.

2.2.3. Technological Criteria

Every object is produced by a technological process. The physical demands are the most important limits of this process for production in required form and these are technological criteria.

2.2.3.1. Material Criteria

Used material should be suitable for the object to be produced in required form. Also designed form should be producible from the material to be used, because material selection is related to function and usage conditions; so material criteria should be

considered in 3 parts. 1) Selected material being suitable to function and usage conditions. 2) Selected material being suitable to form 3) Forming being suitable to selected material. Also if more than one material is used, their structures should be suitable to each other.

2.2.3.2. Production Method Criteria

These are also active/passive criteria. Production method should be suitable for the required from to be achieved while form should also be suitable to production method limitations. There is also a close relation between production method and material.

2.2.4. Economic Criteria

2.2.4.1. Criteria in Consumer Scale

The production reason of an object is to cover the consumer demand. Consumer accept to pay a value for the object (buy it) in order to fulfill his demand. This value exchange should be optimal for consumer. In other words, he should get the equivalent of what he paid for. Calculating the monetary equivalents of objects is a complex matter. The responsibility of the designer here is, to contribute for the designed material being transmitted to the consumer in the cheapest way.

2.2.4.2. Criteria in Producer Scale

Producers have certain economical conditions (production methods, marketing methods, work power, time) and his purpose is profit maximization. The production of the object is related with designer accepting these conditions and not being in a conflict with these purposes.

2.2.4.3. Criteria in Macro Scale

Design errors cause all resources, (raw material, man power, energy and natural resources) to be spent in vain. For this reason, designer's designing correct objects, is not only important for transmitting the correct object to the consumer, it is also important for correct using of natural resources which are the property of all mankind. However the real criterion is designer being persuaded to produce products by using all sources positively and efficiently.

2.3. Adaptation of Industrial Design Criteria to Ship Design

Ship will be considered as the object and industrial design criteria will be adapted for ship.

The main functional criterion of passenger ship is to carry passengers from one pier to another. Ships have a physiologic relation with the young, adult, old, child and disabled people of the city that can be formulated with the ergonomic data obtained during the journey. This function can be summarized by comfort but it actually contains a wide spectrum of factors such as machine sound, vibration isolation and ergonomic seats.

The physical accordance of the ship with other ships and the pier are environmental criteria. Board height is important for approaching the pier in means of tying, passenger boarding and emerging, etc… These criteria are used to determine the physical dimensions. The sea condition is also very important. For example a lake ship with a smooth hull is not suitable for using in an open bay. Tide is also important. Designs will be different in North seas where sea level changes about 2.5 m, than designs in Mediterranean Sea where the sea level changes only 75 cm.

The one-to-one communication of ship and passenger functionally includes the following: Boarding – emerging, doors, seats in outer parts and inner parts. These functional relations and the design items for describing the rules that organize those relations are ship-passenger communicational criteria.

Ship is not only in relation with passenger. It should be in relation with all the vehicles used in public transport. This will increase its usage percentage. This can be synchronization with other public transport vehicles or buses and minibuses that carry

passenger to piers can have the same color or logo (Karakaplan 1992). User-object relation being considered as service design and ship design being made as a component of service design will provide different point of view to the city - human – public transport triangle. Every factor that will organize the sea transportation will be defined as a component in means of service and function. (Auto Park, bus, subway, bridge for passengers to reach the pier, road, etc…) With these definitions, a systematic point of view will be achieved for the solution of the public transport problem and the success of the ship design will increase.

Perceptional criterion for ship is the confidence of the passenger not being harmed to the ship in all weather conditions. A design to be made with form – material – comfort combination should persuade public transport to the sea transport. Design should explain that sea transport is faster, more comfortable and more reliable compared to other kinds of public transport.

If the design is made in order to show ships as contemporary, economical, comfortable and environmentalist public transportation vehicles for cities that are preferred by passengers who care about their environment, socio-cultural criteria is dominant in selection of the design.

Ships should be identified with the people of the region where they are going to be used. This is related with passengers' responses according to the values they owned previously to the visual and physical impulses that are transmitted by the ship. Items that will remind previous emotional sharing should be used. Mimetic items should also be used to be appreciated.

The designer, who gives shape to the ship, should select an object language in order to transmit what he wants to tell properly to the passengers. Underlining the beauty of sea transport should be the expositional criterion of the designer.

Material and production method selection is the most effective criterion in design, technological criterion. Material for ship should be resistant to corrosion and should be easy to produce at the same time. Designer should select the proper form and technology according to production availabilities and conditions.

In order to use the monetary resources for design in the most efficient way, necessary passenger, operator and macro criteria should be taken into consideration. A ship design which purposes success in sea transportation should cover the demands and requirements of the passengers. The service should be given for the benefit and

consciousness of the community and its security should be seriously taken into consideration.

Municipality can be assumed as the producer of the service. The profit that will be obtained when public transport is persuaded to the sea can be considered in many fields. Cost of sea transport is 5 times cheaper than land transport which decreases the transportation costs of municipality. It is also a partial solution to the city traffic, parking, pollution problems which is much more important than monetary benefit for municipalities.

In macro level there are many benefits of a successful and demanded passenger ship. These benefits are; Decreased city traffic and related to that decreased fuel, time and work power loss. Correct economical design, allows limited municipality resources to be spent for other services.

2.4. Analysis from Inquiries

New ships not being made are related to economical reasons. Design criteria being suitable for the ship to be built in bay of İzmir, will be kept in the foreground. The form and its relation with interior space are defined according to design criteria. The design will be evaluated from the industrial design perspective and under water part of the design will not be considered. The requirements in order to give better service to İzmir citizens are examined and things to do in order to cover their demands are determined. The results of the surveys were paid attention at this point. The designed ship should be a part of city life. Design criteria should be evaluated according to passenger-ship relation in interior space. The existence, protection and security of human factor should be emphasized.

After the matters that affect the industrial design are subjected to passenger ship, they will be evaluated under the scope of observations, surveys and former studies. The functional and psychological criteria, physiology and the physical relation with its environment and the survey results are examined to determine the ship design criteria for İzmir.

According to the survey made in 1996 the realities and requirements that appear in the surveys made in 1996 are mentioned below: (Ziya Göksel 1997)

- Safe board – emerge
- New ship
- Bicycle park
- Improving the image of sea journey
- Service to be given in order to attract automobile drivers to sea journey. Luxurious tours to be made for this issue.
- Canteens
- Good service
- Disabled people

The survey made in 2003 supports the survey made in 1996. On the other hand, it seems that the demands of the public have not yet been fulfilled. The main topics of the survey in 2003 are mentioned below: (İzdeniz 2004)

- Disabled
- Security
- Hygiene
- Service
- Comfort
- Ergonomic
- Newspaper and magazine
- Music broadcast
- Cine-vision

2.5. Design Criteria for Passenger Carrying by Ferries

The design criteria according to studies and surveys are as follows:

Passengers should be serviced with excellent and modern municipality concept in order to reflect them the beauty of the city they are living in. For this purpose, the designed ship should be unique and especially for İzmir.

FOR PASSENGER CARRYING:

- Safe boarding and emerging
- Fast boarding and emerging

• Comfortable and anatomic seats from where blue İzmir bay view can be watched.

• Stair design for old and disabled passengers.

• Special WC for disabled passengers.

• Lift for disabled or tired passengers to reach the terrace level.

• Interior design to address the usage habits of passengers:

1. Ergonomic seat design and maximum passenger – maximum comfort optimization in seat placement.
2. Interior address to give various functions to the ship assuming the passenger criteria.
3. Introducing municipality services to public.
4. Boards where İzmir city news are published. Renting these boards for advertisement in order to cover some expenses. (Cine-vision shows etc…)
5. Cine-vision shows made in order to generalize environmental consciousness.
6. Introducing fairs and exhibitions on cine-vision.
7. Stand for selling books and brochures that introduce İzmir to tourists.
8. Movie-theatre posters.
9. Sales of İzmir's local newspapers and Kent newspaper.
10. Providing wireless internet service in ships which will be sponsored by an IT company.
11. Placing clock and thermometers in ships.
12. Designing lighting and heating instruments.
13. System for music and news broadcast
14. A board where summaries of local and global weekly news are placed.

The economical success of the design is not only related with costs. People of İzmir should like and prefer the ship. In order to achieve this: Passengers should be serviced with excellent and modern municipality concept in order to reflect them the beauty of the city they are living in. For this purpose, the designed ship should be unique and especially for İzmir.

CHAPTER 3

DESIGN SCENARIO

Design process will be told in this chapter, what are the phases to pass through and evolved in design process will be designated. Design phases to pass through in evolution will be determined. Selections will be made from design criteria which are told in second chapter. The reasons of the selections will be referred to knowledge and experience. Information will be given for understanding the reasons of the selections. Knowledge will be referred to the reasons of the selections.

3.1. Production materials and material selection
3.2. Examples from Alaska
3.3. Boat speed selection
3.4. Selection of Changing Forms by Berthing and Passenger Embarkation or Debarkation Functions
3.5. Engine type, impelling and operating type
3.6. Passenger capacity
3.7. Economic criterion in boat design: ease of building

3.1. Production Materials and Material Selection

Production material alternatives are: wood, composite, steel

3.1.1.Wood

Wood is a high-tech composite material. It's one of the strongest and most tenacious materials. Stronger in tension and in bending than even high-tensile steel, wood is also just plain tougher than steel; kg for kg, it will absorb more energy or abuse before failure than even the best steels. A structure built of good-quality, dry, straight grained wood will be lighter and stiffer than the same structure fabricated from nearly any other material-even including most modern high-tech composite laminates like

Kevlar epoxy and carbon fiber/epoxy. The best carbon composites can exceed wood in strength in stiffness, pound for pound, but at considerably higher cost. (Gerr, 1999)

All traditional planks on frame have fundamentally the same structure. A keel forms the backbone of the hull curves up forward to form stern and projects up aft in a stern post. The stern post is the simplest form of aft-end backbone extension. On a deep-keel boat where the hull sweeps aft in longer run to transom, the sternpost runs roughly vertically up from the keel, for a relatively short distance, to a horn timber, which in turn runs horizontally aft to the transom. The transom itself is fastened to the horn timber with a transom knee.

3.1.2. Composite

While building a new boat, first a female mold would be built which is the shape of the hull. Next it is coated with a mold release agent. Alternating layers of polyester resin and fiberglass cloth of varying styles and weights are laid in until the desired thickness is reached. This method is called hand lay-up. It is the most common used method. Hand lay-up, vacuum bagging, and chopper gun are three standard methods of modern fiberglass construction

Vacuum bagging: Fiberglass is covered with a vacuum bag after the lay-up process finished but before the resin cured. The air in the bag is sucked out by a pump causing the outside air press to press down evenly on the entire plastic sheet with great force. An average 8-footer (8.5 m boat) would have 44.6m^2 of hull surface. Net result is 115,900 kg total pressure about equal to 115 ton hydraulic press. The result is extremely dense and strong.

Chopper gun: A special gun is used to the builder blow small short glass fibers mixed with liquid resin onto the surface of the mold. This mixture is rolled down by hand. Because the fibers are short, run in random direction, and laid down without precise thickness control, a chopper-gun-Lay-up hull is less dense and less strong than a hand-laid up hull, and far less strong than one that is vacuum-bagged. But chopper-gun lay up is very quick and low cost. Clearly, chopper-gun lay-ups have to be thicker and thus heavier for the same approximate strength. (Gerr, 1999)

3.1.3. Steel

Steel is iron alloyed with carbon and other trace elements to adjust its characteristics. Generally, the higher the carbon content, the stronger and harder the steel. Too much carbon, though, makes the steel brittle and difficult to weld, particularly in a marine environment where carbide by products in the weld can cause corrosion. Steels are thus divided into categories based on their carbon content.

- Low-carbon steel has no more than 0.15percent carbon.
- Structural carbon steel, or "mild steel," has between 0.15 and 0.30 percent carbon.
- Medium-carbon steel has between 0.30 and 0.50 percent carbon.
- High-carbon steel has between 0.50 and 1.00 percent carbon.

Medium- and high-carbon steels require pre- and post-heat treatment and/or low hydrogen welding. They aren't suited to boatbuilding. Mild steel is most commonly used, with the exception of Cor-Ten steel, which at 0.09 percent carbon is a low-carbon steel.

The most common boatbuilding steel alloys are A36, ABS/A, A373. Higher strength steels are A440 A441. These steels have higher strength but lower elongation. (Gerr,1999)

Steel is chosen as a production material in this project. Wood is not chosen because of the maintenance cost and hard to care. The reason of not choosing fiber material is its producing method and cost of production. Producing fiber boats technically, one to one model have to made and building mold from this model. After that, serial production can be made from the mold. But at this boat size investment cost is an important component of decision. First boat can be made at the end of mold building. A steel boat can be carried out already by that time. The desire of building the project with minimal cost and ease of producing steel is the material that meets the needs because of the economic criterion. Steel is going to be used as a main structure material in this design.

3.2. Examples from Alaska

An example from abroad; Alaska model. Well developed maritime example, Alaska sea transport is examined. Maritime business is developed because some cities in this cold region can be arrived only by sea. Usually sea transportation is made by ferries in additional yachts and cruisers are used for tourist tours. Ferries in service are:

M/v Columbia

625 passenger capacity 418 feet long service speed is 17.3 knot 134 car capacity 104 passengers cabin

Figure 3.1. M/v Columbia
(Source: WEB_1 2004)

M/V Kennicott

748 passenger capacity 382 feet long 85feet width service speed is 16.75 knot 80 car capacity 2 x 6,690 hp wartslila 32e engine,

Figure 3.2. M/V Kennicott
(Source: WEB_1 2004)

M/V Leconte

250 passenger capacity 235 feet long service speed is 14.5 knot 34 car capacity

Figure 3.3. M/V Leconte
(Source: WEB_1 2004)

M/V Malaspina

500 passenger capacity 408 feet long service speed is 16.5 knot 88 car capacity

Figure 3.4. M/V Malaspina
(Source: WEB_1 2004)

M/V Tustumena

210 passenger capacity 296 feet long service speed is 13.5 knot 36 car capacity

Figure 3.5. M/V Tustumena
(Source: WEB_1 2004)

M/V Taku

450 passenger capacity 352 feet long service speed is 16.5 knot 69 car capacity

Figure 3.6. M/V Taku
(Source: WEB_1 2004)

Three ferryboats built in Alaska to meet the demands. These are:

- two fast ferryboat
- one metlekala ferryboat

Metlakala ferry has 149 passenger capacity 131 feet long 18 car capacity service speed is 12 knots and in service since 2003

Figure 3.7. Metlakala Ferry
(Source: WEB_1 2004)

New fast speed ferry is a catamaran which has 35 car capacity 250 passenger capacities and its service speed is 35.5 knots. Ferry made from aluminum alloy and has four 3600kw mtu engines. Concept design of the ferry and general plan would be seen below (figure 3.8, 3.9). Constructed ferry (figure 3.10) and details of construction would be seen at the other figures below.(WEB_2 2004)

Figure 3.8. Concept illustration
(Source: WEB_2 2004)

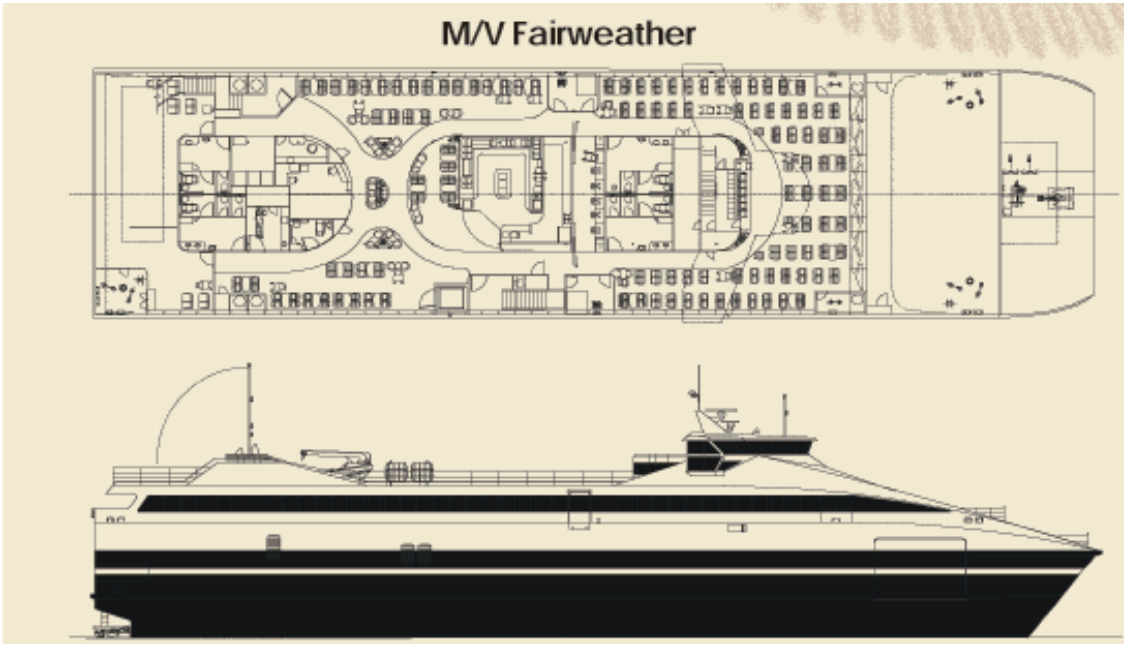

Figure 3.9. General plan
(Source: WEB_2 2004)

Figure 3.10. High speed ferry
(Source: WEB_2 2004)

Figure 3.11. Ferry back seen
(Source: WEB_2 2004)

Figure 3.12. Coating isolation material
(Source: WEB_2 2004)

Figure 3.13. Bridge construction
(Source: WEB_2 2004)

Figure 3.14. Bridge and entrance left side seen
(Source: WEB_2 2004)

Figure 3.15. Deck
(Source: WEB_2 2004)

Figure 3.16. Water jet side seen
(Source: WEB_2 2004)

Figure 3.17. Last coating
(Source: WEB_2 2004)

Figure 3.18. Water jets
(Source: WEB_2 2004)

Figure 3.19. Ferry's catamaran hull
(Source: WEB_2 2004)

Figure 3.20. Cupboard and equipment for interior space
(Source: WEB_2 2004)

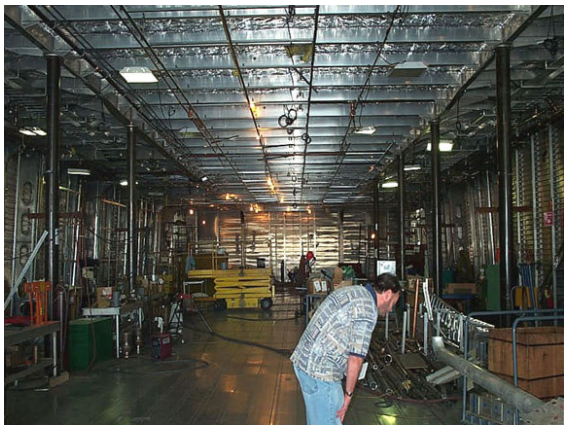

Figure 3.21.Superstructure
(Source: WEB_2 2004)

Figure 3.22. Captain deck
(Source: WEB_2 2004)

In the example of Alaska improvement trends shows; high speed catamaran ferry is the solution for new demands. High cost aluminum alloy ferries demands are acceptable when considering Alaska's economic opportunities and developments. There is no overland route to connect some cities therefore only sea transportation is improved. Some Alaska cities aren't connected with overland route similar to İzmir in 1880's because at that time there is no main street but thirteen piers in İzmir bay (Ürük 2000). Having no highway is the most important development factor of maritime business. Using sea transport traffic jam and demands of building new roads are no more needed and pollution from car exhausts will be decreased to acceptable ratios. (Neser and Tekoğul 1992)

3.3. Boat Speed Selection

After examining Alaska case, excursion and public transport used catamaran boat is searched whether it is suitable or not for İzmir bay. These boats aquaplane after a certain speed.

Figure 3.23. Catamaran tour boat
(Source: WEB_2 2004)

A usage of catamaran boats is economic when cruising speed is higher speed than aquaplaning speed. Approximately 4 km route is not enough for speeding up to aquaplaning speed and then stop. For this reason it is not available for Karşıyaka-Konak route, but it can be used at long distance routes like Bostanlı-Foça, Bostanlı-Karaburun. At first put in service to these routes in summer season for three months. Ticket prices can not compete with bus at this time but it can be alternative transport for future. It is not possible to compete between ticket prices of bus and boat for now but it would be alternative public transport in near future.

Figure 3.24. Catamaran ferry
(Source: WEB_3 2004)

Interviewing with İzdeniz authories, municipality first action plan is sea public transport in short distances second action plan is long distance public transport. Long routes like Bostanlı-Foça, Bostanlı-Karaburun can be done in seasonal for now but in future can be done with new high speed boats to met new demands regarding the situation of new settlement places out of the city established in these areas.

Figure 3.25. Buquebus, investing for two new ferries, cost US$100mil.
(Source: WEB_4 2005)

In addition authority determined, catamaran or other high speed boats will make traffic and control of the traffic would be harder in the bay. Another disadvantage, this project can be risked by cost of high power engines which are used in these boats. High speed boat forms are not chosen with respect to views of the authorities and the knowledge gained from this research. Other high speed boats met in research can be seen below.

Figure 3.26. Catamaran ferry
(Source: WEB_3 2004)

Figure 3.27. Catamaran ferry
(Source: WEB_3 2004)

Mono hull fast ferry example can be seen in figure3.28.-29. (WEB_5 2005)

Figure 3.28. Mono hull fast ferry
(Source: WEB_5 2005)

Figure 3.29. Mono hull fast ferry
(Source: WEB_5 2005)

Figure 3.30. Concept design
(Source: WEB_6 2004)

Figure 3.31. Mono hull fast ferry
(Source: WEB_6 2005)

3.4. Selection of Changing Forms by Berthing and Passenger Embarkation or Debarkation Functions

Generally three variations in changing form by berthing and passenger boarding or landing functions. These are berthing from head, back and board. Successfully arranging method met in research is boat berths to u form pier and passengers board in from port side land from star boat side. This method allows passengers in pier will board in and passengers will land at the same time in different boards without waiting and getting mixed. There has to be made changes in all piers to use this embarkation or debarkation method in İzmir Bay. Besides all boats width and length are different because of that using this embarkation or debarkation method is not possible. Berthing from board is the system used by large boats. Boats are berthing from head which can be easier and faster than berthing from board. Sea buses are docking from head and passengers get off from front. Different regions of the world different usages with different functions can be seen below.

Figure 3.32. Berthing from head
(Source: WEB_7 2005)

Docking from head function is made the difference by a special boat especially designed for Caribbean. This special boat can be seen below (WEB_8 2006).

Figure 3.33. Boat especially designed for Caribbean
(Source: WEB_8 2006)

Figure 3.34. Landing in shallow water
(Source: WEB_8 2006)

Figure 3.35. Landing in shallow water
(Source: WEB_8 2006)

Figure 3.36. Landing in shallow water
(Source: WEB_8 2006)

3.5. Engine Type, Impelling and Operating Type

Impelling and operating kind defines characteristic functioning elements of the boat form. In meeting with municipality officials firstly system used at tugboats was offered. Ship's maneuver capability is maximized in this system. Rejecting this offer first elementary factor was this special engine and impelling system is expensive for municipality budget. Besides this system necessitate skilled workmen. This system positive effect on the sea transportation system is minimizing time loss while to approaching and leaving maneuver to pier. This is the one of the important time saving without increasing cruse speed.

As a result of changing engine selection, boat double head two way boat is planed to design at the beginning of designing. Boat's hull type is chosen as mono hull. In this boat design demands are two engines and for maneuvering two captain decks and all its components like double rudder wheel and all control equipments. Singapore is one of the cities which this type ferries used in the world. Singapore Star Ferry and its interior can be seen in the figures below. One of my design criteria, using advertisement and information panel is applied in this design seen at interior figure 3.37. Especially back sporting of sitting group can be changed in moving direction and passengers can sit in the direction of destination in this double head ferry.

Figure 3.37. Star ferry interior
(Source: WEB_7 2005)

Figure 3.38. Star ferry
(Source: WEB_7 2004)

Figure 3.39. Star ferry
(Source: WEB_7 2005)

Finally considered opinion; cost of double engine and gear is much for budget of the project and will increase service and using costs. Search is kept looking at different boat forms in the world.

Figure 3.40. Different ferry example
(Source: WEB_7 2005)

Figure 3.41. Different ferry example
(Source: WEB_7 2005)

Figure 3.42. Different ferry example
(Source: WEB_7 2005)

Figure 3.43. Passenger boat for Caribbean
(Source: WEB_8 2006)

Figure 3.44. Mono-hull fast ferry
(Source: WEB_9 2006)

Below figures latest constructed ferries can be seen.

Figure 3.45. Blue Star Ferries
(Source: WEB_10 2005)

12.7milion passengers carried with the 26 ships fleet in 2004 by P&O ferries (WEB_11).

Figure 3.46. P&O ferry
(Source: WEB_11 2005)

Concept design made by NVC-Design for Rolls Royce is at figure 3.47-3.49.

Figure 3.47. Rolls-Royce
(Source: WEB_12 2005)

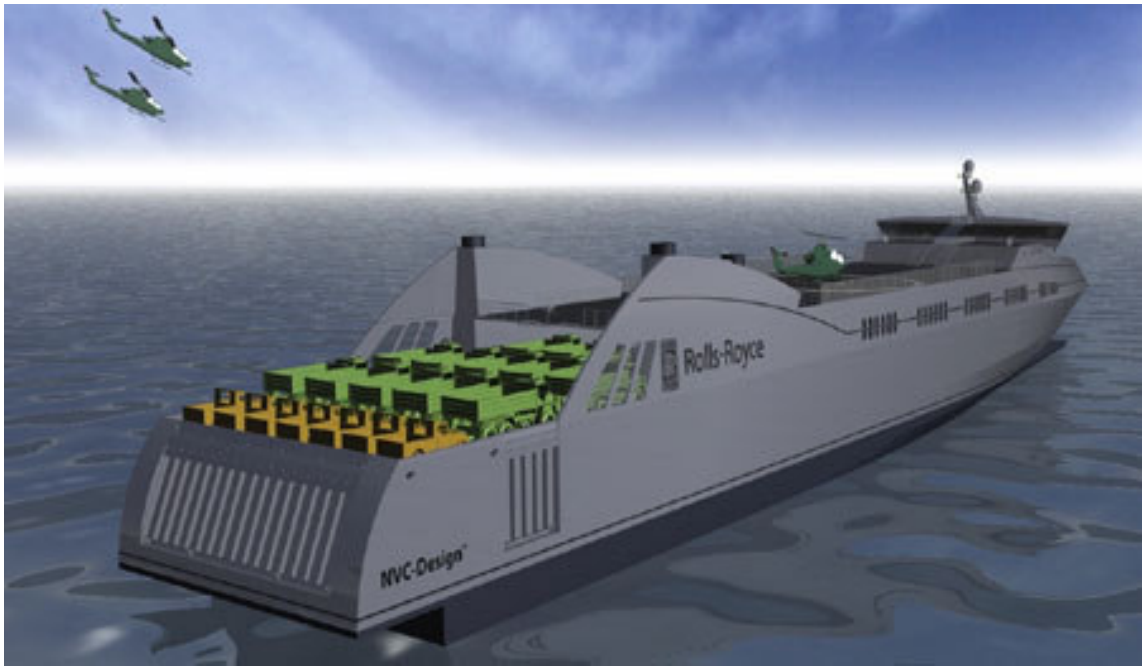

Figure 3.48. Rolls-Royce
(Source: WEB_12 2005)

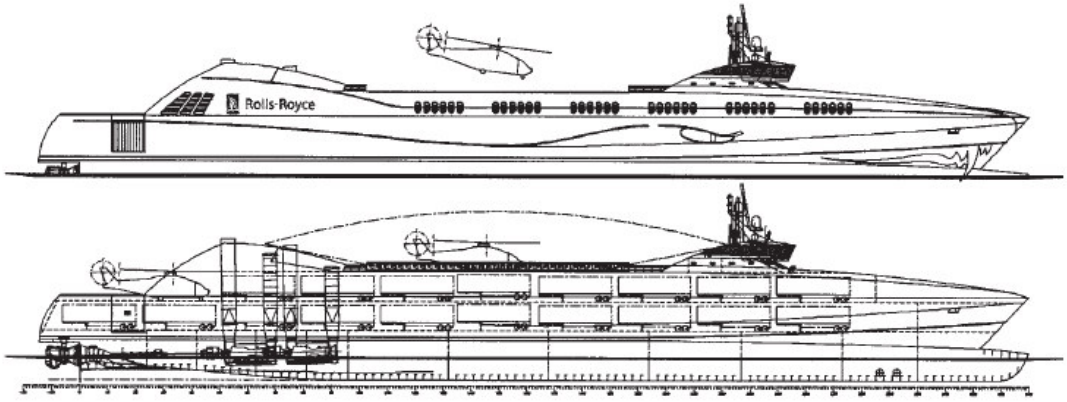

Figure 3.49. Rolls-Royce
(Source: WEB_12 2005)

3.6. Passenger Capacity

Passenger capacity is the main elementary characteristic of deck dimensions. General sitting plan has to be designated and necessary deck areas have to be determined. Passenger capacity importance is; passengers boarding and getting off time has to be short and action has to be safe and quickly. Making easy boarding and getting off from ferry, safety components have to taken into consideration as a designing necessity. Utilizing from different applications or mechanisms safety have to be increased sufficient.

3.7. Economic Criterion in Boat Design: Ease of Building

Production costs, service costs, ease of construction constitute the economic components of the ferry design. Decisions of every criterion told in this chapter taken in the view of primary criterion, economic criterion.

Designed ferry is able to be constructed by municipality. Ferry design can be constructed at the capacity and availability of municipality increases feasibility of this project. Desired plus values can be form becoming free of nonessentials and affectations besides function becoming a united whole with form. If economic conditions are provided İzmir municipality can make fleet from a design which can be build with minimal worker effort.

CHAPTER 4

PASSENGER BOAT DESIGN FOR İZMİR BAY

4.1. Differences between Current Ferry and Proposal Design

4.1.1. Stairs

Stairs angle is big and steps are high in sea bus. As for passenger boats steps are small besides both small and big angled at head. Handles are just for adults. There are no handles for children. Stairs doesn't comply with standards for disabled people. For this reason stairs are designed to comply with standards and handles are added to both sides for children. Also toilets are designed to be suitable for them. (Neufert 1943, Weimer 1993)

Figure 4.1. Boat stairs

4.1.2. Embarkation and Debarkation Functions of Current Boats

Today there are two embarking kind. Embarking from head is faster to dock but it is dangerous for the passengers because passenger has to go up to stairs than step

on to board. There is a place only two people can get on board and there is noting to hold on to. Besides stairs are moveable so they are moving or shaking when passengers step on it. It is so risky for not only elderly also for every one. A careless step may cause a big accident.

Figure 4.2. Debarkation of passengers

Figure 4.3. Debarkation of passengers

Figure 4.4. Stairs for embarkation and debarkation from head

Figure 4.5. Distances between boat and stairs

The other berthing system is berthing from board. Boarding is safer than the other but there are some disadvantages for landing because some passengers can jump to pier before the boat dock. Besides many passengers don't wait the wooden plate put to walk on it from ship to pier. Passengers must not be allowed to risk and hurt themselves.

Figure 4.6. Berthing from board

Figure 4.7. Embarkation from board

Figure 4.8. Embarkation from board

Figure 4.9. Berthing from board

Figure 4.10. Embarkation from board

Figure 4.11. Precaution

The boats in use are not for disabled residents. This design is not only commercial therefore a new system has to be designed for disabled people to board in. I thought they have right to travel with passenger boats so I innovate and use ferryboat's car boarding system apply to my passenger transportation boat design. This form increases speed of boarding in, because more passengers can board in at the same time safely. Celal Üstünbaş, a far distance captain said when he saw my design:

"This was my vision that came true. I always thought to use a system for passenger boarding"

This was not enough. Boat corridors and doors had arranged for disabled passengers. After an elevator is designed to lift them to the second floor and terrace. Open spaces are 9.3 times bigger than existing big boats when terrace is included.

Simplicity modern appearance of boat is aimed to break image of marine transport today. In the questionnaire passengers think sea public transport is nostalgic with the big boats.

Figure 4.12. Proposal design

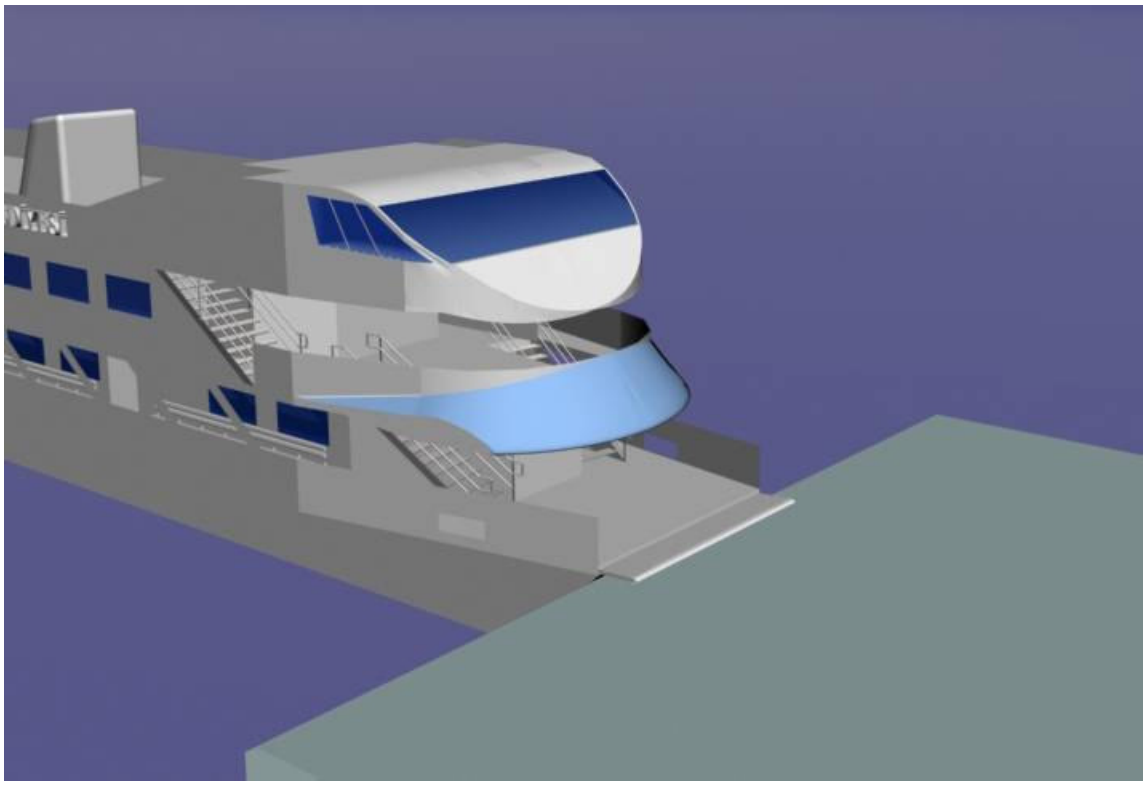

Figure 4.13. Embarkation function

4.2. Form for Function

Forms are set to ensure plus values in the design. Front and back wind shelters are designed to prevent direct sunlight to closed spaces. These shelters are same for easy construction. They can be produced with one mold.

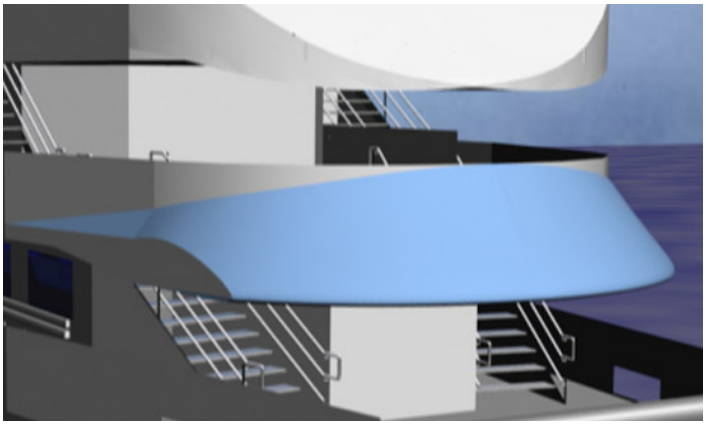

Figure 4.14. Front shelter

Design construction is based on simplicity and ease of production. Therefore forms are selected to build in less hours and minimum effort. Stairs are all one design to be produced for mass production. Four stairs have the same dimension but rotated. Incline angle is chosen to easy use for elderly or disabled passengers. Stairs comply with standards.

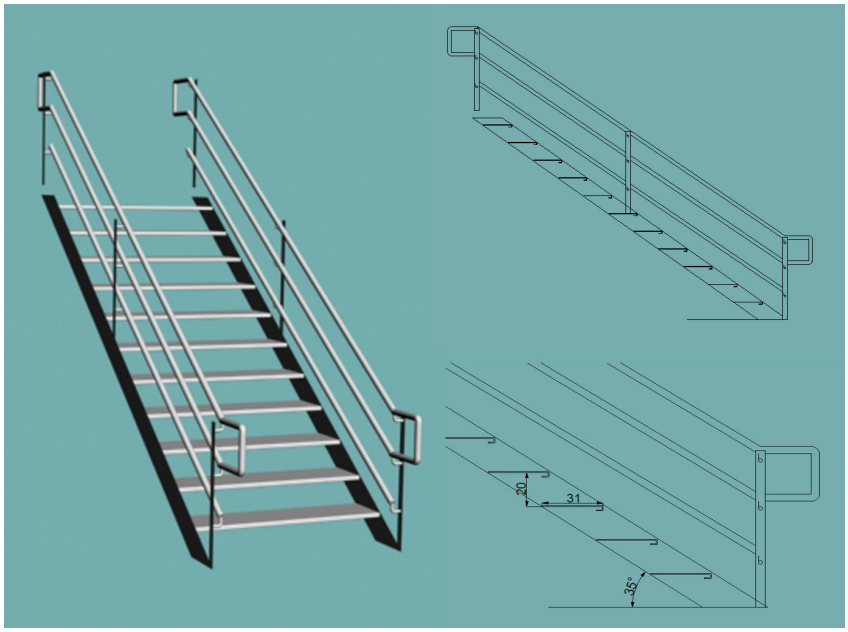

Figure 4.15. Stairs

Chimney is not designed to use as it is. It is designed as elevator to reach terrace. To have a journey in the terrace will be freedom for disabled citizens. I have a personal occasion with walking sticks. This is my personal experience.

Figure 4.16. Elevator formed as chimney

Sitting groups and windows sizes are defined to watch İzmir view. While designing sitting groups ergonomic is the very important criterion for that reason anatomic information is taken from furniture and ergonomic studies. (Erkan 1997, Pile 1990)

Coach is designed to set the dimensions to watch İzmir view from windows. Also it is anatomical and comfortable.

Figure 4.17. Reflect beauty of İzmir

Figure 4.18. Reflect beauty of İzmir

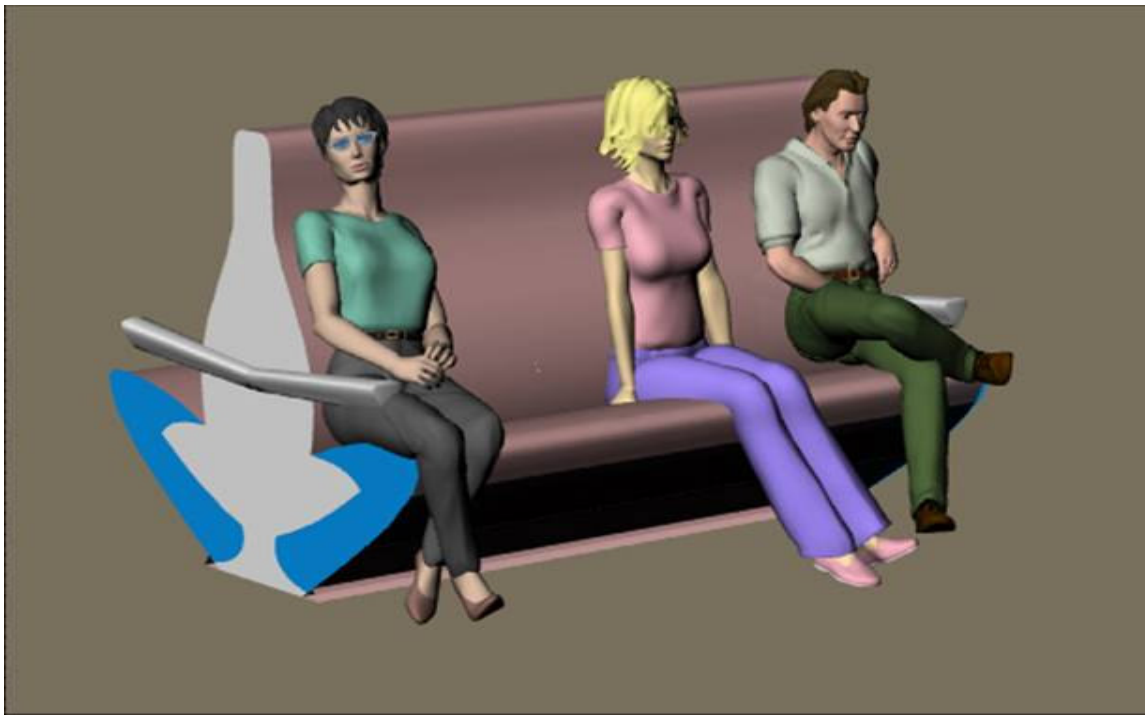

Figure 4.19. Coach design

Couch form is generated from anatomic studies (Pile1990). These values studied to attract passenger to sea transport. My observations about passenger approach to sitting groups help me to emphasize comfort and relaxation with graphic sign and form.

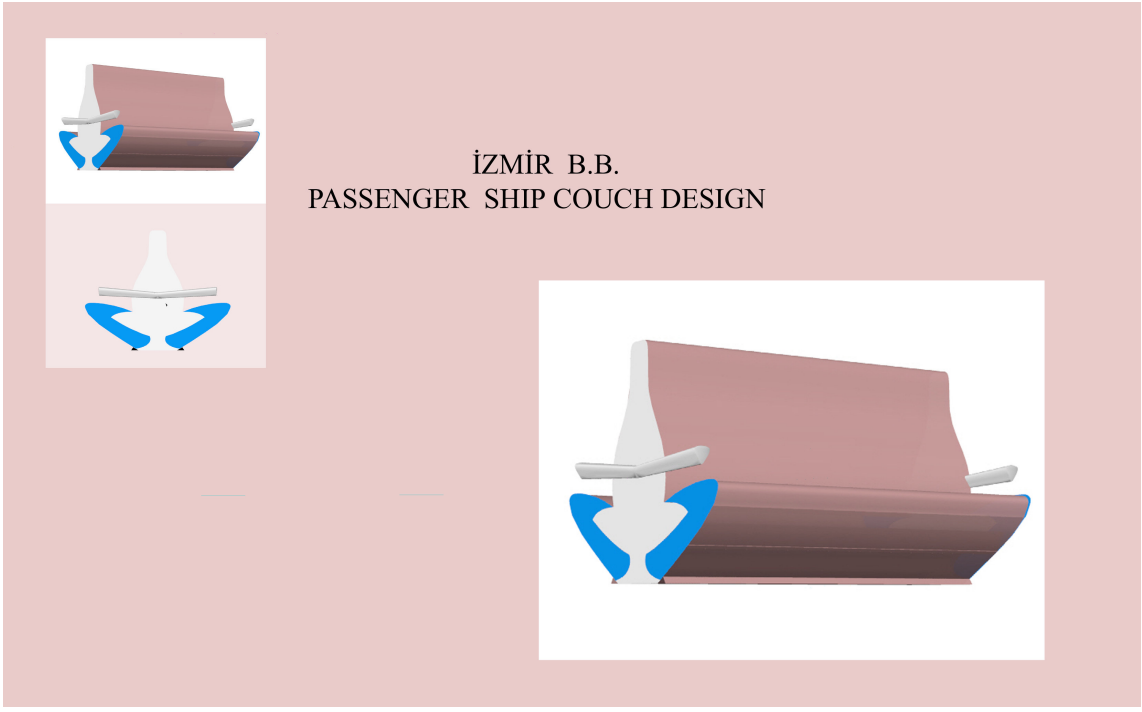

Figure 4.20. Couch design

Figure 4.21. Proposal Design

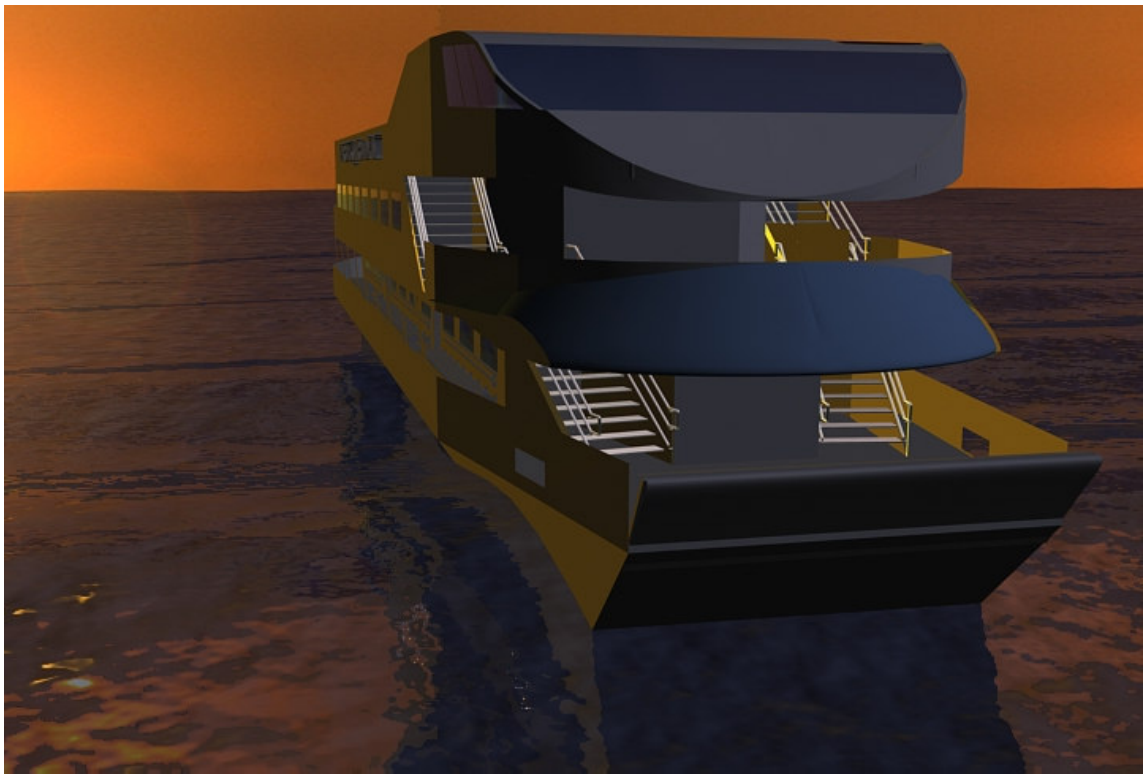

Figure 4.22. Proposal Design

CHAPTER 5

CONCLUSION

A design can not be considered “good” in means of engineering if only it is liked, confirmed, demanded and used by the user. Industrial designer should add a value to the engineering based approaches. Adding value means putting human factor, esthetical values and visual sensitivity. Industrial design criteria have to be adapted to boat as an industrial product. Ferryboat is considered as the object and industrial design criteria is adapted for ship and the design criteria evaluated from the results of thesis, panel discussions and two surveys made in 1996 and 2003 about İzmir inner-city transportation and used for designing passenger boat for İzmir gulf.

The main functional criterion of passenger ship is to carry passengers from one pier to another. Boats have a physiologic relation with passengers that can be formulated with the ergonomic data obtained during the journey. This function can be summarized by comfort but it actually contains a wide spectrum of factors such as machine sound, vibration isolation and ergonomic seats. Couch form is generated from anatomic studies.

Passenger boat has to be designed with low produce cost and minimum maintenance cost and to be built or bought by municipality. To be successful in economy is not only low produce and maintenance costs also passenger ship has to be liked, preferred, demand by İzmir residents. There are many benefits of a successful and demanded passenger ship. Some are; decreased city traffic and related to that decreased fuel, time and work power loss. It is also a partial solution to parking, pollution problems which is much more important than monetary benefit for municipalities. Cost of sea transport is 5 times cheaper than land transport which decreases the transportation costs of municipality. Correct economical design, allows limited municipality resources to be spent for other services.

New design is made to break image of marine transport today. In the questionnaire passengers think sea public transport is nostalgic with the big boats also uncomfortable and noisy with sea buses. More over to add an important point: they are never and ever uncomfortable like bus or minibus. Besides it is the safest vehicle of all kind of public transport system.

Design has the image of contemporary appearance to break nostalgic image of marine transport today. One of the main targets in the design is to obtain the passenger the safe, secure feeling. For this reason to have this target boarding system of the boat is innovated.

A new system has to be designed for disabled people to board in because design is not only commercial; it is a service of municipality. Moreover this system decreases the time needed for the passengers to board in with remarkable safety. After boarding in safely passengers arrive at the stairs which are designed for children and disabled people. If passengers wish, they can be lift the deck 1 or terrace with by the elevator and have the pleasure of İzmir bay's view. The open spaces are a lot more than other ferries in use (nearly 9.3 times more than the big ferryboat) which is the request of İzmir residents.

5.1.Future Intentions

This project needs to promote and then take in action with their own will of İzmir citizens. This is a must because the designed boat will be used by them. A new questioner needs to be made for the intentions for of the new generations. The design may have some advanced technologic services like wireless internet access and kiosks in the boat for many municipality applications can be made by them like in piers now. Importance of youths coming is from the percentage. These boats will used by them with the high percentage. In the view of İzmir's citizen demands and needs are not only for now also for future. Design has to be promoting as a new cultural activity place for the city, not an ordinary public transport vehicle. From here next step for to future is to make a service design to make the boat, preferred to use instead of bus, metro and minibus. Number of population, car therefore traffic jam, pollution is increasing. As a result increasing trend makes life harder and harder every day. A real pleasure and comfort is using sea transport for every day instead of using own car or bus. Economy for passenger, more profit for municipality, less pollution for city, less usages of nature sources for future. In this equation every body wins. If we lost the marine transport chance for İzmir new generations never understand nor use seaway. It is a problem for now but in future it is more likely.

After all others marine transport and generally all sea activities, city and sea interaction are to be promoted for trying with psychological methods. An example when a person has enough money his or her would like to buy a boat than to buy a car. People who live in cities by the sea want to buy a boat and get pleasure out of sea.

Nature and life style of İzmir needs to be keep for next generations without ruined. Green spaces and sea coast have to be saved therefore we have to give priority to basic substructures. İzmir made peace with sea and sea transport but this have to improve for our future.

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