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THE APPLICATION OF SHIPBUILDING MANAGERIAL AND OPERATIONAL CAPABILITY ASSESSMENT MODEL (S-MCM) TO TURKISH SHIPYARDS

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by

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FOREWORD

This thesis mainly concentrates on measuring and assessment of management and production problematic of Shipbuilding Industry which is a strategic sector for Türkiye to get a quick jump in the economy.

Obviously, shipbuilding is a strategic sector, and namely, it needs strategic analysis. “Strategic management research focuses on the relationships among strategy, environment, leadership/organization; each of these four constructions is multidimensional.

Looking with a wider angle; as a developing country, Türkiye, with the possibility of new projects in areas with growth potential and capabilities of information technology and knowledge economy to compete with developed countries must develop new investment. Shipbuilding is precisely stands in this field, this recognition and proper development and high potential to growth.

To get precise results, it is needed Capability and Maturity (C&M) measurement tool. Maturity Models have been proven powerful tools to assess to current state of an organization regarding a certain aspect and drive improvement. The Capability Maturity Model (CMM) and its Assessment Methodology provide a tool and methodology to assess the maturity of an organisation across some criteria at present time.

It is widely inspired from CMMI (Capability Maturity Model Integration) system tools in SW area. CMMI is a process model; organization of SW processes the SW planning, development, such as applications assessment of the maturity model. An interesting and good example of new generation standard is CMMI. To evaluate and appraisal of SW companies existing standards were not enough. For this reason, SW sector needed a new type standard. It was quite different but overlaps real and necessary demands. Software Engineering Institute (SEI) of Carnegie Melon University started the approach and now 200 companies and university supports CMMI in January 2002.

CMMI is a model that provides guidance for developing processes. It is not a set of process descriptions that can be directly applied in an organization. The actual processes

used by an organization depend on many factors, including application domain and organization structure and size. CMMI (Capability Maturity Model Integration) is made up of best practices dealing with the development and maintenance of products and services. Here in this work it is also separated a company managerial and production sides and phases of each side. Naturally to propose a well-designed model those are not enough. Standards some times changes as technological and social demands changes. Some new standards publish or existing standards changes or two or more standards steering under an umbrella with more consensually manner. Another conduct to standards is measuring and appraisals. Measuring and appraisals are based on real needs and can be used thousands of goals.

This dissertation thesis is aimed at the notion of consciousness regarding the management, classification and assessment of shipyards. The use of software area method known as CMMI; was investigated. A CMMI-like index has been developed and a new perspective has been introduced.

One of this work's goal is getting some measurement and appraisal standards for shipbuilding industry. Standards are results of economic, social, technological demands and have historical backgrounds. Today standards are divided into two groups: Volunteer and regulatory.

While the process orientation is on the agenda of an organizational business and senior executive, maturity models are developing in business process management. On the other hand, it is the amount and width that the maturity models create.

ABSTRACT

THE APPLICATION OF SHIPBUILDING MANAGERIAL AND OPERATIONAL CAPABILITY ASSESSMENT MODEL (S-MCM) TO TURKISH SHIPYARDS

Marine transportation has a very crucial role in the World economy. Shipyards have a very significant place in the maritime transportation. For economic development and stability must take a bigger share of shipbuilding.

New technologies and trends, this is not possible without being followed. It is important to measure the maturity of a shipyard capacity in all respects. It is important when there is a possible ordering, money lending, or incentives. It is important when developing strategies for the future. It is important when there is a possible cooperation.

However, according to George Akerlof's theory have received the Nobel Prize cannot be understood without cutting a decay lemon. Therefore, you cannot get enough information on the financial statements.

In the shipbuilding sector, to assess the capability&maturity just by looking at shipyards financial statements is incomplete and even incorrect. In this study, it was tried to develop a level determination and criteria set suitable for the developing and changing needs of the day to evaluate the shipyards in terms of capacity and maturity.

It was inspired by the CMMI model, which was originally introduced by the Carnegie Mellon University Software Engineering Institute and is accepted by other sectors today, based mainly on best practices from both manufacturing and management in the software industry. According to the results of the study, 5 basic levels and their criteria have been considered as well as the CMMI model inspired by S-MCM levelling.

ÖZET

TERSANELERİN YÖNETİMSEL VE OPERASYONEL KABİLİYET DEĞERLENDİRME MODELİNİN (S-MCM) TÜRK TERSANELERİNE UYGULANMASI

Deniz Ulaşımı Dünya ekonomisi içinde çok önemli bir yere sahiptir. Tersaneler ise deniz ulaşımı içinde çok önemli bir yere sahiptir. Ekonomik gelişme ve istikrar için tersanecilikten daha çok pay almak gerekmektedir.

Yeni teknolojiler ve eğilimler takip edilmeden bu mümkün değildir. Bir tersanenin kapasite olgunluğunu ölçmek her bakımdan önemlidir. Sipariş verirken, kredi verirken, teşvik verirken önemlidir. Geleceğe yönelik stratejiler geliştirirken önemlidir. İşbirliği yaparken önemlidir.

Ancak George Akerlof'un Nobel Ödülü almış teorisine göre, bir limonu kesmeden çürük olup olmadığı anlaşılamaz. Yani mali tablolar yeterince bilgi veremez.

Tersane sektöründe de, sadece mali tablolara bakarak bir tersanenin kapasite olgunluğunu değerlendirmek eksik ve hatta yanlıştır.

Bu çalışmada tersaneleri kapasite ve olgunluk bakımından değerlendirmek için günün gelişen ve değişen ihtiyaçlarına uygun bir seviye belirleme ve kriter kümesi geliştirilmeye çalışılmıştır.

Temel olarak yazılım sektöründe hem üretim hem de yönetim tarafında en iyi deneyim örneklerinden yola çıkarak Carnegie Mellon Üniversitesi Yazılım Enstitüsü tarafından ortaya atılan ve günümüzde diğer sektörler tarafından da kabul gören CMMI modelinden esinlenilmiştir. Çalışmanın sonucuna göre S-MCM seviyelendirmesi için de esinlenilen CMMI modelinde olduğu gibi 5 temel seviye ve bunlara ait ölçütler gözetilmiştir.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF SYMBOLS

$: United States Currency-Dollar

€: European Union Currency-Euro

₺: Türkiye Currency-Lira

LIST OF ACRONYMS AND ABBREVIATIONS

3D: Three Dimensional

ALPT: Adaptive Logic Programming Technology

ANSI: American National Standard Institute

Approx.: Approximately

Bn.: Billion

S-MCM: Capability and Maturity

CAD: Computer Aided Design

CAM: Computer Aided Manufacturing

CAL: Computer Aided Lofting

CAE: Computer Aided Engineering

CE: Conformity European

CIM: Computer Integrated Manufacturing

CGT: Compensated Gross Tonnage

CMMI: Capability Maturity Model Integration

CNC: Computer Numerical Control

CWT: Unit Hundredweight in British Measurement

DoD: Department of Defence

DTO: Deniz Ticaret Odası (See also **TCOS**)

DWT: Deadweight Tonnage

EIA: Environmental Impact and Assessment

EDI: Electronic Data Interchange

IEEE: Institute of Electrical and Electronics Engineers

ESW: Electro Slag Welding

ETSI: European Telecommunication Standard Institute

EU: European Union

FAA: Federal Aviation Agency

FMS: Flexible Manufacturing System

GDP: Gross Domestic Product

GİSBİR: Turkish Shipbuilders' Association

GIT: Global Information Technology

GMAW: Gas Metal Arc Welding

GTAW: Gas Tungsten Arc Welding

HW: Hardware

IACS: International Association Classification Societies

ICT: Information and Communication Technologies

ILO: International Labour Organisation

IMO: International Marine Organisation

ISO: International Standard Organisation

ITU: International Telecommunication Union

LCS: Littoral Combat Ship

LNG: Liquefied Natural Gas

LPG: Liquefied Petroleum Gas

M: Million

MDWT: Million Deadweight Tonnage

MIG: Metal Inert Gas

MT: Million Tons

MPW: Magnetic Pulse Welding

MRP: Material Requirement Planning

MPS: Master Production Schedule

NASSCO: National Steel and Shipbuilding Company

NAVSEA: Naval Sea Systems Command

NRI: Networked Readiness Index

OECD: Organisation for Economic Co-operation and Development

OHSAS: Occupational Health & Safety Advisory Services

OMT: Object Modelling Technique

OO: Object Oriented

PPCS: Performance of Prediction Criteria Scale

QFD: Quality Function Deployment

ROTAS: Shipyard Rotating & Sliding System

RO/PAX: Vessels are designed for transport of both freight and passengers

RO/RO: Roll-on/Roll-off

R&D: Research and Development

SAW: Submerged Arc Welding

SCARA: Selective Compliance Assembly Robot Arm

SD: System Design

SMAW: Shielded Metal Arc Welding

SME: Small and Medium-Sized Enterprises

SW: Software

S-MCM: Shipbuilding Maturity and Capability Model

T: Tonne

TCOS: Turkish Chamber of Shipping

TEU: Twenty-foot Equivalent Unit

TIG: Tungsten Inert Gas

TL: Turkish Lloyd

Tn: Trillion

TRI: Technology Readiness Index

TSI: Turkish Statistical Institute

TQM: Total Quality Management

TÜBİTAK: Scientific and Technical Research Council of Türkiye

US: United States

UML: Unified Modelling Language

VLCC: Very Large Crude Carrier

YoY: Yield on Year

WTO: World Trade Organisation

1. INTRODUCTION

Shipbuilding Industry is such a strategic industry for Türkiye that, it is essential to get a quick jump in the economy. Shipbuilding and shipyard industry allow the foreign exchange input, foreign capital inviting, providing and development drag the supply industry in together. This industry attracts the transfer of technology, because of the service to the country's defense "strategic importance" which supports the commercial marine, 1 to 7 percent of employment with the supplier industry. (GİSBİR, 2014)

Obviously a strategic sector requires strategic analysis and strategic management. Strategic management starts strategic analysis. “Strategic management research focuses on the relationships among strategy, environment, leadership/organization; each of these four constructions are multidimensional. Strategy, for example, can be viewed as composed of process and content concerns (Ansoff, 1965), scope and resource deployments (Hofer and Schendel, 1978), or corporate, business, and functional-level issues (Andrews, 1971) similarly, environment may be divided into task and general elements (Thompson, 1967)”. (Ketchen and Shook, 1996)

A strategies analysis must cover goals as well as current position analysis. By this mean, how they can achieve those goals can be decided. (Byars et al., 1996) From looking inner side this is the picture that why a company need C&M analysis.

Looking with a broader angle; as a developing country, Türkiye, with the possibility of new projects in areas with growth potential and capabilities of information technology and knowledge economy to compete with developed countries must develop new investment.

Shipbuilding is precisely stands in this field, this recognition and proper development and high potential to grow.

Furthermore, the investment is considered a high *multiplier effect* regarding the return. However, the field of information technology and the Modern World, it was needed

to appreciate the need for countries not regarding the knowledge economy and the fact that the league will not go to a top league regarding competition.

Insurance company mainly can use the output of this work when they have to assess a single shipyard. However, at a first glance when a defense need arises, government also can use the output of this work. Using some changing and after experiments of sides, not in Türkiye but in all around the world, most of the parties can use output of this work.

Assume new attacks or projects may be manifested in various ways. For instance;

i. Opened up new markets with new commercial contract, or maybe new orders,
ii. Bilateral agreements or economic integration or as required by the business associations such as the customs union may be necessary investment,
iii. New incentives, loans, grants or funds can be disbursed,
iv. Applying the yard of the newly developed SW or technology may be encouraged or may be required,
v. Necessity of EU or other such unions regulations, (as required by international conventions),
vi. Maybe desirable to increase productivity and business competitiveness,
vii. Through the cloud may be desirable to use some programs and SW for all kinds of data for planning and control to achieve online,
viii. Taxes and other legal sanctions and automatic control of the obligation may be desirable.

When Türkiye or another country having shipbuilding potential, wants to make jumping from this point of view, developing the project, starting a work, first thing that should be decided the current situation. It supposed to understand current position as much as possible but in short time and as much detailed as possible. They want to know in both management and production sides. They want to understand company's agility as well as Machine Park. They have to learn human potential and future vision as well.

Facts that mentioned above to reveal the objective criteria all the things out of the current situation asked to all parties. So it is needed a Capability and Maturity (S-MCM) measurement tool. Maturity Models have been proven powerful tools to assess to current state of an organization regarding a certain aspect and drive improvement. However, maturity models are often developed ad hoc, without following a well-documented design and development method, and often do not provide a pathway to extend further and update the model to foster systematic enhancements and extensions. (Proenca et al., 2009) Different kind of work and scales can be used for method improvement. For example, the scale used by the Union of European electronic state preparation 'e-readiness' concept is one of them.

Another useful method of inspiration for this work is the Cloud Computing Assessment Effect analysis. A comprehensive model for cloud computing effectiveness assessment was presented by the committee. The subdivisions of this model consist of technical, organizational, economic and external dimensions, and they appeal to the users as well as the cloud computing service providers in various levels. Independent and dependent activity variables were determined. (Yarlıkaş, 2014)

The Capability Maturity Model (CMM) and Evaluation Methodology provide a tool and methodology for evaluating the odds of an organization according to some of the existing criteria. Maturity represents the ability to implement and sustain an internet service portfolio of an organization.

Investment in human resources, structural capital, relational capital and IT technologies and investments and five maturity stages (web presence, interaction, transaction, integration and continuous improvement). These areas are evaluated using IC management model and CMMI model. The use of IC management intermediaries and processes not only ensures that practitioners manage resources efficiently, but at the same time evaluates auditors objectively. (Kim and Grant, 2010) In chapters it is considered some e-government and e-readiness models and evaluate similarities those projects and this work (dissertation thesis).

It is widely inspired from CMMI (Capability Maturity Model Integration) system

tools in SW area. CMMI is a process model; organization of SW processes the SW planning, development, such as applications assessment of the maturity model. An exciting and excellent example of new generation standard is CMMI. To evaluate and appraisal of SW companies existing standards were not enough. For this reason, SW sector needed a new type standard. This was quite different but overlaps real and necessary demands. Software Engineering Institute (SEI) of Carnegie Melon University started the approach and now 200 companies and university supports CMMI in January 2002. Most of the sectors and fields like SW companies are need capability and maturity level measurements and appraisals. (Krowston and Qin, 2010) So in coming chapters CMMI will be especially irritated.

"Since the Software Engineering Institute has launched the Capability Maturity Model (CMM) almost twenty years ago (Paulk et al., 1993), hundreds of maturities models have been proposed by researchers and practitioners across multiple domains (de Bruin et al. 2005, Weber et al., 2008). For instance, maturity models aim at assisting organizations with digital government (Gottschalk, 2009), IT management (Becker et al. 2009, IT Governance Institute 2007), or knowledge management (Kulkarni and Freeze, 2004). Also in business process management (BPM), an array of maturity models has been suggested (Hammer 2007, Lee et al., 2007, Rohloff 2009, Rosemann and de Bruin 2005, Weber et al. 2008), which is probably rooted in the high importance of process orientation and continuous process improvement for organizational design (Wolf and Harmon, 2010). In practice, the overall adoption of maturity models is expected to increase (Scott, 2007), a prediction corroborated by the numerous proprietary models proposed by software companies and consultancies. Recent literature also reports; an increasing academic interest in maturity models (Becker et al., 2010)" (Roglinger et al., 2012). At the end of this work, it was proposed an area specific survey method for S-MCM model investigation.

CMMI is a model that guides processes that are constantly evolving. A process definition sequence that can be directly applied to an organization is not a sequence. The actual procedures used by a business depend on many factors, including the application area and organizational structure and size of the plant.

CMMI has two dimensions covering product life cycle: products and services. It consists of best practices for the development and maintenance of processes from development to delivery and support. (Safe+, 2015) Here in this work it is also separated a company managerial and production sides and phases of each side. Naturally to propose a well-designed model those are not enough. So it has also been found out machine park maturity, new technology and concept usage and global vision.

To use a CMMI model published by SEI, it must be selected from multiple models available according to development needs. For this reason, in order to use the CMMI models published by SEI, it is necessary to know the content of each model and the area required to be developed. But on the other hand, it seems difficult for many users to choose a model from the SEI Web site because they need to prioritize the information bodies they want to address in their organizations and the approach they are taking to the process improvement efforts. (Khrissis et al., 2003) In this thesis, it was desired to perform 360-degree investigation including all equipment and legal necessaries. Those legal aspects are in not only Türkiye but also international regulations.

At the outset, it was not possible to select a specific model to ensure that all the needs were compiled in a job. Requirements define a standard procedure for all CMMI models. It represents, for example, how processes evolve as the organization progresses and basic concepts. Each CMMI model helped to understand the content and decide how CMMI could best meet sector needs. (Ben-Menachem, 2003)

One of this work's goal is getting some measurement and appraisal standards for shipbuilding industry. Standards are results of economic, social, technological demands and have historical backgrounds. Today standards are divided into two groups: Volunteer and regulatory.

Standards decided by countries, regions, unions or regulatory foundations. Some of the standard institutes are TSE, ITU, CE, ANSI, ETSI, and IEEE[1]. Some parties to make a

[1] See Abbreviations List.

standard are consumers, producers, governments, institutes, universities as well as technological developments and social needs. Some standards are known only in a small business and group. Nevertheless, some are effects and widely spread out all over the economic sectors like ISO 9001. Those standards most of the time renamed or coded according to countries.

Standards sometimes changes as technological and social demands changes. Some new standards publish or existing standards changes or two or more standards steering under an umbrella with more consensually manner. Another conduct to standards is measuring and appraisals. Measuring and assessments are based on real needs and can be used thousands of goals.

Methods to understand capability and maturity level are same for another sector. At the beginning, there must be white paper, which covers actual needs and real demands. Also, previous standards are must be scanned.

At the beginning standards only described goods and by the time services also got standards since economy has two main components as goods and services. It's evident that measurement and appraisals of facilities is also based on actual and real needs.

With process orientation being a central paradigm of organizational design and continuous process improvement taking top positions on top-level manager's agendas, maturity models are also prospering in business process management. Although the application of maturity models is increasing in quantity and breadth, the concept of maturity models is frequently subject to criticism. In fact, numerous shortcomings have been disclosed referring to both maturity models as design products and the process of maturity model design. Whereas research has already substantiated the design process, there is no holistic understanding of the principles of form and function that is the design principles maturity models should meet. It should be proposed an area specific, yet well-founded framework of general design principles justified by existing literature and grouped according to illustrative purposes of use. The structure is demonstrated using an exemplary set of maturity models related to business process management. So firstly, it has to be located exact place of shipbuilding sector by the light of historical, economic, technological and regional

facts. (Roglinger et al., 2012)

Inspiring CMMI in SW sector, it can be built a S-MCM model for shipbuilding sector. Before starting this work, literature have been scanned and there were some examples but no detailed work for shipbuilding sector.

SW also can use in shipbuilding sector both in management and production sides. However, this is not the only reason to make S-MCM work. Main reason exists standards, data cannot reveal a shipbuilding company's exact position, and it does not matter from which angle one can watch.

On the other hand, primarily like another standards evaluation, it has to be clarified what makes mandatory such a model. However, to understand this it has to be located the point of shipbuilding sector:

i. Economic perspective, in general, commercial and both in the World and in Türkiye.
ii. Historical Perspective.
iii. The exact place of shipbuilding sector in maritime sector.
iv. Changing world, needs and technologies perspectives.
v. Upcoming management and administrative understandings
vi. Both in management and production sides.

Beginning from this and similar works, in the future widely consensual standards can be accepted so appraisals and measure of shipbuilding company in capability and maturity way easier. But in this work, it has to be suggested a method to understand capability level and maturity grade.

But till that time, it also has to be limited capacity to get right answers of questions, which can be asked to understand S-MCM measurement. A large number of items/issues have potentially risks. It can't be sure the answers certainty. Company may avoid to responses some questions because of trading cares. Too long and too many questions can because weariness.

Up to now, it has been revealed the similarity to evaluate S-MCM analysis for a shipbuilding company and IT-CMMI technique. But if it is considered Shipbuilding Company as a technology basement it has to be understood that there should be more relation between Shipbuilding Company and IT usage.

Beginning from management wit has to be considered all phases of production and not surprisingly now new technologies; new concepts and methods are strongly related with IT technologies with different levels. The issue also shows the need of measurement of S-MCM level in another aspect. Just for this kind needs there is a concept called 'succinct[2] questions' means asking as low questions as reasonably and achievable to reach our goals. Aimed result may only be possible preparing short but reliable questionnaire.

Each field and question decided by using previous works, historical, social, economic facts and needs. But, if some others standards have common points it is also calculated those facts. After preparing criteria cluster, it was testified whether it works or not.

At the end, it was proposed a questionnaire to measure S-MCM level of a shipbuilding company with less effort but maximum precisely manner. To provide this purpose it was eliminated some questions, which give same results or one can be predicted by only looking the other's answer.

It will be no more used the term 'state support' because its nature is not mirroring the modern world's facts therefore the term 'policy' is preffered. But any of them doesn't matter; state or institutes can give funds. Here are the questions: Whether the funds can be spending on the right point or not. How can be possible funding a company on its actual needs? But after this works everybody can understand real demands.

Credit institutes and insurance companies can use this criteria cluster. But there are tens of parties can also use this set. In some other areas, similar works already been performed. For example, e-readiness ranking scale have identical story so it was also mentioned e-readiness, Lisbon Strategies and e-transform concepts in the sections below.

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[2] Theorethical Computer Science

In the future works, more specific areas can be studied in shipbuilding sector. S-MCM standards can be more common in shipbuilding sector.

This dissertation thesis is aimed at the notion of consciousness regarding the management, classification and assessment of shipyards. The use of software area method known as CMMI; was investigated. A CMMI-like index has been developed and a new perspective has been introduced.

2. PROBLEM DOMAIN

2.1. Assessment of Total Quality of a Shipyard Company in Capability&Maturity Manner both in Management and Production Side

As an emerging industry and opportunity, Türkiye can make a big jump both in shipbuilding and SW industry. The job of the shipbuilding industry is to supply new ships, while shipbrokers are the last resort buyers for old vessels when it is no longer possible to operate them beneficial in the shipping market.

Afterward focusing to an individual shipyard, it was founded out the production stages and concerning using technology the category or generation of a shipyard. Then It was revealed new generation and High-Tech products and SW as well as new concepts and methods. Moreover, it was righted down risks sourced from regulations. To measure Technological maturity of a shipyard e-readiness ranking is a good example and Lisbon Strategies have some essential elements.

Shipbuilding and marketing, regarding their economic structure are very different industries. Shipyard is a massive engineering business with capability of large and sophisticated product built that requires high level of technical expertise to design and produce a merchant ship. Marketing requires substantial capital investment. Competitor shipbuilding is mainly in industrialized countries of Japan, Europe, S. Korea, China and Taiwan.

Shipbuilding industry structure is mainly based on labor-intensive branches of industry. Moreover those are enable installation of shipyard techniques and capabilities in a capital-intensive industry.

Ship is an item that has great importance. Shipbuilding in World trade; steel industry, machinery manufacturing, electrical and electronics industries, as of many sectors in products such as paint industry and rubber-plastic industry based on scientific and

technological base, in particular a systematic and disciplined, brought together in the shipyard are emerging as a result of merging.

In this sense, labor-intensive character and created a significant contribution to solving the employment problem is the broad scope of eligibility to be found.

Besides this nature of shipbuilding industry; provide input in the development of foreign exchange and supply industry, attracting technology transfer, supporting the national maritime fleet and is an industry that contributes to the country's defense needs.

Countries primarily, for the way giving importance to the shipbuilding industry development initiative, initially effortless and relatively easy to mass production, a job that requires systematic discipline and show the need for advanced technology applications are liquid and dry bulk carriers begin construction. To achieve the acqusition of such ships, which do not require advanced technical skills and shipyards are building steel construction that can be performed.

Leader shipbuilding countries also have leader automotive industries. The fact behind is because of technology transfer and heavy industry characteristic.

Experiences and knowledge gained from shipbuilding activity are input to increasingly advanced establish a shipyard that has technological capability. A sophisticated and technical equipped shipyard requires a significant investment.

On the other hand, due to the shipbuilding industry is labor-intensive industry, in countries where labor costs are lower than US$ 2000/capita income level to set up new plants easier. To sell more cheaply ship in international markets and to increase the competitive condition, it is more suitable for countries where the income level is lower respectively. States that have completed the development of the shipbuilding industry and the countries have reached the level of economic prosperity, should not migrate easily move their capabilities and qualifications to those developing countries.

Developed countries with advanced shipbuilding capacity, despite losing international competition in shipbuilding due to high labor costs, since shipbuilding industry have excellent employment potential, transport and industrial products that also provides other industrial sectors drag and development of significant size, governments prevents from closure of shipyards using subsidies.

Shipyards in developed countries, the needs of other industries in other special types of advanced technological and colliding with the shipbuilding and shipbuilding machine, they resist closure undertaking the construction of equipment and steel construction.

Another reason for state support, shipbuilding industry has a strategic importance for country defense. In these countries, considering the supply of vital importance for the military ships and maritime trade and the renewal of the fleet they want to be dependent from other countries.

More than 90% of World transport achieved via maritime. Maritime transport compared to road transport the average seven times; compared to railway transport 3.5 times more economical addition to the enormous number of loads is an essential advantage for the shipbuilding industry at a time and safe transportation.

As long as there are human and technological progress no matter how many years will be needed to move the ship and shipping. In this sense, foreign currency inflow will contribute to the maritime sector of the economy and transport ships built can't be underestimated.

It was investigated some fact files of leader shipbuilding countries. All of those facts show that starting point is governmental support.

In this chapter topics investigated for shipyards as follows;

i. Importance in maritime economy
ii. World shipyard history
iii. Turkish shipyard history

iv. World shipbuilding industry
v. Regional influence

2.2. CMMI

CMMI- Capacity Maturity Measurement Indexing[3] is a model that guides developing processes. It is not a set of process descriptions that can be directly applied in an organization. The actual methods used by an organization depend on many factors, including application domain and organization structure and size. Thus, the process areas of a CMMI model do not typically map one-to-one with the processes used in an organization. Procedures used in an institution depend on various parameters such as work area, organizational structure and size. CMMI models are not processes or process definition is guiding the realization of a process. (A Safety Extension to CMMI-DEV, V1.2, 2007)

CMMI models are composed of process areas. These process areas are used or in that each institution and the process consists in combining the organic bond with each other. Process areas results in any process improvement activities within the institutional structure of the interaction is defined independently of each other, though admittedly must be kept in mind.

Many stakeholders are involved in the development and maintenance of CMMI models, with participants from commercial industry, government, and the DoD (Department of Defence). Broad adoption has occurred worldwide. Adopters range from small and midsize organizations (these are the majority) to large and massive organizations. Organizations that provide products and services to the DoD use CMMI to improve programs, systems, product and service management, systems and software engineering, work processes, and training solutions. (https://resources.sei.cmu.edu/library)

One of the best practice is FAA example. The Federal Aviation Administration (FAA) developed an integrated Capability Maturity Model (CMM), known as the FAA-iCMM, that integrates the Systems Engineering CMM, the Software Acquisition CMM

[3] A Safety Extension to CMMI-DEV, V1.2, 2007

and the CMM for Software. The FAA-iCMM was released in 1997 and is the first major integrated CMM in existence.

Since 1997, it has been successfully guiding the systematic improvement of FAA-wide processes used to manage, acquire, and engineer systems, products, and services. (The FAA Experience. Available from: https://www.researchgate.net/publication/251805628_Using_an_Integrated_Capability_Maturity_Model_-_The_FAA_Experience [accessed Aug 21, 2017].)

The important thing that it has to be taken account, like blood value for our health, Performance Prediction Criteria Scale (PPCS) of shipyards have to give accurate data as a model of CMMI level calculation. Mainly PPCS is criteria cluster namely question set of survey (See also 4.6 Field Survey).

Primarily insurance companies can use the output of this work but it is not the only result. Likewise, it's not the only method to make an assessment. In case of:

i. New order,
ii. A bank lending,
iii. Institutional funding,
iv. Promote or arranger of a public authority,
v. While making a service contract between a parent organizations and subcontractor has received a service contract,

There are 25 process areas of CMMI model. This process area can be grouped under four main disciplines including:

i. Systems Engineering,
ii. SW Engineering,
iii. Integrated Product,
iv. Process Development and Supplier Control.

CMMI model via bringing together various process improvement models, and this is a natural transformation from model to provide targets, therefore has two different representations that are equivalent results.

The first of these impressions continuous playback is called and is determined by a process capability maturity level in any area. One work in process capability maturity level desired area the wanted the organization thanks to this show.

Another representation is called as the phase views. Continuous playback in this illustration is provided as distinct improvements in various stages of process-specific group. Beginners' institutions to process improvement activities so they can see a path in front of precisely defined.

2.3. Benefits of CMMI Adopting

CMMI technique is not only rates the maturity of companies' process, but it gives a level of assurance that the company being given the work will be able to complete the job in predefined time and price for a project. At the beginning it was used in the US defense sector. CMMI is now being adopted increasingly and widely to all business improvement in very diverse organizations. (https://resources.sei.cmu.edu)

For the local software development industry to become more competitive on a global scale, it will need to fall into line with international standards, so that local companies seeking international contracts will be able to meet the CMMI level specified by foreign companies. CMMI provides a proven approach that has enabled diverse organizations to drive out real benefits regarding dramatically improved project predictability and consistency. While any or all of the above factors may drive an organization's initial interest in CMMI, the key benefit from implementing the model that executives focus on is consistency in delivery. CMMI driven process improvement also delivers real cost savings such as earlier and more effective error detection, and hence reduced cost of remediation, more effective management of change so you spend less on re-work, reductions in schedule variability and increased cost predictability. (https://resources.sei.cmu.edu)

The Need of a Model

Without a model of how an organization work, which functions it need, and how those functions interact, it is challenging to lead efforts to improve. The model gives an understanding of discrete elements in an organization and helps to formulate language and discussion of what needs to be improved and how much improvement might be achieved. The model offers some of the following benefits:

- Succeed a common framework and language to help communicate
- Leverages years of experience
- Helps users keep the big picture in mind while focusing specifically on improvement, trainers and consultants often support it
- Can provide a standard to help solve disagreements (Vizteams, 2017)

Technology Availability

Over the course of several decades, technology has helped address the needs of industries to implement production increased efficiencies and improve productivity. Ship-building industry is faced with an ever-increasing complexity with their products and processes.

These complexities are not just from the shipyard product characteristic but also from the environment, safety, regulatory laws and the changing nature of the workforce. Once it is looked at shipyard industries High -Tech ranging from reducing workforce varying forms of technological innovations has been implemented for providing better and more cost-effective products.

Lisbon Strategy and e-readiness report also wants to stress the importance of adoption to new method and technologies. In fact, one of them is shipyard and the only way to understand the level of approval is CMMI and maturity level.

Broadband penetration now exceeds 20% of the population of most OECD countries. Improving access to a fast Internet connection, however, is still a work in progress

for most countries. Meanwhile broadband usage and new generation SW penetration to shipyard are increasing from day to day. S. Korea is famously broadband prosperous likewise leader shipbuilding country, and the next stage of the country's Internet development should be instructive for all fast-growing broadband markets. Regulators and operators are working to established a new policy framework, which among other things may force that broadband becomes part of operators' universal service obligations recognition, in other words, that broadband access is a fundamental need of citizens and must be an indicator. There should be a correlation between e-readiness and Internet (broadband) penetration. Even there should be a direct relationship between country e-readiness ranking and average capability of maturity indexing level of all industries in that country. (http://www.oecd.org/sti/broadband/broadband-statistics/)

Today, World has considirable challenges, IT technologies are an opportunity higher levels of growth but they don't reduce high unemployment rates competitiveness while fighting, especially among the youth them. Same dilemma is in shipbuilding industry. High -Tech is a big chance to grow economy but can't reduce unemployment rate.

Smartphone usage in a country gives a data about average person's technology usage ability. And it also implies average shipyard staff can do digital affairs and it means readiness of technology usage in a shipyard is a factor of country global e-readiness. In the future, some new investigations may find out the correlation between smartphone usage (at least in some aspects) and maturity of shipbuilding industry (not entire country) of that country.

Turkish Shipbuilding History

Prior to Ottomans and the Imperial Period; After the Malazgirt Victory in 1071, Turks entered Anatolia. Just after and they were dispersed in a short time over Anatolia, from Sinop at north to Alanya at south, in the west until they reached İzmir. Thus, those living in the territories are not acquainted with the sea for centuries in Central Asia; Turks have been dismissed meet sea after migration to Anatolia.

Çakabey, commander of Alpaslan, has reached in the year 1081 in İzmir. He has established an independent principality around İzmir. Çakabey worried about shipping and releasing first set up the Turkish fleet began to collide with the Byzantines. Age after Çakabey's death has been unable to maintain its vitality in İzmir Principality.

Seljuks, Anatolian whether the historic Silk Road reconstruction to improve the road transport they revive. At the same time in Sinop on the Black Sea, the Black Sea and the Mediterranean and using other ports of Antalya and Alanya in the Mediterranean port began with the maritime trade.

Over time, Antalya, Alanya and Sinop ports, have become essential transit ports of both the Mediterranean Sea and the Black Sea. Therefore, these ports need to protect them from possible attacks have been heard by foreign fleets. Thus, The First Turkish shipyard is Alanya shipyard, history and Sinop Dockyard is the second Turkish shipyard in Turkish maritime history.

If Alanya Shipyard assumed that began operation at the beginning of the twelfth century, it seems that Turkish shipyard has at least an 8 centuries-old history.

After the Ottoman have reached the Sea of Marmara. And the first shipyard established by the time of Sultan Orhan Bey by Karamurselbey in Karamursel. Masters from the Karesibeyligi began to be built new ships in this shipyard. In addition to the shipyard established in Karamürsel Edincik and also founded two small shipyards in İzmit on a small scale.

When Ottoman moved to the Thrace, they have established a naval base and a shipyard at Gallipoli. Gallipoli Shipyard, which formed during Sultan 1. Murat developed and it has become one of the era's major shipyards.

Construction of Turkish maritime fleet of warships, which needs to start conquering the countries, taken as bases, thus established the first Turkish shipyards. Our first shipyard that forms the basis of our shipbuilding industry, Sinop by the Seljuks in Anatolia (1214) and Alanya (1227) has been built. During Ottoman Empire's founding period, İzmit,

Karamursel, Gemlik, Aydın and Gallipoli were inactive. Gallipoli yards could build 15 'Galley' was known as an example to understand the building capacity.

Much attention is paid to the shipyard during the rise of the Ottoman Empire. In addition to the existing shipyards, Suez, İstanbul and Sinop shipyards were built. Fatih Sultan Mehmet has established Haliç and Taşkızak shipyard 'İstanbul Shipyard' in 1455. This shipyard in the Ottoman period, were built small wooden vessels. However, since the late 16th century, along with technological advances in the West and the decline of the Empire growth in shipyard had been stopped. (Baykal, 2017)

Our shipyards have been kept active until the early 19th century. 'Steam Machine' of the face of Western countries managed to place the ship, has been shown to accelerate the negative developments. For the prevention of these problems and will try our shipyards to meet the needs of qualified employee; in addition to İstanbul shipyard in 1773 'Mühendishane-i Bahr-i Humayun' established, and thus began the first modern engineering education core the Naval Academy established İstanbul Technical University. (Yıldız, 2008)

Republican Period; By the Treaty of Lausanne; Haliç and Taşkızak shipyards military activities stopped. With a German company to carry out maintenance and repair of existing military vessels, collaboration was made in 1924. Haliç and Taşkızak shipyards with some slides were moved to new established shipyard in Gölcük whose name 'Republic of Türkiye The Directorate of Naval Factories, Shipyards Pool and Manufacturing Plants'.

After the 1936 signing of the Montreux Treaty, Taşkızak Shipyard reopened. Taşkızak closed since 1923 has been connected to the Marine Corps and activated as a second shipyard.

It had been purchased shares of the companies in 1923 just after establishment of the Republic of Türkiye. Those companies are Camialtı and Haliç shipyards under 'Seyri Sefain İdaresi-Navigation and Scheduling Administiration' and the French company founded in 1912 Saint-Nazaire whith the name 'Bosphorus, İstinye pool and looms'.

Subsequently, in 1933, 'Seyri Sefain İdaresi' terminated. Instead of terminated company 'Denizyolları İşletmesi-Maritime Administiration, Akay İşletmesi-Akay Administration, Fabrika ve Havuzlar İşletmesi-Fabrics and Pool Administiration' were founded. In 1938, these enterprises combined under the name 'Denizbank Genel Müdürlügü-General Directorate of Denizbank'. İstinye Shipyard also purchased from the French owner and joined to Denizbank. (Baykal, 2017)

In 1939, convenient as Atatürk's recommendation our maritime fleet to the in the previous year and 50,000 Deadweight Tonnage-DWT/year capacity was decided to establish the Pendik region of a shipyard places have been expropriated, but unfortunately postponed the establishment of the shipyard with the start of the 2nd World War -WW II-.

In Türkiye, first private sector activities began with the established in Haliç with slipway and maintenance of trees in the 1940s barge boat.

In Türkiye, taking into account developments in the shipbuilding industry and maritime services 'Denizcilik Bankası Türk Anonim Ortaklığı- Maritime Bank Cooperation Venture of Anonymous Turk' was established in 1952. Hence, Port Services, Sea Freight towboat were saving together.

Across the organization, Haliç, Camialtı, Hasköy, İstinye Shipyard in İstanbul, and İzmir Alaybey Shipyard have continued their activities. Afterward Pendik Shipyard for construction started in 1969 and partially commissioned in 1982 and the Engine Factory participated in was started in 1982 and operations in 1992, joined to those shipyards.

Within the planned development period the innovation studies in shipyards, shipyards and opened schools for the training of workers within the organization grow by making education work for shipyard employee are also provided.

Public shipyards during the period 1950-1963 have been developed. Private sector shipyards started manufacture of the wooden boat-worked steel boat. In the mid-1960s, the Haliç and the Bosporus Private Sector Shipyards have been established. Maintenance and

repair of commercial wood boat building and small tonnage vessels took place. Since 1963, the 5-year development plan began circuits.

With the Council of Ministers Decision in 1969 in Tuzla Aydınlı Bay has been declared as Shipyards Zone. Infrastructure investments made by the State to entrepreneurs to build shipyard 'revolution' have been decided.

Fourth Five-Year Plan Period (DPT, 1978); Tuzla Shipbuilding Industrial Zone was established. Partial regulation and infrastructure work has been made in the region. Haliç and Bosporus shipyards have moved to Tuzla shipyards district since the early 1980s.

The development of maritime planned years, it was taken into account as an important element of economic development. Five-Year Development Plans have been given special importance in the framework of the maritime sector. As a result, private organizations began to develop in the shipbuilding industry. Cabotage transport in abandoned wooden boats steel boat building and management has become widespread.

Our shipbuilding, yearlong, industry has gone through various phases, has come to reach that position today finally. Our shipyards, military, public and private sector, construction of all types of maritime vessels using the facilities of modern technology, repair and modifications can be made. Thus, in developing countries have achieved a level that can compete to some extent.

In 2013, the area remaining from old shipyards (Camialtı-Taşkızak) was rented for 45 years' period to Haliç Altın Boynuz Marina Turizm Gayrimenkul İnş.Yat. Tic. AŞ. By an auction held by Transportation Ministry. (UBAK, 2015)

Some facts of that project as follows:

Haliç Marina and Complex Projects, Beyoğlu District neighborhood of about 252,000 m2 of space Camiikebir "Build Operate Transfer" model will be built.

Main investment areas involved in the project:

i. Binding capacity of at least 70 or marina,
ii. 400 room 5-star hotel with a capacity of 2,
iii. Congress and culture center, cinema, leisure facilities and so on,
iv. Apartment / boutique hotels,
v. Office buildings, shopping, eating, drinking units,
vi. 1000 people mosque,
vii. 2400 parking garage.

The necessary criteria for settlement to:

i. Total construction area cannot exceed 438,000-m² in the project area.
ii. The construction area cannot exceed 318,000-m² including the precedent years.
iii. Sea landfills integrity of the project will not exceed 30,000-m² year.
iv. Maximum building height, from the lowest level was lowered into the ground floor of the building 21.50 m.
v. Rentable area will be held open or closed parking for one vehicle each have 100 m².

Taşkızak -Haliç-Camialtı shipbuilding complex are may include the world's oldest shipyard area. After finishing this build-operate-submit project, hopefully main theme will be shipyard area. The main contractor company is 'Altınboynuz' and they want to protect natural tissue and historical shipyard theme (Cülfik, 2015). Undoubtedly the area has great importance and it is treasured place.

World Shipbuilding

Due to the shipbuilding industry characteristics origins dating back to the year BC 3000 are one of the oldest manufacturing industries. In the year 2015, in an archeological caving, one of the most former shipbuilding plant has been found in Dana Island in Mersin, as a 3200 years old (Ertuğrul et al., 2017).

Especially technological advances have made sense with WW II, and then there have been new developments with the transfer of know-how learned from other sectors of the shipbuilding industry. This breakthrough is the result of the shipyard had frequently been used regarding technological level; technological level determination is made in detail to existing or newly established shipyard.

Since the founding of the US, ships and shipbuilding industry has been a significant milestone in the development of this country, shipyards have been the technology bases.

Shipbuilding industry has the nature and character that it can easily migrate to developing countries from developed countries. Although this ship industry faces from the 1970s onwards emigrated from Europe to the Far East Asian countries.

In 19th and 20th Century, Japan has made remarkable advancements and breakthroughs in shipbuilding industry. In this way, especially after WW II, in the World's shipbuilding industry has taken the lead. After WW II, Japanese shipbuilders have come to precisely the level that they can meet the needs of their maritime sector.

Having the majority of World merchant fleet, the countries that they also control the World trade and, by the time, they also operate in the shipping industry in the major. During the 19th Century England was in the hands of the perform 80% of the World shipbuilding.

Sharing of this rule in the 20th century primarily with other European countries, Germany, Sweden, the Netherlands, have undergone a next hand the leadership of the 20th Century Japan in the first half of the ship. Subsequently Far East countries, S. Korea, China

and Taiwan have developed their shipbuilding capacity. Meanwhile, these countries' national maritime fleet has reached an advanced and high capacity.

Developed countries that have this competition ship between the shipbuilding industry of the country, the government of building a great incentive program with added and the ships they apply to the shipbuilding industry, the industry tried to block the shift to Far Eastern countries and even Japan to convince reduce the capacity of S. Korea hurtful, against the trade measures even getting brought up.

Global players in the shipbuilding industry are China, S. Korea and Japan. In some European turnover continues to compete with these countries. The new player candidates are Philippines, Vietnam, Romania, Taiwan, India and Türkiye. Respectively leader shipbuilder companies are in those countries. (See also Table 2-3 'World Leader Ship Building Companies'.)

Shipbuilding industry and maritime activities are considered as priority industries in economic development. Some of the developing countries and priority attaches great importance to this industry. Shipbuilding industry migrates from Western Europe to low-cost developing countries, where economic conditions prevail tended to settle.

Western European countries have subsidized shipbuilding industry. Then as other industrial sectors of the construction industry, restructuring ships are wanted. So that left the face of restricting state aid and/or their obligate use by this restructuring aid.

Since the early 2000s, growth in World trade volume, high trading volume provided by the Chinese, especially the more high levels of demand, the liquidity of the market, the rise in the freight market, international rules should need renewal of the merchant fleet outside activities, ship investments reasons such as the Worldwide shipbuilding industry is about 75% more profitable than the financial investment has experienced an explosion in great demand. The increase in demand has brought with it the increased capacity.

S. Korea is the World leader in the shipbuilding industry history as of 2004. In the first quarter of 2008, S. Korea moved first row in ship orders received, and second-row

tonnage some of the pieces. India, Vietnam, Taiwan, the increase in demand for ships built many developing countries such as the Philippines is entering the parallel shipyard investment.

Been significant developments in the World shipbuilding market in recent years, countries have their share of all ships constructionist events. After the 2002 World ship construction were faced with very high demand growth in the industry. To execute on share purchase, some countries increased the productivity of the plant and build new facilities and used more top value-added products.

The ship construction sector chooses the target countries have tried to take a share of the new plant explosion in demand by preparing production as soon as possible.

S. Korea and Japan, increased productivity and low demand periods and took its place in the supply market by introducing a jump-start the dead plant. Efficiency with low shipyards in Poland, Croatia, Romania, and high labor costs due to competition strapped Germany, the Netherlands, Finland, Norway, and Denmark shipyards capacity utilization rates have increased significantly due to higher ship prices.

Vietnamese, especially in China, India, the Philippines had entered the shipbuilding yard rapidly increased the capacity of investment, especially with the rapidly growing Chinese shipbuilding rate every year.

In all countries, the importance given to the shipbuilding industry through new investments were made to increase project capacity is also reflected in the increase in delivery capacity. While delivering a total amount of 43 MDWT in 2000, this Figure is 70.6 MDWT in 2006, came in at 80.1 MDWT in 2007. An increase of 86% from 2000, by 2007 when the delivered capacity is understood that record. (Govan, 2013)

Shipbuilding in Türkiye; According to very recent side survey of GİSBİR, there are 145 shipbuilding and berths places in Türkiye. Those are distributed as 45 in Tuzla, 42 in

Yalova, 12 in Zonguldak, 9 in İzmit, 9 in Trabzon, 8 in Balıkesir, 5 in Samsun, 4 in Çanakkale, 4 in Kastamonu, 2 in Hatay, 1 in Adana, 1 in Bursa, 1 in Ordu, 1 in Sakarya and 1 in Mersin. (GİSBİR, 2014) This work considers last 1-year period from October 2014.

Under current legislation, it can be counted and considered 99 of them as shipyard and 46 of them are as berth those 145 places. However, unfortunately 47 of shipyards out of 99 and 10 of berths out of 46 are not in service or closed status.

Moreover, 24 of those 145 places business is only new shipbuilding, 30 of those 145 places business is shipbuilding and repairment-maintenance, 24 of those 145 places business is only repairment-maintenance.

Considering last 2 years entirely in 67 shipyards and berths there has been no activity.

Over the mentioned period, 1801 ships repaired as totally 20.000.000 DWT in those 54 berths and shipyards. Those are distributed 1203 in Tuzla region and 406 in Yalova region and 192 in the other areas.

54 new builder plants buildup 28 type's ships and 249 pieces over that period. Distribution of those 249 as follows: 94 in Tuzla, 74 in Yalova, 27 in Zonguldak, 18 in İzmit, 16 in Balıkesir and 20 in others.

It also can be counted those new build 249 ships considering types: 49 Tugboats, 23 Fishing, 22 Platform Support, 20 Police boat, 19 Passenger Boat, 15 Mega Yachts, 11 General Service Boat, 10 Chemical Tankers, 10 Dry Cargo, 10 Fuel Tanker, 10 Police Patrol Boat and 50 other kinds of vessels.

According to the employment Figures at a facility is determined by taking the average of the total number of employees in a year. Wholy 20334 people have been found to work. The distribution of these numbers as 9882 in Tuzla, 6954 in Yalova, 1871 in Îzmit and 1627 in other regions.

Facilities include 24 pieces of floating, and 1 of 6 in Dry Senkro-lift including a total of 31 pools are available.

Total shipbuilding capacity of the facilities in our country is 4.2 MDWT is. This capacity of distribution: 1,680,960 DWT Tuzla, 1,217,040 DWT in Yalova and 1.302 MDWT are in other regions.

In our country, total area of 7,526,647 square meters has been allocated to the facility of shipbuilding. These areas distributed as: 2,286,516 square meters in Yalova; 1,207,897 square meters in Tuzla, 1.207.520 square meters in Zonguldak, 1,819,714 square meters in Samsun and of 1.005 million square meters has been allocated in other regions. 7,526,647 square meters assigned for the production of 3,948,160 square meters' area is made active. Unfortunately, there is no activity on 3,578,487 square meters.

Over the period that this work performed in 2013 August – 2014 August data's show:

Shipbuilding Industry Export Total (excluding repair and maintenance); there has been $ 1,252,677,000. In this case, the annual export revenue of 317 USD per square meter reveals that obtained (considering the square of the active site).

Türkiye is being performed sharply in recent years, the economy, economic growth beginning in the first quarter of 2002, continues without interruption up to 2014.

2003, 2004 and 2005, the highest rate among OECD countries in the GDP growth of the economy of Türkiye that performs. After growing by 6.1% in real terms in 2006, has recorded 4.5% growth in 2007. In the first two quarters of 2007, GDP growth rate stood at 7.6 percent and 4.0 percent, respectively, were 3.4 percent in the second half of the year.

The year-2007 GDP growth seen since 2002 has been the lowest yearly growth. Also, published by the World Economic Forum and covering 125 countries, Türkiye according to the 2006-2007 Global Competitiveness Index Ranks[4] the 59th.

The year 2008 has surpassed the growth prospects of the economy in the first quarter. It has been increased by 6.7 percent of GDP ₺ 24.3 Bn. But fell short of growth expectations in the second quarter and stood at 1.9 percent of GDP increase rate of 25. The constant and continuous growth process began in the first quarter of 2002 continued in the first and second quarter of 2008, so the economy has grown 26 consecutive periods.

Türkiye; surrounded on three sides by the sea, is a country living close to the sea as well. 6480 km coast of Anatolia, Thrace coast and 786 miles from the coast of the island has a total of 8333 km, including 106 km sea coast of Türkiye. This coastal length corresponds to the extent of 2.5 times the Mediterranean length.

From another point of view, 54.9% of Türkiye's population of 76,667,864[5] is located in these cities namely 42,090,657. Sea route with a significant majority of Türkiye is not included in our province near the sea seems to have favorable geographical position for transport.

Sea carries more than 90% of the world's freight. 84.5% of the foreign trade traffic in Türkiye, while 1.2% of internal cargo is carried by sea (TSI). The share of road transport compared to other types of civil transportation at a rate of 93% is well ahead. (Erdoğan, 2014)

The Importance of Geographical Location Favorable geographical location, the new ships built on the shipping companies, defined as the proximity to the headquarters. During the construction of the ship, vessel owner/their representative, a visit to the shipyard should

[4] (Global Competitiveness Report, 2015)
[5] (TÜİK, 2015)

not pose a problem regarding transportation. Western Europe, Japan and the US zone where the shipping companies are intense.

Accordingly, Türkiye, Germany, Netherlands, Denmark, Croatia, Norway, Romania and Poland can be considered in the most advantageous category of countries for European ship owners regarding geographical location.

Regarding personal ship-owners aspect, US and Far East can be considered advantageous countries for Japan, S. Korea and the US.

These countries followed by Ukraine, Taiwan and China. The location advantage of the weakest countries, transportation management centers of the most problematic aspect of the shipping company regarding distance is Vietnam, India and Brazil.

Growing Shipbuilding Economy in Türkiye;

Shipbuilding industry in Türkiye until 2003 with the emergence of Worldwide boom in demand with a capacity utilization rate well below the World average of private sector shipbuilding industry (approx. 60-68%) and has not been exploited sufficiently worked from the existing potential.

However, in the World economy and trade experienced since 2002, rapid development, the industry Worldwide shipbuilding also had a positive effect and shipbuilding country sector also process. It has followed successfully shifted to areas that require the last three years of expertise, its US$ 700 M investment in High-Tech and automation actual capacity and capacity utilization rates have increased across the system.

When it is considered the ship construction portfolio, our shipyards;

i. Epoxy and chrome-nickel tank oil,
ii. Product tankers,
iii. Heavy cargo ships,
iv. Multi-purpose container ships,
v. Fishing vessels,

vi. Research vessels,
vii. Tugboats,
viii. 80-90 meter mega yachts
ix. Excursion boats,
x. Oil platforms,
xi. Renovations and conversions,
xii. The supply boats,
xiii. Offshore boats

According to international rules are made under the control of various classification societies.

Our shipyard production boutique style having the ability to adapt and production diversity has led to increased production in recent years along with capacity building.

Overall, World shipbuilding order book grew by 89% in recent years; Türkiye's shipbuilding order book has increased 360% over the same period. Our shipyards, especially provides four years capacity and ship orders, with employment growth in the World rankings in 2002 0.32 MDWT 83 units ship.

1.8 MDWT of 182 vessels and yachts orders with 8th row, 2007 in 3.05 MDWT 239 boats and yachts with 6th place in order, according to data from July 2008 at 3.22 MDWT 246 ships and yachts in some units has risen to 5th order.

The number and tonnage of the shipbreaking industry, built in exports in June 2008, the number of orders was replaced by some of the World rankings in the 4th row despite the rise in Vietnam in July. According to WTO data, exports of ships and yachts in 2007 only amounted to 1,820 MDWT, also, ship repair and maintenance of trading is made with 3,100 MDWT in the shipbuilding industry.

Given that the country's total exports of US$ 107.2 Bn.in 2007 by ship and yacht building ship maintenance and repair of our exports is understood to have a 2.9% share in total exports.

For a brief assessment of Türkiye's economy, 2013 was recorded as the most volatile year in recent times. As our economy continues to grow at about 4%; the interest rates rose again to over 10%; inflation reached to 7.4% levels exceeding expectations; the $/₺ ratio climbed up to 2.20 and excessively revaluated were the main ₺ concerns. The expectations from U.S. Central Bank to reduce bond-purchasing program by $ 85 Bn.per month and related processes has created financial fragility for Türkiye. The announcement of the decision to cut only $ 10 Bn./month done at the end of the year did not produce any more negativity; since expectations were previously priced. (DTO, 2015)

The maritime transportation and shipbuilding industries in Türkiye today have become world-renowned. This achievement is the result of many years. All of the actors in the Turkish economy should now realize the importance of this sector and become aware of its significance. Türkiye has become a ship-owning country, which influences the global fleet. Our ship-owners have a fleet of 30 MDWT and the possibility to reach 33 MDWT in one year is too high. On the other hand, the demand on the global shipbuilding industry continues. The shipyards with strong ability of conversion towards the areas in which it is more competitive, it could get a share of the pie. (DTO, 2015)

Table 2.3-1 World Shipyard Statistics with different combinations (Ship2yard.com, 2017)

New Buildings	1647	1232	98	53	41				33
Repair	1827							48	
Naval	147						52		
Designers	390					88			
OffShore	243								
Floating Dock	441	842	1160	1220					
Graving Dock	546					1032			
Slipway	599				717				
Shiplift	172								

Cycles in World Shipbuilding Economy, It is easily understandable why the shipbuilding market is so volatile when it is examined the supply and demand function that drives it. This is best illustrated with a simple example. If the active merchant fleet is 700, as it was in the mid 1990s, and sea sourced trade grows by 5 percent/year, this will generate demand for an additional 30 MDWT of new ships each year. If, also, 20 MDWT of vessels are scrapped each year, the total requirement of new ships will be 50 MDWT each year. If, however, instead of growing by 5 % sea sourced trade remains at the same level for 2 years running then there will be no need to expand the fleet and demand in each year. It will be only 20 MDWT taking the argument a step further, if seaborne trade falls by 5 percent there will not be any demand for new ships. In short, a small change in the growth rate of seaborne deal has a much magnified effect on shipbuilding demand. Falls of 5 or 10 percent in sea-sourced business are by no means unusual much larger swings were experienced, for example, in 1975 and at the beginning of 1980s. (Stopford, 2006)

Another problem with the structure of the shipbuilding market is the protracted delay before supply responds to a change in demand. Since it often takes more than a year to build a merchant ship, and in some cases two or three years, to keep supply and demand in balance ship-owners need to predict the change in market two or three years ahead, a skill that has been manifestly lacking. The usual pattern is for ordering to build up to a peak at the top of the cycle, and for ships to be delivered two years later when the market is already declining, creating a higher surplus of shipping capacity and reducing the level of new orders. The supply side problem is further intensified by various strengths that prevent the supply of shipbuilding capacity responding quickly to a downswing in demand. Undoubtedly, the most crucial rigidity derives from government policy to maintain employment. Many shipyards, particularly in Western Europe and Japan, are located in areas with few alternative employment opportunities, so that politicians often intervene to prevent closures. As a result, it now takes longer for shipbuilding capacity to respond to a significant fall in demand than was the case in the 1930s. (Stopford, 2006)

Figure 2.3-1Word Shipbuilding Cycle (Clarkson, 2015)

In the Figure 2-1 (above) it is observed those cycles. In one sense, this is all there is to be said. Until the demand for ships becomes regular or shipyards find a way of disappearing when they are not needed, the shipbuilding industry must live with cycles. From an economic perspective, however, this is just the beginning of our study. Applied economists in shipping or shipbuilding who understand the underlying relationships can recognize the way a particular market is likely to develop. (Stopford, 2006)

The Role of Shipyard in Transportation; Marine, from the first day it started commercial operations in the world, has kept an excellent place for the transportation of goods and services to overseas continents. Maritime transport and transport vehicles, even today maintains its importance increased.

Sea carries world -more than 90% of the freight imported and exported- trade division. The volume of trade carried by sea between nations is growing every day. Maritime transport in recent years shows a rising trend in total trade volume. The liberalization and industrialization in the national economy increased demand for products also leads to

increase. Technological advances provide the transportation to be done efficiently and quickly. Hence, Shipyards are the heart of Marine Transportation (Çetin, 2012).

Maritime transport constitutes the raw material industry in particular provides an enormous amount of cargo from one place at a time in the possibility of moving to another location. To be reliable, no timeout limit, to be the minimum level of property losses, the loss is almost any other reason to prefer sea transportation. 3.5 times as expensive compared to the cost of maritime transport railway. This ratio is 7 and regarding the value of road transport regarding transport cost airline is 22-times. Therefore, marine traffic is the most preferred form of transportation in the world.

With developments in international trade is a direct relationship exists between the world maritime trades. World trade, in 1990 as 2000 has grown an average of 7%. The world economy increased on average by 3% in real terms since the 1990s and 2.8% in 2000. It is observed that the volume of trade is expanding twice as fast. Although the rapidly growing world trade in the last 15 years, with growth rates in developing countries by developed countries of export volumes in 1990 remained about the same.

As a natural result of the growth in world trade, particularly in the maritime world, including chemical tanker shipping and transportation, a significant increase is observed on a sectoral basis.

The total number of the World merchant fleet was 712 and the total capacity was 261.8 MDWT in 1998, it increased to 974.3 MDWT by the end of 2007.

In another aspect, the number of ship of World included in the marine trade volume load of 300 GRT and above was 44,553 and total capacity was 974.3 MDWT. It consists of various types and each type of ship cargo moved by the World merchant fleet in 2007. World merchant fleet by the end of 2008, it is expected to reach 1,042 MDWT.

Türkiye experienced positive developments in World maritime trade has also affected the naval trade and our maritime fleet has undergone changes as a reflection of it.

Turkish fleet has 150 GRT and above, whiles some units in 2004 increased by 34% as of September 2008 to 1209. Total 1631 pieces, while 7 MDWT bases reached 7.4 MDWT.

Total reasons for not less than DWT based on the increase in some, large cargo and exit the fleet of older bulk carriers, instead maneuverable and technical features new are joining our fleet of young and modern ships. (Stopford, 2006)

As of 2007 World Maritime Fleet is approx. 1,000 MDWT. Turkish fleet under foreign ownership flag, 1000 GRT and above is 513 units and its 6.5 MDWT in capacity in 2008. At the national flag by 490 units is 6.5 MDWT in capacity. 1000 GRT and above 1003 groups based on the total number of Turkish owned fleet is also 13.1 MDWT in capacity. Turkish fleet in the World fleet in MDWT some 1.3%, sum of the pieces has a share of 3.2%.

Greece has 19.3% of the World merchant fleet in 2007. Türkiye may have a share in the same period, but was 1.2%. In 2008, the decline in the percentage of Greece and its share of World merchant fleet was realized as 17.4%. Türkiye is increasing its market share compared to the previous year may have a share of 1.3%.

However, Greece's maritime revenue in 2006 reached US$ 19 Bn, and in 2007 earned income Turkish Chamber of Shipping-TCOS evaluation of € 17 Bn, it is stated to be equivalent to 7% of GDP in Greece (Greece Discussion, 2007). According to the TCOS evaluation, industry's golden age lives.

Türkiye's population reaching about 70 M in 2005, of the turnover of the marine industry US$ 15 Bn, and our neighbor Greece, which has a population of 11 M in the same period as that of the US$ 100 Bn. Marine industry turnover is stated. The datas shows the importance of gap between Greece and Türkiye marine transportation level.

In logistics, always for the most extended path the easiest and cheapest way is marine transportation. When you have large carriage to a long way you have no chance to choose another way. But most of the time you can’t do this as door to door. So you have to arrive nearest harbor in both side

Common Perspectives concerning Leader Shipbuilder Countries; Global players in the shipbuilding industry are China, S. Korea and Japan. In some European turnover continues to compete with these countries. The new player candidates are Philippines, Vietnam, Romania, Taiwan, India and Türkiye.

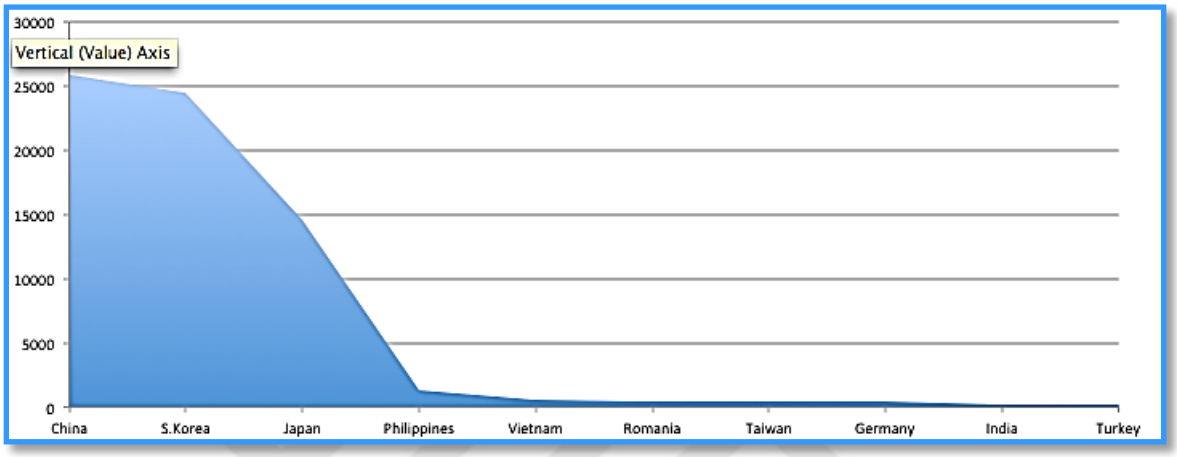

Figure 2.3-2 World Shipbuilding Market Share (Gross Tonnage Completed), 2013

Old shipbuilder countries such as Brazil, Germany, and Netherlands, there are considerable fluctuations. However, between the first three rows sharing the S. Korea, China and Japan, and among other countries there is a significant difference regarding both production rate basis and booking. States to take a share of the sector in the effort, said the three countries to catch up, at least the near future is unlikely (Stopford, 2006).

1980 is the year to start building the shipbuilding industry in China, has begun commissioning shipyards in the 1990s, the 2000s were able to have a significant market share in the Worldwide shipbuilding market. At this point, some of the pieces in the order of 3,331 units ship with the world championship; world tonnage is settled in second place with some 188.95 MDWT in order. This development has an essential role of state policies with low labor costs.

Chinese shipyards constitute 80-90% of the capacity of bulk carriers and tankers. The remaining size of container ships and other vessels are constructed. China in 2006 based on orders from shipyards growth rate of 60%, was 13% in deliveries. In 2007, 402 tankers are connected to the contract; this Figure is less than 699 tankers in 2006.

For bulk segment in 2007, a year in which there has been explosion of order. China has maintained its leadership in the construction of bulk carriers and tankers in 2007. China has not reached yet in these two segments of the most substantial shipbuilders in the world. However, considering the increased production capacity of China is the world's largest ship builder is a candidate to be the case S. Korea continues its leadership.

In fact, in 2002, has a turnover of € 2.52 Bn.at the end of 2006, Chinese turnover is expected to rise € 10.10 Bn. This situation is an indication that ran under the leadership of Chinese shipbuilding industry. Employment in the shipbuilding industry in China is over 148,000 people. When compared with the 2007 level of new production price shipyards in China, S. Korea, were observed to be slightly lower still.

Since 2012, under the environment of slowdown in the growth of global economy and trade, the shipping market is continuously in depression, and the development of Chinese shipbuilding industry faces significant challenges. From January to September in 2012, the completion volume of Chinese shipbuilding was 41.58 MDWT, with a decline of 18.5% YoY. The size of new ship orders was 15.41 MDWT, with a drop of 46.9% YoY.

China's largest shipyards[6] are:

i. CSSC- China State Shipbuilding Corporation,
ii. CSIC- China Shipbuilding Industry Corporation,
iii. COSCO- China Ocean Shipping Company.

By the end of September 2012, the volume of reserve ship orders of Chinese shipbuilding enterprises was 120.9 MDWT, with a decrease of 28.4% YoY, falling by 19.4% over the end of 2011. From January to September in 2012, the completed ship export was 34.34 MDWT, with a decrease of 20.2% YoY; the order volume of ship export was 12 MDWT, with a decline of 44.5% YoY; at the end of September 2012. The reserve orders of export ships of Chinese shipbuilding enterprises were 101.19 MDWT, with a reduction

[6] See also, Table 2-2

of 27% YoY. The export ships separately accounted for 82.6%, 77.9% and 83.7% of completion volume, new order volume and reserve order volume of Chinese shipbuilding. (Research Report on China, 2012)

S. Korea; S. Korea was one of the countries that entered the shipbuilding sector much later than its most significant competitors did at the time. S. Korea had the advantage of the projects best suited their yards, compared to existing in the Asia and Europe. Apart from this, some were designed with enormous capacity, exceeding enormously the total size of countries considered high-power production for the season. Besides these facts, S. Korea was working more weekly when its workforce compared to European countries, and this was the fact that S. Korea increased the competitiveness of the world's shipbuilding chain. S. Korea has created policies towards the shipbuilding segment that gave sustainability to the sector by promoting the development of technology centers, universities, companies of marine parts, service companies, industrial parks, schools, technical and labor-specialized work, and has focused primarily on the external market. (S.Korea Report, 2015)

It is a challenge for shipbuilding engineering, and it is the achievements of the actors directly or indirectly related to the country and the great efforts to ensure globalization in this segment. Both South Korea and Japan are offering to customers specializing in the serialization of bulk carriers and tankers that benefit from production hats because they reduce flexibility or eliminate production.

Low or no flexibility, high quality, low cost, reduced cycle time for development and production with some Innovation/High-Tech were some of the strategies used by S. Korean shipyards. The S. Korean economy has grown remarkably since WW II, becoming a significant player in the global economy by the 1990s. In 2003, the value of S. Korean exports and imports totaled US$ 198.3 Bn. (2.6% of the world) And US$ 178.8 Bn.(2.3%) respectively. In the same year, S. Korea produced 3.2 M automobiles, 5.2% of GDP and ranking 6th in the world.

The entry of S. Korea into the world shipbuilding market was, like that of its near neighbor Japan, the result of a carefully planned technical program. In the early 1970s, a

significant investment program was scheduled, starting with the construction of the world's largest shipbuilding facility by Hyundai Heavy Industry Ulsan, with a 380-meter dry dock capable of taking vessels up to 0.4 MDWT. Later in the decade, Daewoo built a second primary facility, with a 530-meter dry dock capable of taking vessels up to 1 MDWT. The consept started production in the early 1980s. Two other S. Korean industrial groups, Samsung and Halla Engineering built new shipbuilding facilities and by the mid-1990s S. Korea had a 25 percent market share and four out of the world's five largest shipyards. (S.Korea Report, 2015)

S. Korean GDP with revenues excess 7% of World marine industry and continued to lead the World with € 14.2 Bn.in turnover in 2006. With the World's largest shipyard in S. Korea, shipbuilding industry is the most massive manufacturers are:

i. Hyundai Ulsan,
ii. Samsung,
iii. Daewoo,
iv. Hyundai Mipo,
v. Hyundai Samho.

Those are the World's most orders within the first 10 yards. The exact rank changes from time to time. The most current data is above as of 2014.

S. Korea shipyards have received 44% of all orders in 2006. It was a record number of contracts in 2007. While increasing the capacity of existing shipyards new producers have entered the market with similar products available in large shipyard. 90% of orders received in 2006 are:

i. Tankers,
ii. Container,
iii. Ships,
iv. LNG Carriers.

The 2007 was a year of bulk, product carriers, tankers, and containers, bulk cargo tonnage in all S. Korean manufacturers of LPG and LNG ships next took orders significantly. The average price of new production in the mass sector showed an annual increase of about 34%. Ship delivery increased by about 20% in the year to 12% in 2006 and 2007.

In more than 20% will be delivered in 2008 is estimated to increase. Such growth rates are significantly domestic and foreign contractors are provided with overtime practices of contractors and black workers in the plant. S. Korea ship building industry in 2006 was estimated to generate US$ 1.9 Bn. trade surplus. Subcontractors are provided over 90,000 direct jobs included.

S. Korean tanker market during 2007 remained at the average level, and a decrease in tonnage in the order of about 40% in 2007 compared to 2006 (DTO, 2006-2007).

S. Korean shipyards, although increasing labor costs continues its dominance in the market by improving their efficiency, S. Korea has continued its upward trend in production capacity in 2006 and 2007. World based on orders received in the first place overall with 202.63 MDWT, while some of the pieces were in second place with 2,317 pieces.

S. Korea has a rapidly growing economy; this remains very much smaller than the Japanese or European regarding trade volume. The success of S. Korean shipbuilding almost certainly reflects the growing internationalization of the bulk shipping industry where, with the development of international registries and multinational companies, the link between ship, ship-owner and national interest is increasingly fragile. (Economist, 2013)

Japan; Data from the Japanese government suggest there are currently over 1,000 shipyards in Japan. Some of these yards are privately owned that is unlisted, individual enterprises, while others form part of more extensive private or public listed companies that operate multiple yards. Some of biggest enterprises[7] in Japanese shipbuilding, measured by current order books are: Imabari Shipbuilding,

[7] See also, Table 2-2

i. Japan Marine United,
ii. Tsuneishi Holdings,
iii. Oshima Shipbuilding Company,
iv. Universal Shipbuilding,
v. Mitsubishi Heavy Industries (Joint Ventured with Imabari in 2013),
vi. Namura Zosensho.

Also, feature in the top 30 shipyard groups worldwide, as measured by order books (Clarkson, 2012)

World shipbuilding in the early 1970s until the 2000s, Japan was the leader. S. Korean leadership has been lost since the beginning of the 2000s. Since 2006 also took 3rd place in the world remained behind China. Japanese shipbuilding industry is notable for its advanced automation level and high efficiency. Thus, it seeks to protect the critical actors in the market despite high labor costs. Indeed, China has passed us by € 1.126 Bn.in 2006. Therefore, regarding turnover was able to take place in front of the competitors. Japanese shipbuilding industry employment reached 110,000 people (Türk Loydu, 2006)

Japan 103.63 MDWT Shipyard has received orders ship in 2008 and 1487 units. Order distribution approx.is as follows;

i. 50% bulk carriers&tankers,
ii. 40% constitute,
iii. 10% of container ships. (Sea-Web, 2008)

Japanese shipyards took the 21.2's percentage of all orders. The most prominent drop has seen in market share in the tanker segment and other types of ships. With 47% of all bulk orders ship in 2006, Japan has continued in this segment to be the most critical constructive ship in 2007.

Japanese shipbuilding industry, like other Far East manufacturers, faced with strong demand for dry bulk segment, favorable payment conditions and weak ¥/$ exchange rate

Japanese manufacturers (DTO, 2007) have brought an advantageous position in the competition in 2007. (OECD, 2013)

Europe; Shipbuilding is a critical and strategic industry most of EU Member States. Shipyards often play a significant role for the regional industrial infrastructure and, about military shipbuilding, for national security interests. The European shipbuilding industry is the global leader in the construction of sophisticated vessels such as cruise ships, ferries, mega-yachts and dredgers. It also has a strong position in the building of submarines and other naval vessels. There are around 150 large shipyards in Europe, with about 40 of them active in the global market for large sea-going commercial vessels. Shipyards civil and naval, new building and repair in the European Union directly employ around 120,000 people. With a market share of approximately 15% in volume terms, Europe is still vying with S. Korea for global leadership regarding the value of civilian ships produced € 15 Bn.in 2007. (European Commission, 2013)

Historically, the industry has suffered from the absence of global rules and a tendency of state supported over investment because shipyards offer a wide range of technologies, employ a significant number of workers and generate foreign currency income as the shipbuilding market is dollar based and a global one. Many of the resulting problems are still troubling this industry and the commission is actively addressing the issues through a variety of policy measures, especially LeaderSHIP2015 and supporting studies (European Commission, 2013).

Europe dominates the World shipbuilding until the 1970s. European lost its competitiveness against firstly Japan, then S. Korea and chiefly China. In certain types of vessels, intending expertise has continued to be successful and about 50% of container vessels that constitute the delivery of European shipyards ship (Mickeviciene, 2011).

European shipyards are mainly holds the world leader in cruise ships type, continues its success in specific types of ships such as Ro/Pax. In Europe, Germany, Denmark, Italy, Poland, Romania and Croatia are the leading countries in the shipbuilding industry.

Ship building industry in Europe, in 2006 and 2007, had a high-level activity at record levels. Many shipyards were to be unable to take orders until 2010. European shipyards turnover reached the level of € 12.9 Bn.at the end of 2006.

European shipyards are positively influenced by the growth of the sector Worldwide. European shipyards their catch record activity in 2006 continued in 2007. However, it has also seen a decline in market share. Once European (Croatia, Poland and Romania) shipbuilding employment was 306,047 in 1975, participation has decreased to 85,355 as of the year 2005.

Container of European shipyards built in the area has experienced a decline of 10 percent. This decline is known to compensate for the increase in cargo specialized areas such as, navigation vessels, Ro/Ro and car carriers. Europe's share of tankers and bulk cargo area remained as 3% and 1%, respectively, and were unchanged. Cruiser, Ro/Pax and Ro/Ro vehicle in the offshore sector of activity has led to the demand for the new generation racing industry in Europe.

European builders are up to in 2011 about cruise shipbuilding industry has continued to maintain its monopoly position. S. Korean Daewoo Shipyard in Europe in 2007 reached a severe level with 2.6 Bn. orders. According to the 2008 July, Türkiye is 5th level Worldwide with new law with 246 requests. (EU, 2013)

Since the founding of the US, ships and shipbuilding industry has been an essential cornerstone in the development of this country, has seen the technology base shipyards task. Navy shipbuilding is a market segment most dominated by two large corporations:

- General Dynamics-GD
- Huntington Ingalls Industry-HII

Those are builders of the Littoral Combat Ship-LCS added to the six shipyards of these two corporations. These principal navy shipbuilders construct aircraft carriers, submarines, involved surface combatants and the large auxiliary ships of the fleet.Huntington’s Newport News Shipbuilding and General Dynamics’s Electric Boat build nuclear

class vessels. Huntington's Ingalls Shipyard and General Dynamic's Bath Iron Works build the destroyer class ships, and Huntington's Ingalls and Avondale build the amphibious warships that transport the U.S. Marine Corps. (Shipbuilding History, 2015)

Fincantieri Marinette and Austal USA build the LCS type ships. Finally, GD's National Steel and Shipbuilding Company (NASSCO) on the west coast, specializes in the more significant, complex auxiliary and support ships as well as massive commercial vessel construction. US merchant ships are not among the leading countries in the construction sector however, in the construction of warships American Shipbuilding Industry at the forefront in the World. The contribution of shipbuilding and ship repair sector to national economy is around US$ 10 Bn/year. Now there is about 85% of the revenue is to achieve 10% of the firms operating in the sector. About 100,000 workers are employed in the sector. Shipbuilding industry, the international market, as warships and merchant ships are located in two categories. US ships received from global markets account for 80% of orders warships. Most of the US meets the needs of merchant ships from Far Eastern countries. US international markets have taken in the year 2004, 158 units and 168,000 GRT orders ship was ranked 14th in the World. (Shipbuilding History, 2015)

Table 2.3-2 World-Country Order book in 1st Qtr. Of 2016 in GT and values)
Source: Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017 (Original Source Clarkson Research, 2016)

#	COUNTRY	MGT	Bn$
1	China	32	29.3
2	Greece	26.7	27.1
3	Japan	25.4	26.3
4	Norway	10.3	17.7
5	US	10.2	35.1
6	Singapore	7.7	14.3
7	S Korea	6.9	7.1
8	Germany	6.7	8.1
9	Denmark	5.6	5.8
10	Hong Kong	5.2	4.4
11	Italy	4.9	8.7
12	Canada	4.9	7.7
13	Taiwan	.2	.4
14	UK	4.1	7.2
15	India	1.4	2.2
16	Turkey	1.3	1.3
17	Netherland	1.3	6.4
18	Belgium	1.1	1.5
19	Russia	0.8	6.3
20	Indonisia	0.2	0.4
SUM of List		160.9	220.3
Global Total		196	286

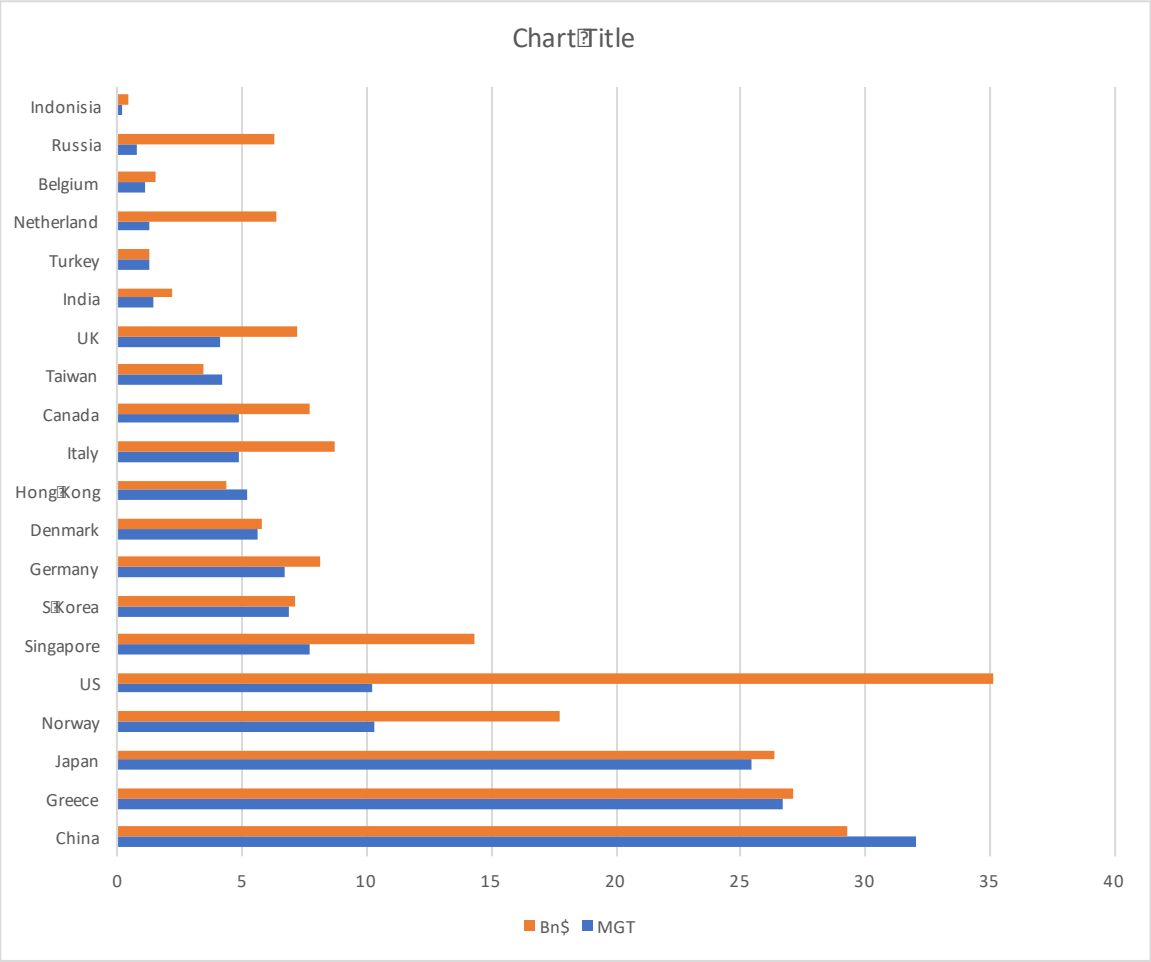

Figure 2.3-3 Shares in the World-Country Order Books Source: Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017 (Original Source Clarkson Research, 2016)

Common Perspectives concerning World-Wide Top Shipbuilding Companies;

World leading shipbuilding companies at a first glance give us some valuable clues. For example, all of them are situated on an island or semi-island as a natural harbor. All of them have enough age to make corporate culture such as over the period 30. One of them (Japan Marine) is very young but in fact it is renamed after a few company got married. Technology and SW usage is at high level. On the other hand, all of them situated in leader shipbuilder countries. It also reveals the importance of state support. (Statistics Portal-www.statica.com: Number of ships produced as of 2012.)

Hyundai Heavy Industry – Ulsan

S. Korea the Leader in the Shipbuilding sector, Hyundai Heavy Industry is based on Ulsan with a record of 11.02 Million Compensated Gross Tonnage-MCGT that includes 1428 ships of various types and sizes. (www.statica.com, 2012)

Daewoo Shipbuilding – Okpo

S. Korea another giant in this sector and second in the world is Daewoo Shipbuilding, located in Okpo and known for its sustainable and giant ships. The future delivery includes much talked about Maersk EEE class vessels. The total production of Daewoo shipyard is 5.95MCGT that consists of 834 ships. (www.statica.com, 2012)

Samsung Heavy Industry – Geoje

S. Korea Samsung Shipbuilding Company is one of the top three shipbuilders in the world with specialization of unique purpose vessels like FPSO, LNG etc. The total compensated gross tonnage production until date is 5.5 MCGT that includes 785 ships. (www.statica.com, 2012)

S. Korean Hyundai – Mipho

Another key player from S. Korea is Hyundai Mipho with its production capacity of approx. 40 vessels per year. The Gross tonnage production until date is 4.82 MCGT that includes 372 ships. (www.statica.com, 2012)

Japan Imabari – Nagasaki

Japan Second in rank within fifth in the world, Imabari-Nagasaki has its specialization in commercial vessels such as oil tanker and cruise ships. The total gross tonnage production till date is 4.18 MCGT that includes 315 ships. In 2013, Imabari Shipbuilding and Mitsubishi Heavy Industries[8]-MHI to establish joint venture MI LNG Co., Ltd. 3rd Imabari maritime fair 'BARI-SHIP' is held. (www.statica.com, 2012)

[8] Founded in 1964

S. Korean STX Offshore and Shipbuilding

STX Offshore and Shipbuilding is the leading shipbuilding company in S. Korea with specialization in building medium-sized bulk carrier ships. The Gross tonnage production is 3.88 MCGT that includes 492 ships. (www.statica.com, 2012)

Japan Marine United

Founded 1st January of 2013 whit a capital of Yen 25 Bn. Its location spread out as Technical Research Center, Ariake Shipyard, Kure Shipyard, Tsu Shipyard, Maizuru Shipyard, Yokohama Shipyard Isogo Works, Yokohama Shipyard Tsurumi Works, and Innoshima Works. Japan Marine Shipbuilding has a specialization in building bulk carrier ships with production capacity of 3.36 MCGT that includes 539 ships. (www.statica.com, 2012)

China Shangai Waigaiqiao CSCC

Waigaoqiao shipyard is the number one shipbuilding company in China with the total gross tonnage production is 2.84MGT, which includes164 ships of various types and sizes. (www.statica.com, 2012)

China Yangzijiang Shipbuilding

Yangzijiang is one of China's leading shipbuilders offering integrated marine and offshore services, which are complemented and enhanced by diversified interests in financial investments and property development. With the total production capacity is 2.6 MCGT. (www.statica.com, 2012)

China State Shipbuilding Corporation-CSSC

Established on 1 July 1999, does the central government of China directly administer an extra-large conglomerate and state-authorized investment institution. With the total production capacity is 2.38 MCGT. (www.statica.com, 2012)

Table 2.3-3 World Leader Shipbuilding Companies Facts

SHIPYARD NAME	OPENED YEAR	OUTPUT IN 2013 IN MCGT	COUNTRY
HHI-Hyundai Heavy Industry, Ulsan	1972	11.02	S. Korea
Daewoo Shipbuilding, Okpo	1973	5.95	S. Korea
Samsung Heavy Industry, Geoje	1976	5.5	S. Korea
Hyundai Mipho	1975	4.82	S. Korea
Imabari Nagasaki	1901	4.18	Japan
STX Offshore and Shipbuilding	1962	3.88	S. Korea
Marine United-Japan	2013	3.36	Japan
CSCC Waigaiqiao-Shangai	1999	2.84	China
Yangzijiang Shipbuilding	1956	2.6	China
CSSC State Shipbuilding Corporation	1999	2.38	China

Table 2.3-4 Ordering Levels of Ship Builder Companies (DWT) Source: Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017 (Original Source Clarkson Research, 2016)

SHIPYARD	BULKER	CONTAINER	LPG/LNG	TANKER	TOTAL (DWT)
Shanghai Walgooqiao	11,283,529	2,190,000	106,000	4,136,200	17,715,729
Daewoo (DSME)		3,886,360	5,158,788	4,931,680	13,976,828
Hyundai HI (Ulsan)		2,710,000	2,456,154	5,701,262	10,867,416
Hyundai Samho HI	360,600	1,105,000	723,208	8,630,091	10,818,899
Samsung HI		4,084,284	2,226,897	2,628,200	8,939,381
Dalian Shipbuilding	360,000	460,000		7,898,046	8,718,046
Jiangsu New YZJ	5,907,169	2,112,377	150,000		8,169,546
İmabari SB Saijo	4,074,393	2,422,000	504,270		7,000,663
Oshima SB CO	6,453,440				6,453,440
Beihai Shipyard	6,140,000			230,000	6,370,000
New Times SB	2,153,550			4,123,500	6,277,050
Nantong COSCO KHI	2,869,200	790,000		1,258,000	4,917,200
JMU Ariake Shipyard	989,988			3,803,000	4,792,988
CIC (Jiangsu)	2,423,141	1,105,500		822,000	4,350,641
Namura Shipbuilding	3,432,554		28,100	769,600	4,230,254

SHIPYARD	BULKER	CONTAINER	LPG/LNG	TANKER	TOTAL (DWT)
Jinghai Heavy Int	423,000	1,281,500		2,238,930	3,943,430
HHIC - Phill (Subic SY)		2,508,089	176,550	1,200,000	3,884,639
Hyundai HI (Gunsan)	600,000		108,892	3,076,000	3,784,892
Imabari SB (Imabari)	3,078,406	637,419			3,715,825
Tsuneishi Cebu	3,661,955				3,661,955
Tsuneishi Zosen	2,065,277			1,556,000	3,621,277
Imabari SB Marugame	2,281,775	1,308,000			3,589,775
Hyundai Mipo		30,000	835,764	2,423,399	3,289,163

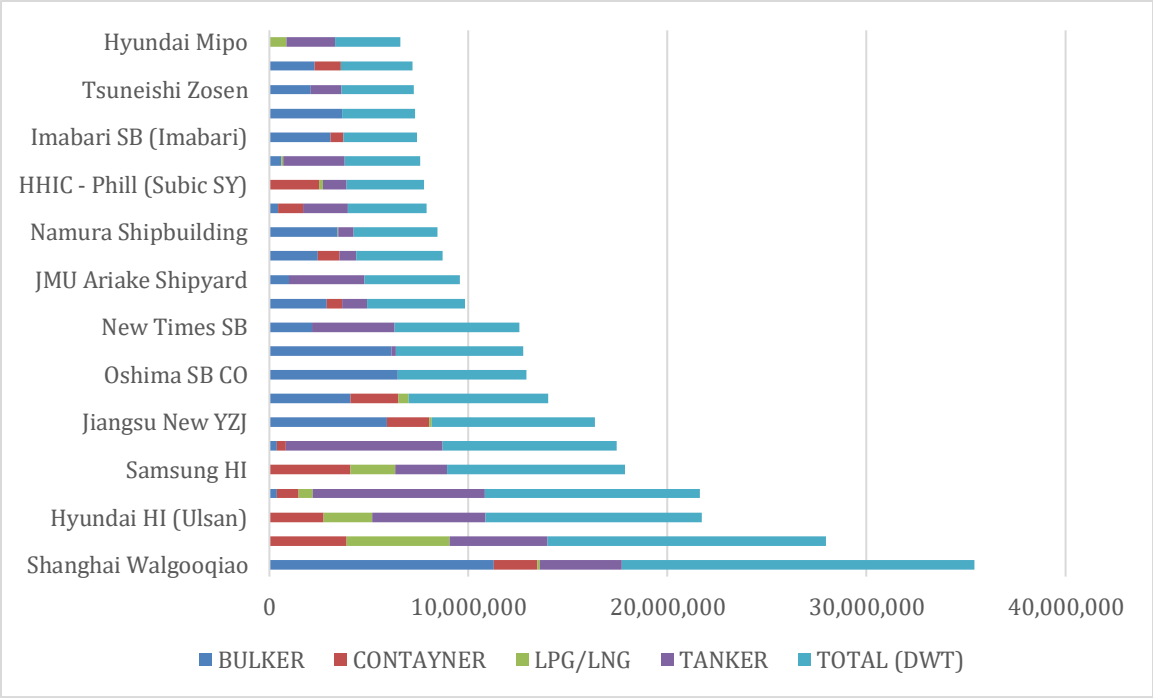

Figure 2.3-4 Ordering Levels of Ship Builder Companies (DWT) Source: Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017 (Original Source Clarkson Research, 2016)

3. MODEL APPROACH AND CUSTOMIZATION FOR SHIPBUILDING COMPANIES

3.1. Organizational Issues concerning CMMI

In this chapter, it will be look out the types (generations) of shipyards and then how a ship builds up. Therefore, it can be understood application of S-MCM level decision-making processes.

Generations of Shipyard

Shipbuilding techniques used, or intended to be used, production management models, settlement patterns, organizational structure, information and communication technology facilities, a multi-criteria shipyard currently considering such shipyard infrastructure is divided into five main classes from the technological point of view as below.

First Generation Shipyard

It can be easily affected by weather conditions sled, pool, or is it a similar structure as the first shipyard download system made of one-piece masonry way in the field of shipbuilding.

To increase the number of annual shipbuilding sled, there are many pools and similar download system area and a large number of labor is needed. The equipment works without almost any boats being launched and then pulled into dock equipment transactions are completed. Equipment and steel construction areas or buildings within the yard looking at the space utilization are remote from each other and there is no communication and information exchange between them.

This shipyard on the technological level is seen in the later period in shipbuilding country in the early 1960s. Massive transportation facilities like crane capacity are limited. Mechanization has an infrastructure is not available. Enterprise management systems are elementary, the computer does not have the support and operations were carried out manually procedure.

Today shipyards in the technological level, there are not given those who have completed the formation.

Second Generation Shipyard

In shipbuilding particularly production method followed by welding in the shipyard with technology development and adaptation of other sectors in the management mounting units eg. a booster unit and blocks, steel construction, has been used.

The most critical change, sled, and so is the number of downloads pool area is bordered by two or at most three and done in a closed space or in large buildings such as factories manufacturing of assembly work.

If the equipment works in the shipyards at this level is still maintained after downloading a large part of the apparatus, the material is only a small amount of work can be done before downloading.

Steel construction and shipyard equipment or buildings in residential areas are still far from each other. Now the equipment units are deployed in a heap near the equipment dock.

As a result of these technological shipyards in the level of modernization works of the old shipyard in the late 1960s early 1970s, the leading shipbuilders developed countries and spread. Shipbuilding is a technological level where the first simple computer applications in business management. In today's conditions, technical level is a level well below the norms of the World shipbuilding industry.

Third Generation Shipyard

In the third-generation shipyards, equipment and steel building area is still not integrated in the shipyard area. Of the blocks, (steel construction) joining process (erection) has gained importance mechanization. Especially in the medium of the ship (parallel to the

body) or the ship's relatively flat block production line (panel line) was initiated applications. Production rate of the steel subassembly and assembly process with this breakthrough has increased.

Physical size of the blocks has increased significantly compared to the previous generation, but the construction time is lower. The number of building blocks production centers relatively less. The equipment has increased the amount of work completed before download. Noteworthy is making the first application in a process of equipping other developments in the block.

Third generation shipyard applications, has frequently been seen in the late 1970s. In the US, Europe, S. Korea and Japan were carried out in conjunction with the newly established shipyard modernization efforts. Due to the conditions of the day in this generation has been the mechanization of the principal competitive factors. Especially in ship design and manufacturing, computer utilization rate is higher in all business areas.

Third Generation Shipyard

This shipyard type, steel construction and equipment areas are separate from each other. However, transport is disposed to minimize the total cost. Steel erection, fully automated production line and a lot of history (panel line) was established. In many applications, they are united under a single umbrella factory gained view.

Blocks were physically growing more than the previous generation. Thus, was born the super and mega blocks. Download the amount of work before the equipment, increased appreciable rate.

Modular production has gained importance in the equipment. Production cycle time the period between the deliveries of the ship to be taken to the stockyards first group of steel is quite reduced. Implementation of the most advanced technology, especially at the beginning of 1980, is an embodiment developed with enthusiasm. This shipyard has been given importance in environmental protection.

The shipyards are equipped with; sled, pool or other download systems and waste collection systems. Principally, in shipyards,

i. Efficiency,
ii. Productivity,
iii. Manufacturability.

It has been taken into consideration. These indicators were tried to be of the highest value.

i. CAD Computer Aided Design,
ii. CAM Computer Aided Manufacturing,
iii. CAL Computer Aided Lofting,
iv. CAE Computer Aided Engineering,
v. CIM Computer Integrated Manufacturing.

Applications and operating systems with specific forms of information technology have been shown conclusively.

Fifth Generation Shipyard

Fifth generation shipyards, scientific studies, arranged in the shipyard are the new generation of ongoing research and development work. The product is targeted to be based production structure. Also, today only increasing efficiency, reducing cycle time and product to be found in a narrow band of targets are abandoned.

Fifth generation shipyard; fully tuned to the intermediate product and is an intermediate product of the standardization shipyard structure is provided.

The product range can be achieved through this structure, which will be the most advanced shipyard structure. For all ships are aimed at ensuring the integrity of steel and equipment. Fully concurrent execution of these two significant events is planned.

Besides the increased product, variety of the most important benefits is that it will fall in the production of the learning curve. Research and development has been initiated in the early 1990s. Automation and the use of robots, it is envisaged the full combination and overlapping levels of the entire system.

Unclassified Shipyard

Shipyards in this class, production and management level due to technological differences, and the classification of individual shipyards those are not possible. In any shipyard design, if it is decided to conduct a study of this type will take priority products to be produced.

Those are concentrated on a single type of product. There is no flexibility. Production planning is relatively easy; the design process is relatively complicated. The best example of this type is Shipyard Rotating & Sliding System (Rotas).

This system, in the end of 1960 and 1970; innovative design has been introduced as a creative shipyard. Rotas system developed by Mitsui Shipbuilding & Engineering Co. Ltd.-Chiba and put into practice.

In those days, as a single product, mega tankers (0.2-0.4 MDWT) are aimed to build. A shipyard has found application is the design for single hull tankers.

Rotas system has tried to do the application for the smaller tankers and bulk carrier. However, this is unrealized. It is the most important reason; system designs only location has brought itself to compete with conventional systems in large ships.

With the Arab Oil Crisis[9] in 1973, the use of this shipyard was stopped at a time. Then, because of the economic development experienced in the yard with a more up to date, this design cannot be made.

[9] Arab oil producer companies stopped exports to the U.S. to protest American military support to Israel and Egypt-Syria war in its 1973.

Such a structure is finding life in the next 50-year period shows a low probability. The main reason for this is the lack of flexibility elements.

In recent years, the Turkish shipbuilding industry experienced explosive demand and increased investment in shipyards after public shipyards survive in Türkiye right now, the second and third generation shipyard. Today the shipyard to determine the technological level is the most critical step that determines all costs and profits of the entrepreneurs.

Newly designed or modernized to shipyards productivity, efficiency, effectiveness and efficiency indicators, depends on the technological level.

Business plan documents and entrepreneurs when they want to loan, loan documents specifying the technological level of importance shipyard is the most crucial decision that will continue throughout the life cycle.

Shipbuilding sector of production, depending on the complexity of the ships can be divided into three primary segments:

i. Low complex-built vessels; such as tankers and bulk, cargo covers most simple types of boats.

ii. Moderately involved built vessels; refrigerated (refrigerated) containers, Ro/Ro, chemical tankers, LPG/LNG ships.

iii. Highly complex built vessels; cruise ships, cruise, they are fishing vessels and cargo ships.

Looking at the leading ship builders in this respect; ship rather than in the middle and high-end segments of the EU countries, S. Korea and China in low and middle segment ship, while it is possible to say that Japan's significant shipbuilders in all three segments. (Ceceli&Özkılınç, 2008)

Pre-Existing Accumulation, One Generation to Another

One of the most critical thing is historical background of shipbuilding culture over centuries. Technology usage and dependency have been increasing by the time. Efficient marketplaces are also a heritage. Project library one another. So from past to future, evaluation of shipbuilding generation gives essential data from this point of view.

Digital Shipyards

A new upcoming concept is ‘digital shipyard’. The motto of this kind shipyard is Better, Faster, Cheaper: Embracing ‘Smart’ Manufacturing. Industry 4.0 is known as computer and automation combination for entire production. ‘Shipbuilding 4.0’ model about the adoption of the so-called ‘industry 4.0’ automation and data-exchange revolution that is sweeping manufacturing in general and those issues become a thing of the past. The digital shipyard replaces the old isolated, disparate technology platforms and their compartmentalized data, with united state-of-the-art planning tools, and a single shared repository of design data that is always current, and available to anyone who needs it.

As previously described, past experiences have a significant place in the development of the vision of a shipyard. To get some criteria and to understand what those criteria’s mean historical background is essential. From another aspect, the experience is vital and historical knowledge can only provide this.

On the other hand, historical background gives the ability of

i. Method used in shipbuilding,
ii. Master/worker relationship,
iii. Project management experience,
iv. Design ability,
v. Employment capability,
vi. Choosing profitable project capability.

Also, corporate vision and culture possibly mean well-established/matured organization. To investigate the minimum age of shipyard it is assumed as five years.

Hence, in the first section of questionnaire it is also inquired ‘considering last five years, at overall, your company in profit-loss statement.

i. Expertise in the shipyard activities,
ii. Last 5 year's approved balance sheet and the profit-loss statement.

Ship Building Process concerning CMMI

Capability in Shipyard or Maturity in Production; generally, it can be considered shipbuilding process in 5-20 stages[10]. Three of them are pre-production stages, Bid Proposal, Agreement, and Design. There are 9 production stages. Also, three steps are last things to do up to delivery. Sum up of scenes here in this work can be considered as 16 stages according to S-MCM classification of my proposal. When whole process of shipyard -both management and production – viewed, it is sensible to use the word ‘capability’. However, if the only consideration is product, then the world ‘capability’ more sensible.

[10] There are generally accepted stages. In this work, It has been divided into 16 stages in this work.

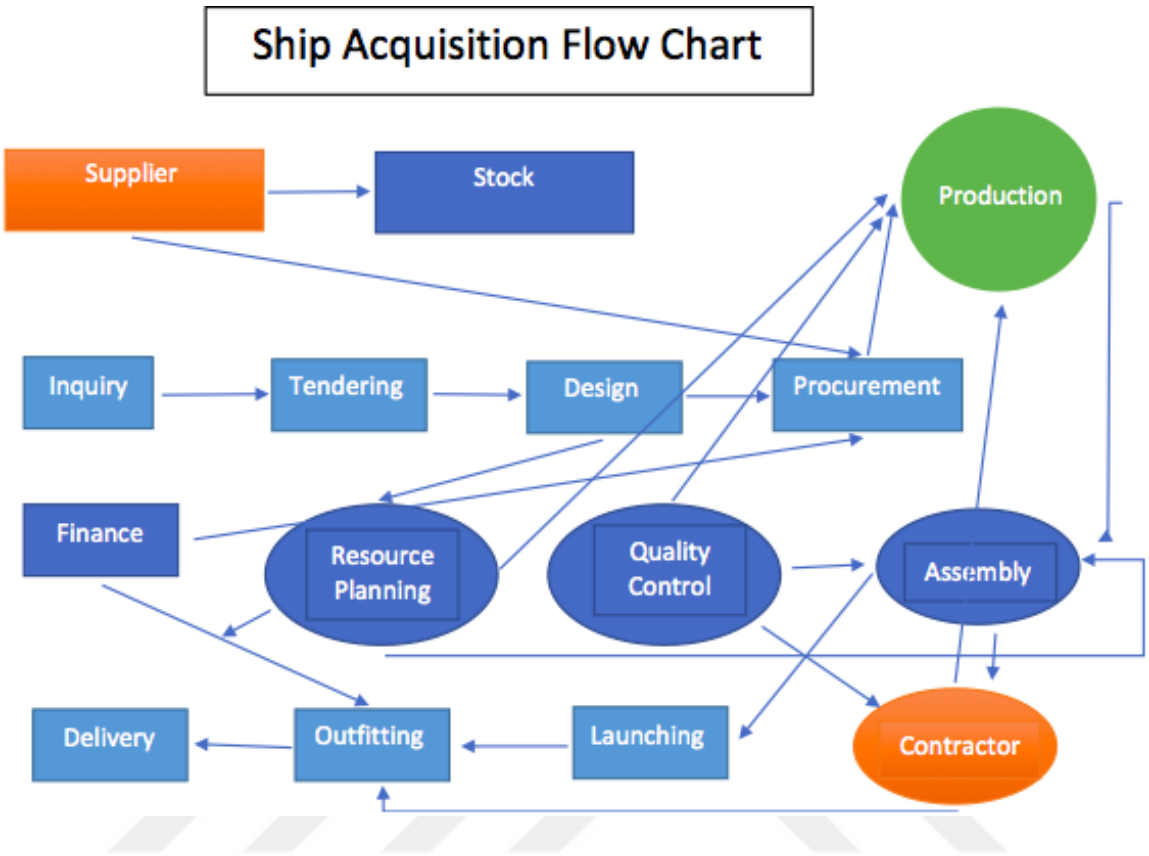

Figure 3.1-1 Ship Acquisition Model (Source: Kâhyaoğlu, 2014)

If the production process well addressed, then the maturity level can be easily measured using some outputs straightforwardly as follows (Stages gives exact information for future S-MCM inspections):

Pre-Production

i. Bid Proposal: Based on the initial specifications provided by customers. The proposal is a critical step of the business since customers largely depend on this proposal to decide whether to place an order or not. Designers lay out a broad design to get a rough overall picture of the ship and subsequently offer a proposal to the customer. Hence, designers try our best to show our ability to the full.

ii. Agreement: If the proposal agreed by both side's engineers proceed to discuss the specifications in detail and settle on the final price of the ship.

Once the shipbuilding process, ship price, general layout, specs, etc. are determined, a contract can be signed.

Design and Estimating

The shipyards must work to minimize or eliminate waste in project and production phases. The integration with the supply chain is essential to develop families of interim products. The production must fabricate using standard work processes in the same way each time using the same equipment.

Design phase can be considered as four different sub-titles. Design in/at:

i. **Performance:** Producing speed is the most significant factor of any ship. By repeatedly adjusting the hull form and tank testing, staff ensures that the ship they are to build can sail at the speed stipulated in the specifications.

ii. **Basic:** There may be various factors that influence ship performance, except for speed. The others can include ship stability, load capacity of cargo, fuel cost and so on. The critical function of primary design is to design the ship so that all those factors comply with the specifications.

iii. **Detail:** The critical point of this step is to work out drawings that are feasible and the accuracy must be enough to facilitate the actual shipbuilding operation on-site without compromising the ability or performance of the ship. Based on the information obtained from the basic design, the detailed plan plays the role of clarifying the design of components and parts of the vessel to be built.

iv. **Production:** The production design enables the field staff to control a large number of components on site meticulously. The production design organizes the design information in the detailed plans into respective component information.

The connection between design functions, planning and manufacturing requires precise and sufficiently complete information on all aspects of product, production processes and operations are available. To implement construction, product design and plan must become tightly integrated with development and all weakness in product flow and the flow of engineering information must be minimized.

So, it is expected that in the future; systems design and planning are closely aligned with the manufacturing technology, and future manufacturing systems will require more complete and more accurate when compared to the information available at this time.

The design, estimate, building strategy and production plans are produced by shipyard staff initially in outline and then gradually developed in detail involving the production of detailed working drawings and parts lists.

Computer-aided design[11] (i.e. CAD, CAM, CAL, CAE, and CIM) and production are now widely used in ship design to speed up this process and create better and more accurate information. Materials are ordered. Developing comprehensive and accurate information at an early stage in the design program is one of the most crucial areas for improving productivity and product quality in modern shipbuilding.

The technology and information systems used in manufacturing can be divided according to the purposes intended:

i. CAD (Computer Aided Design);
ii. CAM (Computer Aided Manufacturing);
iii. FMS (Flexible Manufacturing System);
iv. MRP (Material Requirement Planning);
v. ERP (Enterprise Resource Planning);
vi. EDI (Electronic Data Interchange);
vii. SD: (Systems Design).

Several techniques and systems are addressed in the literature that supports the new systems design:

CAD/CAM, rapid prototyping and QFD are some examples. Regarding the project support systems for New&Innovative Manufacturing, some jobs are worth highlighting:

[11] Sea also the topic 'Third Generation Shipyard'

i. QFD (Quality Function Deployment),
ii. Planning and Control Systems,
iii. Integration of management systems and database,
iv. Continuous improvement,
v. Commitment of senior management and empowerment,
vi. Multi-qualification, flexible and knowledgeable,
vii. Teamwork and participation,
viii. Training and continuing education.

Materials account for about 50-60 percent of the cost and labor and overheads for the remainder and a large merchant ship may involve several thousand separate purchase orders. A cost estimate must be prepared, often before the full design has been finalized and materials, particularly 'long lead items' such as the main engine must be ordered.

Stage 1: Material Ordering and Production Plan

Purchase orders for required materials based on the design and the of the design information. Since a vast volume of elements need to be ordered to build a ship, it is vital to manage and manage the delivery dates of those materials so that the procurement is timely and accurate. It is crucial therefore, to plan thoroughly to control and supervise the flow of materials, work volume, job assignments and subsequent progress of the shipbuilding process. MRP and ERP can be used in this stage. The production plan has a critical impact on manufacturing efficiency because of the enormous number of components and the large number of workers involved on the job site. (Stopford, 2006)

Stage 2: Steel Process

The steel is one of the most essential items to be ordered and when it arrives, it is stored in the steel stockyard. The two prior steel components used in ship manufacture are:

i. Plates,
ii. Rolled sections.

A new stockyard is laid out in an orderly manner and materials are retrieved using an overhead sled crane. Those are mainly used to stiffen the plates. Steel plates and sections are extracted from the steel stockyard and processed through the steel shot blast plant.

The new kind shipyard shops involve rolling plates and straightening sections to ensure that all going well and accurate, followed by shot blasting to remove rust and priming to protect the plate from further rusting and provide a foundation for paint.

Steel plates are cut and processed according to the blueprint[12]. The process of heating and bending a steel plate into curved shapes is of great importance in shipbuilding, and requires sophisticated skill and technique. Cutting machines (robot-arms) and CNC can be used in this stage (See also Innovative Technology Usage in Shipbuilding Processes). (Stopford, 2006)

Stage 4: Plate Process

Any plates that do not need cutting are transferred to the flame planer to have their rough edges removed and create the proper edge profile for welding. The primed steel plates are cut to the precise required size using profile-burning machines. If required, they are bent to shape using a press or rolls.

Framing members are prepared from steel sections, cut to size and then bent to shape using a frame-bending machine. By this process, the many thousands of steel components for constructing the ship's hull are prepared, cut to size and numbered by the drawings. In practice, this is a flow process with a steady stream of components moving through the steel preparation bays.

Assembled blocks are further joined together to make huge chunks, and at this point, rigging articles such as pipes, electric wires are installed. To enhance manufacturing efficiency at the dockyard, most rigging items are installed while the block is still on the

[12] Blueprint is a detailed plan.

ground. Cutting and CNC machines can be used in this phase (See also Innovative Technology Usage in Shipbuilding Processes). (Stopford, 2006)

Stage 5: Assembly

This stage is to assemble the steel components into the 'building blocks' from which the ship will be constructed in the dock.

i. Shaped steel is formed into sub-assemblies, as vast as a few hundred kilograms.

ii. The most substantial plates is hull and transferred to the panel assembly line where framing members are welded in place to form 'panel assemblies'.

iii. Finally, the sub-assemblies and the sub and panel assemblies are welded together into primary 3D assemblies using different types of welding equipment.

Stage 6: Pre-Outfitting

The hull must be fitted with tens of thousands of 'outfit' items such as

i. Pipes,
ii. Electrical Cables,
iii. Switchboards,
iv. Furnishings and,
v. Machinery.

At various stages of steel construction, forward-looking equipment is applied. This involves the installation of as many piping and equipment as possible in the earliest practical stage of production. To achieve high levels of advanced outfitting requires vast amounts of information, accuracy and organization. Plans must be made, materials ordered and delivered to the work region when they are necessary, so that assembly can proceed smoothly. When the materials arrive, they must be precisely as specified and fit into the

assembly without adjustment or rework. It seems like to be comfortable but calls for great care in planning and accuracy control. (Stopford, 2006)

Stage 7: Coating

Traditionally painting was carried out at a late stage in production and often became a production weakest point. Nowadays coatings has become increasingly prominent in the production operation. Two factors are driving this:

i. Effective corrosion protection required by customers, as a way of reducing maintenance and hence total costs.
ii. Recent coatings are technically demanding and must be applied under controlled conditions, ideally in a adequately designed paint cell.

These requirements have led to the careful integration of paintwork into the production operation. Wherever possible outfitted steel units will be blasted and painted in dedicated paint cells prior to final assembly. (Stopford, 2006)

Stage 8: Assembly on Berth

In this stage prefabricated sections of the ship are:

i. Together with those items of outfitting already installed,
ii. Lifted into the assembly dock where they carefully aligned,
iii. Welded into position,
iv. Outfit installations such as pipe runs linked up.

Welding machines are essential in this stage as an innovative technology usage (See also Welding Machine). (Stopford, 2006)

Stage 9: Outfit Berth

When the hull is finished, the dock is flooded and the vessel is floated to an outfit berth where the outfitting of the ship is completed, systems are commissioned to ensure that onboard systems are operating correctly, and basin trials of the main engines.

The significant steps forward in shipbuilding techniques have been in these areas for example:

i. Introduction of pallets for material handling,
ii. Extensive pre-outfitting and painting of assemblies prior to installation in the ship.

The application of these techniques yields practical results. For example, a shipbuilder using these techniques may take only half the person-hours required by methods that are more traditional to build the same ship.

Last Things to Do

Launching; When the blocks are mounted and appropriately jointed, launching is the next stage. While the launching at a dock means merely filling the dock with water to float the ship, the launching from a building berth is an awe-inspiring and exciting sight to see since the vessels slides its way majestically into the sea.

The finishing operation is carried out with the launched hull at the berth and this is one of the most exciting moments for all involved with the shipbuilding process. Starting with finishing work of accommodation and control sections, every equipment and instrument is checked and re-trained in practice. It is the final stretch of shipbuilding.

Test Cruise; the experimental cruise includes tests of speed, engine performance and operation of all equipment and instruments. The test results are recorded as the performance record of the vessel.

Delivery; now the new ship is ready. After the delivery ceremony, the captain, chief engineer and crew embark for the boats for the first navigation. (Stopford, 2006)

3.2. Investigation of CMMI Index Potential for Shipyard Production

Output of Process in Maturity

In the future work, if it is concentrated on product-based maturity, the most important field is ‘stages’. This part will be very straightforward. Only considering these stages with some prepared forms it can be evaluated or calculated. One of the post or follow up work from this thesis is this.

Shipyard Total Capability

If the consideration will be capability of a shipyard, then the stages of production also will have an essential role of evaluation. In this case, stages probably very different and will have not the same importance as much as capability case.

3.3. Adoption of New Concepts & Technologies to the CMMI Principles

In this chapter, especially new concepts, trends and topics will be taken consideration. In the SURVEY chapter when it is wanted to decide the S-MCM level of company, particularly S-MCM Level 4-5 it has to be applied to this chapter to understand related technologies in detail. Following parts are aspects of:

i. Technological,
ii. Computer Aided Production,
iii. Governmental,
iv. Organizational,
v. Innovativeness.

Breaking Design Dependency

In ship's design, to be supplied from foreign countries, is the external dependency problem regarding design. Ship design companies operating in European countries, is preferred by European ship-owners. Design importing's for unique types of ships in the World is still using for Know-How transfer method. According to Dr. Kâhyaoğlu, most of the Tuzla shipyards are dependent to European design offices in design. One of the goals of this work is to understand the dependency level and in future to break out this dependency.

Computer Aided and Simulation-Based Production

Design; the ships will be built in the form of the structure, determination of equipment and integrating placed within a plan, the plan will be made in the function determining how the specified system.

Competitiveness of the country in the ship construction industry is dependent on the design capabilities. Nevertheless, thanks to today's information technology, there are no significant differences between the types of ship design standards of the countries they produce. For instance, tankers, bulk carriers, general-purpose dry cargo ships are examples.

On the other hand, having advanced technology is a significant advantage especially building the ships such as LNG, Ro/Ro, and cruise ship passengers; require high-speed craft, regarding design capability.

Also, built outside the standard design, organized regarding requests for ship owners, ship design capability in boutique-type construction can provide a competitive advantage. Factors that can be used to analyze the design capability comparative advantages:

i. Local design capability,
ii. Outgoing design, functionality,
iii. Technological factors (CAD/CAM) use as determined during the design function.

Serving SW design methodology to use, more efficient product development of these parts in Europe, S. Korea and Japan, computer-aided design, integrated design and configuration information is situated in the most critical areas.

The efficiency in recent year's amplifier and technological level through enhancing investments in China, until 2010, China aims to catch up with S. Korea and Japan. Despite the fact that Romania and Poland is ahead in shipbuilding, regarding design capability, are the left behind countries. The Croatian has their design SW can be characterized as advanced countries in this field.

Innovative Technology Usage in Shipbuilding Processes

The most effective and innovative shipyard equipment's are as follows:

Workshops & Machinery

Welding Machine; Welding is a manufacturing or sculpting process which allows the joining of materials, output metals or thermoplastics. It is a resource type merge tool for the merge operation. (Apdpowercenter, 2014)

In the second half of the century, laser beam welding, electron beam welding, magnetic impact welding and friction welding were used. Today science continues to progress. (AWS, 2014)

Robot Welding; Robot welding is commonplace in industrial settings, and researchers continue to develop new welding methods and gain greater understanding of weld quality. Robot welding is the use of mechanized programmable tools (robots), which ultimately automate a welding process by both performing the weld and handling the part. The source of the robot is a new robotics application, even if it entered the US industry for the first time in the 1960s. Until the 1980s, as the automotive industry began to use robots for spot welding, the use of robots in welding did not stop. Since then, both the number of robots used in the industry and the number of applications have increased significantly. In 2005, more than 120,000 robots were in use in North American sector, about half of them for welding. Growth is basically limited by high equipment costs, and the resulting restriction to high-production applications. In 2014, FANUC US Corp. introduced a low-cost arc-welding robot to provide small manufacturers with a cost-effective robotic arc welding solution. The manipulator is what makes the robot move, and the design of these systems can be classed into several standard types, such as the Selective Compliance Assembly Robot Arm -SCARA- robot and Cartesian coordinate robot, which use different coordinate systems to direct the arms of the machine. (Fanucamerica.com, 2015)

Today, a new technology, called ALPT (Adaptive Logic Programming Technology) is a programming technology invented by Inrotech ALPT (User, 2015), became an interest for the industrial welding companies. It is a unique way of handling welding tasks.

Cutting Machine; Plasma Cutting Robots: Robot plasma cutting is a process, which uses high-velocity ionized gas, known as plasma, to heat and melt metals. The plasma then mechanically blows the molten material away to severe the workpiece. Plasma cutting is used to cut steel or a non-ferrous material less than one inch thick. Using a robotic plasma-cutting machine offers higher quality cuts at faster travel speeds. This versatile application efficiently cuts very thin & thick metals consistently. In the last few years, these machines

have drastically reduced in price and size, allowing more companies to utilize plasma-cutting robotics. Plasma cutting creates great angled or curved shapes, as well as a smoother surface than a manual application. (Robot Work, 2015)

3D Laser Cutting Robotic Solutions; Both laser technology and robot trajectory-controlling technology are evolving rapidly, with 3D13 laser cutting robotic solutions becoming increasingly popular in the automotive industry. A 3D laser robotic cutting solution, which expands technological innovation, flexibility and relative cheapness compared to imported five-axis laser cutting machines, is acknowledged and appreciated by an increasing number of automobile manufacturers. A wide variety of 3D laser cutting robotic solutions is available from a single-robot cutting platform on a flexible manufacturing line. Mainly, it involves two types of workpieces. One is a 3D car body structure and covering parts, formed by stamping or drawing, which includes a thermoformed piece. Another is the tubular metal structure, such as exhaust pipes and cross-members. The traditional way of body part production is stamping, followed by punching and trimming. Thermoformed piece and tubular metal structures can be made by a five-axis laser-cutting machine, which is so expensive that it only can be afforded by joint ventures. The 3D laser cutting robotic solution has not been widely accepted yet because of many factors. Based on market changes of supply and demand, this article discusses the development and prospects for the robotic 3D metal-cutting laser solutions. (Robot Work, 2015)

Conventional Robotic Laser Cutting; Robots do not spread in automotive industry in various applications, but due to three reasons. First, while automotive industry focuses on applications at low cost, such as robots, spot welding, arc welding, painting and machining, sewing is not suitable for automotive laser cutting.

CNC machine; CNC machining, software for the use of production equipment. Turning, mills, routers and grinders are available where this value can be controlled. CNC, Computer Numerical Control.

It can look like a computer; the system and control console are the elements that separate the system for use in the CNC process.

[13] 3D means 3 Dimensional.

Under CNC Machining, machine control of numerical control of machine tools takes place. Programmed with CNC Machining Language. With CNC machining, the computer can control the exact positioning and speed. CNC machining is included in both metal and plastic parts.

The program is loaded and runs a test of a program. Using a CAD drawing (2D or 3D) and an anonymous code to the CNC process. This trial is called 'proper air' and is important. It may result in a piece or a damaged machine.

Using CNC Machining has enough advantages. The process is manual execution and repeatedly. With CNC Machining, it is possible to create this process manually. CNC machining is very complicated. CNC Calibration is used for jobs that are extremely sensitive or repetitive tasks.

Generic Computer Shipyard Model

A Generic Computer Shipyard Model developed as part of the graduate research sponsored by a Naval Sea Systems Command- NAVSEA Cooperative Agreement under the NAVSEA Professor of Ship Production Science, and give examples of its use as a Design for Production tool.

Ship designers perform trade-offs frequently, but often without adequate information or tools to perform them. This results in many decisions that are sub-optimal. Too few tools have been developed to help the ship designer, and those that have, usually have been developed in businesses other than shipbuilding. Ship designers performing trade-off analysis are usually interested in the impact on service performance, although today more are looking at design for production impacts of their designs because of the recognition that acquisition cost is still the major life-cycle cost contributor for commercial ships.

Those that are considering Design for Production, attempt to develop relative costs of the alternatives by applying parametric cost estimating relationships, if available, or simply best judgment. A better tool would be a computer-based generic shipyard computer model that the designer could use to quickly model a shipyard so that the alternative designs

could be processed through the model of the shipyard and the resulting material, work force and schedule impacts be determined.

Conversely, such a model could also be used to determine any necessary changes to the shipyard to make it suitable for a specific new design approach or new ship type. (Transportation Research Board, 2015)

Material Requirements Planning

MRP is concerned with both production scheduling and inventory control. Material Requirements Planning is a computer-based production planning and inventory control system. MRP is applicable in situations of multiple items with complex bills of materials. A material control system attempts to keep adequate inventory levels to assure that required materials are available when needed. MRP isn't suitable for job shops or for continuous processes that are tightly linked.

The main objectives of an MRP system are to make job simultaneously:

i. Maintain the lowest possible level of inventory
ii. Ensure the availability of materials, components, and products for planned production and customer delivery,
iii. Plan manufacturing activities, purchasing activities delivery schedules.

MRP is especially suited to manufacturing settings where the demand of many of the components and subassemblies depend on the requirements of items that face external applications. Demand for end items is independent. In contrast, demand for components used to manufacture end items depend on the requests for the end items.

Demand for final products is planned in some periods and recorded on the Main Production Chart-MPS-. The main production program expresses how much each item is requested and when it is ordered. The MPS has been developed from estimates and tight orders for end products, safety inventory requirements and internal orders. MRP takes the

master calendar for the last items and converts it to the timed staged component requirements.

MRP will be deduced from the primary production timeline and the product structure will record gross component requirements; existing inventory records will reduce gross component requirements.

Group Technology (GT) or Advanced Production Technology (APT)

It is not possible 'mass production and automation' in the shipbuilding sector. Production of every order has to be considered as a separate production. Therefore, the *Group Technology* is critical. Shipbuilding is one of the most important ways to increase efficiency.

Generally, shipyards classify intermediate products into group's namely Group Technology (GT) or (APT), either by product attributes or process. This grouping results in the assignment of each intermediate product to specific machines/processes.

In this model, product groupings by process can be represented as the relationship between intermediate product class and process class. This relationship is naturally determined by the product attributes, such as shape, size, and other special requirements.

On the other hand, process capability of equipment is naturally determined by the equipment itself and is modeled as the relationship between process class and resource class. Thus, the use of GT or APT in shipyard production can be modeled as the assignment of process/process and resource class.

Although in a GT/APT-based production environment routing for intermediate products of each type are consistent and GT is what distinguishes a modern shipyard from a traditional job-shop based shipyard, in the case of very large throughput shipyards greater than 100,000 tons of steel where there are multiple machines/processes that can produce the identical intermediate products group, it is possible to observe non-identical but not random part routings.

Also for planning purposes, alternative capacity plans, for example, an introduction of a new machine for a desired throughput increase must be accounted for. For this consideration, job-shop capacity decision equations mostly used for Flexible Manufacturing System will be used so that the best allocation of intermediate product to machine/process can be determined.

It can be given an example of the support process: Human Resources Recruitment-HR and placement process. Customer demand for staff in the departments of human resources is internal customers of this process. Management should monitor subcontractors also run this process.

Process management consists of the entirety of the following headings that it will be asked:

i. Defined and documented processes model design,
ii. Disciplined, consistent deployment and implementation,
iii. Process report cards (measurements),
iv. Continuous improvement,
v. Regular monitoring processes and their interaction.

Shipbuilding and end-to-end management of the shipyard must be within these processes. Non-well-defined processes are also unmanageable. When another point of view if you have a well-functioning mechanism, where both processes are well defined and can be said that in both a continuous improvement. The study aims to reveal the end of this consistency and correlation.

The enablers of New Manufacturing Method are the strategies, systems, technologies, methodologies and tools that allow the company to become agile. For better understanding, these enablers are classified based on its focus. This classification groups the facilitators of Smart and Serial Manufacturing, according to the center on four categories:

Strategies for virtual enterprise / virtual production: A virtual enterprise is a temporary aggregate of small units and their core competencies and related resources. However, because a company cannot respond quickly to market needs, the virtual company works for agility. In an agile context, the topic of virtual businesses is considered vital and indispensable for the New Production Method.:

i. Integration of supply chain,
ii. Management based on key competencies,
iii. Simultaneous Engineering,
iv. Control based on uncertainty and change,
v. Knowledge-based management.

Quality Management

A company that worked on these issues, regarding paperwork and documentation is auditable and accountable. That can be considered as proof of having a certain level. Quality is a right to think that at a particular maturity hypothesis regarding understanding a company's vision and mission, which is the standard approach. However, work will be done will reveal that it would give an idea at what level.

Standard; Standard is in the production, understanding, and try to measure a sample.

Standardization; Standardization is put specific rules in respect of a particular activity with the help and cooperation of all interested parties to provide economic benefits, and this rule is the application process.

Standardization Process; First, life and property safety of the target is also below the level determined by the lower limit of detection is not permissible for the production of quality goods and services.

Total Quality Management-TQM

Most of quality program, like ISO 9000 wants to guarantee the best quality practices unfortunately, cannot do this. Considering an integrated process throughout the production chain, it can be first step to check quality. Non the less to be the minimum that these requirements must also meet a certain class of production -Total Quality Management- is something more robust which involves an integrated and shared chain with strategic goals of high performance and quality, purposing at highly competitive markets with sustainable industrial processes and international reference. TQM has the emphasis on continuous improvement of industrial processes, always seeking the feedback system, to improve the process and eliminate potential causes of problems.

Class Societies in the World

World Largest Cargo Caring Class Society is IACS. However, there are many others. Look at tables 4.1 and 4.2 below:

Table 3.3-1 Class Societies in the World Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017 –Original Source: Clarkson Research

NAME	ABBREVIATION	DATE	HEAD OFFICE	IACS MEMBER
Lloyd's Register	LR	1760	London	Yes
Bureau Veritas	BV	1828	Paris	Yes
Croatian Register of Shipping/ Austrian Veritas	CRS	1858/ 1949	Split	Yes
Registro Italiano Navale	RINA	1861	Genoa	Yes
American Bureau of Shipping	ABS	1862	Houston	Yes
DNV GL	DNV GL	1864	Oslo	Yes
Nippon Kaiji Kyokai (ClassNK)	NK	1899	Tokyo	Yes
Russian Maritime Register of Shipping	RS	1913	Saint Petersburg	Yes
Hellenic Register of Shipping	HR	1919	Piraeus	No
Polish Register of Shipping	PRS	1936	Gdańsk	Yes
Bulgarian Register of Shipping	BRS (БКР)	1950	Varna	No
CR Classification Society	CR	1951	Taipei	No

NAME	ABBRE-VIATION	DATE	HEAD OFFICE	IACS MEM-BER
China Classification Society	CCS	1956	Beijing	Yes
Korean Register of Shipping	KR	1960	Busan	Yes
Turk Loydu	TL	1962	Istanbul	No
Biro Klasifikasi Indonesia	BKI	1964	Jakarta	No
Vietnam Register	VR	1964	Hanoi, Vi-etnam	No
Register of Shipping Albania	ARS	1970	Durres	No
Union Marine Classification Society	UMCS	1970	Union of Comoros	No
Registro Internacional Naval[7]	RINAVE	1973	Lisbon	No
Indian Register of Shipping	IR Class	1975	Mumbai	Yes
International Naval Surveys Bureau	INSB	1977	Piraeus	No
Asia Classification Society	ACS	1980	Tehran	No
Brazilian Register of Shipping	RBNA	1982	Rio de Janeiro	No
Registro Cubano de Buques	RCB	1982	La Habana	No
International Register of Ship-ping	IRS	1993	Miami	No
Ships Classification Malaysia	SCM	1994	Shah Alam	No
Isthmus Bureau of Shipping	IBS	1995	Panama	No
Guardian Bureau of Shipping	GBS	1996	Syria	No
Shipping Register of Ukraine	RU (РУ)	1998	Kiev	No
Phoenix Register of Shipping	PHRS	2000	Piraeus	No
Orient Register of Shipping	ORIENT Class	2000	Philip-pines	No
Overseas Marine Certification Services	OMCS	2004	Panama	No
Intermaritime Certification Services	ICS Class	2005	Panama	No
Iranian Classification Society	ICS	2007	Tehran	No
Venezuelan Register of Ship-ping	VRS	2008	London	No
International Classification of Ship Malaysia	ICSM	2008	Kuala Lumpur	No

Tasneef-Emirates Classification society	TASNEEF	2012	Abu Dhabi	No
Mediterranean Shipping Register	MSR	2012	Great Britain	No
Pacific Marine Services	PMS	2013	Ajman	No
Danforth Marine Surveys & Certification Services	DMSCS	2014	India	No

Table 3.3-2 World Classification Societies Source: Lamb 2005

Region	# IACS	# Others
North America	1	0
Western Europe	6	4
Eastern Europe	1	3
Asia and Australia	4	2
Other	0	2
Total	12	11

Business Process

In business life often, process means Business Process. Word *Business* in dictionary says ‘to get a result, efforts to create a value. It consists of a combination of two words ‘business process’ produces a result that creates value to an organization's customers, from end to end, is a set of interrelated and organized group activities.

All of these activities are organized, reproducible and specific purpose-oriented, and so it must be focused on the customer. Customers may be internal or external customers. Business processes, operational, which are associated with external customers or support providing service to internal customers, can classify it as.

The generic model of product, process, and resource relationship is the model that refined from a previous study (Lamb et al., 2000) and measuring method and buffers at workstations are included. The model describes how process, product, and resource classes, as well as other classes related to these three classes, should be and are related to each

other. The model is constructed by Object Modelling Technique (OMT) the predecessor to UML, OO analysis. The OMT approach views a system from three related but different viewpoints, each capturing an essential aspect of the system. All views are required for the complete description. The object model, or object diagram, represents the static, structural aspects of the system in which objects, their identities, attributes, relationships to other objects, and operations are fully described. The dynamic model represents the temporal, behavioral aspects of a system in which changes marked by events, sequences of events, states that define the context for events, and the organization of events and states are described. (Rumbaugh, 1991)

Competition; Rivalry in which every seller tries to get what other sellers are seeking meanwhile: sales, profit, and market share by offering the best possible combination of price, quality, and service. Where the market information flows freely, competition plays a regulatory function in balancing demand and supply. (BusinessDictionary.com, 2017)

Efficiency&Corporation Culture

As Dr. Kâhyaoğlu conducts in his lecture notes; organizational cultures importance throughout production phases, corporate culture affects everything prior to total price of an ordered ship. Kâhyaoğlu also explained the importance of corporate culture via German Blohm&Voss[14] shipyard illustrates his proposal.

External dependency in engineering is useful with the receipt of quality services from abroad. Examples of these activities are class services; measurement services, machinery and equipment imported central installation, service thereof. The numerical evaluation of these criteria could not be made. As in table below, productivity depends countries shipbuilding history and culture.

[14] See also German Blohm&Voss Shipyard.

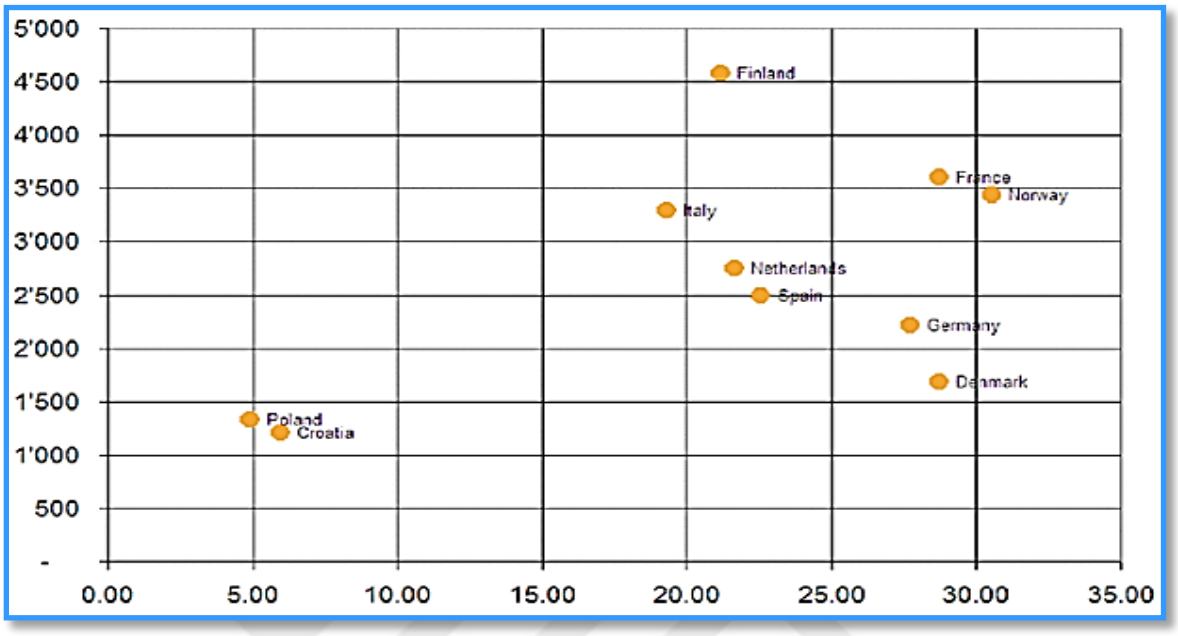

Figure 3.3-1 European Countries Shipbuilding Productivity (Ton Produced-Hourly Wage in EUR) (CESA, 2015)

For the countries included in the review low, medium, high assessment values are given, according to the knowledge and experience of the project team. Those countries are considered the following evaluation criteria:

i. The availability of own class organizations,
ii. To operate the foreign classification societies,
iii. Noise, vibration measurements,
iv. Their design ability,
v. The availability of own engineering union,
vi. International organizations (i.e. ITTC, ISSC, ISO, IMO) participation,
vii. Experimental use of foreign countries in pool activities.

According to Peter Senge Mental Model (Hejase et. al, 2012); in an organization, assume that average IQ of personnel is 100. However, in operation it can be got only the level 80. The reality behind this is because the corporate culture has importance to get then

average IQ in a process. On the other hand, group working in wild animal's life increases average IQ of those animals (Canan, 2015). New research show the facts this is because animals learn from their gene. If there is historical culture in an organization, average IQ in there is increases.

In shipbuilding, it is not possible to make a clear definition of efficiency. Manufactured products are produced on order. Therefore, it has to be different properties from each other, are manufactured using different materials and different labor. Commonly accepted definitions for productivity are man-hour/ (steel processing amount) i.e. man-hours/ton or man-hours/CGT values. The purpose of the evaluation of the efficiency of the CGT units is not allowed to make comparisons between different types of ships shipyard in the production.

As described in the definition of production efficiency can be calculated based on different values. The former is a method of determining the ability depending on the result of the study as to whether another processing escapes of kilograms of steel. Türkiye's shipbuilding industry initially steel processing costs US$ 1.2/kg. While this value rose due to increased demand growth and reached the US$ 4/kg level.

In Far Eastern countries in the shipbuilding industry leading processing cost of steel is around US$ 3.5/kg. Among EU countries has reached the level of US$ 7 Figures mentioned in the Netherlands and Greece. Results are given as the end of the shipbuilding activities. In this case the steel processing costs should be reduced, at least for the prevention of further rise is evidence mandatory.

Relative efficiency ratio is 0.8 in S. Korea is about 0.3 in Türkiye. China and Türkiye, in shipbuilding, subcontracting practices is very high, for a low efficiency. Estimated productivity assessment findings for Türkiye's shipyards, which Lamb (2001, 2007) they found there along with the values for other countries. (Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017)

Table 3.3-3 Productivity Value Ranges of Country Shipyards

Countries	Productivity(Man * Hour)/CGT
Japan	7-14
S. Korea	20-26
EU	16-60
US	49-115
Türkiye	45-115
China	40-175

On the other hand, in Japan, S. Korea and qualified labor employment has high automation and technological level is higher than the capacity. Productivity is higher for this reason.

The "Productivity Validity" account developed by Lamb has been updated using the data currently available from the shipyards (Lamb, 2007).

Productivity Value:

$PD = 150\ BP^{-3.00}\ TE^{0.27}\ PR^{0.60}\ DP^{0.41}\ VI^{-0.66}\ ST^{-0.08}$

PD = Predicted Productivity CGT/MH

BP = The Best Practices Rating of the shipyard

TE = The total number of employees (TE) includes everyone employed by the shipyard from President to janitor and where in house subcontracted labor is used it includes them also.

PR = The Production Ratio is the ratio of total number of employees (TE) divided by the number of production workers (PE).

VI = Vertical Integration is the ratio of value added by the shipyard versus the total ship value and is defined by the percentage of labor cost to total cost.

DP = Dual Purpose Trigger = 1 if a shipyard is building commercial and naval ships only, and the value is DP=2 for a yard producing commercial as well as marine vessels.

ST = Ships delivered/Ship types, is a parameter that takes into account the number of total ships built compared to number of "series" ships constructed over a given time, such as three years. (Lamb, 2007)

As it can be seen in Table 3-3 above, Türkiye and China have significant Productivity values. Those values are in the same similar interval. That means that comparing Türkiye and China's shipyards with Europe's and US shipyards, concerning other conditions unfortunately Turkiye and China in the terrible situation.

In this context no one can assess adequately the managerial and operational capabilities of those countries shipyard capacity satisfactorily. For to fulfill this gap S-CM Model can be used in an efficiently manner.

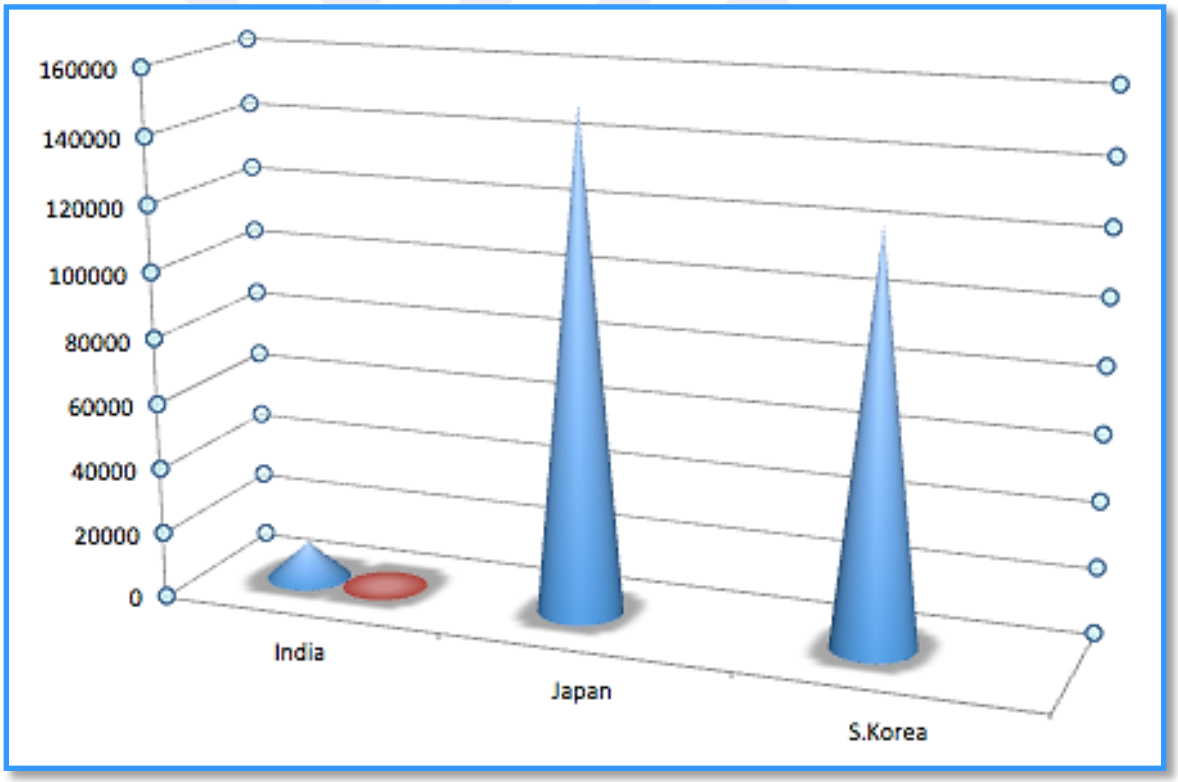

Figure 3.3-2 Labor Productivity Competing in Asia (Labor productivity in USD/Employee-India 11134, Japan 151487, S. Korea 122994 respectively) (Unido, 2015)

Shipyards in Türkiye, because of the financial problems are experienced difficulties raising their level of technology.

Efficiency ratio, in compared with the Far East shipyard has remained in the 20-40% level. Therefore, our product type shipyard cannot be developed. Except for a few of our shipyards capable of mass production could occur.

The development of our future shipyard to be made:

i. Financing Provision,
ii. To Increase Their Level of Technology,
iii. Raising the Productivity,
iv. Ensuring Competition in the Large Ship Construction are required.

Today's Turkish shipbuilding industry, dating from the early ship by methods based on the unproductive and cheap labor of Haliç and Tuzla do not seem able to sustain its claim.

Japan, S. Korea and China are the most advanced ships in the World and shipyards constructive and mergers in this country are experiencing. The fact shows the brutal competition of the sector and the structural change.

The sector in Türkiye needs to make:

i. Improving the overall efficiency,
ii. Give particular importance to merge shipyard in this regard,
iii. Shipyard of them as collateral, finance and technological Know-How to provide discovery of new partners,
iv. Ship-owner merger of the company,
v. New partners boost through the capital Structure and Management,
vi. The state, both the owner, as well as, the shipyard; typical example to the World and banking convention as appropriate, up to a certain amount of Ship Cost Loans Obtaining External Build Ships are required.

On the other hand, will be able to build massive tonnage ships are required to establish the capacity of the shipyard. What is needed is on the 120,000 DWT ships in the tanker market. This sized ships; shipyard production in Türkiye is difficult with the present moment. To improve the competitiveness of the new ship concepts must be developed.

Need of Big Capital and Equity

All kinds of technological investment can be made more accessible than small companies if companies have significant capital. Since;

i. They can have all types of machinery and workbench,
ii. They have their CAD, CAM, CIM etc. design, the use of management and production program,
iii. They can do great purchase this is due to price reductions,
iv. They can do improvement in time delivery of steel and other raw materials,
v. One Yard - Many Products, due to lower marketing expenses and can be classified as active relationship marketing.

To look at countries that are active in the sector between developed nations and emerging differences are in firm size. Funds and subsidies are necessary both competition and growth. Theee fact also means keeping up to date a shipyard.

Funds and State Subsidies

One of the most critical issues in the new shipbuilding market and government incentives is guarantee. Interest on loans to be taken because of government guarantees is being too low. Thus, decreasing the burden of the cash outflows. Government grants are low-interest rates, a certain grace period, and long-term loans.

Other supports:

i. Income tax exemption for a specified period,

ii. The use of cheap energy,
iii. Tax reduction or exemption on imported equipment and parts,
iv. Payment of cash, and so on.

Government grants are also available. Tax incentives offered are accelerated depreciation, self-depreciation, investment tax credits, and tax exemptions.

Although not as active in the construction of commercial vessels in US 1990, has made a high impact on the international shipbuilding industry. In June 1989, the Council of American Ship Builders justification of their construction vessels of other government incentives, is untenable, presented a petition containing that World trade and undermine the US trade OECD.

Japan, S. Korea, Germany and Norway arrange this petition, against promoting their ship construction. US have proposed an international agreement to regulate the working group created in the OECD framework of shipbuilding in October 1989. Organized Agreement of 21 December 1994, the World representing more than 80% of EU shipbuilding capacity, Finland, Japan, S. Korea, Norway, Sweden, and has been signed by the US.

OECD agreement, the commercial shipbuilding and maintenance aims to adhere to the usual competitive conditions. The basic principles of ship construction deal with the removal of incentives in the international prohibition of injurious dumping and pricing practices. Agreement to achieve these objectives, include a ban on state aid in the following cases:

i. Export Incentives,
ii. Loans&Loan Guarantees,
iii. Debt Cancellation,
iv. Incentives have benefited from the use of goods and services,
v. Discriminatory tax regimes, especially tax cuts aimed at the construction and maintenance of ship repair,

vi. Internal market for shipbuilding, maintenance and repair of private unfair regulations, which release some incentives,

vii. 'OECD Understanding on Export Credits for Ships' document suitable export credits,

viii. Introverted market, 'The OECD Understanding on Export Credits for Ships' appropriate documentation loans and loan guarantees,

ix. Research and development incentives: 100% in basic research, in necessary industrial examination 50%, 35% applied study, 25% of the development,

x. Shipyard became unemployed due to the closure; employment will be transferred to other sectors.

Harmful pricing occurs when a ship is sold under the regular price. OECD agreement establishes a mechanism for the investigation of adverse pricing.

European shipyards, giving incentives S. Korea and selling meat those ships built under the cost price, lousy pricing policy that is followed lasted forward. One can have applied to the TCOS with this claim. However, the application of unjust structures found in the panel and is rejected.

Incentives in China; after 1990, the Chinese government, international investors are encouraged to invest in the shipbuilding industry in China. Mainly to be imported from abroad for the transfer of new technologies, has provided low-interest loans by creating a single fund has been collecting taxes from ships built for export purposes. Also, banks have to give priority to the shipbuilding sector loans. Besides all these, Chinese government is making 17% returns over the issue price of the exported products ship supply industry.

In fixed capital investments in China, the investment rate is 40%. Low or zero interest loans are given for the development of shipbuilding industry. Loan repayments are spread over an extended period. Tax exemption is applied in imported material. Depreciation of releasing it, the selection of which advantageously is provided between 2000-2005, 12% of ship cost to ship first built in the domestic market has made a refund if the ships

built in the indigenous ship owners abroad, was able to get back 12% of the price paid for the boat. (China Report, 2012)

Incentives in S. Korea; S. Korea announced that, shipbuilding in 1986 'the industry support law' and in 1995 'tax exemption' is already been uninstalled. Thus application specific support given to the construction of the ship abandoned (OECD, 2006). After 2002, built are to be shown and the collateral vessels operating revenues, income, taking into context, can be used for credit purchases. The rise of low labor costs in China and S. Korea shipbuilding is it to set new policies.

These policies LNG ships with technological developments that require High-Tech, specialization in types of vessels such as cruise ships. Shipbuilding in both High-Tech transition as well as training to meet the needs of qualified staff posed as a requirement of productivity growth and international policymakers in institutions (IMO, ISO, IACS etc.) to have a voice in determining the rules by playing an active role. (Economist, 2013)

Incentives in EU Countries; Shipbuilding since the 1970s has been a subject of state aid union regime. Framework prepared by the Union[15] of the laid down by the rules and principles, aims to redress the differences between the laws applicable to the shipbuilding industry and other related sectors. However, the Commission considers that the following factors affecting the shipbuilding industry admit that should be reflected in the control of state aid policy;

i. Nature of the World shipping market excess capacity, reduced price, etc.,

ii. The terms of credit facilities with colossal capital ships,

iii. Chamber of Commerce challenges in the implementation of the rules on unfair trade in the shipbuilding industry,

[15] Europedia, EU framework on state aid to shipbuilding (EC No: 2003/C317/06)

iv. OECD in the presence of an agreement on the lower shipbuilding industry. About Guide to the Public by Supported Export Credits OECD Arrangement-1998.

These arrangement Council Decision[16] requirements in the EU are also applied. In other OECD arrangement the Shipbuilding and Repair Industry Agreement on Recognition of Normal Competitive Conditions-1994 has not yet entered into force. Shipbuilding State Assistance for the Framework, the Commission's 1994 agreement[17] instead to prepare another deal that agreed to participate in studies in OECD are indicated. These savings are the main reason for the difficulties in the introduction of the 1994 agreement and the strengthening of the possibility to enter into force. (EU, 2013)

Employment Aid; Shipbuilding and ship maintenance to hire disabled workers in the company, the support for additional costs to work in the employment to create or handicapped workers provided to comply with the rules laid down in Commission Regulation[18] regarded as the standard market compatible.

Development Aid and Export Credits; Provided that they comply 'Officially Supported Export Credits About Contacts and Export Credits' with the provisions of the OECD Arrangement About Memorandum on the industry to help 1998 ships made to shipbuilding like development aid and export credits, regarded as the standard market compatible.

Agreement to shipbuilders, ship owners themselves or other party, directly or indirectly, is detailing a strict discipline to bring government support to be made and the types of assistance that may be prohibited. Although it is not permitted to reflect the cost to ship an agreement with state aid, are expected exceptions in the following areas;

[16] Europedia, EU framework on state aid to shipbuilding EU (EC No: 2001/76)
[17] Europedia, EU framework on state aid to shipbuilding (EC No: 2003/C317/06)
[18] Europedia, EU framework on state aid to shipbuilding (EC No: 2204/2002)

i. National government-backed loan for the modernization of the fleet shipbuilding activities will be given to buyers in the domestic market and guarantees,

ii. Supporting R&D activities have been released with some restrictions,

iii. Promotes various state are permitted for workers who retire or lose the job.

Regional Aids; Shipbuilding and ship maintenance for regional aid are considered as compatible with the standard market if the following conditions of transport;

i. Help to modernize their installations to improve not related to financial restructuring of the shipyards and related investments to improve productivity or to be given.

ii. Life level specified in s abnormally low or total investment or expense ratio of significant unemployment ruled that aid for regions to support the economic development does not exceed 22.5%[19].

iii. Detrimental to the common interest of the trade conditions specified extent it affects as a negative, which of the specific activities or economic areas of development to a total investment of aid to facilitate or expense ratio of 12.5% or the applicable regional aid limits smaller than that applied[20].

iv. Because the founding treaties prohibit state aid harm to competition with two exceptions. These exceptions are;

a. Living standards in areas where unemployment is deficient and is in serious Assistance made to promote economic development,

b. Grants created to facilitate the development of specific economic activities or specific commercial areas.

[19] Europedia, Europa Competition Article 87 of the EC Treaty-(3) (a)
[20] Europedia, Europa Competition Article 87 of the EC Treaty (3) (c)

Such assistance should not adversely affect trading conditions common interests in size. The two exceptions are directly related to regional aid. Regional aid is limited to specific geographical areas through the creation and promotion of investment and employment, especially in these areas are different from other economic development assistance target of reasons.

R&D and University Corporation; In light of these data; the development of sectorial R&D work and should be supported. Also, the scope of work TÜBİTAK must also enter the ship design and technology.

Positive approaches to R&D activities in the sector began to emerge. One of the most concrete examples of different segments of expression 'Marine Technology R&D Center' setting up studies, certain institutions (TÜBİTAK, TCOS, GİSBİR and Universities) under the umbrella of the establishment, has planned this particular R&D in support of the central sector of the forecast.

The essential elements of competition in shipbuilding are economic competition and labor costs. Labor costs of emerging countries, the state has pursued two main strategies for the use of incentives to remain in the sector.

i. Japan and S. Korea shipyards increased their output/labor productivity (CGT/ person-year),

ii. European countries that require High-Tech shipbuilding sector outcomes are expertise to ship.

Thus, they reduce their labor cost disadvantages. Japan and S. Korea shipyards increased their output/labor productivity (CGT/ person-year) European countries on the other hand passed their expertise to High-Tech shipbuilding sector. So, they reduce their labor cost disadvantages.

Both strategies mentioned above in research and development (R&D) require making activities. The number of shipbuilding trainer universities of a country that can be used as indicators workforce potential for a nation.

R&D projects making by shipbuilding, ship repair or ship refurbishment companies, payments for the research and is compatible with the rules established in the Community Framework for State Aid for Development be considered consistent with the common market.

Accordingly to be the exception to public funding for fundamental research, state aid for research and development is subject to this general framework however public funding of higher education or nonprofit research organization that is not covered under the following terms.(Mentioned community framework, on February 17, 1996 announced in the Official Gazette -Resmigazete, 2015-)

i. Results will be made available without discrimination of community industry,

ii. Studies, surveys conducted by research institutions or companies that have been paying for it to be carried out in cooperation with the condition that sector or on behalf of the industry,

iii. Moreover, the results will be published.

In industrial research projects, feasibility studies, maximum 75% funded. Maximum of 50% of the pre-competition preparation activities are financed. Aid granted to current shipbuilding and ship-repair yard maintenance, condition contributing to research for innovative products and techniques, spending a total of up to 20% of the maximum considered compatible with the common market.

If shipyard has R&D activities, which means that they already came a significant level. At least the standard problems are overcome; knowledge and experience, looking for the way to become more competitive by bringing together can be thought. In this context, refer to the need to promote and assure funds and both universities and institutes regarding predictor relationships. Now one opportunity is in naval education area. Look at Table 3 below:

Table 3-4 WORLD Universities Offering Degree Courses in Naval Architecture (Source: Lamb, 2005) [21]

Region	Number
North America	8
South America	3
Western Europe	25
Eastern Europe	8
Asia and Australia	20
Total	65

Innovation means, in other words, competitiveness. Advantages of Segments. For this reason, it is imperative that companies invest in a way to stay away from their competitors and become recognized. Innovation will require proactive methods to understand and anticipate technological and market changes.

Innovation is a critical factor in the competitive advantage for an organization. Then fine-tune the needs of the markets. Financial sustainability, supply chain and customers, reliability and quality-related quality-of-service paths are essential points to consider when making a strategic decision to make a company global competitive.

Thus, this process must also be added to a customer's supply chain; Otherwise, it would be challenging to gain competitive advantage over the opponent. It is also imperative that a company and its partners integrate an innovative business strategy.

Competitive advantage shows that the company stands out from its competitors to meet market need which means making it easier to get the most out of your time and money. It's the right thing to do.

[21] In original source the total number is 64, it is corrected in the table, probably there must be counting mistake.

For a company develop and continuously meet the new knowledge and technology and should be added to collaborate with academic institutions for them to process. However, most modern concepts, theories and techniques curious and businesses that want to benefit from them, they work with educational institutions.

Staff from these organizations also employs from universities, namely human resources as a potential benefit. Employed human quality, R&D activities and academic cooperation, are expected strong correlation between the fund and benefit from the support issue.

Regulations

OHSAS; with industrialization, there have been fundamental changes in economic, social and cultural areas. Industrialization brought about by automation, mass production, and workers whose main elements of the work and life-like development work in groups, businesses, and close and distant surroundings affects from various angles.

Endure the negativity of occupational diseases caused by working conditions of workers and professional accidents more often than not the concept of OHSAS has led to the agenda.

Threaten the OHSAS that there are many important factors. Unhealthiness of the deficiencies in the workplace and working environment management system of due to insufficient training in accidents and occupational diseases to the workers, the lack of technical equipment and ergonomic disadvantages are some of these factors. On the other hand, the problems arising from the ignorance of employers and workers are threatening the OHSAS.

Working conditions as well as human error, these errors can be prevented causes both. Measures relating to OHSAS to be adequate and efficiently price civil society organizations and employers, life safety management and control systems of all studies should be implemented at an adequate level. In this way, the state and the private sector will be more productive working life. Working life will become healthy and human character.

On the other hand, it may cause financial losses. However, beside this, compensation can't be moral losses can also occur. Increase productivity, adjusted so as not to cause insecurity and unrest in the running of the business environment, the general population regarding benefits, the elimination of the hazards in the workplace is necessary.

Safety is a culture like Dr. Çeşmeci always emphasizes in his Safety Lecture's the inception point of safety most of the time a big crash or disaster. Two of the examples for safety culture inception crash's are Titanic[22] and Torrey Canyon[23] disasters (Çeşmeci, 2013). But most of the today's modern safety and OHSAS regulations sourced by those tragic disasters and the culture of safety inception points unfortunately are catastrophic disasters.

European Union regarding OHSAS of Türkiye to solve the problems in the integration process is an area that should be produced. Survey conducted by the ILO today, Worldwide, and every second of at least three workers are injured because of accidents at work; reveal that a worker's occupational injury or occupational disease results in die every three minutes. Just one of these numbers, as well as how universal the OHSAS issues show that it is essential.

According to the ILO resources; each year 1.2 M people are killed because of work-related accidents and occupational diseases in Worldwide. 250 M occupational accidents and 160 M people are exposed to losses occurring because of a professional illness (ILO, 2015).

[22] Titanic was an English cruiser ship sinking in the North Atlantic Ocean early in the morning of April 15, 1912. Southampton, New York, USA. The sinking of the Titanic caused more than 1,500 people to die in one of the deadliest marine disasters of modern history.

[23] The ship left the Kuwait National Petroleum Company on 19 February 1967 at the Mina al-Ahmadi raffinia and reached the Canary Islands on March 14th. The planned route from there was Milford Haven in Wales.On 18 March 1967, Torrey Canyon struck Pollard's Rock on Seven Stones reef between the Cornish mainland and the Isles of Sicily. Ship was registered Liberia.

Table 3-5 Türkiye Total Numbers of Work Accident and Death Rate[24]

YEAR	WORK ACCIDENT	DEATH	TOTAL EM-PLOYEE
1996	97631	1492	4624330
1997	98318	1473	4830056
1998	91895	1252	5299533
Year	Work accident	Death	Total Employee
1999	77955	1333	5005403
2000	74847	1173	5254125
2001	72367	1008	4886881
2002	72344	878	5223283
2003	76668	811	5615238
2004	83830	843	6181251
2005	73923	1096	6918605
2006	79027	1601	7818642
2007	80602	1044	8505390
2008	72963	866	8802989
2009	64316	1171	9030202

Accidents at work and occupational diseases are fundamental social problem in Türkiye. Occurring in Türkiye every year, according to statistics published by the Social Security Administration about 70,000-80,000 occupational accident and 400 occupational diseases arise because of the loss of about 1,000 deaths and 2 M workdays. The number of deaths in 2006 reached 1,600.

According to ILO statistics (ILO, 2015) work accidents and occupational diseases in industrialized countries the total cost is 1%-3% of GDP level. Although there is no definite information in this regard in Türkiye is estimated to be at a much higher level with this amount.

As it's known the state of the historical development of OHSAS, workers' and employers of different but complementary tasks they undertake.

[24] Overview of work accidents in Türkiye compared with developed countries, International Journal of Engineering Research and Development, Vol.3, No.2, June 2011.

The task of the state about OHSAS; making legislation is organizational and control. Employer's responsibilities are education, supervision and to take measures. Employed is obliged to comply with the steps taken.

In recent years, Türkiye and the World, OHSAS quality and environment are seen as complementary sides of a triangle.

This approach on OHSAS issues has become an inseparable part of business management. The law for many years in the business management of OHSAS issues has been addressed in the understanding of a task given to the employer.

However, with a multi-disciplinary nature of OHSAS (in total quality and total quality process of international quality standards, the main elements) to keep a special place, and the solution of the problems with business management of OHSAS management system passes the directly interested.

On OHSAS with this business-oriented management approach OHSAS of dealing in business issue are not just fulfilling the provisions of the legislation seems to do very much ahead of the application.

To eliminate the problems that exists in the field of OHSAS everything before the formation of our society awareness on the subject, and depending on the creation of a belief and enthusiasm in all relevant and occupational diseases to do its part too crucial for each. However, so is of great importance to cooperate.

According to the International Labour Organization and the World Health Organization' definitions of health: All working people physical, spiritual, moral and social aspects, the provision of complete well being and to maintain the highest level of business conditions and the prevention of damage to the health of employees due to hazardous substances used, and also to be placed at the appropriate places on the physiological characteristics of workers, business people and people's work fit the medical science is dealing as principal purposes.

Table 3-6 Death rate of different countries over years by work accident (Ceylan, 2011)

	2004	2005	2006	2007	2008	2009
Türkiye	843	1096	1601	1044	866	1171
Finland	44	51	47	37		
Germany	949	863	941	812	765	
US	5764	5840	5657	5214		
Mexico	1364	1367	1328	1279	1412	
Netherlands	93	73	84	86	92	
Japan		1514	1472			
Italy		918	938			
Austria		124				
Bulgaria		130				
Switzerland		45				

Works, performed to prevent from hazards caused by the conduct of business in workplaces and to be protected from conditions that may cause harm to health are called the method of job security.

OHSAS, as well as the employees, the company also provides security and production safety. OHSAS measures, makes it possible to avoid accidents without incident. In Türkiye, Labor Ministry has a slogan: Preventions is cheaper than compensation.

The primary goal of OHSAS measures is the protection of the employees. Employees protect from the adverse effects of the workplace, and to ensure their work in a safe environment is in other words, employees work accidents and providing preserving their mental and physical integrity against occupational diseases purpose foremost of job security.

With OHSAS measures employees can be protected, and product safety can be guaranteed. Could produce results in an increase in the efficiency with ensuring product safety in a workplace is also important economically.

The protection of workers in the workplace occupational diseases and accidents at work resulting from labor and lost work time will be reduced. Therefore, confidence that

the production workers will be protected, healthier, and safer working environment will also increase the work efficiency.

Using measures to be taken in the workplace, operation safety will be provided. Occupational accidents arising from or due to unsafe and unhealthy working environment (i.e. machine failures and remain disabled, explosion events, fire) that can reduce the danger of such business cases will increase security business will vanish. (Çalışma ve Sosyal Güvenlik Bakanlığı, 2012)

Environmental and Other Regulatory Laws

Local laws can bring the cost disadvantages of the various aspects of the shipyard. These limitations include:

i. Environmental protection restrictions,
ii. Weekly working time restrictions,
iii. Restriction profile of employees,
iv. Import duties,
v. Technical limitations.

Environmental Impact Assessment Report or project presentation file prepared only obligation of: Environment Act ecological problems their activities by performing planned institutions, organizations and businesses to develop this report is obligated.

Under Law, Environmental Impact Assessment of Positive Decision or Environmental Impact Assessment is not required decision regarding must be received by the project, approval, permit, encourage, structure and use of license or permit investment for the project could not be given.

Provisions of this act cover shipyard investment projects, which the Ministry said, shipyard investments to be made in the area during construction and operation phase, the

Environmental Impact and Assessment- EIA associated with shipyard activity of the Certificate of Conformity. Also, these areas 1/25.000 scaled environmental master plan approves.

4. SHIPBUILDING MATURITY AND CAPABILITY MODEL (S-MCM)

4.1. CMMI Modeling to Shipyard and Shipbuilding Production Side

Technological capabilities and maturity level has a key role in the competitiveness of firms in all industrial sectors as well as shipbuilding. Suppliers in emerging economies often acquire technical skills by operating and mastering technologies developed by others and then leveraging this learning to create local technologies.

By reconsidering research on firm-specific technological capabilities, the development of global value chains and industrial clusters in emerging markets.

In this chapter, first it will be explained the data collecting methodology. The criteria cluster of survey determined after some diagonal process. Afterward it is irritated what the reason or what is the behind of each question is. The relevant item (s) indicates in parenthesis near with each of topic.

The methodology of this work is **quasi-experimental**. CMMI is a widely used and tested system in different areas. Since the philosophy of this work adopting CMMI methodology to shipbuilding area in each step a custom method used after taking particular data. In this case study, previous examples are control group while experimental are shipbuilding companies.

Data Methodology

First draft of the theoretical approach questions story is like this: Prof. Dr. Nurhan Kâhyaoğlu (Supervisor of This Dissertation Thesis) identifies some articles and reports, especially in Simulation-Based Performance Improvement for shipbuilding prepared by the State Supervisory Board report on the Shipbuilding Process in Türkiye were investigated.

Also, as it was mentioned in the lesson Operational and Strategic Management on Shipbuilding lecture notes:

i. Generic Shipyard Computer Model,

ii. Group Technology,

iii. Simulation-Based Production and Productivity Measurement and Enhancement,

iv. Production of Culture and Information Accumulation in Shipbuilding,

v. Importance of Accurate Estimation of Production Stages and Processes,

vi. Role of labor costs in manufacturing,

vii. Importance of Accurate Estimation of the projected additional costs,

viii. Ensuring the Whole Process of Transferring Electronic Media or Computer Support.

On the other hand, two more criteria besides from articles and lecture notes above are noted:

i. Compliance with thread (Soundness)

ii. Subject to inclusion (Completeness)

Subject to compliance with thesis, each question asked to investigate what is described to analyze the financial statements of a forward look is not enough? 2001 Economics Nobel Prize winner George Akerlof's theory describes precisely that rotten lemon[25]. Loss-profit tables are not enough to understand the potential risk assessment of a shipyard because of cycles of shipbuilding economy (See also Figure 2-1: Cycles of World Shipbuilding Economy). It has to be understood that shipbuilding economy is not always profitable industry. Sometimes goes down and sometimes goes up.

Shipbuilding Industry Performance

[25] http://berkeley.edu/news/features/2001/nobel/

According to the Report "TÜRK GEMİ İNŞA SANAYİNİN REKABET GÜCÜNÜN ARTIRILMASI (Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017) " page 106 and 107, Performance and performance parameters/metrics in the world and country performances, and most of the productivity and performance parameters/metrics and generalization of these parameters. For this purpose, it is necessary to verify information about backordered.
These are on a shipboard basis;

- Work power capacity (man*day),
- Annual steel processing capacity,
- Annual CGT (Gross Tonnage) or GT (Gross Ton) ship production capacity
- Shipyard Lifting capacity and diversity (cranes, heavy load carriers, forklifts etc.)
- Lama Stocking capacity (open and closed material stock area/volume),
- And the area of closed and open ship manufacturing,
- Area Total,
- / Production / manufacturing / manufacturing technique / material and material handling properties,
- Equipment and Abilities (password piercing number and working)
- Launch games and up-to-date launch options,
- Shipyard approach waters and dock depths and dock lengths; threesome life
- Geographical, meteorological features of the place and the transfer to the shipyard,
- An expansion capability,
- Whether those SW are in use or not (Planning research techniques together; management and production planning software such as ERP, SAP, ERP)
- Basic Ship basic design concept and detail design ability (whose design belongs to; whether the customer/subcontractor / own design; ship)
- Employment spelling-work packages prepared in the shipyard planners preparation which,
- Construction the level of standard in shipbuilding sub-procurement and in particular in work packages/work orders,
- Number of experienced / permanent workers (including subcontractors)
- The number of ships to be made to the inner and outer market

- Ship Serial ship manufacturing rate
- Depending on the infrastructure of a Shipyard; which size (height-width-depth), which draft (DWT-Deadweight Tone, GT-Gross Tone, CGT or DGT, i.e. Equalized Gross Tone, Displacement Tone)
- In Shipbuilding projects deliveries are over 2-3 months, 3-6 months, 12 months and more overdue,
- Certified Quality monitoring status,
- The parameters related to occupational health and safety,
- Sensibility of environment and civil shipbuilding, dimensional models or dimensionless and/or dimensionless proportions.

4.2. Five Levels of Capability&Maturity Model in Shipbuilding

S-MCM models are evaluated on 5 levels. These levels are:

Level 1 –Existing or Ad-Hoc; the process cannot be predicted in advance, and are responsive controls are weak. Instant solutions and methods developed in an emergency are left altogether. If anyone of Shipyard Company exists than the S-MCM level is already level 1.

Level 2 – Managed; Processes are defined and managed on a project basis even if those processes are not written S-MCM level is 2. It is assumed that most of the Turkish shipyard companies are in this level. If a company only matches corporate questions, it can be assessed as S-MCM level 2.

Some primary data like below is necessary but not enough for S-MCM level 1 respect unless getting some extra data:

i. Annual production capacity,
ii. Loss-profit statement,
iii. Total amount of bill,

iv. The number of workers,
v. Some facts like crane and pool types-sizes-capacity.

(More comments can be performed after survey application.)

Level 3 – Defined; Processes are defined regarding organization and management. Organization's processes are pooled and used this process in all projects. It is assumed that some of Turkish Shipyard might be in this level. Some of the High-Tech questions match this level and those questions indicated as S-MCM level 3. However, just after this level it also has to be considered maturity. (See also Maturity as Likert Scale)

Level 4 - Quantitative Manageable; Processes are quantified and controlled. If a company matches all the High-Tech questions and some of the Vision questions, which are indicated as S-MCM 4, or 5 answers implies the exact level of S-MCM. It is assumed at this stage of the work only a few Turkish shipyard companies may be reached up to this level.

Level 5 – Optimizing; The Processes and process improvement is the focal point. If a shipyard company matches all the segments but whit, different degrees it can be considered this as S-MCM level 5. No one of the Turkish shipyard company can reach up to this level according to some previous examinations.

After many control and check, the draft set of questions prepared. Some incompleteness and inaccurateness were corrected. Two important points regarding the issue is:

i. One has attempted to establish hierarchies,
ii. Tried to ensure consistency in their self.

On the other hand since it want to be established a new concept based on digital shipyard or in this sense it want to be stressed the importance of digital technologies some more considerations as follows in section 2 or a particular question that is High-Tech questions.

SW Usage in Shipyard; SW as computer-aided and simulation-based design in all sectors is very important just like in shipbuilding field. Generic Shipyard Computer Model, GT, ERP and MRP are essential. On the other hand, packet programs like OHSAS, Quality Management System are also vital to understand the level of maturity.

Materials Planning and Procurement; make the maximize efficiency throughout the procurement process; a comprehensive-adaptive materials management solution is required. Providing workflow management functionality to support a shipyard of any size, shipbuilding technology supports all stages of the shipbuilding process, from titles to procurement.

Ship assembly and design; the ship design and construction process benefits from shipbuilding technology. Shipbuilding plans may leverage automated drawing functionality, providing shipbuilding companies with accuracy. Through automating routine tasks and allowing pre-configuration of equipment characteristics, shipbuilding companies benefit from reduced labor costs and quicker time-to-design schedules.

Smart Production in Shipbuilding; in today's production plan in all sectors different items can produce either in the same place or distinct and separated areas. Improving and scheduling as Just on Time process is very important. Those services such as computer design based digital applications CAD, CAM etc.

Maturity Level of Web Pages; The extent to which businesses make use of digital platforms for ordering and following production, stages by using companies own web pages have particular importance. There is a new concept for economy as it is called new economy or Internet economy. A company cannot underestimate this economy in any sector so shipbuilding company as well.

Information Management; In today's shipbuilding industry, shipbuilding companies whose shipbuilding plans are specific to military vessels, or design for cruise or cargo ships, ship design and construction are transformed with new kind solutions.

Labour Cost and Skill; Moreover, labor cost also can be reduced since this industry mostly depends upon labor cost this can be reducing total cost of a ship. On the other hand, using High-Tech can be obtaining more skillful power.

Characterizing Practices, the questionnaire applied over 20 Turkish Shipyard companies. The companies were small, medium and significant level. A responsible and knowledgeable person was identified who answered the questions posed, sometimes referring to his colleagues or other employees in the company. The interviews usually took about less than 1 hour. These companies did not know about S-MCM concept and levels.

Bülent Akköse (Deputy general secretary of GİSBİR) chose companies. The categorization is building, repair and mix (mid-class). In each, class 7 companies choose. However, those companies were the well-known companies.

The answers of each company to the questions in a process area were averaged. The average points received by each company in each process area. Remembering that Figures can have a maximum value of 5 and a minimum value of 1, the average of total score over all fields must be higher than 1. It means if a company exist and work it implies that its S-MCM level at least 1.

Maturity as Likert Scale

It can be decided the S-MCM level after some testing and checking. But how mature in that level is another business. Here in this work technology usage especially in some question gives a result. However, using one of proposed SW or all of the proposed SW must be different. So, it is needed a different scale but these also must be five categories. Thanks to Likert Scale, which is also in 5 levels just, it is wanted to set the level up.

The Likert Scale is the sum of the answers given to various Likert Items. These items are usually displayed with a visual aid such as a series of radio buttons or a horizontal bar representing a simple scale.

An appropriate Likert Scale is balanced on both sides of a neutral option and a less biased measure is created. The actual scale labels, the numerical scale, may vary.

Likert Item is an expression that the participant wants to evaluate. In the list below, this item was easy to use for payment processing. (Surveygizmo, 2015)

Here is how to remember it: The Scale in Likert Scale refers to the total sum of all Likert Items in the question, not the 1-5 range you see for each item. Each practice is characterized as one of the following values:

i. Likert Level 1 Not Yet (NY),
ii. Likert Level 2 Not Implemented (NI),
iii. Likert Level 3 Partially Implemented (PI),
iv. Likert Level 4 Largely Implemented (LI),
v. Likert Level 5 Fully Implemented (FI).

4.3. S-MCM vs. PPCS

PPCS (Performance Prediction Criteria Scale) results give a meaningful interpretation by the effects of the scale but it has to be followed a methodology. The relationship and hierarchy with each of survey questions and which grade stands for which S-MCM level are identified.

More comments can be made after many exams. Also, the results of this work may help identify additional interpretation. Some significant questions can be found from public resources or can be got from some institutional or governmental body or authority.

According to given preliminary information's above, survey questions divided into 3 categories to measure the S-MCM Level, except for facts and statistics information questions 1-4. Those sections are

i. Corporate&Cultural S-MCM Level 2
ii. High-Tech S-MCM Level 3-4
iii. Visional S-MCM Level 4-5

More detailed table that which question investigates which level is in the table below:

S-MCM.2 CORPORATE	S-MCM.3	S-MCM.4	S-MCM.5
6,7,9,10,11			
	26,27,28,29		
		30,31,32	
			33,34,35

Table 4.3-1 S-MCM vs. PPCS

4.4. Corporate&Culture (Group. 1) S-MCM Level 2

Historical Background and Questions

As previously described, past experiences have a vital place in the development of the vision of a shipyard. To get some criteria and to understand what those criteria's mean historical background is essential. From another aspect, experience is vital and authentic knowledge can only provide this.

One the other hand, historical background gives the ability of

i. Method used in shipbuilding,
ii. Master/worker relationship,
iii. Project management experience,
iv. Right design ability,
v. Right employment capability,
vi. Choosing profitable project capability.

Also, corporate vision and culture possibly means well-established/matured organization. To investigate minimum age of shipyard it is pointed 5 years as an assumption.

Hence, in the first section of questionnaire it was also asked 'considering last 5 years, at overall, your company in profit-loss statement.

iii. Expertise in the shipyard activities,

iv. Last 5 year's approved balance sheet and profit - loss statement.

Responsibilities and Proficiency Level regarding Legislation

A company first, must comply with the legislation of the countries in which it operates. Non-compliance or even one of these activities can be confronted with the lethal penalties and sanctions.

However, not all those sanctions are with the same intensity. Some of those carry high-level risk assessment while some of them take low-level risk assessment. On the other hand, Environmental Law and the OHSAS Law[26] have particular importance concerning:

i. Social responsibilities,
ii. Risk level of state sanctions,
iii. High level of penalties,
iv. An excellent approach to maturity level.

These legislations mentioned above and it was wanted to investigate are;

i. Permits, licenses and allocation,
ii. Labor Law and ILO Conventions[27],
iii. Occupational Health and Safety Law[28],
iv. Tax Procedure Law[29],
v. Environmental Law[30] / Waste management system,
vi. Commercial Law[31],
vii. Social Security Law[32].

[26] Article Number 6331, 30.6.2012.
[27] Conventions and Recommendations of ILO, 2014.
[28] Turkish Code Article Number 6331, 30.6.2012.
[29] Turkish Code Article Number 3475, 4.1.1961.
[30] Turkish Code Article Number 5909, 9.8.1983.
[31] Turkish Code Article Number 6102, 14.2.2011.
[32] Turkish Code Article Number 5510, 31.5.2006.

OHSAS Process and Procedures[33]

Occupational health and safety is essential for a modern workplace. Each accident will reduce the company's reputation and trust in employees. Also, even compensation of a single accident can be faced a company to close completely.

Today OHSAS is a favorite topic[34], and mentioned in the above legislation. Because of its importance, this issue asked under a separate title. The items below were subjected:

i. OHSAS committee existing,
ii. Risk assessment,
iii. Emergency plans,
iv. First entry and periodic health checks,
v. OHSAS instructions and guidelines,
vi. Detailed list of employment situation.

Physical Situation of the Shipyard[35]

To growth and the development of a shipyard, it should have an enough large area and strategic location. For example,

i. Large area is required for the production of a large ship,
ii. Transportation should be easy, optional and ready.
    a. Such as railway,
    b. Highway,
    c. Airport.

[33] OHSAS 18001 Health & Safety Zone, 2002.
[34] Mine accidents occurred in Manisa-Soma (13 May 2014) and Karaman-Ermenek (29 Oct 2014), drew the attention to this topic namely OHSAS.
[35] Turkish Code, Regulation of Shipyard, Boat Manufacturing and Berth, 2008.

However, in fact in Türkiye most of the shipyards are gathered in Tuzla-Aydınlı Bay and Altınova-Yalova. Therefore, in this field it cannot be understudied the maturity level and those questions above didn't asked.

It was investigated the topics below by the light of legislation (see footnote):

i. The shoreline of the land and invested separately costing the ship-yard is located on the seaside portions,
ii. The total area of indoor and outdoor space,
iii. The types and dimensions of the sled,
iv. The number and size of docks and piers,
v. Aspects and functions of the closed shop,
vi. The number of pool and capacity,
vii. Total amount of steel capacity,
viii. Annual repaired and maintenance ship number and size,
ix. New shipbuilding capacity,
x. Crane and capacity,
xi. Waste reception facility information will be shown on the site plan.

4.5. High-Tech (Group 2) S-MCM Level 3-4-5

Investment Level of Science and New Technologies

In this section, it was investigated S-MCM Level 3 but some of the questions also match S-MCM Level 4 and/or S-MCM Level 5. The use of new machinery is essential. The capbility of machine park both increases efficiency and increases security. Quality and standards rises (trends) on the other hand it was only asked whether the newest technology is being used or not.

In the future work maybe it would ask; Steel processing capacity/year, number of ships/year, tonnage of vessels/ (CGT or DWT), including gross new shipbuilding capacity and the most substantial ship length a few of the related information such as capacity. It is essential types and lifting capacity of the crane used in the facility. Dry pool/swim largest

tonnage pools with pool sizes can be taken. Whether the latest technological followed or scheduled to be supplying in cutting, welding and CNC processes. (Regulation of Shipyard, Boat Manufacturing and Berth, 2014)

ERP SW

Almost the entire SME sector is indispensable resource utilization enterprise SW. This SW business thanks to all inputs and outputs to be seen as a whole and all measures necessary for the effective and efficient use of all corporate resources can be taken quickly. It is essential for manageable and entirely manageable companies. Also, this shows that it can be decided at least S-MCM Level 3 and by maturity of ERP usage also it can be considered as S-MCM Level 4 or 5.

Optimization&Process Management SW S-MCM Level 4&5

The use of computer support SW is significant. However, in sectors such as shipyards and ship production using the most efficient; single factor is almost guaranteed profit. Unlike the ERP SW Process Management SW can monitor workflows and processes that have the defined roles and the slightest disruption is changing all methods. Halting places and jobs is also increasing the chance of interference.

Simulation SW S-MCM Level 4&5

The way use worker and machines the most efficiently and efficiently manner is Simulation SW and Technologies. In this way, processes can be planned from the first day to the end. Moreover, order can be observed more clearly. Of course, after some maturity testing it can be sure exact S-MCM Level namely 4 or 5.

Generic Shipyard Computer Model S-MCM Level 4&5

A Generic Computer Shipyard Model developed as part of the graduate research sponsored by a NAVSEA Cooperative Agreement under the NAVSEA Professor of Ship Production Science, and give examples of its use as a Design for Production tool.

Group Technology S-MCM Level 4

It is not possible 'mass production and automation' in the shipbuilding sector. Production of every order has to be considered as a separate production. Therefore, the *Group Technology* is critical. Shipbuilding is one of the most important ways to increase efficiency.

Shipyards classify intermediate products into group's namely Group Technology (GT), either by product attributes or process. These grouping results in the assignment of each intermediate product to specific machines/processes.

It was only asked whether group technology is being used or not. Since because GT usage can be meaningful after some iterations and evaluations afterward more comment will be performed. (Whitfield et. al, 2003)

4.6. Visionary (Group 3) S-MCM Level 4-5

Total Quality

Shipbuilding is unable mass production, consisting of thousands of pieces of wood products, manufacturing and installation industry. Therefore, it is understandable that quality, planning and competition are essential elements of resource management.

Management in shipbuilding consists of:

i. Purchase,
ii. Materials Management,
iii. Planning,
iv. Human Resources,

v. Marketing Items.

It will be tested and found out S-MCM Level 4 but some of questions in this section following items are also matches S-MCM Level 5 and those indicated just after related question number:

i. TSI and/or ISO 9001[36] quality certification and TQM,
ii. Strategic objectives and planning,
iii. Mission and vision definitions,
iv. IMO quality and standards in production and Regulation of Ship-building;
a. Marpol,[37]
b. Solas,[38]
v. Process Analysis of TSI/ISO 9001 Quality Certification and business process identification and method are exists and applications of those are consistent and well disciplined S-MCM Level 5,
vi. Continuous improvement plan and process S-MCM Level 5,
vii. Green Production[39] or Energy Management (ISO 5001[40]) availability S-MCM Level 5.

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[36] ISO 9001:2008 sets out the criteria for a quality management system and is the only standard in the family that can be certified.
[37] International Convention for the Prevention of Pollution from Ships, last amendment 2005.
[38] International Convention for the Safety of Life at Sea held in 1974.
[39] Green Production (http://definitions.uslegal.com)
The color of green is closely associated with environmentalism and hence production, enterprise, business and so tags signal activities related to environmental goals in a positive way like green production.

[40] ISO 50001 is based on the management system model of continual improvement also used for standards such as ISO 9001 or ISO 14001which are other well-known standards. ISO 50001: 2011 Provides a framework of requirements for Organizations to:

1. Develop a policy for more efficient use of energy,
2. Fix targets and objectives to meet the policy,
3. User data to better understand and make Decisions about energy use,
4. Measure the results,
5. Review how well the policy works,
6. Continually improve energy management.

viii. A functional and active-up to date website

ix. Budget Allocated to Employee Education

A modern enterprise, both work-related legislation and work done, with new equipment and related technological or will train the employees. Resources allocated to the training of employees, businesses need both productivity and quality standards also give information on clearly. The strength of these relationships will be identified in the study. Whether being encouraged to develop them out of business, does human resources Services Company taken, should be investigated.

Fund and Supports

Incentives received from the various funds and state funds and are very important for global competition. Companies with the earlier studies on this subject are far away from others.

Also, those companies provide specific standards. Firms in global competition can be heard or seen to benefit from these incentives and funding.

Shipbuilding also gets rid of one of the backwardness and the way of being there in the global market will benefit from these funds and incentives.

These incentives will mean that above a certain level of quality that will benefit from the funds already open. However, this relationship will mean the end of a given research. It was investigated if the company take support about the fields below:

i. Employee Support,
ii. Tax Exemption,
iii. Export/Import Credit,
iv. Loan Support,
v. R&D Support,
vi. Area Support,
vii. Other incentives and support,

If a few of the answers above is ‘yes’, then at least it can be considered that company as S-MCM Level 4. But more than one ‘yes’ match can be considered as S-MCM Level 5.

R&D and Innovations Cooperation with Universities

If shipyard has R&D activities, which means that they already came a significant level. At least the standard problems are overcome; knowledge and experience, looking for the way to become more competitive by bringing together can be thought. In this context, refer to the need to promote and assure funds and both universities and institutes regarding predictor relationships.

Innovation is a one of the prior factor in competitive advantage for an organization. Then, fine tune with the needs of markets is a crucial factor to promote the competitive edge of companies. Financial sustainability, ways of relating to their supply chain and customers, reliability and recognized quality of products and service are vital points that shall be taken into consideration when making strategic decision for a company to become global competitiveness.

If few of the answers in question ‘section of technology’ is ‘yes’, then at least it can be considered that company as S-MCM Level 4. But more than one ‘yes’ match can be considered as S-MCM Level 5. (Moura and Botter, 2012)

4.7. Level of Social Responsibility

Social responsibility is public, private sector and civil society live in a typical orientation around an objective recovered.

Social responsibility is in a sense to improve the general interests of the society as well as to protect their interests and to make the action.

Solution for the production of society, improving, developing Social Responsibility as priority topics determined in ensuring social justice and are as follows:

i. Education,
ii. Health,

iii. Environment[41],
iv. Sport or Moral activities,
v. Marpol[42] volunteer standards.

A company with a high level of social responsibility regarding compliance with quality standards and legislation is expected to be of a high standard. Especially the relationship between these issues will also be tested in this study.

If one of the answers above and hence in questions this section is 'yes', then at least it can be considered that company as S-MCM Level 4. But more than one 'yes' match can be considered as S-MCM Level 5.

[41] Barobirlik, 2014.
[42] International Convention for the Prevention of Pollution from Ships, last amendment 2005.

5. THE APPLICATION OF SHIPBUILDING MANAGEMENT AND CAPABILITY ASSESSMENT MODEL (SMCAM) TO TURKISH SHIPYARDS

5.1. Field Survey

Introduction

This survey applied to Tuzla shipyards between June 2015 and August 2015. Questionnaire asked to 40 Tuzla shipyards but 17 of them officially rejected to answer the poll.

23 of Tuzla Shipyards answered survey and since, at the beginning our target was 18-21 this result is enough to get reasonable results.

Our first purpose is evaluating an index to understand and measure the shipyards capability and maturity level. To know whether the index works or not it was applied the index to Tuzla shipyards.

In the future works followers can apply this set to other region and may be all around the world.

In the question, there are set 3 main groups. First group is about demographic information's and fact files. Second group questions investigate technological approach and level of a shipyard. Finally, last group of items finds out the vision of a shipyard.

Questions are from multiple choose, multi choose, Likert scale, 'yes or no' and open end.

Collected data are interpreted and analyzed by the software SPSS PASW 18.0. Afterward it was completed our decision whit our area and field knowledge. It was also got aid from previous work of GİSBİR. They all proof the coherency of this work.

Question 1: Region of shipyard?

Answer of this question is same answer for all. The reson is; all shipyards in this survey are in the same region. However, it is a well-known fact that the district or location of a shipyard is critical. In this work, it is non-sense to analyse this since all in the same area. Nevertheless, in the future works investigators can use the criteria cluster hence it is stressed that this is an important topic.

Question 2: Which one of the below describes the best of your shipyards facility?

	FREQUENCY	PERCENTAGE
Shipbuilding	7	%30.4
Maintanance&Repairement	3	%13.0
Mid(Both)	13	%56.5
No Work	0	%0
Total	23	%100.0

Table 5.1-1: Kind of Shipyard

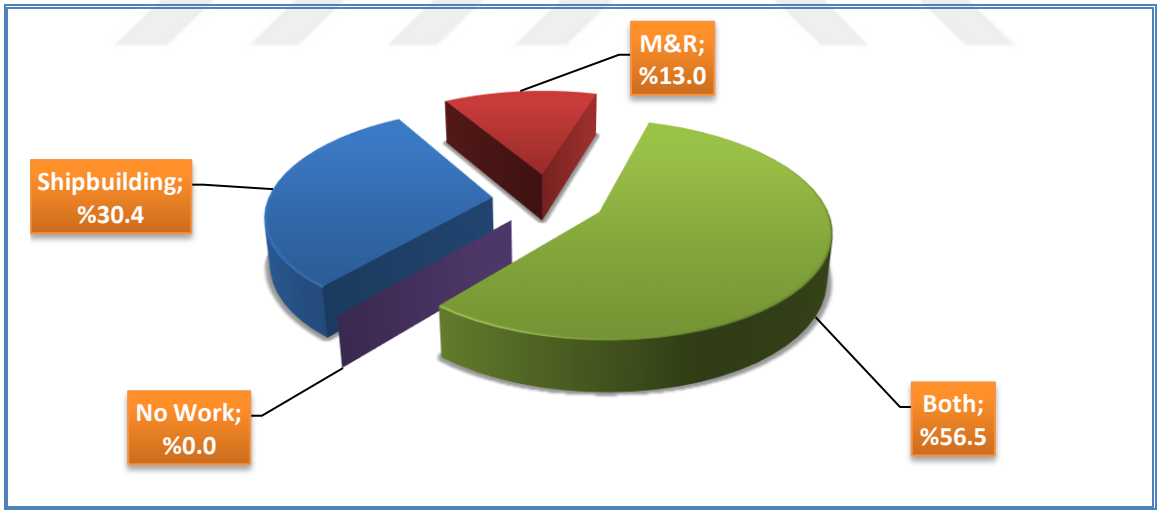


Figure 5.1-1: Kind of Shipyard

According to Table 4-2 and Figure 4-1 above it can be understood 56.5% of participants of survey are active in both new building and repairment and maintenance.

Question 3: How long the shipyard has been active?

#STATEMENT	FREQUENCY	PERCENTAGE
<10	2	%8.7
11-20	6	%26.1
21-30	5	%21.7
31-40	1	%4.3
41-50	7	%30.4
>51	2	%8.7
Total	23	%100.0

Table 5.1-2 Shipyards average age

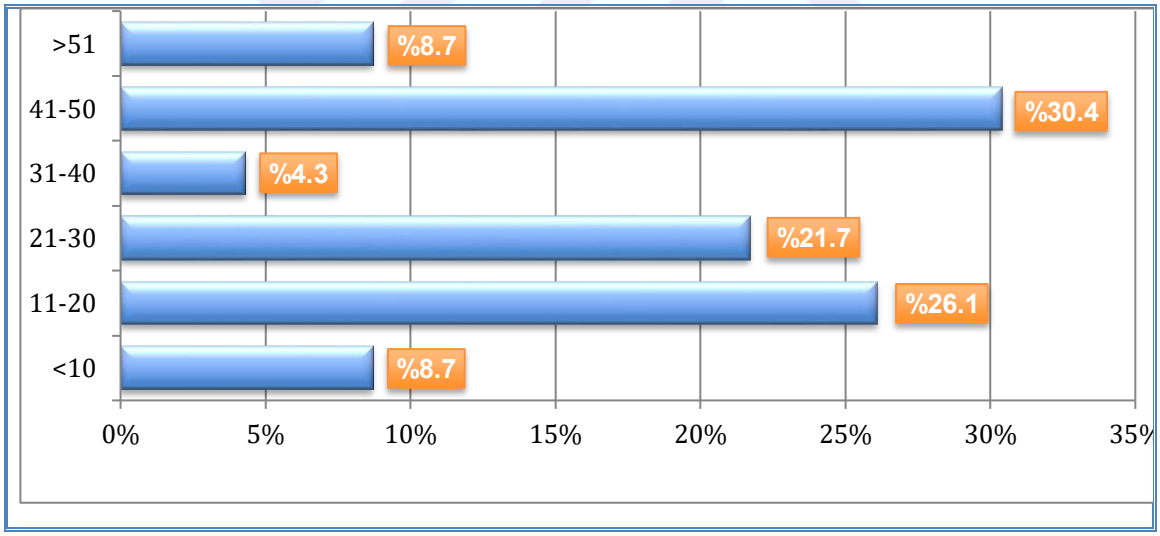


Figure 5.1-2 Shipyards average age

According to Table 4-3 and Figure 4-2 above shows: 30.4% of participants of survey are active for 41-50 years.

Question 4: What is the number of the employees in your shipyard under your staff list?

#STATEMENT	FREQUENCY	PERCENTAGE
50-249	18	%78.3
260-499	1	%4.3
>500	0	%0
Other	1	%4.3
No Answer	3	%13.0
Total	23	%100.0

Table 5.1-3 Shipyards own employee

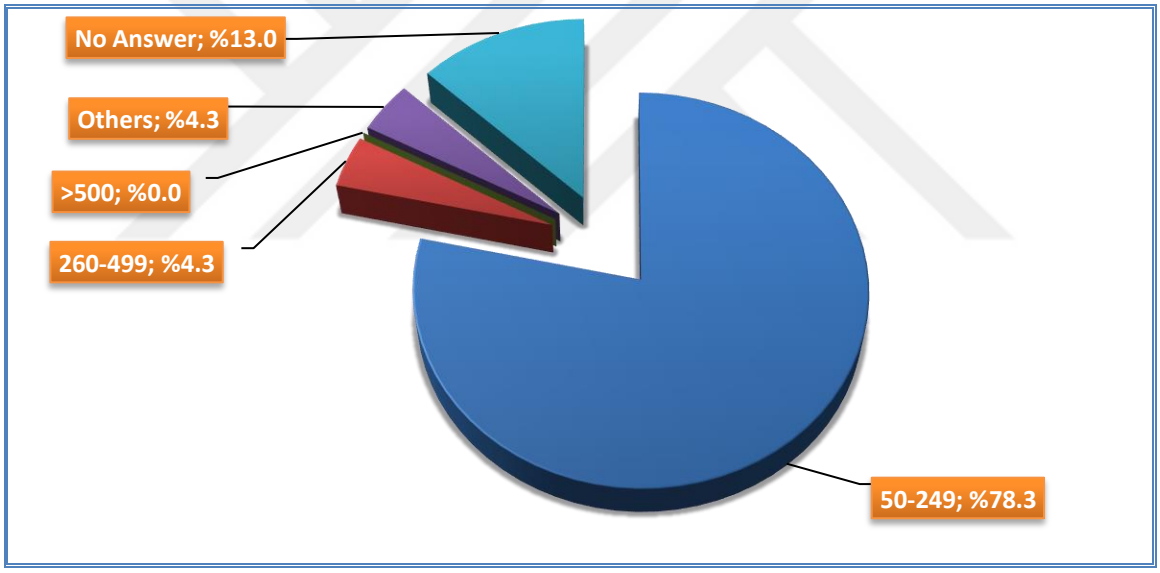


Figure 5.1-3 Shipyards own employee

According to Table 4-4 and Figure 4-3 above 78.3% of participant have worker under 250 who are in their personal list. Also, there is no company having 500 or more workers.

Question 5: What is the number of the employees in your shipyard via sub-contractors?

#STATEMENT	FREQUENCY	PERCENTAGE
<500	11	%47.8
501-1000	8	%34.8
>1001	4	%0
No Answer	0	%17.4
Total	23	%100.0

Table 5.1-4 Shipyards employee via subcontractors

According to Table 4-5 above most of the Tuzla shipyards are greater than SME Law and regulations.

Question 6: ‘I believe that our shipyard is in profitable level’ considering last 5 years.

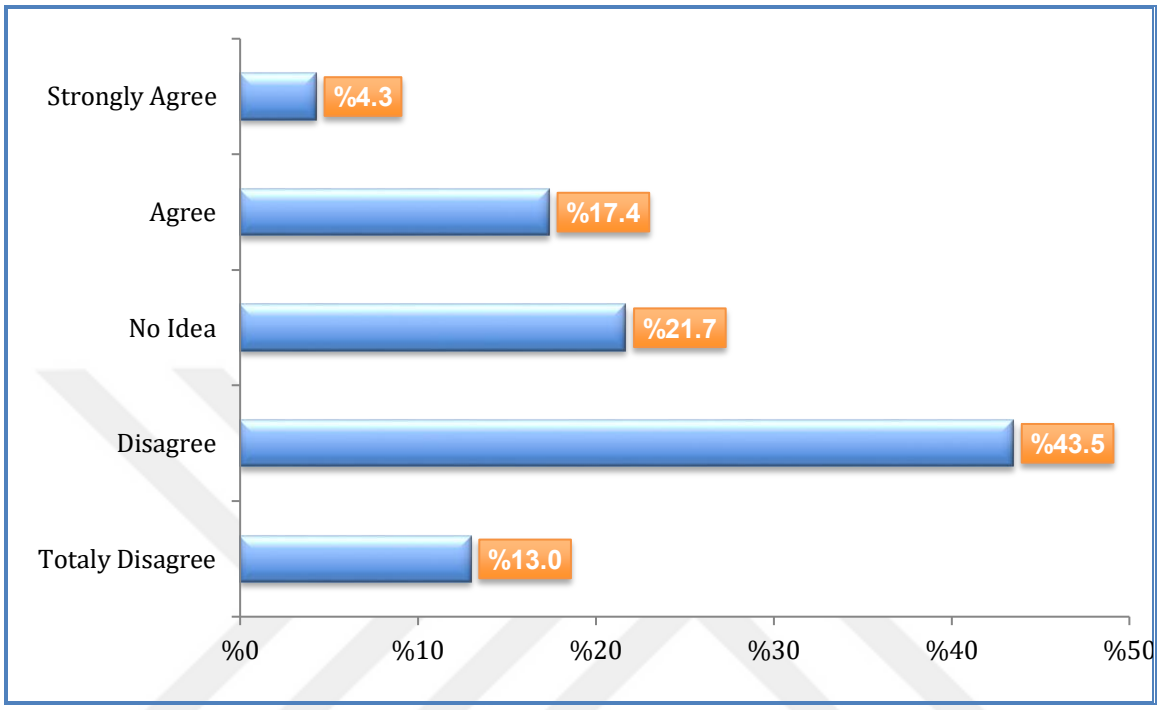


Figure 5.1-4 Loss-profit position of shipyards

Statistics		
N	Valid	23
	Miss-ing	0
Mean		2.57
Percen-tiles	00	5.00

By looking the total results (mean 2.57) as in table and Figure 4-4 above it can be thought shipyards are in profit level.

Question 7: Do your shipyard relate/contract defense projects?

#STATEMENT	FREQUENCY	PERCENTAGE
Yes	8	%34.8
No	15	%65.2
Total	23	%100.0

Table 5.1-5 Shipyard vs defense projects

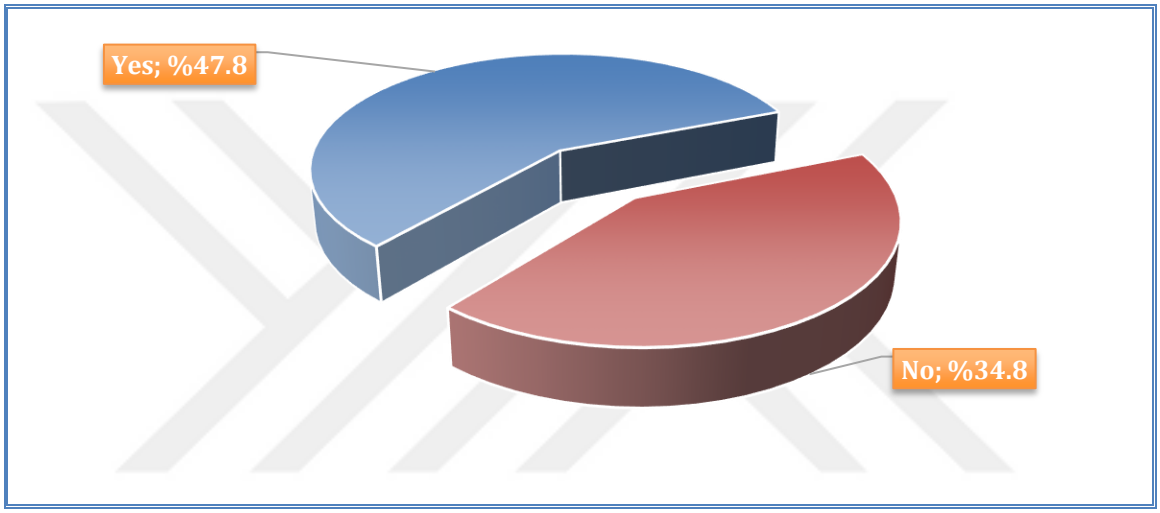


Figure 5.1-5 Shipyard vs defense projects

According to Table 4-6 and Figure 4-5 above, nearly half of Tuzla shipyards concerns and gets project from defense projects from defense industry.

Question 8: If your shipyard contracts defense projects, what is the percentage of the defense projects in total endorsement?

#STATEMENT	FREQUENCY	PERCENTAGE
<25	1	%4.3
>50	5	%21.7
No Answer	17	%73.9
Total	23	%100.0

Table 5.1-6 Defense projects level in shipyards total endorsement

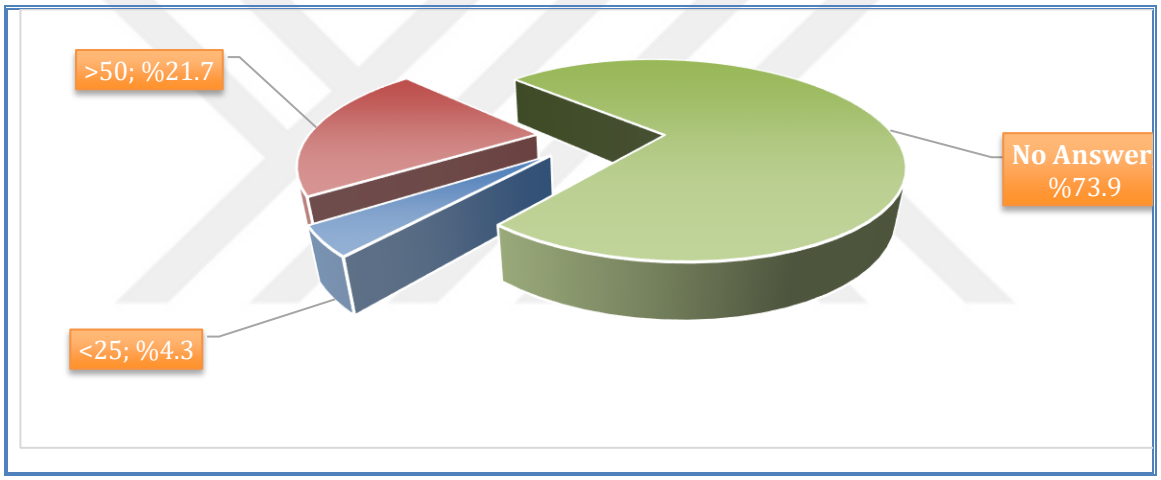


Figure 5.1-6 Defense projects level in shipyards total endorsement

According to Table 4-7 and Figure 4-6 above, defense projects are smaller than 21% of gross-support.

Question 9: Considering last 2 years (2014-2015), was there serious accident with death or severe injury.

#STATEMENT	FREQUENCY	PERCENTAGE
Accident with Death	3	%13.1
No Serious Injury	19	%82.6
No Accident	0	%0
No Answer	1	%4.3
Total	23	%100.0

Table 5.1-7 Work accident level of shipyards

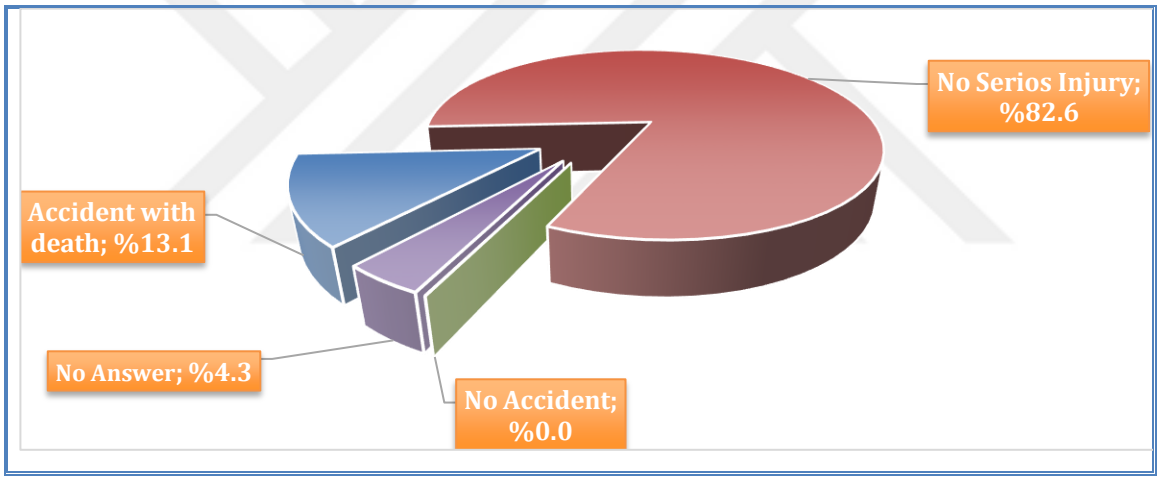


Figure 5.1-7 Work accident level of shipyards

According to Table 4-8 and Figure 4-7 above 82.6 % of participants, believe no severe accident in their company. However, misfortune with death is 13.1% and this is significant number.

Question 10: Did your shipyard inspected about environmental protection/waste management in last 5 years by the responsible authorities?

#STATEMENT	FREQUENCY	PERCENTAGE
Inspected/ No Warning or Punishment	21	%91.3
Inspected/Warned or Punished	1	%4.3
No Inspection/I have no idea	1	%4.3
Total	23	%100.0

Table 5.1-8 Inspection and results about environment

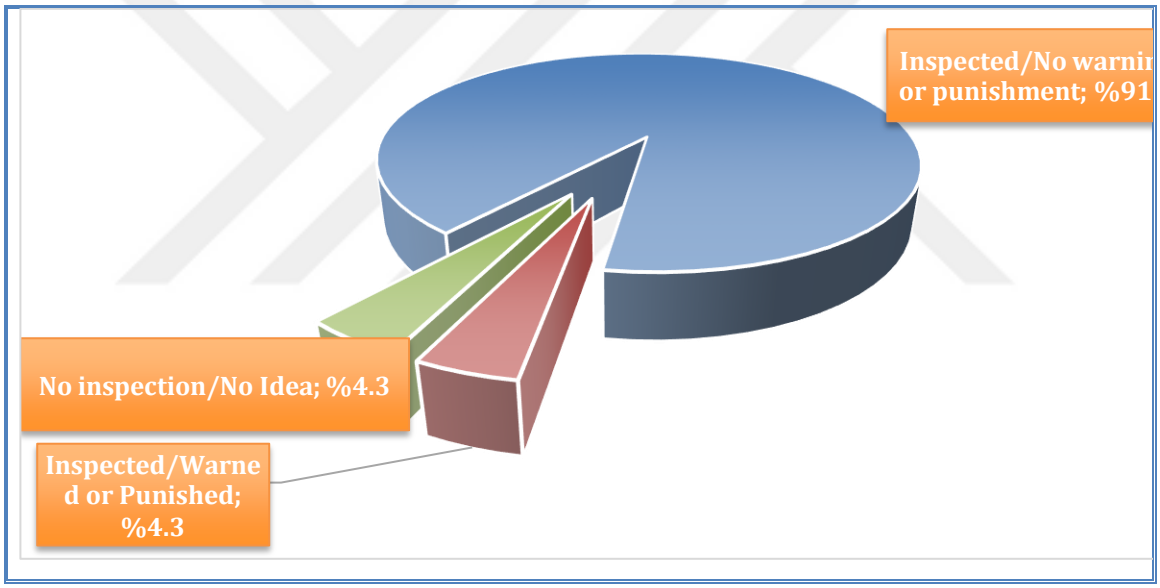


Figure 5.1-8 Inspection and results about environment

According to Table 4-9 and Figure 4-8 above, inspections are very frequent and fortunately, they obeys rules as 91.3%.

Question 11: Did your shipyard inspect in last 5 years by social security authority?

#STATEMENT	FR.	PR.
Inspect/ No Warning or Punishment	21	%91.3
Inspected/Warned or Punished	1	%4.3
No Inspection/I have no idea	1	%4.3
Total	23	%100.0

Table 5.1-9 Inspection and results about social security

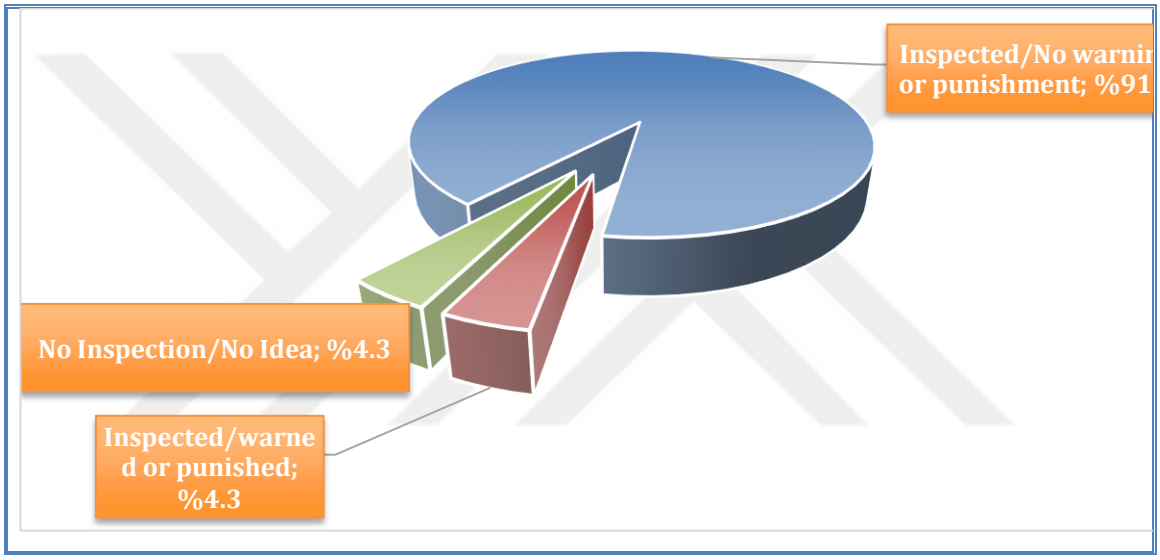


Figure 5.1-9 Inspection and results about social security

According to Table 4-10 and Figure 4-9 above, inspections about social security are very frequent and fortunately, they obey rules as 91.3%.

Question 12: What is the total length of your shipyard berth?

#STATEMENT	FREQUENCY	PERCENTAGE
<100 m	8	%34.8
100-200m	10	%43.5
>200m	5	%21.7
Total	23	%100.0

Table 5.1-10 Situation of coast

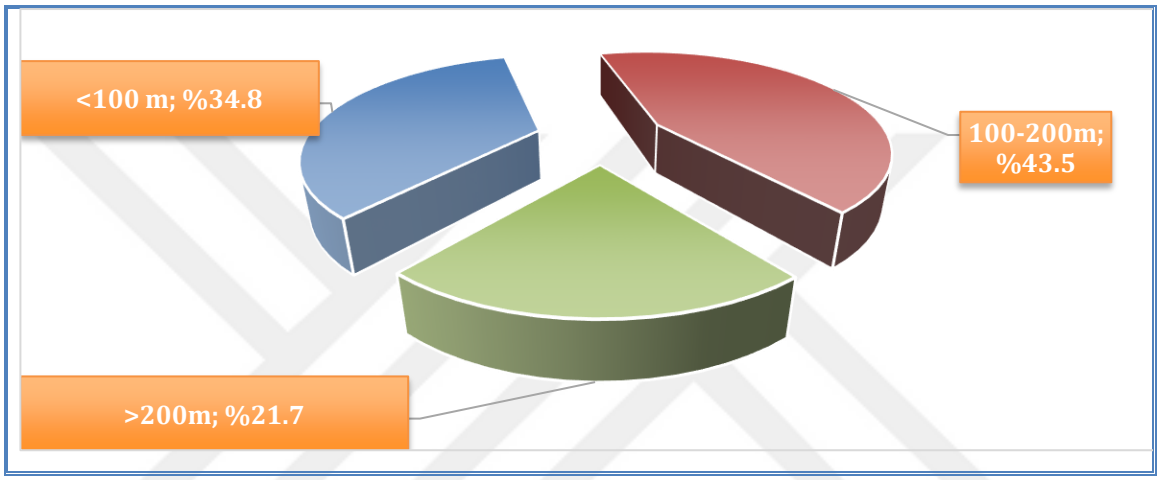


Figure 5.1-10 Situation of coast

According to Table 4-11 and Figure 4-10 above common position of shipyards having berth length as 100-200m as the percentage of 43.5 of participants.

Question 13: How many different locations does your shipyard company has?

#STATEMENT	FREQUENCY	PERCENTAGE
All facilities in one location	15	%65.2
2 locations	6	%26.1
3 locations	2	%8.7
4 locations	0	%0
Total	23	%100.0

Table 5.1-11 # of locations

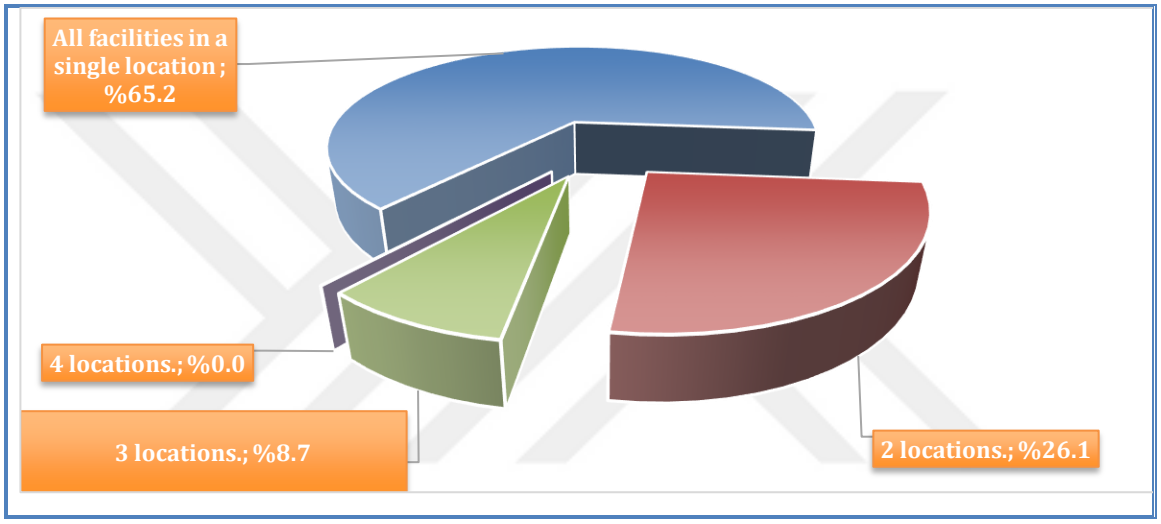


Figure 5.1-11 # of locations

According to Table 4-12 and Figure4-11 above mostly they facilitate in one and single location as the percentage of 65.2 of participants.

Question 14: What is the total area (m2) of your shipyard occupies?

#STATEMENT	FREQUENCY	PERCENTAGE
<5000m^2	8	%34.8
5000-10000 m^2	3	%13.0
10000-50000 m^2	9	%39.1
50000-10000 m^2	3	%13.0
Total	23	%100.0

Table 5.1-12 Total area

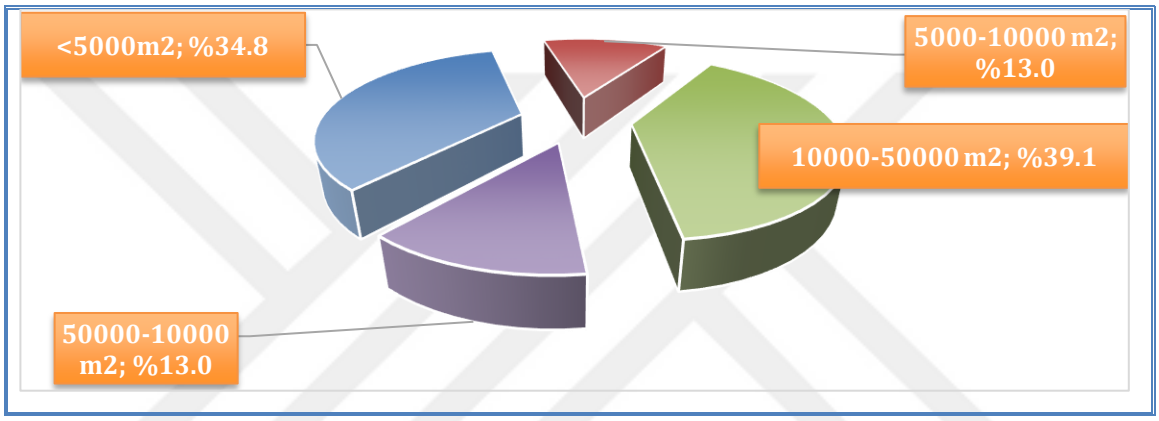


Figure 5.1-12 Total Area

According to Table 4-13 and Figure 4-12 above, the majority of shipyards have 10K-50K m2-closed area as the percentage of 39.1 of participants.

Question 15: What is the total closed area of your shipyard occupies?

#STATEMENT	FREQUENCY	PERCENTAGE
<5000m^2	12	%52.2
5000-10000 m^2	4	%17.4
10000-50000 m^2	7	%30.4
Total	23	%100.0

Table 5.1-13 Total Closed Area

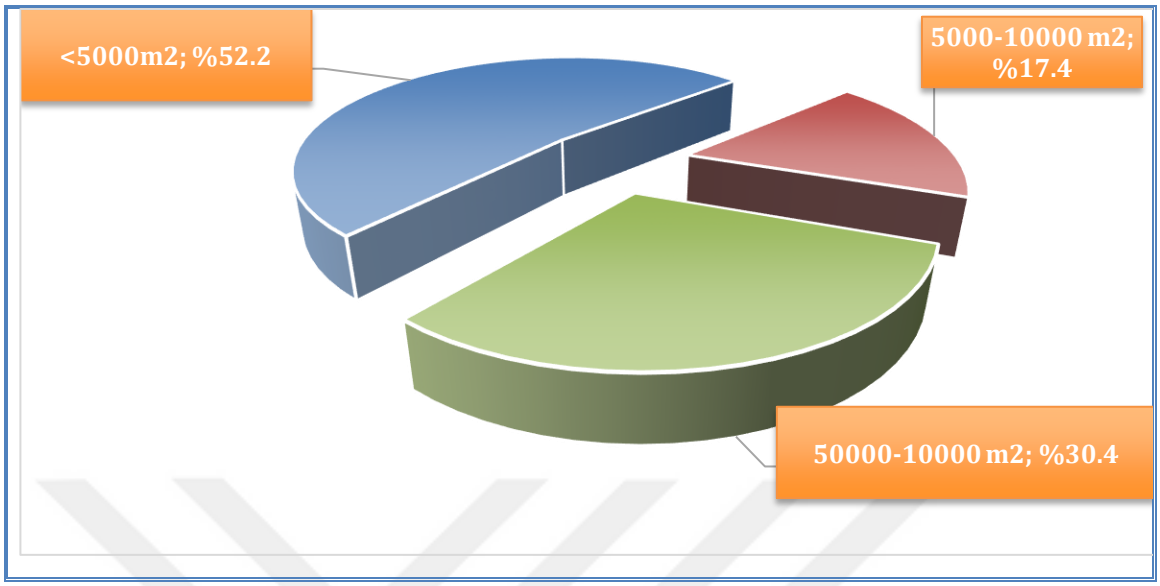


Figure 5.1-13 Total Closed Area

According to Table 4-14 and Figure 4-13 above majority of shipyards have closed area as smaller than 5K m2 as percentage of 52.2 of participants.

Question 16: What is the total number of wet/dry sledge in your shipyard?

#STATEMENT	FREQUENCY	PERCENTAGE
1	9	%39.1
2	7	%30.4
3	2	%8.7
>3	3	%13.0
No Answer	2	%8.7
Total	23	%100.0

Table 5.1-14 # of sledge

According to Table 4-15 above nearly they all have wet/dry sledges. One or two sledges are the percentage of 69.5 of total participants.

Question 17: Are closed areas (social-administrative) enough?

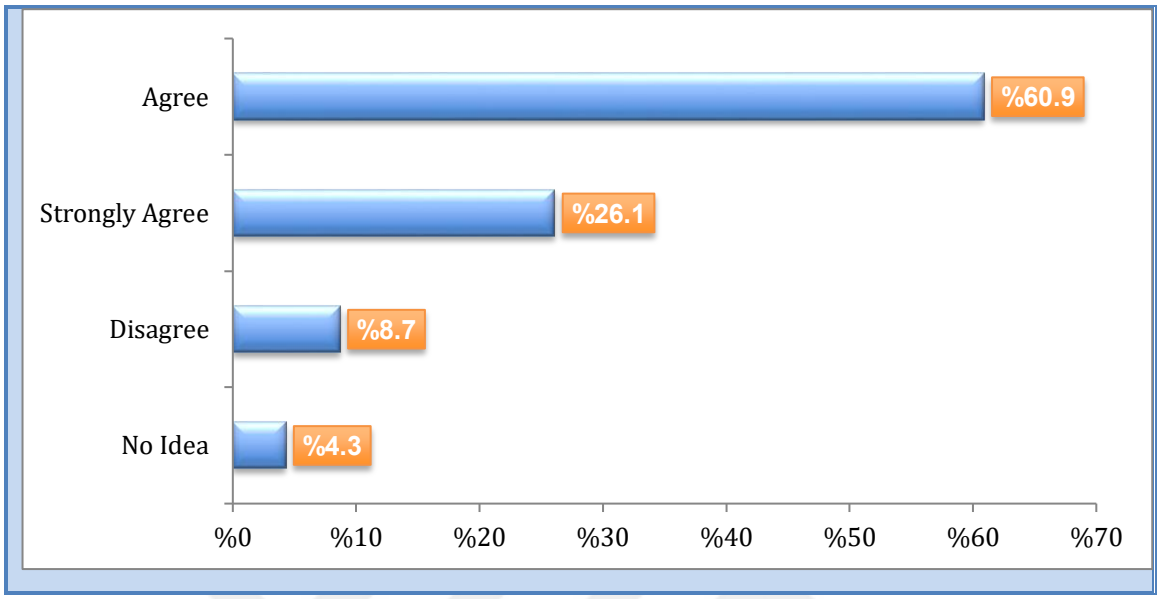


Figure 5.1-14 Sufficiency of closed area

Statistics		
N	Valid	23
	Miss-ing	0
Mean		4.04
Percen-tiles	00	5.00

According to statistical data above Figure 4-14, gun-chart, 80.4% of participant percepts are closed areas are enough.

Question 18: Is there pool in your shipyard?

#STATEMENT	FREQUENCY	PERCENTAGE
No	7	30.4
Yes	16	69.6
Total	23	%100.0

Table 5.1-15 A pool is available or not

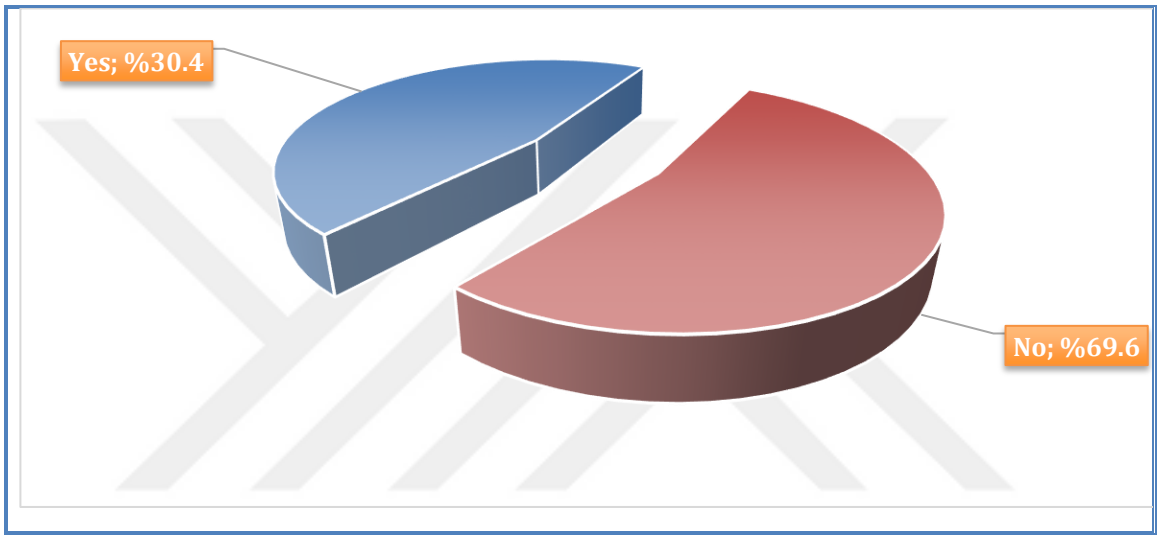


Figure 5.1-15 A pool is available or not

According to Table 4-16 and Figure 4-15 above, 30.4% has not pool while others (69.6%) have pool.

Question 19: What is the total annual steel process capacity?

#STATEMENT	FREQUENCY	PERCENTAGE
<10000 T	13	%56.5
10000-20000 T	2	%8.7
20000-30000 T	6	%26.1
>30000 T	1	%4.3
No Answer	1	%4.3
Total	23	%100.0

Table 5.1-16 Steel process capacity

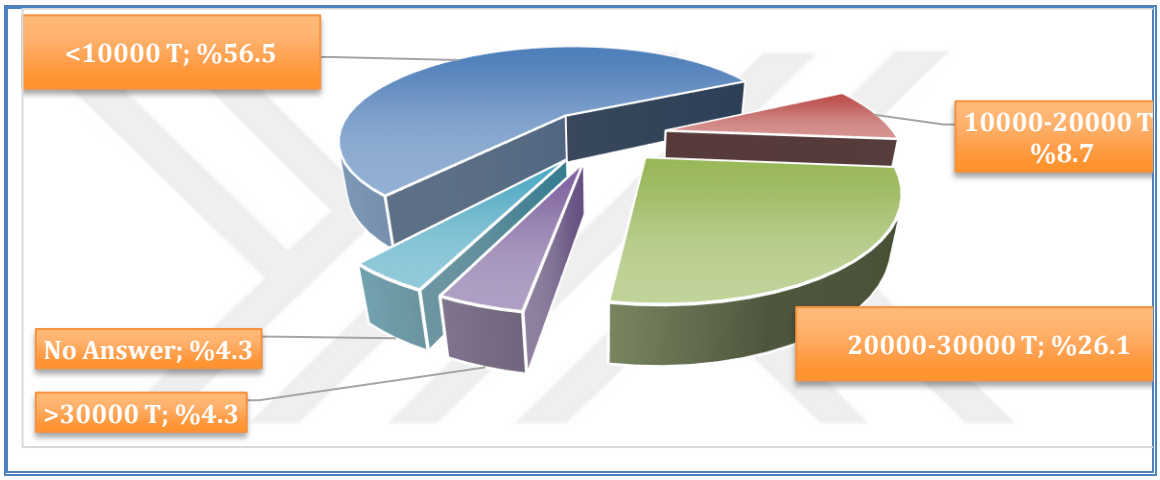


Figure 5.1-16 Steel process capacity

According to Table 4-17 and Figure 4-16 above steel, process capacity under the 10K Tonne as the percentage of 56.5% of total participants.

Question 20: How many ship repaired/maintained in last one-year period?

#STATEMENT	FREQUENCY	PERCENTAGE
<10	10	%43.5
11-50	8	%34.8
51-100	3	%13.0
No Answer	2	%8.7
Total	23	%100.0

Table 5.1-17 # of repaired ship over last one year period

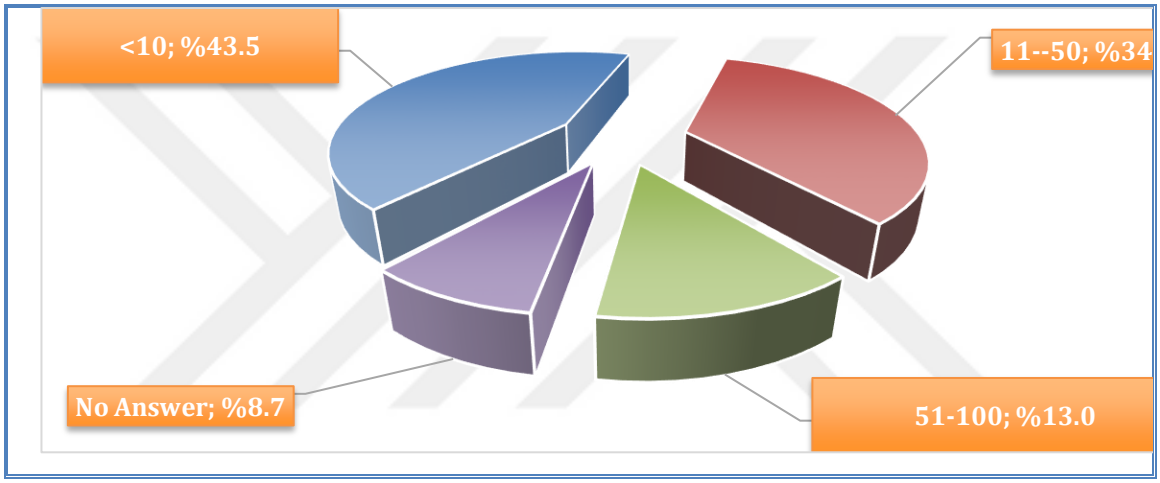


Figure 5.1-17 # of repaired ship over last one-year period

According to Table 4-18 and Figure 4-17 above majority of shipyards repairs fewer than 10 ships over last year as the percentage 43.5 of total participants.

Question 22: What is the gross tonnage (DWT) of the repaired ship in your ship-yard over the last one-year period?

#STATEMENT	FREQUENCY	PERCENTAGE
<500 K DWT	14	%60.9
500 K-1M DWT	2	%8.7
No Answer	7	%30.4
Total	23	%100.0

Table 5.1-18 Gross tonnage (DWT) of repaired ship over last one-year period

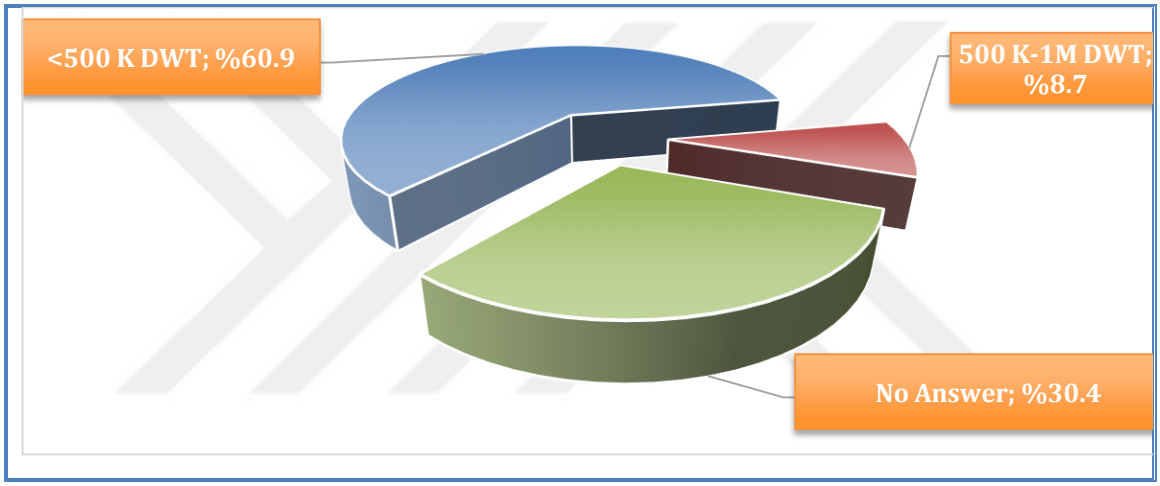


Figure 5.1-18 Gross tonnage(DWT) of repaired ship over last one-year period

According to Table 4-19 and Figure 4-18 above majority of shipyards repairs under 500KDWT ship over last year as the percentage 60.9 of total participants.

Question 23: What is the total number of ship build over last one-year period?

#STATEMENT	FREQUENCY	PERCENTAGE
1	8	%34.8
2	5	%21.7
3	2	%8.7
4	3	%13.0
No Answer	5	%21.7
Total	23	%100.0

Table 5.1-19 # of built ship over last one-year period

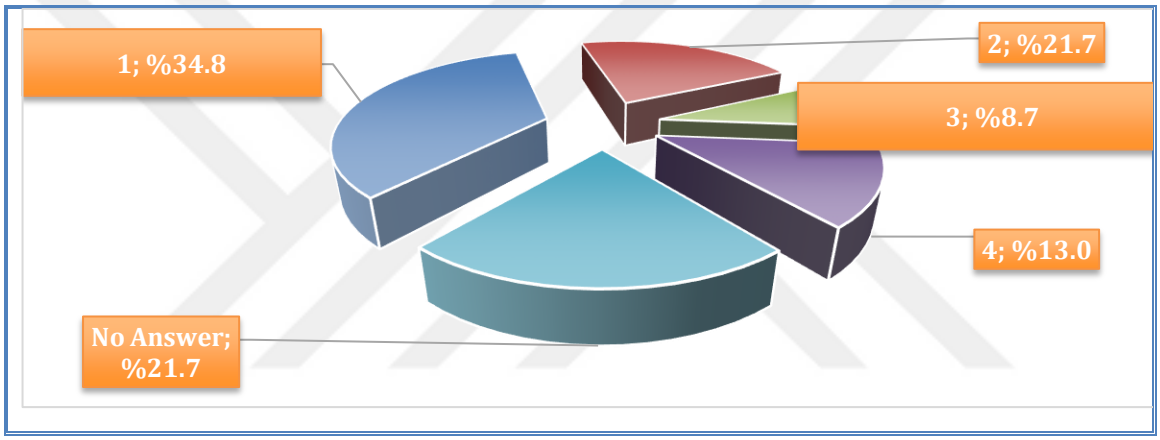


Figure 5.1-19 # of built ship over last one-year period

According to Table 4-20 and Figure 4-19 above majority of shipyards, build only one ship over last year as the percentage 34.8 of total participants.

Question 24: What is the total number of crane(s) in your shipyard?

#STATEMENT	FREQUENCY	PERCENTAGE
1	2	%8.7
2	3	%13.0
4	4	%17.4
5	2	%8.7
>5	9	%39.1
Leasing	1	%4.3
No Answer	2	%8.7
Total	23	%100.0

Table 5.1-20 # of cranes

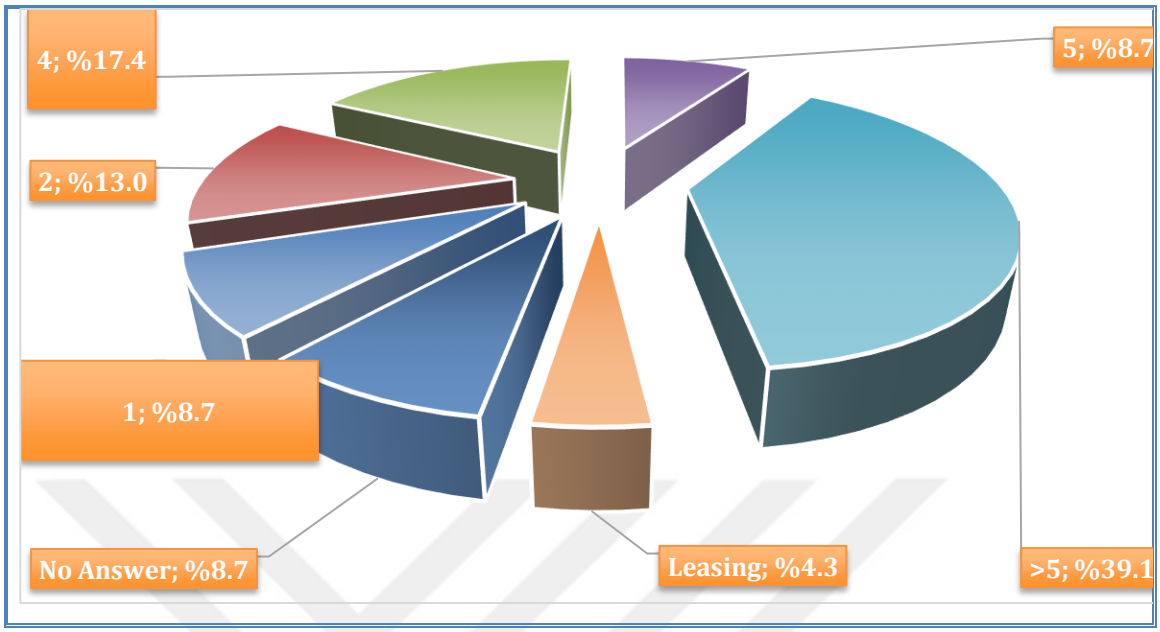


Figure 5.1-20 # of cranes

According to Table 4-21 and Figure 4-20 above majority of shipyards, have over five cranes as the percentage 39.1 of total participants.

Question 25: What is the total lifting capacity of cranes of your shipyard in tonnage?

#STATEMENT	FREQUENCY	PERCENTAGE
>50 T	5	%21.7
>100 T	8	%34.8
>500 T	3	%13.0
>1000 T	4	%17.4
No Answer	3	%13.0
Total	23	%100.0

Table 5.1-21 Lifting capacity

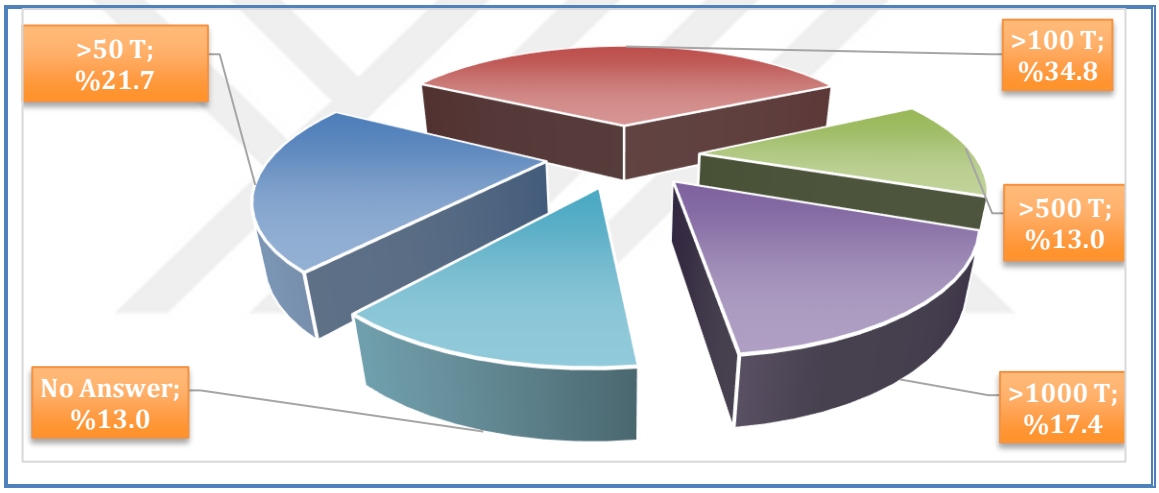


Figure 5.1-21 Lifting capacity

According to Table 4-22 and Figure 4-21 above majority of shipyards have lifting capacity over 100T as the percentage 34.8 of total participants.

Question 26: Considering the semi-life cycle of your machine park, which of the below states best your shipyards position?

	WELDING MACHINE		CUTTING MACHINE		CNC MACHINE	
	FR.	PR.	FR.	PR.	FR.	PR.
Not Reached	10	%43.5	12	%52.2	12	%52.2
Just in	8	%34.8	6	%26.1	8	%34.8
Passed	3	%13.0	3	%13.0	1	%4.3
No Answer	2	%8.7	2	%8.7	2	%8.7
Total	23	%100.0	23	%100.0	23	%100.0

Table 5.1-22 Machine park vs semi-life

Figure 5.1-22 Machine park vs semi-life

According to Table 4-23 and Figure 4-22 above majority of shipyards, have Machine Park not passed semi-life as the percentage near 90 of total participants.

Question 27: Which of the software's exists in your shipyards?

	MRP		ERP		OHSAS	
	FR.	PR.	FR.	PR.	FR.	PR.
Yes	8	%34.8	7	%30.4	2	%8.7
No	14	%60.9	16	%69.6	20	%87.0
No Answer	1	%4.3	0	%0	1	%4.3
Total	23	%100.0	23	%100.0	23	%100.0

Table 5.1-23 Software pool

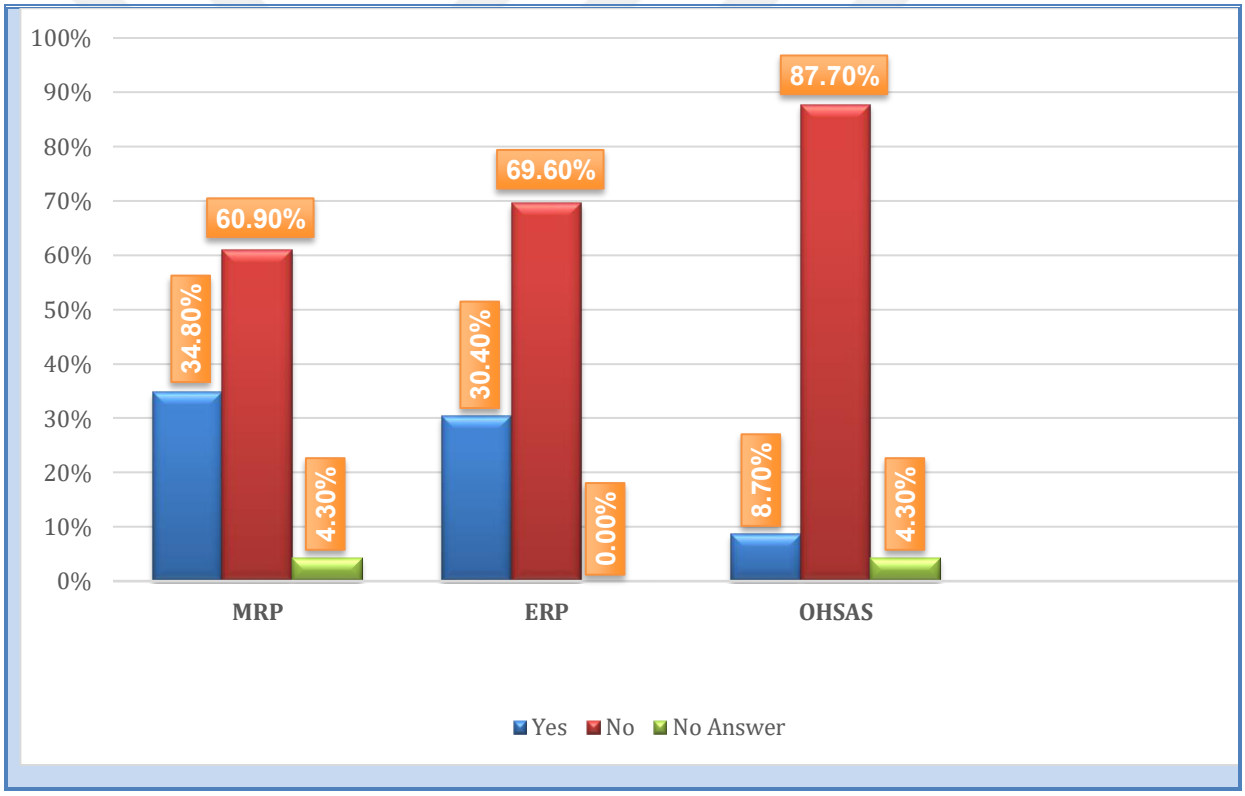


Figure 5.1-23 Software pool

According to Table 4-24 and Figure 4-23 above majority of shipyards have no re-sent SW as the percentage near 60 of total participants.

Question 28: Which of the concepts are available in your shipyard?

	CAD/CAM		EFFI-CIENCY		GENERIC SHIPYARD		GROUP TECHNOL-OGY		MARPOL& SOLAS REGULA-TIONS	
	FR.	PR.	FR.	PR.	FR.	PR.	FR.	PR.	FR.	PR.
	17	%73.9	12	%52.2	7	%30.4	5	%21.7	12	%52.2
No	6	%26.1	9	%39.1	14	%60.9	15	%65.2	9	%39.1
No An-swer	0	%0	2	%8.7	2	%8.7	3	%13.0	2	%8.7
TO-TAL	23	%100.0	23	%100.0	23	%100.0	23	%100.0	23	%100.0

Table 5.1-24 Concepts familiarity

According to Table 4-25 and Figure 4-24 above nearly majority have CAD/CAM SW's and as the percentage 73.9 of total participants. They know about efficiency and Marpol and Solas regulations as 52.2%. They mostly do not know about group technology and generic shipyard modeling as the percentage of near 60.9 of total participants.

Question 29: Please choose the existing certificate(s) in your shipyard?

	OHSAS 18000		ISO 9001		ISO 14001		ISO 5001	
	FR.	%	FR.	%	FR.	%	FR.	%
Yes	18	78.3	20	%87.0	20	%87.0	4	%17.4
No	4	17.4	3	%13.0	3	%13.0	15	%65.2
No Answer	1	4.3	0	%0	0	%0	4	%17.4
Total	23	%100.0	23	%100.0	23	%100.0	23	%100.0

Table 5.1-25 Certification

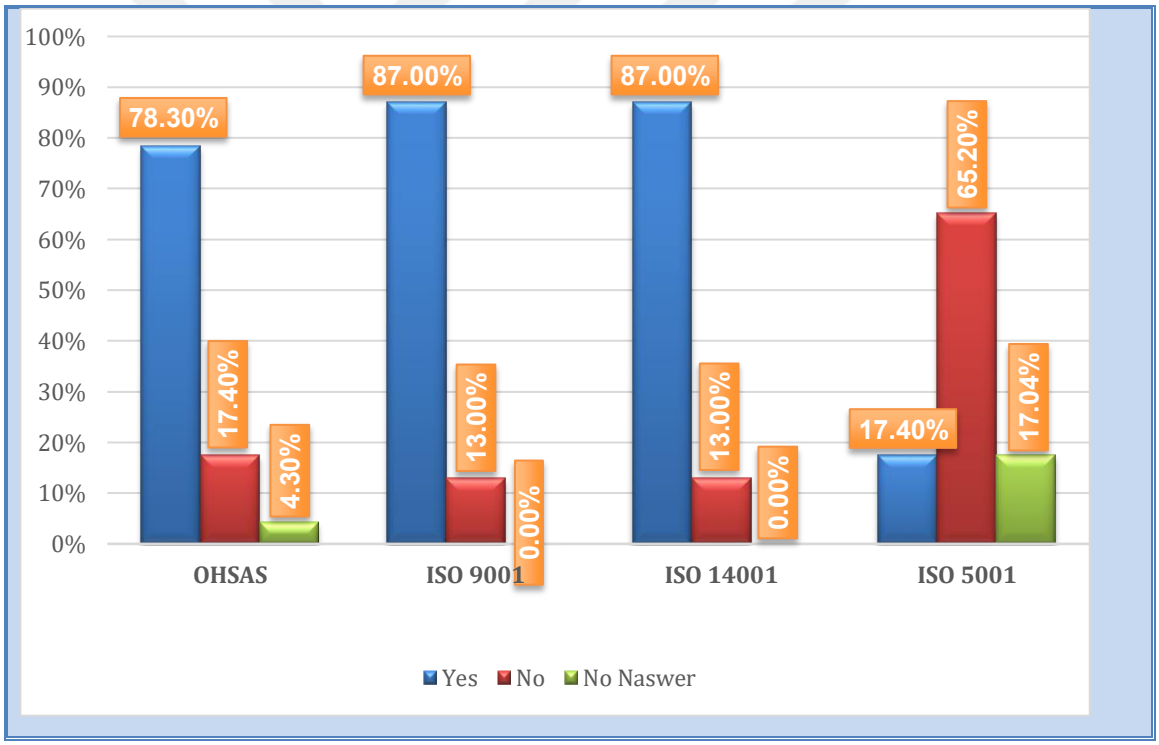


Figure 5.1-24 Certification

According to Table 4-26 and Figure 4-25 above nearly all have OHSAS-ISO 9001-ISO 14001 certifications as the percentage 78-87 of total participants. However, the situation is worst in ISO 5001.

Question 30: Mark one or more, which describes your shipyards current position.

STATEMENT	MEAN	
	Value	Percentage
Shipyard has Official Web Site	4.43	%88.6
Official Web Site Updated	4.00	%80.0
Vision and Mission well defined	4.48	%89.6
Vision definition consists of strategic plan and targets	4.13	%82.6

Table 5.1-26 Web Page

According to Table 4-27 above;

a. Percentage88.6 thought they have official Web Site.
b. Participants also think;
    i. Percentage 80; website is updated.
    ii. %89.6; vision and mission well defined,
    iii. Percentage82.6; strategic plan and targets are in vision definition.

Question 31: Does your shipyard have design office?

#STATEMENT	FREQUENCY	PERCENTAGE
Yes	11	%47.8
No	10	%43.5
No Answer	1	%8.7
Total	23	%100.0

Table 5.1-27 Design Office

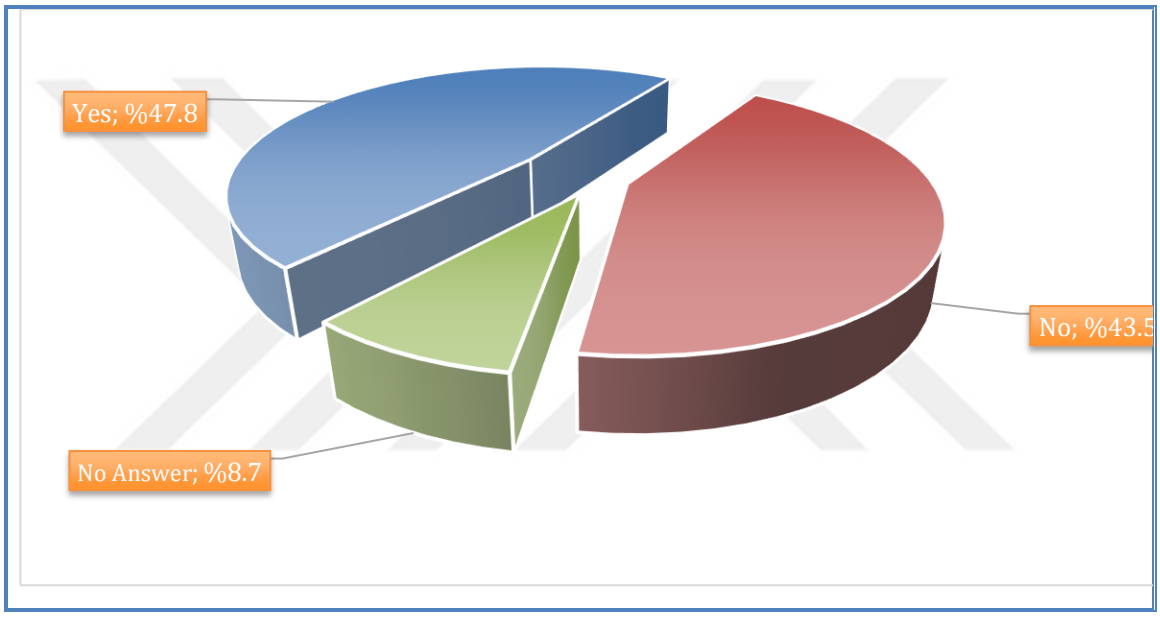


Figure 5.1-25 Design Office

According to Table 4-28 and Figure 4-26 above nearly half of them have design office and as the percentage 47.8 of total participants.

Question 32: Mark one or more which describes your shipyards current position.

STATEMENTS	MEAN	
	Value	Percentage
Design&Analysis with own sources	3.50	%70.0
Design&Analysis with country sources	3.67	%73.4
Design&Analysis with foreign sources	3.11	%62.2

Table 5.1-28 Design Sources

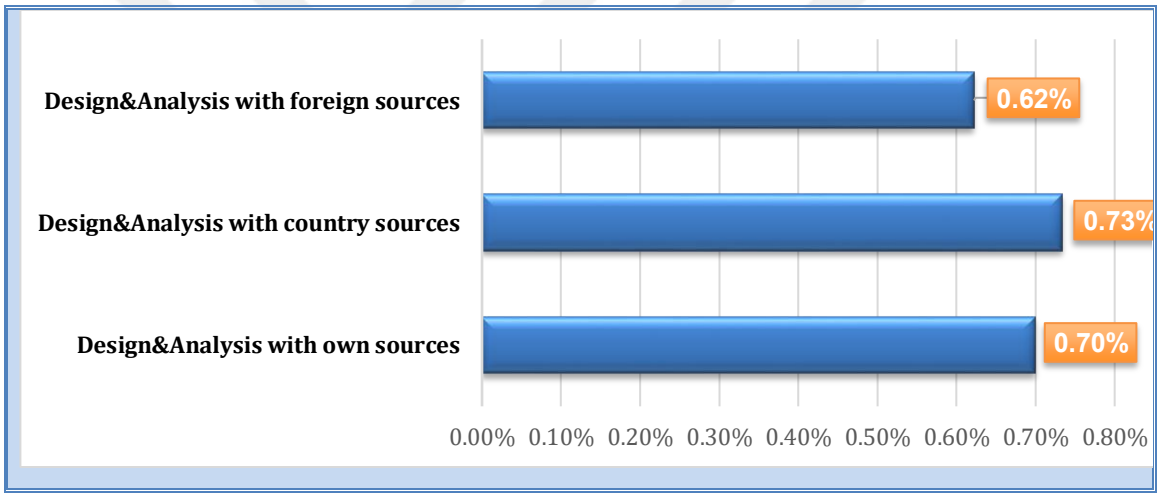


Figure 5.1-26 Design Sources

By looking over Table 4-29 and Figure 4-27 above, it is evident that primary source for design is our country sources. However, those three sources are also available equally well level.

Question 33: Which kind of supports does your shipyard take? Mark one or more, which describes your shipyards current position.

	FREQUENCY	PERCENTAGE
Employee Support	2	%8.7
Export Support	3	%13.0
Import Support	0	%0
Credit Support	2	%8.7
R&D Support	6	%26.1
Area Support	2	%8.7
Other	2	%8.7

Table 5.1-29 Kind of supports

By the light of the data's in Table 4-30, 10 companies did not answer to this question out of 23. They need awareness rising in supports and distributions.

Question 34: Which kind of R&D support does your shipyard take? Mark one or more, which describes your shipyards current position.

	FREQUENCY	PERCENTAGE
Equity	1	%4.3
University	11	%47.8
TÜBİTAK	6	%26.1
EU Fund	0	%0
Defense Industry Fund&Supports	1	%4.3
Other	2	%8.7

Table 5.1-30 Kind of R&D Supports

It is clear that Table 4-31 show; Universities now concerns about shipyards. TÜ-BİTAK also is in field.

Question 35: Did your shipyard perform any social responsibility project? Mark one or more which describes your shipyards current position.

	FREQUENCY	PERCENTAGE
Health	3	%13.0
Environment	4	%17.4
Education	8	%34.8
Culture	1	%4.3
Sport	2	%8.7
Other	4	%17.4

Table 5.1-31 Social Responsibility

Table 4-32 show that 10 companies did not answer to this question out of 23. Nevertheless, mostly they contribute education as the percentage of 34.8 of total participants.

Question 36: Your shipyards CEO's education or career-related with maritime or comes from another sector?

	FREQUENCY	PERCENTAGE
His education/career is about maritime	23	%100.0
Comes from another sector	0	%0
Total	23	%100.0

Table 5.1-32 CEO background

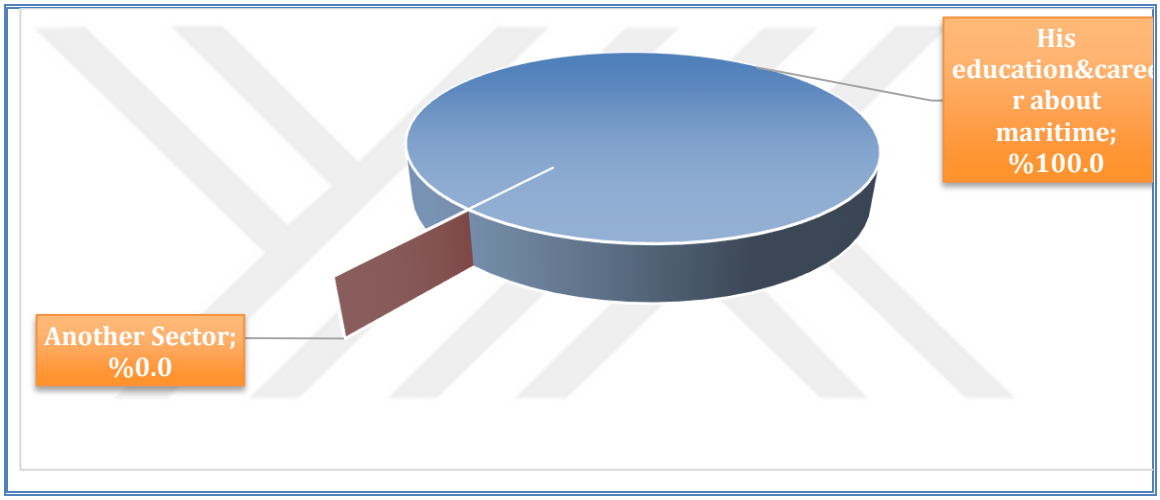


Figure 5.1-27 CEO background

Table 4-33 and Figure 4-28 show that CEO's are from maritime sector and their education is also about maritime.

Question 37: Do you want to stay in this sector?

	FREQUENCY	PERCENTAGE
Yes	23	%100.0
No	0	%0
Total	23	%100.0

Table 5.1-33 Willing to stay in shipyard sector

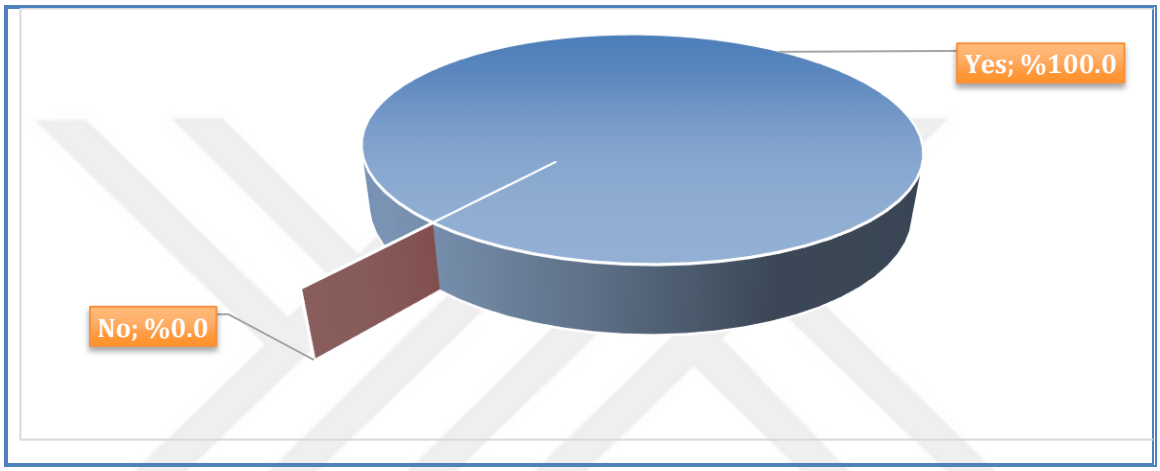


Figure 5.1-28 Willing to stay in shipyard sector

Table 4-34 and Figure 4-29 clarify that whatever happens, they want to stay in this sector.

Question 38: To stay in this sector, what do you want from government or what kind of support do you need?

	FREQUENCY	PERCENTAGE
Shipbuilding Support must be a state policy	23	%100.0
Area problem must be solved	6	%26.1
Incentives to compete with Far East country	17	%73.9
Qualified Person	10	%43.5
Design Independency	4	%17.4
Our representatives in Administrative Level	10	%43.5
Our Representatives in Political Arena	2	%8.7

Table 5.1-34 Needs to stay in this sector

According to the Table 4-35 above, there is the state must support firm believing about Maritime and shipbuilding sector.

Free Statement

Unfortunately, no one stated own and free statement.

Cross Tests

In this section, it is tested with different methods that weather is there a correlation or regression between some different answers. The aim of this is to make succinct and sufficient criteria cluster or question set.

In the section machine, park and Software Park will be tested below.

Multi Regression

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	-5.551E-16	.000	
	Melting Machine	.333	.000	.379
	Robot Arm	.333	.000	.387
	CNC	.333	.000	.312

Table 5.1-35 Regressions Melting Machines-Robot Arms-CNC's

Using correlation Table 4-36 it is decided there are strong correlations between machines. By using this method, it can be understood the relation between two variables concerning way and weight.

Comparing CNC Machines semi-life with;

i. Robot arm there is a relation with positive way and the ratio is 70%,
ii. Melting Machine, there is a relation with positive direction and the rate is 72%,
iii. Comparing Robot Arm with Melting machine in semi-life term, there is a definite and robust relationship as percentage 92%.

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		CNC	Robot Arm	Melting Machine
CNC	Pearson Correlation	1	.700**	.721**
	Sig. (2-tailed)		.000	.000
	N	21	21	21
Robot Arm	Pearson Correlation	.700**	1	.917**
	Sig. (2-tailed)	.000		.000
	N	21	21	21
Melting Machine	Pearson Correlation	.721**	.917**	1
	Sig. (2-tailed)	.000	.000	
	N	21	21	21

Table 5.1-36 Correlations Melting Machines-Robot Arms-CNC's

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation between robot arm and melting machines

Cross Tables

It can be interpreted as those questions can be asked in one single sentences or it may also be possible to ask only one of them.

Crosstabs

			CNC			Total
			Not Reached	Just In	Passed	
Melting Machine	Not Reached	Count	9	1	0	10
		Melting Machine	90.0%	10.0%	.0%	100.0%
	Just In	Count	3	5	0	8
		Melting Machine	37.5%	62.5%	.0%	100.0%
	Passed	Count	0	2	1	3
		Melting Machine	.0%	66.7%	33.3%	100.0%
Total		Count	12	8	1	21
		Melting Machine	57.1%	38.1%	4.8%	100.0%

Table 5.1-37 Melting Machine semi-life

Chi-Square Tests 1

H1: Hypothesis in this test is there is a healthy relationship between melting machine and CNC machines and in positive way.

Since P degree= 0.007 < 0.005 H1 can be accepted.

Chi-Square Tests give meaningful results.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.109a	4	.007
Likelihood Ratio	14.055	4	.007
Linear-by-Linear Association	10.391	1	.001
N of Valid Cases	21		

Table 5.1-38 Chi-Square Test Melting Machines vs. CNC's

Symmetric Measures

		Value	Asymp. Std. Er-rora	Approx. Tb	Ap-prox. Sig.
Interval by Interval	Pearson's R	.700	.122	4.272	.000c
Ordinal by Ordinal	Spearman Correla-tion	.672	.148	3.953	.001c
N of Valid Cases		21			

Table 5.1-39 Symmetric Measures

i. Not assuming the null hypothesis,
ii. Using the asymptotic standard error assuming the null hypothesis,
iii. Based on normal approximation.

Tests between Robot arm and CNC Machines

Comparing semi-lives of robot arms and CNS Machines as follows:

Cross-tabulation

			CNC			Total
			Not Reached	Just In	Passed	
Robot Arm	Nort Reached	Count	10	2	0	12
		Robot Arm	83.3%	16.7%	.0%	100.0%
	Just In	Robot Arm	2	4	0	6
			33.3%	66.7%	.0%	100.0%
	Passed	Robot Arm	0	2	1	3
			.0%	66.7%	33.3%	100.0%
Total		Count	12	8	1	21
		Robot Arm	57.1%	38.1%	4.8%	100.0%

Table 5.1-40 Semi-Life Cross-tabulation of Melting Machines vs. CNS's

Chi-Square Tests 2

H1: Hypothesis is there is a healthy relationship between robot arm and CNC machines semi-lives.

Since P value= 0.011 < 0.005 H1 can be accepted. It means there is a strong relationship between robot arm and CNS machines semi-lives.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.125a	4	.011
Likelihood Ratio	12.690	4	.013
Linear-by-Linear Association	9.798	1	.002
N of Valid Cases	21		

Table 5.1-41 Chi-Square Tests Robot Arms vs. CNC's

Correlation between MRP and ERP

Cross Tables

i. Out of eight shipyards that have MRP at the same time 6 of them have ERP.

ii. On the other hand, those who do not have ERP, which means 16 of them, at the same time 14 of them don't have MRP either.

Crosstab

			ERP		Total
			Yes	No	
MRP	Yes	Count	6	2	8
		MRP	75.0%	25.0%	100.0%
	No	Count	0	14	14
		MRP	.0%	100.0%	100.0%
Total		Count	6	16	22
		MRP	27.3%	72.7%	100.0%

Table 5.1-42 Crosstabs ERP vs. MRP

H1: Hypothesis is there is a healthy relationship between MRP and ERP.

Since P value= 0.00 < 0.005 H1 can be accepted. That means there is a meaningful relation between MRP and ERP.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.438a	1	.000		
Continuity Correctionb	10.904	1	.001		
Likelihood Ratio	16.785	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.781	1	.000		
N of Valid Cases	22				

Table 5.1-43 Chi-Square Tests MRP vs. ERP

2 cells (50.0%) have expected count less than 5. The minimum expected number is 2.18. Computed only for a Table 4-44.

Correlation between MRP and OHSAS

Crosstab

			OHSAS SW		Total
			Yes	No	
MRP	Yes	Count	2	6	8
		MRP	25.0%	75.0%	100.0%
	No	Count	0	14	14
		MRP	.0%	100.0%	100.0%
Total		Count	2	20	22
		MRP	9.1%	90.9%	100.0%

Table 5.1-44 Correlation MRP vs. OHSAS

H1: According to Hypothesis, there is a healthy relationship between MRP and OHSAS.

Since P value= 0.05 < 0.05, H1 can be accepted. That means there is a meaningful relation between MRP and OHSAS.

Chi-Square Tests

	Vvalue	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.850a	1	.050		
Continuity Correctionb	1.419	1	.234		
Likelihood Ratio	4.407	1	.036		
Fisher's Exact Test				.121	.121
Linear-by-Linear Associ-ation	3.675	1	.055		
N of Valid Cases	22				

Table 5.1-45 Chi-Square Tests MRP vs. OHSAS

Correlation between OHSAS and ERP

Cross-tabulation

			OHSAS SW		Total
			Yes	No	
ERP	Yes	Count	2	4	6
		ERP	33.3%	66.7%	100.0%
	No	Count	0	16	16
		ERP	.0%	100.0%	100.0%
Total		Count	2	20	22
		ERP	9.1%	90.9%	100.0%

Table 5.1-46 Crosstab ERP vs. OHSAS

H1: According to Hypothesis, there is a healthy relationship between ERP and OHSAS

Since P-value = 0.015 < 0.05 H1 can be accepted and that means there is a meaningful relation between ERP and OHSAS.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.867a	1	.015		
Continuity Correction	2.527	1	.112		
Likelihood Ratio	5.766	1	.016		
Fisher's Exact Test				.065	.065
Linear-by-Linear Association	5.600	1	.018		
N of Valid Cases	22				

Table 5.1-47 Chi-Square Tests ERP vs. OHSAS

1. 2 cells (50.0%) have expected count less than 5. The minimum expected number is .55.

2. Computed only for a 2x2 table

Correlation

It could be interpreted the table below as:

There are relationships between MRP;

i. ERP as the percentage of 81,
ii. OHSAS as the percentage of 42,
iii. There is also relationship between ERP and OHSAS as the percentage of 52 and in positive way.

Correlations

		MRP	ERP	OHSAS
MRP	Pearson Correlation	1	.810**	.418
	Sig. (2-tailed)		.000	.053
	N	22	22	22
ERP	Pearson Correlation	.810**	1	.516*
	Sig. (2-tailed)	.000		.014
	N	22	23	22
OHSAS	Pearson Correlation	.418	.516*	1
	Sig. (2-tailed)	.053	.014	
	N	22	22	22

Table 5.1-48 Correlations MRP-ERP-OHSAS

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed

Question 28

Correlations

		CAD /CAM	Effi-ciency	Generic Shipyard Modelling	Group Technol-ogy	Mapol/ Solas
CAD/CAM	Pearson Correla-tion	1	.304	.447*	.126	.304
	Sig. (2-tailed)		.180	.042	.597	.180
	N	23	21	21	20	21
Efficiency	Pearson Correla-tion	.304	1	.612**	.522*	.192
	Sig. (2-tailed)	.180		.003	.018	.418
	N	21	21	21	20	20
Generic Shipyard Modelling	Pearson Correla-tion	.447*	.612**	1	.630**	.154
	Sig. (2-tailed)	.042	.003		.003	.518
	N	21	21	21	20	20
Group Technol-ogy	Pearson Correla-tion	.126	.522*	.630**	1	.522*
	Sig. (2-tailed)	.597	.018	.003		.018
	N	20	20	20	20	20
Marpol/ Solas	Pearson Correla-tion	.304	.192	.154	.522*	1
	Sig. (2-tailed)	.180	.418	.518	.018	
	N	21	20	20	20	21

Table 5.1-49 Correlations CAD-Efficiency-Gen.Ship-Marpol/Solas

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Question 29

Correlations

		OHSAS 18000	ISO 9001	ISO 14001	ISO 5001
OHSAS 18000	Pearson Correlation	1	.843**	.843**	.286
	Sig. (2-tailed)		.000	.000	.250
	N	22	22	22	18
ISO 9001	Pearson Correlation	.843**	1	1.000**	.224
	Sig. (2-tailed)	.000		.000	.357
	N	22	23	23	19
ISO 14001	Pearson Correlation	.843**	1.000**	1	.224
	Sig. (2-tailed)	.000	.000		.357
	N	22	23	23	19
ISO 5001	Pearson Correlation	.286	.224	.224	1
	Sig. (2-tailed)	.250	.357	.357	
	N	18	19	19	19

Table 5.1-50 Correlations OHSAS-ISO (9001-14001-5001)

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations between Questions 9-10

Linear Regression

Inspections in all dimension are essential to prevent accidents, environmental diseases etc. by using (R Square Test) Table 4-52 shows 30 % dependency as follows.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.549a	.302	.267	.602

Table 5.1-51 Linear Regression Q9 vs. Q10

a. Predictors: (Constant), Did your shipyard inspected about environmental protection/waste management in last 5 years by the responsible authorities?

Level of Meaning column of ANOVA table shows p = 0.008 < 0, 05 this means statistically there is a relationship.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regres-sion	3.126	1	3.126	8.636	.008a
	Residual	7.238	20	.362		
	Total	10.364	21			

Table 5.1-52 ANOVA Q9 vs. Q10

1. Predictors: (Constant), Did your shipyard inspected about environmental protection/waste management in last 5 years by the responsible authorities?

2. Dependent Variable: Was there serious injury during last two years (2014-2015)?

Cross-tabulation

			Environmental Inspection in last 5 years		Total
			Inspected/No Warning or penalty	In-spected/warned or punished	
Accident with death in last 2 years	Accident with death	Count	2	1	3
		Accident with death in last 2 years	66.7%	33.3%	100.0%
	No serious injury	Count	19	0	19
		Accident with death in last 2 years	100.0%	.0%	100.0%
Total		Count	21	1	22
		Accident with death in last 2 years	95.5%	4.5%	100.0%

Table 5.1-53 Crosstab Q9 vs. Q10

Correlations between Questions 9-11

Dependency inspection by social security authority and severe accident.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.461a	.213	.173	.639

Table 5.1-54 Model Summary Q9 vs. Q11

Predictors: (Constant), “Inspection in last 5 year by Social Security Authority”

Level of Meaning column of ANOVA Table 4-53 and Table 4-54 shows p = 0.031 < 0, 05 this means statistically there is a relationship.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.205	1	2.205	5.406	.031a
	Residual	8.158	20	.408		
	Total	10.364	21			

Table 5.1-55 ANOVA Q9 vs. Q11

1. Predictors: (Constant), Did your shipyard inspected about environmental protection/waste management in last 5 years by the responsible authorities?
2. Dependent Variable: Was there serious injury during last two years (2014-2015)?

Cross-tabulation

			Inspection in last 5 year by Social Security Authority			Total
			Inspected/No Warning or penalty	Inspected/warned or punished	No Inspection/No Idea	
Accident with death in last 2 years	Accident with death	Count	2	0	1	3
		Accident with death in last 2 years	66.7%	.0%	33.3%	100.0%
	No serious Injury	Count	18	1	0	19
		Accident with death in last 2 years	94.7%	5.3%	.0%	100.0%
Total		Count	20	1	1	22
		Accident with death in last 2 years	90.9%	4.5%	4.5%	100.0%

Table 5.1-56 Crosstab Q9 vs. Q11

Correlations between Q6 and Others

Is there a relationship between the groups who believe shipyard in profitable level and?

a. Defense Projects,
b. Support,
c. 26-32 questions?

It is necessary to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

Correlations between Q6 and Q7

H $_{S1}$: The group who think shipyard in profitable level are different distribution with defense projects.

QUESTIONS	CALCULATED F VALUE	LEVEL OF MEANINGFUL
Defence Projects	0.471	0.561

Table 5.1-57 Correlations Q6 vs. Q7

Here in this table significant level is 0,561. Since the value 0.561 greater than p=0,05 there is no significant difference so it can't be claim there is a relation between profit level and defense projects according to Table 4-58.

Independent Samples t-Test

Independent Samples Test

	Levene's Test for Equality of Variances			t-test for Equality of Means						
	F		Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	pp
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.471	.500	.590	21	.561	.283	.480	-.715	1.281
	Equal variances not assumed			.545	11.581	.596	.283	.520	-.855	1.422

Table 5.1-58 Sample Test Q6 vs. Q7

Correlations between 6 vs 33.

It is necessary to make a hypothesis set to test the relationship between groups who believe shipyard in profitable level and others respectively as follows:

i. $_{H}$ S33-1: Profit Level vs. Employee Support,
ii. H S33-2: Profit Level vs. Export Support,
iii. H S33-3: Profit Level vs. Import Support,
iv. H S33-4: Profit Level vs. Credit Support,
v. H S33-5: Profit Level vs. R&D Support,
vi. H S33-6: Profit Level vs. Area Support.

QUESTIONS	CALCULATED F VALUE	LEVEL OF MEANING-FUL
Employee	0.471	0.561
Export	0.002	0,866
Import	0.075	0,563
Credit	0.551	0.261
R&D	5.053	0.451

Table 5.1-59 Sample Tests Q6 vs. Others (until 33)

Having a quick look at Table 4-60, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and (Employee-Export-Import-Credit-R&D) Supports. Therefore, it can be interpreted as: There is no relation between profit level and supports.

H S33-1: Profit Level vs. Employee Support

Independent Samples t – Test

ANOVA

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sg. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	pp
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.471	.500	.590	21	.561	.283	.480	-.715	1.281
	Equal variances not assumed			.545	11.581	.596	.283	.520	-.855	1.422

Table 5.1-60 Independent Sample Teste Q

H S33-2: Profit Level vs. Export Support

ANOVA

Independent Samples Test

		Levene's Test for Equal of Variances		t-test for Equality of Means						
		F	Sig	t	df	SSig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	002	964	171	21	866	117	684	1.305	1.539
	Equal variances not assumed			164	2.575	.882	.117	.711	-2.371	2.604

Table 5.1-61 Sample Test Q6 vs Export Support

H S33-3: Profit Level vs. Import Support

ANOVA

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig	t	df	SSig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	equal variances assumed	075	787	587	1	563	476	811	-1.211	2.163
	equal variances not assumed.			464	1.114	.717	.476	1.027	-9.816	10.768

Table 5.1-62 Sample Test Q6 vs Import Support

H S33-4: Profit Level vs. Credit Support

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.551	.466	1.156	21	.261	.588	.509	-.470	1.647
	Equal variances not assumed			1.292	11.025	.223	.588	.455	-.414	1.590

Table 5.1-63 Sample Test Q6 vs Credit Support

H S33-5: Profit Level vs. R&D Support

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	5.053	.035	-.767	21	.451	-.619	.807	-2.297	1.058
	Equal variances not assumed			-2.540	20.000	.020	-.619	.244	-1.127	-.111

Table 5.1-64 Sample Test Q6 vs R&D Support

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.700	1	.700	.589	.451
Within Groups	24.952	21	1.188		
Total	25.652	22			

Table 5.1-65 Sample Test Q6 vs Profit Level

H S33-6: Profit Level vs. Area Support

Group Statistics

	Area Support	N	Mean	Std. De-viation	Std. Error Mean
I believe that our shipyard is in profitable level considering last 5 years.	Yes	2	2.00	.000	.000
	No	21	2.62	1.117	.244

Table 5.1-66 Group Statistics Test Q6 vs Area Support

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	5.053	.035	-.767	21	.451	-.619	.807	-2.297	1.058
	Equal variances not assumed			-2.540	20.000	.020	-.619	.244	-1.127	-.111

Table 5.1-67 Sample Test Q6 vs Area Support

Correlation between Questions 6 and 34

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. $H_{S34\text{-}1}$: Profitable Level vs. Equity,
ii. $H_{S34\text{-}2}$: Profitable Level vs. Universities,
iii. $H_{S34\text{-}3}$: Profitable Level vs. TÜBİTAK,
iv. $H_{S34\text{-}5}$: Profitable Level vs. Defense Funds,
v. $H_{S34\text{-}6:}$ Profitable Level vs. Other Funds.

STATEMENT	CALCULATED F VALUE	LEVEL OF MEANING
Equity	0.471	0.690
Universities	0.002	0.293
TÜBİTAK	0. 397	0, 261
Found of Defence Industry	0163	0.690
Others	5.053	0.451

Table 5.1-68 F Values Equity-Universities-TÜBİTAK-Defence-Others

Having a quick look the Table 4-69 above, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and R&D with (Equity-Universities-TÜBİTAK-Defence-Others). Therefore, it can be interpreted as: There is no relation between profit level and supports.

H $_{S34-1}$: Profitable Level vs. Equity

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	SSig	t	f	SSig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.	.	404	1	.690	.455	1.126	1.886	2.796
	Equal variances not assumed			.	.	.	.455	.	.	.

Table 5.1-69 Sample Test Q6 vs Equity (Q34)

H $_{S34-2}$: Profitable Level vs. Universities

ANOVA

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	SSig. 2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	1.290	.269	1.080	21	293	485	.449	-.449	1.419
	Equal variances not assume.			1.071	19.683	297	485	453	.460	1.430

Table 5.1-70 ANOVA Test Q6 vs University Corp. (Q34)

H $_{S34\text{-}3}$: Profitable Level vs. TÜBİTAK

ANOVA

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig	t	df	ig. (2-tailed)	Mean Differ-ence	to. Error Differ-ence	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profita-ble level consider-ing last 5 years	Equal variances assumed	397	535	1.156	21	261	.588	509	-.470	.647
	Equal variances not as-sume.			1.030	7.355	336	.588	571	-.749	.925

Table 5.1-71 Sample Test Q6 vs TÜBİTAK (Q34)

H $_{S34\text{-}5}$: Profitable Level vs. Defence Funds

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.	.	.404	21	.690	.455	1.126	-1.886	2.796
	Equal variances not assumed			.	.	.	455	.	.	.

Table 5.1-72 Sample Test Q6 vs Defense Funds (Q34)

Correlation between Questions 6 and 26

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. H S26-1: Profit Level vs. Melting Machine,
ii. H S26-2: Profit Level vs. Cutting Machine,
iii. H S26-3: Profit Level vs. CNC.

If there exist more than two groups, one-way Table 4-73 above, ANOVA is the better way to test hypothesis.

By looking the table below, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and Semi –Life of Machines with (Melting-Cutting-CNC Machines). Therefore, it can be interpreted as: There is no relation between profit level and supports.

STATEMENTS	CALCULATED F VALUE	LEVEL OF MEANINGFUL
Melting Machines	0.608	0.555
Robot Arms	1.286	0.301
CNC	1.286	0.301

Table 5.1-73 F Values Melting-Robot-CNC Machines

One-way ANOVA test

$H_{S26-1:}$ Profit Level vs. Melting Machine does not give a proper relation.

H_{S26-1} Profit Level vs. Melting Machine

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.471	2	.736	.608	.555
Within Groups	21.767	18	1.209		
Total	23.238	20			

Table 5.1-74 ANOVA between &Within Groups

H S26-2: Profit Level vs. Cutting Machine

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.905	2	1.452	1.286	.301
Within Groups	20.333	18	1.130		
Total	23.238	20			

Table 5.1-75 ANOVA between &Within Groups

H S26-3: Profit Level vs. CNC

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.113	2	1.557	1.392	.274
Within Groups	20.125	18	1.118		
Total	23.238	20			

Table 5.1-76 ANOVA between &Within Groups

Correlation between Questions 6 and 27

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. H S27-1: Profit Level vs. MRP,
ii. H S27-2: Profit Level vs. ERP,
iii. H S27-3: Profit Level vs. OHSAS.

By looking the Table 4-78 below, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and SoftWare Park (MRP-ERP-OHSAS). Therefore, it can be interpreted as: There is no relation between profit level and SW's.

STATEMENTS	CALCULATED F VALUE	LEVEL OF MEANING-FUL
MRP	0.042	0.777
ERP	0.007	0.698
OHSAS	0.192	0.055

Table 5.1-77 F Values MRP-ERP-OHSAS

H $_{S27\text{-}1}$: Profit Level vs. MRP

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	SSig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	042	.840	.287	20	.777	.143	.498	-1.181	.895
	Equal variances not assumed			.279	13.495	.784	.143	.512	-1.245	.959

Table 5.1-78 Sample Tests Q6 vs Q27

H S27-2: Profit Level vs. ERP

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	SSig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.007	.934	.394	21	.698	.196	.499	1.234	.841
	Equal variances not assume.			.360	9.579	.726	.196	.545	1.418	1.025

Table 5.1-79 Sample Tests Q6 vs ERP (Q27)

H S27-3: Profit Level vs. OHSAS

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	SSig.	t	df	SSig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	192	.666	2.042	20	.055	1.550	.759	.033	3.133
	Equal variances not assumed			1.513	1.102	.355	1.550	1.025	-8.938	12.038

Table 5.1-80 Sample Tests Q6 vs OHSAS (Q27)

Correlation between Questions 6 and 28

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. H S28-1: Profit Level vs CAD/CAM,
ii. H S28-2: Profit Level vs Efficiency,
iii. H S28-3: Profit Level vs Generic Shipyard,
iv. H S28-4: Profit Level vs Group Technology,
v. H S28-5: Profit Level vs MARPOL and SOLAS.

By looking the Table 4-82 below, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and concepts (Cad-Efficiency-Generic Shipyard-Group Technology-Marpol/Solas). Therefore, it can be interpreted as: There is no relation between profit level and supports.

STATEMENTS	CALCULATED F VALUE	LEVEL OF MEANING-FUL
CAD/CAM	0.225	0.553
Efficiency	2.531	0.479
Generic Shipyard Modelling	0.462	1.000
Group Technology	3.930	0.901
MARPOL and SOLAS	0.736	0.144

Table 5.1-81 F Values CAD-Efficiency-Gen. Shipyard-Marpol&Solas

H $_{S28\text{-}1:}$ Profit Level vs CAD/CAM

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	SSig.	t	df	SSig. (2-tailed)	Mean Dif-fer-ence	Std. Error Dif-fer-ence	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level con-sidering last 5 years	Equal vari-ances as-sumed	.225	.641	.603	21	.553	.314	.520	.768	1.396
	Equal vari-ances not assumed			.563	7.873	.589	.314	.557	.974	1.602

Table 5.1-82 Sample Tests Q6 vs CAD (Q28)

H $_{S28\text{-}2:}$ Profit Level vs Efficiency

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	f	Sig. (2-tailed)	Mean Dif-fer-ence	Std. Error Dif-fer-ence	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level con-sidering last 5 years	qual vari-ances as-sumed	.531	128	.722	9	479	-.361	.500	1.409	686
	Equal vari-ances not as-sume.			.694	4.533	499	-.361	.521	1.474	752

Table 5.1-83 Sample Tests Q6 vs Efficiency (Q28)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.671	1	.671	.521	.479
Within Groups	24.472	19	1.288		
Total	25.143	20			

Table 5.1-84 ANOVA between &Within Groups

H S28-3: Profit Level vs Generic Shipyard

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.462	.505	.000	19	1.000	.000	.533	-1.115	1.115
	Equal variances not assumed			.000	12.339	1.000	.000	.529	-1.148	1.148

Table 5.1-85 Sample Tests Q6 vs Generic Shipyard (Q28)

H S28-4: Profit Level vs Group Technology

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	ig.	t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.930	063	.126	8	901	-.067	.530	1.179	.046
	Equal variances not assumed			.175	4.804	863	-.067	.380	.878	744

Table 5.1-86 Sample Tests Q6 vs Group Technology (Q28)

H S28-5: Profit Level vs MARPOL and SOLAS

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	736	402	.526	9	144	.639	.419	.238	1.515
	Equal variances not assumed			.434	2.876	175	.639	.446	.325	1.603

Table 5.1-87 Sample Tests Q6 vs Marpol&Solas (Q28)

Correlation between Questions 6 and 29

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. H S29-1: Profit Level vs OHSAS,
ii. H S29-2: Profit Level vs ISO 9001,
iii. H S29-3 Profit Level vs ISO 14000,
iv. H S29-4: Profit Level vs ISO 5001.

By looking the Table 4-89 below, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and concepts (OHSAS-ISO's). Therefore, it can be interpreted as: There is no relation between profit level and supports.

STATEMENTS	CALCULATED F VALUE	LEVEL OF MEANING-FUL
OHSAS 18000	0.535	0.566
ISO 9001	0.522	0.343
ISO 14000	0.522	0.343
ISO 5001	0,658	0.309

Table 5.1-88 F Values OHSAS-ISO (18000 9001-14000-5001)

29-1 H $_{S29-1:}$ Profit Level vs OHSAS

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	535	473	584	0	566	.361	.618	.929	.651
	Equal variances not assumed			657	5.118	539	.361	.550	1.042	.764

Table 5.1-89 Sample Tests Q6 vs OHSAS (Q29)

H S29-2: Profit Level vs ISO 9001

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
believe that our shipyard is in profitable level considering last 5 years	qual variances assumed	522	478	971	1	343	650	669	.742	.042
	qual variances not ass.			037	2.766	.382	.650	.627	1.443	2.743

Table 5.1-90 Sample Tests Q6 vs ISO 9001 (Q29)

H $_{S29-3}$ Profit Level vs ISO 14000

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	522	478	.971	21	343	650	669	.742	2.042
	Equal variances not assumed			1.037	2.766	.382	.650	.627	1.443	2.743

Table 5.1-91 Sample Tests Q6 vs ISO 14000 (Q29)

H $_{S29-4:}$ Profit Level vs ISO 5001

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	SSig.	t	df	SSig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.658	.429	1.048	17	.309	.600	.573	.608	1.808
	Equal variances not assumed			.805	3.690	.469	.600	.745	-1.539	2.739

Table 5.1-92 Sample Tests Q6 vs ISO 5001 (Q29)

Correlation between Questions 6 and 30

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. H S30-1: Profit Level vs. Web Site,
ii. H S30-2: Profit Level vs. Up to Date,
iii. H S30-3: Profit Level vs. Mission&Vision,
iv. H S30-4: Profit Level vs. Strategic Plan.

By looking the Table 4-94 below, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and web pages and futures. Therefore, it can be interpreted as: There is no relation between profit level and web properties.

STATEMENTS	CALCULATED F VAL-UES	LEVEL OF MEANING-FUL
Official Web Site	0.370	0.696
Updated	0.340	0.797
Mission&Vision	0.140	0.871
Strategic Plan	1.734	0.372

Table 5.1-93 F Values Official Web-Updated-Mission&Vision-Strategic Plan

H $_{S30\text{-}1:}$ Profit Level vs. Web Site

Correlations

		I believe that our shipyard is in profitable level considering last 5 years.	Official Web Site
I believe that our shipyard is in profitable level considering last 5 years	Pearson Correlation	1	.121
	Sig. (2-tailed)		.581
	N	23	23
Official Web Site	Pearson Correlation	.121	1
	Sig. (2-tailed)	.581	
	N	23	23

Table 5.1-94 Sample Tests Q6 vs Web Page (Q30)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.915	2	.457	.370	.696
Within Groups	24.738	20	1.237		
Total	25.652	22			

Table 5.1-95 ANOVA between &Within Groups

H $_{S30\text{-}2:}$ Profit Level vs. Up to Date

Correlations

		I believe that our shipyard is in profitable level considering last 5 years.	Official Web Site
I believe that our shipyard is in profitable level considering last 5 years	Pearson Correlation	1	-.088
	Sig. (2-tailed)		.689
	N	23	23
Official Web Site	Pearson Correlation	-.088	1
	Sig. (2-tailed)	.689	
	N	23	23

Table 5.1-96 Sample Tests Q6 vs Updated Web Page (Q30)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.307	3	.436	.340	.797
Within Groups	24.345	19	1.281		
Total	25.652	22			

Table 5.1-97 ANOVA between &Within Groups

H S30-3: Profit Level vs. Mission&Vision

Correlations

		I believe that our shipyard is in profitable level considering last 5 years	Vision&Mission
I believe that our shipyard is in profitable level considering last 5 years	Pearson Correlation	1	.103
	Sig. (2-tailed)		.641
	N	23	23
Vision&Mission	Pearson Correlation	.103	1
	Sig. (2-tailed)	.641	
	N	23	23

Table 5.1-98 Sample Tests Q6 vs Mission&Vision (Q30)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.353	2	.177	.140	.871
Within Groups	25.299	20	1.265		
Total	25.652	22			

Table 5.1-99 ANOVA between &Within Groups

H S30-4: Profit Level vs. Strategic Plan

Correlations

		I believe that our shipyard is in profitable level considering last 5 years.	Vision and Mission
I believe that our shipyard is in profitable level considering last 5 years	Pearson Correlation	1	-.107
	Sig. (2-tailed)		.626
	N	23	23
Vision&Mission includs strategic plan	Pearson Correlation	-.107	1
	Sig. (2-tailed)	.626	
	N	23	23

Table 5.1-100 Correlations Q6 vs. Vision&Mission (Q30)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.163	4	1.291	1.134	.372
Within Groups	20.489	18	1.138		
Total	25.652	22			

Table 5.1-101 ANOVA Q6 vs. Vision&Mission (Q30)

Correlation between Questions 6 and 31

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as:

H $_{S31:}$ Profit level of shipyard and design office availability.

By looking the Table 4-103 below, all of the meaningfulness values are greater than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and web pages and futures. Therefore, it can be interpreted as: There is no relation between profit level and design office availability.

STATEMENTS	CALCULATED F VALUE	LEVEL OF MEANING-FUL
Design Office	0.003	0.385

Table 5.1-102 F Value of Design Group

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
I believe that our shipyard is in profitable level considering last 5 years	Equal variances assumed	.003	.958	.889	19	.385	.418	.471	-.567	1.403
	qual variances not assumed			.889	18.823	.385	.418	.470	-.567	1.404

Table 5.1-103 Sample Test Q6 vs Q32

Correlation between Questions 6 and 32

It is necessary to make a hypothesis' to test the relationship between groups who believe shipyard in sufficient level and others respectively as follows:

i. H S32-1: Own Design Office,
ii. H S32-2: Country Design Sources,
iii. H S32-3: Foreign Sources.

By looking the Table 4-105 and succeeding is below, all of the meaningfulness values are higher than 0.05 and it can be easily interpreted that there is no meaningful difference level of profit and design sources and futures. Therefore, it can be interpreted as: There is no relation between profit level and design office availability.

STATEMENTS	CALCULATED F VALUE	LEVEL OF MEANINGFUL
Equity	1.947	.155
Country	2.312	.113
Foreign	.549	0.703

Table 5.1-104 F Values Equity-Country-Foreign (Q 32)

H S32-1: Own Design Office

Correlations

		I believe that our shipyard is in profitable level considering last 5 years.	Design&Analysis
I believe that our shipyard is in profitable level considering last 5 years.	Pearson Correlation	1	-.315
	Sig. (2-tailed)		.177
	N	23	20
Design&Analysis	Pearson Correlation	-.315	1
	Sig. (2-tailed)	.177	
	N	20	20

Table 5.1-105 Correlations Q6 vs Design (Q32)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.476	4	2.119	1.947	.155
Within Groups	16.324	15	1.088		
Total	24.800	19			

Table 5.1-106 ANOVA Between&Within Group

H S32-2: Country Design Sources

Correlations

		I believe that our shipyard is in profitable level considering last 5 years	Design&Analysis
I believe that our shipyard is in profitable level considering last 5 years	Pearson Correlation	1	-.489*
	Sig. (2-tailed)		.025
	N	23	21
Design&Analysis	Pearson Correlation	-.489*	1
	Sig. (2-tailed)	.025	
	N	21	21

Table 5.1-107 Correlations Q6 vs Design (Q 32)

*. Correlation is significant at the 0.05 level (2-tailed).

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.286	3	2.429	2.312	.113
Within Groups	17.857	17	1.050		
Total	25.143	20			

Table 5.1-108 ANOVA Between& Within Groups

H S32-3: Foreign Sources

Correlations

		I believe that our shipyard is in profitable level considering last 5 years	Design&Analysis
I believe that our shipyard is in profitable level considering last 5 years	Pearson Correlation	1	-.011
	Sig. (2-tailed)		.963
	N	23	19
Design&Analysis	Pearson Correlation	-.011	1
	Sig. (2-tailed)	.963	
	N	19	19

Table 5.1-109 Correlations Q6 vs Design Office (Q 32)

ANOVA

I believe that our shipyard is in profitable level considering last 5 years

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.998	4	.750	.549	.703
Within Groups	19.107	14	1.365		
Total	22.105	18			

Table 5.1-110 ANOVA Whithin Group

6. RESULTS ANALYSIS AND DISCUSSION

After survey and interpreting those collected data, there is now essential information's about Turkish shipbuilding industry. The aim was using minimum or succinct questions to get maximum information of a shipbuilding company. At this point using the S-MCM classification of SEI it can be now done the point. At least it can be classified a shipbuilding company as S-MCM level.

6.1. S-MCM Level 1-2 or Organizational Metrics

Historical Background; This works and some others that are previously performed showed that historical background has great importance for any company. Experiences are also a part of corporate culture. Skills are at least enlightening crisis terms management. After specific shocks only experienced companies remain. Other firms either terminate or suffer from that shock and they field adverse effect of the excitement for a long time.

In the section 'cycle in the world shipbuilding economy', it explained that. Up to now, there have been peak and bottom levels in this sector and period of the variable. If a shipbuilding company has this knowledge, then they can prevent their shelves from adverse effects of crisis and make smart investment. They also know that this sector is not a beneficial short-term sector. They can quickly see that they need always back up money.

In briefly experiences are essential all sectors. However, it is crucial in shipbuilding sector. It is not the only reason cycles in world shipbuilding sector. Undoubtedly there are some other reasons.

There are changing environment of total number of employees in shipbuilding sector. Economic facts are directly affects total number of employees. However, shipyards order book. Subcontractor or outsourcing models and positions are also some other related factors.

However, proper subcontracting and outsourcing are also a part of experiences. One more thing about employment is when you need well-skilled person. Probably others also do. So employment policy is also relevant companies past experiences.

Following world order book gives essential information about a single company's strategy. They can get right position for upcoming orders. They have to watch each other. Hence, they can catch essential laws and other opportunities or vice versa.

Shipbuilding is a matter of time. Most of the time when a ship erects it shows some divergently. Experiences prove this fact. A company that has knowledge and database can guess this and makes suitable preventions.

This study shows the importance of historical background of a shipbuilding company. On the other hand, some external reasons affect this evaluation adversely. If it is investigated foundation date of companies, this may be wrong. Because sometimes there have been company merges. Sometimes company's share structure can be changed. Sometimes owner of company can be changed. Sometimes name of company can be adjusted for a necessity. However, any way corporate culture of company remains.

Therefore, it can be said that foundation date of a company gives essential data considering historical background and corporate culture. Nevertheless, it has to be noticed that there is a difference between 'historical background' and 'foundation date'. Historical knowledge can give data that are more accurate.

In this work when it was found out the most prominent shipyard company in the world. Such examples have seen. Considering some of biggest shipyard companies' foundation date it can be said they are very young and it can be subjected 'how they can perform such a success' while they are so young.

However, the fact is different; they have at least one-hundred year's experiences. Japan shipbuilding company Marine United is such an example. It has been founded 2013 but now it is one of the 10 biggest shipbuilding company. In fact, this is because its name and share structure has been changed. But even though it can be understood that a historical background still exists.

Responsibilities and Proficiency Level regarding Legislation; At the very beginning of this study, it was considered obeying local rules is critical and has great importance thinking the potential of breaking rule/rules may cause to terminate of that company and its operations. The information is still valid. However, after study it is understood another point that it could not be got sufficient information of inspection of companies by the authorities.

Even they did not get any punishment or warning by those legal authorities. No one can say ‘we didn’t get any punishment or warning after a complaint or inspection’. Therefore, as an interpretation for this subject is, when it was wanted to analysis a company it is still essential to understand the obeying level of legislation.

However, it has difficulties as if no one wanted to give exact information penalties or warnings. Therefore, in this area the best way is talking about real documents.

It is very well known in Türkiye that most of the time employers want ‘clearance’ or ‘criminal records’ from candidate of employee.

Obeying rules and punishment history is critical information for evaluation S-MCM analysis. However, getting information for this section has difficulties.

If someone needs those information and sanction, it is strongly advised that they have to want clearness from the record of legal authorities.

OHSAS Law; Comparing other laws and regulations OHSAS law has particular importance. Therefore, this must be specially checked.

First, this is related with human life and shipyard accidents has public attention in Türkiye. On the other hand, compensations and punishments according to OHSAS Law (article number 6331) are incredible. Some actuating accountings examples are so big that a company can be terminate its operation after a particular accident.

Before the mentioned law, sub-contracting may prevent employers from unwanted situations. However, after the OHSAS Law employers responsible all the time.

In fact, this is also a regulation and obeying others may be the same comparing this. However, this study shows OHSAS Law and rules have particular importance.

Certification of OHSAS is essential but not enough. Nearly all of Tuzla region ship-yard companies have OHSAS 18001certification. However, OHSAS still has enormous risk and potentials comparing other regulations. So, in the future works and detailed investigations OHSAS have to have particular check procedure and new grades.

For example, comparing with tax punishment one can consider this can be a temporary situation. Nevertheless, OHSAS record is essential all the time both human consideration and continuity of compensations and other risks.

Physical Situation of Shipyard; The study shows that shipyard companies in Türkiye know their potential about repairment or building or mix. They also know their advantages and experiences about ship types and sizes.

It is important because they all have physically what they need. Considering pool observed in the site survey if a shipyard needs a pool, it can have around its location. It is the same for crane.

When they need, they redraw their positional project and can reproduce more convenient and useful area. In fact, there is no directly relation coastal length and company S-MCM level and efficiency or profit.

Considering closed or open area, it was interfaced the same situation. There are too many alternatives. If open or closed space is not sufficient, they use some other regions. For example, Orhanlı is one of them. Pre-erecting phases can perform over there. Therefore, the need of land closed or open area and some other facilities are decreases in absolute amount.

The uncertainty of Tuzla Shipyard Region after 49 years rental period most of the companies also got areas in Yalova-Altınova region. In the current situation, some of them use this region as back up like mentioned above.

One more things decreasing the importance of physical situation are sub-contractors. Most of the company use either sub-contractors or outsourcing some branches. Sometimes, there is no need some particular group or department in shipyard because of this method. For example, ‘electric group’ cannot appear in some shipyards. When it was asked ‘why’ they express they do not need because outsourcing of electrical affairs.

There is no example in the site seeing that insufficiency of crane or crane capacity pool and pool capacity or type of berth and so on.

The area problem causes from another reason. Rental time will be terminating in 20 years, and they have not their areas in Tuzla region and there is uncertainty in this field. However, this not mean physical situation problem of shipyards.

They also very well know each other. Only give the name of company. They immediately provide fact files and their capability and experiment level of shipbuilding ship types and capacity.

In Türkiye like other countries ship, order method is using brokers. Brokers also very well know shipyards and their specialization.

Capability Level 1-2; as it was proposed previously, Capability level 1 is existence level. If a company exists and open, it can be said its level of capability degree is 1.

However, unfortunately some of shipyards are not in service and terminated their operation. Therefore, except for those closed shipyards if a shipyard is open it can be said its level of capability is one.

On the other hand, this study also showed us in Türkiye considering historical and corporate background their experience and method to overcome shortage and inabilities it can be said our shipyards averagely at the level two.

If it is wanted to understood maturity level then it is needed those criteria cluster set. However, in this time it has to be careful because there is no direct relation between numerical values and operational capability. It is because alternative solutions and specialization of shipyards.

6.2. S-MCM Level 3-4 or High-Tech Usage

At first, it can be said one of the outcome of this survey there is no S-MCM fifth level shipbuilding company in Türkiye. Further information can be found in coming section. In the survey section, it has to be mentioned that high-tech strongly related level 3-4-5. However, after some try and error method and site seeing process it is now clear that there is no fifth level company. Nevertheless, it has to be described that level in either case.

However, after stating this fact now procedure is more straightforward to identify level 3 or level 4. Only it can be repeated the difference explained above: In level 3 all processes are recorded and high-tech usage is in a certain amount. In level 4 all basic high-tech usage is available.

More short statement for discrimination those two: In level 3 high tech usage must be sufficient level. However, in level 4 all necessary available must be inside.

After survey, now it can be deduced which is sufficient and which is necessary level namely level 3 or level 4.

Basic SW's is available in Turkish shipyards primarily if it is identified that Level 3 or 4. At least package SW's like ERP and OHSAS is already exists.

In design concept, foreign dependency is a big problem in both sides. But after this study it is clear that if it can be told about level 4 company it has its design team and foreign dependency must be shallow level.

However, if its level is 3 in this case even there must be design office no matter how much dependent to foreigners.

An updated and visionary or portal web site is also essential. In this work, over 100 shipyard official web pages studied. Unfortunately, web pages are not updated and not used as a portal.

However, even though some fundamental parameters can be found in those websites. Such as basic descriptions historical information main business, mission and vision descriptions, communication facts are already available. After this information, it is easy to say there is no level 4 company either in Türkiye. Because, it could not be found even a portal from those shipbuilding company's websites that it was investigated on.

New technology usage is also related both level 3 and level 4. It is also a matter of efficiency. Looking with this angle it can be decided a level 4-shipbuilding company must has acceptable efficiency level and this is not possible without using new technology. Otherwise it cannot be possible entirely manage those plants.

Considering semi-life of those machines, level-4 company's devices must be under semi of lifecycle. It was seen in sites this is true both level 3 and level 4. However, main difference between them is efficiency consideration level.

To measure this, it can be investigated if there is efficiency control software or programme is available or not. It is also maybe not a clear divergence point. Because, nearly all companies are above the level 2 by having certification of energy, OHSAS, ISO's and waste management. Therefore, it cannot be understood from this point the difference between level 3 and level 4. However, one more suggestion to clarify this is MRP usage.

In briefly, after survey it can be now more confident to distinguish level 3 and level 4 which have sufficient and acceptable level of proficiency.

6.3. Visionary

Level 4-company must have at least a certain amount of vision. However, level 5-company must have a global view. Not only new technologies. Level 5 companies must know the philosophy behind those technology and new concepts arising around this world.

In level 3: There is a lack of vision can be understandable. Nevertheless, in level 4-level 5 this is not possible. At a certain level of intellectual capacity of companies must know related topics. Those are 'social responsibility', 'healthy environment', and 'understanding the importance of education' etc.

Even in this study, it has to be interfaced social responsibilities before education, sport and health support. At a first glance, GİSBİR Hospital is one of them. In the interviews, it was learned some other examples but these were off the record.

A visionary company also must have organizational identification. Simply personnel must be happy inside. It is one of and maybe the first efficiency improvement method. So finding out private social activities and personal education is one of the essential techniques to understand company's vision.

In site survey, it was obtained that if company looks like visionary than person of that company also happy.

Taking grant and found and cooperation of the universities or institutes is an critical display. Undoubtedly if company has such relation and previous experiences one can easily claim the company's vision and level are in high concentration.

R&D -like above- corporation is also shows and proofs a certain level. However, as expected, this type cooperation and visions are shallow level in Turkish shipyards.

6.4. Decision Formula and Algorithm

To understand how mature the shipyard; use the Lamb Productivity formulate [$PD = 150\ BP^{-3.00}\ TE^{0.27}\ PR^{0.60}\ DP^{0.41}\ VI^{-0.66}\ ST^{-0.08}$] (Lamb, 2007). For decision use the answers of Poll Items are: [3,4,5,8,12,13,14,15,16,17,18,19,20,21,22,23,24 and 25] as the formulation input parameters.

S-MCM Level 1

- No Poll Item is needed!
- If the shipyard works, then S-MCM Level 1
- If it doesn't work, then reject!

S-MCM Level 2

- Poll Item Input for S-MCM Level is [6,7,9,10,11]
- Ask Item-6; If the Answer "No" then check If the Answer of Item-7 is "No" then sum up the Answers of Items-6 and 7. If summation is '0' or both is "No" then reject!
- If the Answer of Item-6 is "Yes" then ask Item-7
- If the Answer is "Yes"
- Then ask Items- [9,10,11]
- If any of them "Yes" specially check.
- If all of them "No" then Decision S-MCM Level 2

S-MCM Level 3

- Poll Item Input for S-MCM Level 3 is [26,27,28,29]
- Ask Item-29
- If Answer "No" then S-MCM Level 3 is not acceptable and reject!
- Ask Items-26,27and 28 if all of them above average then decide S-MCM Level 3
- Any of them "No" or below averages then specially check!

S-MCM Level4

- Poll Item Input for S-MCM Level 4 [30,31,32]
- Ask 30 and subtitles [a,b,c,d]. If Any of them is "No", then reject!
- If all "Yes"

- Then ask 31
- If "No" reject!
- If "Yes" then ask 32 subtitles [a,b,c]
- If any of them "Yes" then decision is S-MCM Level 4

S-MCM Level 5

- Poll Item Input for S-MCM Level 5 is [33,34,35]
- Ask Item-33 and its subtitles [a,b,c,d,e,f and g]
- If all of them "No" then reject
- If any of them "Yes" then ask Item-34 and its subtitles [a,b,c,d,e and f]
- If all of them "No" then reject
- If any of them "Yes" then ask Item-35 and its subtitles [a,b,c,d,e and f]
- If all of them "No" then reject
- If any of them "Yes" then specially check and decision is S-MCM Level 5

Notice that, some times the Answer is No, where as the meaning is (+) and vice versa. If there will be any decision making problem, users can use Likert scale. Simply put value '1' to each of meaning 'yes' and '0' each of meaning 'no'. If Summation of those sub items above average, then assume that considered section is '1' and vice versa.

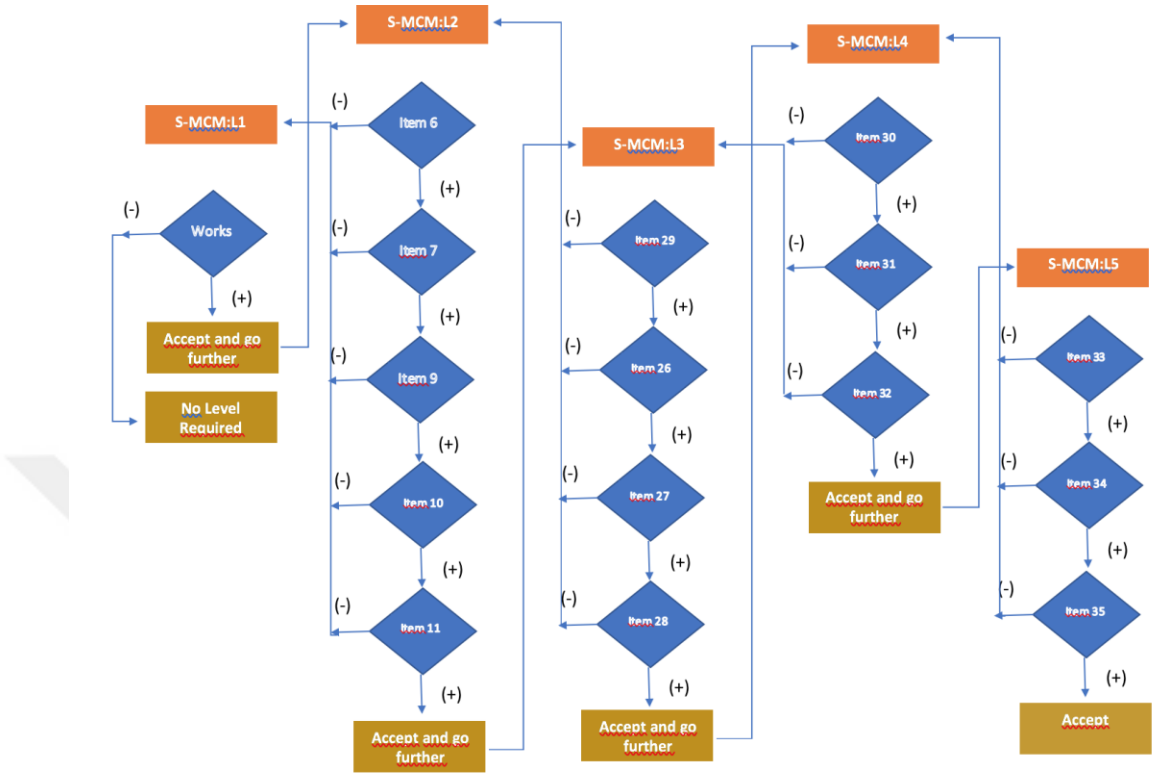


Figure 6.4-1 S-MCM Decision Flowchart Diagram

7. CONCLUSION

It is possible to make Capability and maturity study for too many different areas. For some cases, it is a necessity. When ordinary measurement methods cannot response the actual needs then this method is applicable one.

There are 5 different Capability level. However, in this study for Türkiye it was only considered 3 of them. It is because level 1 and level 5.

All existing and in-service shipyards are already in level 1. On the other hand, there is no level-5 Turkish shipyard.

So if one can understand the exact level of Turkish shipyard its quite simple and our suggestion to him at first step maybe it will be change in the future but at least now present study has been showed that there is no level 4 shipyards either.

Under this estimation, it can be said if a Turkish shipyard company already exists and in service, it must be in level 2 or level 3.

Theoretically the differences between them are rules and written rules. Scalability can be one more criteria. However, after this practice it has learned some more points stated above.

Nevertheless, even though it was clarified level 4 and level 5 characteristics.

7.1. Swot Analysis

According to the report "Türk Gemi İnşa Sanayinin Rekabet Gücünün Artırılması" (Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017) Swot analysis of Turkish Shipbuilding Industry as follows:

Strengths

- Experienced shipbuilding for many years

- Familiarity and brand recognition in small tonnage vessels (Small chemical tankers, Tugboats, Megayachts)
- Military shipbuilding capability
- Professional qualification during the detail design phase
- The presence of ship-owners supporting the shipbuilding industry
- Material quality
- Proximity to Europe and recognition of ship maintenance and repair
- Ability to create a significant amount of employment when previous years' experience is considered

Weaknesses

- Disadvantaged position regarding capital supply (regarding cost, maturity and collateral)
- Qualification of workforce development
- Concept design
- Inter-ship cooperation and synergy capability
- Serious added value in the global maritime industry regarding commercial value, although off-shore and cruise ships seen in the creation of Turkey's failure to get a share of this class
- Operational cost effectiveness
- Technology production
- Low R&D investments
- Professional level of branding
- Professional marketing management
- Creating a database

Opportunities

- Shipbuilding demand will continue at the global level - to take a significant share of the possibility of Turkey
- The government's recent positive approach to the shipbuilding industry and its concrete actions
- Making Exim-bank and Credit Guarantee Fund more efficient
- The introduction of Turkey Fund
- The necessity of renewal of old ships
- Increase in eco-design ship requirement
- Increase in demand for Eco-Retrofit

Threats

- Abundance of capacity at global level
- Slowdown in global marine trade demand, recession possibilities
- Incentives and support of unfair competition and creative protectionists of rival countries
- Financial problems in the economy

7.2. Discussion and Summary

As it was stated with the research problems of this study, we aimed to identify the variables that affect capacity and maturity effectiveness assessment of a shipyard company and to propose an appropriate method for assessing effectiveness regarding the variables identified i.e. succinct/short question or research to answer those questions-set.

At the end of this work, it has to come up with the answers for these research questions. It was obtained the variables that determine capability and maturity effectiveness, categorized as organizational, high tech and visionary, together with their operationally and objectively defined measures.

Capability level is to be assessed regarding variables evaluated using those questions. However, in a certain level of capability; Consideration of maturity level is a matter of ordinary scale. It can be said to decide maturity level is straightforward business. Further information for this may be subjected for future business.

Some Figures and diagrams were used to understand correlation of independent variables hence assessment results for each of the level diminished. Each of the variables of the model have been crossly associated and checked with at least one another.

Moreover, the normality and applicability also can be controlled in the real sides. 20 measures were validated through case studies in Tuzla region. By this means it has had chance to adjust some metrics while in the literature scanning phase there were not enough information. In the survey sections furthermore, each questions linked with the related literature, emphasizing their theoretical justification.

Participants in the confirmatory case studies were requested to decide whether they considered measures of S-MCM to be sufficient or succinct question to assess level of how mature and how capable.

Shipyard companies in Tuzla, if they are in services are in the capability level 2. Most of them are in the level 3. No one of them has the level 4-5. However, one can ask how it can be scaled those companies if the level difference so small. The answer is it can be done this measurement in maturity segment. As it was mentioned above this can also be a problem of future works.

On the other hand, this is not the only result scaling all those shipyard companies. It can be used ‘succinct question set’ in interviewing company representatives. Moreover, they can investigate their shelves using this set and evaluate their real position and level. However, this is a basement in any point of view.

7.3. Contributions

The main contribution of this study is that an effectiveness assessment model including 3 separate dimensions and 40 variables was constructed. Some benefits of this contribution can be outlined as follows:

There are many assessments and understanding methods an individual shipbuilding company but in this area, there were no capability and maturity assessment method considering all operational and numeric data of a shipyard.

There are many categorizations of a shipyard but this type i.e. capability and maturity based conduction is also first.

The classical approach to evaluate credibility of a shipyard company is not different from an ordinary company. However, one can quickly think that this is not sufficient or be exact case. On the other hand, no one proposes such an approach up to now.

In this work, it can also be concentrated on to perform those questions answer with succinct/short questions. By this means, one can investigate or directly ask relevant and meaningful questions and interpreted answers easily.

One of the today's tool is high technology which is a healthy part of high capability and maturity level and there is a direct relationship between those two subjects.

The list of cloud computing effectiveness measures together with their objective operational definitions was compiled.

The criteria cluster set was validated for three different categories of companies and other parties of shipyard.

7.4. Limitations of the Study

There are two noteworthy limitations of this study: The first limitation has originated from companies' confidential information's are not available in the open sources. That information's even cannot be learned easily from other sources. It is also very natural

that company owners or administrators are reluctant to answer those questions. Therefore, it could be not testified some questions and correlations of those questions between each other's.

The second limitation is related to the OHSAS Law (regulations) and culture. It may be enough degree of visiting performed all different places in each category can be acceptable. However, outer look on this area can be thought all of Turkish shipyards are in somewhere that is in Tuzla region so laboratory is in one place.

When it was wanted to visit shipyards at the beginning, they rejected. They afraid OHSAS rules and punishments. They scared both regulations and us. Most of the visiting they thought us as if one were OHSAS inspector. Also since OHSAS, penalties are deterrent they are avoiding making us visit inside of plants.

At the beginning of the study, it was revealed that financial table's analysis of a company is limited and even non-sense. On the other hand, if it possible to get quickly that information's it can be changed the scenario and testify more data's with each other's.

Subcontractor usage in this sector is also limiting our study. It is widely using subcontractor and most of the data are in some other companies.

Hence, to ensure validity multiple interviewees with different organizational roles were selected and approached in most cases.

7.5. Future Work

Turkish shipyards have their characteristics. This thesis shows this fact and explained in the 'result' chapter. It also means that different shipyards around the world may prove different symptoms and to understand and to categorize those shipyards this criteria cluster set is not sufficient.

Also, as it is stressed above making a capability analysis is very easy using this tool. However, in each level of category it has to vary company's using their maturity level. However, this work is not enough case studies to scale in maturity level. Future work may

focus on the usage of maturity level as a decision support for construction of an improvement strategy and method based on this assessment model to assist companies in enhancing their maturity level.

Besides new measures associated with marine-transportation companies can be derived. Effectiveness assessment results of all of these measures may provide decision support for capability and maturity. It is apparently also possible to use S-MCM for planning process or infrastructure improvements to enhance their capability and maturity effectiveness. A structured approach for such usage may be formulated if strategies priorities and goals are also studied formally.

The most critical issue that needs to be addressed for using S-MCM as a basis for effectiveness enhancement is the mapping between S-MCM variables and succinct/brief question set.

Other issues that need to be resolved for usability of S-MCM in process improvement may be listed as follows:

Measures of S-MCM cannot be used to determine the capability level of shipbuilding companies. It is because their aims and needs are different by changing worlds. Also, this transition may be completed and they will be needed some other scales but anyway this was the first step.

Confidential nature of organizational priorities may go on and hampers objective and open formulation of improvement plans.

Internal validity will/can be remains as an issue. The same measures will be used for assessing the effectiveness of other marine-transportation companies.

Determining the appropriate scale for achievement of process attributes is also a significant issue. After collecting relevant data, decision of data evaluation will/may be straightforward.

In Türkiye Most of the variables proposed in S-MCM cannot be used in improvement practically because most of the shipbuilding processes are not defined explicitly by

many companies even by highly IT experienced ones. Initial designs are still bought from abroad. But some of our companies are good at in detailed drawings. (See also 5.5. Suggestions)

Because of these challenging issues, this work has been left out of the scope of the present study. If the technical requirements of process mapping, information transparency issues regarding the organizational priorities of company, questions regarding internal validity and the need for determining the appropriate scale for achievement of process attributes are appropriately conducted. A structured approach for S-MCM based analysis and process improvement may be formulated more accrued than this one.

7.6. Suggestions

National Real Estate and Development Plan revision of our shipyards problems should be solved in the short term and should be opened in front of the foreign investment.

According to The Report [(Ceceli&Ozkilinc-2008) Tuzla Shipyards Zone Master Plan] master plan re-plotted by Türkiye Shipbuilders' Association (GİSBİR) Türkiye Shipbuilders' Association (GİSBİR). This plan sent to UDH (Transportation. Marine and Telecommunication) Ministry of Shipyards and Coastal Structures by the General Directorate of Istanbul Environment and Urban Development Department whit date by 09/05/2014and registered.

One of the conditions required to enter the Business Plan to get permit approved without further delay by the shipyard of Environment and City Ministry therefore has great importance.

Our shipyard is operating on public lands leased from the General Directorate of National Estate. National Real Estate General Directorate made with lease agreements payment of annual rent per square meter price determined over areas that are organized because of the allocation made.

However, Public Finance and Debt Management Law on Regulation of Certain Laws and the Law on the Amendment of 04/18/2013 Decree were published in the Official Gazette No. 28.622.

Henceforth the pre-paid rental rate of one thousand of turnover and thus demand exorbitant rent increases has been avoided.

It is essential that General Directorate of National Estate remaining lease term of the new lease agreements signed with it is imperative to rise to 30 years.

Because it saves the stability Turkish shipbuilding industry in recent years attracting the attention of foreign investors and some investors want to come to Türkiye from all over the world.

However, the shipyard to be leased for 49 years by the National Property of the land and (to the end of their term) to have remained on average 20 years is slowing down their investment plans for the sector to foreign investors. The Turkish shipbuilding industry millions of dollars into extending the shipyard of the lease term it was believed the draw in Türkiye. However, after failed coup attempt in 15 July 2016 there have been published so many KHK's[43]. Article 29 of the KHK #678 solved these leasing problems. (Official Gazette, http://www.resmigazete.gov.tr/eskiler/2016/11/20161122-2.htm)

Under the regulation of Shipyards Boat Building, Berth Places applications should be included in the scope of our shipyard partial business/business permits should be finalized urgently.

Revised zoning plan carries great importance. An essential part of the shipyard has received partial operating permit which is according to the regulations in force until 10 August 2015 on the face of working licenses must be completed.

[43] KHK means Emergency Decree Law.

Realistic and accurate data to gather information to prevent pollution is also very important. The benefit provided by the shipbuilding industry to the national economy will enable analysis to be made of healthy by this means.

Obstacles in front of the unification of sector firms should be removed. Ensuring the consolidation and financial strength of the foreign sector representatives should be forming a partnership with this company.

Several variations of consolidation can be generated. These variations purchase or partnerships or another company to operate the structures established under the roof can be possible.

Our existing shipyards which, when compared with the size and capacity of the shipyards in the Far East, except for some medium and small-scale shipyards.

To be on this scale, in addition to not being able to build large-tonnage ships disadvantage brings with it many advantages.

There has to be many new shipyards that build and maintenance at the same time.

Our shipyards can determine their capacity; they have already had good performance and producing in the area suitable results. They can understand theyselfs and concentrate on their strength potentials.

Our shipyards installed capacity owned, infrastructure and technology, because they have specialized and trained workforce; yachts, tugboats, chemical tankers, timber vessels, Coasters, military ship is such segments in branching state. There has been a vast improvement in military (naval) areas like Milgem. MİLGEM means national warship. The project has exciting and long story. Up to now all, four of those "Ada" Class Corvettes have been launched, starting from TCG Heybeliada Corvette started in year 2011. Other three corvettes have been launched TGC Büyükada in year 2013, TGC Burgazada in year 2014, and Kınalıada in year 2017 respectively. Now Turkish navy wants to build up national aircraft ship and frigate (Örnek, 2016).

Also, specialized in the repair and renovation, it has become a regional power. For increased capacity if demand can be met with average productivity growth, the reduction of operating costs will be involved. The gold solution in production phase for this problem is ‘group technology’. Some merging examples gave good results up to now.

Design dependency from abroad is another hot topic. State, ministries and TÜ-BİTAK have to concerns this topic. One of the outcome of this study must be this fact: If they want to support shipbuilding industry in Türkiye and if they consider this sector as strategic; they have to analysis sector using different tools. This proposal is one of them. Also, one can quickly realize that design dependency is maybe first of them.

Including these work, using some other measurement tools in the future ‘well-skilled person or person who make design’ will be supported by those organizations. That is; state will give found and encourage to get design skilled person employment.

8. REFERENCES

1. +SAFE. V1.2 A Safety Extension to CMMI-DEV. V1.2. 2015.

2. *6331 SAYILI IS SAGLIGI VE GUVENLIGI KANUNU*. Ankara: Çalisma ve Sosyal Guvenlik Bakanligi. 2012.

3. A. Yildiz. 'TURKIYE'DE TERSANELERIN TARIHI ve GEMI INSA SANAYISININ GELISIMI'. *Mühendis ve Makina*. vol. 49578. pp. 23-47. 2008.

4. Alderton. T. The Global Seafarer. Geneva: International Labour Office. 2004. Print.

5. Apdpowercenter.com. 'SMAW. FCAW. GTAW and GMAW welding processes explained APD Power Center Phoenix Arizona'. 2014. [Online]. Available: http://apdpowercenter.com/welding_process.html. [Accessed: 21- Feb- 2015].

6. Aws.org. 'American Welding Society (AWS)'. 2015. [Online]. Available: http://www.aws.org/w/a/. [Accessed: 21- Feb- 2015].

7. B. Docherty. 'RISK ASSESSMENT SURVEYS SHIPYARDS & PROJECTS'. Piraeus Greece

8. Barobirlik.org.tr.. 'UNION OF THE TURKISH BAR ASSOCIATIONS ©2013'. N.p.. 2014. Web. 26 Feb. 2015.

9. BAYKAL, R. (2017). TERSANELERIMIZ VE DENIZCILIK KURULUSLARIMIZ. 1st ed. ISTANBUL: ITU VAKFI YAYINLARI, pp.87-89

10. BDI. Wikipedia 2015. Web. 26 Feb. 2015.

11. Berkeley University. 'George Akerlof Wins Nobel Prize in Economics'. 2001. [Online].Available: ttp://www.berkeley.edu/news/features/2001/nobel/index.html. [Accessed: 21- Feb- 2015].

12. Blohmvoss.com. Blohm+Voss'. Visited May 2016. Available: http://www.blohmvoss.com/en/corporate/content/blohm-voss/company. [Accessed: 19- Agust- 2017]

13. Blohmvoss.com.. 'Blohm+Voss'. N.p.. 2015. Web. 26 Feb. 2015.

14. BusinessDictionary.com. (2017). What is competition? Definition and meaning. [online] Available at: http://www.businessdictionary.com/definition/competition.html [Accessed 19 Aug. 2017].

15. Canan. Sinan. Kimsenin Bilemeyecegi Seyler. Ankara: Tuti Kitap. 2015. Print.

16. Cesa.eu. 'CESA - Community of European Shipyards Associations'. [Online]. Available: http://www.cesa.eu/leadership. [Accessed: 21- Feb- 2015].

17. Cesa.eu.. 'CESA - Community Of European Shipyards Associations'. N.p.. 2015. Web. 26 Feb. 2015.

18. Ceylan. Huseyin. 'Türkiye'Deki İş Kazalarının Genel Görünümü ve Gelişmiş Ülkelerle Kıyaslanması'. International Journal of Engineering Research and Development 3.2 (2011): 18-24. Web. 26 Feb. 2015.

19. CLARKSONS THE HEART OF GLOBAL SHIPPING. 'SERVICES/ BROKING/ SHORTSEA'. 2014. [Online]. Available: 1. http://www.clarksons.com/services/broking/shortsea/. [Accessed: 21- Feb- 2015].

20. Clarksons. 'Clarksons | Clarksons'. 2015. [Online]. Available: http://www.clarksons.com/. [Accessed: 22- Feb- 2015].

21. Council Working Party in Shipbuilding of OECD. 'PEER REVIEW OF JAPANESE GOVERNMENT SUPPORT MEASURES TO THE SHIPBUILDING SECTOR'. OECD. Paris. 2013.

22. D. Irak. 'AN APPROACH TO DEVELOP A 3-LAYER HOLISTIC MARITIMIZATION MODEL AND ITS ANALYSIS WITH INFERENTIAL STATISTICAL METHODS'. Graduate. Pirireis University. 2014.

23. D. KETCHEN Jr. and C. SHOOK. 'THE APPLICATION OF CLUSTER ANALYSIS IN STRATEGIC MANAGEMENT RESEARCH: AN ANALYSIS AND CRITIQUE'. *Strat. Mgmt. J.*. vol. 17. No. 6. Pp. 441-458. 1996.

24. D. Kim and G. Grant. 'E-government maturity model using the capability maturity model integration'. *Journal of Systems and Information Technology*. Vol. 12. no. 3. pp. 230-244. 2010.

25. D. Moura and R. Botter. 'Can a shipyard work towards lean shipbuilding or agile manufacturing?'.*Sustainable Maritime Transportation and Exploitation of Sea Resources*. 2012.

26. D. Proenca. C. Becker. R. Vieira. G. Antunes. M. Da Silva. J. Borbinha and H. Kulovits. 'Evaluating a Process for Developing a Capability Maturity Model'. *System Engineering*. p. 1474. 2009.

27. D. Ryane. 'The Next Generation of Innovation in the Digital Shipyard'. in *Re-Birth of the Marine Technical Community*. Ottawa. 2012.

28. D. White. 'Cultural Change and Capability Maturity'. 2012.

29. Deadweight tonnage. *Wikipedia*. 2015.

30. Definitions.uslegal.com. 'Green Production Law & Legal Definition'. 2015. [Online]. Available: http://definitions.uslegal.com/g/green-production/. [Accessed: 21- Feb- 2015].

31. Deniz Ticaret Odasi.. 'DTO'. N.p.. 2015. Web. 26 Feb. 2015.

32. DPT (State Planing Organisation). 'DORDUNCU BES YILLIK (1979 - 1983) KALKINMA PLANI'. State Planning Organisation. Ankara. 1978.

33. E. Bates. 'Determinants of Achieving Effective Shared Situational Awareness within the Context of Global Maritime Partnerships'. Command and Control Research Program.

34. E. Dizdar and I. Toprak. 'TERSANECİILIKTE OLUMLU IS KAZALARININ KAZAZEDENIN EGITIM DURUMUNA GORE ANALIZI'. *International Iron & Steel Symposium*. pp. 1202-1205. 2012.

35. Economics Online. 2015. [On-line]. Available: http://www.economicsonline.co.uk/Managing_the_economy/The_multiplier_effect.html. [Accessed: 21- Feb- 2015].

36. Ekonomi Bakanligi. 'Ihracat'. 2012. [Online]. Available: 1. http://www.ibp.gov.tr/pg/sektorpdf/sanayi/gemi_insa_sanayi.pdf. [Accessed: 21- Feb- 2015]

37. Erdoğan, O., Aslanoglu, E., Kâhyaoğlu, N., Akdeniz, Z., Albayrak, T., Karahasan, B., Arslan, A., Tata, K. and Sernikli, S. (2017). TURK GEMI INSA SANAYININ REKABET GUCUNUN ARTIRILMASI. Istanbul: GISBIR, pp.47,48,51,52. **In-text:** (Erdoğan, Aslanoğlu, Kâhyaoğlu et al., 2017)

38. Ertuğrul, E., Özgür, A., Parasayan, O., Emir, B. and Balcan, B. (2017). Mersin'de Bulunan Antik Tersane: Yrd. Doç. Dr. Hakan Öniz Röportajı | Arkeofili. [online] Arkeofili. Available at: http://arkeofili.com/mersinde-bulunan-dev-antik-tersane-yrd-doc-dr-hakan-oniz-roportaji/ [Accessed 19 Aug. 2017]. **In-text:** (Ertuğrul et al., 2017)

39. European Commission Enterprise Industry. 2015. [Online]. Available: 1. http://ec.europa.eu/enterprise/sectors/maritime/shipbuilding/index_en.htm. [Accessed: 21- Feb- 2015].

40. European Commission.. The Sea. New Opportunities For Future. Brussels: N.p.. 2013. Web. 26 Feb. 2015.

41. Europedia.moussis.eu. 'Europedia - Shipbuilding and maritime industries in the EU'. 2011. [Online]. Available: http://www.europedia.moussis.eu/books/Book_2/6/17/03/02/?all=1. [Accessed: 21- Feb- 2015].

42. F. Ceceli and M. Ozkilinc. 'Tersanecilik Sektörü ile İş Sağlığı ve Güvenliği Açısından Tuzla Tersaneler Bölgesinin İncelenmesi ve Değerlendirilmesi Hakkında'. TC Cumhurbaskanligi. Ankara. 2008.

43. F. PROUT. R. BAKER and H. DeMATTIA. 'COMBATANT CAPABILITY ASSESSMENT-STATUS IN THE SHIP DESIGN PROCESS'. *Naval Engineers Journal*. Vol. 86. no. 3. pp. 56-66. 1974.

44. F. Yucalar and S. Erdoğan. 'A QUESTIONNAIRE BASED METHOD FOR CMMI LEVEL 2 MATURITY ASSESSMENT'. *JOURNAL OF AERONAUTICS AND SPACE TECHNOLOGIES*. Vol. 4. no. 239-46. Pp. 39-46. 2009.

45. Fanucamerica.com. 'FANUC America - Automation Solutions for CNC Systems. Industrial Robotics & ROBOMACHINE'. 2015. [Online]. Available: http://www.fanucamerica.com/corporate-home.aspx. [Accessed: 21- Feb- 2015].

46. Fanucamerica.com.. 'FANUC America - Automation Solutions For CNC Systems. Industrial Robotics & ROBOMACHINE'. N.p.. 2015. Web. 26 Feb. 2015.

47. Federalreserve.gov.. 'Board of Governors Of The Federal Reserve System'. N.p.. 2015. Web. 26 Feb. 2015.

48. G. Akerlof. 'The Market for "Lemons": Quality Uncertainty and the Market Mechanism'. *The Quarterly Journal of Economics*. Vol. 84. No. 3. p. 488. 1970.

49. G. Burnett. D. Finke. D. Medeiros and M. Traband. 'AUTOMATING THE DEVELOPMENT OF SHIPYARD MANUFACTURING MODELS'. 2008.

50. G. Tokdemir. 'AN ASSESSMENT MODEL FOR WEB-BASED INFORMATION SYSTEM EFFECTIVENESS'. Ph.D. METU. THE GRADUATE SCHOOL OF INFORMATICS. 2009.

51. GARCIA, S. Http://Citeseerx.Ist.Psu.Edu/Viewdoc/Download?Doi=10.1.1.123.392&Rep=Rep1&Type=Pdf [Accessed 18 Aug. 2017]. IN-TEXT: (GARCIA, 2017)

52. GİSBİR. 'Year 2013 Sector Report'. GİSBİR. Istanbul. 2013.

53. GİSBİR. ‘Tersanelerin Guncel Durumu’ Istanbul. 2014.

54. Greece Discussions. Istanbul. Yenibosna: N.p.. 2007. Print. Foreign Trade Complex Greece Country Discussions.

55. Group Member. 'DEFINING THE FUTURE OF THE EUROPEAN SHIPBUILDING AND SHIP REPAIR INDUSTRY'. European Commission. Brussels. 2003.

56. H. Brtolo. *Green design. Materials and manufacturing processes*. London: CRC Press. 2013.

57. H. CHUNG. T. Lamb and J. SHIN. 'A GENERIC SHIPYARD COMPUTER MODEL -- A TOOL FOR DESIGN FOR PRODUCTION'. *JOURNAL OF SHIP PRODUCTION*. Vol. 16. Pp. 160-172. 2000.

58. Hejase. Hussin J. et al. 'Applying Emotional Intelligence in Lebanon: An Exploratory Study'. Universal Journal of Management and Social Sciences 2.6 (2012): n. Pag. Print.

59. Hejase. S. Al-Sayed. Z. Haddad and B. Hamdar. 'Applying Emotional Intelligence in Lebanon: An Exploratory Study'. *Universal Journal of Management and Social Sciences*. Vol. 2. 2012.

60. http://www.investopedia.com/terms/p/porter-diamond.asp [Accessed: 19- Agt- 2017].

61. I. Spikin. 'A COMPREHENSIVE RISK MATURITY MODEL FOR DUTCH MUNICIPALITIES'. Ph.D. University of Twente. 2013.

62. Imo.org. 'IMO | International Convention for the Prevention of Pollution from Ships (MARPOL)'. 2015. [Online]. Available: http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx. [Accessed: 21- Feb- 2015].

63. Industrial Union. 'US Ship Building Industry: Shipbuilding and Ship Repair'. 2011. [Online]. Available: http://www.industriall-union.org/sites/default/files/uploads/documents/Kan-meeting-DenmarkSHIP/iamaw-usa.pdf. [Accessed: 21- Feb- 2015].

64. InterFigure.com. 'Technology for Shipbuilding Companies | InterFigure Shipbuilding Plans'. 2015. [Online]. Available: http://www.interFigure.com/learnmore/ppm/shipbuilding/shipbuilding-companies.aspx. [Accessed: 21- Feb- 2015].

65. International Labor Organization. 'Conventions and Recommendations'. [Online]. Available: 1. http://ilo.org/global/standards/introduction-to-international-labour-standards/conventions-and-recommendations/lang--en/index.htm. [Accessed: 21- Feb- 2015].

66. International Telecommunication Union. 'E-Readiness Assessment of Egypt'. 2015. [Online]. Available: https://www.itu.int/osg/spu/ni/digitalbridges/presentations/07-Hashem.pdf. [Accessed: 21- Feb- 2015]

67. J. Armstrong. R. Barbour. R. Hefner and D. Kitson. 'Standard CMMISM appraisal method for process improvement (SCAMPISM): Improvements and integration'. *Syst. Engin.*. vol. 5. no. 1. pp. 19-26. 2002.

68. J. John. V. Dixit and R. Srivastava. 'Indian Shipbuilding in the Global Context: An empirical study on current state of industry and exploring scope for improvement'. *Academia*. 2011.

69. Joint Hull Committee. Lloyd. 'Shipyard Risk Assessment Form'. London. 2009

70. K. Crowston and J. Qin. 'A capability maturity model for scientific data management'. *Proc. Am. Soc. Info. Sci. Tech.*. vol. 47. No. 1. pp. 1-2. 2010.

71. K. Ferraiolo. 'The Systems Security Engineering Capability Maturity Model'.

72. K. Shin and P. Ciccantel. 'THE STEEL AND SHIPBUILDING INDUSTRIES OF SOUTH KOREA: RISING EAST ASIA AND GLOBALIZATION'. *American Sociological Association*. vol.. no. 2. pp. 167-192. 2009.

73. Kobimiyim.tobb.org.tr. (2015). TOBB-Kobi Bilgi Sitesi. [online] Available at: http://kobimiyim.tobb.org.tr/Default.aspx [Accessed 3 Mar. 2015].

74. L. Byars. L. Rue and S. Zahra. *Strategic management*. Chicago: Irwin. 1996.

75. L. Pearson. 'Shipbuilding Industry Outlook'. *Reportlinker.com*. 2015. [Online]. Available: http://www.reportlinker.com/ci02322/Shipbuilding.html. [Accessed: 21- Feb- 2015].

76. LAMB, T. Ship design and construction Table 3, 3-18 **In-text:** (Lamb, 2005)

77. M. Ben-Menachem. 'Review of "CMMI: guidelines for process integration and product improvement by Mary Beth Chrissis. Mike Konrad and Sandy Shrum." Addison Wesley 2003'. *SIGSOFT Softw. Eng. Notes*. Vol. 29. No. 5. p. 37. 2004.

78. M. Chrissis. M. Konrad and S. Shrum. *CMMI*. Boston: Addison-Wesley. 2003.

79. M. Krause. F. Roland. M. Heinemann and D. Steinhauer. 'Discrete Event Simulation: An Efficient Tool to Assist Shipyard Investment and Production Planning'. *Journal of Ship Production*. Vol. 20. No. 3. 2004.

80. M. Onosato and K. Iwata. 'Development of a Virtual Manufacturing System by Integrating Product Models and Factory Models'. *CIRP Annals - Manufacturing Technology*. Vol. 42. No. 1. pp. 475-478. 1993.

81. M. Roglinger. J. Poppelbus and J. Becker. 'Maturity models in business process management'.*Business Process Mgmt Journal*. Vol. 18. No. 2. pp. 328-346. 2012.

82. M. Stopford. *Maritime economics*. London: Routledge. 2009.

83. M.S. Cülfik. Intewiev. Golden Horn. Istanbul. 25 March 2015.

84. Marine Systems Division Transportation Research Institute The University of Michigan. 'SHIPBUILDING STANDARDS MASTER PLAN UPDATE'. 1997.

85. N. Cesmeci. 'Safety Quality and Environmental Management'. Pirireis Univesity Tuzla Istanbul. 2013.

86. N. Kâhyaoğlu. 'Operationel and Strategic Management on Shipbuilding'. Pirireis University. 2014.

87. Nation Master. N.p.. 2015. Web. 26 Feb. 2015.

88. O. Cetin. *Denizci Turkiye Icin Yol Haritasi*. Istanbul: Donence Basim ve Yayin Hizmetleri. 2012.

89. O. Erdoğan. '2013 and 2014 in World Economy and Maritime Markets'. *Sea News*. 2014.

90. OECD Council Working Party on Shipbuilding (WP6). 'The Shipbuilding Industry in Türkiye'. 2011.

91. OECD Council Working Party on Shipbuilding. 'Report on ship financing'. Paris. 2007.

92. Ohsas-18001-occupational-health-and-safety.com. 'Code of Practice'. 2015. [Online]. Available: http://www.ohsas-18001-occupational-health-and-safety.com/procedure.htm. [Accessed: 21- Feb- 2015].

93. Öngel. F. (2014). TÜRKİYE'DE TAŞERONLAŞMANIN BOYUTLARI. Diskar. [online] Disk. pp.40-51. Available at: http://www.disk.org.tr/wp-content/uploads/2014/02/DiSKAR_06.pdf [Accessed 3 Mar. 2015].

94. Örnek, Ö. (2017). Milgem'in Öyküsü. First Ed. Istanbul: Kirmizi Kedi Yayinevi, p.25.

95. Osorio. Benat Bilbao. Soumitra Dutta. and Bruno Lanvin. 'The Global Information Technology Report'. Growth and Jobs in a Hyperconnected World (2013): n. Pag. Web. 26 Feb. 2015

96. R. Mickeviciene. 'Global Competition in Shipbuilding: Trends and Challenges for Europe'.

97. R. Mickeviciene. 'Global Shipbuilding Competition: Trends and Challenges for Europe. The Economic Geographic of Globalization'. *InTech*. 2011.

98. Research Report on China's Shipbuilding Industry. 2013-2017. 'Research Report on China's Shipbuilding Industry. 2013-2017'. 2012.

99. Research Report on China's Shipbuilding Industry. 2013-2017. 2015.

100. Resmigazete.gov.tr.. N.p.. 2015. Web. 26 Feb. 2015 and 22 Nov 2016.

101. Robot Works. N.p.. 2015. Web. 26 Feb. 2015.

102. Robots Works. 'Plasma Cutting Robots'. [Online]. Available: 1. http://www.robots.com/applications/plasma-cutting. [Accessed: 21- Feb- 2015].

103. Rosendal. Christian. 'Descriptive Classification Theory and Separable Banach Spaces'. Notice of the AMS 58.9 (2011): n. Pag. Web. 24 May 2015.

104. Rumbaugh. James et al. Object Oriented Modeling and Design. Estados Unidos: Prentice Hall. 1991. Print.

105. S. Brocklehurst. 'Govan: A shipbuilding history'. *BBC News*. 2013. [Online]. Available: http://www.bbc.co.uk/news/uk-scotland-glasgow-west-24820573. [Accessed: 21- Feb- 2015].

106. S. Caracchi. P. Sriram. M. Semini and J. Strandhagen. 'Capability Maturity Model Integration for Ship Design and Contruction'. 2014.

107. S. Yarlıkaş. 'CLOUD COMPUTING EFFECTIVENESS ASSESSMENT'. PH.D. METU. Department of Information System. 2014.

108. Sea-web.com.. 'Sea-Web - Welcome'. N.p.. 2008. Web. 26 Feb. 2015.

109. Ship2yard.com The largest worldwide shipyard database - Ship2yard.com. [online] Available at: http://ship2yard.com [Accessed 23 Aug. 2017].

110. Shipbuilder Council of America. 'Advocating for a strong shipyard industrial base since 1920'. 2015. [Online]. Available: https://shipbuilders.org/. [Accessed: 21- Feb- 2015].

111. Shipbuildinghistory.com. 'U.S. Shipbuilding History. Shipbuilding Records. Tim Colton'. 2015. [Online]. Available: http://www.shipbuildinghistory.com/. [Accessed: 21- Feb- 2015].

112. Software Engineering Institute's. 'Introduction - IT Architecture Capability Maturity Model'. 2003.

113. Surveygizmo.com.. 'Surveygizmo | Professional Online Survey Software & Form Builder'. N.p.. 2015. Web. 26 Feb. 2015

114. T. Lamb. H. Chung. M. Spicknall. J. Shin. J. Woo and P. Koenig. 'Simulation-Based Performance Improvement for Shipbuilding Processes'. *Journal of Ship Production*. Vol. 22. No. 2. pp. 49-65. 2006.

115. TEU. Wikipedia 2015. Web. 26 Feb. 2015.

116. The Economist. 'Extreme drilling'. 2013. [Online]. Available: http://www.economist.com/blogs/schumpeter/2013/10/shipbuilding-south-korea. [Accessed: 21- Feb- 2015].

117. The Global Competitiveness Report 2014 - 2015 | World Economic Forum. 'The Global Competitiveness Report 2014 - 2015'. 2015. [Online]. Available: http://www.weforum.org/issues/global-competitiveness. [Accessed: 22- Feb- 2015].

118. Theoretical Computer Science. 2015. [Online]. Available: http://cstheory.stackexchange.com/questions/11261/need-a-good-overview-for-succinct-data-structure-algorithms. [Accessed: 21- Feb- 2015].

119. TMMI Foundation. 'Test Maturity Model Integration'. TMMI Foundation. Ireland. 2012.

120. Trb.org.. 'Transportation Research Board | Main'. N.p.. 2015. Web. 26 Feb. 2015.

121. Tuik.gov.tr. 'TUIK'. 2015. [Online]. Available: http://www.tuik.gov.tr/HbGetirHTML.do?id=18616. [Accessed: 22- Feb- 2015].

122. Turkloydu.org.. 'Türk Loydu Vakfı - Deniz Endüstrisi Hakkında'. N.p.. 2006. Web. 26 Feb. 2015.

123. Ubak.gov.tr. 2015. [Online]. Available: http://www.ubak.gov.tr/BLSM_WIYS/ISTANBUL/tr/html/20120528_121237_4083_1_4066.html. [Accessed: 22- May- 2015].

124. *ULUSLARARASI ÇEVRE KORUMA SÖZLEŞMELERİ*. 2nd ed. Ankara: Turkiye Barolar Birligi. 2014.

125. Unido.org.. 'UNIDO | United Nations Industrial Development Organization'. N.p.. 2015. Web. 26 Feb. 2015.

126. US Naval Forces Africa. 'Capacity building for Maritime Domain Awareness in East Africa'. 2015. [Online]. Available: http://ipsc.jrc.ec.europa.eu/fileadmin/repository/mare/vescosur/pmar_wks/US_Naval_Forces_presentation.pdf. [Accessed: 21- Feb- 2015].

127. User. Super. 'ALPT'. Inrotech.com. N.p.. 2015. Web. 26 Feb. 2015.

128. Vizteams. (2017). Top 6 Benefits of Adopting Capability Maturity Model. [online] Available at: http://www.vizteams.com/blog/top-6-benefits-of-adopting-capability-maturity-model-cmmi-focus-software-companies/ [Accessed 21 Aug. 2017].

129. Whitfield. R.I. et al. 'Ship Product Modeling'. Journal of Ship Production 19.4 (2003): 230-245.

130. Wikipedia.. 'Type I And Type II Errors'. N.p.. 2015. Web. 24 May 2015.

9. APPENDICES

9.1. Appendix A. Survey Questions

TERSANELER ICIN KAPASİTE&OLGUNLUK ÖLÇME KRİTERLERİ ALAN ARASTIRMASI SORULARI

Bu anket ile herhangi bir tersanenin kapasite olgunluk performans kriterle-rini ölçmeye yarayacak bir indeks geliştirilmeye çalışılmaktadır. Anket tam-amen gönüllülük esasına göre doldurulacak olup veriler üçüncü taraflarla paylaşılmayacaktır.

Ankette sorulan sorulara:

1. Nümerik değerler ve aralıklar
2. Spesifik cevaplar
3. Var ya da Yok
4. Çoktan seçme
5. Likert ölçeği
6. Evet ya da Hayır
7. Fikrim Yok
8. Çoklu Seçme
9. Ucu açık cevaplar

Kullanılarak cevap verilecektir.

Değerlendirme ölçeği soru tipi çok benzer bir şekilde işler. Bu genelde bir ‘katılma - katılmama’ ölçeği olarak değerlendirilir. Likert ölçekleri matristeki her bir satıra 1'den

5'e kadar skorlar verilmistir. Likert ölçeğinin amacı. her bir yanıtlayan için skorları toplamaktır (değerlendirme ortalaması); likert'in kastettiği şey ise beyanın aynı davranışın farklı yönlerini temsil edeceğidir. Bu testte likert ölçeği olgunluk ölçüm araçlarından biri olarak kullanılmaktadır.

1’den 5’e kadar beş kutu vardır. Bunların anlamı:

1. Kesinlikle katılmıyorum☐

2. Katılmıyorum☐

3. Fikrim yok ☐

4. Katılıyorum☐

5. Kesinlikle katılıyorum☐

Olarak değerlendirilecektir

SORULAR

1. Tersanenizin faaliyet gösterdiği lokasyonu veya coğrafi bölgeyi en uygun şekilde seçiniz

- Marmara- Tuzla
- Marmara-Yalova
- Marmara-Diğer
- Ege
- Karadeniz
- Akdeniz

2. Tersanenizin faaliyet gösterdiği kolu en uygun şekilde işaretleyiniz.

- Yeni İnşa
- Tamir ve Bakım
- Orta (Yeni inşa ve tamir bakım birlikte)
- İş Yok

3. Tersaneniz kaç yıldır faaliyettedir?

- <10
- 11-20
- 21-30
- 31-40
- 41-50
- >51

4. Tersanenizde kadrolu olarak kaç işçi istihdam edilmektedir?

- 50-249
- 250-499
- >500

5. Tersanenizde alt yüklenici üzerinden çalışan işçi sayısı nedir?

Bu sayı dönemlere göre değişebilir. Ancak bir defasında istihdam edilebilen en yüksek işçi sayısı araştırılmaktadır.

- <500
- 501-1000
- >1001

6. Tersanenin son 5 yıllık bilançosu ortalama olarak değerlendirilirse 'kârda' olduğunu düşünüyorum.

1. Hiç katılmıyorum☐2. Katılmıyorum☐3. Fikrim yok ☐4. Katılıyorum☐5. Tamamen katılıyorum☐olarak değerlendirilecektir

7. Tersaneniz savunma sanayi projeleri almakta mıdır?

- Evet
- Hayır

8. Tersaneniz savunma sanayi projeleri alıyor ise bu projeler toplam cironun yüzde kaçını oluşturmaktadır?

- <25
- 25-50
- >50

9. Tersane son 2 yıl (2014-2015) içinde ölümlü/ağır yaralanmalı iş yeri kazası oldu mu?

- Ölümlü kaza oldu
- Ağır yaralanmalı kaza oldu
- Ölümlü ve ağır yaralanmalı kaza olmadı

10. Tersane son 5 yılda Çevre Kirliliği ve/veya Atık Yönetim Sistemi konusunda sorumlu kurum/kuruluşlar tarafından denetlendi mi?

- Denetlendi-Ceza/Uyarı almadı
- Denetlendi-Ceza/Uyarı aldı
- Denetlenmedi/Fikrim Yok

11. Tersane son 5 yılda Sosyal Güvenlik Bölge Müdürlüğü tarafından denetlendi mi?

- Denetlendi-Ceza/Uyarı almadı
- Denetlendi-Ceza/Uyarı aldı
- Denetlenmedi/Fikrim Yok

12. Tersanenin toplam kıyı uzunluğu (cephesi) kaç metredir?

- < 100m
- 100-200m

- >200

13. Tersanenin ek ve eklentileri ile birlikte kaç farklı yerleşkede faaliyet göstermektedir? (Tersane birden fazla lokasyonda faaliyet gösteriyor olabilir.)

- Tüm faaliyetlerimiz tek bir lokasyonda toplanmış durumdadır
- 2 ayrı lokasyonda faaliyet göstermektedir
- 3 ayrı lokasyonda faaliyet göstermektedir
- 4 ayrı lokasyonda faaliyet göstermektedir

14. Tersanenin üzerinde oturduğu toplam alan büyüklüğü (m2) nedir?

- <5000 m2
- 5000- 10000 m2
- 10000-50000 m2
- 50000-100000 m2

15. Tersanenin toplam kapalı alan büyüklüğü (m2) nedir?

- <5000
- 5000- 10000 m2
- 10000-50000 m2

16. Islak/kuru kızakların toplam sayısı nedir?

- 1
- 2
- 3

- >3

17. Kapalı mekanlar (İdari-yönetim. atölyeler. sosyal kullanım) yeterli midir?

1. Hiç katılmıyorum☐2. Katılmıyorum☐3. Fikrim yok ☐4. Katılıyorum☐5. Tamamen katılıyorum☐olarak değerlendirilecektir

18. Tesisinizde havuzunuz var mı?

- Var
- Yok

19. Yıllık çelik işleme kapasitesi nedir?

- <10000 ton
- 10000-20000 ton
- 20000-30000 ton
- >30000 ton

20. Geçen bir yılda tamir/bakımı yapılan gemi sayısı nedir?

- <10
- 11-50
- 51-100

22. Geçen yıl tamir/bakımı yapılan gemi tonajı (DWT) nedir?

- <500 Bin DWT
- 500 Bin-1Milyon DWT
- >1Milyon DWT

23. Geçen yıl inşa edilen gemi sayısı nedir?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- >10

24. Tersanede kullanılan vinçlerin (crane) toplam sayısı nedir?

- 1
- 2
- 3
- 4
- 5
- >5

25. Tersanede kullanılan vinçlerin toplam kaldırma/elleçleme kapasitesi (Ton) nedir?

- >50 Ton
- >100 Ton
- >400 Ton
- >500 Ton
- >1000 Ton

26. Makine parkı ile ilgili toplam kullanım ömrü düşünüldüğünde uygun olan seçenegi işaretleyiniz.

	Ulaşmamıştır	Yarı Ömründedir	Geçmiştir
Kaynak makineleri yarı ömrüne/ömrünü			
Kesme makineleri/robotları yarı ömrüne/ömrünü			
CNC makineleri yarı ömrüne/ömrünü			

27. Aşağıdaki yazılımların tersane işletme ve üretme işlerinde kullanılıp kullanılmadığı araştırılmaktadır.

	Vardır	Yoktur
MRP/Materyal kullanımı ve planlaması yazılımı		
ERP/Kurumsal Kaynak Kullanımı ve planlaması yazılımı		
İSG/ İş Sağlığı ve Güvenliği otomasyonu yazılımı		

28. Aşağıdaki kavramların tersane işletme ve üretim işlerinde kullanılıp

kullanılmadığı araştırılmaktadır.

	Vardır	Yoktur
CAD/CAM vb. Simülasyon yazılımları		
Verimlilik takibi		
Jenerik tersane modeli		
Grup Teknoloji uygulaması		
Marpol ve Solas Regulasyonları		

29. Aşağıdaki belgelerden olanları işaretleyiniz.

	Vardır	Yoktur
OHSAS 18000 Belgesi		
ISO 9001 Toplam Kalite/Standart Sertifikasy-onu/Sistemi		
ISO 14001 Çevre Belgesi		
ISO 5001 Enerji Yönetimi Bel-gesi		

30. Aşağıdaki sorulara uygun olan seklide cevap veriniz.

1. Hiç katılmıyorum☐2. Katılmıyorum☐3. Fikrim yok ☐4. Katılıyorum☐5.

Tamamen katılıyorum☐olarak değerlendirilecektir

	1	2	3	4	5
Tersanenin Resmi Web sayfası vardır					
Tersanenin Resmi Web sayfası günceldir					
Vizyon ve Misyon tanımları vardır					
Vizyon tanımı Stratejik Plan ve Hedefleri içerir					

31. Tersanenizin dizayn/tasarım ofisi var mıdır?

- Var
- Yok

32. Aşağıdaki sorulara uygun olan seklide cevap veriniz.

1. Hiç katılmıyorum☐2. Katılmıyorum☐3. Fikrim yok ☐4. Katılıyorum☐5. Tamamen katılıyorum☐olarak değerlendirilecektir

	1	2	3	4	5
Dizayn/Tasarım/Analiz konularında kendi kaynak-larımızdan faydalanılmaktadır					
Dizayn/Tasarim/Analiz konularında ülke kaynakların-dan faydalanılmaktadır					
Dizayn/Tasarim/Analiz konularında yurtdışı kaynak-lardan faydalanılmaktadır					

33. Tersanenin aşağıdaki konularla ilgili aldığı destek fonu/fonları varsa lütfen ilgili olanı/olanları işaretleyiniz.

- Çalışan desteği
- İhracat desteği
- İthalat desteği
- Kredi desteği
- Ar-Ge desteği
- Arazi desteği
- Diğer

34. Araştırma ve Geliştirme faaliyeti var ise aşağıdakilerden hangisi ya da hangileri ile yapılmaktadır?

- o Öz kaynaklarla yapılır
- o Üniversitelerle işbirliği ile yapılır
- o TÜBİTAK ile yapılır
- o Avrupa birliği fonları ile yapılır
- o Savunma Sanayi Kaynak ve Fonları ile yapılır
- o Diğer

35. İşletmeniz aşağıdakilerden sosyal sorumluluk projesinde rol aldı ise hangi alanda ya da alanlarda olduğunu işaretleyiniz.

- o Sağlık
- o Çevre
- o Eğitim
- o Kültür
- o Spor
- o Diğer

36. Üst yöneticiniz (Genel Müdür ya da CEO) eğitimi ve profesyonel kariyeri göz önünde tutulduğunda tersanecilik sektörünün içinden mi gelmektedir. Sonradan mı bu sektöre girmiştir?

- o Eğitimi ve/veya profesyonel kariyeri denizcilik ve tersanecilikle ilgilidir
- o Başka bir sektörden gelmektedir

37. Bu sektörde faaliyet göstermeye devam etmek istiyor musunuz?

- Evet
- Hayır

38. İşletmenizin bu sektörde faaliyet göstermeye devam etmesi için beklentileriniz nelerdir?

- Gemi İnşaa sanayinin desteklenmesi bir devlet politikası olmalı
- İşletmemizin arazi sorunu çözülmeli
- Uzakdogu ülkeleri ile rekabet edebilmemiz için uygun teşvikler oluşturulmalı
- Kalifiye eleman ihtiyacımız karşılanmalı
- Tasarımdaki yurtdışı bağımlılığı giderilmeli
- İdari mekanizmalar içindeki temsil ağırlığımız artmalı
- Siyasi temsil ağırlığımız artmalı

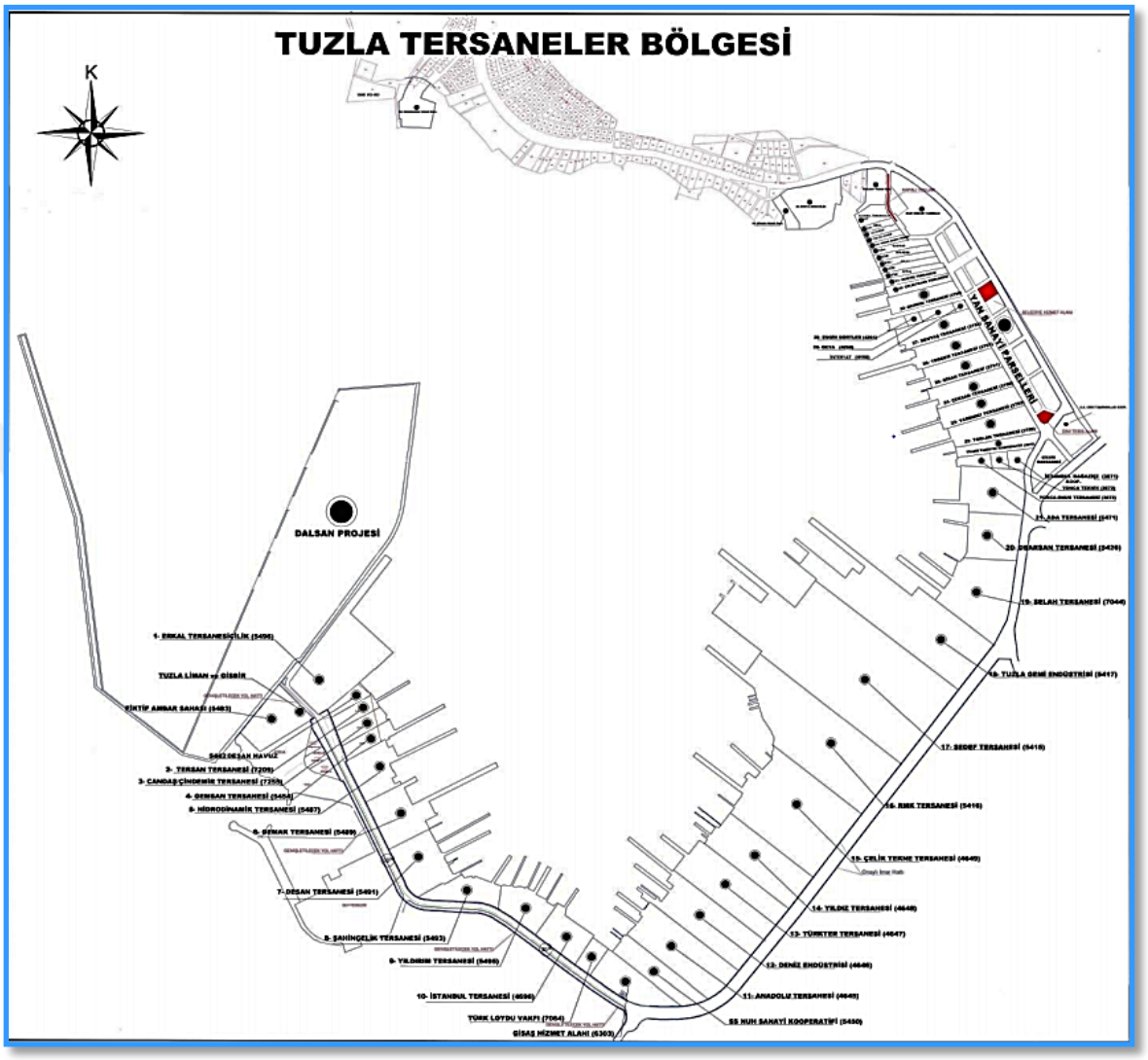
39. İşletmenizin bu sektörde faaliyet göstermeye devam etmesi için beklentileriniz nelerdir?

Yukarıda olmayan seçeneklerle ilgili düşüncelerinizi bu bölüme ekleyebilirsiniz.

40. Eklemek istediğiniz başka bir konu var mı?

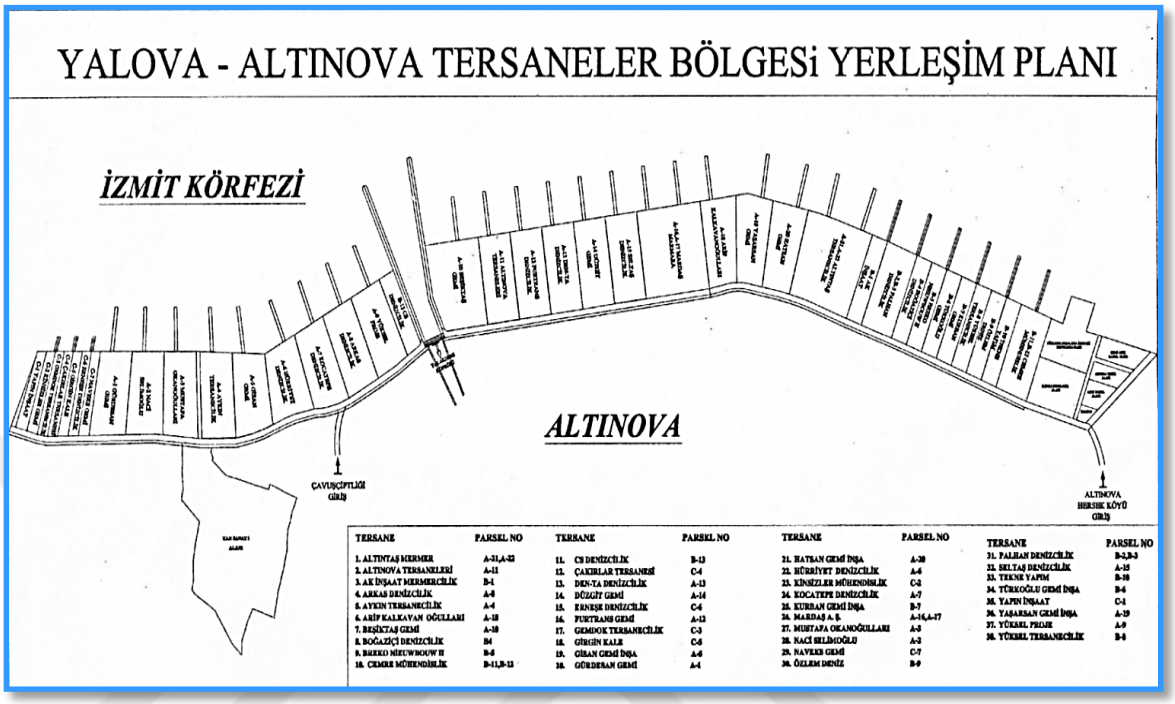
9.2. Appendix B. Index

9.3. Appendix C. Istanbul Tuzla Shipyard Area Sketch



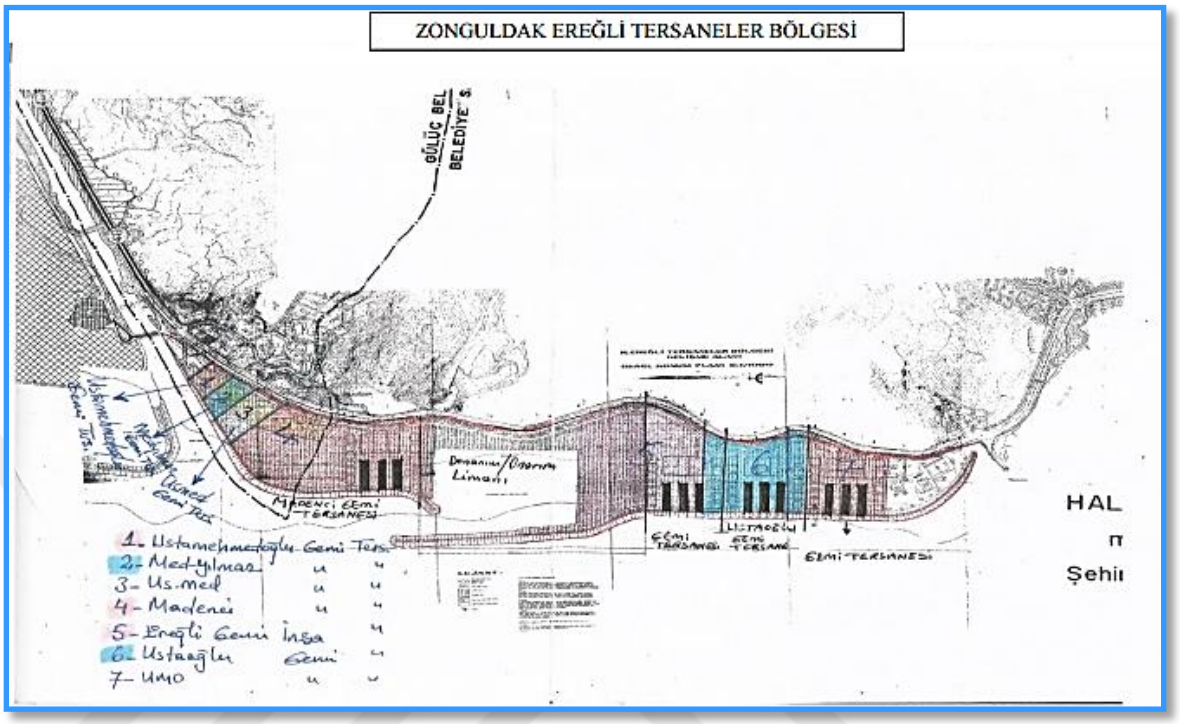
Sketch 1 (GİSBİR. 2015)

9.4. Appendix D. Yalova AltınovaShipyard Area Sketch



Sketch 2 (GİSBİR. 2015)

9.5. Appendix E. Zonguldak-Eregli Shipyard Area Sketch

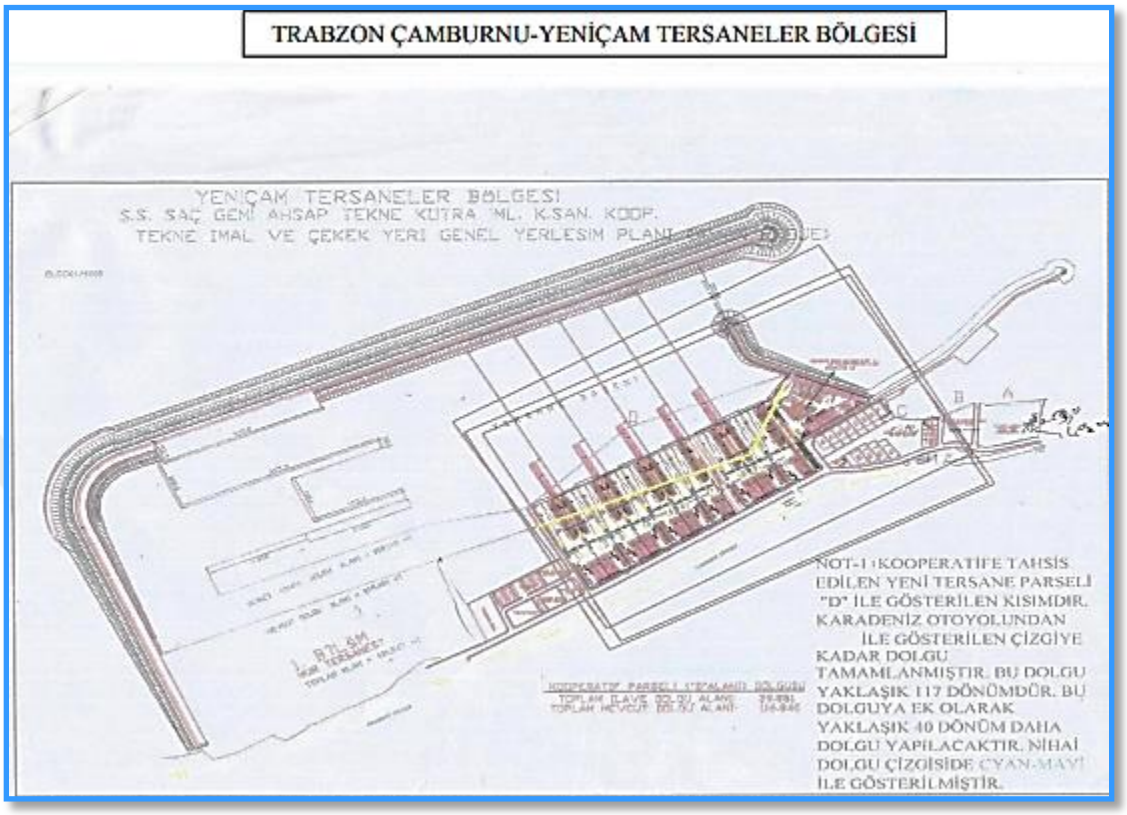


Sketch 3 (GİSBİR. 2015)

9.6. Appendix F. Kocaeli Free Zone Shipyard Area Sketch

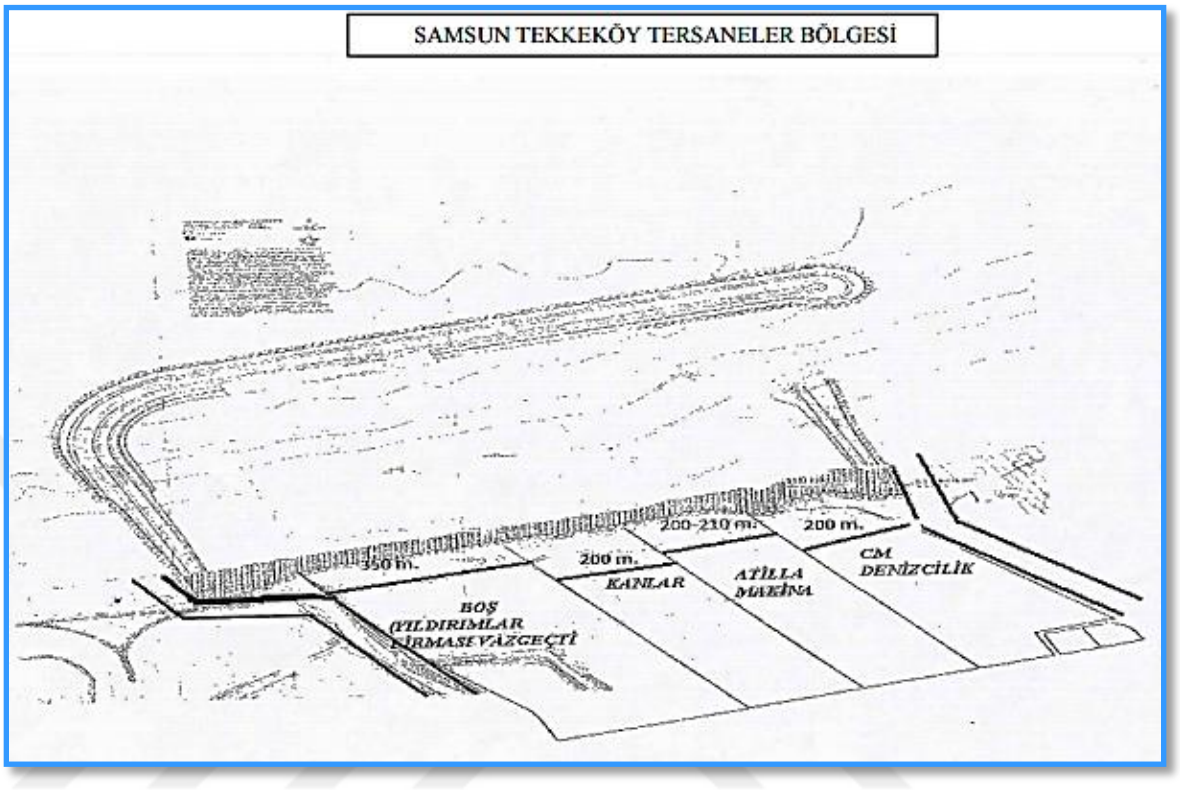
Sketch 4 (GİSBİR. 2015)

9.7. Appendix G. Trabzon Çamburnu Shipyard Area Sketch



Sketch 5 (GİSBİR. 2015)

9.8. Appendix H. Samsun Tekkeköy Shipyard Area Sketch



Sketch 6 (GİSBİR. 2015)

9.9. Appendix I. Historical Haliç Shipyard Area Sketch

Photo-Sketch (http://emlakkulisi.com/halic-tersanesi-halicport-projesi-imar-plani-bakanlik-gundeminde/370480.)

CURRICULUM VITAE

Hakan Yıldırım was born 1972 in Mersin.

His BSc. Degree, Middle East Technical University as Electrical and Electronics Engineer in 1997.

His MSc. Degree Institute of Security Sciences in 2012.

He used to work different governmental and private sector organisations.

He leaded many disruptive projects. Polnet, Afis, Metsis are some of them.

He played forcritical role awareness rising about cyber security in Türkiye.

He is founder of Cyber Security Society of Türkiye.

He is founder of Technology Talking Platform.

He is a member of METU Alumni Foundation.

He published 4 books about electronic life and e-government.

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