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# Key Performance Indicators (KPIs), Shipping Marketing and Safety Orientation: The Case of Greek Tanker Shipping Companies

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**Abstract**

*If you are not sure where you are, how will you find out where to go?*

The aim of this paper is to examine the relationship between the KPIs and the shipping marketing as well as the usefulness of KPIs in shipping companies performance evaluation. The paper brings the importance of KPIs closer to the reader and examines their definition, purpose and role in the shipping company. The first part is devoted to literature review on KPIs. The second part examines the relationship among the KPIs, the shipping marketing and the safety orientation of tanker shipping companies. The third part includes the research methodology; since the tanker market is a safety oriented market, a questionnaire is taken across the tanker shipping companies in Greece. The third part is the analysis of the questionnaire which showed that KPIs improve the marketing planning, the customer relationships and the company's competitiveness. The most important KPIs are safety, operational, technical, environmental, navigational, security and financial indicators. The final part is the conclusion.

**JEL Classification:** M310; M100; M140; R410.
**Keywords:** Key Performance Indicators; Shipping Companies Performance Evaluation; Shipping Marketing; Safety Orientation; Tanker Companies.

## 1. Introduction

The primary objective of an organization is success, which can be achieved with the appropriate strategy. Which are the potentials for tanker shipping companies being successful in the future? The assessment of a tanker shipping enterprise's success potentials should include criteria focused on the market aspects and criteria focused on safety matters.

Shipping companies set strategies in order to reach objectives. In return they develop and follow processes in order to realize strategies through the achievement of ob-

jectives. This is a never ending cycle. The foundations of success are set by processes. A business process is a set of activities which are performed in order to achieve common aims according to well-defined company objectives. These processes contribute towards the achievement of aims and objectives.

During the last ten years, tanker shipping companies adopt the philosophy of shipping marketing and as a consequence their goal is not just earnings but also profitability and not just winning but retaining clients as well. Tanker shipping companies aim at providing safe sea transport services to the right people (charterers / shippers) at the proper place (loading / discharging ports) and time, at a fair price (hire or freight) with suitable promotion. Nevertheless, what makes a tanker shipping company perform adequately? Are the right processes capable to achieve the right objectives? Does the shipping enterprise perform up to the levels required? That explains why shipping enterprises employ performance indicators in order to measure, control and improve. The most successful tanker shipping company is the one that offers the sea transport service to the charterer better than the competitor. But how is success measured?

The financial performance is measured by effectiveness and efficiency. Effectiveness is defined as "the degree to which a predetermined objective or target is met" whereas efficiency is given by "the degree to which inputs are used in relation to a given level of outputs". Is then improvement a synonymous of effectiveness and efficiency? When tanker companies want to improve continuously, can they do so by just improving the account numbers? Measures that determine just the financial performance of the company are deemed inadequate regarding all business aspects. More specifically, the tanker shipping companies need also measures that determine operational, security and environmental aspects.

## 2. Literature Review

### 2.2 Performance Measurement: 20 Years' of Attention

The concept of performance management is still young and has emerged in the last two decades (Sharif, 2002) as a logical response to the question: "How are our firms performing?" What is known as an old management adage, *"you cannot manage what you do not measure"* it is the basis of the performance measurements theories. Getting that one step further, *"if you cannot measure it, you cannot improve it"* (Hamel and Prahalad, 1994) illustrates the importance of the right things being measured and the not so important being left out.

Literature review showed that traditional systems, based on transparent financial measures, cannot integrate all factors that are affecting performance of enterprises and organizations (Freeman and Beale, 1992). Performance management is just part of a larger system of business improvement. For an effective system, managers need a balanced set of performance indicators (Kaplan and Norton, 2001).

Performance indicators are compilations of information that are used to measure and assess performance (Edwards and Thomas, 2005). Moreover they indicate the final mark of a company's efficiency and effectiveness. KPIs represent the basis for measuring bu-

siness and project success. Their purpose is to enable the measurement of performance within companies and the industry, and to initiate benchmarking. Besides direct advantages, KPIs are used as means of communication within stakeholders to inform them about constant improvement endeavors (Vukomanovic *et al*., 2010).

There are seven main reasons why performance measurement is used in the management world: the changing nature of work; increasing competition; specific improvement initiatives; national and international quality awards; changing organizational roles; changing external demands; and the power of information technology (Neely, 1998).

Maskel suggests that performance measurement systems must have the following characteristics (Maskel, 1991, University of Warwick, 2006):

1. They are directly linked to overall business strategy and the company's critical success factors
2. They combine both financial and non financial measures
3. They use different measurements for different areas of the company
4. They are changed over time to reflect changes in strategy and operation
5. They are simple and easy to use
6. They give fast feedback to operators and managers
7. They are intended to teach rather than monitor and control
8. They use benchmarking to set target characteristics of performance measurement systems found in world class companies.

Research in manufacturing has shown that the frameworks in performance measurement systems refer to: quality, customer service, delivery, process time, dependability, speed, cost, flexibility and resource utilization. The company will decide which and how many different measures are needed. Table 1 describes the evaluators that may be used in terms of capacity management, scheduling and delivery in manufacturing.

Throughout the last twenty years various models have been developed to measure the performance of organizations, such as the BSC, the BEM, the KPI, the Capability Maturity Model (CMM), and the Six Sigma. All models have achieved considerable success with regard to the improvement of different sectors organizations' performance (Meng and Minoque, 2011), but the KPI model is more popular with financial management practitioners and organisations. In addition to the selection of effective performance models, the proper selection of performance indicators is also important to the measurement and improvement performance (Meng and Minoque, 2011).

Models, like the European Foundation for Quality Management (e.g. EFQM excellence model), have divided performance indicators on leading, lagging and perceptive measures (Plomaritou *et al.*, 2006). Leading measures are indicative performance measures that assess unfinished processes. Lagging measures are those measures that report accomplished performance and final outcomes and as such they are not able to change the future outcome. Perceptive measures are those measures that report stakeholders' perception in projects and can be lagging or leading (Vukomanovic *et al*., 2010).

**Table 1. Measures used in Manufacturing**

| | | |
|---|---|---|
| Capacity management | Time related: | customer service time, cycle or process time, set up times, machine down-time, time spent on preventative maintenance/total time spent on maintenance, time between overhauls of machinery, value added, actual versus theoretical throughput time |
| | Cost related: | output per equipment, output per metre, output per total labour, cost per operation hour, cost of machine down time, distance travelled, variance against budget, overtime hours/total hours, overtime costs/total payroll cost, Non value adding activities, direct labour productivity and overhead efficiency |
| Scheduling and Delivery | Internal Delivery Performance | production schedule adherence or attainment; number of order amendments and schedule changes |
| | Customer Delivery Performance | customer service level; On-time shipment %, average lateness of orders number of overdue deliveries, order fill %, customer query time, customer order lead time, frequency of delivery, lost sales analysis |
| Inventory | | total stock turnover, stores inventory or work in progress turns, number of days stock, inventory record accuracy, proportion of products in stock, % stock outs, average batch size, average safety stock level, material usage (actual versus standard), distance the material is moved, non moving stock, quantity or value of obsolete stock |
| Quality | Internal Quality | % right first time or first-time yield, % conformance to quality standards, % dependence on post-inspection, % operations measured using statistical process control, number of defects per unit, scrap level, rework level, cost of quality; at the very minimum scrap and rework costs, data accuracy; inventory, bills of material, routing or forecast accuracy, assessment of cleanliness/tidiness |
| | External or Customer Quality | reported customer complaints; surveys of customer satisfaction; warranty claims or costs, mean time between failures |

*Source:* University of Warwick (2006).

## 2.2 Shipping Companies Performance Measurement

Shipping being characterized as a highly competitive industry makes the use of performance indicators extremely important. According to Panayides (2003), the reasons for the increased emphasis on the strategy-performance relationship in shipping include intense competition, the need to attain competitiveness, maximize shareholder wealth, and the requirement to address stakeholder. Consequently it is very important to closely monitor of the performance implications of the adopted competitive strategies.

The boards of directors will make the decision and the senior managers will determine the performance management and information systems (Burgelman, 1991). Thus they must initiate the need and development of performance indicators in order to evaluate and get feedback of their performance, compare it against goals, and benchmark it against competitors.

The choice of the important indicators has impact on the operation and the direction of the organization. Prior to choosing transport performance indicators, the identification of clear objectives, matching the strategy and acceptance of those involved is required (Išoraitea, 2010).

Profitability as a measure is not capable of discriminating excellence (Panayides, 2003). Performance measurement is multi-dimensional (Chakravarthy, 1986). The best value performance indicators can be used for five dimension performance: (Išoraitea, 2010)

1. Strategic objectives: why the service exists and what it seeks to achieve
2. Costs/efficiency – the resources committed to a service: the efficiency with which they are turned into inputs
3. Service delivery outcomes – how well the service is being operated in order to achieve the strategic objectives
4. Quality – explicitly reflecting user's experience of services
5. Fair access – relating to case and equality of access to service.

As with any management decision, indicators must be specific, measurable, achievable, relevant and timely. Examples for transport indicators include: resource or input indicators, output indicators, result indicators, and impact indicates. Financial measures of performance are inadequate for addressing the overall performance of companies and those reports in company accounts may be flawed and not comparable across companies (Panayides, 2003).

## 3. Shipping Marketing, Safety Orientation and Key Performance Indicators

The primary target in any supply chain is the customer and shipping is a part of the supply chain (Pesmatzoglou and Konsta, 2009). Customers for the liner companies are the shippers and for the tramp are the charterers. The KPIs must be customer oriented in marketing or logistical terms. The concept of customer orientation in business markets has attracted attention from both academics and managers and it has been widely used in the marketing discipline. The term customer oriented companies is used to describe how knowledgeable the company is about the clients' needs and how responsive the firm is to them in terms of the continuous value creation and delivery.

In accordance with the customer orientation, the activities of a shipping enterprise must be implemented within the framework of a well-studied philosophy of an effective, productive and responsible marketing. The shipping enterprise must understand the charterers' buying behaviour. A necessary precondition of an effective shipping marketing is the understanding of the different needs the charterers – shippers have within the different segments of the shipping market (Plomaritou, 2008). The shipping company must understand the charterer's behaviour in every stage of the decision process, as well as the existing influences in the above process. Consequently, the enterprise must comprehend the chartering policy of charterers and shippers in tramp and liner market. The lack of understanding the needs the various client groups have, leads to the lack of correct marketing planning and to the failure of providing desired transport services at acceptable freight levels (Plomaritou *et al*., 2011). Correct shipping enterprise's strategy is achieved through planned rational company's actions.

According to a comparative study of charterers' transportation needs in bulk and liner market (Plomaritou, 2011), it was concluded that the most important selection criteria of a shipowner by a charterer in the tanker market are the compliance of the company to the safety requirements concerning vessel's construction, ship's operation and

crew management. The reputation and image of the shipowner in the market, as well as the company's history of losses and damages play a decisive role in the selection of a shipowner by a charterer. The cost of the maritime transport service, i.e. the freight, is not the decisive factor for selecting a ship owner, though it is kept seriously in mind by the charterers. From the above, it is concluded that the decisions of the charterers in the tanker market are more oriented to safety and not to freight. The tanker market is safety oriented.

During the last 10 years, tanker shipping companies adopt the philosophy of social marketing and as a consequence their goal is not just earnings but also profitability and not just winning but retaining clients as well. The philosophy of social marketing presupposes that the duty of the tanker company is to determine the transportation needs of charterers and offer the desired satisfaction more effectively and efficiently than the competitors, in a manner that maintains the environmental protection. Tanker shipping companies aim at providing safe sea transport services to the right people (charterers / shippers) at the proper place (loading / discharging ports) and time, at a fair price (hire or freight) with suitable promotion (Plomaritou, 2006a).

The most successful tanker shipping company is the one that offers the sea transport service to the charterer better than the competitor in a manner that maintains the environmental protection. KPIs play a vital role in the measurement of this success. The shipping company needs processes for measuring the results of marketing plans and for re-feeding them in order to be ascertained that the marketing objectives will be achieved. KPIs assume an important role for measuring and evaluating performance. KPIs provide the right information to the right people at the right time.

KPIs should have the following characteristics (Parmenterg, 2007):

- Nonfinancial measure
- Frequently measured
- Acted on by the CEO and the senior management team
- Understood by all staff
- Ties responsibility to the individual or team
- Has significant impact
- Has positive impact

Polyviou, gives an example on shipping KPI's i.e., *the Lost Time Injury Frequency (LTIF)*, which is a non financial indicator (see Table 2). The company's goal is to keep the LTIF value as low as possible since it will positively affect the company's performance. This will be achieved by lowering off the financial cost associated with the treatment of injuries sustained by the crew and the resulting loss in productivity. Furthermore, the financial cost can be reduced by improving training and security procedures which can lead to fewer accidents, higher morale and increased productivity for the crew. Finally, keeping LTIF value as low as possible, it will satisfy both oil majors and ship owners (Polyviou, 2011).

Since KPIs are the tools for improvement of performance, shipping companies should acknowledge one common set of KPIs, and implement them systematically and methodologically. The shipping industry has moved a step nearer to a "common set of KPIs" in an effort to arrive at a broad-based way of measuring the performance of ships. More specifically, the InterManager's Ship Performance Indicator Standard has been develo-

ped over the last years and was released in the end of 2008. Intermanager (www.intermanager.org) is the caretaker of the standard and is hosting the governing body of the standard. It is not an international standard in the sense that it is adopted by an international standardization body. The proposed stand is aimed at becoming a de facto Industry Standard. The objective of the Shipping KPI project is to create a KPI standard that is suitable for (Garfield, 2009):

- Internal Improvement Processes
- External Communication about Performance

The applications of the results from standardising the performance measurements within the shipping industry are the Internal Improvement, Benchmarking, Performance Based Contracting and Building of Public Awareness (Mathews, 2011).

Individual ship data will be entered by ship managers or shipowners in a web based system, initially voluntary and the KPIs will be automatically measured. Once this database works, each ship will be able to measure its KPIs and improvements in performance overtime. It will enable owners to compare ships with all others globally or all those in a certain category, including flag (Garfield, 2009).

Table 2 depicts a shipping KPI example while Table 3 presents the performance measurement techniques.

**Table 2. Shipping KPI example: Lost Time Injury Frequency (LTIF)**

| | | |
|---|---|---|
| **Step 1** | Identifying and calculating a set of KPIs | (What?)<br>An indication of the time lost due to various types of injury sustained by crew members.<br>(How?)<br>It is derived for a specific period of time based on the total number of injuries, the total number of crew on board the company's vessels and the total number of hours in the selected time period.<br>(When?)<br>Its value is constantly updated based on information such as crew members signing on and off vessels and reported injury incidents. |
| **Step 2** | Evaluate | Set boundaries of acceptability.<br>Does the value of a KPI begin to slide precipitously close to the boundaries of acceptability? |
| **Step 3** | Take action (Action must be straightforward to be understood by all staff involved) | Empower alerted user to investigate the root causes of the problem. Decide on appropriate corrective action. |

*(to be continued)*

| | | | |
|---|---|---|---|
| | | Starts to rise | the CEO or the head of the Marine & Safety department would have to take action a review of training and safety procedures or a competence evaluation of implicated officers. |
| | | Rising value of LTIF for a specific vessel | The indicator can serve as a warning sign for its captain, who is the person responsible for keeping it as low as possible. |

*Source:* Polyviou (2011).

**Table 3. Performance Measurement Techniques**

| Technique | What it does | Aim & Development | Sectors | Shortcomings |
|---|---|---|---|---|
| **BSC** Balance Scorecard | Introduced in 1992. As a tool to support strategic management Focuses on financial measurement. Evaluates whether a business is moving towards its strategic goal from four different perspectives: (1)financial, (2)customer, (3)internal business process, and (4)learning and growth. | It aims to balance (a)long-term with short-term objectives, (b)financial with non-financial concerns, and (c)internal with external environments. It has moved from a pure performance model to a full management system with applications for both public and private sector organisations. The BSC is often mixed with the BEM. | FTSE (Financial Time & Stock Exchange) 100 companies financial management researchers and practitioners contractors consultants education government non profit organisations. | Insufficiency of four perspectives. |
| **BEM** Business Excellence Model | 1990 was developed by EFQM (European Foundation of Quality Management) this model describes a cause-and-effect relationship between enablers and results of business processes within an organization. | Results − financial, customer satisfaction, people satisfaction, and impact on society, are achieved through acting on Enablers − leadership, policy and strategy, people management, resources, and processes management. (1) has the ability to incorporate a number of initiatives already being applied by an organisation; and (2) has an equal focus on enablers and results. | Hotel. National health services. Sports. | |
| **KPI** Key Performance Indicators | A performance indicator is a measure of performance that focus on critical aspects of outputs or outcomes. As a performance measurement system. | Time, cost and quality were three primary indicators. | Different industry sectors. | |

*(to be continued)*

| | | | | |
|---|---|---|---|---|
| 6σ Six Sigma | Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects (driving toward six standard deviations between the mean and the nearest specification limit) in any process -- from manufacturing to transactional and from product to service. Six Sigma is a business management strategy originally developed by Motorola, USA in 1986. | Six Sigma is a rigorous and disciplined methodology that uses data and statistical analysis to measure and improve a company's operational performance by identifying and eliminating "defects". | As of 2010, it is widely used in many sectors of industry, although its use is not without controversy. | |
| Capability Maturity Model | The CMM was proposed by the SEI [Software Engineering Institute (SEI) of Carnegie Mellon University] 1991 as a software development evaluation standard. | It helps an organisation to identify best practices they currently exhibit and those upon which they need to improve. A capability or a maturity level is a well-defined evolutionary plateau of process improvement for an organization important the cluster of activities to achieve a set of goals considered important. | It enables an organisation to improve a set of related processes by incrementally addressing successive sets of process areas. It enables an organisation to incrementally improve processes corresponding to an individual process area (or process areas). | Not widely used. |

*Source:* Developed by the authors based on Meng and Minoque (2011).

## 4. Research Methodology

The primary objective of this research is to investigate whether KPIs are applied by Greek tanker shipping companies and to what extent. Another objective of the research is to examine the relationship of KPIs with the shipping marketing and safety orientation. The paper also identifies how KPIs were used by tanker shipping companies and how these companies defined their overall performance measurement. Finally, this research examines the benefits offered by the KPIs to the above mentioned companies.

The basic characteristic of the tanker market is the dominant role played by a small number of big charterers, that is, the big oil companies. It is worth noting that the oil terminals are controlled by oil companies (state and private) and as a result the market is controlled by them. Tankers, also, are obliged to comply with strict safety rules due to the hazardous potential of their cargo. Under these conditions, KPIs in the tanker shipping companies are of special importance to the extent they positively influence the efficiency and effectiveness of vessels.

Primary information was collected through a quantitative research. From the techniques of filling in a questionnaire, their electronic sending was chosen, which means anonymity, allows absolute control on the formulation of questions, does not pressurize the participants in terms of time and minimizes partiality which might exist in the case of physical presence. More specifically, a questionnaire was sent by email to the Greek tanker shipping companies. The determination of the appropriate size of the sample was

based on the principles of the science of statistics. The Greek tanker market comprises 135 tanker companies from which forty tanker companies were randomly selected from the Greek Shipping Directory (Skolarikos, 2010); 14 of these companies agreed to participate in the study resulting in a response rate of 10,3% of the population size. The above mentioned rate gave statistically reliable results, since in accordance to the principles of the science of statistics, 5% of the population size gives good results.

Structural design was adopted in the questionnaire making it easier to be answered and reach high return rate. The study questionnaire was divided into two parts. The first part contained background of the companies and the second part included information regarding the implementation of KPIs in shipping companies. The questions provided up-to-date information on contemporary ship management practice allowing a deeper understanding of its context.

## 5. Analysis of Research Results

Regarding the type of respondents' shipping activity (Diagram 1), 12% of the respondents are third party ship management companies; while 88% have the ownership and management of its tankers.

In order to classify the tanker enterprises in small, medium and large companies, the following criteria were taken into consideration:

1. Total GRT managed by each company
2. Number of employees of each company

**Diagram 1. Type of Respondents' Shipping Activity**

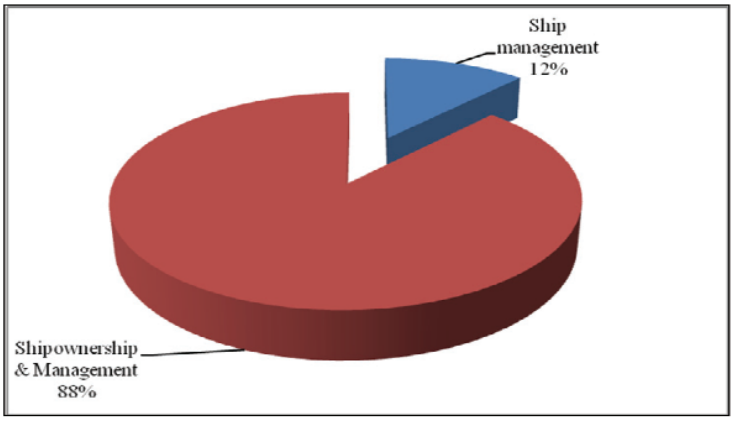



Diagram 2 presents the distribution of the companies' size in the sample. More specifically, 45% of the respondents are large tanker companies, 35% are medium tanker companies and 20% are small tanker companies.

As far as the selection model of the tanker companies is concerned (Diagram 3), 62% of the participants answered that they apply the selective specialization, where the com-

panies offer their transportation services to a number of market segments. Most of them manage tankers as well as bulk carriers. The segmental concentration is applied by the 38% of the participants, where the companies select to offer their sea transport services only to the tanker market.

**Diagram 2. Size of Shipping Companies**

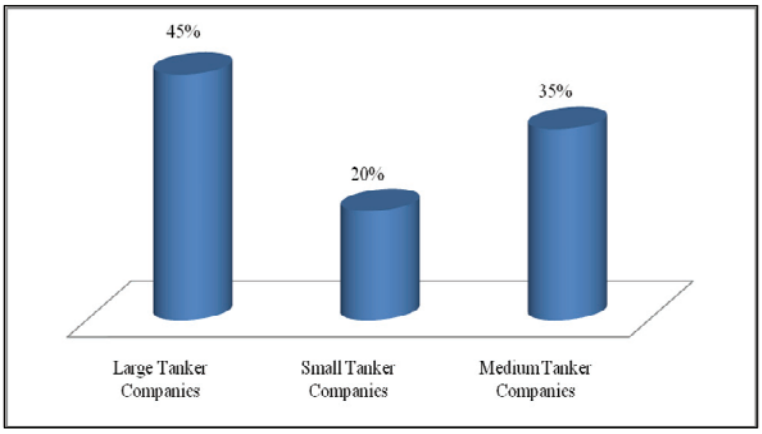



**Diagram 3. Selection Model of Respondents**

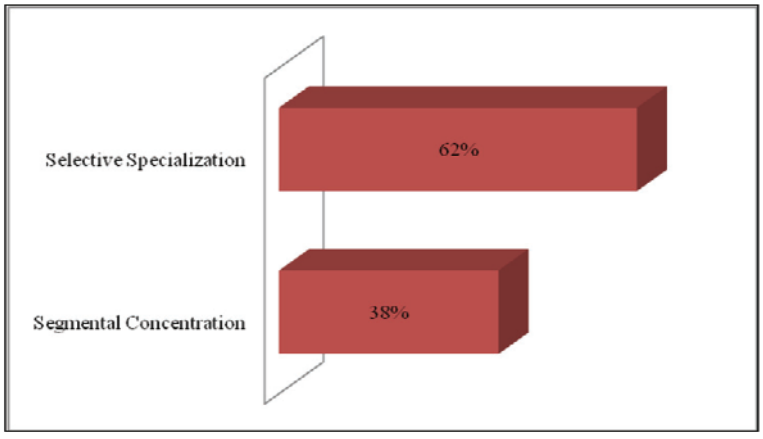



Diagram 4 presents that 72% of respondents believe in KPIs' necessity, while 28% of respondents do not hold such a view. More specifically, 55% of KPIs' respondents consider that the indicators are more necessary in tanker shipping companies. However, 25% of KPIs' respondents argue that the indicators are more necessary in large shipping companies and 20% of KPIs' respondents maintain that the indicators are necessary in shipping companies irrespective of the size and type of managed fleet (Diagram 5).

**Diagram 4. Necessity of KPIs**

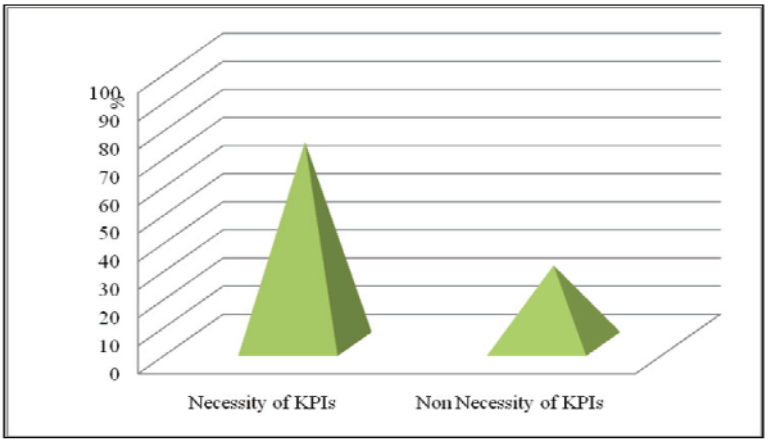



**Diagram 5. Necessity of KPIs in Relation to Fleet**

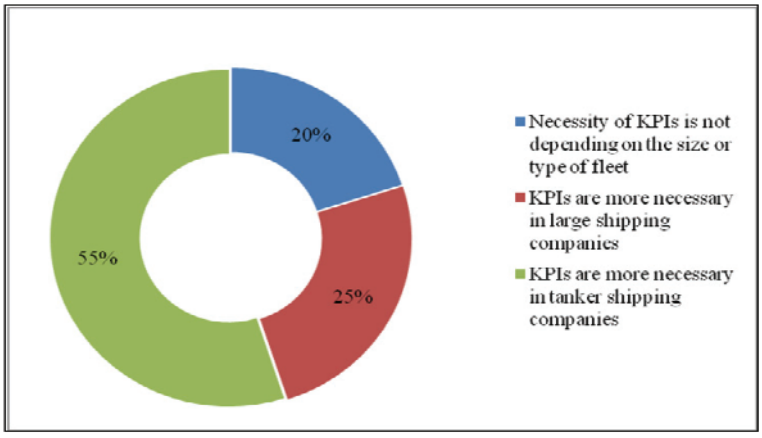



Diagram 6 shows that 22% of tanker companies apply KPIs in their daily managerial tasks, while Diagram 7 presents that 69% of the above mentioned enterprises are large, 27% are medium and 4% are small tanker companies.

Diagram 8 presents the areas which should be covered by KPI measurement in large, medium and small tanker companies. More analytically, KPI measurement should cover operational, financial, crew/personnel and legislation areas. The most important data provided by KPIs in large, medium and small tanker companies are the operational as well as the legislation data. The above mentioned data are in a great extent related to safety and environmental matters.

**Diagram 6. Implementation of KPIs in Tanker Shipping Companies**

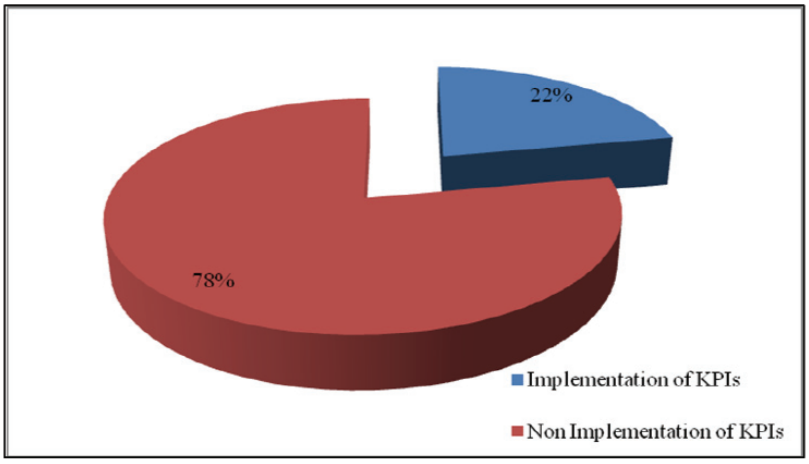
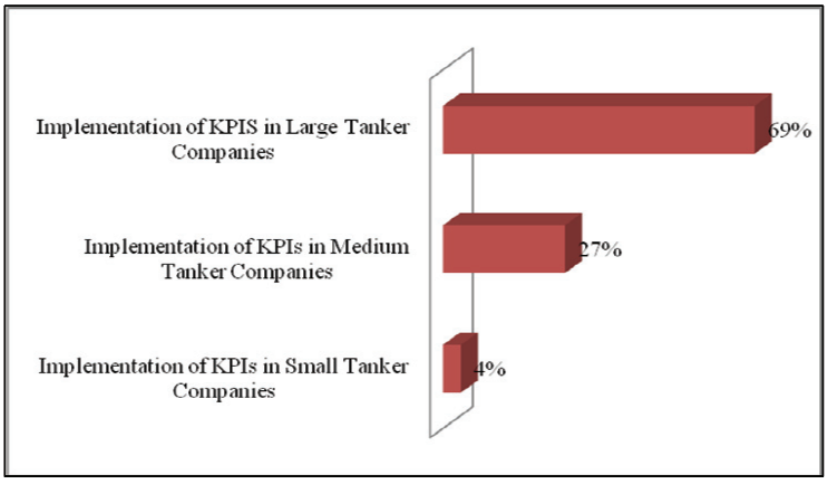



**Diagram 7. Implementation of KPIs in Large, Medium and Small Tanker Companies**




KPIs are dependent on the kind and size of fleet that a company manages. One reason for that is the type of regulations instituted by the International Maritime Organizations, which varies according to the type and size of vessels. Therefore, requirements and measurements are different amongst the shipping companies. Although some specific KPIs are common to all shipping enterprises, Diagram 9 shows that large tanker companies carry out performance measurements into a greater extent comparing with the small and medium tanker companies. Moreover, safety and operational performance indicators are of vital importance in large tanker shipping companies.

**Diagram 8. Data Provided by the Mechanism of KPIs to Small, Medium and Large Tanker Companies**

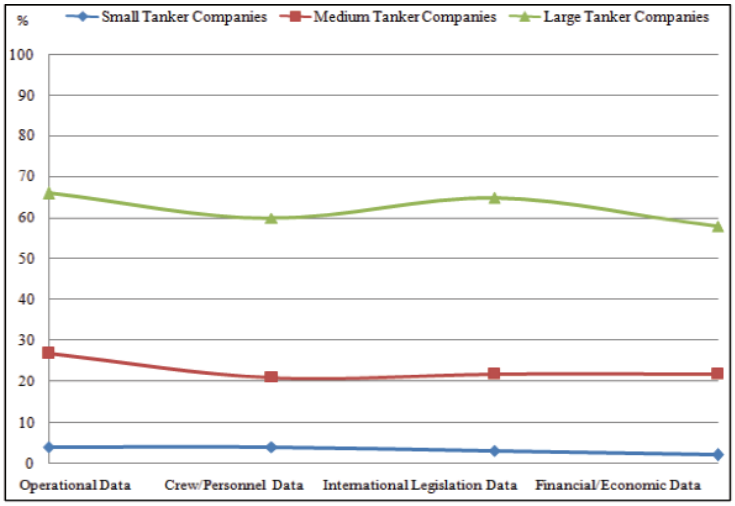
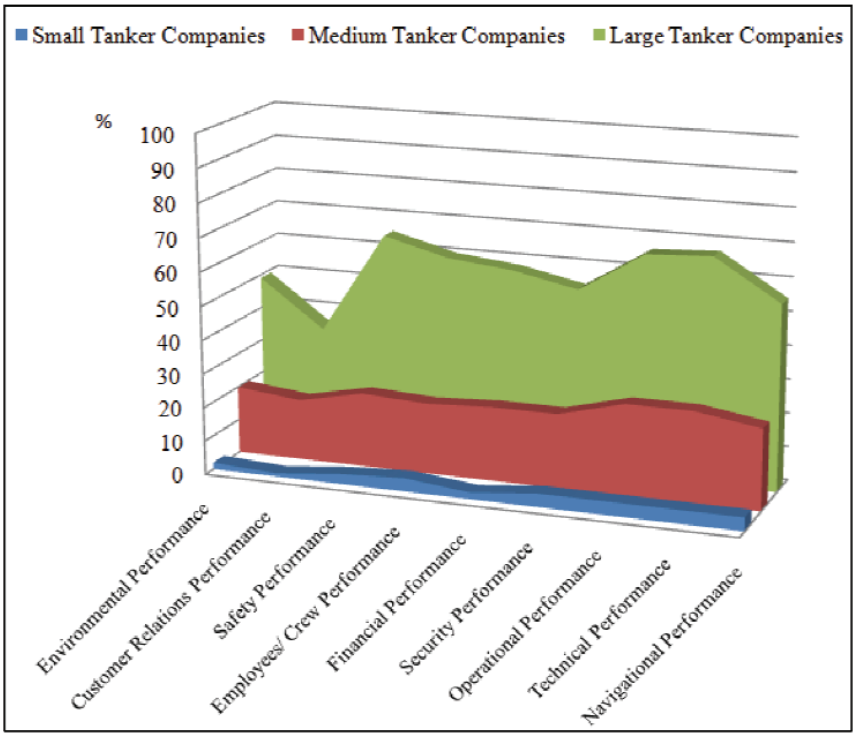


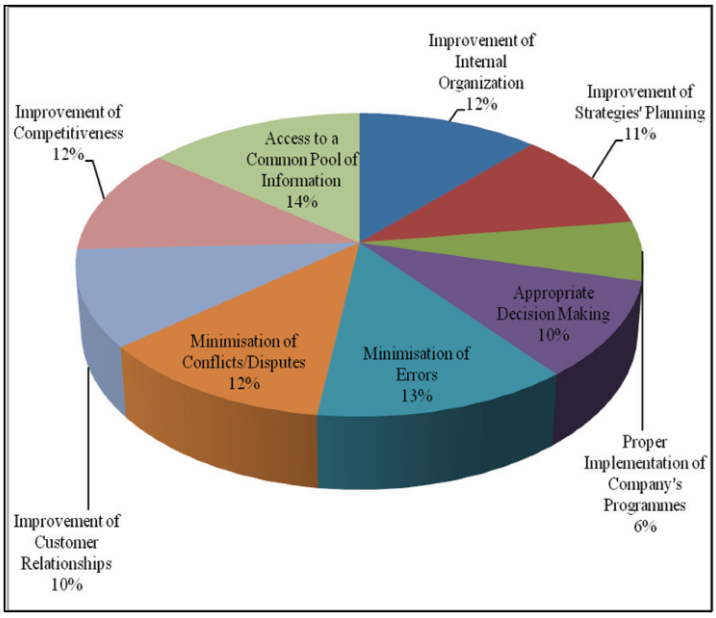

**Diagram 9. Performance Indicators in Large, Medium and Small Tanker Companies**



The most important KPIs are safety, operational and technical. Other types of indicators are customer relations, environmental, navigational, security, financial and employees/crew performance indicators. At this point, it is recognized that each of the individual performance indicator influences others (Latorre *et al*., 2010). For example, safety is related to cost. It is known that a ship manager has to adhere to national and international regulations that constantly change. As changes are implemented in the shipping industry due to legislation insisting on safety precautions, safety measurements will also increase. As a result, the increase in safety means an increase in cost (however, in the long term, increased safety will decrease cost due to marine accident prevention). Furthermore, raised safety performance measurements lead to raised operational and technical performance measurements. Another example is the relation of customers' (charterers) satisfaction to financial performance. Strong customers' relationships and a well reputation of the company in the shipping market lead to the repeat of a profitable charter with the charterer (Plomaritou, 2008).

Regarding the benefits provided to the KPIs users (Diagram 10), 12% of respondents answered that KPIs improve the company's competitiveness and 10% of respondents argued that KPIs lead to the improvement of customer relationships. A numerical scale of quantifying customer' (charterer-shipper) satisfaction minimises customer complaints, create customer loyalty and improve customer relationships. Many shipping companies, nowadays, make a systematic effort to acquire information about their customers' perceptions of quality and other attitudes to the company. The results of these polls are used primarily in shipping marketing (Plomaritou *et al*., 2011).

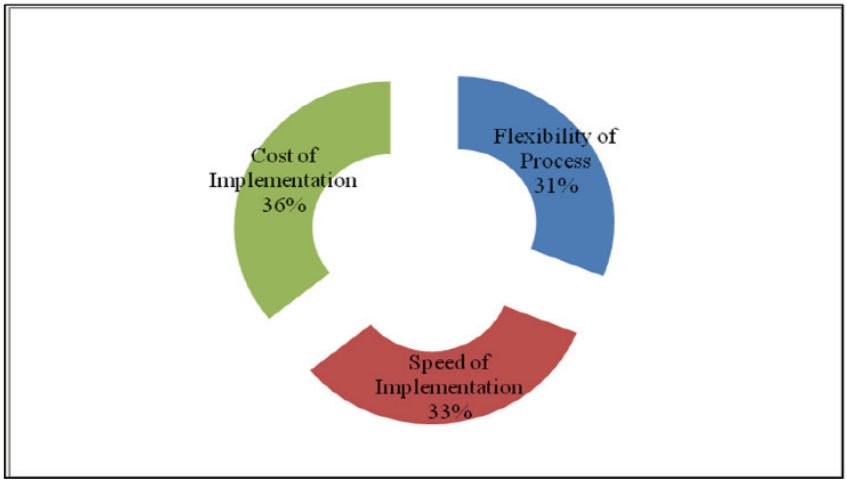
**Diagram 10. Benefits of KPIs in the Tanker Shipping Company**



Moreover, 11% of respondents claim that an important advantage of KPI measurements is the improvement of marketing planning. The development of setting goals in terms of KPIs assists the strategies' planning process. By using KPIs the company's objectives are translated into, and measured by, a set of targets for the manager to be achieved. Moreover, 6% of respondents consider that KPIs contribute to the proper implementation of company's programmes and 12% of respondents think that KPIs conduce to the improvement of internal organization.

Furthermore, 14% of the respondents answered the access to a common pool of accurate, timely information which allows decision makers to monitor progress and take corrective actions promptly. In this way, 10% of respondents consider that KPIs are necessary tools for decision makers. It is widely accepted that effective performance measurement should provide decision makers with information regarding how well the various objectives are being achieved (Santos *et al*., 2002). Managers have two obstacles when making optimal decisions regarding company's objectives. The first is that the shipping industry is complex and the complexity lies in its high cyclicality, volatility and unpredictability. The second involves the human capacity to process information; the rationality of human decision-making is bounded and humans make decisions on the basis of selective information as their cognitive abilities are overwhelmed by the complexity of the system (Sterman, 2000). Furthermore, 13% of respondents argued that KPIs' mechanism contributes to the minimization of errors.

**Diagram 11. Success Factors of a KPI Process**




Concerning the success factors of a KPIs' mechanism (Diagram 11), 36% of respondents answered the minimum cost of implementation, 33% of respondents argued the speed of implementation and 31% of respondents consider the flexibility of KPI process.

## 6. Conclusion

The findings of this research are the following:

- The questionnaire taken across tanker shipping companies in Greece, showed that 72% of respondents believe in KPIs' importance, but only 22% of tanker companies apply KPIs in their daily managerial tasks.
- Furthermore, 69% of the companies that implement KPIs are large, 27% are medium and 4% are small tanker companies.
- KPIs in tanker market are still evolving.
- The most important KPIs are safety, operational and technical. Each of the individual performance indicator influences others.
- The most important data provided by KPIs in large, medium and small tanker companies are the operational and legislation data, which are related in a great extent to safety and environmental matters.
- KPIs are dependent on the kind and size of fleet that a company manages. Large tanker companies carry out performance measurements into a greater extent comparing with the small and medium tanker companies. Moreover, safety and operational performance indicators are of vital importance in large tanker companies.
- The most important benefits provided to the KPIs users are the improvement of customer relationships, competitiveness, marketing planning and internal organization.
- Tanker companies should acknowledge one common set of KPIs, implement them more systematically and thus improve their performance. Therefore, in the following years, researchers in cooperation with shipping market practitioners should try to integrate performance measurement systems and thus form a unified model of KPIs for performance management.
- Projecting the above point to all shipping companies since KPIs are the tools for improvement of performance, all shipping companies should acknowledge one common set of KPIs, and implement them more systematically and methodologically. Benchmarking can thus be achieved and all parties in the market can benefit.
- On an overall supply chain perspective, the research evidences that the performance measurement should not go under the arms' length of the supply chain but it should take under consideration the final customer/consumer of the product (charterer and freight forwarder). The successful shipping company is the company which can define and satisfy the needs and the wants of the customers by making available its service at the right time, place, in the right capacity and quality. The successful shipping company must utilize to the maximum its resources in order to provide its customers with the "rights": right service, right quality, right condition, right place, right time, right customer and right cost.

This paper has verified and established the need for increased efficiency in the shipping industry and the role that Key Performance Indicators (KPIs) have in driving these required efficiencies.

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