

SEVENTH FRAMEWORK PROGRAMME
SST-2007-TREN-1 SST.2007.2.2.4. Maritime and logistics co-ordination
platform
SKEMA Coordination Action
“Sustainable Knowledge Platform for the European Maritime and Logistics
Industry”



SKEMA Consolidation Study

Title: Quality Criteria and Performance Indicators
Task T2: Maritime Transport and Logistics Development
Sub-Task: T.2.5.2
SKEMA Subject Index: SE2.5
Responsible partner: GPI
Contributing partner: VTT, AUEB
Planned submission date: Version 1- 31/12/2008; Version 2-15.06.2009
Actual submission date: 31/03/2009
Distribution group: Consortium
Dissemination level: PU (Public)
Contract Number: 218565

Project Start Date: 16th June 2008 **End Date: 15th May 2011**
Co-ordinator: Athens University of Economics and Business

Document summary information

Version	Authors	Description	Date
0.1.	V Bojkova GPI A Permala VTT	Initial Draft	22/08/08
0.2	V Bojkova GPI	Initial Version 1	12/09/08
0.3	V Bojkova GPI A Permala VTT J Eckhardt VTT	Plan of work; collection of information; literature review;	08/01/09
0.4	V Bojkova GPI A Permala VTT J Eckhardt VTT V. Bojkova GPI I Koliouisis AUEB	Draft Work 1) Socially Responsible Criteria 2) Performance Measurement in Supply chains (incl. transport and logistics practices) 3) Statistical Sources	05/03/09
0.5	V Bojkova GPI	Draft Final Version 1 Final Version	12/03/09 31/03/09
0.6	UGOT Sweden	Reviewed the study and provided suggestions for improvement	01/09/09
0.7	V Bojkova GPI Prof C Dixon GPI	Revision of the study Revised Final Version	27/01/2010

Quality Control

	Who	Date
Checked by Task and WP Leader		
Checked by Peer Review	GS/UGOT	27/08/2009
Checked by Quality Manager		
Approved by Project Manager	Takis Katsoulakos	28/01/2010

ABSTRACT

An objective of the SKEMA project is to gather dispersed and unstructured information and to convert it into *valuable knowledge*. As part of this aim, the SKEMA Policy Index was proposed to structure the maritime policies of DG TREN in a form that facilitates the easy search for information.

Our study "Quality criteria and performance indicators" recommends a potential indicator set based on this Policy Index framework. This will assure the policy-makers that there is a clear link between policy objectives of the European Union and performance of an industry. Also it will assure the market agents that they are well prepared to anticipate any changes in EU transport policy.

The EU policy is evolving with relatively huge implications for markets, companies and investors. National governments themselves become increasingly involved in EU policy proposal and design. EU policy objectives became targets for the internal market. Economic consequences from policies are being regularly analysed. And this process will move inwards still further.

The study provides an extensive review of existing criteria and performance indicators relevant to the European maritime/logistics sector as a solid basis for the proposed indicator set. The introduction provides wider theoretical understanding of how to develop sustainable indicators. Further sections analyse the performance indicators of the supply-chain driven by efficiency and competitiveness. The study also explores the capital markets' criteria as socially responsible benchmarking in order to broaden the set of industry-led indicators. In addition, the study discusses briefly the statistical sources of information that will provide quantitative data.

Finally, the report proposes a potential indicator set which will be developed further in future studies. The proposed indicators are linked to the SKEMA Policy Index through the codes and clearly define the relation between policy objectives and an industry performance. Future studies could discuss the desired direction or quantitative levels of indicators.

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Quality Criteria and Performance Indicators

INTRODUCTION

Objectives and target stakeholders

Any business activity relies on indicators for providing guidance in long-term. Indicators are important for business management, analysis and modelling. Therefore which indicators are selected and used or how data are collected need to be evaluated.

Indicators account for indirect and long-term impacts, and so help to determine how short-term decisions relate to the long-term strategic goals. They have to reflect diverse impacts while still being affordable to collect and analyse.

Planning activities rely on the indicators for providing guidance. As Henrik Gudmundsson points out, indicators perform a number of important functions¹. They have the communication function, i.e. telling us why such a thing is important. They perform the informative function, i.e. telling us how we are doing things. They also have the diagnostic function, i.e. telling us what is wrong. Last but not least, indicators have the action function, i.e. telling us what to do. According to the Division of Economic and Social Affairs of the United Nations, indicators can help to make ‘better decisions and more effective actions by simplifying, clarifying and making aggregated information available to policy makers’. They enable us to ‘incorporate physical and social science knowledge into decision-making, to measure and calibrate progress toward sustainable development goals’. Moreover, ‘they can provide an early warning to prevent economic, social and environmental setbacks’. Indicators are ‘also useful tools to communicate ideas, thoughts and values’². Todd Litman defines indicators as variables that we use to measure and evaluate progress toward goals and objectives. As such, indicators can help identify trends, predict problems, assess options, set performance targets, and evaluate a particular jurisdiction or organisation. According to him, indicators ‘are equivalent to senses – they determine how things are perceived and what receives attention’³. In short, indicators are important tools for making decisions and measuring progress.

¹ Hendrik Gudmundsson, *Sustainable Transport and the Role of the Performance Indicators*, A presentation at the Third International Performance Measurement Conference, California 10-12 September 2007. Available at

http://onlinepubs.trb.org/onlinepubs/archive/conferences/2007/PM/4A_Henrik_Gudmundsson.pdf

² *Indicators of Sustainable Development: Guidelines and Methodologies*, UN’s Economic and Social Affairs, 3rd ed, October 2007, p. 3. Available at <http://www.un.org/esa/sustdev/natlinfo/indicators/guidelines.pdf>

³ Todd Litman, *Developing Indicators for Comprehensive and Sustainable Transport Planning*, Victoria Transport Policy Institute, 12 March 2009, p. 12. Available at http://www.vtpi.org/sus_tran_ind.pdf

In recent years, with the increasingly strong interest in sustainability, especially in sustainable development and sustainable transportation, the role of indicators in planning and monitoring such activities has been increasingly emphasised. The UN Conference on Environment and Development in 1992 recognised the important role of information for decision-making and called on countries and the international community to develop indicators of sustainable development⁴. For the EU, sustainable development is its overarching long-term goal and since 2006, it has developed a Sustainable Development Strategy (SDS). To monitor this SDS, the EU ‘recognised the role of indicators, strengthening both their importance and the role of the statistical community in the monitoring the strategy’⁵. The Communication from the Eurocommissioner Almunia to the Members of the Commission, which focuses on possible indicators for monitoring the implementation of SDS can be seen as an effort in this direction⁶.

In the light of the above, and as part of an international move towards performance assessment through results⁷, the objective of this study is to establish a set of harmonised performance indicators linked to policy objectives. These indicators will be for “quality guidance” to set up high service standards. The report will be of interest to:

- Policy makers in analysing policy results and strategies
- Transport operators, shippers to plan their activities, monitor their performances and identify improvement options
- Transportation professional organisation to incorporate these indicators into their research programmes
- Consultancy to recommend this set of indicators to shippers and freight forwarders that will support their decision-making
- Think tanks to influence policy-making

The study consists of:

- a. definitions
- b. review of quality criteria, performance indicators
- c. discussion of statistical sources

Glossary terms

Indicators are variables selected and defined to measure progress toward an objective. They reflect various levels of analysis such as decision-making process, policies,

⁴ Indicators of Sustainable Development: Guidelines and Methodologies, p. 3.

⁵ Inna Šteinbuka and Pascal Wolff, *Indicators and Better Policy-making: The Case of Sustainable Development*. Available at <http://epp.eurostat.ec.europa.eu/>

⁶ Communication from Mr. Almunia to the Members of the Commission: Sustainable Development Indicators to Monitor the Implementation of the EU Sustainable Development Strategy. Brussels, 9.2.2005, SEC (2005) 161 Final: http://ec.europa.eu/sustainable/docs/sec2005_0161_en.pdf

⁷ OECD defines results-based management as a management strategy focusing on the achievement of outputs, outcomes and impacts.

economic impacts, performance evaluation, etc. All levels of analysis provide standardised information (data) which is suitable for measuring, but it is important to take into account what we are aiming to achieve in order to select the appropriate data and indicators. Hence, we need to:

- discuss definitions and statistical sources;
- describe factors to support the selection of indicators;
- define a range of existing indicators and quality criteria;
- and recommend specific indicators;

Key Definitions based on H. Gudmundsson's study⁸:

- *Indicator framework* – conceptual structure linking indicators to a theory or planning process;
- *Indicator set* – a group of indicators selected to measure progress;
- *Indicator data* – values used in indicators;
- *Indicator type* – nature of data used by indicator (qualitative or quantitative)
- *Target* – a specified, realistic, measurable objectives
- *Objective* – a desirable change defined in a policy document or in a planning process

While it is recognised that indicators are important for planning and monitoring activities or policies, in general, and sustainable development and sustainable transportation, in particular, there is no standard set of indicators that can be used for monitoring every policy or organisation. Indicators differ depending on the organisation or the policy. Furthermore, as Todd Litman points out 'a particular policy may seem beneficial and desirable when using one set of indicators but harmful and undesirable when evaluated using others'. That is why it is important for everybody involved in sustainable transportation planning to understand assumptions and perspectives used to select and define sustainable transportation indicators⁹.

One of the fundamental issues is to define the framework for organising the selection and development of indicators. In the domain of sustainable development, for instance, according to the UN, while it is recognised that any framework for organising the selection and development of indicators on its own is an imperfect tool for expressing the complexities and interrelationships encompassed by sustainable development, such a framework seems to be essential¹⁰. Following the UN experience and recommendations, the Commission has designed a framework for indicators to monitor the implementation of the Sustainable Development Strategy (SDS) - it is based on themes, sub-themes, and 'areas to be addressed', which are directly linked to EU policy

⁸ Gudmundsson H. "Indicators and performance measures for Transportation, Environment and Sustainability in North America", Research notes No. 148, 2001, Denmark

⁹ Todd Litman, *Well Measure: Developing indicators for Comprehensive and Sustainable Transport Planning*. Victoria Transport Policy Institute, 7 August 2009, p. 3, <http://www.vtpi.org/wellmeas.pdf>

¹⁰ UN Division for Sustainable Development: "Indicators of Sustainable Development: Guidelines and Methodologies", 2001. Quoted by *Communication from Mr. Almunia to the Members of the Commission*

priorities¹¹. This framework corresponds to a three-level pyramid of indicators: level 1 consists of indicators, which are aimed at a high-level policy-making and can be seen as a set of headline indicators; level 2 corresponds to the sub-themes of the framework and together with level 1 monitors progress in achieving the headline policy objectives; level 3 corresponds to ‘the area to be addressed’, i.e. various measures implementing the headline objectives, and facilitates a deeper insight into special issues in the theme¹².

By referring to the recommendations and experiences of the UN and EU in developing indicators for sustainable development, what we want to underline is that having a framework in which objectives and priorities are defined is primordial for organising the selection and development of indicators. It seems implausible to develop or organise indicators if one does not know what are the objectives or goals of a policy, project or organisation.

The second important issue that should be considered when organising and developing indicators is to define the scope and the purpose of the set of indicators. In other words, what should be measured? According to Henrik Gudmundsson, the defining factor for the success of indicators is, in conceptual terms, there must be clear idea of what is being measured¹³. According to Todd Litman, ‘indicators can reflect various levels of analysis’, for instance in the field of sustainable transportation, indicators may reflect the decision-making process (i.e. the quality of planning), responses (travel patterns), physical impacts (emission and accident rates), effects this has on people and the environment (i.e. injuries and deaths, and ecological damages), and their economic impacts (i.e. costs to society due to crashes and environmental degradation)¹⁴. That is why performance indicators can be categorised in terms of *process*, i.e. the types of policies and planning activities, such as whether the organisation has a process for collecting and publishing performance data, and public involvement. They can be measured in terms of *inputs*, i.e. the resources that are invested in particular activities, such as the level of funding spent on various activities or modes. They can also be measured in terms of *outputs*, i.e. direct results, such as the miles of sidewalks, paths and roads, and the amount of public transit service provided. Finally, they can be categorised in terms of *outcomes*, i.e. ultimate results, such as the number of miles travelled and mode split, average travel speeds, congestion and crowding, number of accidents and casualties, energy consumption, pollution emissions, and user satisfaction¹⁵.

It is also important to note that decision-making or policy-making increasingly incorporates sustainability concepts such as consideration of long-term economic, social and environmental impacts. As mentioned above, the UN and the EU, in particular, has increasingly emphasised the importance of sustainability in development and transportation, in particular. When selecting transportation performance indicators

¹¹ *Communication from Mr. Almunia to the Members of the Commission*, p. 3.

¹² *Communication from Mr. Almunia to the Members of the Commission*, p. 5; Inna Šteinbuka and Pascal Wolff, *Indicators and Better Policy-making*, p. 4.

¹³ Hendrik Gudmundsson, *Sustainable Transport and the Role of the Performance Indicators*, p. 23

¹⁴ Todd Litman, *Well Measure: Developing indicators for Comprehensive and Sustainable Transport Planning*, p. 10.

¹⁵ *Ibid.*

one must ensure ‘that indicators should reflect various economic, social and environmental impacts’¹⁶.

Previously, transportation was evaluated mainly in terms of competitiveness, but increasingly it is evaluated in terms of accessibility and environmental performance. Many factors support the use of such set of indicators. Firstly, the EU transport policy documents tend to measure performance in terms of environmental and social perspectives¹⁷. The policy focus is now on rebalancing all modes of transport and reducing environmental impact of transportation. To achieve this goal, it is essential to have a balanced growth path of transport development. To accommodate this policy tendency, the SKEMA Policy Index¹⁸ classified the policy objectives into:

- economic – competition, liberalisation, quality of services, etc.;
- social – mobility, employment, quality of life, and others;
- and environmental sustainability – pollution, noise, climate change, energy/waste management and risk management.

Secondly, other factors supporting such a set of indicators are the location of transport activities that affects local communities; or technological development (telecommunications; various delivery services; improvement of port systems); or the planning process of approving land use, consultation periods, etc.

Thirdly, transportation represents various aspects of life and some indicators reflect multiple impacts. To provide comprehensive analysis, the indicator set should include types of indicators from each of the major categories of issues – for instance, transport cost efficiency (economic), accessibility (social) and carbon emissions (environmental).

Supporting factors have a broad scope and recognise different transportation issues. Transportation has to offer a choice of services and support a competitive EU economy as well as to limit emissions and waste within the member-states’ ability to handle them.

Approach

The crucial question for organising the selection and development of indicators is the criteria for indicators. According to Paul G. Thomas, the ideal performance indicators must have the following criteria¹⁹. First, they must be clear, i.e. performance indices

¹⁶ Todd Litman, *Developing Indicators for Comprehensive and Sustainable Transport Planning*

¹⁷ For more details, please see: White Book (2000), Green Paper (2006) and Blue Book (2007) or the consolidation study “EU Transport Policy Analysis”

¹⁸ The Index is publicly available on the website: www.skematransport.eu

¹⁹ Paul G. Thomas, Performance Measurement, Reporting, Obstacles and Accountability, from http://epress.anu.edu.au/anzsog/performance/mobile_devices/ch08.html

should be simple, well defined and easily understood. Second, they must be consistent, i.e. the definitions used to produce the indicators should be consistent over time and between units. They must also be comparable and controllable. The fourth requirement is that they must be comprehensive. For instance, they must reflect those aspects of behaviour that are important to management decision-makers. Relevance is another important criterion. Many applications require specific performance indicators that are relevant to their special needs and conditions. So one must ask whether the indicators serve these needs. In addition, they must be feasible. For instance, the targets should be based on realistic expectations and can be reached through reasonable actions. Last but not least, performance is not independent of the environment within which decisions are made. The environment also includes the organisation structure, the management style adopted, as well as the uncertainty and complexity of the external environment. In short, the ideal performance indicators are those that have clarity, consistency, comparability and controllability, comprehensiveness, relevance and feasibility.

With regard to the selection of indicators for sustainable transportation, Todd Litman points out the following principles²⁰. First, they must be comprehensive and balance. The indicator sets should include indicators from each of the three major categories of issues, namely *economic, social and environmental*. Second, data should be feasible to collect and of adequate quality. Data collection practices should reflect high standards to insure that information is accurate and consistent and should be standardised so the results are suitable for comparison between various jurisdictions, times and groups. Third, they must be understandable and useful, i.e. indicators should be understandable to the public and useful to decision-makers. Fourth, indicator data may need to be disaggregated in various ways to support specific types of analysis, such as by travel activity, demographics, and geographic location. Fifth, one should choose appropriate reference units. The reference units, which also called ratio indicators, are measurement units normalised to facilitate comparisons, such as per-year, per-capita, per-mile, per-trip. The selection of reference units can affect how problems are defined and solutions prioritised. Sixth, at the level of analysis, if possible, indicators should reflect ultimate impacts of concern rather than intermediary effects. Seventh, performance targets, i.e. specific measurable objectives to be achieved by a stated deadline, should be based on scientific analysis when applicable, and updated over time as better information becomes available. If performance targets are not specified, the desired direction of change should be indicated. In short, compared to the criteria pointed out by Paul G. Thomas, there are two important points that Todd Litman underlined: 1) the importance of data collection; 2) with the focus on sustainability, he underlined that indicator sets should include indicators from each of the three major categories of issues, namely economic, social and environmental.

For the EU, the first criterion for choosing indicators for sustainable development is that an indicator should capture the essence of the problem and have a clear and accepted normative interpretation. Second, it should be robust and statistically validated. Third, it should be responsive to policy interventions but not subject to manipulation. Fourth, it should be measurable in a sufficiently comparable way across Member States, and comparable as far as practicable with the standards applied

²⁰ *Sustainable Transportation Indicators: A Recommended Research Program for Developing Sustainable Transportation Indicators and Data*, by Sustainable Transportation Indicators Subcommittee of the Transportation Research Board, 10 November 2008 <http://www.vtpi.org/sustain/sti.pdf>

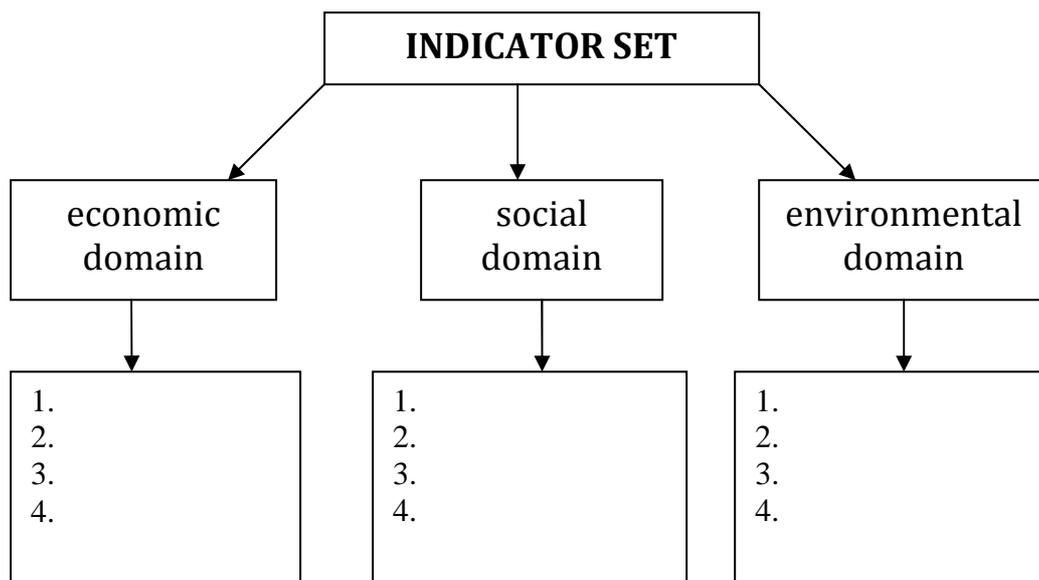
internationally by the UN and the OECD. Fifth, it should be timely and susceptible to revision. Sixth, the measurement of an indicator should not impose on Member States, on enterprises, nor on the Union's citizens a burden disproportionate to its benefits. In addition to the above criteria, there is portfolio of indicators, which should follow the following principles. They should, as far as possible, be balanced across different dimensions, be mutually consistent within a theme, and be as transparent and accessible as possible to the citizens of the European Union²¹.

Compared to the principles or criteria identified by Henrik Gudmundsson, Paul G. Thomas and Todd Litman, there are two new and insightful points in the criteria set by the EU. First, an indicator should capture the essence of the problem and have a clear and accepted normative interpretation. Second, the indicator should be responsive to policy intervention but not subject to manipulation. In addition to these two, like others, the EU emphasises the importance of data, i.e. indicator should be statistically validated, comparability, balance, consistency, transparency, and accessibility. Furthermore, it underlines that the measurement of an indicator should not impose a burden disproportionate to its benefits.

In this respect, this study aims to identify an indicator set that will address the policy objectives of the EU Transport Policy and support the decision-making process. It uses the framework of the SKEMA Policy Index as an indicator framework. Thus the suggested set has three domains (see Fig 1).

Each of the domains will be populated with a group of indicators that represent quantitative or qualitative characteristics of the industry from economic, social and environmental perspective. This report reviews existing projects and their indicators, and in light of these recommends a set of indicators that are compatible with the transport policy objectives.

Figure 1



²¹ *Communication from Mr. Almunia to the Members of the Commission*, p. 5.

Furthermore, the study also discusses issues of information sources such as collecting indicator data from national statistical offices, EUROSTAT, companies' websites, and accounting reports. The aim is to create a set of indicators that will be applicable to industry's best practices in order to establish high service standards and monitor progress.

REVIEW OF PERFORMANCE INDICATORS AND QUALITY CRITERIA

The review presents two types of indicator sets from different perspectives. The first one focuses on the capital markets' requirements that businesses have to meet in order to be associated with socially responsible business practices. These standards are global and they have been established to facilitate the investment flows. They provide broad exposure to external factors that shape the working environment of transport agents. The second one focuses on the efficiency and competitiveness of the supply chains and these indicators were derived within the system *itself*, in order to create incentives for improvement. Of course these standards are also globally recognised and they have been set up to enhance "quality culture" within the supply-chain-businesses.

SOCIALLY RESPONSIBLE PERFORMANCE CRITERIA

In recent times socially responsible business practices become more important for investors and capital markets. Climate change as well as globalisation, or technological change inexorably shape the business environment in which companies from all industries operate. Markets anticipate environment protection actions. Expected future effects from environmental protection become brought right forward to the present. Many businesses will be affected by environmental policy long before they are affected by the pollution itself. Therefore, it is essential that companies take a step towards greening their business in advance of any governmental policy.

Over time, it is likely that investments will be directed towards companies that are relatively "carbon light". To facilitate this process, the capital markets have already developed a mechanism to distinguish socially responsible companies from the rest. A number of indices have been established for those investors and businesses that make the right decisions in terms of implications from environmental policies. Such investors may be able to anticipate the directions of asset prices and turn the evolution of EU policy to their advantage.

As mentioned above, there are a number of investment indices such as FTSE4Good, Dow Jones Sustainability and the Calvert Social Index, where companies are included if they meet specific criteria. Each of these three indices apply sustainable criteria to assess social responsibility fitted to their targeted markets. The Dow Jones and FTSE divide their criteria into several groups such as environmental, social, etc. Similarly, Calvert Social Index is a broad-based constructed benchmark for measuring the performance of large US-based socially responsible companies²². However, these have very different coverage and supply varied details of the methodology utilised. For the purpose of this study the FTSE4Good is by far more relevant because it focuses on European coverage and provides a full account of its methodology.

The FTSE set of core and desirable criteria is presented in this study to emphasise the external requirements that businesses have to meet in addition to their industry-led efficiency criteria nowadays. Although this indicator set was established as an

²² See more details: www.calvertgroup.com

investment benchmark and does not correlate directly to only one business, it is believed that any industry activities are run as "business as usual". Whether the discussion is about the logistics and transportation, or engineering and machinery, the investors apply the same set of socially responsible criteria for their evaluation strategies. Thus, the logistics business may gain more investments if it relies on the environmentally-friendly modes of transport to realise better footprint.

FTSE4Good Criteria

FTSE4Good Index series has been developed to measure the performance of companies that meet globally recognised corporate responsibility standards, and to facilitate the investment flows in such socially responsible companies. There are three key objectives defined explicitly on the website of the series:

- 1) to provide a tool for responsible investors to identify and invest in companies;
- 2) to provide asset managers with socially responsible benchmark and a tool for socially responsible investment products;
- 3) to contribute to the development of responsible business practice around the world.

Companies eligible for inclusion are expected to meet criteria requirements in five areas:

- working towards environmental sustainability
- developing positive relationships with stakeholders
- supporting universal rights
- having good supply-chain labour standards
- countering bribery

The Index series has a strict policy towards some businesses. Companies with business activities in the following areas are excluded from the series:

- tobacco producers;
- companies manufacturing either whole, strategic parts, or platforms for nuclear weapon systems;
- companies manufacturing whole weapon systems;
- owners or operators of nuclear power stations;
- companies involved in the extraction or processing of uranium;

A significant component of this inclusion is the collection of the most up-to-date companies' data, and FTSE employs a variety of mechanisms:

1. scrutiny of annual reports
2. research of companies websites
3. written questionnaires and liaison with companies
4. other publicly available material
5. fact-sheets with information are distributed to companies on a regular basis for updating and review.

All companies that meet the FTSE4Good criteria are members of one of the benchmark indices. Companies in the FTSE4Good Tradeable indices are the largest 100 or 50 stocks in the benchmark indices (for ex. FTSE4Good Europe 50).

FTSE4Good set of criteria consists of five groups. They are usually separated into three levels – Policy, Management and Reporting:

- 1) Environmental criteria
- 2) Social&stakeholder criteria
- 3) Human rights
- 4) Supply-chain labour standards criteria
- 5) Countering bribery criteria

For the purposes of the environmental standards, companies are classified as high, medium or low impact based on environmental footprint of their activities. Table 1 shows that shipping has high impacts while ports activities have medium impacts on the environment. This compels the shipping industry to meet both the core and desirable criteria before it is considered for inclusion in the series.

Environmental Criteria

Table 1: Classification of Sectors

<i>High Impact Sectors</i>	<i>Medium Impact Sectors</i>	<i>Low Impact Sectors</i>
agriculture	DIY&Building supplies	information technology
<i>air transport</i>	electronic and electrical equipment	media
<i>airports</i>	energy and fuel distribution	consumer/mortgage finance
building materials	engineering and machinery	property investors
chemicals and pharmaceuticals	financials not elsewhere classified	research and development
construction	hotels, catering and facilities management	leisure not elsewhere classified
major systems engineering	manufactures not elsewhere classified	support services
fast food chains	<i>ports</i>	telecoms
food, beverages and tobacco	printing&newspaper publishing	wholesale distribution
forestry and paper	property developers	
mining and metals	retailers not elsewhere classified	
oil and gas	vehicle hire	
power generation	<i>public transport</i>	
<i>road distribution and shipping</i>		

supermarkets		
vehicle manufacture		
waste		
water		
pest control		

The environmental criteria target the specification and transparency of companies' environmental policy. They are to acquire from companies more efforts and resources dedicated to resolving issues of environmental scope. The indicators are defined in detail for each level of governance (see Annex 1).

I. Policy area

Core Indicators

- Policy refers to all key issues
- Responsibility for policy at board or department level
- Commitment to use of targets
- Commitment to monitoring and audit
- Commitment to public reporting

Desirable indicators

- Globally applicable corporate standards
- Commitment to stakeholder involvement
- Policy addresses product or service impact
- Strategic moves towards sustainability

II. Management area

Indicators

- Presence of environmental policy
- Identification of significant impacts
- Documented objectives and targets in key areas
- Outline of processes and responsibilities, manuals, action plans, procedures
- Internal audits against the requirements of the system not limited to legal compliance
- Internal reporting and management review

III. Reporting area

Core indicators

- Text of environmental policy
- Description of main impacts
- Quantitative data
- Performance measured against targets

Desirable indicators

- Outline of an EMS
- Non-compliance, prosecution, fines, accidents
- Financial dimensions
- Independent verification
- Stakeholder dialogue
- Coverage of sustainability issues

Social and Stakeholder Criteria

The social criteria are oriented towards the companies' policy of treating their personnel in terms of training and flexible working arrangements. The focus is on development of equal opportunity systems at a company level.

I. Policy area

Criteria

- 1) Adopting an equal opportunities policy and/or including a commitment to equal opportunities or diversity in their annual report or web-site.
- 2) Adopting a code of ethics or business principles.

II. Management area

Criteria

Providing evidence of equal opportunity systems including one or more of:

- monitoring of the policy and workforce composition
- flexible working arrangements and family benefits
- more than 10% of managers being women or the proportion of managers who are women or from ethical minorities exceeding two fifths of their representation in the workforce concerned

Providing evidence of health and safety systems including one or more of:

- awards
- details of health and safety training
- published accidents rates

Providing evidence of training and employee development systems including one or more of:

- annual training reviews for staff
- providing significant data on time and money spent on training

Providing evidence of systems to maintain good employee relations including union recognition agreements or other consultative arrangements.

III. Reporting area

Indicators

The requirements are to meet one of the following:

- making charitable donations in excess of £50,000
- operating payroll giving schemes
- providing gifts in kind or staff secondments to community schemes
- assigning responsibility for charitable donations or community relations to a senior manager

Human Rights Criteria

These criteria aim to acquire from companies transparency of their policies towards human rights issues. One of the requirements asks for clear communication of this policy. They are divided into three levels – policy, management and reporting (see more details in Annex 1).

Supply Chain Labour Standards Criteria

FTSE4Good criteria for Supply Chain Labour standards are applicable only to companies identified as exposed to highest risks due to the nature of their business. For this purpose, a process is set out to identify high risk companies by applying a three stage screening system – evaluation of products; evaluation of countries; evaluation of exposure in risk markets in terms of revenue. In the same way as with the other criteria, these ones are divided into three areas. The focus is on equality and avoiding discrimination at the working place as well as appropriate communication of a relevant policy or code (see more details in Annex 1).

Countering Bribery Criteria

The issue of bribery is an important ingredient of the evaluation process. It needs to be targeted on various levels. To prevent bribery, special measures were planned to be introduced to reduce the engagement level in bribery that companies face. That level of risk varies widely in certain countries and contexts. FTSE series has established a process to identify companies as high risk through three filter selection:

- sector
- country

- public contracts

All high risk companies currently not in FTSE4Good Index Series have to meet the criteria in full to gain inclusion.

Criteria for High Risk Companies

I. Policy criteria:

- Prohibits giving and receiving bribes;
- Commits to obeying all relevant laws;
- Commits to restricting and controls facilitation payments;
- Commit to restricting giving and receiving gifts;
- Policy is publicly available;

II. Management criteria:

- Communicates policy to employees;
- Trains relevant employees;
- Compliance mechanisms (e.g. assurance, audits, monitoring, board reports);
- Provides secure communication channels for employees to seek advice or voice concerns (e.g. hotlines, advice-lines, whistle-blowing procedures for protection, internal reporting mechanisms);
- Procedures to remedy non-compliance;

III. Reporting criteria:

- Policy is publicly disclosed;
- Compliance mechanisms are publicly disclosed;

FTSE's intention is to contribute to the development of socially responsible business practice around the world and by introducing the indices, it is believed that this is gradually achievable.

Climate Change Criteria

Additionally there are Climate Change criteria, which have to be met by companies in the industry sub-sectors with the highest level of associated emissions. Indicators are divided into four areas: Policy and Governance; Management and Strategy; Disclosure; and Performance.

Sub-sectors classification

Table 2: Classification of sub-sectors

<i>High Operational Impact</i>	<i>Medium Operational Impact</i>
Diamonds and gemstones General mining Gold mining Platinum and Precious metals Commodity chemicals Aluminium Nonferrous metals Steel Building materials and fixtures Airlines Electricity Delivery services	Speciality chemicals Paper Heavy construction Defence Commercial vehicle and trucks Trucking Waste and Disposable services Tires Brewers Distillers and Vintners; Soft Drinks Farming and fishing Food products Home construction Pharmaceuticals Travel and tourism; Multiutilities; Water

Sub-sectors that have a high product impact are required to meet additional impact criteria (Exploration and Production; Integrated oil and gas; Coal; Aerospace; Automobiles)

Indicators

I. Policy and Governance

Table 3: Policy and Governance Criteria

<i>High Operational Impact</i>	<i>Medium Operational Impact</i>	<i>Additional High Product Impact</i>
Board level or senior executive responsibility for climate change related issues (individual or committee) Public statement/policy identifying climate change as relevant to business activities and the need to address climate change as a key concern.	Board level or senior executive responsibility for climate change related issues (individual or committee) Public statement/policy identifying climate change or energy consumption as relevant to business activities and the need to address climate change as a key concern.	Responsibility: No additional requirement Public statement/policy should also include a commitment to reduce product related emissions or climate change impact.

II. Management and Strategy

Table 4: Management and Strategy Criteria

<i>High Operational Impact</i>	<i>Medium Operational Impact</i>	<i>Additional High Product Impact</i>
<p>At least <i>one</i> of the following must be met (unless the company meets the performance requirements:</p> <ul style="list-style-type: none"> • Long-term strategic goal of significant quantified reductions of operational GHG emissions or carbon intensity improvement over more than five years, which should be publicly available. • Short/medium-term management targets for quantified GHG operational emissions reduction over less than five years. 	<p>No requirements yet. (the criteria for this group of companies are focused on disclosure rather than management)</p>	<p>No requirements yet. (for companies with product-related emissions reduction targets are currently regarded as impractical so commitment is established separately in policy)</p>

III. Disclosure

Table 5: Disclosure

<i>High Operational Impact</i>	<i>Medium Operational Impact</i>	<i>Additional High Product Impact</i>
<p>Public disclosure of <i>both</i> the following:</p> <ul style="list-style-type: none"> • total operational CO₂ or GHG emissions as tonnes of CO₂ equivalent • sector metric where established as an industry norm. For example, for cement companies, kg CO₂ per tonne of cement; or efficiency ratio. 	<p>Public disclosure of <i>one</i> of the following:</p> <ul style="list-style-type: none"> • total operational CO₂ or GHG emissions as tonnes of CO₂ equivalent or operational energy consumption. • sector metric where established as an industry norm, e.g. kgCO₂/t cement; or efficiency ratio. 	<p>Public disclosure of product related emissions/efficiency. This will vary for different sectors:</p> <ul style="list-style-type: none"> • oil&gas: end user emissions • coal mining: end user emissions • automobiles: fuel efficiency • aerospace: fuel efficiency

IV. Performance

Table 6: Performance Indicators

<i>High Operational Impact</i>	<i>Medium Operational Impact</i>	<i>Additional High Product Impact</i>
<p>At least <i>one</i> of the following must be met:</p> <ul style="list-style-type: none"> • at least a 5% reduction in carbon intensity over the last two years; • the company is able to demonstrate that for the previous two years it is in the top quartile of companies in its sub-sector when assessed on accepted carbon efficiency metrics; • a transformation initiative or a combination, providing they are quantified and significant. 	<p>No requirements yet. (performance requirements to be introduced for medium impact companies in the near future)</p>	<p>Automobile and Aerospace companies must meet <i>one</i> of the following:</p> <ul style="list-style-type: none"> • emissions reductions: fuel efficiency improvements above average for sub-sector; • eco-efficiency metrics: above average fuel efficiency relative to sub-sector peers; • a transformational initiative to reduce product emissions <p>NB: Oil&Gas and Mining: no further “product” requirement at this time, but still need to meet performance criteria for their operational impact.</p>

The Climate Change criteria are not yet set at a level compatible with the substantial emission reductions that are expected to stabilise the GHG concentrations in the atmosphere. They reflect what is possible for leading companies at the current moment. In future, the criteria will become more congruent with the demands of long-term sustainability in result of further development of international environmental frameworks.

This part of the study provided detailed information about the FTSE4Good Index series and its performance criteria. The quality standards are universal and companies are required to meet them in order to be included in the series. The FTSE set of criteria was presented to broaden the understanding of industry-led indicators with additional criteria for social responsibility. These provide a clear understanding to the Potential Indicators set included under the Social domain and Environmental domain (Figure 8).

PERFORMANCE MEASUREMENT IN SUPPLY CHAINS

The following part of the study deals entirely with supply chain performance. While the FTSE criteria touch mainly the labour aspects of the supply chain, this analysis discusses all issues in detail such as logistics costs, divided to transport, warehousing, inventory, packaging and administration; lead times, giving attention to shortening lead times; improving service quality, and decrease of product life cycle. It is focused exclusively on efficiency and competitiveness of the supply chain system. ELA / AT Kearney study "*Differentiation for performance - Excellence in logistics 2004*" gives key parameters for supply chain performance.

Logistics is characterized by global supply chains, heightened uncertainty, increasing product complexity and ever-increasing customer demands for higher service at lower costs. The effects of increasing complexity of supply chains are:

- Larger share of purchases and sales outside Western Europe leading to longer and more complex supply chains that are less failure tolerant
- Increasing customer requirements regarding service levels, especially with respect to lead times and delivery reliability
- Increasing amount of value added service, shifting activities that traditionally belong to manufacturing into the distribution centres
- Higher product complexity, manifested in shorter product life cycles and arising number of stock keeping units

Key areas of supply chain development are collaboration - sharing and utilization information along the entire supply chain, value chain management (organization of the entire supply chain by integrating partners according to their qualifications and capacities in such a way that total supply chain performance reaches its optimum) and finally differentiation of supply chains, recognising that "one size does not fit all".

A number of surveys also identified factors that are important to users of freight services (customers) in order to choose a transport mode. These factors are – reliability, transport costs, response to problem notification, transit time, frequency, personal service, quality of infrastructure, trust in brand, congestion and pollution.

A. Performance Measurement System

According to Neely et al. (1995) a *performance measurement system* can be defined as the set of metrics used to quantify both the efficiency and effectiveness of actions. Effectiveness refers to the extent to which customer requirements are met. Efficiency measures how economically the firm's resources are utilized when providing a given level of customer satisfaction (Neely et al. 1995).

An effective performance measurement system includes following characteristics (Beamon 1999):

- inclusiveness (measurement of all pertinent aspects),
- universality (allow for comparison under various operating conditions),
- measurability (data required are measurable), and
- consistency (measures consistent with organization goals).

Drivers of Supply Chain Performance

The four drivers that affect significantly the supply chain's efficiency and responsiveness are (Chopra & Meindl 2001):

1. **Inventory** stands for all raw materials, work in process and finished goods within a supply chain.
2. **Transportation** moves inventory from point to point by different combinations of modes and routes, each with its own performance characteristics.
3. **Facilities** refer to all places where inventory is stored, assembled or manufactured.
4. **Information** is probably the most important driver because it directly affects each of the other drivers. Information consists of data and analysis related to inventory, transportation, facilities and customers.

The goal of a supply chain strategy is to reach the balance between responsiveness and efficiency that matches with the competitive strategy (Figure 2). The supply chain has to use the supply chain drivers to reach the performance level defined in the supply chain strategy (Chopra & Meindl 2001).

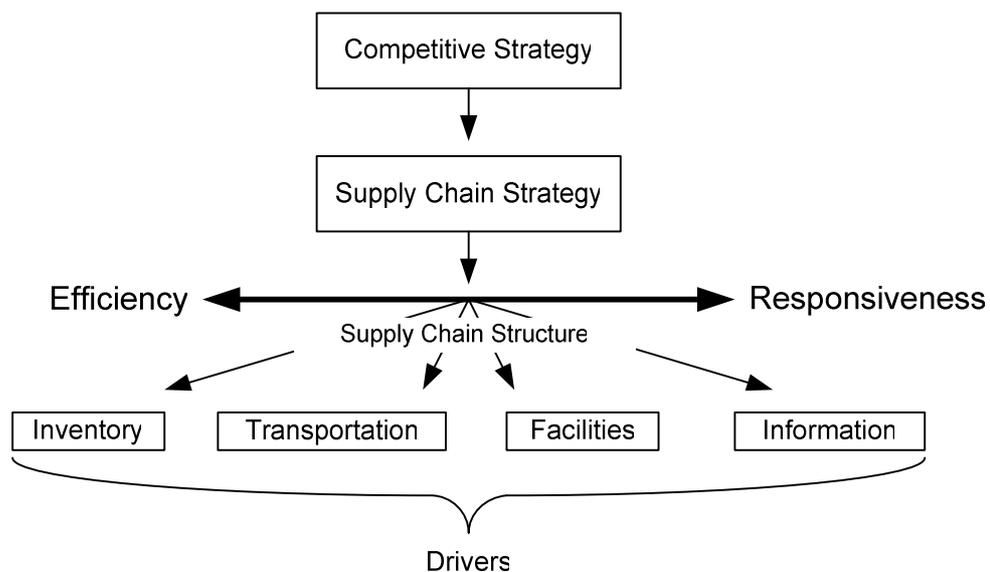


Figure 2. Supply Chain Decision-Making Framework (Chopra & Meindl 2001)

Measurement Levels

Gunasekaran et al. (2004) have classified the four major supply chain activities/processes (plan, source, make/assemble, deliver) at strategic, tactical and operational level (Table 7). The division clarifies the appropriate level of management authority and responsibility for performance. The items in each cell are listed in the order of importance based on an empirical study of Gunasekaran et al. (2004). However, the framework is largely based on the metrics discussed in the literature and individual firms may have unique needs for measurement.

Table 7: Supply Chain Performance Metrics Framework (Gunasekaran et al. 2004)

Supply chain activity/process	Strategic	Tactical	Operational
Plan	Level of customer perceived value of product, Variances against budget, Order lead time, Information processing cost, Net profit Vs productivity ratio, Total cycle time, Total cash flow time, Product development cycle time	Customer query time, Product development cycle time, Accuracy of forecasting techniques, Planning process cycle time, Order entry methods, Human resource productivity	Order entry methods, Human resource productivity
Source		Supplier delivery performance, supplier leadtime against industry norm, supplier pricing against market, Efficiency of purchase order cycle time, Efficiency of cash flow method, Supplier booking in procedures	Efficiency of purchase order cycle time, Supplier pricing against market
Make/Assemble	Range of products and services	Percentage of defects, Cost per operation hour, Capacity utilization, Utilization of economic order quantity	Percentage of Defects, Cost per operation hour, Human resource productivity index
Deliver	Flexibility of service system to meet customer needs, Effectiveness of enterprise distribution planning schedule	Flexibility of service system to meet customer needs, Effectiveness of enterprise distribution planning schedule, Effectiveness of delivery invoice methods, Percentage of finished goods in transit, Delivery reliability performance	Quality of delivered goods, On time delivery of goods, Effectiveness of delivery invoice methods, Number of faultless delivery notes invoiced, Percentage of urgent deliveries, Information richness in carrying out delivery, Delivery reliability performance

Measuring Delivery and Customer Satisfaction – effectiveness

The delivery is a primary determinant of customer satisfaction in supply chains. Thus, measuring and improving delivery is also desirable to increase competitiveness. Improvements are challenging due to the dynamic and ever-changing environment where delivery takes place (Gunasekaran et al. 2004).

It is possible to increase delivery performance by a reduction in lead time attributes. An important aspect of delivery performance is *on-time delivery*, which is also a measure of customer service level. *Percentage of finished goods in transit* is related to inventory turns. High percentage implies to low inventory turns leading in unnecessary increases in tied up capitals. *Delivery speed* can be influenced by vehicle speed, driver reliability, and location of depots. Increasing efficiency in these areas can lead to decreasing inventory levels (Gunasekaran et al. 2004).

Number of faultless notes invoiced implies whether perfect delivery has taken place or not, and areas of discrepancy can be identified and improved. *Flexibility of delivery system to meet particular customer needs* refers to requirements at an agreed place, agreed mode of delivery and with agreed upon customized packaging. This type of flexibility can influence customer's decision to place orders (Gunasekaran et al. 2004).

It is essential to understand *total distribution cost* in order to apply proper trade-offs as a basis for planning and reassessment of distribution systems. Measuring individual cost elements together with their impact on customer service encourages trade-offs leading to a more effective and efficient distribution system (Gunasekaran et al. 2004).

Satisfied customer is remarkably important and supply chain metrics must concentrate on customer satisfaction. *Flexibility* is a critical factor when supply chains compete. Flexibility refers to the capability to provide products/services that meet the individual demands of customers. *Customer query time* means the time it takes to respond to a customer query with the required information. *Post transaction measures of customer service* have an important role in customer service and provide valuable feedback for future improvements (Gunasekaran et al. 2004).

Efficiency In the Supply Chain

The efficiency of supply chain is a financial measure and can be assessed using the total logistics cost. Since logistics is a multi-functional activity, the impact of actions to influence costs in one area may influence other areas. For that reason the impacts of actions must be assessed carefully. For example, change in capacity affects cost related to inventory and order processing. (Gunasekaran et al. 2004)

Cost associated with assets and return on investment: Supply chain assets consist of accounts receivable, plant, property and equipment, and inventories. It is important to determine how the cost associated with each asset, combined with its turnover, affects total cash flow time. Total cash flow time is a metric which determines the productivity of assets in the supply chain. Once total cash flow is determined, combined with the profit, the rate of return in investment (ROI) can be calculated. ROI indicates earnings on the total capital invested in the business and determines the performance by top management. (Gunasekaran et al. 2004)

Effective inventory management in the supply chain is crucial. Total inventory cost consists of (Gunasekaran et al. 2004):

- opportunity cost: warehousing, capital and storage,
- cost associated with inventory at the incoming stock level and work in progress,
- service cost: cost associated with stock management and insurance,
- cost of finished goods including those in transit,
- risk costs: cost associated with pilferage, deterioration, and damage,
- cost associated with scrap and rework, and
- cost associated with too little inventory accounting for lost sales/lost production.

Information processing cost includes costs associated with order entry, order follow/updating, discounts, and invoicing. Information processing cost has been identified as a largest contributor to total logistics cost. Modern information technology (IT) provides timely, accurate and reliable information. IT is probably the most powerful way to integrate modern supply chains (Gunasekaran et al. 2004).

B. The Environment of Performance Measurement System

The performance measurement system has to interact with its environment. The dimensions to this environment are internal and external ones. (Neely et al. 1995)

The internal environment refers to organization's strategy and culture. In a strategic control system the performance measure is seen as a wider system including goal setting, feedback, and reward or sanction. (Neely et al. 1995)

The external environment consists of two distinct elements: customer satisfaction and competitors. One technique to measure competitor performance is benchmarking which can be defined as the search of best practices that lead to superior performance. The benchmarking process consists of four steps: planning, analysis, integration, and action. There are four types of benchmarking (Neely et al. 1995):

1. *Internal*. Internal to corporation, but maybe external to a business unit. The advantage of internal benchmarking is the access and confidentiality of the data.
2. *Competitive*. This form of benchmarking is probably the most beneficial, but receiving comparable data is very difficult.
3. *Functional*. This refers to comparison of similar companies who are not direct competitors.
4. *Generic*. Comparison of generic business process, e.g. order entry, invoicing.

C. Tools for Measuring Supply Chain Performance

In the area of supply chain management, the academic literature proposes few valid tools for performance measurement: balanced scorecard, the Supply Chain Operations

Reference model (SCOR), a system approach, and process benchmarking (Bichou & Gray 2004).

1.1.1. Balanced scorecard

The supply chain performance in a manufacturing environment is usually measured in terms of quality, time, cost and flexibility (Brewer & Speh 2000, Neely et al. 1995). In any organization performance measure can relate to results (competitiveness, financial performance) or to determinants of the results (quality, flexibility, resource utilization and innovation). Balanced scorecard is based on both results and its determinants. (Neely et al. 1995)

The idea of balanced scorecard is to measure strategic goals by key performance indicators (KPIs) between financial and non-financial results (Brewer & Speh 2000, Christopher 1998). The balance is obtained by adopting performance measures from four different perspectives: customer, internal business, innovation and learning, and financial perspective. (Brewer & Speh 2000, Neely et al. 1995)

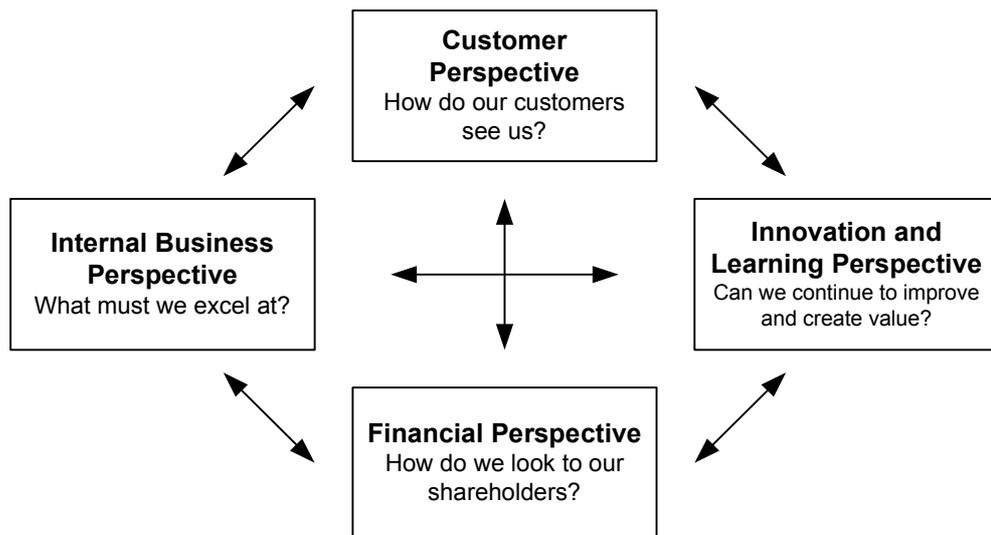


Figure 3. The Balanced Scorecard Framework (Brewer & Speh 2000, Neely et al. 1995, based on Kaplan & Norton 1992)

Modifications to the balanced scorecard performance measurement approach results into a comprehensive framework for measuring supply chain performance. The balanced scorecard is expanded to include “interfunctional” and “partnership” perspectives for the supply chain purpose. Figure 4 illustrates how supply chain management can be linked to the balanced scorecard. (Brewer & Speh 2000)

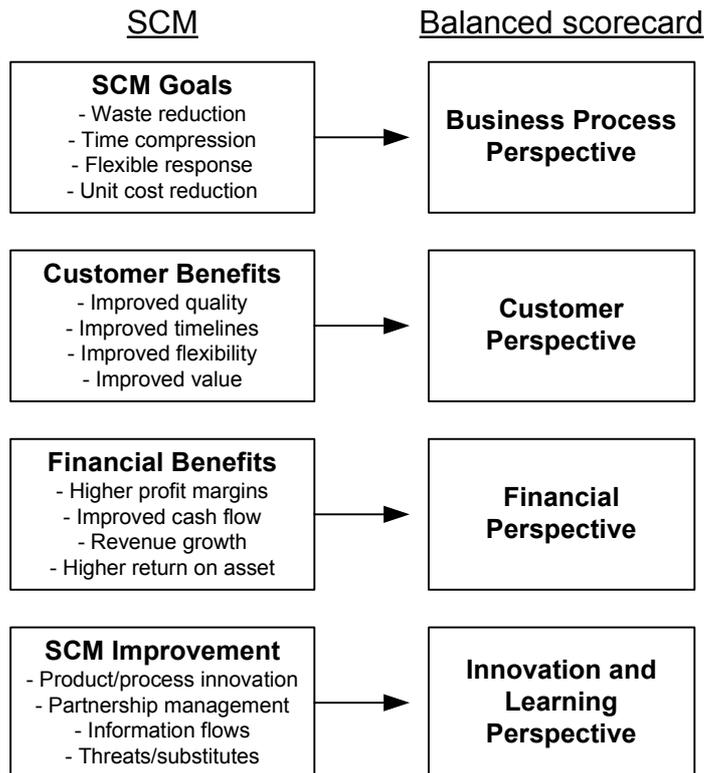


Figure 4. Linking Supply Chain Management Framework to the Balanced Scorecard (Brewer & Speh 2000)

1.1.2. SCOR

The *Supply-Chain Operations Reference-model (SCOR)* is a process reference model developed by the Supply-Chain Council as the cross-industry standard diagnostic tool for supply-chain management. SCOR enables users to address, enhance and communicate supply-chain management practices within and between all interested parties. SCOR is a management tool, spanning from the supplier's supplier to the customer's customer. The SCOR-model has been developed to describe the business activities related to all phases of satisfying a customer's demand. By using process building blocks, the Model can be used to describe supply chains that are very simple or very complex using a common set of definitions. As a result, diverse industries can be linked to describe the depth and breadth of virtually any supply chain. The SCOR - model has been able to successfully describe and provide a basis for supply chain improvement for global projects as well as site-specific projects. (Supply Chain Council 2009)

http://www.supply-chain.org/cs/root/scor_tools_resources/scor_model/scor_model

The SCOR model integrates the well-known concepts of business process re-engineering, benchmarking, and process measurements into a cross-functional framework (Holmberg 2000). The model views activities in a supply chain as a series of allying interorganisational processes with each individual organisation including four components: plan, source, make, and deliver (see Fig.4). Each component has four measurement criteria: (1) supply chain reliability, (2) responsiveness/flexibility, (3)

costs, and (4) assets. The first two criteria are effectiveness-related (customer-facing) performance measures, while the other two are efficiency-related (internal-facing). (Lai et al. 2002)

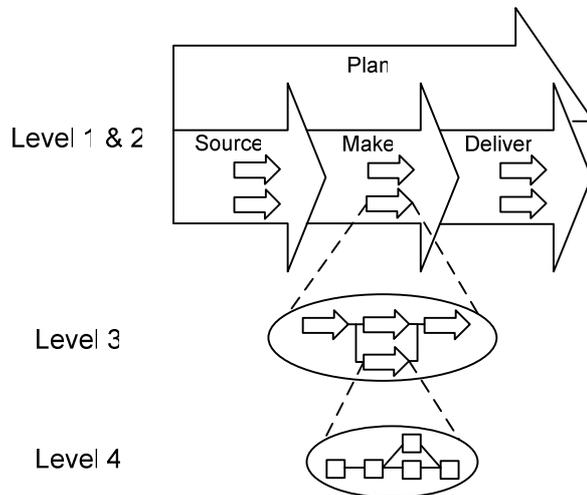


Figure 5. Different Levels of the SCOR Model (Holmberg 2000)

Each of the four components at the top level is divided into sub-processes, first at a configuration level, then at a process element level. At the fourth level activities are defined by companies individually. Measures are defined for all processes at the three top levels, and companies can compare their results across the supply chain. (Holmberg 2000). Table 8 lists examples of SCOR level 1 metrics.

Table 8: Examples of SCOR Level 1 Metrics (Simchi-Levi et al. 2008)

Perspectives	Metrics	Measure
Supply chain reliability	On-time delivery Order fulfillment lead time Fill rate Perfect order fulfillment	Percentage Days Percentage Percentage
Flexibility and responsiveness	Supply chain response time Upside production flexibility	Days Days
Expenses	Supply chain management cost Warranty cost as percentage of revenue Value added per employee	Percentage Percentage Dollars
Assets/utilization	Total inventory days of supply Cash-to-cash cycle time Net asset turns	Days Days Turns

1.1.3. System approach

Holmberg (2000) proposes a systems thinking to performance measurement. The idea of a system is that a set of elements connected together form a whole. This approach shows properties of the whole rather than properties of its components parts. The systems thinking provides a method for describing, analyzing and planning complex systems of different kinds. The general approach defines components, decides what components should be included in the system, and defines how the components are related. (Holmberg 2000)

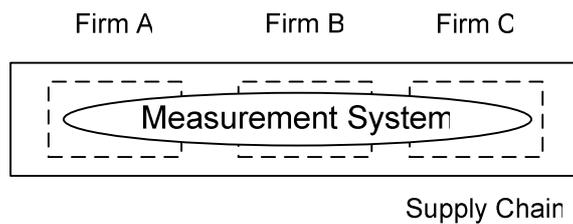


Figure 6. System Approach in Supply Chain Measurement

A structural view of a measurement system is depicted in Figure 6. The metrics, that need to align measurement methods across organizations, and the development of a performance model have been viewed as parts of the same system. As a supply chain must be viewed as one entity, the measurement system should span the entire supply chain. Thus, each of the components in the measurement system has to be considered throughout the entire supply chain (Holmberg 2000).

1.1.4. Process benchmarking

Process benchmarking is a technique where all members in the supply chain collaborate for the purpose of process comparison and performance analysis (Bichou & Gray 2004). Benchmarking is a repeatable process which enables to identify performance gaps and target the improvement areas that will provide the most benefit and ROI. Benchmarking metrics can for example be based on the SCOR model (Performance Measurement Group 2009).

TRANSPORT AND LOGISTICS PRACTICES

The intention of this section is to present transport practices in more details. Although the previous part takes into consideration all components of the supply chain, this bit of the report focuses solely on the indicators derived from the transport practices. It discusses air and maritime transport as well as intermodal transportation. In contrast to the capital markets' social indicators, these ones are oriented entirely to the competitiveness of the transportation activities.

A. Intermodal Transport

PROMIT D4.1²³ European benchmarks in intermodal transport gives key performance indicators (KPIs) used in intermodal transport in Europe. The PROMIT study divided the intermodal transport into three levels; shippers' level, logistics service provider level and operators' level. On shippers / customer level the most used indicators are:

- price, lead time which means transit time;
- frequency of service, shipment compatibility, damages and theft;

On logistics service providers (LSP) level the same, except lead time is calculated from execution time. And on operator level:

- price, transit time, capacity, capacity utilization;
- reliability, damages, and operator specific topics.

Often the indicators are cost of service, frequency and reliability. To measure the performance of an intermodal initiative it might be wise to look further than just the obvious indicators. In intermodal transport cases the indicators will be compared to single mode road transport. It is important to make them comparable with road shipments, thus increasing transparency and showing the advantages of intermodal transport. A good set of KPI's is a sound basis for operational as well as strategic control of business.

B. Air Freight Industry²⁴

World class companies active in the air cargo business recognise the important role that best practice and quality plays in the development of the air freight product. The growing importance in the reliability and performance of manufacturers' supply chains, and the need to improve efficiency in the supply chain, has created greater demands on the air cargo industry to improve its performance, reliability and measurement standards. The unifying element driving all those engaged in the air cargo supply chain

²³ www.promit-project.net

²⁴ http://www.europeanshippers.com/public/statements/archives/air_kpi_guide.htm#top#top

is enhanced competitiveness. This is the core of best practice, and the key motivation on the part of world beating companies who recognise the real value of quality in achieving world class status.

Key performance indicators and other measurement standards have been used as a means of bench-marking the performance of the air cargo supply chain by quality companies for some time. This has largely been conducted on an individual company basis. Industry wide guide sets common definitions, standards and measurements to encourage adoption of harmonised KPI's and best practices to improve performance within the air cargo industry. The aim is to:

- Provide a standard of KPI's to be understood and recognised by all involved in the air freight industry as the minimum under which all must be prepared to measure their performance;
- Provide instruction as to precisely what measurement is required and to denote the standard of performance to be achieved;
- Target the KPI's and best practices at shippers (consignors and consignees), air freight forwarders and freight carrying airlines;
- Explain the importance of KPI's as the means of changing behaviour and practices;
- Improve and enhance the whole air freight service;
- Provide a register of companies which have agreed to publish the KPI's on behalf of the consignor, freight forwarder(s) and airline(s) used in the air cargo supply chain;
- Provide a register of companies which have agreed to support the measuring of performance as described in this guide;
- Analyse the various points in the air cargo supply chain to identify where a failure or breakdown in the chain occurred;
- Improve the success-rate of the air cargo service by applying standard industry recognised KPI's and recommended industry best practices;
- Achieve a more efficient air freight industry for the benefit of air cargo service providers, freight forwarders and their customers.

Specifying with the service provider(s) the service required is the essential first step. All the facts about what service is required should be clearly identified at the beginning. Flight or Time Definite service should be specified by the shipper. The measure is the time difference between agreed collection/delivery time and actual collection/delivery time:

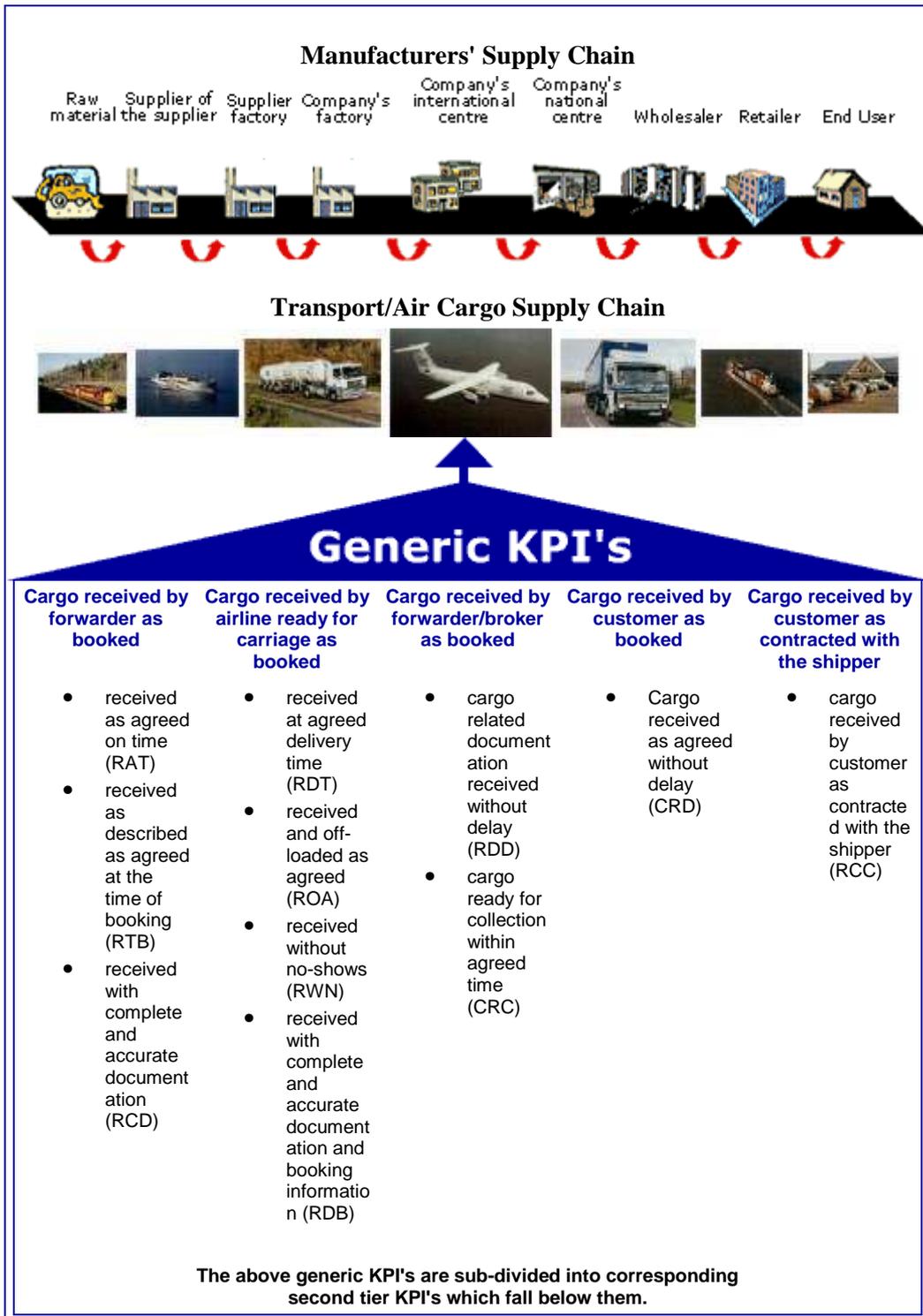


Figure 7: Generic KPI

C. Maritime Transport

Performance of liner shipping operations

The overall aim of logistics, including liner shipping and maritime transport, is to achieve high customer satisfaction by providing a high-quality service with low or acceptable costs since the key task is the time-related positioning of resources. Logistics adds value, so-called place utility and time utility, by making products available in the right place at the right time. Maritime transport and liner shipping in particular aim for adding place and time utility in performing their related operations. The performance goals of liner shipping companies are related to reliability, time, cost, space utility and customer satisfaction. (Panayides 2006)

Logistics has a number of indicators that measure the extent to which the broad logistics goals are achieved. The same indicators also apply in measuring the performance of liner shipping operations. These include (Panayides 2006):

- the management of demand and supply to avoid surpluses and shortfalls,
- the full utilisation of resources,
- minimisation of losses in transportation,
- cost reduction in transportation and storage,
- meeting customer needs in order fulfillment, and
- improving customer service and customer communication.

Port Performance

Previously, port performance has been measured mainly by quantification of efficiency and competitiveness. More recently the increasing intermodal transportation and the consideration of ports as nodes in the supply chain led to a logistics and supply chain management approach in measuring port performance. (Panayides 2006)

Waiting times and delays are responsible for logistics costs to the customer due to schedule unreliability caused probably mostly by port congestion. This emphasizes the need for greater integration between ocean carriers and ports in the quest to achieve mutual goals. There is also a selection of measures and planning tools available to shipping lines for maximising schedule reliability. (Panayides 2006)

Port efficiency from the supply chain perspective can be defined as the ability of the port to reduce its costs through efficient use and utilisation of infrastructure, the use of sophisticated equipment and efficient information technology. (Panayides 2006)

In addition to the conventional selection of variables for port efficiency studies, the *output* can be measured by container throughput (Panayides 2006). Cargo size or throughput is determined by (Tongzon 1995):

- *Location*. The geographical location of a port influences cargo size. A free trade zone around a port encourages its performance. Some ports are driven by small economy.
- *Frequency of ship calls*. The number of ship calls is important because it has an effect on the volume of cargo which can be moved through the port. High

frequent of ship calls is attractive to both importers and exporters. Several studies have shown that frequency of ship service is remarkably important reason for port choice

- *Port charges.* Port charges account for a very low share of overall costs of international trading. Thus, shippers are more concerned with indirect costs related to delays, loss of markets/market share, loss of customer confidence, and opportunities foregone due to inefficient service.
- *Economic activity.* The demand for port activities is dependent on the level of economic activity within a country and between them.
- *Terminal efficiency.* Terminal efficiency reflects the labour and capital productivity levels in ports and is measured in number of containers loaded and unloaded per berth hour.

Inputs of the port performance could include following variables (Panayides 2006):

- provision of value-added services,
- facilitation of inter-connectivity/inter-operability with other modes of transport,
- hinterland accessibility,
- the extent to which the port authorities plan for the smooth/cost-effective flow of cargoes through it by taking into account transportation flow beyond the port's boundaries, and
- the relationship between the port authority/operator and the customers (liner shipping companies).

Other possible measures of port performance could include for instance leanness, agility, time compression as well as the performance of other parties in the supply chain. (Panayides 2006)

Motorways of the Sea

D2.5 MOSES²⁵ quality criteria could be called “industry-led standards” which are produced as quality labels to raise the profile of the short sea shipping. KPIs attached to such quality labels set up benchmarking system to facilitate the comparison of companies' performance or industries' performance. Their proposed indicators are:

- environmental sustainability;
- security and safety;
- commercial reliability;
- time;
- cost effectiveness;
- intermodality (interoperability);
- access;
- capacity;

²⁵ <http://www.moses-eu-project.org/index.php?q=Deliverables>

The MOSES survey showed that customers accept environmental friendliness “as long as it is free” or for marketing reasons. However, the majority of freight transport users show a positive attitude and awareness regarding the importance of reducing pollution from transport activity, and acknowledge that sea and multimodal transport has less impact on the environment.

Environmental sustainability is not easily integrated in a company’s strategy, which often is driven by financial indicators. The variables below show how environmental and social sustainability aspects of sea-based intermodal transport can be related and assessed:

<i>Economic</i>	<i>Social</i>	<i>Environmental</i>
<ul style="list-style-type: none"> • Energy use • Economies of Scale / Efficiency • Extra Capacity • Lack of Truck drivers + Road Congestion 	<ul style="list-style-type: none"> • Congestion of road • Road accidents • Truck-drivers life style 	<ul style="list-style-type: none"> • Air pollution • Environmental impact of infrastructures • Noise

❖ **Economic Sustainability**

- Energy use

Cost of service as a percentage of energy use is different for MoS than for Road only. SSS and intermodal transport have the advantage in terms of energy use, costs and stability over time.

- Economies of Scale

With sea transport, more cargo can be transported each time, which conveys economies of scale and higher margins - this enable to either reduce the transport price (per load unit or per tonn/km), or to keep a satisfactory level of service (offer more flexibility, ensure reliability, etc.).

- Extra Capacity

SSS and MoS can offer extra capacity - an alternative that generates more stability and less dependency.

- Lack of Truck drivers and Road Congestion

The economic problems linked to road congestion (loss of time) and lack of truck drivers (because non sustainable life-style) can be minimized with well integrated SSS and intermodal service.

❖ **Social Sustainability**

The social impact of Road transport can be alleviated through sea and intermodality.

- Congestion of road, having a direct cost impact on traffic.
- Road accidents, having a permanent impact on societies.
- Truck-drivers life style: unsustainable. Ideally it should be possible to reduce truck-transport to a certain perimeter (e.g 400km), such that truck drivers can have “normal” working hours.

❖ **Environmental Sustainability**

- Air pollution:

Sea and intermodal transport generate much less CO₂ emission by tone/km than road transport. Indeed, the energy efficiency of the maritime transport is the highest between all the transport modes, therefore, a modal transfer towards maritime transport services would constitute an important element of the community strategy to the obligations derived from the protocol of Kyoto. However, benchmarks are still unclear at this stage, trucks have different type of motors which complicate the modal comparison, and ships have additional impact on the environment - NO_x and SO_x.

- Environmental impact of infrastructure and Noise

The external costs caused by new infrastructure are much lower for sea than land highway. Also road generates high levels of noise in rural areas, therefore high inconvenience for population. Sea transport has much less noise impact on society.

CONCLUSION

Summing up the supply chain performance, the section analysed only the performance indicators from efficiency and effectiveness perspectives. It explored the literature on this topic and discussed in more details the transport/logistics practices.

It seems a difficult task to define an indicator set that will cover all aspects of the supply chain. The system has to be simplified. However, in terms of logistics businesses the criteria might be classified into:

- monitoring surpluses and shortfalls;
- utilisation of resources;
- lost minimisation;
- cost reduction;
- meeting customer needs and improving customer services;

These criteria clearly lie behind the efficiency and quality indicators hold under the Economic Domain (Figure 8).

STATISTICAL SOURCES

The other important element of defining an indicator set is the sources of information. Indicators have to be selected so the necessary data are feasible to collect. If it is possible the data collection should be standardised to allow comparison. Some indicators may rely on existing data sets, but others may require additional collection of information.

In this section, the brief outlook of the existing statistical sources in the maritime industry shows inconsistency with the quantitative data necessary for our indicator set. Logically the proposed indicator set explores the performance of companies from economic, social and environmental perspectives. It is a business-oriented approach. On the contrary, the standardised statistical data provides information about the industry as a market driven merely by supply and demand. Therefore we had to discuss other ways and mechanisms to find desired information from companies.

Conventional sources of statistical information

Classification of statistical information is considered to be extremely important for the various information that can provide to different parties which are involved in shipping industry. Such parties can actually be the shipowners, port operators, banking institutions, freight forwarders, transport operators, consultants inside shipping, etc. All aspects of information can only be provided to interested parties upon the existence of statistical methods and sources that could also contribute a lot at the prediction on behalf of the parties mentioned above and determine the necessary steps that those persons need to make inside the industry.

Such considerable statistical information is that of charter rates. Those are quoted on a competitive basis through brokers in various exchanges throughout the world. Several indices are available to keep track of rate fixing in the international dry bulk markets, such as the Baltic Freight Index (BFI) which is determined by an expert group and published daily by the London-based Baltic Exchange.

On the other side, statistical figures in liner services are provided on the basis of fixed schedules and itineraries. Until recently, the liner shipping sector was largely oligopolistic in fact that these services were controlled by cartels which were known as shipping conferences.

Also it has to be said that despite the existence of conferences and because of the increasing role of independent carriers in the liner trades, the rates actually charged vary widely and often deviate substantially from published tariffs in statistics information provided each time. Service contracts are gaining importance whereby individual shippers pledge a minimum amount of cargo to be shipped during a certain period in return for specially discounted rates offered by the contracted carrier.

Statistical information is also involved with ports and the various services that those could offer to ships call there and their ship-owners. Statistical information of that type can also be classified accordingly and possess a high ranking in the level of information about the existence of ports and services could be offered. A basic factor that can affect the way that the ports set the prices for the services that they offer and determine accordingly the statistical information provided to ship-owners and shipping lines irrespectively, is that of the commodities which are being traded by sea.

As already mentioned the conventional sources of statistical information in the maritime industry are irrelevant to the data needed to be collected for this study's indicator set. Also the wide range of governmentally collected data do not match the needs of this study, because the desired information is possessed by companies.

Mechanisms to collect companies' data

It appears from the discussion above that the conventional statistical sources in the maritime industry provide very standardised information about freight rates and tonnages which is not sufficient for a wide range of performance indicators or quality criteria. This requires additional search for ways to find the desired companies' information such as:

- separate research of companies' websites;
- investigation of annual reports and business plans;
- search of publicly available documents;
- direct contacts with companies;
- search of EUROSTAT, OECD and other data for evaluating purposes;

In this aspect, FTSE's mechanisms to collect and update companies' data seem the most practicable²⁶. It is important that companies are prepared to cooperate and offer statistical information. For this purpose, a standardised mechanism for collecting data will have to be delineated.

It is suggested that a sample of companies should be established to test the mechanism of collecting data. A questionnaire may be developed to ask companies for necessary data via a range of questions and statements relevant to our potential indicator set. This may require a direct contact with companies to create better understanding of their current activities and policies. Such surveys will have to be performed annually as it is important that each step of this process is well described and specified.

In addition, search of companies' websites and annual reports will be done to evaluate their commitment to public reports. The availability of business plans will help to

²⁶ For more detail: www.ftse.com

understand their policies, especially the environment and risk management, and how they plan to improve the corporate and social responsibility strategies. Any publicly available reports will provide more information about the companies and their level of transparency. It is essential to combine all these methods to collect companies' data necessary for our indicator set.

Searching for data from the official statistical sources such as EUROSTAT, OECD or national statistical offices will be needed for evaluating purposes. Particularly in the case of some indicators from the environmental domain (for ex., air pollution or climate change particles), we will have to see what the industry standards are and the other transport modes' achievements in order to evaluate the companies' performances.

Ranking

In the end, it is also important to mention that companies will be ranked by indicator values but no detailed information will be revealed in the public domain. What will be available is only the ranking of *sustainable transport companies*. To respect the competition rules, no quantitative data on a company level will be published. The ranking, itself, will be announced on the website of SKEMA project.

CONCLUSIONS AND RECOMMENDATIONS

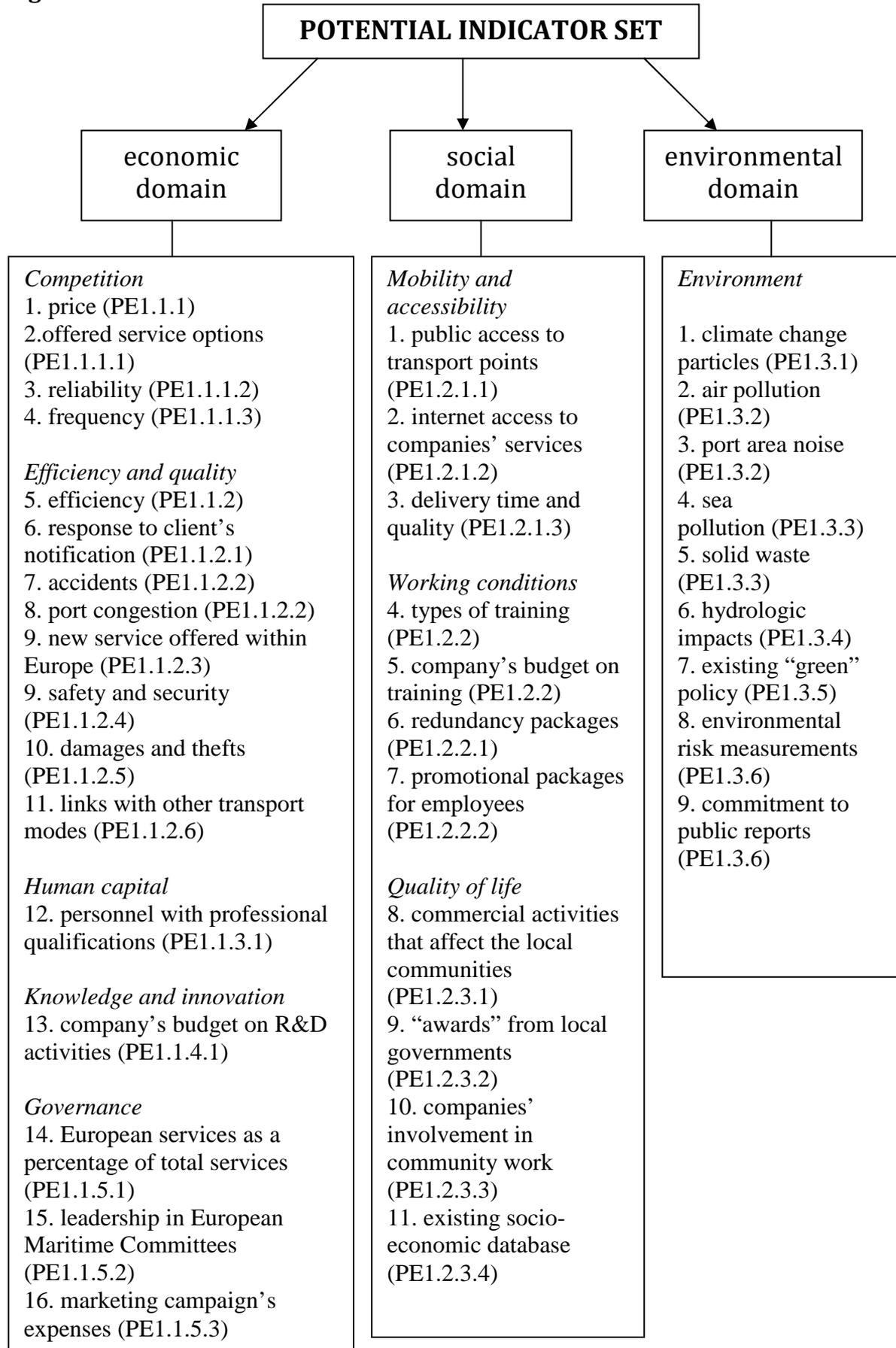
This study has provided reviews of the quality criteria and performance indicators relevant to the European maritime sector. These have identified different types of indicators in regard to socially responsible business practices and competitiveness of supply chains practices. Each of these indicator sets focuses on improving the business practices via maximisation of different objective functions. These sets of indicators have been combined with EU policy objectives to produce a Potential Indicator Set that will establish not only high quality standards for companies in the maritime and logistics industry, but also give directions to where the EU transport policy is heading.

The indicators are set out in Figure 8, linked to the SKEMA Policy Index through the codes and structured around Index's three domains – Economic, Social and Environmental (see p.11 and the SKEMA Platform www.skematransport.eu). These divisions and the indicators allocated to them are supported by the wide range of studies reviewed in this report. Indeed, it should be stressed that overall the reviews of the approaches, performance indicators and quality criteria, reveal high level of communality. While the naming of the individual indicators and their groupings vary, the essence of what is being measured is remarkably consistent. This is evident in the FTSE4Good (pp. 13-23) which provides a model for socially responsible performance indicators. This supports the Social Domain and Environmental Domain indicators, and the Governance aspect of the Economic Domain. Similarly, the reviews of performance measurement (pp. 23-31) and transport/logistics practices (pp. 32-39) underpins the Competition and Efficiency and Quality indicators under the Economic Domain. In this respect, particularly importance is attached to the Balanced Scorecard approach (pp.28-29) because of its ability to provide comprehensive measurement of supply chain performance and SCOR (pp. 29-30) with its customer satisfaction orientation.

The proposed indicators will be the subject of further development and it is recognised there will always be debate over which indicators best measure the economic, social and environmental impacts of transport and its level of sustainability. This reflects the on-going debates over the nature of the impact of the transport sector and the factors that govern its sustainability.

Some experts argue that unsustainability consists of problems that could be regarded as 'self correcting' within the existing production system, for instance, by improving fuel efficiency or the cars' engines. Others argue that strategies to change travel behaviour are required in order to improve transport system efficiency. Some research indicates that a portion of current transport inefficiency results from market distortions and planning needs to be optimised to deal with this. It is apparent that there are many issues which still have to be clarified, while measurements will need refining, and policy objectives will continue to develop. All of these will affect the indicator set in future.

Figure 8



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Key EU Projects:

[1]. **PROMIT** Project, Promoting Innovative Intermodal Freight Transport, 6th Framework Programme Priority, Key Performance Indicators (Work Package 4, Deliverable 4.1)
<http://www.promit-project.net/>

PROMIT is funded by the European Commission with main objectives to contribute to a faster improvement and implementation of intermodal freight transport technologies and procedures, and to help Promoting Innovative Intermodal Freight Transport and modal shift by creating awareness on innovations, best practices and opportunities for potential users as well as politicians and research community.

[2]. **SafetyNet** Project, Safety Performance Indicators (Work Package 3)
http://ec.europa.eu/transport/wcm/road_safety/erso/safetynet/content/wp_3_safety_performance_indicators.htm

SafetyNet is a project funded by DG-TREN of the European Commission. The objective of this project is to build a framework of a European Road Safety Observatory, which will be the primary focus for road safety data and knowledge, as specified in the Road Safety Action Plan 2003. To download a complete overview of the project, click here:
http://ec.europa.eu/transport/wcm/road_safety/erso/safetynet/content/safetynet.htm

Key Websites:

1) European Environment Agency

<http://www.eea.europa.eu/themes/transport/indicators>

2) EUROSTAT, Transportation Statistical Data

<http://epp.eurostat.ec.europa.eu>

3) OECD Main Economic Indicators (MEI)

www.oecd.org

4) UNCTAD Statistical Databases online, Handbook of Statistics

www.unctad.org

5) The *World Integrated Trade Solution* (WITS) is software developed by the World Bank in close collaboration with UNCTAD. It gives an access to the major trade and tariffs data compilation by WTO, UNCTAD and UN Statistics Division.

<http://wits.worldbank.org/witsweb/>

6) DG TREN, Transport

http://ec.europa.eu/transport/index_en.htm

ANNEX I

I. Environmental Criteria

Table 1.1: Policy Area

<i>High Impact Companies</i>	<i>Medium Impact Companies</i>	<i>Low Impact Companies</i>
<p>Policy must cover the whole group and either:</p> <ul style="list-style-type: none"> • meet all five core indicators plus one desirable indicator • or meet four core plus two desirable indicators 	<p>Policy must cover the whole group and meet four indicators, three of which must be core</p>	<p>Companies must have published a policy statement including one commitment indicator</p>

Table 1.2: Management Area

<i>High Impact Companies</i>	<i>Medium Impact Companies</i>	<i>Low Impact Companies</i>
<p>(1) If environmental management systems (EMS) are applied to between one or two-thirds of company activities, all six indicators must be met, and targets must be quantified.</p> <p>(2) If EMS are applied to more than two-thirds of company activities, the company must meet five of the indicators. One of these indicators must be documented objectives and targets in all key areas.</p> <p>(3) Companies with ISO certification and EMAS registrations are considered to meet all six indicators.</p>	<p>EMS must cover one third of the company and meet four indicators.</p> <p>If the EMS covers less than one third of the company's operations, the company must meet six indicators, including quantitative objectives and targets. ISO14001 certified or EMAS registered systems are considered to meet all six indicators.</p>	<p>No requirement</p>

Table 1.3: Reporting Area

<i>High Impact Companies</i>	<i>Medium Impact Companies</i>	<i>Low Impact Companies</i>
<p>The Report must have been published within the last three years, cover the whole group, and meet three core indicators.</p> <p>Reports which do not cover the whole group must meet all indicators OR three core indicators together with two desirable indicators.</p>	<p>No requirement</p>	<p>No requirement</p>

II. Human Rights Criteria

Table 1.4: Policy Area

<i>New criteria</i>	<i>Details</i>
Public Policy	The company has published policies covering human rights issues that are clearly communicated globally.
Board responsibility	The strategic responsibility for the human rights policy rests with one or more Board members or senior managers who reports directly to the CEO.
ILO Core labour standards OR UN Global compact/SA8000/OECD guidelines	A statement of commitment to respect all the ILO core labour standards globally. The core conventions relate to: equal opportunities, freedom of association/collective bargaining, forced labour and child labour. Alternatively signatories to the UN Global compact or SA8000, or whose policy states support for the OECD guidelines for Multi-national Enterprises are considered to meet this requirement.
UDHR	A clear statement of support for the Universal Declaration of Human Rights.
Guidelines on armed security guards	Guidelines governing the use of armed security guards based on UN Basic principles on the use of Force and Firearms by Law Enforcement Officials. Alternatively signatories to the Voluntary principles on Security and Human rights meet this requirement.
Indigenous people	A stated commitment to respecting indigenous peoples' rights.

Table 1.5: Management Area

<i>New criteria</i>	<i>Details</i>
Implementing policy criteria and monitoring	Monitoring implementation of its human rights policy including the existence of procedures to remedy any non-compliance.
Employee Human rights training	Training for employees globally in its human rights policy
Stakeholder consultation	Consulting with independent local stakeholders in the countries of concern
Human rights impact assessment	Evidence of a human rights impact assessment which includes the company identifying the major human rights issues it faces and integrating human rights concern into its risk assessment procedures.

Table 1.6: Reporting Area

<i>New criteria</i>	<i>Details</i>
Produce a human rights report	Reporting on the human rights policy and performance to the public in a published format.
Cover policies and management systems	Covering policies and management systems as a minimum

III. Supply Chain Labour Standards

Table 1.7: Policy Area

<i>Minimum criteria (Policy and Systems)</i>	<i>Final criteria 1st July 2006 (Policy and Systems)</i>	<i>1st January 2007 (Reporting)</i>
<p>Policy/code (or other relevant information) to commit to, or clearly be based on (and contain the principles of), the four ILO core convention areas:</p> <ul style="list-style-type: none"> • equality/discrimination <ul style="list-style-type: none"> • forced labour • child labour • worker representation <p>Policy/code must be available on request. Please note that companies that are members of the Ethical Trading Initiative, The Fair Labour association, or audited to Social Accountability International's SA8000 will be considered to be demonstrating commitment to the four ILO Core Convention areas.</p>	<p>In addition to meeting the minimum criteria the policy/code should also be extended to address:</p> <ul style="list-style-type: none"> - Health and Safety <p>In addition one of the following areas, as appropriate to the supply chain, and subject to ILO conventions:</p> <ul style="list-style-type: none"> - working hours - wages - disciplinary procedures <p>The policy/code must be publicly available.</p>	<p>It starts on 1st Jan 2007</p>

II. Management

Table 1.8: Management Area

<i>Minimum criteria (Policy and Systems)</i>	<i>Final criteria 1st July 2006 (Policy and Systems)</i>	<i>1st January 2007 (Reporting)</i>
<p>Communication of a relevant policy/code, position or concern to suppliers (at least in some regions)</p> <p>Some monitoring of supply chain (for ex. identification of supply chain, supplier numbers, assessment of where the issues are by country or product)</p>	<p>Some visiting/auditing of suppliers (e.g. some risk assessment and some substantial supplier visits or audits)</p> <p>Policy/code should be communicated to suppliers globally</p> <p>Strategic responsibility for the policy/code implementation shall rest with one or more board members or senior executives/managers</p> <p>Training of relevant employees on the policy/code</p> <p>Policy/code has producers to remedy any non-compliance</p>	<p>It starts on 1st Jan 2007</p>

III. Reporting

Table 1.9: Reporting Area

<i>Minimum criteria (Policy and Systems)</i>	<i>Final criteria 1st July 2006 (Policy and Systems)</i>	<i>1st January 2007 (Reporting)</i>
	No requirement	Report (or other form of communication) is publicly available and covers both policy and management systems