



PERFORMANCE MEASUREMENT IN TRANSPORT SECTOR ANALYSIS

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Abstract. The article analyses the following issues: 1. Performance measurement in literature. The performance measurement has an important role to play in the efficient and effective management of organizations. Kaplan and Johnson highlighted the failure of the financial measures to reflect changes in the competitive circumstances and strategies of modern organizations. Many authors have focused attention on how organizations can design more appropriate measurement systems. Based on literature, consultancy experience and action research, numerous processes have been developed that organizations can follow in order to design and implement systems. Many frameworks have been proposed that support these processes. The objective of such frameworks is to help organizations define a set of measures that reflect their objectives and assess their performance appropriately. 2. Transport sector performance and its impacts measuring. The purpose of transport measurement is to identify opportunities enhancing transport performance. Successful transport sector management requires a system to analyze its efficiency and effectiveness as well as plan interventions if transport sector performance needs improvement. Transport impacts must be measurable and monitorable so that the person responsible for the project intervention can decide when and how to influence them. Performance indicators provide a means to measure and monitor impacts. These indicators essentially reflect quantitative and qualitative aspects of impacts at given time and places. 3. Transport sector output and input. Transport sector inputs are the resources required to deliver transport sector outputs. Transport sector inputs are typically: human resources, particularly skilled resources (including specialists consulting inputs); technology processes such as equipment and work; and finance, both public and private. 4. Transport sector policy and institutional framework; 5. Cause – effect linkages; 6. Alternatives analysis. The numerous courses of action could be taken to improve performance. However, due to limited resources choices have to be made. This requires prioritizing.

Keywords: performance measurement; transport input; transport output.

1. Introduction

The transport sector plays a central role in Lithuanian's modern national economy. It is only through the transport of goods (raw materials, intermediate and finished products) and people (workers, travelers, consumers) that the division of labour and the production of value added can be finally ensured in all sectors of economic activity. Against that background of internationally growing trade in goods and services, the transport sector has gained significance. Statistical information on transport activities serves as an important basis for transport – and business – related decision – making. Transport performance measurement has become a common expression among public officials in Lithuania. We focused on answering the questions such as “What is transport performance measurement?”, “Why is it necessary?” Performance measurement has many meanings, but it is defined as measurement of the results (outcomes) and efficiency of services on a regular basis. The effectiveness of performance measurement is an issue of growing importance to industrialists and academics. Many trans-

port organizations are investing considerable amounts of resource implementing measures that reflect all dimensions of their performance. Consideration is being given to what should be measured today, but little attention is being paid to the question of what should be measured tomorrow. Measurement systems should be dynamic. They have to be modified as circumstances change. Several dimensions are important to the development of an effective performance measurement system. These dimensions include inputs, outputs, outcomes, efficiency, effectiveness (quality), and equity.

2. Performance measurement in literature

The performance measurement has an important role to play in the efficient and effective management of organizations, it remains a critical and much debated issue. Significant management time is being devoted to the questions – what and how should we measure – while substantial research effort by academics from a wide variety of management disciplines is being expended as

we seek to enhance our understanding of the topic and related issues (Neely, 1999) [1].

Following their review of the evolution of management accounting systems, Johnson and Kaplan highlighted many of the deficiencies in the way in which management accounting information is used to manage businesses (Johnson, 1983; Kaplan, 1984; Johnson and Kaplan, 1987) [2–4]. They highlighted the failure of the financial performance measures to reflect changes in the competitive circumstances and strategies of modern organizations. While profit remains the overriding goal, it is considered an insufficient performance measure, as measures should reflect what organizations have to manage in order to profit (Bruns, 1998) [5]. Cost focused measurement systems provide a historical view, giving little indication of future performance an encouraging short term (Bruns, 1998) [5].

The shortcomings of traditional measurement systems have triggered a performance measurement revolution (Eccles, 1991) [6]. Attention in practitioner, consultancy and academic communities has turned to how organizations can replace their existing, traditionally cost based, measurement systems with ones that reflect their current objectives and environment. Many authors have focused attention on how organizations can design more appropriate measurement systems. Based on literature, consultancy experience and action research, numerous processes have been developed that organizations can follow in order to design and implement performance measurement systems (Bourne, 1999) [7]. Many frameworks, such as the balanced scorecard (Kaplan and Norton, 1992) [8], the performance prism (Kennerley and Neely, 2000) [9], the results and determinants framework (Fitzgerald, 1991) [10], and SMART pyramid (Lynch and Cross, 1991) [11] have been proposed that support these processes. The objective of such frameworks is to help organizations define a set of measures that reflect their objectives and assess their performance appropriately. The frameworks are multidimensional, explicitly balancing financial and non-financial measures.

Furthermore, a wide range of criteria has also been developed, indicating the attributes of effective performance measures and measurement systems. These include the need for measure to relate directly to the organizations mission and objectives, to reflect the company's external competitive environment, customer requirements and internal objectives (Globerson, 1985; Wisner and Fawcett, 1991) [12, 13]. Others make explicit the need for strategies, action and measures to be consistent (Dixon, 1990) [14].

The performance measurement revolution has prompted many organizations to implement new performance measurement systems, often at considerable expense. However, unlike the environment in which organizations operate, many measurement initiatives appear

to be statistic. Eccles (1991) [15] suggests that it will become increasingly necessary for all major businesses to evaluate and modify their performance measures in order to adapt to the rapidly and highly competitive business environment. Numerous authors espouse the need for reflection on measures to ensure that that they are updated to reflect this continuous change (Meyer and Gupta, 1994; Ghalayini and Noble, 1996) [16, 17]. However, there has been little evidence of the extent or effectiveness with which this takes place. Moreover, the literature suggests that ineffective management of the evolution of measurement systems is causing a new measurement “crisis”, with organizations implementing new measures to reflect new priorities but failing to discard measures reflecting old priorities resulting in uncorrelated and inconsistent measures (Meyer and Gupta, 1994) [16]. Furthermore, it is suggested that organizations are drowning in the additional data that is now being collected and reported (Neely, 2000) [18]. As with measurement systems introduced at the turn of the century, there is a danger that failure to manage effectively the way in which measurement systems change over time will cause new measurement systems to lose their relevance, prompting a new crisis and necessitating a further measurement revolution.

Bititci (2000) [19] goes on to posit that a dynamic performance measurement system should have:

- an external monitoring system, which continuously monitors developments and changes in the external environment;
- an internal monitoring system, which continuously monitors developments and changes in the internal environment and raises warning and action signals when certain performance limits and thresholds are reached;
- a review system, which uses the information provided by internal and external monitors and the objectives and priorities set by higher level systems, to decide internal objectives and priorities; and
- an internal deployment system to deploy the revised objectives and priorities to critical parts of the system.

Bourne (2000) [20] suggests that measurement systems should be reviewed and revised at a number of different levels. They identify the need for review of targets and performance against them; individual measures as circumstances change; and the set of measures to ensure that they reflect the strategic direction. Although the authors discussed the need to review measures and suggest techniques for such review, there is little discussion of their application in practice, investigation of how measures actually change or of the factors that affect how effectively and efficiently performance measurement systems change. With a few notable exceptions (Bourne, 2000; Townley and Cooper, 1998) [20, 21], empirical

investigation of the evolutions of measurement systems over time remains a considerable gap in performance measurement research. Based on a review of the relevant literature, Waggoner (1999) [22] summarizes the key forces driving and demanding change as: customers, information technology, the marketplace, legislation (public policy), new industries, nature of the work (e.g. outsourcing) and future uncertainty. However, many authors also identify barriers to change that have received little attention in the performance measurement literature.

The importance of the evolution of performance measurement systems is to ensure that they continue to reflect the environment and objectives of the organization. The literature suggests that the factors affecting evolutionary change within organizations, and hence the evolution of performance measures, are many and complex. However, these issues can be grouped into two main themes:

- drivers of change (those factors that cause change to be necessary); and
- barriers to change (those factors that must be overcome if change is to be effective).

3. Transport sector performance

The purpose of transport evaluation is to identify opportunities for enhancing transport performance. The task of the project planner is to make sure that transport sector policies, investments, and services benefit transport sector performance and use time, money and opportunity efficiently.

Successful sector management requires a system to analyze its efficiency and effectiveness as well as plan interventions if transport sector performance needs improvement.

Figure 1 provides an overview of the interrelationships between various factors influencing sector results. Systematic sector analysis requires an understanding of these factors and their causal links.

Transport sector performance can be measured at several levels. At its highest level, transport sector performance is reflected in specific impacts that in turn influence the status of the overall national economy.

These impacts arise from another level of transport sector performance – transport sector outputs. The outputs are the tangible goods and services delivered by public and private institutions operating within the transport sector. Lithuanian road network is an example of transport output. The ability of transport sector institutions to deliver transport sector is in turn influenced by the policy and legal framework operating within the transport sector and the economy as well as the institutional capabilities (effectiveness and efficiencies) of the transport sector. Finally, the inputs of financial and human resources devoted to the sector by public and private institutions are also key variables influencing transport sector outputs.

4. Transport sector impacts measuring

Each sector contributes, in varying measure, to the quality of life of its country's citizens and to the overall growth and development of the economy. For example, the energy sector provides power supply to industry, entertainment, and daily life. The transport sector provides the physical infrastructure and facilities for moving people and goods between points. This facilitates industrial and agricultural production, trade, social activities, and cultural exchange. The name given to such contributions to the economy is sector impacts.

These sector impacts arise not only from the policies and regulations controlling the sector, but also from the goods and services delivered by public and private institutions operating within it.

These also reflect the relative significance of a given sector to people's life and to the overall social and economic progress of the country. Sector impacts provide a tool for planning sector and institutional performance and monitoring, managing, and finally reporting on it. This performance focus leads to improved management. It also becomes the basis allocating scarce resources among sectors, based on how effectively each is managed and on their relative performance in contributing to the economy.

Transport impacts must be measurable and monitorable so that the person responsible for the project intervention can decide when and how to influence them. Performance indicators provide a means to measure and

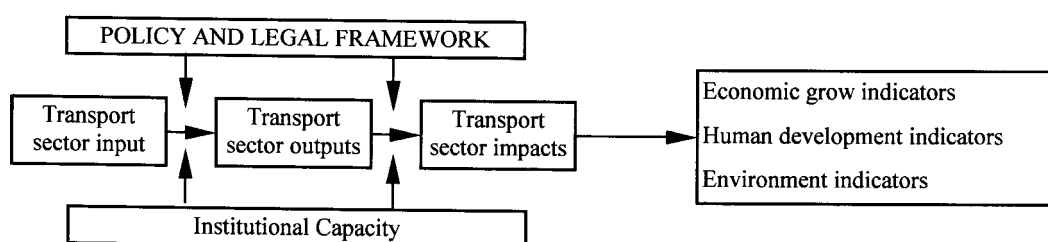


Fig 1. Interrelationship within a transport sector

Sector impacts	
Sector	Sample sector impacts
Agriculture	<ul style="list-style-type: none"> farmer income agriculture production agriculture productivity share of work force agriculture share of GDP
Transport	<ul style="list-style-type: none"> vehicle usage/density journey time safety transport share of GDP
Health	<ul style="list-style-type: none"> infant mortality rate life expectancy population growth health status (morbidity) productivity
Education	<ul style="list-style-type: none"> enrollment rates literacy work force education level absorption rates productivity
Energy	<ul style="list-style-type: none"> capacity utilized consumption access to electricity average cost to customer

monitor impacts. These indicators essentially reflect quantitative and qualitative aspects of impacts at given time and places. These thereby enable measurement. Typically, between five and ten key impact indicators, depending on their nature and diversity, can adequately represent sector overall performance. Table provides a sample of such impact indicators by sector. Some of the indicators inherently include quantitative and qualitative dimensions that allow monitoring and performance assessment. For example, farmer income and literacy rates can be directly measured and monitored. Other indicators require further definition because they are not readily measurable. For example, health status must be further defined by morbidity and mortality rates and road safety is further defined by the indicator number of accidents/deaths per period.

Hierarchy of transport impacts. Transport sector impacts often comprise varying levels with one level in-

fluencing the next. Transport sector has a hierarchy of impacts to clarify and manage sector performance. See Fig 2, for example, of the hierarchy of transport impacts.

Understanding this cause – effect linkage between impacts is important. It enables transport planners and managers to identify potential interventions at a primary impact level. This in turn influences (causes) consequent and longer – term impacts on the transport sector and the economy.

Generally, institutions that manage a transport sector can influence, but never completely control transport sector impacts. The reason for this is that impacts are subjected to variables and influences, many of which are outside the control of such institutions. Sector institutions can influence, but never completely control impacts such as life expectancy, road safety, and literacy.

Managing of transport impacts therefore implies:

- identifying of the critical impacts important to society and the economy,
- specifying of monitorable indicators for these impacts,
- assessing of transport sector performance against these indicators so that problems can be identified and corrected and improvements addressed, and
- changing of those variables within our control that influence impacts.

Verifiable performance indicators. Verifiable performance indicators define transport sector performance objectives to be attained. They force us to specify:

- what we want to achieve in a transport sector;
- how we will recognize success;
- evidence of the level of transport sector performance in terms of
 - quantity how much?
 - quality how well?
 - time by when?
 - location/area where?
- a basis for monitoring and evaluating of the transport sector.

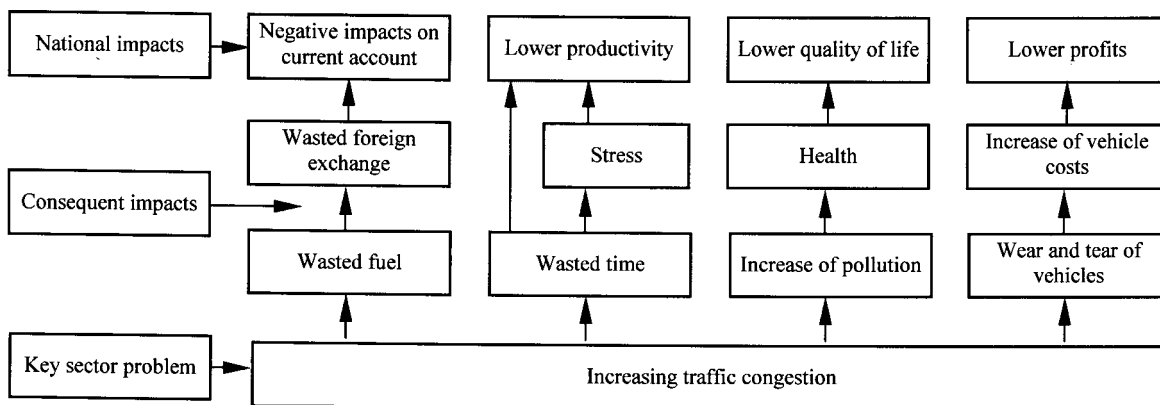


Fig 2. Hierarchy of impacts in the road transport sector

Example 1 illustrates the hierarchy of impacts and the relationships between impacts and performance indicators in the transport sector.

5. Transport sector output

Outputs are the services provided or products produced by the program. Outputs refer to the activity of an transport organization and are generally internal in nature. Outputs generally address how much activity is generated within a program. Outputs are important when it is desirable to measure efficiency. In the most simplistic terms, efficiency is measured by dividing outputs by the number of inputs. Efficiency is covered more thoroughly below in a separate section. Understanding outputs is required before improvements can be made in the way something is being done or determine the most right way to do something. However, outputs are not indicators of whether the activity is the right thing to do. Outputs are only indicators of how efficiently Litae is being spent, how efficiently staff time is being used, and how efficiently supplies are being allocated to accomplish the stated activities. Sector outputs are essentially the whole spectrum of goods and services offered by a sector, which in turn cause and influence sector impacts (see Fig 3). These goods and services are also called the “deliverables” of a sector.

Traffic flows and related congestion is a key sector indicator in the road transport sector. It is significant due to its ripple effect upstream in the local and national economy. When traffic flows increase smoothly, many of these impacts are beneficial, such as easier access,

greater movement of goods, increased trade, and more investment. However, there is a point at which increased traffic flows begin to cause traffic congestion. This sets off an alternate set of impacts: increased fuel consumption; increased travel time (plus its related costs to the economy); increased fuel – generated pollution; increased wear and tear of vehicles. These impacts have a domino effect at both the sector and national levels. Traffic congestion may therefore be a significant sector performance problem (see Fig 4) that gives significance and meaning to the institution outputs.

Some outputs are generally more under the control of public and private institutions than are their consequent impacts. Outputs are the direct result of planned human effort. They are the immediate level of physical results on which an institution performance is gauged for a specific time period. However, they cannot and should not become the *raison d’etre* of the institution. A public work department does not exist simply to build a road. Applying of cause – effect analysis to the traffic congestion examples helps identify which sector outputs could be responsible for the problem.

6. Using benchmarks to monitor transport sector performance

Transport sector performance is represented by transport sector outputs and consequent impacts. Both outputs and impacts can (and should) be monitored on a continuing basis.

Generally, organizations seek to carry out their functions and deliver their services as costs – effectively as

Agriculture	<ul style="list-style-type: none"> • area irrigated • irrigation system operated and maintained • agriculture extension services • research 	<ul style="list-style-type: none"> • farmer income • agriculture production, productivity • share of work force • contribution to GDP
Transport	<ul style="list-style-type: none"> • roads constructed • roads operated and maintained • traffic management • driver education 	<ul style="list-style-type: none"> • vehicle use/density • journeys time • safety • transport share of GDP
Health	<ul style="list-style-type: none"> • health care services • clinics and hospitals • drug availability • health care education 	<ul style="list-style-type: none"> • life expectancy • population growth • health status • productivity
Education	<ul style="list-style-type: none"> • education facilities • curriculum scope and quality • enrolment and graduations • teacher education and quality 	<ul style="list-style-type: none"> • literacy • workforce education • labor absorption rate • productivity
Energy	<ul style="list-style-type: none"> • installed capacity • distribution coverage • energy mix • revenue/surplus 	<ul style="list-style-type: none"> • capacity utilized • access to electricity • consumption • average costs to customer

Fig 3. Typical sector outputs and impacts

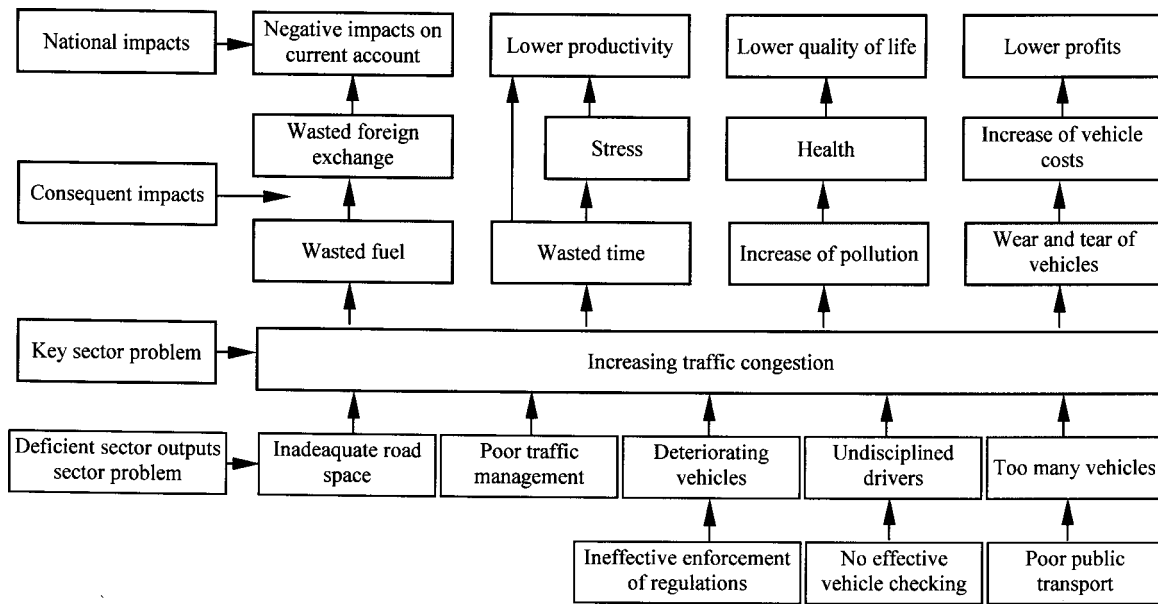


Fig 4. Cause – effect analysis in the transportation sector

possible. Benchmarking is a tool which can help them do this. It does so by using an internal or external comparator to assess how an organization currently does things or performs, to identify gaps in performance, and to suggest how improvements might be made. Benchmarking is simply about making comparisons with other organizations and then learning the lessons that those comparisons throw up. Benchmarking is the continuous process of measuring products, services and practices against the toughest competitors or those companies recognized as industry leaders. Also benchmarking can mean “A systematic approach to business improvement where best practice is sought and implemented to improve a process beyond the benchmark performance”. Benchmarking does not necessarily involve establishing arbitrary standards or norms. There are three main types of comparisons [23]:

- **High – level comparisons** of an organization with some other body having the same function or carrying out similar activities. Comparisons can be of a number of aspects, for example different organizational structures, operational policies, and how each organization tackles a specific problem. The emphasis is on learning from others; experience and ideas.
- **Performance benchmarking** uses a range of measures and indicators to compare performance. Indicators typically cover productivity, resource utilization, unit costs and, where possible, quality of service.
- **Process benchmarking** is the systematic analysis of organizations processes. Performance benchmarking can tell you where an organization is in relation to others, but it will not normally explain why performance is as it is and how it might be

improved. Process benchmarking can be used to examine the variances revealed by quantitative performance data. By comparing organizations’ systems and processes in some detail, process benchmarking allows you to identify where they differ, to explore why, and to consider the implications in terms of outcome, costs incurred, revenue collected, and overall performance.

Process benchmarking in particular can be costly to implement. And to avoid problems during clearance, all forms of benchmarking need to be carefully explained to departments and agencies before they are used. Study teams will need to be wary of using benchmarking to create large multi – departmental studies which may be difficult to clear with departments: studies should normally focus on improving the performance of a single department, or bodies within the purview of a single department. Benchmarks provide a basis for comparison and therefore a basis for making a judgement on the quality of performance (see Fig 5). Benchmarking involves

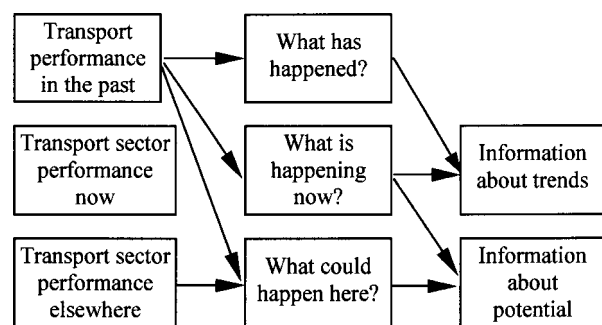


Fig 5. Information provided by benchmarking

establishing of comparison criteria to enable you to answer the following questions:

- What are the trends in this sector?
- How does current performance compare with the trend?

What is the potential of this transport sector?

Transport public and private sector institutions use benchmarking extensively to establish standards for transport performance, to monitor efficiencies and effectiveness, and to identify a transport performance problem. Using available data is the key to both benchmarking and monitoring transport sector performance. This involves establishing of an appropriate data collection and reporting system.

Benchmarking is also useful for examining interregional trends and differences. National statistics is necessary for international benchmarking and monitoring of transport performance. When using national statistics to measure sector performance, we must be aware of the appropriateness of the particular statistics being used, its reliability, and timeliness. When examining annual trends, it is necessary to ensure that the data are comparable across the whole period, i.e., to ensure that data collection has been continuous and that definitions have not changed [24].

Transport sector managers are generally responsible for monitoring and using sector impact and output information. Managers range from those responsible for transport sector policy to those who deliver the sector goods and services. Regulatory authorities, government departments servicing the transport sector private bodies, and individuals who produce goods and services all contribute to monitoring key transport sector indicators. The purpose of such monitoring is to help institution assess whether it is playing its appropriate role in facilitating the delivery of outputs and achieving of impacts.

7. Transport sector inputs

Inputs are the resources required to perform a program, deliver a service, or produce a product at some desired level. Inputs include Litas, staffing (additional personnel and time allocation of existing personnel), equipment, supplies, and other tangible goods or services. Inputs can also include demand characteristics of a program on target populations. Costs analysis requires a review of all inputs whether they are direct or indirect. The indirect inputs tend to cause the greatest amount of anxiety between both program managers and elected officials when they are trying to cope with sensitive resource allocation decisions. Indirect costs (sometimes caused by unintended consequences) are important and if overlooked can cause a program fail due to a lack of adequate resource or other organizational support.

Transport sector inputs are the resources required

to deliver transport sector outputs. Transport sector inputs are typically:

- human resources, particularly skilled resources (including specialists consulting inputs);
- technology such as equipment and work processes; and
- finance, both public and private.

They resist the easy and ever – present temptation to use input indicators to reflect transport performance. Government departments frequently report performance on the basis of money spent as a percentage of budget allocated. Even development finance agencies often use the indicator of approvals and disbursements to reflect organizational performance.

8. Transport sector policy and institutional framework

Transport sector impacts, outputs and inputs are generally and substantially influenced by the transport policy and legal framework and by the organizational or institutional framework managing the transport sector.

Institutional framework and capacity. In this context, institutional capacity refers to the capacity of public, private and community – based institutions to support and promote the development, progress and **Policy and legal framework.** Transport public sector institutions are responsible for putting in place and managing the policy and legal framework governing the transport sector. The policy and legal framework creates an environment that substantially influences the availability of inputs, the efficient production of outputs, and the significance of the expected impact. Policies can make dramatic changes to inputs such as the availability of technology or private sector investment. They can also change the demand – supply situation of sectors outputs. Further cause – effect analysis reveals the influence of institutional capabilities and policies on key outputs such as “traffic management” and “number of vehicles on the road”. It also shows the role of inputs such as financial and technical resources and their influence on transport sector outputs (see Fig 6).

9. Cause – effect linkages

The cause – effect analysis shows the hierarchy of causes and effects from transport inputs to transport outputs through to transport sector impacts. The sector policy and legal framework as well as the institutional capacities in the transport sector significantly influence the extent of achievement at each level of this hierarchy.

The causal links represent the hypotheses that an output or impact at one level causes further impacts at a higher level. The relative influence of each output on the

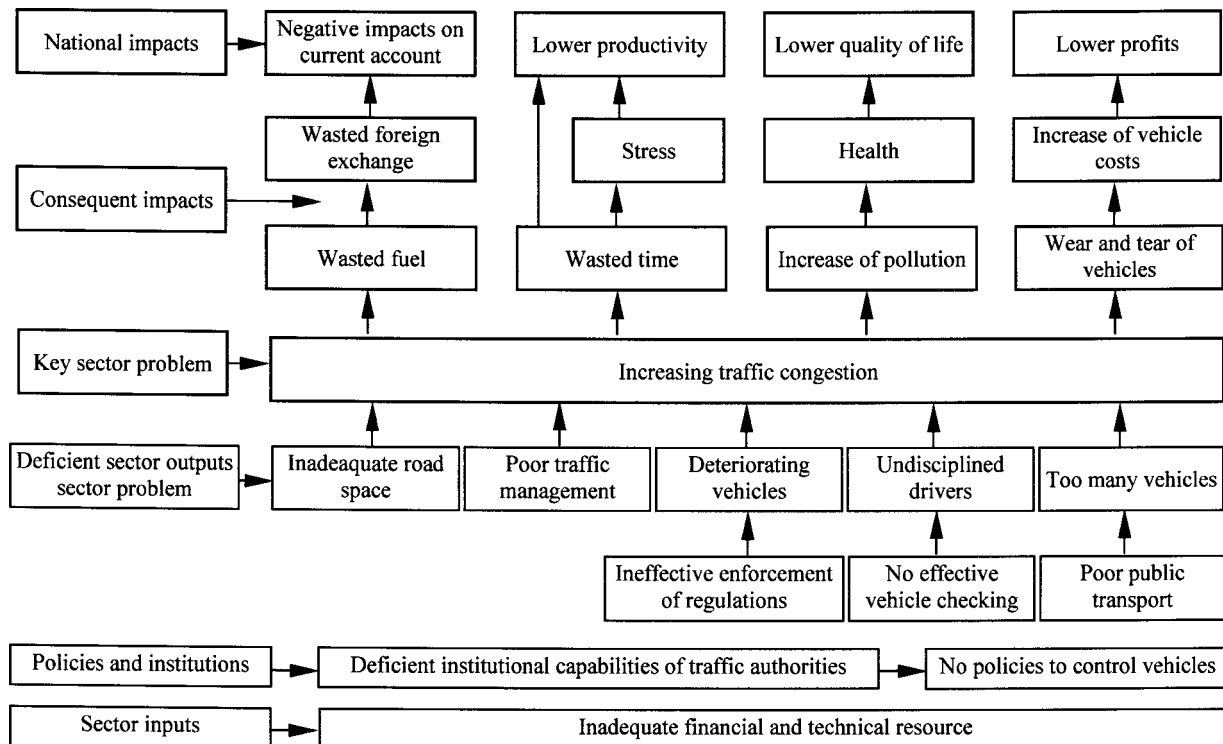


Fig 6. Influence of capacities in the transportation sector

performance of the transport sector usually differs, with some outputs having a greater impact than others. Similarly, the impacts of the transport sector are not of equal significance to the overall transport sector or the economy at large. Thus, each causal link must be verified and, if proven accurate, clearly identify an opportunity for improving transport sector performance. Some key questions must be considered in the effective use of the cause – effect analysis.

1. *Where do you start a cause – effect analysis? What is the trigger?*

One trigger is usually a transport sector impact problem: in the example it was increasing traffic congestion. It could just as well be increasing pollution. Another and more positive type of a trigger is an initiative to improve transport sector performance on a particular transport performance indicator. Examples of such initiatives include:

- increase of food production,
- improve access to clean water,
- increase access to good quality education, and
- increase of private sector investment in a particular sector.

2. *How to identify where inputs stop and outputs begin and where outputs stop and impacts begin? Is it important to know these distinctions?*

The easiest way to distinguish between impacts and outputs is to remember that outputs are tangible

deliverables. They are services produced by public and private sector institutions. Impacts are the effect of those services. Inputs are generally the financial, human and technological resources used to deliver outputs. A cause – effect analysis will clearly identify these causal influences. It is important to understand and make explicit these influences so we know clearly the hypotheses on which project and program investments are made. Thus, what outputs need to be strengthened or increased to achieve intended impacts? And, what is the input cost of each of these outputs?

3. *The links from one level to the other are hypotheses that need to be verified. How are they verified?*

Experienced transport sector specialist, in consultation with key groups of stake – holders who have a detailed knowledge of the transport sector may work together to develop a cause – effect analysis. Each cause – effect link identified in the analysis is in fact a hypothesis. Verify these hypothesis by checking them on a sample basis. The transport example contains a number of hypotheses to be verified. One hypothesis is that pollution is caused by traffic congestion. Another is that poor traffic management is a more significant cause of traffic congestion than inadequate road space. The process of verifying hypotheses also identifies the relative levels of influence of each of the identified variables. The verification process involves observation, physical measurement, and stakeholder consultation.

4. How to decide where to locate a point of intervention to improve transport sector performance.

Locate the point of intervention by identifying the most important sectoral concerns; checking at what level these can be influenced through policies, goods, services, investment and institutions; and using this a starting point.

Converting the cause – effect tree into an objective tree. The cause – effect tree that emerges from a cause – effect analysis is used as a basis for planning and designing appropriate program and project interventions (see Fig 7).

These interventions must focus on resolving performance problems or enhancing the current level of performance. To achieve this, the cause – effect tree must first be converted into an objectives tree.

Step 1: Convert or restate the problem or negative statements of cause – effect tree into objective – type positive statements of the objectives tree. These statements should be desirable and realistically achievable. Thus, in our example, “increasing traffic congestion” will be restarted as “smooth traffic flow”.

Step 2: Examine the means – end relationships thus derived, and ensure the validity and completeness of a diagram.

Step 3: Revise the objective – statements if necessary. Add new objectives – statements if these appear relevant and necessary to achieve the stated objective at next higher level. Delete objectives that do not seem to be expedient or necessary.

The completed objectives tree will help to identify alternative actions and investments necessary to address the central problem (or opportunity) and the consequent impacts of addressing this central problem (or opportunity).

When the three steps are applied to the transportation example, the following objectives are tree results.

10. Alternatives analysis: choosing between interventions

The numerous course of action could be taken to improve performance. However, due to limited resources, not all can be accomplished simultaneously; hence choices have to be made. This requires prioritizing. For instance, one option is to focus simply on the policy of reducing traffic by introducing disincentives such as:

- stricter registration requirements,
- increased sales tax on cars or on gasoline, and tighter regulations on the use of vehicles in selected congested city areas.

An alternative option is to focus on the management of traffic through the stricter enforcement of regulations, traffic education programs, and upgrading the traffic management system.

One helpful tool for deciding between possible interventions and developing the scope of a project is the

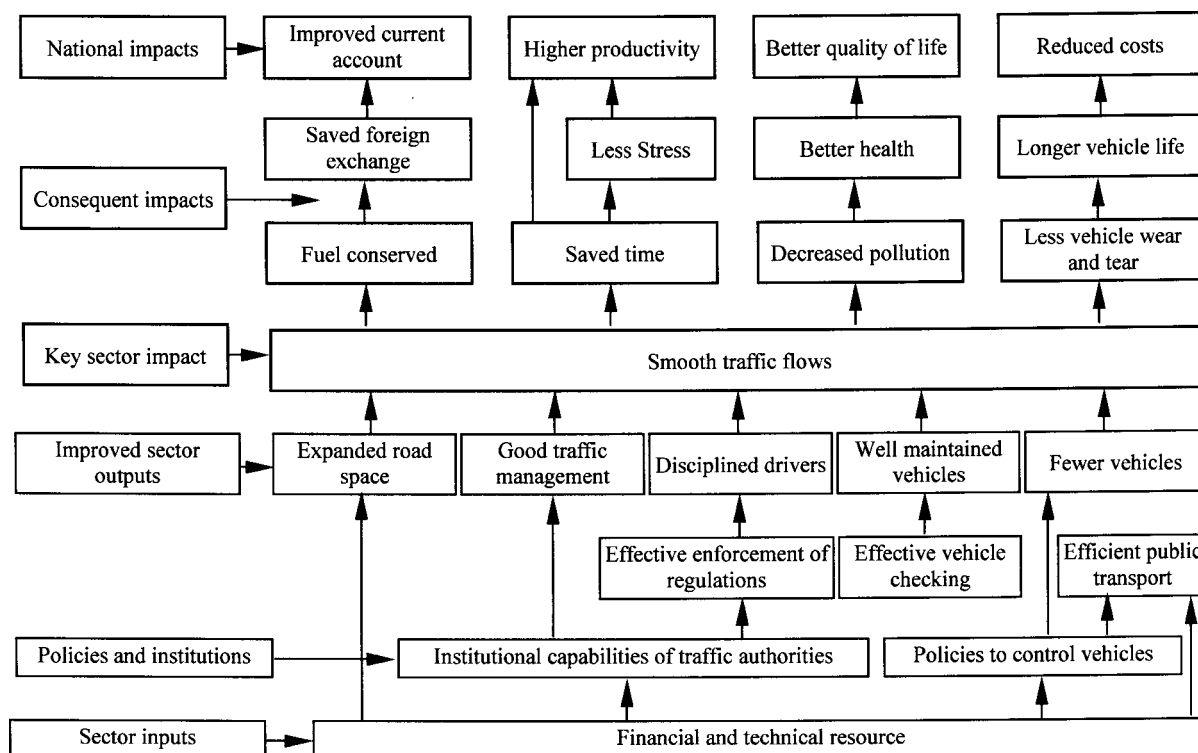


Fig 7. An objectives tree in the transportation sector

alternatives analysis. The analysis involves:

- identifying of the long term impacts and objectives you wish to pursue (desirable and achievable);
- identifying of the differing means and ends ladders as possible alternative project strategies or project components; and
- assessing which alternative or mix of alternatives represent an optimal project strategy to enhance performance.

To help make a rational choice between alternatives, or at least to prioritize them because they may not be mutually exclusive, the development analyst must first document the criteria to be used to decide or prioritize. Typical criteria used are:

- probability of achieving the desired objectives;
- technical and institutional feasibility (implementability);
- financial and economic feasibility (cost – benefit analysis);
- social and political feasibility;
- resources available and
- linkage with or contingency on other related initiatives.

These criteria need to be weighed in terms of their importance and significance. This is usually done using a scale of 1 to 10, with 10 signifying the highest level of significance.

All options must be scored with each criterion with the best option scoring the highest. The options need not be mutually exclusive. The comparative analysis provides an understanding of the value each option in achieving the desired objectives.

The process is:

- to identify criteria and assign weights to them on a scale of 1 to 10;
- to identify the options;
- to collect data to allow you to compare each option with each criterion;
- to score each option with each criterion on a scale of 1 to 10;
- to multiply the score (with each criterion) with the weight (of that criterion) to obtain the weighed score of each option on each criterion;
- to add the weighed scores for each option; and
- to identify the options with the highest scores.

The analysis is simple. Collecting the data is not. How is relative contribution that a change in driver discipline will make to traffic congestion assessed? Any method used must make that assessment anyway. This technique simply provides a way to document the assessments. The result of the analysis is identified investment opportunities.

11. Conclusions

Until now the Lithuanian transport sector was rather isolated from the transport system of the countries of Western Union. There is a lack of modern transport infrastructure, transport means adequate to the requirements of international technical, technological and ecological standards, also there is not a sufficient number of specialists able of efficient international transport operation. The integration of Lithuania into the European transport system has to be inseparable from the formation of integrated international transport corridors of the entire Baltic Sea region countries relating with the transport infrastructure objects of the Western and Northern Europe. On the other hand the reconstruction, restructuring and development of the transport sector is a constituent part of the process of entire Lithuanian economy and its integration into the European Union [25]. Transport is a very dynamic and changeable object, therefore scientifically grounded methodological fundamentals have to be created enabling efficient coordination of strategies. This helps performance measurement.

1. Performance measurement systems are the focus of considerable attention in academic and practitioner communities. They clearly have a considerable contribution to make the management of performance transport organizations. It is essential that measurement systems used are relevant and appropriate for the environment and strategies of transport organization.

2. Given the dynamic and rapidly changing environment in which most organizations compete, it is important that transport organizations effectively manage their measurement system so that it remains appropriate and provides information that is relevant to the issues that are of current importance.

3. Data by themselves have no meaning. The data collected in performance measurement systems must be set within a particular context. There are at least two ways to accomplish this:

- a) performance measurement must be integrated into the long – term goals of the community;
- b) comparisons of the community to other communities through benchmarking must be done to demonstrate the outcomes achieved.

4. A performance measurement system should provide information to policymakers and managers so that they can make better decisions.

5. There must be a strong commitment from leaders to move toward measuring performance and not just collecting data on effort.

6. Performance measurement system must not be used as punishment. If measurement focuses on negative accountability, managers and employees will seek to avoid accountability when things go wrong.

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