Monitoring of energy transition of Dutch mobility: a knowledge value added approach

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Abstract

Dutch energy policy aims to realize sustainable mobility. The Netherlands choose to use a transition approach. The Platform for Sustainable Mobility (with members from car companies, oil organizations, lease companies, pressure groups and the government) drafts strategic agendas to realize sustainability, analyze and remove bottlenecks for market introduction and set up experiments. The transition approach has the ambition to fundamentally change the Dutch mobility system in the long term. No clear goals are set in the short run, therefore the standard approach of monitoring and evaluating is not applicable. In this paper we develop and apply another approach to the activities of the Platform for Sustainable Mobility: a knowledge value added approach.

The approach developed in this paper links elements from knowledge management literature and the added value literature to obtain an approach for the monitoring of the added knowledge value of the Platform for Sustainable Mobility. Starting point is the addition of knowledge value according to the knowledge value circle: development, consolidation, transfer and application. The circle relates in a comparable way all, objectives, issues, instructions, and events. While solving issues knowledge is consolidated according to an object model from knowledge management literature. This so called knowledge value added approach helps the Platform to justify their progress in the state of the art of the Dutch Mobility System. The approach is applied to the case of clean buses. Monitoring and evaluating this case has helped the Platform to add more knowledge value and therefore become more effective.

Introduction

Dutch energy policy aims to realize sustainable mobility with a transition method. The characteristics of this method are its long-term orientation, the emphasis on economical, socio-cultural and political bottlenecks for sustainable innovations, the collaboration between government and stakeholders and its systemic thinking before specific actions in the short term are taken. The Platform for Sustainable Mobility (with members from car companies, oil organizations, lease companies, pressure groups and the government) drafts strategic agendas to realize sustainability, analyze and remove bottlenecks for market introduction and set up public-private partnerships to experiment with the new concepts for transport, fuels and mobility management.

The Platform is part of, and interacts with the actors of the Dutch mobility system. The actions of the Platform are related to choose markets for innovation, writing visions and roadmaps, stimulating new collaborations, advise companies how to draft environmental friendly business plans, etc. However, the added value of knowledge has not always been explicitly recognized, documented and evaluated, at least not as additionality. In theoretic models used by evaluators the Platform for Sustainable Mobility would be considered as system external entities ("the black box" model), see e.g. Ros and Monfort (2006). In this paper we link additionality to the operations of the Platform, we take "the white box perspective", regarding the Platform as a system internal investor. The knowledge value added approach consists of three methods to monitor the Platform for Sustainable Mobility to make it more effective:

- The knowledge value circle
- The object model
- Added knowledge value

Before describing and applying our method we briefly describe the Dutch Platform for Sustainable Mobility and our specific case: clean buses.

Sustainable Dutch Mobility Platform and clean buses

Transport is crucially important for our society, now and in the future. However, the current generation of motor fuels produces excessive emissions of CO_2 and other hazardous substances, and we depend on the oil-producing countries for these fuels. During the transition to a sustainable energy supply, the Platform therefore aims to ensure affordable and independent mobility as well as sustainability.

The current technology and fuels for road transport can be greatly improved in the near future. The automobile industry has already begun on this endeavor. In addition, there will be various options in the future for new propulsion systems, fuels and energy sources for the transport sector. From an economic perspective, it is essential to compile a viable portfolio of the most promising options. The selection of these options will be based on their contribution to aspects such as emission reduction, energy diversification, innovation potential, opportunities for economic development and cost effectiveness. Some options are nearly ready for the market if subsidies or tax benefits were offered, while others are still in the research and demonstration phase.

The Platform focuses on the accelerated market introduction of sustainable fuels and vehicle technologies, especially commercially-feasible possibilities for the Netherlands during the next two to four years. This accelerated development has three advantages:

1. Future problems with the current fuels will be avoided.
2. Dutch businesses will have the opportunity to become market leaders in this field.
3. The most favorable routes to sustainable mobility will quickly become clear.

The Platform for Sustainable Mobility focuses on three related areas:

1. Clean fuels that are more climate neutral (natural gas, biofuels, hydrogen).
2. Clean and efficient vehicles (hybrid electric propulsion, fuel cells, weight reduction, treatment of exhaust gasses).
3. More efficient use of vehicles (improved traffic flows, intelligent traffic management systems).

The Platform activities focus primarily on mediating the realization of tangible experiments, continuing the development of the transition, establishing international frameworks of co-operation and providing advice about the policy framework aiming to eliminate any bottlenecks and stimulating further experimentation. The participants have a wide range of backgrounds; they represent the relevant ministries, the oil and transport sectors, regional and local governments, and interest groups. Clean Buses is one of the **objectives** the Platform is dealing with.

Public transport buses have an important function in the Dutch traffic system. Their specific energy demand and pollutant emissions per person transported are much lower than for private vehicles. However, in absolute terms they still contribute significantly to the air pollution and climate problem. Because they tend to be used in the most densely populated urban corridors, their impact on public health can be disproportionate to their numbers. Therefore a transition to cleaner bus systems will have a positive impact on local air quality and public health and also contribute to global climate protection.

Cleaner engine technology and fuels are available, like advanced diesel buses using low sulphur diesel, CNG bus (natural gas), LPG (liquefied petroleum gas), biodiesel, ethanol, electric and hybrid drive systems, and fuel cell systems running on hydrogen.

There are several non-technical **issues** that affect the environmental impact from public transport buses. The organization of the public transport system, types of structure of ownership for buses, bus line commissions, design of line network, management of bus operations, renewal of the bus fleet and driver education will all affect environmental performance. In this paper we focus on the relation between concession grants and the introduction of clean buses in the Netherlands.

Under the concession grant system, the country is divided in various lots where the right to carry out public transport is granted by regional authorities to one company at a time for a specific period. These authorities have a budget that is mainly provided by national government. Budgets have decreased over the years because of the implicit assumption that the concession grant system would lead to higher efficiencies (more transport for less money) in the sector. As a result the margins for the companies are very small, and that makes them reluctant to offer extras in their bids (such as cleaner buses) as this could make them lose the competition. The law allows the regional authorities to include environmental requirements in the tender documents, such as emission standards. However, they too are reluctant because they do not want to be faced with more expensive bids, or even lack of response from companies. The companies' willingness to participate in experiments is also low as the reliability of the service is essential to the authorities and negative impacts can lead to fines. All this leads to a risk-averse situation where innovation is low. See for more information Platform for Sustainable Mobility (2006).

Knowledge value circle

The knowledge value circle consists of four functions (Zagema, 2007a):

- Knowledge development: stands for the growth to sustainability of the Dutch mobility system. Developing knowledge is done per objective. Objectives are triggered by wishes or by events on the existing mobility system. Deadlines of selected objectives are planned and monitored in the roadmap by the management.

- Knowledge consolidation: stands for the update of the state of the art of the Dutch mobility system. Changing the content of the state of the art is done after an issue has been answered. An issue is a question that reveals when reaching an objective.
- Knowledge transfer: once an issue is solved, it asks for training in order to be sure it is implemented properly in the existing mobility system. These issue-triggered instructions are meant to take preventive actions in order to prevent events. If an event nevertheless occurs event-triggered instructions are made to learn the right corrective action.
- Knowledge application contributes to the practical experience with the mobility system. The lesser the amount of events in the changed mobility system, the more it has proved to be a stable solution.

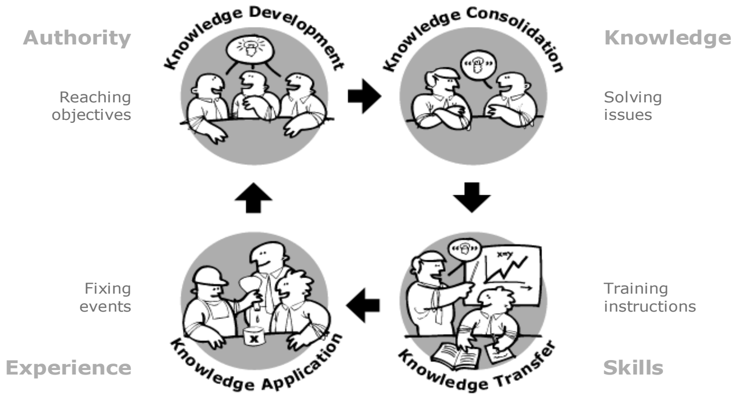

Figure 1: Knowledge value circle

Table 1: The knowledge value circle applied to concession grants

Type	Description	Activity	Added value
Event	No clean buses used in concessions	Set up working group within Mobility Platform and doing research	Insight in causes of the event
Objective	Concession grants for clean buses	Platform writes a letter with proposals to the Ministry	Decision about the framework of the concession
Issue	What is the cost of ownership of clean buses?	Developing fiscal facilities for experimenting with clean buses Collect knowledge about cost of ownership	New knowledge about the cost of ownership consolidated
Training	How to calculate the cost of ownership?	Training actors in new knowledge	Bus companies are competent in calculating their cost of ownership.

Object model

The intention of knowledge management is to ensure that the right information (complete, correct and actual) is delivered to the right person just in time, to take the most appropriate decision. Knowledge, as in knowledge management, is the familiarity, awareness, or understanding gained through experience or study. It is the sum of what has been perceived, discovered or learned, while solving issues. This knowledge will fade away if not consolidated adequately in a state of the art. Consolidating knowledge means writing a topic document according to a template, but also relating topics to one another. An object model is a explicit formal specification of how to represent the topics that are assumed to exist in some area of interest and the relationships that hold among them. The structure of the object model for innovation management (Zagema, 2007b) makes it visible if all knowledge is consolidated in the state of the art, for example when applied on the case of clean buses.

In figure 2 the relationships are made clear between the first seven phases in project management and the knowledge objects that are used in each phase. In energy transition the focus is on the first three phases. Phases 4-7 describe the traditional process of developing new concepts, done by individual companies.

Added knowledge value

The activities carried out by the Platform for Sustainable Mobility have to be translated to added value, i.e. impact on the internal and external environment. These added values can be classified in (Närfelt and Wildberger, 2006):

- Project outputs: This class covers the progress of the specific projects that are reaching individual objectives to innovate the Dutch Mobility System, like clean buses in Haarlem.
- Organizational outcomes: This class covers knowledge value adding that is confined to a certain actor (e.g. access to new technologies, new competences, capital, improved internal communication and interaction, improved human resources, management skills).
- System effects: This class covers the aggregated outcomes on a systems level, i.e. aggregated outcomes that are not confined to a single actor, rather this class comprises outcomes that involve and are common to several actors of the system. (e.g. new or additional investments in an area, skill acquisitions or allocations to an area, new relations/networks, new collaboration, joint commitments by organizations to a certain technology area).

In table 1 the added knowledge values for the concession grants for buses are presented. Of course it is important that the meas-

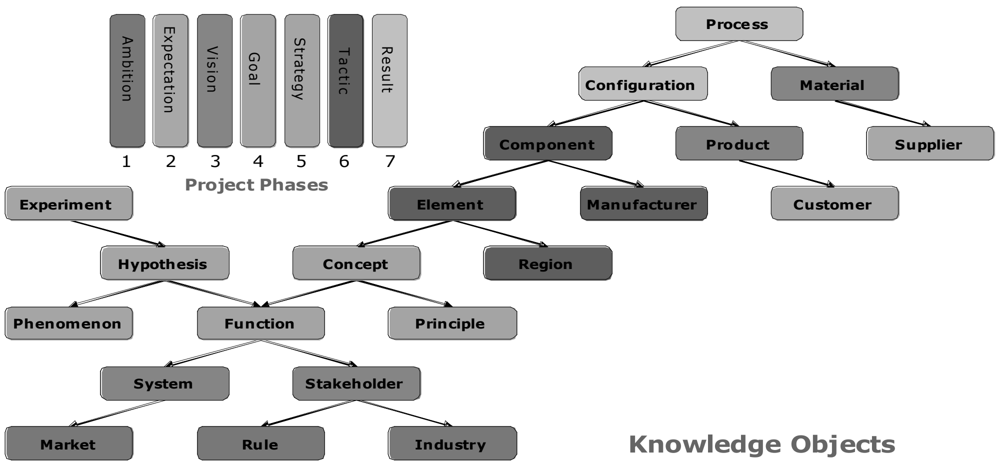

Figure 2: Object model

Table 2: Definitions of the objects, examples from the case of clean buses

Object definitions:	Added knowledge value in the case of clean buses
Phase 1 Ambition	
A Market is a commodity segment with unique driving forces	Market for public transport
A Rule is a regulation proclaimed by law	Rules with respect to public transport concession grants
An Industry is a branch of manufacture and trade	Transport sector, Oil industry
Phase 2 Expectation	
A Customer is a purchaser interested in a long term agreement	Regional government
A Supplier is a provider on contract basis	Fuel suppliers
Phase 3 Vision	
A System is a solution for one or more Markets	Clean public transport bus
A Stakeholder is an interested party who is responsible to meet one or more Rules in one Industry	Bus companies, Fuel companies, Local government, Producers of busses, the managers of the public road
A Product is an output produced for one Customer	A trip by public transport characterized by ticketprice, safety, time of transport, noise, comfort and emisions
A Material is an input delivered by one Supplier	Fossil or non-fossil fuel such as oil, gas or biodiesel

ured effects should be discussed with the actors, reflexive monitoring (see also Grin and Weterings (2005)).

Conclusions

The approach developed in this paper links elements from knowledge management literature and the added value literature to obtain an approach for the monitoring of the added knowledge value of the Platform for Sustainable Mobility. Starting point is the addition of knowledge value according to the knowledge value circle: development, consolidation, transfer and application. The circle relates in a comparable way all, objectives, issues, instructions, and events. While solving issues knowledge is consolidated according to an object model from knowledge management literature. This so called knowledge value added approach helps the Platform to justify their progress in the state of the art of the Dutch Mobility System. The approach is applied to the case of clean buses. Monitoring and evaluating this case has helped the Platform to add more knowledge value and therefore become more effective.

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