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Sustainable market involvement in transport infrastructure management

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Abstract

The construction industry is going through hard times in many countries. This is certainly true in the Netherlands as all big Dutch contractors face disappointing results. The market policies of major (public) clients are held accountable by politics and the market for this situation. However, for the operation and development of transport infrastructure networks, a sustainable construction industry is essential. But how do public infrastructure network managers involve this industry in their network management? And does this involvement lead to the development of a sustainable construction market?
In this paper we argue that the market policies of public transport infrastructure administrators (still) favour price competition and risk opportunism, thereby inhibiting a healthy development of the industry.
This paper describes the reciprocal relation between public infrastructure network administrators (in their role as manager of the network and client) and the construction industry as a supplier of infrastructure hardware and services. It reveals that a sustainable development of the construction industry can only be achieved through the development of a value awarding mechanism, explicitly linked to the functions of the infrastructure network instead of to intermittent one-off projects. The paper will give practical recommendations for (public) infrastructure network administrators how to stimulate the creation of added network value through sustainable market involvement.

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1. Introduction

Public transport infrastructure network managers, such as ProRail and Rijkswaterstaat in The Netherlands[1], are currently developing from traditional network operators and employers to public-oriented network manager and (simultaneously) professional clients for the market. For realizing, exploiting and maintaining their infrastructure networks the construction market is necessary. Moreover, market companies need public clients for their business. This reciprocal relationship is largely governed by the market policies of public clients. Their policies are aimed at getting (added) value for the network, i.e. creative improvement of network functionality and simultaneously stimulating the development of a sustainable market. This is (partially) filled in by giving room for creativity to the market to develop creative solutions, which stimulates innovation, allowing market companies to differentiate themselves from competitors through specific knowledge and skills. Competition then may shift from just the lowest price to competition based on quality and added value.

Important questions in relation to this are: How do public clients currently involve the market in their businesses? Does this involvement lead to the development of a sustainable construction industry? What is meant by a sustainable construction industry?

The aim of this paper is to discuss these questions from a practical and theoretical perspective.

We define the overall system of public infrastructure network administrators, clients and their markets as the construction sector. With infrastructure we thereby mean the physical network of main roads, railways or waterways. The construction industry we define as all market companies that are involved in the planning, realization, maintenance, exploitation and financing of transport infrastructure.

We start the paper by arguing that the market policies of public transport infrastructure administrators (still) favour price competition and risk opportunism, thereby inhibiting a healthy development of the industry.

We explore (recent) literature about competition and procurement in the construction industry to characterize the (current) construction sector. Literature about competitive strategy is then reviewed to get more insight in the phenomenon of sustainable market dynamics. On basis of this review a conceptual framework for sustainable development of the construction sector is developed. This framework is then confronted with the observed current practice of the (Dutch) construction sector. Subsequently, we discuss the consequences of current behaviour of clients and market regarding project procurement and suggest improvements to transform this behaviour to stimulate the creation of added network value through sustainable market involvement.

2. Characteristic of the construction industry

The role of public authorities in contracting is changing (Leendertse, 2015; Lenferink, 2013; Adamson & Pollington, 2006): from prescription of a detailed solution to more functional specification, from awarding on lowest price to awarding on the basis of best price/quality balance (MEAT[2]), from many different contracts to a fewer number of standardized contracts and from a employer-employee relationship to more cooperation. As a consequence, contracts become more integrated in the sense that more disciplines are combined and that more risks are allocated to the market (Leendertse & Arts, 2013; Leendertse et al., 2012) through design & construct contracts and performance-based contracts. The public client thereby shifts upwards in the supply chain focussing on network management and the management of market involvement instead of determining solutions (Vrijhoef et al., 2013). Consequently the position and role of market companies is also changing (Noorderhaven et al., 2006).

[1] Rijkswaterstaat is the executive department of the Dutch ministry of Infrastructure and Environment responsible for the realization and exploitation of the main road and waterways network. ProRail is an independent public administration responsible for the realization and exploitation of the main railroad network in The Netherlands.

[2] Awarding the Most Economically Advantageous Tender (MEAT) means awarding an offer with the best price/quality balance, to stimulate the creation of added value instead of lowest price (Drechsler,2009).

Because the construction industry has a relatively low number of (public) clients compared to the number of contractors (monopsony), market companies tend to adjust their business strategies to these clients (Noorderhaven et al., 2006).

This change of policy provides (in theory) more room for creativity for market companies and therefore the possibility for competitive differentiation. However, through their expertise, their public responsibility and because of planning regulations public clients tend to specify their requests in detail (Morledge, 2006; De Ridder, 2011). Moreover, European and national contracting regulations (based on a level “playing field” for potential candidates) and public accountability seem at odds with awarding distinction between candidates. Public contracting is therefore (still) mainly based on price competition. "...Competitive bidding is perceived to select the lowest cost bidder, prevent corruption and favoritism that is opposed to efficiency, and it offers a clear yardstick with which to compare offers..." (Bajari & Tadelis, 2006, p. 15).

This is reinforced by the strong focus on projects. "...organizations are more frequently referred to as being project-based or project dependent with projects as a vital part of the organizational architecture..." (Söderholm, 2008, p. 81). As mentioned, the market requests of clients largely determine the behaviour of contractors. The client defines the creativity boundaries (demand) of the market (De Ridder, 2011). An incentive mechanism governs what value can be captured. The market companies organize themselves around a (one-off) project request. The achievable value is predefined through the specifications (Drechsler, 2009). "...the planning process is being organized in great detail by public actors, reducing the private actors to simple implementers..." (Klijn & Teisman, 2000, p. 88). Because the incentive mechanism and the specifications are strongly tied to projects, creativity is often one-off and investments must be recovered through a limited number of projects. Product innovations in the construction industry require relatively high investments and have a high risk profile. As a result the construction industry mainly invests in process innovation (Leendertse, 2015; Lenferink, 2013). Studies by Manseau & Shields (2005) and De Bruijn & Maas (2005) state that innovations are mainly small and incremental focused on the optimal project and process control in one or a few projects. With these innovations companies aim at a more efficient and therefore cost-effective construction process.

Infrastructure projects are also become more complex (Verhees, 2013; Hertogh & Westerveld, 2010; Arts, 2007). Projects must be realized in "ongoing business". The "greenfield" nature of projects is decreasing and thus the number of interfaces with the environment is increasing. Stakeholders are more numerous, more vocal and better organized. The political sensitivity of projects increases. Regulations surrounding projects are becoming even tighter and lead to “juridification” of relations. Projects must be realized within tight time and budget frames. Projects are becoming more integrated, because multiple disciplines, including the associated interfaces, have to be included in the projects because of societal and political pressure. As a result, projects are organized as networks (consortia) of disciplines and risk distribution. "...projects are organized in (actor) networks having several partners thus being dependent on several host organizations and somewhat different goals..." (Söderholm, 2008, p. 81). The increasing complexity leads to more control and increases transaction costs and overhead of projects. As a result an ever smaller number of companies are able to execute these projects, which increases the dependency of the remaining companies on the few clients.

Bygballe et al. (2010) describe, based on an extensive literature review, the relationship between a (public) client and the market in the (European) construction industry as dyadic, short-term and project-oriented with great emphasis on formal tools. The typical and strong “community of practice” maintains the current structure and values and inhibits a radical transition of the construction industry. Beach et al (2005, p. 612) state that: ‘‘…questions remain as to whether an environment which is frequently characterized by one-off contracts and short-term gains is capable of supporting a concept which is based on mutual trust and long-term collaboration…’’. The findings of Bygballe and Beach et al. correspond with Leendertse (2015), who states that one-off project cooperation based on typical project incentives have not lead to a sustainable transition of the industry.

3. Sustainable market dynamics in industrial markets

According to Porter (1996) a sustainable competition is based on a business strategy focused on *differentiation* from competitors, through targeted investments in unique competences (Prahalad & Hamel 1990, 1994) that are hard and costly to imitate and difficult to replace (Barney, 2010). "...Competition based on operational effectiveness

alone is mutually destructive; leading to wars of attrition that can be arrested only by limiting competition... Competitive strategy is about being different. It means deliberately choosing a different set of activities to deliver a unique mix of value..." (Porter, 1996, p. 64-65). Based on unique competences a market company can deliver a unique and desirable service or product to a client (Matthyssens, 2004). However to develop these unique competences investments are necessary. New skills must be developed, existing skills improved and in-competences removed. To be able to invest, the financial appreciation of the value added by the client is necessary. The space for investment is dependent on the price that can be obtained for the quality offered in relation to the costs to provide this quality. Figure 1 (based on Heene, 2010) schematically shows the described differentiation cycle.

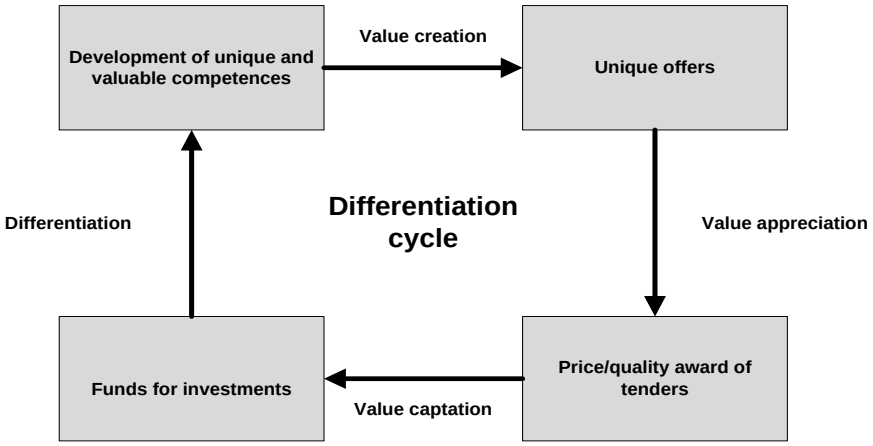

Fig. 1. Cycle of sustainable market dynamics based on differentiation (based on Heene, 2010).

Treacy and Wiersema (2007) speak of *product leadership*. The company constantly innovates and regularly launches new and unique (valuable for clients) products and services. According to Treacy and Wiersema the competitive strength of the company is not solely the presence of specific competences as well as its innovative capacity. The company must have the creative skills to continuously develop technological and market-driven unique solutions. Daems and Douma (2000) argue that a good competitive strategy is not defending existing market share, but continuously creating (temporary) competitive advantage through *innovation*. However, unique competences become less unique through imitation, the innovations of competitors and clients' habituation. Matthyssens et al. (2004) speak of commoditization, "...a dynamic process that erodes the competitive differentiation potential and consequently deteriorates the financial position of any organization..." (Matthyssens & Van den Bempt, 2008, p. 317). A once unique offer becomes a commodity over time and a build-up competitive advantage will diminish (Goffin & Mitchell, 2010; Tidd et al., 2005). This in turn should be a stimulation to search for new distinctive innovation. The skills to continuously play this game are what Treacy and Wiersema (2007) mean by product leadership and innovative capacity.

According to Treacy and Wiersema (2007) *customer intimacy* - i.e. being involved in the customers' business - is needed to deliver added value for the clients. Customer intimacy means a long and close relationship with the client. Then skills and resources can be optimally adjusted to the needs of the clients. An advanced form of customer intimacy is *co-development* (Matthyssens et al., 1998, 2004), where the own business of the market partly adapts to the business of the client in favour of joint value creation

Through *networking* the knowledge and skills of related businesses can be strategically linked to the company's own business. Through this, investments in specific competences can be reduced and a wider range of products can be offered. Companies become more adaptive and less dependent on specific customers. According to Ford et al. (2011) companies always act in networks of relationships. They consider the ability to network as an important core competence of firms. "...The business of modern companies is to modify, add to, combine, distribute and sell what they buy from others. Some of these other companies (customers or suppliers) are vital..." (Ford et al., 2011, p. 8).

According to Ford et al. (2011), the success of a company is not based on turnover through the maximum use of available resources (within the company), but based on a smart continuous adaptive portfolio of relationships.

In summary, business strategy literature asserts that for a company to be sustainable, they must run the differentiation cycle continuously. This makes the capability to innovate, in addition to the capability to network the most important core competence of companies in a sustainable market. However for capitalizing these capacities they are dependent on the tender policy of the clients.

4. A conceptual framework for sustainable development

Public transport infrastructure network operators organize their business usually as a hierarchical chain of linked activities from policy making (strategic level), through network management and programming (tactical level) to projects for realization, maintenance and exploitation (operational level). The market is involved at operational level, through the contracting of projects. Analogously, the market can be considered on a strategic, tactical and operational level. In Figure 2 this is presented schematically in six clusters of actors with their environment. Between these (clusters of) actors interactive and reciprocal relations exist, that give the system cohesion. A change in one relationship immediately affects the other relations. They can therefore not be considered independently of each other. From the figure it is also eminent that the project-contract only covers one relationship out of several necessary for the cohesion of the system. Therefore the contract alone is not able to transform the sector. As discussed in the previous section the differentiation cycle can be regarded as a basis for sustainable development of the industry. Placing this cycle in Figure 2 (as represented by the arrows) provides a conceptual framework for further discussion (based on Leendertse, 2015). Typical for the construction industry is that the value chain is “squeezed” through the project relation.

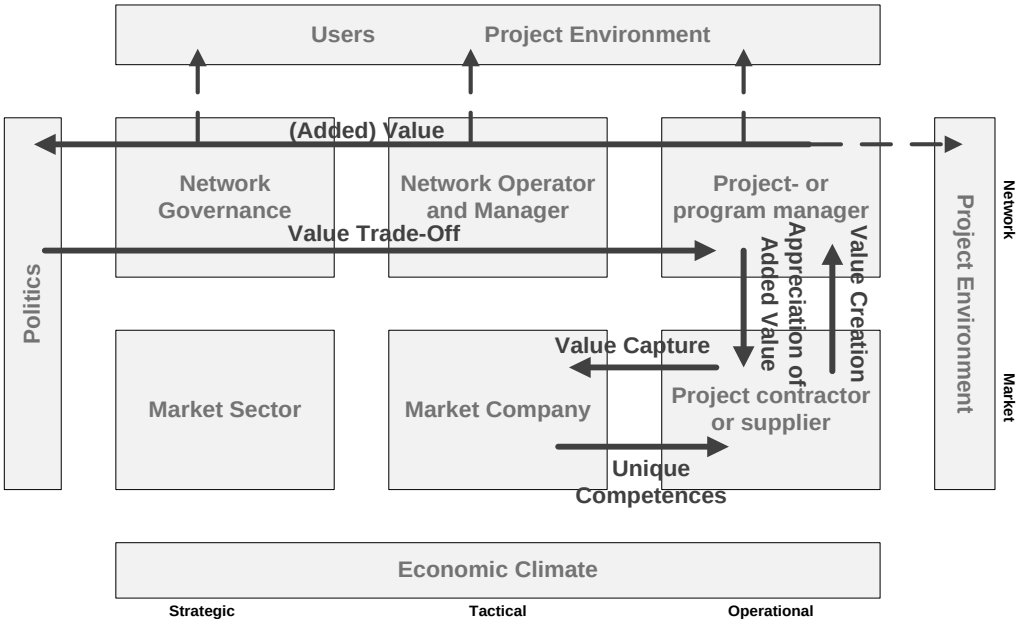

Fig. 2. Conceptual framework for sustainable development of the construction industry (based on: Leendertse, 2015).

On basis of this framework and the theory discussed in the previous sections, the following hypotheses can be derived regarding the development of a sustainable construction industry through the relationship between a public client and the market:

1. Network value does not come from the project itself. Projects add (extra) functionality to infrastructure networks by the efforts and creativity of the market. Appreciation of this extra functionality is a stimulation for creativity;
2. To be creative, room for creativity in a project is necessary. The boundaries of this room for creativity are determined by the network management of the proposed infrastructure project;
3. Exploitation of existing resources is required to finance exploration. Exploration is necessary to develop distinctive and unique customer value;
4. Appreciation of creativity in a project only leads to differentiation if sufficient capital can be captured for investment in key competences of the mother companies. The less value can be captured, the greater the pressure on efficiency and utilization of existing resources;
5. The differentiation cycle is a long-term investment cycle. For profitable investments, the network and market policies of clients should remain consistent over time;
6. Networking reduces capital intensity of the differentiation cycle.

5. Research results Dutch construction industry

In a recent study (Leendertse, 2015) the relationship between public infrastructure network operators as clients and their market in the Dutch construction industry, has been investigated. This paper builds upon this study. Through 83 interviews, concerning all major clients, consultants and contractors in the Dutch construction industry, the study looked into the way these network operators involve the market in their business. The interview results provide a picture of the current perception among (Dutch) network operators, major clients in the construction industry and market organization of how this involvement influences their related businesses. Specifically, the study makes a comparison between the market involvement by (semi-)public clients and industrial clients.

The appreciation of tender offers is directly linked to a value capture mechanism in the project relation (MEAT). According to the interviews added value is hardly appreciated above the costs of the offered measures to generate this value (*compare hypothesis 4*). If only the costs (with a little plus) are appreciated no value remains for investing in distinctive competences. Public clients indicate that accountability of non-material value is difficult to justify. Through strong competition offers are mostly cost based. As reaction on a clients' request a market company develops a solution for minimal costs and adds necessary value to score in the project awarding mechanism (MEAT). Market participants indicate that, even through MEAT, the price is still (often) decisive. Creativity is approached as a recombination of existing resources. Competitive differentiation occurs mainly by improving the efficiency of processes. However, distinction does not last long due to the open culture of the construction industry. The result is uniformity in the structure of companies and their businesses. Consequently, companies are forced even further into price competition.

In addition, the interviews state, that the strong regime of the sector makes companies that differentiate to outsiders. Breaking with the current regime is hard. Because of this strong regime only few new companies join the sector. This creates a locked-in situation for market companies (Prahalad, 2004).

All main contractors are organized as holding companies of production units. Because of this structure they need turnover from projects. None of the companies interviewed said to have ambition to grow into a pure general contractor. They want to remain their core business in building and subsequently organize offers based on integrated disciplines, customized per project. In this way they differentiate from each other per project. Because of the great emphasis on turnover generation, MEAT is used mainly for maximization of turnover instead of (real) added value for the client. The risk of discontinuity of production, due to a limited number of (large) infrastructure projects, stimulates the focus on available projects even more.

In the interviews clients indicate the importance of a creative, evolving market for the industry (*compare hypotheses 1 and 3*). However, neither of the interviewees had a vision for this development. They all focus on exploiting the existing market. Competition is seen as an incentive for creativity and as a means for getting a good price/quality ratio. Strikingly, the presence of competition in itself is considered a sign of a healthy market. In this the construction industry differs from other industries, where the focus is more on reliability and quality through (for

example) long-term partnerships. The interviews show a traditional employer-employee culture regulated by a contract.

Interviewees indicate that the available room for creativity in the clients' requests is limited (*compare hypothesis 2*). This is partly because infrastructure planning and decision-making is focused on certainty for stakeholders and consequently prone to extensive detailing. There remains little room for the market unless the market is early involved in the planning and decision making process. But because of the greater risks and because their core business is building, market companies are cautious to be too early involved (see also Lenferink, 2013).

The necessity of appreciating (real) value and the opportunity to capture this value is mentioned regularly. MEAT is seen as a good instrument for this value capturing. However, how the captured value should be invested in specific knowledge and expertise of the mother companies remains underexposed. The emphasis is mainly on projects, indicating a relative loose coupling between projects and mother companies. Once the tender is won, everything seems to focus on the realization of a positive financial project balance (*compare hypothesis 1*).

Investing requires time and thus a consistent network and market policy. Given the political and economic dynamics of the transport infrastructure sector a consistent network and market policy is difficult. The uncertain (long-term) planning of projects through political and administrative influences makes a long-term strategy based on differentiation difficult. Moreover, due to the strong economical sensitivity of the construction industry the business strategies of major contractors have a horizon of only five to seven years. This makes long-term investments risky. From the fact that the phenomenon of networking as a means for differentiation is hardly mentioned in the interviews we suggest that this type of strategic networking is not common in the construction industry. This strengthens the assumption that competition is merely price competition (*compare hypotheses 5 and 6*).

6. Discussion

This paper shows that (competitive) differentiation is a foundation for a sustainable market development. Differentiation is based on having and developing distinctive knowledge and skills, which are valuable for a client. It is based on a cycle of investing in specific competences by the market, value creation distinctive from competitors, and value capture from the valuation of the tenders, which is then used to invest in the further development of distinctive competences. This investment can be made only if the client reimburses value. If value is not reimbursed, a company will optimize a pre-defined performance by the client through efficiency and quality reduction. The competition then shifts to price competition.

Behaviour of the main contractors is determined by the need for turnover

The major construction companies in The Netherlands are organized as holdings of semi-independent production units mainly focused on production. Differentiation is mostly based on a combination of existing production capacity, tailored to the client's request. Structural differentiation, based on the development of specific distinctive competences, is low. Because the structural differentiation is limited, price competition is still the dominant market mechanism. This leads to low-price, high-risk offers and hence further price competition in the production chain (of suppliers and subcontractors) and tensions in the relationship with the client during the contract realization. Production – i.e. turnover - orientation makes the companies dependent on specific clients and sensitive to economic fluctuation. With declining public investments in infrastructure, the only remaining action for the market is - given the structure of the industry - further process optimization and reduction of overhead. This perspective is based on interviews in the Dutch construction industry. The described characteristics of the (international) construction industry give no reason to presume it will be different in other countries.

It is the infrastructure network that matters

The interviews show that differentiation is hardly encouraged by the market requests of major clients in the construction sector. The added value is mostly (one-off) project-oriented and reimbursement is related to the costs of the measures to realize that added value. A residue is used by the market for the financial balance of the project.

Important for the initiation of the differentiation cycle is the linking of expected value to the function of the infrastructure network (the clients' business). First, the network provides a trade-off for the reimbursement of value regardless of a budget and time-controlled project. Second, the network is permanent and investment in specific

knowledge and skills can therefore render.This linking can only occur if projects are considered from its function in the transportation network, and if the management of this network has financial resources to reimburse the improvement of its functionality. However, in practice projects become essentially independent from both the network administrator and the mother (market) companies after tendering.

Differentiation implies in-equality

Differentiation implies inequality in the offers of market companies. To render differentiation, the selection of candidates and the evaluation of tenders by the clients will have to award this inequality. From the interviews, it appeared that public clients increasingly strive for equality based on the principle of providing a level playing field for candidates. This manifests itself in a lack of distinguishing selection criteria and an objectivized and transparent calculation method of MEAT. The more calculable MEAT is, the more predictable the ranking of an offer, and the lower the necessary for distinct creativity. More subjectivity in the evaluation (for example through juries) should be seriously considered, but is often seen as legally vulnerable. Paradoxical however is that investing just requires consistency and predictability.

Strategic networking is hardly applied

Through networking - i.e. developing and maintaining a network of strategic relationships - companies can develop unique resources without big in-house investments. Networking is essential for the development of competing technologies and thus the value of a company. Interesting is that - given the discussion about appreciation of delivered value - the networking phenomenon is hardly mentioned in the interviews. Large contractors are focused and organized on generating production or turnover through projects. They are structured to generate this turnover through their own production units and through fixed relations with other companies based on missing skills or risk distribution. Networking is not primarily seen as a strategic means for adaptability.

7. Conclusion and recommendations

We started this paper by arguing that the market policies of public transport infrastructure administrators (still) favour price competition and risk opportunism, thereby inhibiting a healthy development of the construction industry. The reviewed literature and the research of practice assert this argument at least for Dutch construction industry. But the discussion in this paper also shows that this situation can be largely improved. Key elements for improvement - especially for public transport infrastructure clients - are:

1. Selection and awarding criteria (MEAT) should be primarily derived from the network functions, with additional project-oriented criteria;
2. Room for creativity for market parties should be provided, where added value for the infrastructure network is needed or can be expected;
3. Stimulate innovation:
    - Allow market companies to exploit innovation outside the specific projects and client[3];
    - Spread innovation over a number of projects through (for example) programs or innovation development contracts;
    - Strive for a reasonable risk allocation.
4. Reimburse creativity based on real added value instead of the costs to deliver that value;
5. Strive for a consistent network and market policy over a longer period. Involve the market early in case of change;
6. Stimulate strategic networking by market parties focussed on differentiation through integration of disciplines:
    - Through adequate selection and awarding criteria;

[3] See also the new European regulation on pre-competitive procurement (ec.europa.eu).

- Focus the contracting on integration of disciplines based on the network functions;
- Focus the contracting on risk management instead of risk distribution.

For sustainable market involvement, public transport infrastructure clients should stimulate market companies to individualize based on specific core competences and to deliver added value for the clients business, i.e. the functioning of the transport infrastructure network.

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