

Strategic Choices for Supervising Systems

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*“If you can’t measure it,
then you can’t manage it”*

Peter Drucker

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Abstract

In the last decade there has been a shift in responsibility for product quality within the Dutch construction industry. Traditionally, the project engineer was responsible for approving the level of the product-quality, the engineer assessed that the created product shows conformity with the product demands. This engineer was hired by the client organization.

Nowadays, for most larger contracts, this responsibility is carried out by the contractor, where supervisor of the client organization assesses the credibility of the contractor's data. Next to the basic difference (the shift in product-quality responsibility) all findings (either positive or negative) must be recorded, where the traditional system only recorded negative findings (non-conformities). The changes are most visible in the Engineering Agencies because these organizations are often hired for supervision activities of the client organizations.

Next to this development in the construction industry, the Ministry of Housing, Spatial Planning and the Environment is demanding a new approach on supervision building permits of the Local Governments. The newly demanded approach does have a lot of similarities with the Quality Assurance (QA) approaches within the construction industry.

The QA approach for supervision construction can be explained by the theories of Project Management and Risk Management. Basics of the system is through a documented system, document findings and discuss foreseen and occurring problems openly. The system will result in clear communication and a healthy relationship between client and contractor.

The Local Governments act in response to the demand of the Ministry in setting up a system similar to the QA approach. The first moves towards a measurable supervising system are made, but a concrete QA supervising system fitting the new demands is not (yet) created.

Changing an organization, either the client organization or the Engineering Agency, from a traditional approach (where product quality is assessed by the engineer, hired by the client) towards a QA system (where product quality is assessed, demonstrable, by the contractor) demands a different mindset for the people working with the system. This change is only possible when the right circumstances are created by management: not only the tools (the QA system) need to be adapted to the strategy, but the culture of the organization must allow change and the leadership needs to be carried out in order to accomplish a stable change.

The development of QA within the construction industry shows a different stage for each part of the industry (discipline), but does have its influence in almost all parts. Some Engineering Agencies (supervising organizations) use the QA system for increase in chance of acceptance of the offer by the decrease of costs, and in some cases as base for an overall corporate strategy.

The Local Governments are willing to change towards a QA approach in supervising their permits. Current approach of supervising and dividing capacity relies mostly on the knowledge and experience of the supervisor. Changing the current supervising system into the QA approach seems difficult without knowledge and experience of the QA system and experience with implementing the new system.

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1. Introduction

The dissertation topic is focused on supervising systems for both the local government organizations as well as engineering agencies acting as supervisor. The difference between the two organizations (local governmental organizations and engineering agencies) can be found in their role: the governmental organization is supervising its building permits and the engineering agency is supervising its contract with the contractor.

The supervision system is defined as the process of the supervising organization in its goal of controlling specifications. E.g. in case of an engineering agency operating as the supervisor of a project, the goal is to determine if the product of the contractor meets the specifications of the contract. The process this agency uses for achieving the goal is called the supervising system.

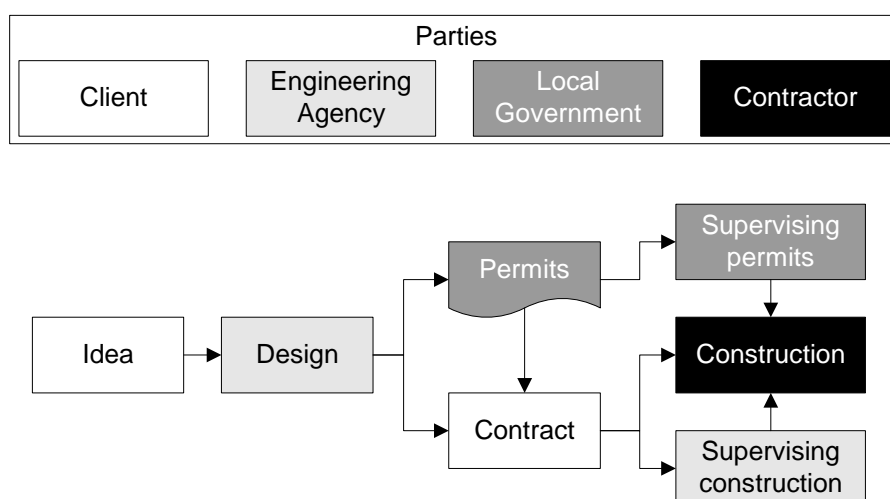


figure 1: Simplified process of a construction project

Basically the system of supervision can be similar for both, as supervision is performed to determine the conformity of the product or process to certain demands (either a permit or a contract). In practice there seem many differences, even within the organizations. These differences result in different strategies towards product-quality responsibilities and supervision approaches. Next to differences and similarities the system used by the engineering agency could be used for informing the local government's supervisors.

An Engineering Agency could be supervising all aspects of the construction from the overall processes to the most detailed activities, resulting in large organizations and taking up a lot of responsibility regarding the product quality. Where another Engineering Agency could choose a lean organizational structure and limit the aspects of control, based on a risk analysis. In order to prevent risks from occurring or immediately correct occurring problems, the contractor will need to set up an internal control system.

The preference for a supervising approach differs based on culture and experience. This dissertation is about comparing the choices of management (in local governmental organizations and supervising engineering agencies) for the different systems; the focus of the study is on the reasons behind the choice made.

There are several articles concerning the topic of supervising systems. Most articles describe the current problems of used systems or guidelines to follow, setting up a system. The study on the reasons behind the choice for a supervising system is lacking.

Aims of the dissertation

The aim of this dissertation is to understand the reasons behind the management choices of both the Engineering Agencies as well as the Local Government, regarding the approach to supervising systems.

Background to the topic is the experiences with supervising systems. Frequently occurring problems regarding the implementation of systems are based on differences within teams, either on cultural, experience or other factors. With concrete information regarding common interference factors it could be more easy to overcome upcoming problems during the implementation phase.

2. Review of literature

The dissertation subject finds its roots in an article by van Staalduinen (2003). In this article a major problem of construction was identified: Through the use of more contractors on the same location clarity in communication was lacking. The choice to use more small contractors instead of one major contractor is based on economic motives. But the consequences can be fatal: in the example of the article the construction of a building was not correctly executed. Balconies dropped down and two residents died. Research proved that causes of this Balcony incident were found in design changes during construction, these changes were not communicated with the engineering department. Too many parties were communicating but none felt responsible.

The use of multiple contractors on a single construction site increases the risk of miscommunication and organizational problems can arise with possible quality consequences for construction. These risks can be minimized by choosing a supervisory style where product quality is a responsibility for the contractor.

Problems discussed in the article are primarily focused on the miscommunication between contractors, supervisors and local government. The responsibility for the structure failure of the Balcony incident was divided amongst three parties; the client (and engineering agency), the contractor and the local government. Had this project been supervised with more clarity concerning responsibilities the incident might have been prevented.

This Balcony incident and other structural failures have identified as a basic point of attention for supervising systems: clearness. The Dutch Ministry of Housing, Spatial planning and the Environment increased the control over local governments regarding their supervision activities. (VROM, 2004)

Local governments now need to create and implement a certain supervising system in order to a) control the various permits and thus ensure a minimal quality demands and b) be able to show to the ministry that a sufficient supervision strategy is used. The ministry will monitor the local governments on their approach towards supervision. (Website VROM).

2.1. *Strategic choices*

There are several choices to be made when an idea for a project starts. One of the basic choices is what kind of contract should be used. In "Gemeentelijk aanbestedingsbeleid, Europese regels en contractvormen in de bouw" (Vereniging van Nederlandse Gemeenten, 1994) different contract systems and the pros and cons of each system are outlined. The document contains basic options to contracting solutions. Each type of contract needs a (slightly) different approach towards supervision. Based on the choice for a contract type

– or based on experience with previous contracts – a supervising system is chosen.

This dissertation focuses on two extremes of supervising systems: the traditional approach and the Quality Assurance approach. These approaches are both standardized methods of supervising systems and can both be used on various types of contracts, but traditional contracts, as described in Gemeentelijk aanbestedingsbeleid (Vereniging Nederlandse Gemeenten, 1994) often make use of the traditional supervising approach and the newer forms of contracting as design & construct are related to the Quality Assurance approach.

The QA approach can be used for traditional contracts as well. However, the traditional supervising approach cannot be used in the newer contracts, as the newer contracts are based on the contractor being responsible for the product quality, in stead of the project engineer.

2.2. *Traditional approach*

2.2.1. *Supervising construction*

Twort (1995) gives an overview of the whole process of construction based on experiences. Each phase is discussed, from feasibility studies towards the last payment and possible claims. In the document the (resident) engineer is responsible for the assurance of product quality.

One of the major demands for the engineer is the impartial behavior. Though hired by the client he will need to “act impartially within the terms of the contract having regard to all the circumstances” (ICE, 1991).

According to the ICE Conditions the tasks of the engineer encompass traditional aspects of responsibility towards designs, deciding on actions to overcome unforeseen ground conditions, assurance of conformity with the contract, document aspects of control and give directions in dispute between contractor and client.

The ICE regulations are based on the UK system but are comparable to the Dutch traditional system. Based on the “traditional” contracts a contractor is granted the project for being the most economical for the client. The contractor is then asked to come up with minor planning and signaling of possible problems before starting. The execution phase will take a minimum of preparation time. Responsibility regarding the design will be in the hands of the Engineer as an advisor of the client.

During the execution phase the contractor will stop activities at certain points, within the process, where a supervisor (the engineer) will inspect if product quality is conform to quality demands. When the supervisor regards the product as “passed the demands” the

responsibility of the product will fall into the hands of the supervisor and therefore the client.

This approach has a major advantage because of its speed. But the client must be aware of the quality of the supervisor. A steady and experienced supervisor will result in a steady product of good quality. But, because utilizing a minimum of preparation time, all occurring problems are unforeseen and can result in extra time and costs for the client. Next to that can a false decision of the supervisor result in extra problems and claims. After the approval of the supervisor, product failure is the responsibility of the client.

2.2.2. Supervising permits

Local governments have the responsibility to control the constructions to be build within the area of responsibility. Their task is based on the Law of Housing (Nederlands Staatsblad, 1991). In this law the local government are obliged to judge if building plans are within the demands of an approval commission and the construction demands. If the design is according to the demands a building permit will be granted and the organization can start construction activities.

During construction the local government must supervise if the granted permit's regulations are followed. This maintaining of permits is carried out through departments of Construction and Housing Supervision.

The supervision of permits is roughly executed in a similar method as the traditional supervising approach of construction. Construction activities are checked based on the building permit. Only when errors or failures are discovered, the findings are documented. If no problems are found, registrations of site visit will be limited to weekly reporting. The frequency of inspection is determined solely by the discretion of the supervisor.

2.3. Quality Assurance

2.3.1. Project Management

A theoretical approach towards Project Management is given by Groote *et al.* (1998). Here Groote *et al.* give an outline for setting up, coordinating and finishing a project. An important aspect of the theory is the aspects of control: Time, Money, Quality, Information and Organization. These aspects of control should be identified in the supervising system. The aspects of control form the base of the project, where the project already is divided in logical pieces, a work breakdown structure (WBS). Dividing the project is based on the norms and demands related to the project.

2.3.2. Risk Management

A limited quantity of capacity and a need for a structural approach led to the use of risk management. With supervising on the larger risks, less capacity is needed to be able to control the whole of the project (Leuven, 2003)

During the design phase and the preparation phase both constructors and executing personnel are determining which risks could occur during construction phase, what the origins are and the consequences and what actions are needed to prevent the risk from occurring. All determined risks are then quantified: the chance of occurrence (between 1 to 5, where 1 equals 0,1% chance and 5 equals 50% or more) and the consequences (between 1 to 5, where 1 equals a minor consequence and 5 equals vital consequences) for each aspect of control: time, money, quality and safety & health. The chance is multiplied by the largest of the consequences, the result is the risk-figure. Next step is to sort risks by their risk-figures. Based on the available capacity the larger risks will be acted upon first, and downward, following the risk-figure, until the total quantity of capacity is used.

2.3.3. Samenwerkingsmodel

The use of Project Management will allow more control over the supervising organization. The organization needs to improve control of its core activities and is helped through the use of existing systems.

The result of the use of the Quality Assurance system can guarantee a more direct and clear communication between parties. Because the contractor now is directly responsible for the product quality he will react faster to occurring problems, and will inform the client sooner when problems are occurring. During the construction of the HSL-Zuid (the high speed track from Amsterdam to Brussels) one of the pillars of a bridge showed more settling than anticipated in the design. This was noticed by the contractor, directly communicated with the client and corrective actions were taken immediately (Jonkhout, 2005).

With different strategic approaches towards contracting there are different strategic solutions towards supervising. Visscher (1999) gives an overview of possible alternatives for supervision systems and approaches in construction for local governmental organizations. The theories are mostly based on the usage of certification bodies, and therefore focused on only one aspect of supervision. This research therefore gives only a narrow image of alternatives within supervision systems.

Though the created image is narrow, making use of Certification Bodies in order to proof product quality, helps the supervising team and the contractor to keep responsibilities straight. The contractor is responsible for the product quality, where a third party is used for proving that the actual product is created according to the demands. This aspect is an important part of the quality assurance system. The

supervising organization is totally outsourced (the Certification Body) and the client will be informed of the reached quality demands.

A fairly new method for supervising is the Quality Assurance process. This process is based on the assumption that the contractor has responsibility for the product and the process to realize the product. The client is responsible to control the stated process. This system is explained in "Samenwerkingsmodel ten behoeve van beheersing van projectrisico's in de bouw" (RR bouw, 1998).

The document "Samenwerkingsmodel" gives a basal vision of a supervising system and a construction system for individual projects. The combined systems are described in eight logical steps from design to the submitting of reports.

2.3.4. Supervising Process

The document of "Samenwerkingsmodel" does not give direct demands towards the system of a supervision organization. It is based on the demands to contractors. The supervision organization needs to work according to certain standards. Supervision organizations are either incorporated into the client organization with its own quality system or are hired through an engineering agency. In either case the supervision organisation will need to organize according to the use of the "Samenwerkingsmodel".

Filling in the need to give direction into setting up a formal Supervising organization according to standards the norm BRL 5006 is used (SKW Certificatie, 2004). This norm can also be used for certifying the supervision organization by one of the accredited certifying institutes.

The norm 5006 gives standardized demands on the aspects of contracting and project management and the directions needed to prepare and use a structured supervising organization.

The base of the QA system is that product quality will be in the hands of the contractor. The task of the supervisor is to assure that data generated for demonstrability purposes by the contractor are trustworthy. In stead of inspecting product-quality, after realization, the process is controlled, during realization. (Meeuse-Simon, 2004).

The use of Quality Assurance with a contract and the effects are described in an evaluation report on one of the projects of the Betuweroute. A large railway project building a railway track from the Rotterdam harbour to the German border (website Betuweroute). The evaluated project encompasses the building of sound-walls next to the track for over 110 kilometres, with a total cost of 80 million Euros. The project was executed under Quality Assurance and proved to be very successful (Stubbe, 2005). One of the important conclusions is that the supervising organization should be set up as a mirror to the contractors organization. This mirror allows informal communication

between the parties before formal documents are finished, speeding up the process.

2.3.5. Quality Assurance for Construction

When we combine Project Management, Risk Management, the Samenwerkingsmodel and the Supervising Process (BRL 5006), we get to a process where both contractor and the supervising organization (engineering agency) will have actions towards each other and the client. This process is shown in the figure below.

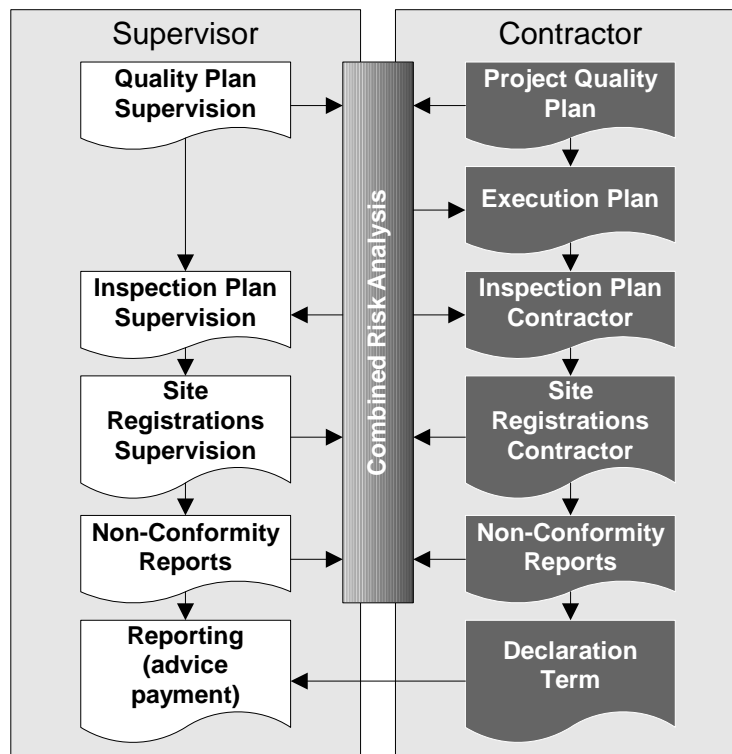


figure 2: Process of Quality Assurance for Construction

The plans each party are setting up guarantees the preparation of works on the aspects of control: time and quality, information and organization. The registrations of the contractor will define that demands, in the contract, are met and that risks did not occur or non-conformities are solved. The registrations of the supervisor will define that contractor's registrations are correct and trustworthy. When the contractor is making a declaration the supervisor will be able to advise to the client if the payment can be made. This last phase in the process is controlling the aspect of "money".

2.3.6. Supervising Building Permits

Because of changes in the Law of Housing, where the new law will have a different demands for maintaining permits the local governments need to change the organization of supervising. Base of the change is a focus on a risk analysis and a prioritizing of aspects of control, based on the risk analysis (VROM, 2004).

Supervising permits can be executed in a similar approach as the QA approach for construction. The local government can identify where supervision is needed, based on the available capacity. Smaller risk permits can be supervised through taking samples, larger risk permits will need more capacity for supervising. Available capacity can be assigned to the project. The process of controlling permits is visualized in the figure below.

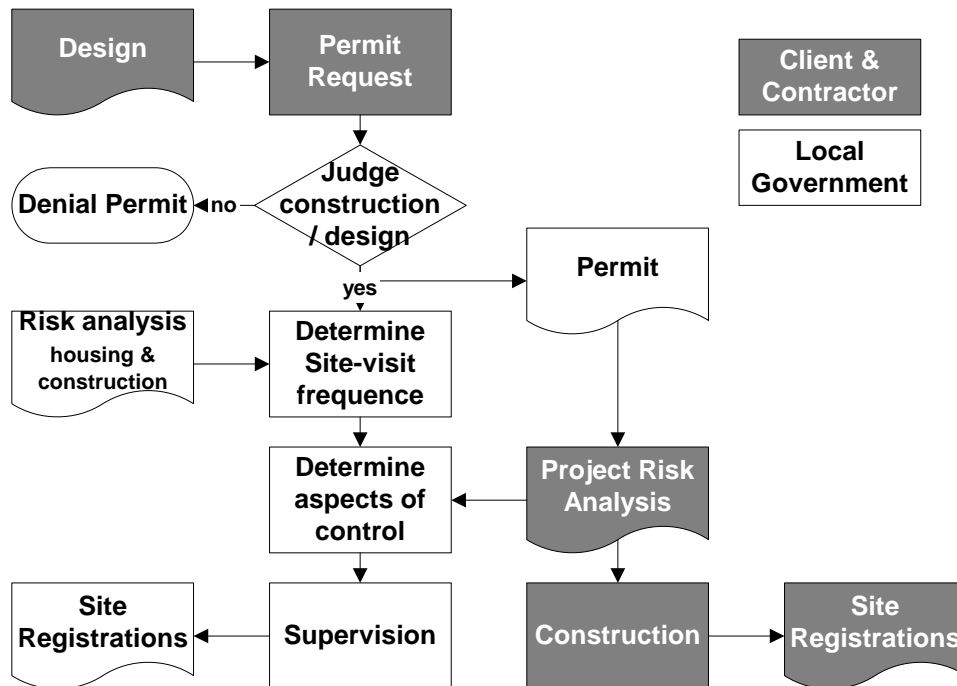


figure 3: QA process of controlling permits

The client is responsible for the Permit Request and supplying the Department of Construction and Housing Supervision of the right design and constructive background information. After the approval of the request the client & contractor are able to start construction activities. The CHS Department will then determine the capacity needed for supervising the project.

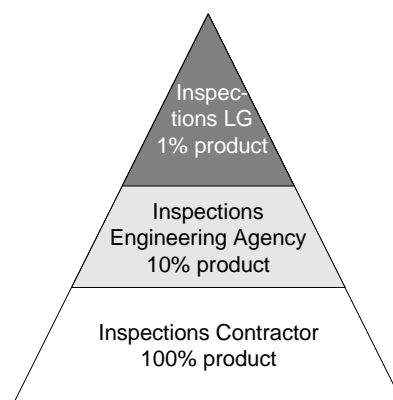


figure 4: Level of inspection

When quantity of capacity is determined the technical risks, identified by the contractor and the engineering agency, can be used to determine the necessary aspects for supervision. With making use of

the available material for supervision within the project the Local government can determine which aspects to observe in controlling the permit.

2.4. Differences in traditional vs. QA-system

The goal of supervising is the assurance of acquiring a product conform the stated demands (either a contract or a permit). In the previous chapters possible supervising systems are discussed. Here the concrete differences between the two approaches of supervising are discussed.

2.4.1. General differences

One of the striking differences between the two systems – traditional vs. QA-system – is the difference in responsibilities. With the traditional system the supervisor (engineer) is responsible for solving occurring problems and thus for the actual product quality, where the QA-method is striving for product responsibility of the contractor.

In a practical sense the engineer is traditionally hired by the client, and with the QA method hired by the contractor. The correction of occurring failures and proposals for contract changes originate from the contractor rather than the client with the QA method. This approach results in the outsourcing of personnel from the client's contract team to the contractor's team.

Another typical difference is the preparation time needed before the execution phase starts. In the traditional approach the contractor can almost start the execution phase as occurring problems will be solved by the engineer of the client, but with the QA method all risks must be calculated and communicated and dealt with before starting the execution phase. Philosophy of the QA system is that good prepared projects need less executing time and are more easily controlled (Project Management).

Demonstrability of met demands in the contract is guaranteed using the QA-system. The traditional approach does make use of norms for specific parts of the industry (E.g. railway construction or Electrical engineering), and in some cases these norms demand demonstrability as well. But with using the traditional method not all demands will be demonstrable controlled unless mentioned in these norms. A contractor might measure the product quality during the process, the measurements are not recorded.

Another important aspect is the risk of forgery when implementing the QA-system. The contractor's freedom to act unethically can be increased, the supervisor will use samples for controlling the process and not be on-site continuously, the contractor's data might be forged on moments of inattentiveness. The system should be able to track these forged data, but the supervising team might not have the experience to react with the suitable tools. In some cases the

supervising team should be able to go back to a traditional approach if the contractor proves to be acting unethical, the extra costs for increasing the capacity of supervision will then need to be charged to the contractor.

The use of the one system or the other does not have any consequences for the product quality. The quality will have to meet the demands in both cases. If processes are performed correctly in both systems, no measurable differences in product will occur. The only difference after finishing the project is the fact that when using the QA system, the product is also demonstrable (in paper) in good order. Acquired data can be analyzed – even during the construction – in order to improve the risk analysis and improve construction and supervising strategy.

2.4.2. Comparing supervising systems within the Strategy Map

Kaplan & Norton (2001) designed a Strategy Map based on their Balanced scorecard (1992). The Strategy Map describes how an organization creates value by connecting strategic objectives. The Strategy Map gives an overview of all possible objects with a “cause-and-effect relationship” to the corporate strategy. The Strategy Map can be used as a communication tool for illustrating consequences of actions towards the corporate strategy.

Comparing both approaches (traditional and QA) in the Strategy Map we can see the effects on the corporate strategy. The traditional approach affects the internal operations of the supervising organization. The effects can be discovered in the “Customer Perspective” on the fields of Price, Quality and Availability. The Financial Perspective will have no direct relation to the supervising system, the traditional supervising approach does not increase value for productivity or growth. Strategy based on traditional method is only a part of the operations.

The QA system utilizes more objects within the internal perspective: Within the Operations Management control is made visible using Risk Management. Because of the use of Risk Management chances in acquiring new contracts are increased because prices will decrease (as a result of improving the cost structure). Next to that because preparation time is used, the innovation processes can be utilized for optimizing the project. With making demands and prevention of risks demonstrable the regulatory and social processes are affected.

At the level of Customer Perspective this is influencing Price, Quality, Availability and Functionality, and will ultimately affect the Financial perspective: Improvement of cost structure, increase asset utilization, expand revenue opportunities and enhance customer value. Embedding the QA approach into the Strategy will fit into an overall Strategy of the company.

2.4.3. Summary differences in Supervising Systems (traditional vs. QA-approach)

Theme	Traditional approach	QA approach
Responsibility product quality	Client (supervisor/engineer) is responsible	Contractor is responsible
Amount of personnel	Quantity personnel supervisor: 10-15% of total budget.	Quantity personnel supervisor: 5-7% of total budget.
Preparation time after contracting	<ul style="list-style-type: none"> • Small amount of preparation needed; • execution phase can start immediately after contracting. 	<ul style="list-style-type: none"> • Medium to large amount of preparation time needed, • both contractor and supervisor will need preparation time for setting up the quality plans and risk analysis.
Risk of forgery	Small, all formal data is generated by or under direct supervision of the supervisor	Medium to high, data is generated by contractor – without skilled supervision data is not trustworthy.
Time	Agreements regarding milestones formalized in the contract with contractor	Agreements in contract and QPS (the Supervisor needs to give an indication of time as well, in relation to capacity usage)
Money	Agreements formalized in the contract with contractor. Payment is based on progress of the project.	Agreements in contract and QPS (the Supervisor needs to give an indication of capacity as well), payment is based on product-quality (achievement)
Quality	Demands are set in contract and related industry norms, no demands regarding process	Next to contract a risk analysis, descriptions in PQP, QPS and inspection plans. All demands now become demonstrable.
Information	Progress and activities are discussed in periodical meetings. Demonstrability of demands is assured when demanded in norms	Activities discussed in PQP and inspection plans before being executed. Progress discussed through meetings Demonstrability of demands on all demands in the contract and norms
Organization	No agreements made, organization is based on experience with former contracts.	Organizations described – and agreed to by client – in PQP and QPS.
Strategy Map	Approach is focussed on internal operation. No direct relation to added value for productivity or growth	Basis for overall improvement of the corporate strategy – the QA system starts with internal focus, influencing customer focus and ultimately productivity and growth.

Table 1: Summary differences traditional vs. Quality Assurance

2.5. Cultural influences on the choice for supervising systems

Next to the known and measurable differences choices for the use of a system can be influenced with other aspects. These differences are not defined, but can be associated to theories regarding culture, group development and leadership.

2.5.1. Organizational culture

Differences in business decisions start with often the organizational culture. Researcher Sonnenfeld (1999) identified four different types of cultures: Academy Culture (a stable organization with highly skilled employees); Baseball Team culture (employees with highly prized skills, fast paced, high risk organizations); Club Culture (seniority is highly valued, an employee must fit into the group) and Fortress Culture (unstable organizations, massive reorganizations with many chances for timely specialized skills). Each type comes with their own characteristics.

The culture types can have a relation to the chosen supervising system; e.g., the Academy Culture predisposes the manager to the progressive system, while the Fortress Culture is more likely to support the traditional system. The interviewee was asked to describe the culture, based on what type of employee is operating in his team, the average education level and the stability of the organizations (e.g. recent reorganizations).

2.5.2. Group development

An other characteristic to identify an organizational type is the stage of group development: forming, storming, norming, performing and adjourning (Maples, 1988). The theory of stages of group development can be used to determine the stage each company is in.

Maples suggest that choice of supervision system will be influenced by stage of group formation, i.e., managers will be likely to choose the progressive QA-system for a group that is just forming and will be likely to choose the traditional system for a long-established group. In the interview this group status will be discussed.

2.5.3. Leadership

Next to the organization theories a view on each leader was used to identify the leadership within the organization. With identifying the characteristics of the leader the trait theories of leadership can be used. (Geier, 1967). This study is criticized as there are limitations: the trait theory predicts behavior in "weak"-situations more than in "strong" situations. Strong situations occur in case of strong behavior norms, strong incentives for specific types of behaviors and clear

expectations. In this study the focus will not be on prediction of future behavior but on identifying the leadership used, within normal (weak) circumstances. And with that the theory is an easy tool in differentiating each leader and the consequences for the supervising system.

In order to give a complete picture regarding the leadership issue the theories regarding situational leadership (Blanchard, 2003) will be used. Whether or not this theory is implemented correctly, the phase of leadership can be determined: Directing, Coaching, Supporting or Delegating.

Leader traits and the leadership approach towards different members of the organization can contribute to choice of supervision system.

2.6. Summarizing literature review

From the literature review there are two theories behind supervising systems, a) the traditional approach where the supervisor (project engineer) is approving to the product quality, taking up full responsibility for the product quality. And b) there is the progressive approach of approval of product quality by the contractor, where the supervisor is controlling the process of approval. The common used systems will find the approach between these extremes.

Both types of organizations, the Engineering Agency and the Local Government, will be using a supervising system for controlling activities. Difference between the two organizations can be found in the organization they supervise: the local government is both supervising the engineering agency and the contractor, where both parties are considered as one organization regarding the permit. The engineering agency is operating in the name of the client to supervise the contractor and its possible sub-contractors.

The traditional method is supported with several basic juridical contract forms. These contracts are common for smaller construction projects, low risk and little or no extra disciplines, and should be working in good order, because of long history usage and therefore a high quantity of experience.

For the larger projects, involving extra risks and more disciplines the progressive approach could help the client or supervising organization in efficiency. Reducing cost but not the quality. Next to that the risk approach is a system that can identify the different responsibilities of the players within the project thus creating more clarity, resulting in even better products.

An organization using a working quality system and a project approach could easily adapt to the QA system for supervising as the QA system uses a planning scheme, followed by documenting and possibly the evaluation of projects in order to improve the system. But the traditional approach is a well known and standard approach towards supervising contracts and building permits.

The management choice for a certain supervising system is based on experience, personal preference and corporate culture. All of these possible influences to the choice of what supervising system to use can be compared.

3. Methodology and data collection

In order to gather the required information, interviews of management of local government and engineering organizations responsible for supervision are held. The tool of interviewing is preferred as there was no standard supervising approach expected, both systems could be used next to each other, where factors influencing the choices are not clear. According to McNamara (1999) the research method of interviews are particularly useful for getting the story behind the interviewee's experiences.

'Interviews are appropriate when questions are open-ended or when the order and logic of questioning may need to be varied.' (One Vision, 2004). This flexibility with acquiring data is needed, because terminology within the subject may vary and questions might need extra information. Personal contact with policy makers and policy executers is deemed necessary in order to being able to answer questions and use the right terminology.

The interviews took approximate one hour of time of the interviewee. Interviews were performed in the working environment of the interviewee. Four managers of the Engineering Agencies were interviewed, and three managers of the Local Government. All concerned with executing the policy towards supervising, with a respectable amount of influence on policy making.

The medium of interviews is used to determine the use of a supervising system of each organization and the actual choices made by management regarding this supervision system. The interview will encompass the fields of background information as the cultural characteristic features and organization structure, the differences in contracts or permits and the used supervising systems, related to the theories.

These theories will serve as the basis for designing the interview questions. The theories of Project Management, Risk Management, the usage of the traditional vs. the QA approach, the theories of culture and group development will be discussed. The specific leadership traits of each manager will be determined during the interview, and the leadership approach towards the employees will be discussed during the interview.

The interviewee is involved in the choice for or the implementation of the policy regarding supervision. This will generate an overview of the differences and correlation between the two subjects: supervising permits and supervising contracts and the backgrounds of the choices.

With making use of the theories behind supervising systems the data acquired form the interviewees is translated into what the differences and similarities are between the systems. Why certain organizations choose for a system and possible improvements.

Next step is to determine the differences regarding the supervising approach and compare these with the culture and structure of the interviewed organization, other factors with correlation to the choice of management can be counted in also (e.g. knowledge and experience with risk analyses).

The acquired data, the interview reports, will be used to draw conclusions regarding the strategic choices of supervising systems by management of the supervising organizations.

4. Interviews

In this section the interviews are discussed, all interviews are summarized and striking aspects of policy towards supervising is mentioned. Each interview conducted with making use of the theories behind supervision (the literature review). For each interview these theories are compared to practical use as stated in the tables in Appendix A Interview Reports.

4.1. *Engineering Agencies*

4.1.1. **Ingenieursbureau Zuid-Holland / DHV**

Mr. Ron Hart of Ingenieursbureau Zuid-Holland / DHV did make a clear choice towards the use of either traditional or QA for supervising contracts. In short his decision is based on the amount of disciplines to supervise. If the contract is limited to one discipline the supervisor does have enough experience and the traditional approach will be used. Increased risks and more than one discipline will most often result in the QA approach.

Most contracts are limited in size and risk. When risks are increased, either when the size of the contract increases or as the number of disciplines is more than one the QA system is used. Most risks will be put on the side of the contractor and less costs are necessary for the supervising organization, because less capacity is needed.

Because most contracts are small and involve a single discipline the QA system is not used frequently according to Mr. Hart. There is an ambition to start up the QA system for smaller projects but because the client does not demand this approach and projects can be started up easily due to the experienced supervisors.

The QA system is not fully implemented in the system, e.g. the inspection registrations were not used for reporting inspections, in stead the traditional weekly reports were used. Though this can be sufficient for operations, analyzing data and improving the risk analysis with experience from other contracts will not be possible.

4.1.2. **Arcadis**

Arcadis has divided the organization into several disciplines and workgroups. Mr. Les Sloesen is the head of one of the workgroups based on project-site management. All team members are operating in the execution phase of projects, as supervisors, head of supervisors or work process leader.

The last two years Arcadis has been growing into the Quality Assurance system and now most contracts operate under this system, where in the offer stage the client is informed of how the contract will

be supervised, with the amount of capacity in mentioned in the Quality Plan Supervision. Concrete supervision is agreed with the client through the use of the Supervising Inspection Plan. In this plan identified risks are supervised according to the available capacity.

The growth into the QA system is driven by the demands of the major client, ProRail where the need of demonstrability and an insight into the inspection strategy is large, compared to other clients. The ProRail organization is outsourcing knowledge and experience but still wants to keep hold of the processes, this can be arranged through the use of the QA system.

Current period is used to make implicit risks identification (based on experience) more explicit, through assuring experiences in an overall risk analysis. This is making the operations of capacity more clear and is helping the team into the understanding of the importance of a system as QA. The overall risk analysis will form a basis for each project risk analysis.

An other workgroup at Arcadis, Contract and Site Management, is lead by Mr. Rob Snijders. This workgroup is not limited to one discipline but is based on contract management.

Next to the management function Mr. Rob Snijders functions as the coordinator of the trade deliberation group, and is making sure that a uniform approach is used for managing and coordinating contracts and projects. Most contracts are now performed under a regime of QA. With some contracts the approach of QA is totally embedded, but some projects are in the process of growth towards the use of this system. Because the QA approach is started only a few years ago a total implementation takes up its time.

One of the implementation actions taken is setting up new projects with a mixture of personnel, lead by a project leader familiar to the QA system and a supervisor with less experience and understanding of the system. Now the supervisor can get more comfortable to the use and is able to build up experience with the system.

This will ultimately lead to experienced employees familiar with working with the QA system. A steady slow-paced growth will ensure the grasping of techniques for all employees, without losing necessary knowledge and experience on their skills in disciplines.

4.1.3. Holland Railconsult

Holland Railconsult divided operations into three divisions, where Mr. Ron Brouwer acts as the manager of one of the disciplines. Most contracts are the construction of new products, with the positive consequence of keeping ahead when implementing new processes. Other disciplines are concerned with maintenance or smaller construction sites, these disciplines are focused on more traditional approaches.

All contracts are executed with the use of Quality Assurance, though there are differences in approach, based on the demands of the clients. Most clients demand a QA approach, but the demanded depth of usage is differentiating amongst the different clients. A basic approach is implemented within the organization and all employees are trained into the QA approach.

The system of QA is already used for the development of internal strategy of operations within the division Large Projects. This strategy identifies five competences among the available personnel. Each competence is representing an other type of person within the organization. The structure is built up with identifying, respecting and using each type and their strengths.

This is a different approach towards the implementation of QA. Here the chances of success of implementing with certain employees is accepted to be nihil, but the strengths of these employees is used when necessary. Competence of the "non-QA" employee is most often the skill, knowledge and experience within his discipline.

The identified competences allow all types of employee and recognize each strengths and weaknesses. The more traditional employee will fit into a knowledge pool, which can be used for each project; less experienced supervisors will use a QA approach with more easy. Projects are run with managers familiar with the QA system and the project team will consist of a team with a mixture of experienced and less experienced QA personnel. Both types will then be able to learn either the content or the quality control system. In this way each member of the organization is rewarded a position with his/her strength.

4.2. Local Governments

On the first encounters with the local governments responsible for supervising permits it becomes clear that there should be a system, but the current status of systems is unclear.

There is a commission installed in order to help local governments with the setting up of a supervising system¹. Four local governments show documents for use setting up a system of supervision. But these documents are basic, there is no definition regarding the quantity of supervision.

4.2.1. Delft

During a telephone conversation one of the employees of the Delft municipality stated that most supervising actions are based on hunches and work "ad hoc" where ever the inspector thinks his presence is needed. The knowledge and experience of the inspector should guarantee that inspections will be done on the more risk-involving projects.

4.2.2. Gouda

During the discussion with the Gouda Head of City Works Mr. Leo Maurits it became clear that a lot of changes are going on, especially on the organization aspect of the supervising and permit departments. In the coming months, organizational systems are set up and implemented in order to create a certain assurance of capacity. The implementation is primarily limited to the management level. The quantity of supervision is based on the experience of the supervisor, but Mr. Maurits commented that every given permit is checked at least once on site, while larger sites are checked more often – the quantity is left to the experience of the supervisor.

The current approach of supervising is based on changes started in 2001, when a large restructuring of the organization started. Now – the beginning of 2005 – the changes are starting to become visible and are rooted into the organization. A new reorganization was more or less prevented in order to get the organization a more stable foundation.

The current structure is based on the voluntary choice between office and on-site. Based on the theory that everyone has his own strengths, either determining if the plans are correct (office activities) or assuring that acceptable plans are executed according to plan (on-site activities). Both aspects need globally the same amount of capacity. During the restructuring each supervisor was asked to spend some time in office and for each advisor some time on-site. This is needed in order to know what colleagues are doing, and to keep “sharp” between the two disciplines (office or on-site).

4.2.3. Leiden

The interview with Mr. Nol Karbet shows a similar approach in supervising, where the style of supervising can be related to the traditional approach.

Mr. Karbet is managing a divers department of the Municipality Leiden, the department of permits and subsidies, where a part of the organization is controlling the issuing of building permits and supervising these permits. This part of the organization is based upon the regions setup by a combined effort of governmental institutes in creating logical divisions of the area of Leiden. In total four regions are identified: Middle (the old central town), South, West and North.

The issuing of permits is performed by a team of five people – four for the identified regions and one for large projects, all occupied with the judgment regarding juridical aspects for each building design. Aspects judged range from the structural kind to the Safety & Health regulations and environmental norms. The judgment of permit requests does not go further than these aspects. The feasibility or planning schedule of construction is not an item taken into account.

The supervising team has a similar division approach, four supervisors operate within the region and one is focusing on the large projects within the whole Leiden area.

The supervision activities are limited by the available capacity, not all sites will be inspected. Prioritizing of building sites is based on the experience of the supervisor. The supervisor is granted access to all documents regarding the request for and the approval of the permit. According to this data the supervisor will set out a program for supervising. The inspection of sites is not documented, unless a non-conformity is found.

The new demands of the Ministry of Housing, Spatial Planning and the Environment are known with Mr. Karbet. At the moment no direct movements are set into action as the development of new methods will take up limited capacity. Other Local Governments have started with new methods for supervising (the Supervising Protocol), when ready, these methods will be implemented into the Leiden approach, “why invent the wheel twice?”.

The Leiden Department of Permits and Subsidies has been through several reorganizations recently. Two years ago the current structure was implemented. Now a new reorganization is set into motion. The supervising activities will be managed by another manager. This change in management is set up in order to prevent the one manager “masking his mistakes in issuing Permits when finding errors during supervision”. Goal of the reorganization is to keep up the integrity of the team.

4.2.4. Zoetermeer

One of the larger local governments used in the research is Zoetermeer. This municipally is in the middle of a large reorganization, based on new demands of VROM, not only focused on the supervision of permits, but with regard to a new overall approach to various themes of permits. All themes (constructive, environmental and safety) will be used for one overall permit in stead of several permits per object, also called the “single window” policy. Achieving this will require different departments to merge and change current strategies.

Mr. Milten Horn is head of a department occupied with assistance of all aspects for City Works, from juridical aspects to policy makers. His department is hierarchical situated next to the department for issuing and supervising building permits (area teams). The area teams are divided over regional areas, North, south, Middle and Oosterheem, where the latter – Oosterheem – has a special status. This area is a new building area with only large projects (several houses within one permit).

Each inspector operates within his own region, the area team is also divided into sub-areas. Requests for permits will be assigned to the inspector according to his sub-area. Both activities of issuing and

supervising will be performed by the same inspector. This has the advantage that the inspector is familiar with the documents and project prior to execution phase. But this approach has a disadvantage of masking faulty decisions of the inspector. A survey by the Ministry of VROM did identify this as a weak point of the – mostly strong – supervising approach of the municipality of Zoetermeer. The current approach to issuing and supervising is developed within the environment permit departments of a decade ago.

All issued permits will be supervised, where leverage of supervising differs. A policy is set up in order to overcome the limitation of capacity within the department. The policy has identified 25 different types of constructions to be supervised. Each type has its own demands regarding the frequency of visits. Smaller construction objects will be visited less frequent in order to be able to focus on the larger projects. This approach is a first step of the demands of VROM, though the risk analysis is implicitly used. VROM demands this prioritizing of structures to be backed with an explicit risk analysis. Advantage of current method is an easy implementation of new approaches.

Permits visited by the inspecting team will only be registered when faults or non-conformities are found. Positive results are not documented. This is one of the aspects identified for improvement.

The reorganization program must find its end in the end of 2005. The whole reorganization is performed internally, without interference or assistance of other local governments. Mr. Horn is aware of developments of the supervising protocol, but is convinced that creating the strategy internally will be more effective than using a strategy of an other municipality with different characteristics. Zoetermeer is quite different from most local governments because of the scale of new structures. The city is constantly under construction.

5. Discussion – relation of findings with theories

5.1. Engineering Agencies

Each of the systems, either traditional or QA, does have its own advantages and disadvantages. The use for the traditional approach is safe and easy, because it is known. But when risks are increasing or the experience with the material is limited the traditional approach can have negative effects on the control of the project, because responsibility for the product quality is in the hands of the client. With making the wrong decision, the costs in time and money will have direct consequences for the client.

According to several interviewees of the Engineering Agencies the use of Quality Assurance is quite limited, within the smaller contracts, only when projects increase a system is used to record the objective. Smaller projects are mostly performed under the experience of the supervisor. Though this approach does have its favors because of flexibility and speed, no direct actions can be taken after failure, and responsibilities are not documented correctly.

The larger contracts, where risks are increased or where multiple disciplines are working on the same project the QA approach is used. For the near future most contracts – the smaller contracts as well – will be executed under a QA approach.

Within the Engineering Agencies a tendency towards the increase in use of the QA system is visible – in the last few years more and more contracts are executed under the QA system, within all of the interviewed Engineering Agencies. Even when a client does not ask for the QA approach, the QA system is used internally within the supervising system.

The QA system demands a different mindset of the supervisor. The change in mindset is basically related to the feeling of responsibility for product quality, even when the supervisor is not responsible. This change in method takes up time and demands understanding towards the position of supervisors. Traditional oriented supervisors need to be “infected” with the new approach through using it next to QA supervisors.

When the QA system is used correctly, the effects are positive. Supervisors seem to have a better control over the contractor and the completion of the project is better documented. Because of more clarity regarding responsibilities the relationship between contractor and supervisor improves. Resulting in a smooth ongoing process.

For all engineering agencies a matrix-type organization is used. Where knowledge and content is managed by the head of discipline, and responsibility for projects is managed by Project Leaders. The Project Leaders are in direct hierarchical positions to supervisors.

This structure gives the right atmosphere for the use of the QA-system, as less experienced team members can work next to the more experienced team members, increasing their experience and confidence in the use of the system.

Each project the use of QA is determined. In most smaller contracts a traditional approach is used, sometimes in combination with a preparation period for quality plans and demonstrability demands. When risk increase the QA approach is preferred. Partly because a) cost reduction – less capacity is needed – and the increase of chance of a granted contract; b) the client organization demands a QA approach or c) the QA approach is embedded in the standard approach of the Engineering Agency.

All organizations mentioned a difficult transition period from traditional to QA – in fact most organizations are still in transition. The mentality of employees need to be changed. To be able to change the organization needs to be stable and open for critics and emotions, according to the culture theory, an Academic Culture is necessary for the development.

Leadership performed is in line with this culture demand, the employees need to be able to share their concerns. A directing manager would not allow these concerns into the operations. Coaching and supporting techniques are necessary. Most employees are in direct contact with the Project Leaders, leadership approaches should be clear on the usage of QA from this “middle” management level.

The stage of development in the QA approach is related to the discipline, the culture, leadership and the organizational structure. Engineering Agencies do have experiences with the use of Quality Assurance. Each discipline has a different level of development. Large concrete constructions are mostly realized with the QA system, but Rail infrastructural constructions are less familiar with this system, and road constructions are using the QA system whenever a second discipline is introduced into the contract or when project risks increase.

5.2. Local Governments

The current available techniques of Project Management and Risk Management are in most cases not used within the Local Government supervising activities. According to the Ministry of Housing, Spatial Planning and the Environment the supervising departments need to implement a system similar to the QA approach in the coming months. Management of the different responsible department are having a slightly waiting attitude towards the actual changes, awaiting examples to use for implementation, Zoetermeer is an exception in their policy, where structures are prioritized. But this prioritizing is not backed with an explicit Risk Analysis.

The need for a structural and documented approach based on risk management is identified by local governments. Most governments are struggling with starting up a process towards a QA system, mostly because of lack in access to knowledge and experience. Some local governments have joined forces and started up a system of verification. These systems fill in the need of demonstrable control over permits. The available examples show an understanding of the problems the municipalities are facing but lack an actual change of the needed organization mentality.

All local governments do have the ambition to get to a structured and documented system as the Quality Assurance system. But the tools to get to that system are not within reach, there is a limited experience and knowledge available. The choice for the use of the Quality Assurance system are not based on the unwillingness or a conscious choice for the traditional system but more on the unfamiliarity to the QA system, resulting in an automatic choice for the traditional approach. Next to that there seems to be no direct need into improvement of structure. Even though legislation has changed and demands a structural approach towards supervision – new legislation becomes active in July 2005 and will allow a transition period of six months (VROM, 2004).

Organization structure is based upon one manager, managing the knowledge, content and activities of the entire judgment and supervising team. These teams can consist of about 15 employees or larger. This span of control is difficult to support with leadership approaches as coaching and supporting, the delegating style will be used most frequently. The supervisor is asked to use capacity where deemed necessary.

The local governments are aware of having a need in setting up a supervising process, but in most cases the local governments are not on the same level of development compared to the engineering agencies. On a management level there are actions taken in order to create a structural organization, related to the available capacity and the risks identified. The identification of risks is limited to the organizational level. Product related identification of risks is not (yet) performed. The use of a system to supervise permits according to risks is not implemented. Not only because the Ministry of Housing is demanding a more structured approach, but also because there is a wish and an ambition to do so, the local governments are awaiting a standardized system to implement.

5.3. Culture, Group Development and Leadership

Striking difference in the use of the QA system and a traditional approach is the culture. To be able to change the organization into a different set of mind a Academy Culture (Sonnenfeld, 1999) seems the most appropriate. A stable organization, where skill and experience is recognized and appreciated. Though skill and experience is mostly recognized by management, the stability of the organizations can be

debatable. Less stable organizations will create a Club Culture or a Fortress Culture, where the focus on seniority and conservational movements will prevent an organization in changing. In the case of Club or Fortress cultures the supervising approach tends to be traditional. During a phase of change emotional instability might result in a temporary Fortress Culture, because of the “feeling” of threat towards knowledge and experience. Experienced employees might feel threatened because the appreciation of knowledge and experience could be perceived as decreased.

Group development (Maples, 1988) as an aspect of influence is seen in the creation of new groups. With the Engineering Agencies a new group is formed for each project. With the starting of new groups all group developments will be used: from forming to adjourning. Each time the choice for either traditional or QA will be made clear towards the group members. Group forming in the local government organizations is a stable situation. The group is performing. Changing the used (traditional) approach will take extra effort of leadership.

6. Conclusions (including recommendations)

6.1. *The choice for the traditional approach*

Both supervising systems, traditional and QA, can be useful for the corporate strategy. But current motives for the use of one of the systems might not be in line with the strategic objectives. The traditional system is sometimes used because it is easy and safe, it is a known process. With these motives a company might miss on opportunities. But making a clear decision on the traditional approach, e.g. when the risks are low, the discipline is well known and the supervisor is experienced, the traditional system is the fastest and most easy method to choose.

For the Local Governments however the Ministry of Housing, Spatial Planning and the Environment is demanding a different approach than used at the moment. The supervising of given permits needs structured and inspections need to be documented, capacity needs to be divided amongst the projects according to a risk analysis (prioritizing activities). This demand in change of the Ministry can be fulfilled using the QA approach, a system similar to Engineering Agencies are implementing.

6.2. *Deciding to change*

Implementing a new approach towards supervision is a time consuming project on its own, as Engineering Agencies show. The implementation project takes the right structure, culture and leadership of the organization. The most suitable culture for change is the Academy Culture, where employees are respected for their knowledge and experience working within a stable environment, with a motivational approach from leadership – a coaching and supportive leadership style. Next to that the desired QA approach needs to be defined clearly.

The most important starting point can be considered to be the cultural aspect. Through instability of the organizations (after reorganizations) and large span of control for the management, the culture does not have ideal foundations for change into a QA system. E.g. the supervisors might feel misinterpreted, as their current approach can be considered “faulty”.

Knowledge and experience of the supervisors needs to be recognized and rewarded. With making their skills visible in the risk analysis the perception of misinterpretation might be prevented. At this point the leadership technique of coaching and supporting are demanded.

Accepting a slow but steady implementation period will allow all employees to join into the new approach. Where some individuals will need extra time, their skill can be used as expert. Often these

individuals show resistance to change and can be categorized as “non-QA” with a strong knowledge and experience in their discipline. When a QA system is functional and generates positive results for the company the turnaround into acceptance of the system will follow automatically.

6.3. QA approach with extra value

When implementing a QA system the tool for supervising can be used for defining a new – overall – corporate strategy. The QA approach can increase the external benefits with improving the cost structure, increase asset utilization, expand revenue opportunities and enhance customer value. The QA approach will have influence on the whole corporate strategy, where the traditional approach is mere a part of the course to follow.

Once the QA approach is implemented, the smaller projects with less risks or a single technical discipline, can be executed using the QA approach as well. The operating system, enhancing the corporate performance will motivate employees to use the system and improve where possible.

But most important: Quality Assurance creates clearness.

APPENDIX A: INTERVIEW REPORTS

Ingenieursbureau Zuid Holland / DHV, Ron Hart	
Theme	Approach
Responsibility product quality	Small, one-discipline projects, the responsibility stays with the supervisor / client. Larger projects with increased risks will be supervised according to the QA system
Amount of personnel	The team road-construction of IBZH is about 12 employees. Sizes of the projects vary from 0.5 million to 1.5 million, resulting in teams of part time employees
Preparation time after contracting	Only when the choice for QA is made – either by the client or because of larger risks (and less costs)
Risk of forgery	The traditional contracts are supervised based on a 50% interval. In case of the QA approach this number is less.
Time	The time aspect is dependent on the choice of system, with QA extra time for the risk analysis is used.
Money	Larger contracts are supervised with the QA system, this approach ensures less costs; thus an increased chance on acquiring the contract.
Quality	The traditional approach does make use of the registrations of the contractor, but is limited for the supervising organization. In case of the QA approach the registrations of contractor and supervisor will be filed, the archive is used for approval purposes
Information	The contractor will provide the registrations based on the demands of the norms. Inspections by the supervising team are not registered. Supervisor reports by means of a weekly report and gives advise about the declared payment to the contractor.
Organization	Each project will be executed by 1 designer, 1 preparation/contract writer, and in turn the acting supervisor (part time) and 1 Project Leader (part time).
Culture	IBZH is taken over by the large Engineering Agency DHV and the company is integrated into the existing organization. The take-over did leave the team of IBZH as a stand alone team. As a stand alone team the culture can be regarded as a Club Culture. But because of the expertise in the team, and a reasonable stability of the organization a shift towards Academy Culture can be made with ease.
Group development	The IBZH team is a stand-alone team within the DH organization, but can make use of DHV capacity when necessary. This makes the IBZH team an existing team (performing group)
Leadership	Leadership traits (based on impression during interview): Emotional stability, Enthusiasm, Self-assurance, Compulsiveness, Team orientation.
Situational leadership phase	Each team member is regarded as a highly skilled member. To be able to keep this standard the leadership phase is either supporting or delegating.

Arcadis, Les Sloesen	
Theme	Approach
Responsibility product quality	Most contracts demand the product responsibility of the contractor. Small single disciplined projects are executed making use of the traditional approach. Larger and multidiscipline projects all make use of the QA system.
Amount of personnel	The team of work site management encompasses about 15 members. All have the function of (head) supervision or process leaders. Each project (from 10,000 to 3 million Euros) will set up its own approach and capacity, agreed with the client through the offer and the Quality Plan Supervision. Larger projects will have team members from other internal disciplines.
Preparation time after contracting	For multidiscipline and larger contracts a risk analysis is created. And each discipline is setting up a supervision inspection plan.
Risk of forgery	This risk is not identified as a conscious risk. Though this could occur this is regarded as subconscious faults and can be corrected upon occurrence.
Time	Based on the contract the amount of capacity is judged every project and agreed with client through the Quality Plan Supervision.
Money	The use of the QA system is allowing less costs for the client, because the capacity of supervision is less, but the client should accept a certain degree of risk. The less capacity the more risks will not be supervised.
Quality	Setting up a risk analysis is an attempt to make implicit risks (based on knowledge and experience) more explicit. Each projects will need a new risk analysis because each project will have different features but also the implementation of the inspection strategy will be more explicit.
Information	For demonstrability purposes all inspections need to be documented using the inspection form. This demand in the system is not fully implemented at the moment. For supervisors it is common to give directions to the contractor in order to document findings.
Organization	As all team members operate in a Matrix-organization under a Project manager for each project the discipline leaders and head of management will have 2 annual meetings.
Culture	Team members are highly skilled through education and/or experience. No rigorous reorganizations did have their impact to the team, so the team can be regarded as an Academic Culture. For the near future the overall education level of the team will increase.
Group development	The QA system did have a natural inflow into the used procedures. The group did have a chance to grow naturally into a performing group.
Leadership	Leadership traits (based on impression during interview): Emotional stability, Conscientiousness, Tough-mindedness, Self-assurance, Compulsiveness, Maturity
Situational leadership phase	Team members are managed with the delegating style. Mostly because of the matrix-organization approach where individual team members are directly managed through the Project Leader.

Arcadis, Rob Snijders	
Theme	Approach
Responsibility product quality	In the last few years the increase of QA projects has now arrived at the point that about 80% of the projects are executed with the QA system. The contractor carries responsibility for the product of these projects.
Amount of personnel	The group Contract and Site Management is formed by about 30 employees. These team members form the base for different projects. In case a specific discipline is necessary this discipline will be attracted into the project team from one of the work groups. Most teams are formed with a Project Leader (part time, 1 day/week); a Head Supervisor (part time, 2-3 days/week) and a Supervisor (full time), capacity, of course, is dependent on the scale of the project.
Preparation time after contracting	Preparation activities are started by the contract writer, here the execution risks are determined together with the future Supervisor for the project.
Risk of forgery	This is not a calculated risk.
Time	The needed capacity differs each project. The total of capacity, approach and demonstrability used for the project will be agreed with the client in the offer.
Money	
Quality	
Information	Findings are reported using the reports. New experiences and techniques using the system are communicated with other working groups within the organization, with using the trade deliberation. Attention for the use of the system is required in almost all meetings. A standard discussion point is QA use.
Organization	Again a matrix organization, where the Project Leader of each project is responsible for the content of the supervising organization. The department of Contract and Site Management is responsible for delivering quality capacity.
Culture	The implementation of the QA approach did meet some resistance in the past. At the moment this resistance is nil, with a progressive mentality to future contracts. The culture can be regarded as an Academy Culture, highly skilled and trained employees and with a stable organization structure.
Group development	The recent developments and changes have now led to a performing organization, where each project will have new development in groups, but with a standardized approach (norming) each group will turn into performing after the preparation period.
Leadership	Leadership traits (based on impression during interview): Emotional stability, Enthusiasm, Tough-mindedness, Self-assurance, Maturity, Team orientation and Charisma
Situational leadership phase	Depending on the experience of the team member the approach varies from coaching, supporting to delegating. Where team members might be directed by the different Project Leaders, the head of Contract and Site Management is controlling skill and education.

Holland Railconsult, Ron Brouwer	
Theme	Approach
Responsibility product quality	All contracts are based on the assumption of contractor's responsibility
Amount of personnel	The whole team is 40 people, where personnel is either detached in a supervising organization lead by a Project Leader of the client or a Supervising team is set up from the division.
Preparation time after contracting	Each project will be prepared according to the tools of the QA approach, based on the needs of the client. In some cases these needs are not more than an image, in other cases these needs are actual and are controlled in depth
Risk of forgery	This risk is regarded as a low risk chance. Though the risk increases when the needs of the client regarding the QA system are small.
Time Money Quality	The overall strategy concerning the QA approach in the organization is containing seven main risks: Planning; Quality; Money; Environment; Safety & Health; Permits and the Transfer. Each measure of these risk are determined per project. Rail infrastructural works are often related to time, the temporary stopping of track-availability for construction and maintenance is leading to the money and quality aspects. Contractors can use the demanding Time aspect to decrease Quality and Money demands. This can compromise the QA approach in several ways. When the path of QA is left it can also have precedent consequences.
Information	Depending on the client demands for QA standard forms are used for documenting inspections and findings.
Organization	Single discipline projects are started within the team with a Project Manager from within the team and advisors where needed. Multiple disciplined projects are managed by managers from the leading discipline.
Culture	Especially the internal change of organizational approach (with identifying the five competences) the culture can be determined as an Academic Culture. Knowledge and experience is appreciated within the group and strengths of team members are used when necessary.
Group development	Current status of the group is divided. Because most group members are scattered throughout the country and are serving different Project Leaders the group is in an early stage of development. In this case the norming stage can be best associated to the current status. But the internal change could well lift the development.
Leadership	Leadership traits (based on impression during interview): Emotional stability, Dominance, Enthusiasm, Tough-mindedness, Self-assurance, Team orientation, Charisma
Situational leadership phase	Again the manager of the team is not directly managing the tasks and responsibilities of the team members, each team member is working under a Project Leader, within a matrix environment. The phase must therefore be determined as Delegating.

Gouda, Leo Maurits	
Theme	Approach
Responsibility product quality	Not applicable
Amount of personnel	The whole team is about 17 people, including one manager and secretary staff. Inspecting permits is based on two region divisions. Roughly 50% of activities is the issuing of permits, 50% is the supervising of permits and other on-site activities.
Preparation time after contracting	Not applicable
Risk of forgery	This risk is fairly evident, regarding the available capacity. Supervision is planned based on experiences of the supervisor with the policy of at least one site visit per permit.
Time	Each permit is checked at least once, no frequency for large risk construction is determined. Available amount is limited. Time per project is limited, due to low capacity.
Money	Not applicable
Quality	Controlling the construction is based upon demands in permits.
Information	Sites visited are not documented; a standard checklist for verification risk aspects is not used. In case of faults documentation starts.
Organization	A fairly flat organization with 17 employees including one Manager.
Culture	The organization is shifting from a Fortress culture (due to an impacting reorganization) into an Academy culture with highly skilled employees, specialized in their task.
Group development	Since the reorganization in 2001 the group is now at a point where norming is getting the overhand. The system is getting fastened into a documented environment.
Leadership	Leadership traits (based on impression during interview): emotional stability, enthusiasm, tough mindedness, intuitiveness, team orientation.
Situational leadership phase	Based on the academic culture the approach of delegation seems most acceptable, next to that this approach seems most logical with 16 employees and one manager.

Leiden, Nol Karbet	
Theme	Approach
Responsibility product quality	Not applicable
Amount of personnel	The whole team exists of roughly 30 employees, where about 10 employees are working on building permits, based on 5 region divisions, for each division one is working in-house on the issuing of permits and one is supervising permits on-site.
Preparation time after contracting	Not applicable
Risk of forgery	Capacity is limited, there are cases of different activities than the demanded activities within the permit.
Time	Issued permits are put into a database, the supervisor will get all information needed for each permit. According to his experience priorities towards certain permits are implicitly set. The supervisor will work with his own priority list and run through it – based on the available capacity.
Money	Not applicable
Quality	The database with issued permits and all the needed documentation is accessible for the supervisor. Activities of permit owners are supervised based on juridical demands on construction, safety and health and the environment.
Information	Only when non-conformities are discovered the findings are documented. No reports are made if activities are in line with demands in the permit.
Organization	The supervising team is based on regional divisions, divisions are created through a combined effort by governmental organizations in order to create a logical dividing of the regions. Most organizations, as fire departments, work with this divisions.
Culture	Several reorganizations have been taking place recently, even at the moment a new reorganization was set out. The permit-issuing team and the supervising team now will have different managers, in order to ensure integrity of the management. All these reorganizations will have effect on the culture of the organization. Either the Club Culture or the Fortress Culture will describe the organizational behavior.
Group development	The group is operating with the current system for about two years, after the previous reorganization. The group will be developed into the performing situation.
Leadership	Leadership traits (based on impression during interview): Dominance, Conscientiousness, Tough-mindedness, Self-assurance.
Situational leadership phase	The team is quite large in quantity. The expected leadership phase is the delegation type. But based on the identified leadership traits the phase might be the directive style. In either case style will not be adapted to individual employees.

Zoetermeer, Milten Horn	
Theme	Approach
Responsibility product quality	Not applicable
Amount of personnel	About 40 inspectors are performing supervising activities. Half of the time is reserved for issuing and half of the time for supervising. Both activities (issuing and supervising) will be executed by the same inspector.
Preparation time after contracting	Not applicable
Risk of forgery	All permits are supervised, only in extreme cases where capacity reaches limitations the frequency of inspection will be lowered on the smaller constructions.
Time	One of the performance indicators (base for improvement of the department) is the time needed for issuing a permit. Legally the local government is obliged to issue a permit within 12 weeks, but Zoetermeer identified a goal of 10 weeks, with all necessary needed changes in operations.
Money	Not applicable
Quality	The inspectors and all assisting personnel make use of a central database, all documents related to a single permit are directly accessible. This system is helping the inspector setting out a route at the start of each day / week structural supervision.
Information	In case of faults or non-conformities findings are reported. Positive results are not documented.
Organization	The department is divided into regional teams: North, South, Middle and Oosterheem. The latter (Oosterheem) has a character of large construction sites and differs greatly from the other three regions.
Culture	The organization was quite stable until recently where a start was made for reorganization. An internal survey caused a bit of disturbance within the organization. Experienced employees feel threatened by the new approach causing the former Academy Culture to change into a semi-Fortress culture.
Group development	Current operations are stable for the coming period and is the result of the regional approach set in a few years ago. The group is performing.
Leadership	Leadership traits (based on impression during interview): Emotional stability, Conscientiousness, Social boldness, Tough-mindedness, Self-assurance, Compulsiveness, Maturity, Team orientation.
Situational leadership phase	The team is large to manage, most logical approach would be the delegation phase. But because of the knowledge of details and commitment within each aspects it is possible that the coaching phase is used for managing the team. This is consistent with the limited amount of available time for the interview.

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