

How Sustainable Are the Quality Control Procedures for Constructions in Europe?

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ABSTRACT

Requirements on the sustainable quality (e.g. energy performance) of new and existing buildings are one of the pillars building regulatory systems of European countries are founded on. The influence of EU policy goals and contents of EU Directives in the energy regulations of the Member States is clearly noticeable. The European Union has set the ambitious goal that all newly built constructions must have a zero energy level by 2020. The total building stock must furthermore be energy neutral by 2050. The Energy Performance of Buildings Directive and the Energy Efficiency Directive have given Member States the tools and direction to develop and strengthen their regulations. There are doubts if the current requirements are sufficient to realise these goals. There is common agreement that the goals only can be reached by more strict and supportive policy instruments. This does not necessarily mean that the technical requirements must be formulated in more severe terms. Probably the big-gest challenges could be found in the way the construction process is organized, the regulations are enforced and way the roles and responsibilities of constructors (builders and installers) are defined. On the basis of a comparative research project in seven European countries, this paper analyses to what extent the current frameworks for the quality control of constructions are adequately organised to meet the current and future sustainable demands.

Keywords: *policy and regulation, quality control, energy saving*

1. INTRODUCTION

From way back quality control of construction work in Europe has been a governmental responsibility. In most European countries local authorities have been responsible for plan approval, site-inspections and checks on completion of constructions. During the last decades however these building control tasks have been outsourced more and more to private parties. The main driving force behind this development has been the wish of governments to deregulate. The shift of responsibilities to private parties should not only improve the quality of construction works but it could also streamline administrative procedures and processes. The idea is that less regulation leads to a qualitative better building stock through cheaper and faster quality control procedures. It is because of these reasons that the Dutch government is on the brink of changing its quality control system of constructions towards a more private model (MBZK, 2015).

Simultaneously with the strong wish to deregulate new quality goals have emerged that require regulatory governmental intervention. The reduction of energy use and environmental impact of construction have been the most important new policy goals the last decades. The European Union and its Member States have implemented regulations that should ensure very energy efficient new buildings and have introduced instruments to improve the energy performance of the existing building stock. The Energy Performance of Buildings Directive and the Energy Efficiency Directive have been the dominant frameworks for the Member States to fit in their national regulations. This growth of energy performance requirements seems to be at odds with the deregulation trend. Furthermore recent studies show that the (energy) regulations are probably inadequate to realize the ambitious energy saving goals (summarized in Visscher et al, 2016). To reach the goals more strict and supportive governmental regulations are needed. That does not only mean formulating more stern demands. It also poses new challenges to the way the quality control process of constructions is organized and the regulations are enforced. The roles and responsibilities of (private) quality controllers and builders are an essential part of this. This paper explores if the regulations and the quality control processes in the 'average' European building regulatory system are fit for the task that lies ahead. Section 2 characterises the essentials of the systems in seven European countries. In the closing sections 3 and 4 the results are discussed and the main conclusions are drawn.

2. OUTLINES OF THE CONTROL SYSTEMS

For many years we have been involved in studying alternative visions on building regulatory systems in international comparative projects. Recently we have been involved in studies for the DG Internal Market (Ecorys and Delft University of Technology, 2015) and for the Dutch government (Meijer et al, 2016). For the latter we compared the quality control system for constructions in the Netherlands, England and Wales, France, Germany, Ireland, Norway and Sweden. In these countries the tasks and responsibilities of public and private building controllers were analysed. The study was based on our existing dataset on building regulatory systems. Additional and updated information was inventoried via desktop research. Relevant regulatory documents and other sources were analysed. Within the framework of this paper only the essentials of the systems can be touched upon.

2.1 England & Wales

For the technical quality control of constructions requiring approval, applicants can choose between local authority building control or a private Approved Inspector. Approved Inspectors have to be certified and must be registered. No legal demands are made about the way in which quality control should take place. Nonetheless both public, as well as private controllers, have voluntarily committed themselves to the Building Control Performance Standards. These standards give guidelines how qualitative good building control should be performed (DCLG, website). Builders have to comply with the general rules concerning materials and workmanship. There are no general recognition or certification schemes for contractors or builders. However specialist installers can join a Competent Person Scheme. These installers can self-certify certain types of building work (e.g. glazing, heating systems), It is assumed that the work meets the requirements. In practice many installations are being placed by these competent persons. Although there is no certainty that all these competent persons deliver adequate work, the certification frameworks in which they have to operate give certain basic assurances about their workmanship, capabilities and experiences. Obligatory demands on indemnity and warranty insurance schemes are in place to protect the building owner. There are no regulations that apply to a post occupancy testing of for instance if the regulations are being met.

2.2 France

For technical control a public-private construction supervision system has been in operation in France for almost forty years (Meijer et al, 2016). The complexity of the construction defines the quality control procedure. For relative uncomplicated works (e.g. dwelling) a registered architect must declare that the plan meets the demands. In practice these works are hardly being controlled during construction (De-man, 2013). For complex construction works with a higher risk quality control by private control organisations is obligatory. Control starts in the phase of plan approval and continues until completion. After plan approval the control organisation has to deliver an initial technical report and an inspection plan. Private controllers are obliged to control the structural and personal safety. Site inspections are held at random. After completion the private controller must deliver an end report. Public and high-rise buildings must have a user permit before they can be used (MLHD, website). Private controllers have to be certified and accredited and must be independent of the applicant/building owner. Organisations can be certified for various control scopes. A decisive factor behind this system is the French insurance and guarantee system for building works (Meijer et al, 2016). The relevant law dictates that every building professional involved with a construction project must have appropriate guarantee insurances. Builders and contractors have to be registered otherwise there is no certainty that they can meet the guarantee provisions.

2.3 Germany

The German model is a mix between public and private quality control. Municipalities are responsible for issuing the (building and completion) permits. Recognised or registered building professionals however play an important role in the system. Certified and registered architect and/or structural engineer must submit the permit application and usually take care of plan approval. In addition — depending of the construction type and control scope — state recognised experts must be involved in the quality control process. These experts have to be independent and comply with strict demands on education and practical experience (Building Code of NRW, 2015). The building application for constructions that are eligible for a regular building permit procedure must be signed by a qualified architect or engineer. Normally state recognised experts verify compliance with demands on structural stability and fire safety). For the construction phase a contractor and a – independent- site manager has to be appointed. Both the builders as the other building professionals have to meet statutory insurance requirements regarding liability.

During construction, building control is exercised by local authority building control and the site manager. After the construction is finished and local authority building control is satisfied the requirements have been met a completion certificate is issued (Meijer et al, 2016)..

2.4 Ireland

Ireland has recently (2014) changed its system to an almost entirely private quality control system, in which competent private building professionals are responsible for the quality control of construction works.. Applicants for works that need building approval must submit a Commencement Notice that needs the inclusion of a certificate of design compliance and proof that an Assigned Certifier is going to inspect and certify the works and a builder has been hired to carry out the works. The Notice must also be accompanied by an inspection notification framework and an inspection plan. After completion of the project, both the certifier as the builder must certify that the completed construction complies with the demands of the Building Regulations (DECLG, 2014). Shortly after the introduction of the new regulations it became clear that for the construction of one-off dwellings and extensions on existing houses. the control costs were highly disproportionate. This has led to an amendment to the system. Owners and self-builders got the choice to opt-out of the statutory certification and are allowed to demonstrate compliance with the demands by other means. At the same time the government announced the development of a new local authority quality control process for single dwellings and residential and commercial buildings (Meijer et al, 2016). For building professionals inclusion on statutory registers is the primary means of establishing competency. For architects and engineers these registers already are in operation. The register for builders should be in place shortly. Furthermore building professionals must ensure that they are adequately covered for liabilities (DECGL, website).

2.5 Netherlands

In April 2016 the new law on Quality Assurance of buildings has been sent to the Dutch Parliament (MBZK, 2015). The law is going to be discussed in Parliament this autumn. If the bill will be adopted, it will change the quality control system fundamentally. All control activities on compliance with the technical building regulations will be transferred from public authorities to private parties. Construction works eligible for the quality control procedure will be classified in three groups according to their complexity and possible consequences in case of failure. Class 1 contains for instance one family housing. Hospitals and high rise buildings are assigned to class 3. The technical quality control of these construction works will be carried out by private parties. An independent Admission Organisation is going to assess and recognise these private quality controllers and their quality control instruments. In the intended new system an applicant must notify the municipality about his plans and the way quality control is going to be arranged. The appointed private controller carries out plan approval and makes an inspection plan and takes care of the control during the construction phase. At the end of the process the quality controller declares that the building meets the technical demands (IBK, 2014). To strengthen the position of the 'building consumers' the liability of builders (e.g. for hidden faults) will be sharpened in the Civil Code.

2.6 Norway

In the 1990's Norway changed its public quality control system drastically. The new system was largely based on self-certification by approved building professionals. These enterprises could self-certify their own construction works and that of others. In practice it quickly appeared that this new model proved to be highly ineffective. Self-certification proved to be inadequate and local authorities failed to supervise the private parties (World Bank Group, 2013). From 2012 on a new regulatory framework has come into force. The checks and balances to assure the quality of the quality control process have been sharpened considerably. The demands and supervision on both quality as independence of control have become stricter. Building professionals have to meet demands on education and practical experience. For construction works that are eligible for quality control all parties involved have to be approved by the central government as (KoRD, 2015),. All roles have to be filed in properly before the authority issues a building permission (DiBK, website). The process starts with an obligatory consultation meeting where an inspection plan must be established. This plan is used during the construction and completion phase. For critical building elements (e.g. structural components, fire safety, energy efficiency and the building envelope) in complex constructions independent private control is obligatory (Meijer et al, 2016). At the end of the construction process the controller/applicant has to make a completion report. At completion the applicant and builder has to supply the user or occupant of the building with an user and maintenance manual of the building.

2.7 Sweden

For works needing building approval in Sweden at least one private person/party must be involved that controls the quality during construction. Quality controllers must be certified before they can operate in practice (Boverket, website). When private quality control is necessary it is obligatory to make an inspection plan and to organise a technical meeting (Deman, 2013). If the municipal building committee agrees with the inspection plan the building permit is issued. The municipality controls the essential elements (structural and fire safety, sustainability, insulation and health issues) of the intended construction plan during plan approval. During construction a certified independent quality controller takes care of the inspections. No specific demands are made on the builder with respect to registration or practical experience. The building regulations expect that a builder complies with the regulations. Liability-issues of building professionals are usually arranged in standard contracts. After completion an end meeting is held that establishes if all the agreements and commitments have been met that were stipulated in the approved inspection plan. If the municipal building committee is satisfied a written notice is issued to the applicant/owner.

3. DISCUSSION

The main goal of a quality control system is to assure that buildings – after they have been constructed - meet the regulatory quality demands. Traditionally the countries studied, focussed their attention on the beginning of the process. In the meantime they all have developed systems where the checks and balances have been more evenly distributed throughout the building process. During the process qualified architects and engineers (e.g. Germany and France), qualified builders (e.g. Norway, France, Ireland) and qualified controllers (all countries) have to make sure that constructions meet the demands. After completion controllers, and some-times builders too, have to report their experiences and the results of the inspections before local authority building control issues a completion certificate. With these kind of procedures in place the chances are fair that buildings meet the intended minimum quality.

At the same time all countries have been trying (and still are trying) to streamline and simplify their quality control procedures for construction works. Without exception the countries thought that deregulation and privatisation was the way forward. This has led to a greater emphasis on the responsibility of building owners and the transfer of actual quality control from municipalities to private parties. As we have sketched above the emphasis of quality control has moved from the design phase to the as built situation. Strict regulatory demands are made on the requirements that should be tested and sometimes the way it should be controlled. These demands always focus on the control and inspection of the structural and fire safety requirements. What is more, these statutory demands on control and inspection always apply to complex constructions. In most countries dwellings are outside the centre of the quality control attention. An example of this is France, where due to the insurance and guarantee system, the structural and fire safety of complex constructions is inspected thoroughly and adequately. Dwellings are hardly controlled by professionals, because the insurance risks are lower. In a more broader sense one can argue if a regulatory system that is heavily funded on insurance regulations is helpful in the face of climate change. The height of the energy use and the sustainable quality of construction probably hardly affect insurance heights and is no driving force to realise a better environmental quality.

The high potential and expected energy savings in buildings increases the need for accurate quality control. This theme still does not get the attention it deserves in the control systems. However the regulatory infrastructure is already available and more attention for energy and sustainable requirements can be easily incorporated in the current framework. The first step would be to give energy requirements the same status as currently is being done with structural or fire safety requirements. Private quality controllers should be made explicitly responsible to check these requirements.

Other interesting developments are the growing demands on the quality and workmanship of builders and installers. All countries have incorporated various forms of guarantees in their systems to make sure that builders and contractors deliver what they are supposed to do. In England individual installers can certify their work when they are certified as competent persons. In France builders have to be registered before they can be qualified for insurance and can operate in practice. Ireland is working on a voluntary register of builders. In Norway persons and parties who want to perform construction work and building control tasks can be approved and in all cases have to declare that they are fit for the task. In Sweden the builder must appoint a certified site manager who is responsible for the quality control. On top of this, all countries have strict rules for building defects insurances. With

these developments a step can be made to a further professionalisation of builders. However for a successful transition to energy neutral constructions more stern demands must be set on the knowledge and skills of the building professionals. They will have to use new techniques and improve the quality and accuracy of the work. The Competent Person Scheme in England could be an example how to deal with the growing need for accurate quality control. This scheme specifically focuses on construction elements that matter regarding the energy performance of buildings (e.g. windows, glazing and installations). Further study will be needed to determine the accuracy and effectiveness of the scheme.

Regulatory attention for post occupancy monitoring is completely absent in the countries studied. Some countries have had in the recent past some regulations and guidelines relating to the user phase of constructions. Currently only Norway makes regulatory demands with respect to a user and maintenance manual. Besides that building owners all over Europe have to provide an Energy Performance Certificate because of European regulations. It is not foreseeable in the near future that post occupancy monitoring will be incorporated in the building regulatory system of any European country. In view of the growing big datasets with the actual energy use in buildings, one can question if the lack of regulatory post occupancy monitoring matters much. The datasets provide, although indirectly, a wealth of information about the effects of the energy regulations on the actual use of occupants.

4. CONCLUSIONS

This paper pictures the state of the art of quality control systems for constructions in seven European countries. What can be noticed in the countries is that the balance slowly shifts from public control and enforcement towards a more dominant role of private parties and building professionals. This development goes hand in hand with the materialisation of more robust and reliable certification and accreditation schemes to guarantee the quality and qualifications of building professionals. With respect to the scope of quality control we see a strong focus on control of the design to monitoring of the building process and testing of the quality of the final building. Post occupancy monitoring is nowhere an established part of the building regulatory system. With respect to the contents it can be noticed that statutory demands on control (when present) usually are focussed on structural and fire safety issues. The priority to check the energy performance requirements in general does not seem to be high. All along the line more simple constructions (e.g. dwellings) are controlled to a far lesser extent. The leading question in this paper was if current quality control frameworks are adequately organized in the light of the regulatory needs related with the expected climate change. In organizational terms the framework looks adequate enough to make the regulations more climate proof. What is needed is the political will and determination to give the energy and sustainable requirements the same status as for instance the demands on structural or fire safety. The last decades the themes energy saving and climate change have been dominating the political agenda. It seems merely a question of time before the desired changes in the regulatory framework will be implemented. In the end however it is also about the question how the systems function in practice. In our future research we intend to lay emphasis on these practical experiences. Only then a more definite and more balanced judgement can be made about the "sustainability" of quality control systems for constructions.

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