



Received: 10 March 2017
Accepted: 10 May 2017
Published: 01 June 2017

*Corresponding author: Inga Lapina,
Faculty of Engineering Economics and
Management, Institute for Quality
Engineering, Riga Technical University,
Kalnciema iela 6, Riga LV-1048, Latvia
E-mail: inga.lapina@rtu.lv

Reviewing editor:
Shaofeng Liu, University of Plymouth,
UK

Additional information is available at
the end of the article

OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

Certification of Persons: Empirical study in the field of energy construction in Latvia

Maija Kavosa¹, Inga Lapina^{2*} and Kārlis Briņķis³

Abstract: The development of the energy sector is an essential precondition for a sustainable growth of the national economy; therefore, the national energy policy is directed not only to the promotion of competition and efficient use of energy resources, but also to an increased security of power supply. Due to the fact that faulty operation of electrical equipment and construction or maintenance of low-quality dangerous electrical equipment may cause serious risks, there is a need for professional qualification certificate stating the person's competence in the sphere. The aim of the study is to analyse the certification process of energy constructors and evaluate the compliance of competence assessment and implementation of supervision of the constructors' independent practice with the requirements laid down in the sphere of electric power in order to develop possible solutions for the improvement of the certification process of energy constructors. The authors' study allows assessing the certification process of energy constructors from the customers' point of view, i.e. finding out what is important to the certified construction specialists, not to the certification bodies or supervisory authorities.

ABOUT THE AUTHORS

The scientific aim of our research activities is to promote scientific discussion and in-depth research of aspects related to certification of persons as regards assessment of their competence and continuous practice-monitoring procedures in general in order to avoid formal attestation of conformity, which can result in the threat to human health and life. Competence evaluation is the biggest challenge at present. In order to describe the certification process of persons and to identify its role in ensuring that the professional competence complies with the requirements, it is necessary to pursue in-depth studies. Particularly to continue research with specific analysis of the person's certification process and competence assessment in order to assess whether the implementation of the competence evaluation and continuous practice monitoring complies with the requirements laid down in the definite field in order to develop possible solutions for the process improvement of the certification of persons.

PUBLIC INTEREST STATEMENT

Because the faulty operation of electrical equipment and construction or maintenance of low-quality dangerous electrical equipment may cause serious risks, there is a need for professional qualification certificate stating the person's competence in the sphere. This paper, using a several research methods, investigates the certification process of energy constructors and evaluates the compliance of competence assessment and implementation of supervision of the constructors' independent practice. Additionally, it assesses the certification process of energy constructors from the customers' point of view, i.e. finding out what is important to the certified construction specialists, not to the certification bodies or supervisory authorities. According to the results of analysis, the construction specialists' requirements for the certification service performance are not fully met. Certification bodies should avoid a situation when certification is perceived solely as a control mechanism. Certification of energy constructors is a socially responsible and sustainable process that does not end with obtaining the certificate but continues by focusing on the certified person's professional competence development.

The results of the evaluation show that the construction specialists' requirements for the certification service performance are not fully met and there exist some challenges to be solved to ensure the professional competence of persons to be certified with the requirements laid down in the particular industry.

Subjects: Engineering Education; Sustainable Development; Production, Operations & Information Management; Human Resource Management; Electrical Power Industries

Keywords: conformity assessment; certification; certification of persons; energy constructors; professional competence

1. Introduction

The development of the energy sector is an essential precondition for a sustainable growth of the national economy; therefore, the national energy policy is directed not only to the promotion of competition and efficient use of energy resources, but also to an increased security of power supply. Due to the fact that faulty operation of electrical equipment and construction or maintenance of low-quality dangerous electrical equipment may cause serious risks, there is a need for professional qualification certificate stating the person's competence in the sphere. Unfortunately, in practice, there are often cases when certificate holders working in their specialty are not properly supervised and their professional skills are not improved in accordance with the assigned qualification level. Therefore, certification of energy constructors nowadays is becoming increasingly important because it is closely related to enhancing safety in the operation and maintenance of electrical installations, as well as minimizing workplace injuries and accidents. However, despite its important role in promoting security of power supply and ensuring quality of construction and maintenance of human life-threatening electrical installations, in Latvia, the process of certification of energy constructors has been very little studied.

A very important role in the certification of persons in the European Union and Latvia is attributed to the compliance of the service provided by the body operating certification of persons with the requirements of the international standard ISO/IEC 17024 "Conformity Assessment. General Requirements for Bodies Operating Certification of Persons". However, several provisions of this standard are ignored in the laws and regulations in the sphere of energy construction. It is necessary to identify the role of certification in ensuring compliance of construction specialists' professional competence with requirements.

In the field of construction, the evaluation criteria are quite specific and clearly start with the design and development of compliance in accordance with sustainability requirements (Stamure, Kamola, & Geipele, 2015). In the context of sustainable development, an organization's integrated policy is a documented commitment that equally considers all three dimensions—environmental, social and economic or translates this concept at an organization's level of policy, which addresses organization's legal obligations related to the quality of products and processes, environmental aspects, health and safety risks, continuous improvement, including pollution prevention and commitment to prevent incidents, which may have consequences for the employees' health and safety (Mežinska, Lapiņa, & Mazais, 2015). Building services, embracing primarily electrical, are essential to proper functioning of buildings—satisfactory design, construction and operation and maintenance entail not only the input of quality materials and equipment, but also the deployment of competent building services engineers (Yik, Lai, Lee, & Chan, 2012).

The study aims to analyse the certification process of energy constructors and evaluate the compliance of competence assessment and implementation of supervision of the constructors' independent practice with the requirements laid down in the sphere of electric power in order to develop possible solutions for the improvement of the certification process of energy constructors. It allows assessing the certification process of energy constructors from the customers' point of view, i.e. finding out what is important to the certified construction specialists, not to the certification bodies or

supervisory authorities. The study analyses the certification process only in the field of electric-power and electrical engineering, i.e. energy in substations of power systems, transformer substations, switching substations, overhead lines and cable lines, electrical installation, electrical safety systems and electrical machines. In Latvia, in every field, there are different certificates, and to get the certificate in the regulated sphere in one of the fields of energy construction (electrical equipment construction management, electrical equipment construction supervision and electrical equipment design), the applicants for the certificate should pass a specific examination.

Several research methods, such as literature review, logical and comparative analysis of regulations, annual statistics of certified energy constructors and survey analysis have been applied in this research. Identification of requirements in the performance of the certification process of energy constructors was made using Quality Function Deployment (thereafter—QFD) or House of Quality.

2. Certification of persons as a means of confirming professional competence

Conformity assessment plays a very important role in providing safe and harmless products and services, thus contributing not only to mutual recognition, but also to the reliability of the performed operations. Certification of products and processes began in the 1960s in the manufacturing industry, as a tool to control and assure the quality/conformity of products and services provided by suppliers to customers/consumers (Ferreira Rebelo, Santos, & Silva, 2014). Certification was as a tool to control and assure the quality/conformity of products and services provided by suppliers to customers/consumers (Santos, Mendes, & Barbosa, 2011).

Some authors in the definition of the concept of certification emphasize the significance of activities performed by an independent third party. Dimov (2010) defines the concept of certification as a form realized by the certification bodies to assess the object compliance with the technical regulations, standards, legislative requirements or agreements. With the “form”, he understands the established procedures that certify the product or other object conformity in accordance with the relevant documents. According to Dimov, certification is one of the ways of ensuring high product quality while improving both scientific and economic cooperation between countries on the basis of mutual trust.

The significant role of certification in ensuring product quality is also emphasized by Auriol (2015) who points out that certification may be defined as a process whereby an unobservable quality level of some product is made known to the consumer through some labelling or stamping system, usually issued by a third independent party. This is substantiated by the fact that during the certification process the trust to a particular product, which is so important for consumers, is turned into a research object and made an integral part of the product. In other words, certification is a process for transforming a credence attribute into a search attribute (Auriol, 2015).

Liepiņa, Lapiņa, and Mazais (2013) define certification as widely used in the conformity assessment procedure and its object may be a person, process or service as well as a certain action, scheme or arrangement. The Latvian law “On Conformity Assessment” (1996) defines certification as an independent third party’s action assuring that a product, process, service or person complies with the requirements stated in the normative act or standard; at the same time, it also characterizes the main elements of the process, namely the object, the parties involved in the process and its goal. Thus, the concept of certification includes a certain set of actions aiming to demonstrate the compliance of the particular object, and as a result, a proof is issued, i.e. the certificate. It is also noted that the assessment is carried out by an independent third party, at the same time pointing to the interrelation between certification and quality, i.e. the particular certified object is described as having good quality, which means that it complies with the specified requirements.

Upon analysing and evaluating the most common definitions of the concept of certification, the authors conclude that certification is a conformity assessment procedure where the object can be not only a product, but also a person, process, service or certain action and under which an

independent third party performs the inspection of the object aiming to assess whether the object meets the necessary requirements and issuing a certificate as a proof of compliance.

Certification as a conformity assessment procedure can be attributed not only to a product, service, process or certain activity, but also to a person; in this case, it involves an independent third party's affirmation that the person's professional competence complies with the requirements set out in the professional sphere. Here, professional competence means that the person possesses the necessary knowledge, professional experience and understanding as well as the ability to use this knowledge and experience in a specific activity (Briņķis, 2014). The meaning of competence is linked to an individual's ability to learn, communicate and cooperate in a changing environment (Lapiņa, Caune, Gaile-Sarkane, Borkus, & Ozoliņš, 2015).

According to Uhlir (2013) today, with processes becoming more and more complex and resources and deadlines ever shorter, the basic success factor has become investment into human resources. For an organization's professional performance to be relevant and competitive, employees should be able to demonstrate a high level of professional competence in their sphere, because the organizations work in a highly regulated environment (Pagell, 2010). The author points out that this professional competence is acknowledged by a certificate; nevertheless, a certificate cannot guarantee an individual's success, but it certainly is a significant indicator and tool for differentiation (Uhlir, 2013). Uhlir also believes that the process of certification of persons has an indirect impact on the educational process of the profession to be certified. It not only influences the quality improvement process that allows the person to demonstrate their professional competence in their daily activities and tests their knowledge and skills, but also the professionalization process of the certified profession helping to provide performance that complies with the professional standards.

Whereas Lengnick-Hall (2012) points out that the goal of certification is to persuade professionals, their employers and their customers that those who are certified exhibit high levels of job performance. He also emphasizes the difference between the licensing and certification, which are two means used by many professions and occupations to require or encourage individuals to demonstrate the mastery of a body of knowledge. The primary distinction between the two is that license is required of people by law to perform an activity, whereas certification in many cases often is voluntary. However, licensing does not imply levels of quality, because it is a process by which individuals are granted permission to perform a defined set of functions and its primary purpose is to assist the public in identifying who is qualified to practice the profession. Certifications focus on the use of a particular professional title and limit its use to individuals who have met specified standards for education, experience and examination performance. Whereas authors conclude that certification is also viewed as one means for regulating a profession, but certification may also protect the public (organizations and employees) from unqualified practitioners, who by incompetence or failure to adhere to professional standards may do harm, and helps maintenance services become more professional and competitive and provide better quality (Farinha, Galar, Adelino Fonseca, & Kumar, 2013).

Cohen (2012) agrees to the view that certified professionals may indeed perform better than non-certified professionals and emphasizes that certified employees are characterized by the ability to apply their knowledge and experience into practice, demonstrating not only work performance of high quality and efficiency but also diagnosing and solving problems related to work performance. Social performance in this aspect is also very important (Maletic, Maletic, Dahlgaard, Dahlgaard-Park, & Gomišček, 2015). Whereas Powell (2014) opposes by arguing that certification of persons by itself does not guarantee a higher professional competence, thus a certificate of compliance with certain professional standards cannot be the decisive factor for the employee's professional performance assessment. Powell stresses that certification should be based on the employee's experience and performance, which nowadays is treated as increasingly less important; Powell believes that certification does not provide any results if the person lacks practical experience, i.e. it does not improve the efficiency or guarantee a better quality. A person with experience, an inquisitive mind and a desire to accomplish something positive can often outperform a person with just a certification.

Also Guerrero (2012) emphasizes that professional competences include a wide range of knowledge, procedures and attitudes combined, coordinated and integrated that the individual is responsible to knowing for professional practice. So it is the characteristics of the individual and their knowledge, skills, abilities, attitudes and values that can affect a competent performance depending on the context. Thus, Guerrero concludes that a person's professional performance is very much dependent on the interaction of all the above-mentioned components, i.e. on the way a person is able to apply their knowledge, skills, experience, values and personal character traits depending on the context of situation.

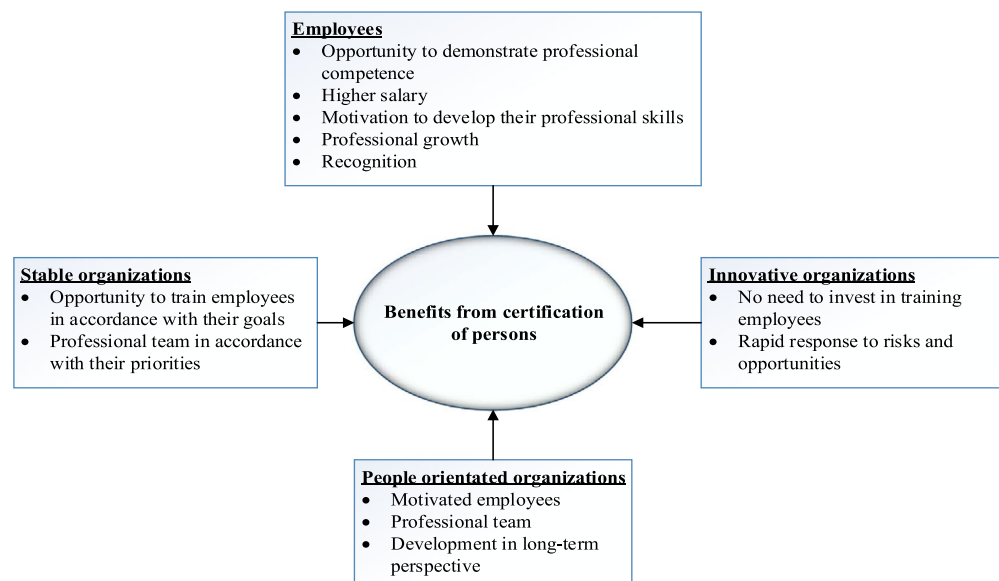
Despite the fact that the authors do not share the same views on the professional performance of certified and non-certified employees, the dominant opinion is—professional certification is considered beneficial by both employers and employees. Also certified companies around the globe are refusing to do business with non-certified companies (Khan, 2006) and the time of certification has significant positive effects (Babakri, Bennett, Rao, & Franchetti, 2004).

Employees have the opportunity to demonstrate their professional attitude and competence thus becoming more valuable to the company, as well as to build their careers and be more demanded in the labour market. It is also indicated that certification positively correlates with the level of wages and salaries (Latham, 2012), which at the same time is also one of the most important motivating factors for employees. However, as pointed out by Garza (2012), the above-mentioned largely depends on each particular organization's values because they are the basis for any strategic decision-making body. Thus, the values of the organization will determine not only how the management and employees will evaluate the certification of persons, but also the benefits from this certification. Three types of organizations (Figure 1) can be distinguished on the basis of their core values: innovative organizations, people-orientated organizations and stable organizations (Garza, 2012).

Since each organization has its own dominating culture that determines the organization's values and also affects the employees' value system, each of the above-mentioned types of organizations will have different benefits provided by certification to the organization and the employees.

Another important benefit from the certification of persons to the organization is related to customer loyalty to the services provided by the organization and the improvement of economic

Figure 1. Benefits from the certification of persons.



performance in the long term, which has a positive effect on the organization's overall image and reputation (Kells, 2015; Wagner, 2015). Whereas Lengnick-Hall (2012) extends this statement by indicating that certification not only positively affects the reputation of the organization but also increases the value of the recipient of the certificate and their professional activities, thus helping the organization to become a competitive market player. "Certification has effects at both the micro level (by influencing individual level job performance and individual level outcomes) and at the macro level (by influencing reputation and effectiveness of organization" (Lengnick-Hall, 2012). Consequently, the benefits of certification can be both internal and external (Franceschini, Galetto, Maisano, & Mastrogiacomo, 2011), but while the internal and external certifications have different implementation aspects, a common goal is to improve product or process performance and advertise superior products and services (Kim & Hwang, 2014).

Auriol (2015) compares the certification process with the "black box" with its high fixed costs; consequently, certification becomes a formal procedure without providing the desired results. Besides that, the benefits from the certification process are described as limited because the relatively high cost of certification creates a certification monopoly, and if the certification process turns into a profitable business, then the very process is implemented mechanistically.

Also DeNisi (2012) questions the unambiguous character of the benefits from the certification process pointing to lack of objective measurements, particularly with regard to the work performance improvement of the recipient of the certificate in comparison with non-certified employees. He points out that neither the increase of wage or salary, nor promotion or better job opportunities and a more positive assessment by the organization's management team can serve as a measurement of individual success, because any performance measurement, starting with the choice of measurable factors and ending with "positive perceptions", is subjective. The benefits from certification to both the organization and the employees are largely related to the perceived value of certification of persons, i.e. if the organization pays very much attention to certification, then the professional performance of a certified employee will be given a greater recognition.

Wyrostek (2001) emphasizes that there are also some disadvantages to be certified. The certification process can cost a great deal in terms of finances and time and if the certifications are too many or there are too much overlap in the content, then there are need for neutral governing body that can offer advice and direction to interested candidates.

Upon collecting and analysing information on the possible benefits, the certification of persons provides to both the organization and the employees, the authors can conclude that they are largely related to the organization's values and how the certification is perceived by the organization's management and employees. Since the culture and values of each organization are different and they cannot be measured objectively, then the benefits the certification of persons provides to the organization and the employees cannot be generalized and applied to all organizations in the same way. If the certification of persons has become a part of the organization's value system, then the benefits that it provide will be applicable to the employee's individual performance and the organization's overall performance, becoming a key prerequisite for successful and sustainable development. Whereas if the certification of persons is perceived as a formal procedure and is implemented mechanistically, then the benefits that it provide will be limited and will not serve as the indicator of the professional competence and efficiency of the organization and its employees. Also authors can conclude that the main disadvantages of certification of persons are associated with financial costs, time loss and personal interest from certification bodies to get new candidates with aim to get more money-implementing certification process mechanistically.

3. Research methodology

Since the certification process of energy constructors in Latvia has so far been viewed solely in the context of legislative changes, where the main aim for the certification process is ensuring

compliance with the regulatory requirements, during the period from March to May 2016 a survey of construction specialists certified by Latvian Association of Power Engineers and Energy Constructors Specialized Certification Centre (thereafter—LEEA SpecSC) was carried out. That was the first survey in the area when construction specialists were involved in evaluation of the certification process. Taking into consideration the ethical standards for survey, all answers are confidential and be used only as consolidated information.

The aim of the survey was to find out what in this process is important for the certified construction specialists themselves, not the certification body or the supervisory authorities, thereby evaluating the service processes when certifying energy constructors from the customer's point of view. The population of the survey was 3131 construction specialists—the total number of certified construction specialists at the time of survey, out of which 1,755 construction specialists are certified in the regulated sphere, but 1,376 construction specialists—in the non-regulated sphere. The sample size at the 95% validity level was calculated according to general practice. According to the error selection traditionally accepted in research practice, the representative error in the survey is 5% (Bell, Teixeira-Pinto, McKenzie, & Olivier, 2014). The random sample is calculated by the formula:

$$n = \frac{t^2 w(1-w)N}{\Delta^2 N + t^2 w(1-w)} = \frac{1.96^2 \times 0.5(1-0.5) \times 3131}{0.05^2 \times 3131 + 1.96^2 \times 0.5(1-0.5)} = 342$$

So, for the size of the permissible error not to exceed 0.05, the sample size should be 342 respondents. Three hundred and eighty construction specialists took part in the survey of construction specialists certified by LEEA SpecSC, which is sufficient for the number of respondents to guarantee the representativeness of the research.

The satisfaction of the certified energy constructors with the service provided has been evaluated through the Quality Function Deployment (thereafter—QFD) matrix. The foundation of the “House of Quality” or QFD method is the belief that products should be designed to reflect customer's desires (Frolova & Lapina, 2015) and operational excellence could be achieved using advanced quality techniques such as QFD (Asif, de Bruijn, Fisscher, Searcy, & Steenhuis, 2009) and it contains information about what to do (e.g. what customers want), how to do it (e.g. how technically customer requirements can be achieved), and the relationships between each of these aspects; prioritization of customer requirements and technical/design requirements and what are the organization's target levels (Büyükoçkan & Çifçi, 2012).

Since the customer is the one who runs and operates the finalized service delivery, it is the client who first notices whether the technical and social efforts have been properly carried out during the process execution stages, the customer must be in the centre of the service provided by any organization (Liinamaa & Gustafsson, 2010). It enables organizations to prioritize the needs of customers, finding innovative responses to those needs and improve processes to achieve maximum effectiveness (Sularto & Yunitasari, 2015).

According to the requirements of the standard ISO/IEC 17024 and normative acts, the certification process in energy construction should be organized so as to be able to assess the competence of persons to be certified, i.e. their abilities, knowledge and skills, with the help of objective assessment tools (Brinķis & Straume, 2015).

4. Results of the empirical study in the field of energy construction in Latvia

In Latvia, certification of energy constructors was started in 1997, and currently, energy constructors' conformity assessment is conducted by two certification bodies—LEEA SpecSC and Certification Department of Latvia's Electricians' Brotherhood (hereinafter referred to as LEB SD). The statistical

data of construction information systems (Information System for Constructors, 2016) show that in 2016 the number of active certificates of LEEA SpecSC has reached 1,764, but LEB SD—only 406, which indicates that LEEA SpecSC is the leading certification body operating certification of energy constructors in Latvia.

4.1. The legislation regulating the certification process of energy constructors

Common conformity assessment procedures in Latvia are determined by the law “On Conformity Assessment” (1996), which aims to ensure a single procedure for conformity assessment, which has been harmonized with the legislation of the European Union and international laws and regulations.

Likewise, certification bodies, when providing their services, must comply with Directive No. 2006/123/EC of 12 December 2006 of the European Parliament and the Council on services in the internal market aiming to promote effective implementation of free movement of services and ensuring independence and impartiality when providing these services. In Latvia, there is no rule of worker’s licence which determines that technicians and electrical engineers should take a licence before working in the energy field. The only condition is that before working in the energy field technicians and electrical engineers should pass a specific training course to get certificate of electrical safety; otherwise, they have no rights working with electrical equipment. However, in the regulated sphere of energy field (electrical equipment construction management, electrical equipment construction supervision and electrical equipment design), legislation provides that an appropriate certificate is needed for performing certain construction work. But certificate in the non-regulated sphere of energy field is voluntary and is demanded only by a few companies for performing particular tasks.

Standards are supposed to encourage regulatory compliance and continuous improvement of performance (Heras-Saizarbitoria, Boiral, & Arana, 2016). By contrast, the requirements related to conformity assessment to be met by bodies operating certification of persons are set in ISO/IEC 17024 “Conformity assessment. General requirements for bodies operating certification of persons”. It is an international standard, which includes the principles and requirements for the institution that certifies persons in accordance with specific requirements including development and maintenance of certification schemes in accordance with which accreditation of certification bodies is also carried out in Latvia. According to the standard, certification process includes several categories: application, evaluation, examination, decision of certificate and periodic monitoring of competence. The thought of continuous improvement established in the standard is also accommodated—the assessment area is structured and constructed systematically and enables in this way that the further development of the management system is captured and development improvements are documented in the course of time (Klute-Wenig & Refflinghaus, 2015).

The certification body should not only ensure that all stages related to the certification process—application, evaluation, examination and decision-taking—have appropriate procedures to evaluate the competence of the person to be certified, i.e. their ability, knowledge and skills by using objective assessment tools, but also ensure continuous competence validation including supervision of the constructor’s independent practice.

4.2. The evaluation of the certification process of energy constructors—survey results

The general information about the respondents in the first part of the questionnaire shows that the majority of respondents, i.e. 37%, are aged between 30 and 40 years and 64% of respondents have the second-level professional higher education (1st cycle in Bologna), which complies to the requirements of the Construction Law. In addition, 50% of respondents have 5–20 years and more work experience in the field of electric energy or energy construction at the moment of obtaining or extending the certificate.

The second part of the survey provides information on the certified construction specialists' requirements for the certification service, identifying what is important for construction specialists in each of the stages of the certification process, while also giving assessment of these needs on an ordinal measurement scale of 1–6.

In order to obtain information about the respondents' views on the provided certification services, in the third part of the questionnaire the respondents were asked to evaluate the quality of certification service on the measurement scale of 1–6, and the mean result is 4.6. Since the measurement exceeds the average rating of 3, it allows to draw conclusions about quite adequate performance of the certification process, which could be explained by the fact that 65% of respondents have the second-level professional higher education that allows them to receive open-ended certificates in the regulated sphere as provided in the Construction Law of the Republic of Latvia.

The third part of the questionnaire gives information about what respondents are most satisfied with in the service provided and what things would be a matter of priority to improve. Upon summarizing the received survey data, the authors conclude that the construction specialists' requirements that received the highest rating and that are important for 50–65% of Latvian certified construction specialists are associated with the group of questions about the certification process itself, i.e. the availability of training materials, public availability of most current information and employee professionalism. Also, a large proportion of respondents indicated the need to improve the preparation of the applicants prior to certification by proposing to organize training and also to publish the examination topics and training materials. The certified construction specialists' focus on the fact that during the certification process not all the necessary information is available to the applicant to prepare for the competence assessment shows that in Latvia the certification process cannot fully ensure the professional competence of persons to be certified with the requirements laid down in the particular industry.

4.3. Satisfaction of the certified energy constructors—QFD matrix results

In Stage 1 of QFD matrix application, construction specialists' needs and requirements for the certification service were identified with the help of the collected survey data, in Stage 2, the mode value of each requirement was set on a scale from 1 to 6 in accordance with the construction specialists' ratings. The quality assessment model included only those requirements found to be most important by certified construction specialists, and each of them was evaluated on a 9-point scale, where rating 1 is given to irrelevant requirements but 9 is given to very important requirements. In Stage 3, all construction specialists' requirements were expressed with appropriate certification service descriptors, thus providing an answer to the question: what Latvian certified construction specialists want and how it is implemented (see Figure 2).

After determining the customer requirements and the service descriptors in Stage 4, the interrelation between customer requirements (Stage 1) and each service descriptor (Stage 3) was numerically evaluated, thus identifying those service descriptors that have the highest connection with the customer requirements: ● = 9 (strong connection); ○ = 3 (moderate connection); Δ = 1 (weak connection).

Many significant connections can be observed between the customer requirements and the service descriptors; it indicates that all customer needs have relevant service descriptors, thus completely or partly ensuring the fulfilment of customer needs. However, upon analysing the connection between the customer requirements and the service descriptors, it was found that the certified building specialists' requirements have the highest connection with resource management, which closely correlates with nearly all the certified construction specialists' requirements regarding the certification service. A close correlation with the certified building specialists' wishes is also observed in such a service descriptor as quality management.

Figure 2. Connection between the construction specialists' requirements and the certification service descriptors.

<div> <div>Functional Requirements</div> <div>Customer Requirements</div> </div>	Employee qualification	Employee responsibilities and role allocation	Internal control system	Information management	Customer management	Document management	Organization of examination	Preparation of applicants	Organization of supervision	Resource management	Cooperation	Organization of application procedure	Quality management	Planning
Professionalism of employees	●	▽	○	●	●	●	●	●	●	●	●	●	●	●
Publicly available information	○		●	●	○	○		●	●	●	▽	●	●	○
Fast evaluation of the documents submitted	●	●	●	●	●	●			○	●	○	●	●	●
Keeping within the time limit	●	●	●	●	○	○				●	○		●	●
Training materials and examination topics	●	○	○	○		○	●	●		●	○	▽	○	○
Service quality	●	▽		○	●			●		●	●	○	○	●
Indication of the scope of the certificate	●	○	●	○	○	●				●			●	●
Information on discrepancies and validity	○	●	●	○	●	●				●		▽	●	○
Reminder of supervision fee		●	●	○	●	○			●	●	○		●	●
Availability of consultations	○	●	○	▽	○			●	○	●	▽	○	●	●
Accuracy of the information in the certificate	○	○	●	○		●							●	
Professional development courses	●	●	○	○	●				●	●	●		○	●
The content of examination	●	○	○	○			●			●	●		●	●
The recertification interval				●			●		▽		○	▽		○
Technical Importance Ratings	582,35	467,65	564,71	492,16	461,76	432,35	264,71	344,12	300,98	758,82	355,88	259,8	708,82	626,47
Relative Weight	9%	7%	9%	7%	7%	7%	4%	5%	5%	11%	5%	4%	11%	9%

The summarized evaluation results show that the construction specialists' requirements for the certification service are not fully met—the highest ratings, indicating compliance with these requirements to a greater extent in comparison with other certified construction specialists' requirements, are attributable to the professionalism of employees and the accuracy of the information in the certificate. If Latvian certification bodies are to ensure that their service performance complies with the construction specialists' requirements, they need to improve those service descriptors that are related to the availability of information, service quality, keeping within the time limit, preparation of the applicants prior to certification, timely provision of information on discrepancies and validity of the certificate, as well as reminder of the annual fee for the supervision of independent practice.

In Stage 5, service descriptors are given the necessary assessment values and they are evaluated to find out how they meet customer requirements, i.e. whether the descriptor value is insufficient and should be maximized (symbol ▲), or the descriptor value is too high and should be minimized (symbol ▼) or the descriptor value is consistent with the target (symbol ◇) (See Figure 3).

When the measurable values of service descriptors are compared with the customer requirements, it is observed that almost all the service descriptor values are insufficient and should be maximized—the only service descriptor values that correspond to the target are the employee qualification and cooperation with the stakeholders.

Figure 3. Evaluation of service descriptors.

Column #		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Direction of development		◇	▲	▲	▲	▲	▲	▲	▲	▲	▲	◇	▲	▲	▲
Customer Requirements	Functional Requirements	Employee qualification	Employee responsibilities and role allocation	Internal control system	Information management	Customer management	Document management	Organization of examination	Preparation of applicants	Organization of supervision	Resource management	Cooperation	Organization of application procedure	Quality management	Planning

Figure 4. Mutual comparison of the service descriptors.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		◇	▲	▲	▲	▲	▲	▲	▲	▲	▲	◇	▲	▲	▲		
Customer Requirements	Functional Requirements	Employee qualification	Employee responsibilities and role allocation	Internal control system	Information management	Customer management	Document management	Organization of examination	Preparation of applicants	Organization of supervision	Resource management	Cooperation	Organization of application procedure	Quality management	Planning		

In order to find out whether or not improvement of certification service of LEEA SpecSC is possible, in Stage 8 the authors compared the service descriptors (Stage 3) and the value descriptors (Step 5) in pairs, thus determining their mutual influence; here “-” means a negative correlation, “+” means a positive correlation, but “0” means no correlation (0 is not shown) (see Figure 4).

Upon evaluation of the impact of service descriptors on each other, it is observed that their interaction is positive; therefore, it is possible to improve certification services without impairing other service descriptors.

With the help of the QFD method, the authors have identified those construction specialists' needs related to the certification process, whose performance is currently assessed as mediocre. In the certification process, it is necessary to improve all the service descriptors except employee qualification and cooperation with stakeholders, which are currently characterized as compliant with the customer requirements. This is evidenced by the construction specialists' survey results collected by the authors, revealing that a large part of the requirements are not satisfied in the certification service process, in particular, the requirements relating to the preparation of the applicants before the competence assessment. In order to improve the certification services according to the customer requirements, it is necessary to carry out an in-depth analysis of the resources allocated for the implementation of the certification service and quality management; and the improvement action plan should include actions related not only to timely planning of the resources and activities necessary for the certification services, but also to the control and monitoring of all the above-mentioned actions. However, certification should not be perceived only as a control mechanism—it is a socially responsible and sustainable process that does not end with obtaining the certificate but continues focusing on the professional competence development of the certified person, as indicated by the certified construction specialists' expectations regarding their professional development and supervision of the independent practice.

5. Conclusions

Certification of energy constructors is not only a way of confirming their professional competence, but also one of the most important qualification control mechanisms in the regulated sphere where the person has no rights to pursue their professional activities without an adequate proof of their competence. Certification also plays an important role in ensuring public and work safety in order to prevent circumstances in which untrained personnel's performance because of their professional incompetence or non-compliance to professional requirements may result in harm to the environment and public safety. Bodies operating certification of energy constructors should evaluate not only the knowledge of the persons to be certified and their professional experience in the particular sphere, but also their ability to apply the acquired knowledge and skills in situations related to their professional activities, i.e. their competence. If certification of persons has become a part of the institutional value system, then the benefits will be applicable not only to the employee's individual performance, but also to the overall performance of the institution. Whereas if certification of persons is seen as a formal procedure and its implementation is simplified, then the benefits it provides will be limited and will not serve as the indicator of the institution's employee professional competence and efficiency.

For the construction specialists', professional competence to be assessed in accordance with the requirements laid down in the professional field in Latvia, at the same time providing the availability and acknowledgement of the service in accordance with the EU Directive No. 2006/123/EC, it is necessary to make amendments in the normative acts, thus increasing the safety of the Latvian energy construction market. This is evidenced by the survey results, where certified construction specialists point out that in the certification process the applicant does not have access to all the necessary information to prepare for the competence assessment, thereby confirming that in Latvia certification process there exist some challenges to be solved to ensure the professional competence of persons to be certified with the requirements laid down in the particular industry. Similarly, certificates of electric energy and energy construction specialists should not be universal (electrical equipment construction management, electrical equipment construction supervision and electrical equipment design)—each of them should indicate the certification directions.

The summarized results of the evaluation show that the construction specialists' requirements for the certification service performance are not fully met. Certification bodies should avoid a situation

when certification is perceived solely as a control mechanism. Certification of energy constructors is a socially responsible and sustainable process that does not end with obtaining the certificate but continues by focusing on the certified person's professional competence development.

Acknowledgements

The research and paper development were supported by the National Research Programme 5.2. "Economic Transformation, smart growth, governance and legal framework for the state and society for sustainable development—a new approach to the creation of a sustainable learning community—EKOSOC-LV".

Funding

The authors received no direct funding for this research.

Author details

Maija Kavosa¹

E-mail: sc@bleea.lv

Inga Lapiņa²

E-mail: inga.lapina@rtu.lv

Kārlis Briņķis³

E-mail: info@bleea.lv

¹ Latvian Association of Power Engineers and Energy Constructors, Specialized Certification Centre, Šmerļa iela 1, Rīga LV-1006, Latvia.

² Faculty of Engineering Economics and Management, Institute for Quality Engineering, Riga Technical University, Kalnciema iela 6, Rīga LV-1048, Latvia.

³ Latvian Association of Power Engineers and Energy Constructors, Šmerļa iela 1, Rīga LV-1006, Latvia.

Citation information

Cite this article as: Certification of Persons: Empirical study in the field of energy construction in Latvia, Maija Kavosa, Inga Lapiņa & Kārlis Briņķis, *Cogent Business & Management* (2017), 4: 1334407.

References

- Asif, M., de Bruijn, E. J., Fisscher, O. A. M., Searcy, C., & Steenhuis, H. (2009). Process embedded design of integrated management systems. *International Journal of Quality & Reliability Management*, 26, 261–282. <https://doi.org/10.1108/02656710910936735>
- Auriol, E. (2015). Quality signaling through certification in developing countries. *Journal of Development Economics*, 116, 105–121. <https://doi.org/10.1016/j.jdeveco.2015.03.007>
- Babakri, K. A., Bennett, R. A., Rao, Subba, & Franchetti, M. (2004). Recycling performance of firms before and after adoption of the ISO 14001 standard. *Journal of Cleaner Production*, 12, 633–637. [https://doi.org/10.1016/S0959-6526\(03\)00118-5](https://doi.org/10.1016/S0959-6526(03)00118-5)
- Bell, M. L., Teixeira-Pinto, A., McKenzie, J. E., & Olivier, J. (2014). A myriad of methods: Calculated sample size for two proportions was dependent on the choice of sample size formula and software. *Journal of Clinical Epidemiology*, 67, 601–605.
- Briņķis, K. (2014). Kāpēc enerģētiķiem svarīgi būt par LEEA biedriem? *Enerģija un Pasaule*, 1, 38–41.
- Briņķis, K., & Straume, I. (2015). Par izmaiņām personāla sertifikācijā elektroenerģētikas jomā. *Enerģija un Pasaule*, 3, 26–29.
- Büyükközan, G., & Çifçi, G. (2012). A new incomplete preference relations based approach to quality function deployment. *Information Sciences*, 206, 30–41. <https://doi.org/10.1016/j.ins.2012.04.010>
- Cohen, D. J. (2012). Identifying the value of HR certification: Clarification and more complex models required. *Human Resource Management Review*, 22, 258–265. <https://doi.org/10.1016/j.hrmr.2012.06.013>
- DeNisi, A. S. (2012). Certification response. *Human Resource Management Review*, 22, 266–268. <https://doi.org/10.1016/j.hrmr.2012.03.003>
- Dimov, Y. V. (2010). *Metrologija, standartizacija i sertifikacija: uchebnik dlja vuzov* [Metrology, standardization and certification: The textbook for higher education institutions]. St. Petersburg: Piter.
- Farinha, J. M. T., Galar, D., Adelino Fonseca, I. A., & Kumar, U. (2013). Certification of maintenance providers: A competitive advantage. *Journal of Quality in Maintenance Engineering*, 19, 144–156. <https://doi.org/10.1108/13552511311315959>
- Ferreira Rebelo, M. F., Santos, G., & Silva, R. (2014). A generic model for integration of quality, environment and safety management systems. *The TQM Journal*, 26, 143–159. <https://doi.org/10.1108/TQM-08-2012-0055>
- Franceschini, F., Galetto, M., Maisano, D., & Mastrogiacomo, L. (2011). A proposal of a new paradigm for national quality certification systems. *International Journal of Quality & Reliability Management*, 28, 364–382. <https://doi.org/10.1108/02656711111121799>
- Frolova, I., & Lapiņa, I. (2015). Integration of CSR principles in quality management. Emerald. *International Journal of Quality & Reliability Management*, 7, 260–273.
- Garza, A. S. (2012). Exploring the link between organizational values and human resource certification. *Human Resource Management Review*, 22, 271–278. <https://doi.org/10.1016/j.hrmr.2012.06.011>
- Guerrero, D. A. M. (2012). Learning model and competences certification in the Project management scope: An empirical application in a sustainable development context. *Procedia: Social and Behavioral Sciences*, 46, 1297–1305.
- Heras-Saizarbitoria, I., Boiral, O., & Arana, G. (2016). Renewing environmental certification in times of crisis. *Journal of Cleaner Production*, 115, 214–223. <https://doi.org/10.1016/j.jclepro.2015.09.043>
- Information System for Constructors. (2016). Retrieved May 2, 2016, from <https://bis.gov.lv/bisp/statistika/buvspecialistu-registrs>
- Kells, J. F. (2015). The changing landscape of human resource management certification: An interview with Dr. Amy Dufrane, Ed.D., SPHR, CAE, CEO, Human Resource Certification Institute (HRCI). *Business Horizons*, 58, 257–260. <https://doi.org/10.1016/j.bushor.2015.01.009>
- Khan, Z. (2006). Cleaner production: An economical option for ISO certification in developing countries. *Journal of Cleaner Production*, 16, 22–27.
- Kim, D., & Hwang, Y. (2014). Self-certification framework for technological innovation: A case study. *International Journal of Quality & Reliability Management*, 31, 751–763. <https://doi.org/10.1108/IJQRM-10-2012-0139>
- Klute-Wenig, S., & Refflinghaus, R. (2015). Integrating sustainability aspects into an integrated management system. *The TQM Journal*, 27, 303–315. <https://doi.org/10.1108/TQM-12-2013-0128>
- Lapiņa, I., Caune, J., Gaile-Sarkane, E., Borkus, I., & Ozoliņš, M. (2015). Development of managers competence model in dynamic environment. In *Proceedings of the 19th World Multi-Conference on Systemics, Cybernetics and Informatics (WMSCI 2015)* (Vol. 2, pp. 219–224).
- Latham, G. (2012). What we know and what we would like to know about human resource management certification. *Human Resource Management Review*, 22, 269–270. <https://doi.org/10.1016/j.hrmr.2012.06.012>
- Lengnick-Hall, M. L. (2012). What is the value of human resource certification? A multi-level framework for research. *Human Resource Management Review*, 22, 246–257. <https://doi.org/10.1016/j.hrmr.2011.03.001>

- Liepiņa, R., Lapiņa, I., & Mazais, J. (2013). Improvement of conformity assessment system: Technical harmonization adjustment. In *Proceedings of the 17th World Multi-Conference on Systemics, Cybernetics and Informatics (WMSCI 2013)* (Vol. 2, pp. 37–42).
- Liinamaa, J., & Gustafsson, M. (2010). Integrating the customer as part of systems integration. *International Journal of Quality & Reliability Management*, 3, 197–215.
- Maletic, M., Maletic, D., Dahlgaard, J. J., Dahlgaard-Park, S. M., & Gomišček, B. (2015). Do corporate sustainability practices enhance organizational economic performance? *International Journal of Quality and Service Sciences*, 7, 184–200.
<https://doi.org/10.1108/IJQSS-02-2015-0025>
- Mežinska, I., Lapiņa, I., & Mazais, J. (2015). Integrated management systems towards sustainable and socially responsible organisation. *Total Quality Management & Business Excellence*, 26, 469–481.
<https://doi.org/10.1080/14783363.2013.835899>
- Pagell, M. (2010). An examination of strategies employed for the integration of management systems. *The TQM Journal*, 22, 648–669.
- Powell, M. (2014). Energy workforce: Certification—Do you get what you pay for??? *PennEnergy*, 14, 25–27.
- Santos, G., Mendes, F., & Barbosa, J. (2011). Certification and integration of management systems: The experience of Portuguese small and medium enterprises. *Journal of Cleaner Production*, 19, 1965–1974.
<https://doi.org/10.1016/j.jclepro.2011.06.017>
- Stamure, I., Kamola, L., & Geipele, I. (2015). Practical aspects of sustainable construction in Latvia. In *5th International Conference on Industrial Engineering and Operations Management* (pp. 2041–2048).
- Sularto, L., & Yunitasari, W. T. (2015). User requirements analysis for restaurant POS and accounting application using quality function deployment. *Procedia: Social and Behavioral Sciences*, 169, 266–280.
- The Law of the Republic of Latvia. (1996). “On Conformity Assessment”. In *Latvian: LR likums “Par atbilstības novērtēšanu”*. Retrieved April 29, 2016, from <http://likumi.lv/doc.php?id=63836>
- Uhlir, Z. (2013). The effect of the Project manager certification process on the development of Project management—A Croatian perspective. *Procedia: Social and Behavioral Sciences*, 74, 223–232.
- Wagner, M. (2015). A European perspective on country moderation effects: Environmental management systems and sustainability-related human resource benefits. *Journal of World Business*, 50, 379–388.
<https://doi.org/10.1016/j.jwb.2014.08.005>
- Wyrostek, W. E. (2001). A case for certification. *CCIE Resource Library*, 2, 1–4.
- Yik, F. W. H., Lai, J. H. K., Lee, W. L., & Chan, K. T. (2012). A Delphi study on building services engineers’ core competence and statutory role in Hong Kong. *Journal of Facilities Management*, 10, 26–44.
<https://doi.org/10.1108/14725961211200388>



© 2017 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

You are free to:

Share — copy and redistribute the material in any medium or format
 Adapt — remix, transform, and build upon the material for any purpose, even commercially.
 The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.
 You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
 No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.



Cogent Business & Management (ISSN: 2331-1975) is published by Cogent OA, part of Taylor & Francis Group.

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com

