

Association between Quality Management and Financial Performance

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Abstract: *This paper deals with quality management using ISO 9001 certificate and other similar certificates and with Costs of Quality. Numerous studies claim that quality management increases a company's performance, mainly measured by operational indicators. The paper aims to find out if there is also a relationship between implementing these tools in a company and higher financial results. An analysis was carried out on a sample of 548 medium-sized and large companies based in the Czech Republic, by way of an extensive questionnaire survey. Financial performance was measured by means of the return on assets indicator between the years 2005-2011. The findings proved that ISO 9001 and other certificates are quite widespread. Costs of Quality, however, are of little interest to companies. Better financial performance in companies which aim at quality management has not been confirmed.*

Key words: Financial Performance · ISO 9001 · Costs of Quality · Quality Management

JEL Classification: M21

1 Introduction and literature review

Literature has long been discussing the need of quality management that would help companies to maintain their positions in a fairly competitive market. Therefore many companies, in an effort to increase their competitiveness, invest in enhancing the quality of their products and implement quality management tools.

This paper summarizes findings of the survey concerning quality management and cost of quality management. The aim of the research is to learn about the scope of quality management and cost of quality in the Czech Republic and to find out if quality management leads to a company's better financial performance.

The quality can be defined in different ways, e.g. fitness for use, conformance to specifications, meeting customer expectations, totality of features and characteristics of a product or service that satisfies customer expectations (Tatikonda & Tatikonda, 1996). One of the examined tools for quality enhancement is a widespread ČSN EN ISO 9001 standard, which deals with the quality management system in companies. The idea behind the standard is that product quality can be secured by quality production processes. The certificate itself does not guarantee a product's quality; it only guarantees that quality processes were performed in a company and certified by documents. Besides the ISO 9001, there are a lot of other certificates confirming achievement of a quality standard in a particular company's activity (ecological behaviour, safety, tested laboratory, etc.). Dick et al. (2008) explain the expected links between certified quality management system and a business performance as follows: to meet the ISO 9001 standards, company is forced to increase an emphasis on internal and external quality dimensions. It leads to less wasting and improving in services and products quality received by customers. Less waste reduce costs, better perceived quality less

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customer attrition and opens sales opportunities. Cost reduction, profitability benefits from scale economies and increased sales volume lead to the increased financial performance.

Whichever serious attempt to improve quality must consider the costs point of view. Quality objectives must not only meet customer requirements, but also to do it at the lowest cost. The final aim for any organization, regardless its mediation by a customer satisfaction or quality outcomes is a financial performance (Al-Refaie et al., 2012). This can happen by reducing the costs needed to achieve quality, and the reduction of these costs is only possible if they are identified and measured. Therefore, measuring and reporting the cost of quality should be considered as an important issue for managers (Schiffauerova & Thomson, 2006).

Another tool under investigation is therefore Cost of Quality (CoQ) management, which evaluates a company's prevention costs and appraisal costs. Rarely do companies have a realistic notion of how much quality costs and what loss is incurred by poor quality (Schiffauerova & Thomson, 2006). The traditional Feigenbaum P-A-F model investigates costs connected with prevention costs, appraisal costs, internal failure costs and external failure costs. Bottorff (1997) claims that quality costs represent about 20-35% of revenues. Maze-Emery (2009) agrees with experienced managers saying that the highest costs are costs of external defects – dealing with rejects, defects and warranty claims. These activities are non-value added components to a business. It turns out that the old phrase "an ounce of prevention is worth a pound of cure" is still valid.

Assuming that customers prefer quality and are willing to pay more to get it, it should hold true that companies striving for quality have better financial performance compared to those companies which do not aim at quality. However, for a long time, there was no general agreement regarding the effects of the ISO 9001 on the company performance. Larson & Kerr's study (2002) discovered a positive impact of the ISO 9001 on a financial performance in Canadian service companies. Similar results have been later achieved by Corbett, Montes-Sancho, & Kirsch (2005). Other studies investigating the effects of the ISO 9001 on a performance have shown mixed results. Dick et al. (2008) compared results of 26 research studies published between the 1997 and 2006. Better financial performance of companies with a quality certificate was observed in less than one half of the studies. Martínez-Costa et al. (2008) suggested that the explanatory variable should be motivation – many companies apply quality management tools for external reasons like a pressure from the customers or as a marketing tool. They found that a financial performance of companies, which were internally motivated to quality management initiatives, was much higher than a financial performance of externally motivated companies. For the purpose of comparing results with other studies, Dow et al. (1999) presented a list of 44 different quality practices measured by various authors. Individual studies used from 1 to 12 measures. Although the concept of quality thus seems to be multi-dimensional, Dow et al. discovered that firms that adopt one quality management technique are likely to employ other techniques.

All above mentioned researchers claim a theoretical possibility of a significant decrease in costs and, consequently, a rise in financial performance due to managing quality costs. Similar studies looked for this association have been made in several countries. This paper aims to find out if these results can also be empirically confirmed in the Czech Republic. Concretely, the aim of this paper is to find out if implementation of certified quality standards and using of Costs of Quality system is associated with higher company financial performance. Another aim is to map the spread of quality management certificates and Cost of Quality system among companies in the Czech Republic.

2 Material and methods

The survey aimed at getting a complete picture of quality management in Czech companies. The basic survey sample was consisting of Czech commercial subjects – companies, based on their

activities, falling into sections A – N and P – R according to the CZ-NACE classification, based in the Czech Republic. The authors of the survey addressed joint-stock companies, limited companies, limited partnerships, public companies, cooperatives, and spins-offs. The survey looked at medium-sized and large companies, i.e. companies with 50 and more employees. A list of basic identification data and financial data was taken from the national corporate database CreditInfo of AlbertinaData, Ltd.

The questionnaires were delivered to 6 363 companies and 548 companies filled in the questionnaire and sent it back, thus making the sample set with the response rate of 8.61%.

Most responses in the sample set came from the manufacturing industry (292 companies). While the percentage of responses from the manufacturing industry was higher than in the basic set (53% vs. 40%), the return rate in wholesale and retail was lower than in the basic set (7% vs. 15%). In other industries the difference was unimportant given the total number of companies in these sections. In principle, a legal form of companies from the sample set tally with the basic set, although the proportion of joint stock companies is higher than that of limited companies (sample set: joint stock 39%, Ltd. 55% vs. basic set: joint stock 30%, Ltd 64%). The size of companies that filled in the questionnaire slightly differs from the basic set by a lower percentage of companies with fewer staff. In other words, larger companies were more likely to complete the surveys. The mean value of companies' financial performance did not differ between the sample and basic sets. A probability distribution in both sets can be considered to be normal and it is the same in both sets.

Although there are some differences between both sets, given the way the companies were selected and high absolute number of responses, the responses can be regarded as a relatively representative sample whose findings can be generalized to the examined population.

The data was collected in the summer 2013 via an electronic questionnaire on a website. The questionnaire was supposed to be filled in by the Head of Economic, Financial or Controlling departments.

In order to measure a performance, one of the most common traditional proportion indicators of a financial performance based on accounting data was chosen. A financial performance is type of a performance most often measured in scientific studies (Hult et al. 2008). In this survey, the advantages of using a financial performance indicator prevailed over the disadvantages which we tried to reduce. The decision was also supported by findings of Allouche & Laroche survey (2005), who found a considerably stronger relation between values of indicators based on accounting data and factors of competitiveness than other kinds of indicators (market or competitive indicators).

It was decided to use only one indicator in order to measure performance. The benefit of using more indicators was considered. Such approach, however, brings a problem of how to combine two or more indicators so that a performance can be expressed by a single piece of information which is easy to interpret. Other scientists face the same dilemma – about one half of 213 surveys measuring (among others) a performance and published in prominent economic journals only used one indicator to measure performance (Richard et al. 2009).

Financial performance of companies was measured using a traditional indicator the return on assets (ROA). The same and only indicator was used also in similar studies (e.g. Corbett, Montes-Sancho & Kirsch (2005), Wayhan et al. (2002)). The ROA indicator was calculated for each company over a relatively long period of 7 successive years (2005-2011). In order to evaluate the obtained data, it was necessary to deal with the different financial performance depending on an industry and also with a different economic development of an industry in time. That is why the data was standardized using the Z-score individually per year and per industry. The total company's financial

performance over the period of seven years was calculated as the arithmetic mean of seven standardized ROA values.

The data obtained from questionnaires and CreditInfo database was evaluated primarily by statistical methods. The basic and sample sets were described by univariate data analysis. The statistical significance of differences between groups was tested using standard statistical tests, mainly t-test, analysis of variance, a set of 4 non-parametric tests was used: the Median test, the Mann-Whitney U Test, the Kolmogorov-Smirnov test and the Kruskal-Wallis test. The next step of the statistical evaluation was a bivariate analysis. The procedure of contingency tables was applied, capturing the different occurrence of the phenomena monitored between the two groups of companies. They were, in suitable cases, complemented by a chi-square test of independence. In order to measure the power of an association between variables, values of coefficient phi, Cramér's V, Kendall's tau b or c, and coefficient eta were calculated. The correlation method with Kendall's tau coefficient was used as a supplementary method for finding out connections to the companies' financial performance. In order to determine a direction of a causal relationship between two variables, the author used the Lambda coefficient and Goodman and Kruskal's tau in nominal variables, and Somers' D in ordinal variables. Values of these coefficients are not included in the text for the sake of clarity, but they can be retrieved from the author. The power of association and correlation of two variables has been interpreted according to De Vaus' classification (for more see Mareš & Rabušic, 2003).

Unless stated otherwise in the text, the level of statistical significance was set as $\alpha = 0.10$ given the nature of the problem examined. In similar survey authors usually opt for the level of significance at $\alpha = 0.05$, according to Blahus (2000), however, there is no reason to require such a low risk level.

The analyses which examined companies from various CZ-NACE sections did not cover section B – mining and quarrying, I – accommodation, catering and taverns, P – education and R – cultural, amusement and recreational activities, because the number of responses from these lines of business ranged from 0 to 3, which would considerably distort results of the this industries. The companies were, nevertheless, included in the evaluation of the whole sample set.

3 Results

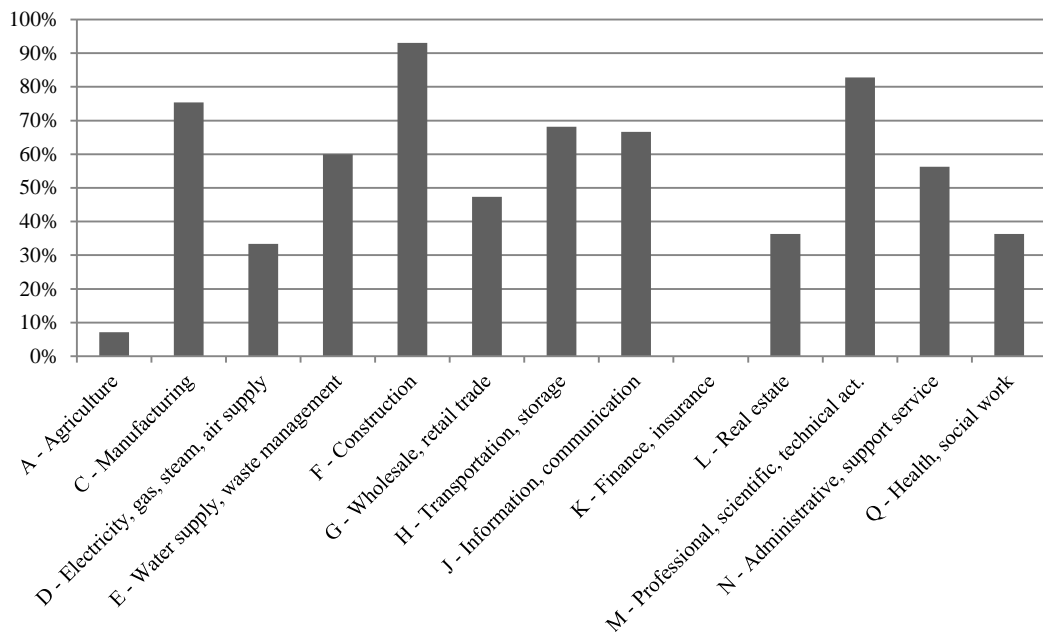
One of the indicators of quality management in a company was whether or not the company has implemented the ČSN EN ISO 9001 standard. Of all the 548 companies in the sample set, 361 has adopted the ISO 9001, i.e. 66%, the other 187 have not. The extent of the adoption, however, is not the same in all sectors and industries: 74% of industrial companies have adopted the ISO 9001 certificate, against 63% of companies in the service sector. On the other hand, only 7% agricultural companies have adopted the certificate. The difference is statistically significant; the rate of association is medium. Figure 1 shows more subtle differentiation, per sections of the national economy.

The survey closely examined medium-sized and large companies employing 50 and more staff. In the majority of size groups the rate of adoption ranged between 62% and 69%. Higher rate of 79% was ascertained in companies with 1 000 and more employees. The association between the size of a company and the adoption rate of the ISO 9001 standard was not found as statistically significant for this sample.

As far as the legal form is concerned, only joint-stock companies, limited companies and cooperatives were analysed. Other legal forms were represented only minimally. Joint-stock companies and limited companies showed the similar adoption rate of the ISO 9001 standard: 67%, respectively 70%. On the contrary, only 24% of cooperatives have adopted the certificate. The survey also

checked whether or not lower rate of adoption in cooperatives was due to the fact that cooperatives are usually agricultural companies. The speculation was not confirmed because cooperative from other industries showed a similarly low adoption rate. The low relationship between the ISO 9001 adoption rate and the legal form of a company was found to be statistically significant.

Figure 1 The adoption rate of the ISO 9001 per the CZ-NACE sections²



Source: Based on survey of 548 enterprises in the Czech Republic

The majority of companies in the sample set were owned by Czech owners. The country of origin of the majority owner does not play any role in adopting the ISO 9001. The rate of adoption in German-owned companies is similar to that in Czech-owned companies. The adoption of the ISO 9001 was not evaluated in companies whose owners come from other countries due to their low number in the sample set.

The important part of the survey was the hypothesis about the difference between the financial performance of companies which have the ISO 9001 certificates and companies which do not. The 7-year-average median of the standardized ROA was 0.04 in companies with certificates and 0.02 in companies without certificates. Neither T-test nor median test found any statistically significant difference between mean values of both sets. The probability distribution of both sets was the same, according to the results of all three tests used.

Besides the ISO 9001 adoption, the ownership of other certificates was also surveyed. The most often stated (174) was the ISO 14001 certificate concerning the environment protection. This certificate was listed twice as often as any other certificate. It must be pointed out, however, that the ISO 14001 was explicitly stated in the question as an example of another certificate, which could have distorted the ratio in its favour. Other stated certificates were the security certificates OHSAS 18001 and ILO (86), other certificates concerned quality management for specific industries (51), food

² Section B – mining and quarrying is not shown because no such a company took part in the survey.

wholesomeness and safety certificates (27), information security systems (19), welding certificates (19), customer certificates (14), product certificates (12), etc.

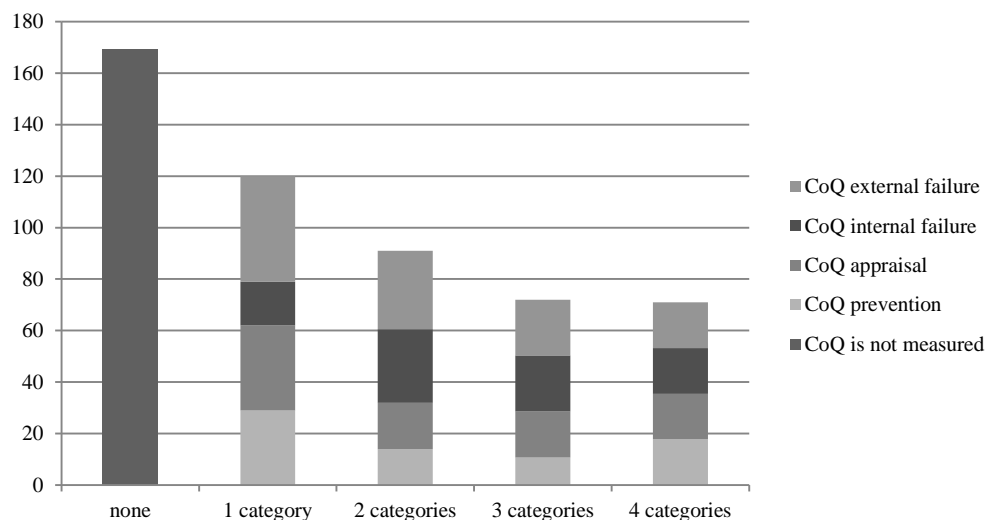
Most companies (306) stated the ownership of a certificate (including the ISO 9001) as opposed to 242 companies, which did not have any certificate. The most common number of certificates was from 1 to 3. When not taking the ISO 9001 into account, 257 companies stated ownership of another certificate. It was found out that companies, which adopted the ISO 9001 certificate, are more likely to have adopted other certificates. This relationship is statistically significant, the association rate is medium.

Moreover, a strong association between industries and the number of adopted certificates has been found as statistically significant. Most certificates are owned by companies from the section F – the building industry (on average 2.42 certificates per company), followed, by a huge margin, by the section E – water supply (on average 1.67 certificates), the section C – processing industry (1.65), and the section M – professional, scientific and technical activities (1.62). On the contrary, the fewest certificates were stated by companies from the following sections: K - banking (0.29), A - agriculture (0.32), L – real estate activities (0.64).

The number of certificates is closely related to the size of a company; larger companies own more other certificates. However, no statistically significant relationship has been found between the number of certificates and a legal form. Neither has such relationship been found between the financial performance of companies which have certificates and companies which do not.

Another examined concept was managing the Cost of Quality, expressed by Feigenbaum's P-A-F model, which divides quality costs into 4 categories – prevention costs, appraisal costs, internal failure costs and external failure costs. More than 50% of companies survey some quality costs, but often not all four areas (see figure 2). 169 companies do not follow any cost of quality. Of those that do, most survey external failure costs and fewest survey prevention costs.

Figure 2 The spread of quality costs measurement. The share of surveyed areas is marked in grayscale.



Source: Based on survey of 548 enterprises in the Czech Republic

Costs of quality are measured the most in companies from the manufacturing industry, banking and insurance. The most companies, which measure all four areas are from these industries.

A company's size influences the number of areas in which quality costs were examined in the company. Larger companies tend to monitor more areas of quality costs. According to the values of the monitored coefficients, the tightness of the association is medium. Legal form does not have an impact on the measurement of costs of quality.

It may be said that there is a connection between adopting the ISO 9001 certification and watching quality costs. The relationship is medium-strength and applies to all areas monitored as well as to each individual area. At least one area of quality costs is monitored by 75% of companies which have adopted the ISO 9001 as opposed to only 51% of companies which have not adopted the ISO 9001 certificate. Similar findings were confirmed by the relationship between cost of quality and implementation of other certificates.

The financial performance of companies, which do not survey at least one of 4 areas of cost of quality, does not differ from that of those companies, which do not measure the cost of quality. The standardized seven-year ROA median is 0.03 in companies, which measure cost of quality, and 0.04 in companies which do not. Such a difference is not statistically significant. Neither was a significant difference found between companies in specific areas of monitoring quality costs, except for costs of control where the t-test indicated a statistically significant difference between medium values. Other tests, however, did not confirm the findings.

4 Discussion

In this research, two aspects of quality management were examined. They were, above all, certificates confirming implementation of procedures, which were designed with a view to improving the quality generated by a company.

The findings confirmed that the ISO 9001 was the most widespread certificate – it has been adopted by two thirds of companies from the set examined. This result coincides with the results of Blažek et al. (2009), who studied medium-sized and large enterprises in the Czech Republic.

As the certification requires a lot of retrospectively retrievable information on all components of company's products, company, which does not follow such information (i.e. does not have the ISO 9001), can hardly supply its products to a company which has the certification. On the other hand, high spread of it devalues its competitive advantage.

The more the certification is widespread, the bigger the pressure is on those companies, which have not adopted it yet. It is especially noticeable in the building industry where almost every company has adopted the ISO 9001 certificate. It can be explained by high competitiveness and a fairly high share of the public sector, one of whose conditions for granting a public contract is adoption of the ISO 9001. The situation in agriculture is quite the opposite as agricultural companies do not face such demand from customers. The reason why almost no banking or insurance company has adopted the certificate is that their products are supervised and inspected by the central bank and, therefore, neither their credibility nor quality requires any certification.

Further findings concerned the fact that cooperatives showed only approximately one third of the ISO 9001 in contrast to stock corporations. It is not only due to their status of agricultural companies, because most other cooperatives have not adopted the ISO 9001 either. A probable reason is a different purpose of cooperatives (from that of stock corporations) because cooperatives follow interests of their members, who are predominantly physical persons and who do not put much emphasis on supplier's certifications.

As the ISO 9001 is an international standard, no difference was found in terms of whether the owner of a company is Czech or foreign subject.

Another important surveyed aspect connecting quality and competitiveness was measuring Cost of Quality (and quality failure) in companies. If a company is able to quantify how much areas related to quality managements cost, it can focus on the most problematic issues and, by means of adopted measures, reduce both non-quality and cost of non-quality, which usually considerably exceed costs of ensuring high quality.

Although there are huge differences between industries, companies in the set do not usually measure quality costs or only follow one of four areas of quality costs. The most often surveyed costs are external failure costs (complaints, etc.), the least surveyed are prevention costs, although experts agree that the most cost-effective category for quality spending is prevention. An explanation was offered by Gupta & Campbell (1995), who suggested that prevention programs are, by contrast to the relatively simple methodology of inspection, more difficult to implement and the results of a prevention program cannot be easily measured, are not usually immediate and may not be readily apparent. On the other hand, managers on the operative and medium level are evaluated according to their immediate results. They are pressed to demonstrate a positive effect of their management actions. This may lead to concentration on short-term solutions.

A company's size proved to be a factor strongly influencing implementation of various quality management tools of a company. Larger companies tend to adopt various certificates more often and they also measure quality costs more often and in greater detail. The reason is that large companies are more aware of the need to systemize corporate processes than smaller companies. They also usually have the capital to implement specific tools.

Tests surveying the connection between quality management (adoption of the ISO 9001 and other certificates, monitoring quality costs) confirmed their considerable interdependence as suggested by Dow et al. (1999). The findings lead to the conclusion that companies, which aim to manage quality, usually do so in more areas. In simple terms, companies can be divided into two groups: 1) companies which strive to manage quality as well as increase it in many ways 2) companies which do not care about quality management.

The second rather surprising finding is that quality management, represented here by quality certificates and Cost of Quality system, is not associated with higher financial performance in comparison with companies which do not manage quality. Possible explanations may lie in the prevailing external motivation to implementation as suggested by Martínez-Costa et al. (2008). Another explanation is that certification and measuring quality costs do not increase the quality as it is perceived by customers. An inflation of certificates devalued its value and a certificate ownership no longer guarantees premium quality of the product/service.

5 Conclusions

The aim of this paper was to find out the extent of quality management certificates and Costs of Quality system among companies in the Czech Republic and to ascertain if using of these quality management tools is associated with better financial performance of companies. Here are presented the main conclusions.

Typical and widespread certificate in the area of quality management is a quality management certificate according to the ISO 9001 standard. Besides, companies were found to have other certificates concerning mainly the environment, quality and security. Certificates are a way of convincing customers of the product quality and differentiate the company from its competitors. However, due to the fact that the ISO 9001 is owned by two thirds of the companies and in some sectors even more, gained competitive advantage is highly debatable.

Despite the pressure on the quality and although the need for productivity growth and cost reduction are ones of the most studied topics in the last decade, the most companies in the Czech Republic do not pay sufficient attention to measurement and management of costs caused by poor quality.

Observed interdependence in using various quality management tools leads to the conclusions that, at a certain degree of simplification, there are two groups of companies: companies which strive to manage quality as well as increase it in many ways, and companies which do not care about quality management.

Although it was assumed that the use of quality management tools is associated with higher financial performance, results did not show this relationship. Part of possible explanation may lie in the fact that due to the prevalence of the quality certificate, its competitive advantage has been eliminated. The findings present a challenge for another survey.

Suitable subjects of further research may be: 1) more detailed analysis - searching for other contexts in reached conclusions, e.g. in the absence of dependencies between higher financial performance and quality management in the enterprise, 2) inclusion of other quality management tools and their mutual influence on company financial performance, 3) the perception of quality from the customers' perspective.

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References

- Allouche, J., & Laroche, P. (2005). A Meta-Analytical Investigation of the Relationship Between Corporate Social and Financial Performance. *Revue de Gestion des Ressources Humaines* 57, 18 – 41.
- Al-Refaie, A. et al. (2012). Effects of ISO 9001 Certification and KAAE on Performnace of Jordanian Firms. *Jordan Journal of Mechanical and Industrial Engineering*, 6(1), 45-53.
- Blahuš, P. (2000). Statistická významnost proti vědecké průkaznosti výsledků výzkumu. *Česká kinantropologie*, 4(2), 53-72.
- Blažek, L. et al. (2009). *Konkurenční schopnost podniků: Analýza faktorů hospodářské úspěšnosti. Druhá etapa*. Brno: Masarykova univerzita.
- Bottorff, D.L. (1997). COQ Systems: The Right Stuff. *Quality progress*, 30(3), 33-35.
- Corbett, C.J., Montes-Sancho, M.J., & Kirsch, D.A. (2005). The financial impact of ISO 9000 certification in the United States: An empirical analysis. *Management Science*, 51 (7), 1046-59.
- Dick, G.P.M. et al. (2008). Shedding light on causation between ISO 9001 and improved business performance. *International Journal of Operations and Production Management*, 28(7), 687-708.
- Dow, D., et al. (1999). Exploiting the myth: Do all quality management practices contribute to superior quality performance? *Production and Operations Management*, 8(1), 1-27.
- Gupta, M., & Campbell, V.S. (1995). The cost of quality. *Production and Inventory Management Journal*; 36(3), 43-49.
- Hult G.T.M. et al. (2008). An assessment of the measurement of performance in international business research. *Journal of International Business Studies* 39, 1064-1080.
- Larson, P.D., & Kerr, S.G. (2002). ISO and ABC: Complements or Competitors? *The international Journal of Logistic Management*, 13(2), 91-100.
- Mareš, P., & Rabušic, L. (2003). *Statistická analýza dat: soubor textů a příkladů do kursů SPC108 a SOC708*. Brno: Katedra sociologie FSS MU v Brně.
- Martínez-Costa, M. et al (2008). Simultaneous consideration of TQM and ISO 9000 on performance and motivation: An empirical study of Spanish companies. *International Journal of Production Economics* 113, 23-39.
- Maze-Emery, E. (2009). The true cost of quality. *Tooling & Production*, 75(5/6), 16-17

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- Richard, P.J. et al. (2009). Measuring organizational performance: towards methodological best practice. *Journal of Management*, (35)3, 718-804.
- Schiffauerova, A., & Thomson, V. (2006). A review of research on cost of quality model and best practices. *International Journal of Quality & Reliability Management*, 23(6), 647-669.
- Tatikonda, L.U., & Tatikonda, R.J. (1996). Measuring and reporting the cost of quality. *Production and Inventory management Journal*, 37(2), 1-7.
- Wayhan, V.B. et al. (2002). ISO 9000 certification: the financial performance implications. *Total Quality Management*, 13(2), 217-231.