

Correlation between QMS Characteristics and Financial Results of Organizations

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Abstract:

Research Question (RQ): Several authors' researches explore relationships between characteristics of quality management systems (QMS) and business results of organizations. Research on relationships between QMS practice and organizational business results may serve as bases for improving the theoretical approach to QMS as well as for improving operational quality management systems in organizations.

Purpose: In the article, we analyse the impact of QMS characteristics on organizational business, or which are impacts between individual QMS characteristics, or how the difference between required and actual QMS characteristics reflect on financial business results in Slovenian organizations.

Method: To answer the above mentioned questions, the research of QMS characteristics was conducted that based on surveying quality system managers and directors of Slovenian organizations that have certified QMS. In this framework, relationships between QMS characteristics and business results were explored, and between individual QMS characteristics elements.

Results: In the article, the most interesting findings of the correlations' research are presented. It is interesting that among all the ISO 9004:2009 quality management principles, in Slovenian organizations only some elements show positive correlation coefficient with organizational business results.

Organization: This research will contribute to improved understanding of individual QMS characteristics and their impact on organizational business results.

Society: This article explains relationships between QMS characteristics in organizations in Slovenian society. Knowing these relationships is of a great importance in improving QMS in Slovenian organizations and by this, in improving efficiency of QMS in individual organizations and the society as a whole.

Originality: The research presented is the first analysis of QMS characteristics based on the original model for analysing characteristics and impacts to QMS characteristics, and correlations between QMS characteristics and business results of Slovenian organizations.

Limitations / further research: The research was conducted between June 2014 and April 2015 in Slovenian business environment. It would be interesting to perform the research also in other social environments.

Keywords: quality management system, business performance, survey, ISO 9001, Slovenija.

1 Introduction

The aim of the study was to determine the characteristics of quality management systems (QMS) and the impact of these characteristics on the business performance of organizations which operate ISO 9001 certified quality management systems. The study, which included 126 Slovenian organizations, was performed as an online survey administered to quality managers of these organizations. The survey was compiled on the basis of the QMS-based data classification model.

The study tested a research hypothesis that a QMS which contains appropriate elements can help improve its organization's business results. According to the requirements of ISO 9001, all organizations certified to this standard should have a very high level of implementation of ISO 9004:2009 compliant quality management system principles.

If an organization claims to comply with all the requirements of ISO 9001, it can reasonably be expected to have in place a well-developed business process model. Business process modelling is part of the management system model which includes all processes within an organization. However, specific key leadership elements do not seem to have the desired effect on organizational effectiveness. The results of the study will form the basis on which the measures aimed at ensuring general improvements of the QMS and the measures that will improve the business performance of the organizations will be defined.

2 Theoretical framework

The introduction of the QMS in the past decades was followed by extensive research into the work of various authors. There is a marked difference between the opinions of the academic community regarding the effects of ISO 9000 on organizational effectiveness.

Terziovski, Samson and Dow (1997, p. 1-18) demonstrated that ISO 9000 certification has no impact on business performance. The motives for certification are largely external, i.e. the requirements or expectations of customers.

Terziovski, Power and Sohal (2003, p. 580-595) show that there is a significant and positive relationship between business performance and the manager's motives for adopting ISO 9000 certification. The principal motivation for the certification seems to come from customer pressure. Relevant advantages of ISO 9000 certification include certification motives and the level of maturity of the organization's quality culture. Godnič, B., and Vodopivec, R.(2017, p. 1-10) have done research of globalization and integration processes in Europe.

The competence of quality managers and their knowledge of the ISO 9000 standards has no effect on organizational effectiveness although it is the most influential factor for the development of the QMS Yeung, A.C.L., Lee, T.S., & Chan, L.Y., (2003, p. 545-569). Yeung, Lee and Chan believe that ineffective implementation of the ISO 9000 system may negatively affect the objectives and expectations of quality managers.

Martínez-Lorente and Martínez-Costa (2004, p. 260-276) discuss the existence of controversies between the execution of ISO 9001 requirements and the philosophy of TQM. The application of ISO 9001 can enhance effectiveness, but only if applied in combination with the TQM principles. According to the authors' findings, benefits normally carry little relevance. Martínez-Costa et al. (2009, p. 495-511) find that the organizations which operate in compliance with ISO 9001:2000 do not perform much better than the organizations that apply ISO 9001:1994, although the first group is expected to apply a higher level of TQM. The authors claim that the use of ISO 9000 standards does not necessarily guarantee quality and organizational effectiveness.

Heras-Saizarbitoria, Casadesus and Marimón (2011, p. 197-218) evaluate the impact of both the ISO 9001 standard and the EFQM model. The process model differs similarly, if the company developed it during the application of the process approach while implementing these initiatives. The authors believe that ISO 9001 might constitute a suitable approach to creating the organization's process development model. This is further evidenced by Sampaio, Saraiva and Rodrigues (2009, p. 1303-1320), who pointed out the importance of the fact that organizations worldwide were adopting the ISO 9000 certification process.

However, even a well-developed process model does not guarantee the application of the model in practice. The responsibility for making this decision rests with the managers. Management decisions aimed at enhancing quality, as well as continuous process improvement, are the most obvious advantages of certification Gotzamani, K., 2010, p. 687-704). Another important aspect is the translation of the process model into managerial practice. If the process model is sufficiently implemented in management practice, then it also benefits the ISO 9001 certified system Karapetrovic, S., Casadesus, M., Heras-Saizarbitoria, I. (2010, p. 245-267).

The effectiveness of the process model is dependent upon the manner in which it was created. Business process modelling has become a key ingredient of contemporary organizations mainly due to increasing organizational changes. The analysis of business process modelling was given by Recker, Rosemann, Indulska and Green, (2009, p. 333-363).

Many companies dedicate a lot of time and money to describing the processes and to the implementation of different programmes. However, the expected results are not achieved. This is because no process diagram or programme used to manage the projects has yet succeeded in

improving the internal organisation of a company. On the other hand, Závadský and Závadská, (20011, p. 319-337) believe that a good process model offers a lot of possibilities of application in managerial practice.

Martínez et. al. (2008, p. 23-39) and Nair and Prajogo (2009, p. 4545-4568) showed that the motivation for the implementation of the ISO 9000 system can be internal and/or external. The latter originates from the efforts to achieve the desired objective in the organization's perception which can potentially affect the business environment and the efficiency of internal organization. The benefits of using an ISO 9001-based QMS can be varied. The benefits of ISO 9001 based QMS, as well as the motivation for improvement, can be internal or external Terziovski, M., Power, D., Sohal, A. S., (2003, p. 580-595) and Chang, D.S., Lo, L.K. (2005, p. 57-69). In-company benefits include improvement of processes and/or quality of products or services, while external benefits include: improving customer relations, striving for better customer satisfaction, securing a higher market share. McAdam and McKeown (1999, p. 229-241) find that by applying the ISO 9001-based quality management system, organizations are able to establish better control and reduce quality issues and claims. Similarly, there are important correlations between internal and external organizational effectiveness and TQM Delić, M., Radlovački, V., Kamberović, R., Maksimović, R., Pečujlija, M. (2014, p. 367-382).

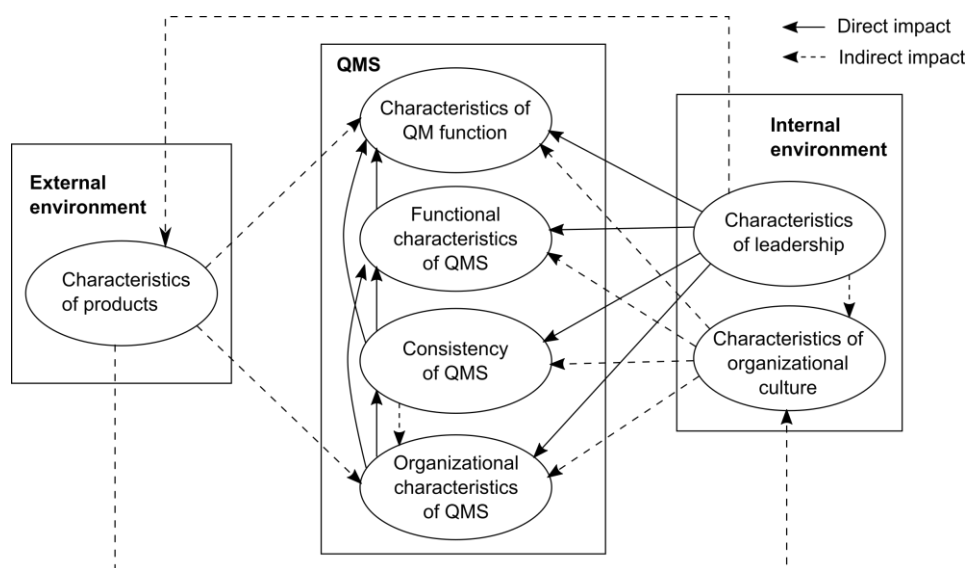


Figure 1. QMS characteristics classification model.

Most quality management studies conducted in Slovenia were not empirical. In her article, Alič (2014, p. 1-22) studies the relationship between the abolition of ISO 9001 certification and the business results of organizations during the economic crisis of 2009-2010. She established that the abolition of the ISO 9001 certificate is in significant correlation with a decrease in business performance, and that the decrease in business performance correlates with the time that has passed since the elimination of registration to ISO.

Pipan and Soković (2012, p.311-317) used the factorial analysis method to investigate the presence of TQM elements in Slovenian organizations. In their paper, Soković et al.(2009, p. 1-9) described the use of Six Sigma methods in improving quality in Slovenian organizations. Bogataj et. al. (2017, p. 78-89) conducted study about relationships between the characteristics of the quality management system and business results in Slovenian organizations.

3 Method

3.1 Implementation of the research

The data identification model was used to determine a model that analysed the relationships between various characteristics of the QMS (Figure 1). The model identifies the key groups of QMS characteristics and the relations between them. The key groups of impacts on the QMS were: characteristics of products, organizational characteristics of the QMS, consistency of the QMS, functional characteristics of the QMS, characteristics of QMS leadership, characteristics of organizational leadership, and characteristics of corporate culture.

All the above stated groups of QMS characteristics are inter-related and affect each other. The magnitude of the impact differs across organizations. The aim of the study was to determine the relationships between the elements of individual groups, e.g. between the level of implementation of fundamental principles of QMS (ISO 9004:2009). In this way, we wanted to collect information about the correlations between individual QMS elements.

The correlation coefficients between individual elements and the correlation coefficients between individual elements and the financial performance of the organizations will provide feedback on the impact of each element on the organization's financial performance. The research was conducted by means of an online survey (KwikSurveys) administered to quality managers in various organizations. Since we were unable to obtain the list of organizations holding an ISO 9000 certificate, we started cooperation with certification bodies by asking them to forward the questionnaires to organizations with ISO 9001 certification. The online survey was conducted between June 2014 and April 2015.

3.2 Research methodology

The main part of the research was carried out through questionnaires given to quality managers in organizations which have in place well-maintained quality management systems. In these organizations the questionnaires were given to quality managers as the responsible persons who possess the best knowledge on the use of QMS within their organizations.

The role of the quality management system within an organization and the role and status of the quality manager was checked through a questionnaire which was also given to the manager/director of the organization. In this way, we obtained information about the

difference between the opinion of the quality manager and the status of quality management in the organization. The 5-point Likert scale was used for both questionnaires. A total of 126 organizations participated in the study. The size composition of all participating enterprises is given in Table 1.

Table 1. Breakdown of participating organizations by size

Size	Number	Share
Large-sized	31	0.25
Medium-sized	43	0.34
Small-sized	40	0.32
Micro-sized	12	0.10
Total	126	1.00

3.3 Participating organizations by economic activity

Completed QMS questionnaires were used as the basis for the analysis of participating organizations by their economic activity. Table 2 shows the breakdown of participating organizations by economic activity.

Table 2. Breakdown of participating QMS-certified organizations by economic activity

Activity	Number	Share
A – Agriculture and hunting, forestry, fishing	4	0.03
C - Processing	55	0.44
D – Electricity, gas and steam supply	2	0.02
E – Water supply, waste water and waste management, environmental rehabilitation	3	0.02
G – Trade, maintenance and repair of vehicles	8	0.06
H – Transport and storage	5	0.04
I – Hotels and restaurants, tourism	1	0.01
J – Information and communication activities	11	0.09
M – Professional, scientific and technical activities	14	0.11
N – Other diverse economic activities	4	0.03
P – Education	1	0.01
Q – Health and social care	6	0.05
R – Culture, entertainment and recreation	1	0.01
S – Other activities	11	0.09
Total	126	1.00

3.4 Classification of financial results

Publicly available data published by AJPES (<http://www.ajpes.si/>;access 5/2016) was used to classify financial data on the basis of business performance (Table 3).

The statistical method of test of proportion was used to analyse the data. In the questionnaire for quality managers, each item was classified as ‘actual’ or ‘required’. On

the basis of the answers received a confidence interval was computed for both proportions (actual, required).

Confidence intervals for proportion, CI, at the 95% confidence level are computed as follows:

$$CI = \hat{p} \pm z_{\alpha}(df) \sqrt{\frac{\hat{p}(1-\hat{p})}{N}} \quad (1)$$

Where \hat{p} are computed proportions and $z_{\alpha}(df)$ is a critical value. In our case, if the degree of freedom is $df = 126 - 1$ and the significance level is $\alpha = 0.05$, it follows that $z_{0,05}(125) = 1.96$. The questions relating to the correlations between the fundamental principles of quality and the financial results of organizations were statistically processed using the Statistica software. Pearson's correlation coefficients (r) were calculated as follows :

$$r = \frac{S_{xy}}{\sqrt{S_{xx} \cdot S_{yy}}} \quad (2)$$

$$S_{xy} = \sum_{i=1}^n (x_i - \bar{x}) \cdot (y_i - \bar{y}) \quad (3)$$

$$S_{xx} = \sum_{i=1}^n (x_i - \bar{x})^2 \quad (4)$$

$$S_{yy} = \sum_{i=1}^n (y_i - \bar{y})^2 \quad (5)$$

The $1-\alpha$ critical values of the sample correlation coefficient may be used to judge whether the computed values of calculated r are significant or not. Here, if the degree of freedom is $df = 126 - 2$ and the significance level $\alpha = 0.05$, the critical value for Pearson's correlation coefficient is 0.17488. In the continuation of this paper, all significant correlation coefficients, i.e. coefficients which exceed the critical region threshold of 0.17488, are bolded . All correlation coefficients written in black are not statistically significant.

4 Results

4.1 Correlations between the level of implementation of fundamental quality management principles and financial results of organizations

The computed Pearson's coefficients highlight the correlations among the financial results of organizations. Table 4 shows the correlations between the financial results of organizations and the level of QMS implementation according to ISO 9004:2009. In fact, these principles define the fundamentals of the approach to QMS. The relationship between specific principles of quality management and business performance results of organizations is shown in Figure 2. It would be expected that the levels of implementation of fundamental quality management principles in organizations operating a certified QMS which has been approved by an external certification body are extremely high. Table 4 indicates that the only principle which quality managers see as highly implemented is the principle of customer focus (average score 4.3), while the average score for other management principles is between 3.5 and 3.9.

Organizations holding the ISO 9000 certification were expected to demonstrate a high level of implementation (grade 5) of the fundamental principles of QMS. However, the answers provided by quality managers show that the level of implementation is actually much lower, except for the principle of “customer focus”. What surprises is that quality managers do not favour a very high level of principle implementation. According to the QMS, the average scores for the required QMS principle implementation level according to the ISO 9004:2009 standard are as follows: 4.66 for customer focus; 4.35 for leadership; 4.26 for involvement of staff; 4.20 for process approach; 4.16 for system approach to leadership; 4.42 for continual improvement; 4.32 for factual approach to decision-making; and 4.30 for mutually beneficial supplier relations.

Table 3. Classification of financial results of organizations with QMS.

Revenue growth rate 2013-2014		Growth rate of added value 2013-2014		Revenue growth rate 2011-2014		Growth rate of added value 2011-2014		Rate of added value 2014	
Score	Value	Score	Value	Score	Value	Score	Value	Score	Value
1	-54.17 %	1	-57.74 %	1	-29.39 %	1	-38.91 %	1	4.048,35 €
	-6.04 %		-12.19 %		-5.90 %		-4.36 %		27.074,05 €
2	-5.29 %	2	-12.18 %	2	-5.33 %	2	-4.16 %	2	27.546,02 €
	+0.37 %		-1.13 %		-0.87 %		-0.18 %		32.760,06 €
3	+1.53 %	3	-1.01 %	3	-0.73 %	3	-0.17 %	3	32.999,00 €
	+7.03 %		+5.28 %		+2.76 %		+3.08 %		41.152,45 €
4	+7.77 %	4	+5.81 %	4	+2.99 %	4	+3.45 %	4	41.328,98 €
	+16.66 %		+14.63 %		+9.50 %		+6.98 %		57.104,37 €
5	+17.21 %	5	+14.78 %	5	+9.78 %	5	+7.08 %	5	59.433,60 €
	+158.04 %		+105.62 %		55%		+42.32 %		132.203,68 €

Table 4. Pearson's correlations between the fundamental principles of QMS and financial results of organizations.

Elements of QMS	Average score	Standard deviation	Revenue growth rate 2013-2014	Growth rate of added value 2013-2014	Revenue growth rate 2011-2014	Growth rate of added value 2011-2014	Rate of added value 2014
			Basic statistics		Pearson's correlations		
Customer focus	4,286	0.7679	0.1989	0.1252	0.2799	0.0810	0.2726
Leadership	3,873	0.8484	0.1800	0.0333	0.2734	0.0000	0.2000
Involvement of people	3,532	0.8068	0.0982	0.0841	0.1753	-0.0140	0.1262
Process approach	3,643	0.7638	0.0148	-0.0518	0.1185	-0.0148	0.0963
System approach to management	3,587	0.7618	0.1485	0.1114	0.1337	0.1337	0.2005
Continual improvement	3,675	0.9106	0.1118	0.0559	0.1988	0.0248	0.2485
Factual approach to decision making	3,889	0.7180	0.0867	-0.0158	0.1418	0.0236	0.1418
Mutually beneficial supplier relationship	3,778	0.7471	0.1817	0.1969	0.2801	0.2574	0.2877

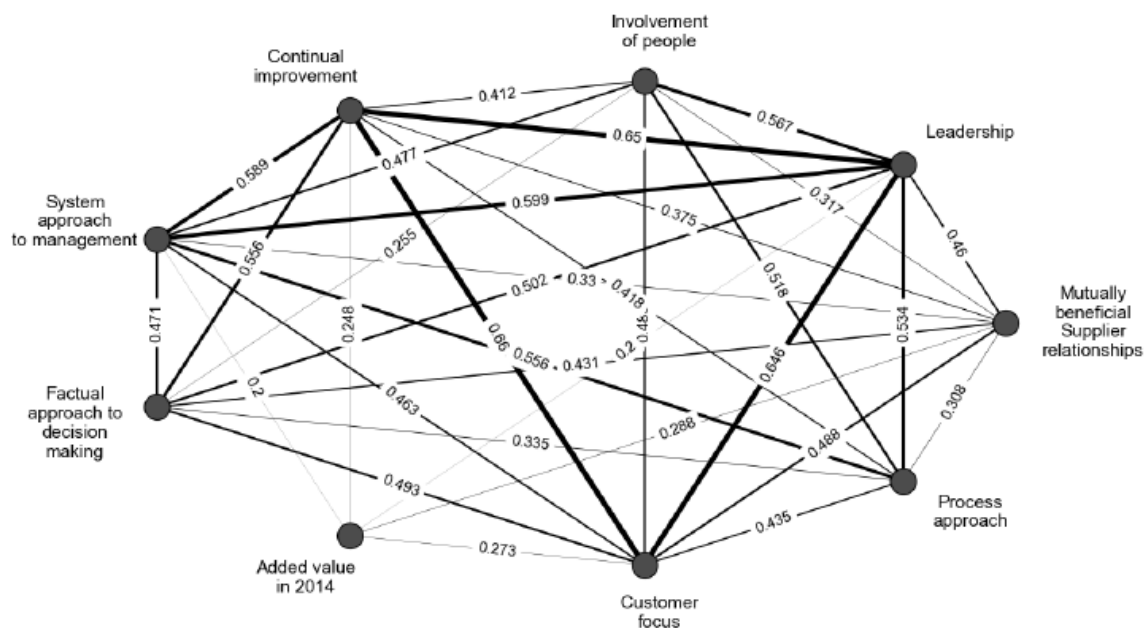


Figure 2. Pearson's correlation coefficients for the fundamental principles of QMS (ISO 9004:2009) and the organizations' financial results.

4.2 Effect of the difference between the required and actual level of implementation of QMS consistency elements on the business performance of organizations

In investigating the characteristics of QMS in Slovenian organizations, the consistency of QMS elements was assessed (on a scale of 1 to 5) in terms of the actual, as well as required, status. Another interesting question focused on how the difference between the required and actual state affected the financial results of organizations. Table 5 gives the correlation coefficients between the difference (required-actual) elements of QMS consistency and the financial results of the organizations. The correlations between the difference (required-actual) in quality management principles and business performance results are presented in Figure 3.

5 Discussion

Organizations operating under conditions of high market uncertainty are not in a favourable position to plan quality and business in general. In order to make any valid conclusions, it is of extreme importance to take into account the effects of current economic, social and political aspects, or 'the climate'. (Delič et. al., 2014) establish that involvement of people has a direct or indirect impact on other identified QMS characteristics. Direct impacts include continual improvements, planning, and quality training.

The study found stronger correlations (Figure 2) between the quality management principles of leadership, continual improvement, and customer focus. In addition to the

principle of mutually beneficial supplier relations these principles show significant correlations with the growth rate of the organization's value added. These correlation coefficients are weak, but significant.

The study also showed a considerable impact of the organizational culture and the role of the manager/director in the organization. Significant negative correlation coefficients with the organization's financial results were observed in organizations with an expressed hierarchical organization structure, and significantly positive correlations with the organization's financial results in organizations with emphasised inter-personal involvement of employees in achieving common goals. The study also observed significantly negative correlation coefficients with regard to the financial results of organizations where the manager/director is appointed by the owners and is not a co-owner of the organization, and significantly positive correlation coefficients with financial results in organizations where the manager/director is also the majority owner. We analysed the correlation coefficients between the difference (required-actual) in the implementation level of specific QMS elements. Stronger correlations were found between leadership and customer focus, and between customer focus and continual improvement (Figure 3). Value added per employee has significantly negative correlation coefficients with the difference in the implementation level of continual improvements, mutually beneficial supplier relationships, and customer focus.

Table 5. Pearson's correlations between the estimated difference (required-actual) in the fundamental principles of QMS (ISO 9004:2009) and the organizations' financial results.

Elements of QMS	Average rating	Standard deviation	Revenue growth	Growth rate of	Revenue growth	Growth rate of	Rate of
			rate 2013-2014	added value	rate 2011-2014	added value	added value
Basic statistics			Pearson's correlations				
Customer focus	0.381	0.703	-0.064	-0.105	-0.129	-0.016	-0.242
Leadership	0.476	0.745	-0.137	-0.129	-0.228	-0.030	-0.167
Involvement of people	0.730	0.763	-0.030	-0.170	-0.096	-0.059	-0.141
Process approach	0.556	0.765	-0.015	-0.141	-0.089	-0.044	-0.096
System approach to management	0.571	0.731	-0.039	-0.209	-0.070	-0.108	-0.093
Continual improvement	0.746	0.857	-0.172	-0.198	-0.205	-0.145	-0.350
Factual approach to decision making	0.437	0.721	-0.024	-0.126	-0.063	-0.102	-0.126
Mutually beneficial supplier relationship	0.532	0.689	-0.074	-0.320	-0.172	-0.271	-0.279

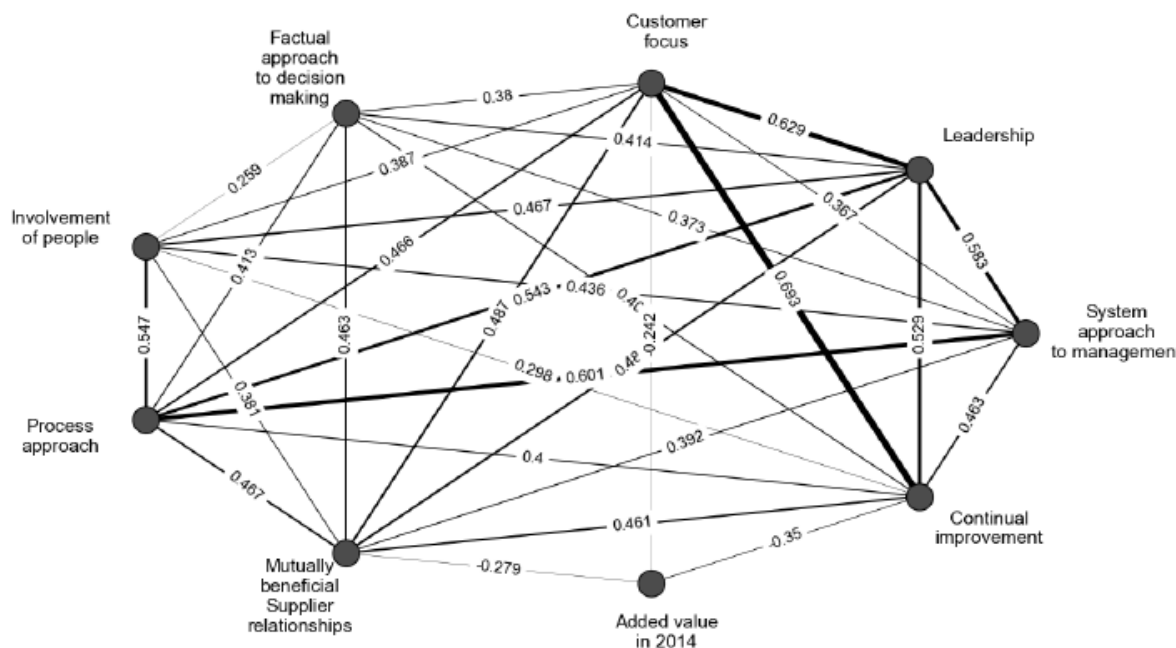


Figure 3. Pearson's correlations between the estimated difference (required-actual) in the fundamental principles of QMS (ISO 9004:2009) and the organizations' financial results.

6 Conclusions

The study presents an investigation into the quality management systems (QMS). The aim of the study was to investigate the characteristics of QMS in Slovenian organizations and their effect on the business performance of these organizations. A total of 126 Slovenian organizations were included in the study. The results show the presence of certain characteristics of QMS and the correlations between these characteristics and the business results of organizations.

In addition to other QMS elements, the study focused on the impact of ISO 9004:2009 compliant quality management on the business performance of organizations. The established correlations between individual elements of QMS and the financial aspects of the organizations' business performance are relatively weak, but significant. The difference between the required and actual QMS principle implementation levels and the financial results achieved by the relevant organizations has pointed to significantly negative correlation coefficient values. By improving the principle implementation level, we could also enhance the business performance and financial results of the organizations concerned.

The managerial approach to using QMS as a total management system is key to enhancing business performance. Without a QMS as a management system, QMS can become a system which is aimed primarily at the acquisition of ISO 9001 certification and as such has no significant effects on the business results of organizations.

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Povzetek:

Korelacije med značilnostmi SVK in finančnimi rezultati organizacij

Raziskovalno vprašanje (RV): Raziskave različnih avtorjev v svetu preučujejo povezavo med značilnostmi sistemov vodenja kakovosti (SVK) in rezultati poslovanja organizacij. Raziskava povezav med SVK prakso in rezultati organizacij lahko služi tako kot osnova za izboljšavo teoretičnega pristopa do SVK, kot tudi za uvajanje izboljšav v operativne sisteme vodenja kakovosti v organizacijah.

Namen: V članku analiziramo kakšen vpliv imajo značilnosti SVK na poslovanje organizacije oz. kakšni so vplivi med posameznimi značilnostmi SVK, oz. kako se razlika med potrebnimi in dejanskimi značilnostmi SVK odraža na finančnih rezultatih poslovanja slovenskih organizacij.

Metoda: Da bi dobili odgovor na zgornja vprašanja smo izvedli raziskavo značilnosti SVK z anketiranjem vodij sistemov kakovosti in direktorjev slovenskih organizacij, ki imajo certificiran SVK. V okviru raziskave značilnosti SVK v slovenskih organizacijah smo izvedli tudi raziskavo povezanosti med značilnostmi SVK in rezultati poslovanja organizacij, kakor tudi povezanosti med posameznimi elementi značilnosti SVK.

Rezultati: V tem prispevku podajamo najbolj zanimive ugotovitve raziskave korelacij med elementi značilnosti sistema vodenja kakovosti in rezultati poslovanja slovenskih organizacij. Zanimivo je, da imajo od vseh načel vodenja kakovosti po standardu ISO 9004:2009 v slovenskih organizacijah le nekatera načela signifikantno pozitiven koeficient korelacije s poslovnimi rezultati organizacij.

Organizacija: Ta raziskava bo omogočala boljše razumevanje posameznih značilnosti SVK in njihov vpliv na poslovne rezultate slovenskih organizacij.

Družba: Ta prispevek razjasnjuje povezave med značilnostmi SVK v organizacijah v slovenskem družbenem okolju. Poznavanje teh povezav je izjemnega pomena pri izboljšavah SVK v slovenski organizacijah in s tem povečanja učinkovitosti SVK in s tem celotne družbe.

Originalnost: Pričujoča raziskava je prvi primer analize značilnosti SVK po izvirnem modelu analize značilnosti in vplivov na značilnosti SVK in korelacij med značilnostmi SVK in poslovnimi rezultati Slovenskih organizacij.

Omejitve/nadaljnje raziskovanje: Raziskava je potekala med junijem 2014 in Aprilom 2015 v Slovenskem družbenem okolju. Podobno raziskavo, bi bilo smiselno izvesti tudi v drugih družbenih okoljih.

Ključne besede: sistemi vodenja kakovosti, rezultati poslovanja, anketa, ISO 9001, Slovenija.

