

The State Of ISO 9001 Certification In Montenegro

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Abstract: In this paper we present the state of ISO 9001 certification in Montenegro. Our research will give results of number of certification comparing with citizen number and Gross Domestic Product (GDP). Furthermore, we will compare them with certain countries in region to estimate approximately number of certifications in the moment of becoming EU member. For the model we choose linear regression.

Keywords: QMS, certification, Montenegro, state, development.

1. INTRODUCTION

The standards are to be applied to any type of organizations; independent to the size of the organizations or the kind of products manufactured or services provided, in private and public organizations, including government services.

ISO 9000 series was the fastest growing standards in history and was very popular from the start (Bergman, 1994). By 2006

more than 170 countries had adopted the series as national standards, and more than 897,000 facilities had certified by third-party organizations to ISO 9001:2000.

In the figure 1 we presented the certification development on the world in function of delivered certificates in the period 1994 – 2006.

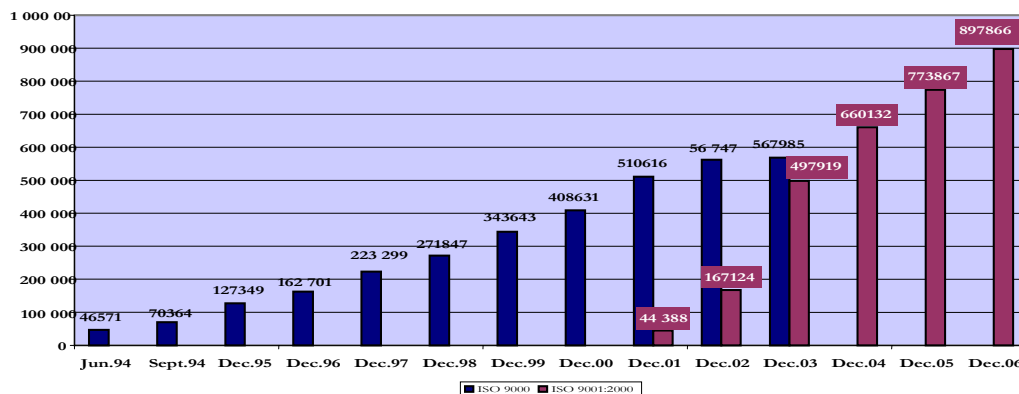


Figure 1 Certification development on the world

Standard ISO 9011:2000 is written to be more user-friendly to small business and service organizations and yet to remain useful to large manufacturing organizations. The standard's generic controls and terminology allow it to be used by all organizations; it not specific to any one particular organization.

The results of several studies showed that the most important reasons for using the ISO 9000 family of quality standards are: customer or marketing demands, needs for improvement in process or systems, desire for global deployment and lack of focus inside the organization. The adoption of a QMS according to the requirements of ISO 9001: 2000 should be a strategic decision of an organization. The design and implementation of an organization's quality management system is influenced by varying needs, particular objectives, the products provided, the process employed and the size of the organization.

How the interest in certification is global trend, it did not pass Montenegro. This paper is focused on the state of certification in Montenegro and its possible entrance in EU.

2. THE STATE OF CERTIFICATION IN MONTENEGRO

Certification by quality system has started in 1994 in Montenegro, when first organization has received certificate in this country. The quality certification was rapidly accepted by other organizations, especially those that export abroad. Today in Montenegro, there are around 140 organizations that are certified by quality management system. In Montenegro, the base of certificate management system is Quality Management System (ISO 9001) what is presented in figure 2.

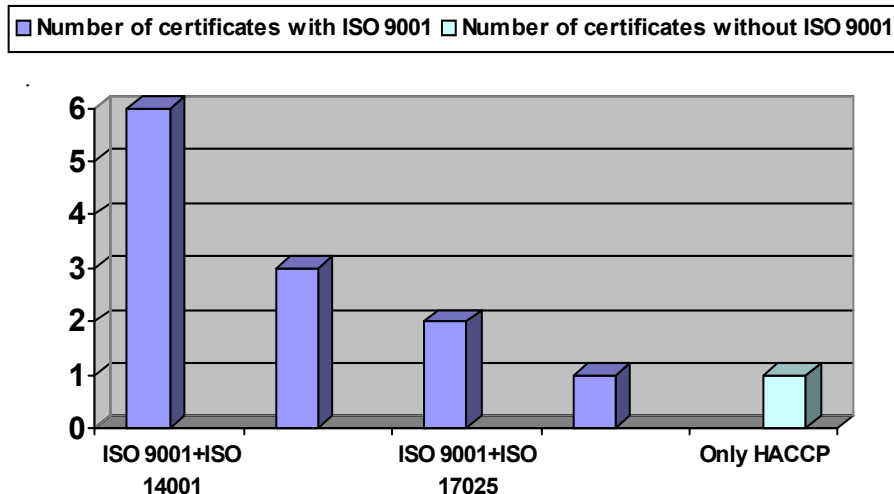


Figure 2. Number of certificates management systems with and without ISO 9001 in Montenegro

It is very hard, in this moment, to confirm the exactly number of certifications because does not exist the register for certified organizations. This unique register does not exist since 2000, when former Institutions' for Standardization Serbia and Montenegro stopped to follow certification process in Montenegro. The data about certified organizations could be obtained only from

registration body contacts, what was done for researches /1, 2/. We use the mentioned database for this research. Today, in Montenegro there is no certified body, and usually for this purpose organizations in Montenegro use service from certification bodies from Serbia, as result of continuity of already existed certification.

If we utilize data that are used for researches in 2005, the state of

certification could be divided in four product categories:

Product category	Number of certification
Hardware	23
Software	1
Services	42
Process material	5

3. RESEARCH AND DEVELOPMENT NOTE OF QMS

Research and development note of QMS include the following European countries : Malt (MT), Cyprus (CY), Czech Republic (CZ), Slovak Republic (SK), Slovenia (SI), Hungary (HU), Poland (PL), Estonia (EE), Leetonia (LV), Lithuania (LT), Italy (IT), Bulgaria (BG), Rumania (RO), Croatia (HR), Bosnia and Herzegovina (BA), Albania (AL), Macedonia (MK), Turkey (TR), Serbia (SER) and Montenegro (MNE).

The period included in our research is conditioned by access to database for all countries, it is from 1st June 2001 to 31st December 2005 /L1/. The research was limited by database about QMS and by negotiation that will probably take period from 31st December 2005 till 31st December 2010 /L3/.

For research and development note of QMS, it was started from suppositions /L3/

that: there exists link between QMS and GDP on one side, and the country's aptitude to enter EU on the other side.

Methodize number of QMS by citizen number includes implicitly, still not completely, higher level of organization, technical improvements, and country's aptitude for EU membership. For more adequate analysis, we should know different data where some are underlined: number of employees that have accepted certification, economic potential of those firms and their part in GDP, their position on the market, sector where certified firms belong to, cultural and technical characteristics and etc. Some of mentioned data could present further research.

In the table I we include: data about number of certified firms related to EU membership and GDP per capita in Euro /L2/. The rest of data in Table I: number of certification per 1000 citizens (QMS) and GDP per capita in Euro.

Table I. QMS and GDP for chosen EU countries

Acronomy	MT	CY	CZ	SK	SI	HU	PL	EE	LV	LT
Certificate										
2001.	25	10	320	144	34	1349	232	66	15	29
2002.	122	160	1125	768	330	4446	914	167	33	158
2003.	204	314	2565	1148	465	7750	3216	261	73	324
2004.	230	573	10781	2008	1811	10207	5753	438	484	487
2005.	302	530	12743	2050	2114	15464	9718	489	561	591
Citizens	399	741	10241	5431	2011	10220	38218	1356	2331	3462
QMS	0.76	0.71	1.25	0.38	1.05	1.51	0.25	0.36	0.24	0.17
GDP	17100	19900	17800	13800	19600	15500	12000	13200	11600	12600
Index GDP	1.71	1.99	1.78	1.38	1.96	1.55	1.20	1.32	1.16	1.26

The relation between firms that have accepted certification is presented by number of

certificates by 1000 citizens and GDP per capita in EU countries. The figures are

presented in the table 2. From the table 2 we can notice significant QMS differences among EU countries. Possible explanation for this is that membership of one country in EU does not depend only on above mentioned relations. They are for sure important, key indicators for entering EU during monitoring process. Still, very often the most important indicators are political ones or market potential than economic development of future EU member.

Increase of number of QMS is notable in year of becoming EU member what we can see from the table I. Furthermore, we can remark that increase of QMS number differs among new EU members. Moreover, it is important to note that the majority of countries doubled QMS number in period of

2003/2004– year of becoming EU member. Common conclusion could be that this increase was conditioned by new demands on EU market /L4/.Furthermore, from the same table we can notice that GDP is more balanced among EU members than QMS number. Moreover, the figures indicate that increase in GDP follows increase in QMS number.

Link between QMS and GDP is showed on figure 3 using 10 EU countries, with all mentioned limits, representing QMS as one important indicator for country development and its candidature for EU membership. For this research it has important interest, because this relation is used to analysis QMS development in Montenegro

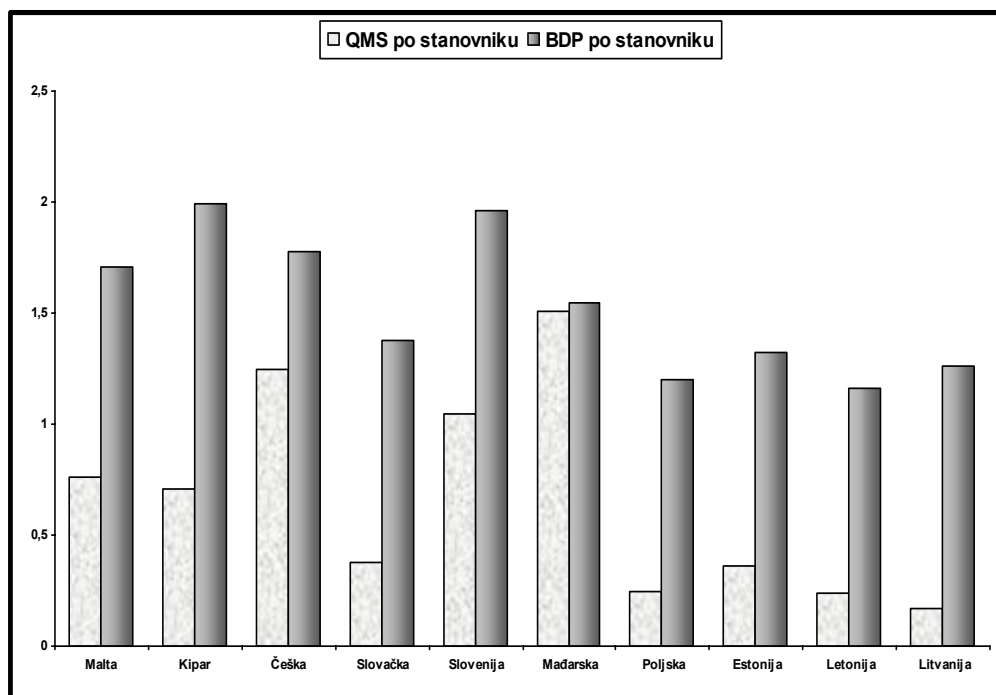


Figure 3. Relation between QMS and GDP for chosen European countries in

Following same principals as in the table I, in table II is presented data for chosen countries in region of Montenegro.

We can remark that Montenegro, relating number of QMS, is equitable with countries that are candidate for EU membership–Croatia, Macedonia and Turkey. Furthermore, Montenegro has

advantage relating to other countries. Of course, Italy is exception, because it is country that is one of the leadres relating this question. Speaking about GDP, Montenegro is on the same level as Bosnia and Herzegovina, in advatage of Macedonia, Serbia and Albania, but behinde Bulgaria, Rumunia, Turkey and

especially Croatia.

Table II. QMS and GDP for Montenegro and chosen countries from region

Acronomy Certificate	IT	BG	RO	HR	BA	AL	MK	TR	SER	MNE
2001.	1974	38	87	30	1	-	1	72	-	-
2002.	14733	246	767	194	8	1	7	911	-	-
2003.	64120	842	2052	580	47	2	47	3248	79	24
2004.	84485	1685	5183	966	209	6	133	5009	634	62
2005.	98028	2220	6097	1273	350	11	154	10929	1138	71
Citizens	58103	7450	22330	4496	4025	3563	2045	71001	80484	620
QMS	1.68	0.30	0.27	0.28	0.09	0.003	0.07	0.15	0.01	0.11
GDP	24900	8000	8100	11600	2410	1938	2170	7200	2035	2860
Index GDP	2.49	0.8	0.81	1.16	0.24	0.19	0.21	0.72	0.20	0.28

The relation between firms that have accepted certification is presented by number of certificates by 1000 citizens and GDP per capita in region of Montenegro. That is presented on Figure 4.

We can notice great advantage of Montenegro comparing with countries in region but also disadvantage comparing with developed countries, EU members. Still, all data could be questionable.

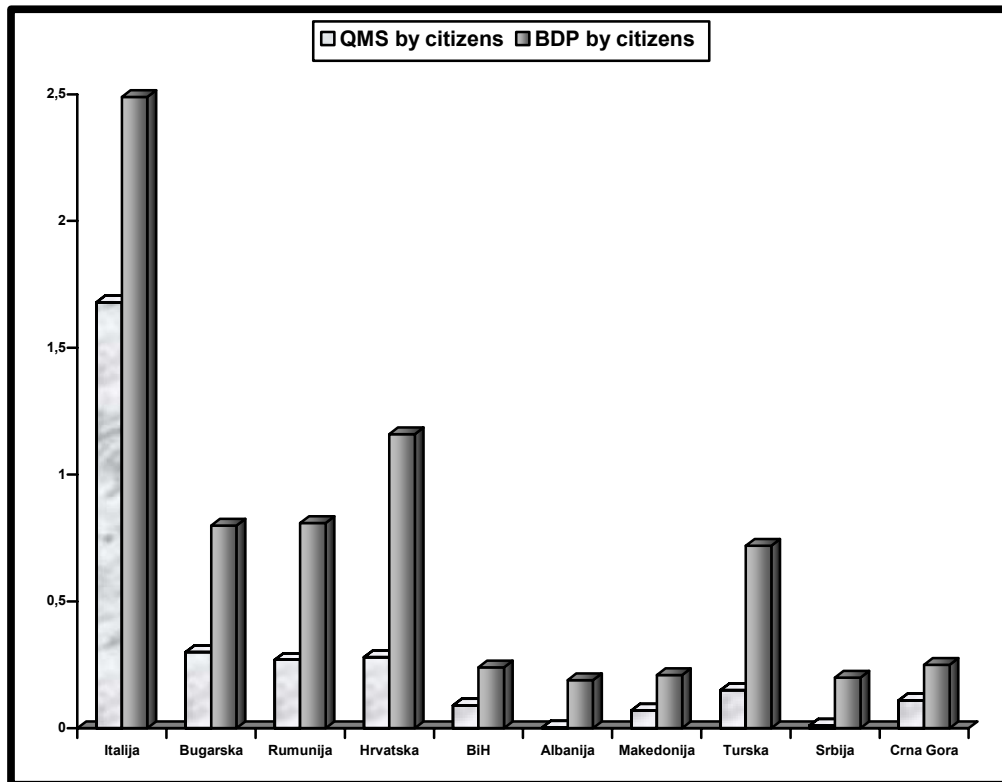


Figure 4. Relation between QMS and GDP for chosen countries from region in 2005

4. RESEARCH RESULTS AND ANALYSIS OF RESULTS

Quality development in Montenegro could be expressed by analysis of QMS and GDP of EU countries. Still, more optimal criteria will be comparison with country that is more coherent with geographical, political and economical conditions in Montenegrin region.

Possible direction of quality development in Montenegro could be analyzed by "minimal increase of QMS" and "maximal increase of QMS". To calculate "minimal increase of QMS", taking into account that Montenegro reached on the 31st December the number of QMS as countries that are candidates for EU, we will use as references average values of QMS for Bulgaria, Rumania and Croatia. Median value of QMS in this case is 0.28 certificated per 1000 citizens. At the same

time, this is "minimal index of QMS".

Maximal possible quality development in Montenegro, beside the theoretical one that is not relevant in this case, should be related to state of QMS in EU countries. Following this criteria "maximal index of QMS" is 0.67 certificates per 1000 citizens. QMS in Montenegro on the 31st December 2005 was 0.11 certificates per 1000 citizens.

For possible quality development in Montenegro using data of GDP as references we will use average values of Bulgaria, Rumania, Turkey and special one for Croatia. We calculate "minimal index" = 0.77 and "maximal index" = 1.16. The GDP in Montenegro is 0.286 or 2.860 €.

The results of possible QMS increase in Montenegro in period 2005 – 2010 are presented in table III

Table III. Possible increase of QMS in Montenegro for period 2005.-2010.

31 st December 2010					
Minimal increase		Median increase		Maximal increase	
QMS	GDP	QMS	GDP	QMS	GDP
173	191	294	240	415	288
Number of certificates on the 31 st December 2005 was 71					

Following chosen coefficient, it is expected (figure 76):

- Minimal number of certified firms in Montenegro between 173 does 191.
- median number of certified firms in Montenegro on the 31st December 2010 could be between 240 and 294
- Maximal number of certified firms could be between 288 and 415.

Research results are obtained using statistical model of linear regression. It presents link between number of certificates per 1000 citizens (y) and GDP per capita in 10 000 € (x), on the 31st December, using Microsoft Excel package. The results are following:

a) Regression analysis related number of certificates per 1000 citizens (y) and GDP per capita in 10 000 € (x) in 2005 in EU countries is obtained by simple regression equation :

$$y = - 0.905 + 1.027x$$

(0.606) (0.389)

Obtained model shows that GDP increase per capita in 10 000 € means increase by approximately one certificate (1,027) per 1000 citizens. Standard deviation is $S_{yx} = 0,364$ certificates per 1000 citizens (n-2). Determination coefficient R^2 shows that model is explained 46,58% and coefficient of linear correlation $r = 0,682$ tell about positive linear correlation between model variables.

b) Regression analysis related to link number of certificates per 1000 citizens (y) and GDP per citizens in 10 000 € (x) in 2005 in countries around Montenegro is obtained by simple regression equation :

$$y = - 0.223 + 0.735x$$

(0.043) (0.045)

Obtained model shows that GDP increase per citizens in 10 000 € means increase by 0.735 certificates per 1000 citizens. Standard deviation is $S_{yx} = 0,091$ certificates per 1000 citizens (n-2). Determination coefficient R^2 shows that model is explained 96,97% and coefficient of linear correlation $r =$

0,984 tell about strong positive linear correlation between model variables.

5.CONCLUSIONS

Research results, with previous comparison with literature, give us certain conclusions as a suggestion and base for future and global analysis, decision making and improvements in this field:

- Results analysis of two regression models, implemented using the same variables, but for different country groups in 2005, confirm the existence of very positive linear connection between the number of certificates per 1000 citizens and GDP per capita in 10.000 €, relating

10 EU countries and 10 countries in region of Montenegro.

- Certain deviation could be explained by the fact that there exists histeresys between QMS and GDP in short period of time. In that period the number of QMS increased 10 times while GDP increased slower what indicates differences between countries and their aptitude for EU membership. We can conclude that improvement of GDP by QMS needs longer period of time.
- Previous researches testified link between QMS and GDP per citizen and the results of this research could be used for analysis of quality development in Montenegro during the period of negotiation for EU membership.

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