Training During ISO 9001 Implementation And Workers Involvement Into The Quality Management Process In Montenegro

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Abstract: *According to several researchers, workers involvement into the implementation of a quality system in a firm is a key of its success. Since training can improve workers involvement during the implementation of a quality system in a firm, we try in this paper to evaluate quantitatively in the case of Montenegro, the impact of training of workers' involvement. Using an original data set about two leading firms from Montenegro, we show that the coefficient associated with the training variable is on average about -1.44 and is significant at a level of 1%. That is workers who are not trained during the ISO 9001 implementation are strongly less involved into the quality management process of their firms.*

Keywords: *Iso certification, training, transition economy.*

1. INTRODUCTION

Does workers' involvement into quality management process matter? The answer seems to be yes. The main reason is that the degree of workers' involvement has an impact on the success or failure of the implementation of the quality norms and hence on firms' financial performance.

This question does not have to be taken for granted since according to many researchers like Cuff et al. (1979), Seddon (1997), Wenger (1998), Eskildson (1994) or Harary (1993), workers may dismiss quality norms because they are too heavy for employees, too procedural, too bureaucratic etc.

However some other researchers (see for instance Lawler et al. 2001) have underlined an important improvement concerning employees' involvement and participation in the quality management system of their firms after the implementation of quality norms.

In any cases, a way to improve workers' involvement could be to train them during and after quality norms implementation. This question is particularly crucial for countries in transition like Montenegro where

workers are not always seen by managers as a human capital. As a consequence, despite most quality norms implementation rules clearly require the training of workers during (and after) the implementation of such norms, we observe on the ground in Montenegro that this is not always the case. Indeed the Center for Quality of Podgorica is not only a research center body from the University of Podgorica, it is also involved in the evaluation of quality system of firms.

The question we ask in this paper is to evaluate in the case of Montenegro the effect of workers training during ISO implementation over their involvement into the quality system management.

In order to answer this question, we set up a research program financed by the French ECONET. We have selected two firms among the best in Montenegro, one is a port (service firm) and the other is an agro-industry firm producing high quality wine, beer, vodka and fish.

Both firms have set up a system of quality management system and they are ISO

9001 certified. They are leaders in terms of quality in Montenegro and even in former Yugoslavia.

With the help of the statisticians and sociologists of the Center for Labor Studies in France, we have constructed a questionnaire (for the employees) of 46 questions. Respectively 251 and 111 employees from the service firm and from the agro-industry firm have answered our questionnaire.

The survey in both firms was conducted with the support of the top management because the Center for Quality of Podgorica has been cooperating with both firms since many years. The survey started from mid July 2007 to the end of August 2007. The survey was simultaneously conducted in both firms using the same methodology: a researcher provides during 15 minutes necessary instructions to a group of 15-20 employees in a room, and then the employees fill the questionnaire.

The time allocated to the employees to fill the questionnaire was not limited but on average this time was about 40 minutes.

After collecting all the questionnaires, they were analyzed by the Center for Quality of Podgorica and put into database format using Excel and SAS. We call our database MQS 2007 for Montenegro Quality System 2007. Table 1 below provides some descriptive statistics

Table 1. Some Descriptive Statistics about the workers

	Service Firm	Manufacturing Firm
SEX		
Women	24.7% (62)[a]	48.65% (54)
Men	75.4% (189)	51.35% (57)
AGE		
Mean AGE	43.95	46.09
STD	8.39	8.62
Age less or equal to 45 years old	47.81% (120)	40.54%% (45)
Age more than 45 years old	52.19% (131)	59.46% (66)
EDUCATION		
Having less than second level of education	32.27% (81)	25.23% (28)
Having strictly more than second level of education	67.73% (170)	74.77% (83)
WAGE		
Per month wage is strictly weaker than 400 euro	73.71% (185)	54.95% (61)
Per month wage is more than 400 euro	26.29% (66)	45.05% (50)
VARIATION OF THE WORKING CONDITION		
Decline[d]	20% (47)[b]	10.75% (10)[c]
Stable[e]	37.45% (88)	25.81% (24)
Increase[f]	42.55% (100)	63.44% (59)

Source: MQS 2007 data base.
Sample size (number of employees) in 251 for the service firm and 111 for the manufacturing firm.
(a) Frequency.
(b) Sub-sample of 235 workers for the service firm (15 workers do not answer to the working condition satisfaction in 2003 and 1 do not answer in 2007).
(c) Sub-sample of 93 workers for the manufacturing firm (18 missing values).
(d) Decline = 1 if the variation of the satisfaction is negative over the period 2003-2007.
(e) Stable = 1 if the variation of the satisfaction equals zero over the period 2003-2007.
(f) Increase = 1 if the variation of the satisfaction is positive over the period 2003-2007.

The rest of the paper is organized as

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follows. Section 2 analyses the results of the statistical tests, while section 3 concludes.

2. RESULTS AND DISCUSSION

Let us recall that both firms are ISO 9000 certified since several years. However (see table 2) some employees still don't know what ISO 9000 is about (almost 15% in the service firm and 7% in the manufacturing one) and other even don't know that their firm is ISO 9000 certified (almost 12% in the service firm and 9% in the manufacturing one).

Moreover (see table 2) to the question "In the context of your work, do you make propositions to improve the quality process, the organizational design or ...? (yes/no)", only 36.65% and 29.73% of workers in the service firm and the manufacturing firm respectively answer "yes".

If we consider these three questions as a proxy of workers' involvement in the quality management process then the question we asked in this paper is to analyse the link between workers' involvement and whether training has taken place during or before the ISO 9001 implementation process.

This question is not trivial because workers' attitude towards the implementation of ISO 9000 is one of the key to its success or failure in firms.

We use in this paper mainly two statistical methods. The first method used in tables 4 and 5, is a logistic regression, using the SAS procedure LOGISTIC. The second method used in tables 2 and 3 is called Wilcoxon exact test. Indeed this test, given the size of our data set, is on the contrary of classical Wilcoxon test, is more suitable for "small" size sample. The Wilcoxon exact test is computed through the software SAS procedure called NPAR1WAY with the options Wilcoxon and Exact. The p-value which is reported in tables 2 and 3 is the one-side p-value. The interpretation is the following. Let α be a level of significance then a p-value strictly weaker than α means that the null hypothesis H0° (the distribution functions in the two populations are identical) is rejected. For instance in table 2, the distribution of the question "Do you know what ISO 9001 is about? (yes/no)" is significantly (at $\alpha=0.05$) different in the service firm and in the manufacturing firm. This is however not the case concerning the question "Do you know whether your firm is ISO 9001 is certified? (yes/no)".

Table 3 presents also some figures which seem suggesting that workers in the two firms have a subjective views of ISO 9001 which are different to the objectives officially pursued by ISO 9001. For instance, to the question "What does ISO 9001 represents for you …. The image of quality? (yes/no)", almost 25% in the service firm and 17% in the manufacturing firm, answer "No". Moreover to the question, "What does ISO 9001 represents for you …. More control from the hierarchy? (yes/no)", almost 11% from the service firm and 17% from the manufacturing firm, answer "Yes".

Table 2. ISO, Training and Cognitive involvement

	Service Firm	Manufacturing Firm	P-value of the Exact Wilcoxon Test
Do you know what ISO 9001 is about? (yes/no)	85.26% (214)[a]	93.69% (104)	0.015
Do you know whether your firm is ISO 9001 is certified? (yes/no)	88.45% (222)	89.19% (99)	0.49
Have you been trained before or during the ISO 9001 implementation? (yes/no)	47.41% (119)	36.94% (41)	0.04
In the context of your work, do you make propositions to improve the quality process, the organizational design or ...? (yes/no)	36.65% (92)	29.73% (33)	0.1

We want to know the role of training (before and during ISO 9001 implementation) on workers' involvement. In table 4, we take in model (1) as proxy of workers involvement the

question:
- *"Do you know whether your firm is ISO 9001 is certified? (Yes/No)"*

Table 3. What does ISO 9001 represent for you ?

	Service Firm	Manufacturing Firm	P-value of the Exact Wilcoxon Test
The image of quality (yes/no)	75.34% (165)[b]	82.86% (87)	0.08
More complicated tasks (yes/no)	2.28% (5)	4.76% (5)	0.19
Profit increasing (yes/no)	7.31% (16)	5.71% (6)	0.39
More work to achieve (yes/no)	2.74% (6)	3.81% (4)	0.41
Make work easier (yes/no)	18.72% (41)	8.57% (9)	0.01
More control from the hierarchy (yes/no)	10.94% (24)	17.14% (18)	0.08
Customers satisfaction (yes/no)	16.44% (36)	8.57% (9)	0.03
Bureaucracy increasing (yes/no)	4.11% (9)	0.95% (1)	0.11

Source: MQS 2007 data base.
Sample size (number of employees) in 251 for the service firm and 111 for the manufacturing firm.
(a) Sub-sample of: 219 workers for the service firm and 105 for the manufacturing one.
(b) Frequency.

Indeed we assume that if the answer of a worker to this question is "Yes", then this worker has made some effort to know what ISO 9001 is about.

In model (2), we take as proxy of workers involvement the question:
- *"Do you know what ISO 9001 is about? (Yes/No)"*

In model (3), we take as proxy of workers involvement a combination of the two previous questions:
- *"Do you know whether your firm is ISO 9001 is certified and Do you know what ISO 9001 is about? (Yes/No)"*

We run over these three dependent variables a logistic regression. We take as independent variable of course the training variable ("Have you been trained before or during the ISO 9001 implementation? (yes/no)"). We add to this variable, three variables concerning workers' characteristics (age, sex, diploma) and one variable concerning the type of firm (the service firm or the manufacturing one).

The results are clear-cut concerning the training variable. Whatever the model which has been estimated, the training variable significantly (at a level of significance $\alpha=0.01$)

impacts workers' involvement.

The coefficient is -1.7788 in the first model meaning that comparing to workers who are not trained, workers who are trained have a lower likelihood to answer "No" to the question "Do you know whether your firm is ISO 9001 is certified? (Yes/No)".

The level of education seems also to play a big role since the estimated coefficients are significant at a level of significance of $\alpha=0.01$.

In the first model for instance, the estimated coefficient is 1.9019 meaning that comparing to workers who have more than a second level of education, workers who have basic education or vocational training, have a higher likelihood to answer "No" to the question "Do you know whether your firm is ISO 9001 is certified? (Yes/No)".

One other socio-demographic workers' characteristic, the age, seems to play a role: being more than 45 years old decreases (comparing to an individual who is younger) the probability to answer "No". But the impact of age is quite ambiguous.

Indeed in the first model, it is significant at a level of 10% (the p-value is actually 0.0594), however it is not significant in the second model (the p-value 0.1045 is however closed to the threshold of significance 10%) and not significant in the third model (the p-value is 0.1892).

The role of the sex variable is unambiguous: sex has no impact on the

probability to answer to "No" to the three questions.

Finally over the three models, we observe that being in a service sector or in a manufacturing one seems to play a role only in model 2, with a p-value of 0.0264.

In this model, working in the manufacturing firm (compared to working in the service one) decreases the probability to say "No" "Do you know what ISO 9001 is about? (Yes/No)". However in models 1 and 3, the sector is not significant (the p-value is 0.9554 in model 1 and 0.3509 in model 3).

Table 4. Logistic Regression: Training and Workers' knowledge of ISO

	(1) "Do you know whether your firm is ISO 9001 is certified? (Yes/No)" (Ref= Yes)	**(2)** "Do you know what ISO 9001 is about? (Yes/No)" (Ref = Yes)	**(3) =** **(1) + (2)** (Ref=Yes to (1) and (2))
Intercept	-2.0729***	-2.0807***	-2.0915***
Sex (Ref = Men) • Women	-0.1810	0.1149	0.2505
Age (Ref = less or equal to 45 years old) • Having more than 46 years old	-0.6976*	-0.5972	-0.4508
Have you been trained before or during the ISO 9001 implementation? (Ref = No) • Yes	-1.7788***	-1.5629***	-1.5426***
Level of Education (Ref =Having more than second level of education) • Having basic education or vocational training	1.9019***	2.2398***	2.1644***
Type of Firm (Ref = Service Firm) • Manufacturing Firm	0.0237	-1.0891**	-0.3809
Max-rescaled R-square	0.2718	0.3174	0.2966

Source: MQS 2007 data base.

Sample size (number of employees) in 251 for the service firm and 111 for the manufacturing firm.

Notes: (*), (**) and (***) indicate parameter significance at the 10, 5 and 1 percent level respectively.

In table 5, we run also another logistic regression by taking as proxy of workers involvement the following question:

- In the context of your work, do you make propositions to improve the quality process, the organizational design or ...? (yes/no)

This regression confirms once again the major role of training before or during ISO 9001 implementation and education on workers' involvement.

However their impact is lower comparing to the models (1), (2) and (3).

Workers' age now plays an unambiguous significant role (p-value is 0.0148) and the sex variable plays also a role: women has a higher probability to answer "No" to the question:

"In the context of your work, do you make propositions to improve the quality process, the organizational design or ...? (Yes/No)".

Table 5. Logistic Regression: Training and Workers' cognitive involvement

	(4) **"In the context of your work, do you make propositions to improve the quality process, the organizational design or ...? (yes/no)"** **(Ref= Yes)**
Intercept	0.7791***
Sex (Ref = Men) 　• Women	0.6876**
Age (Ref = under 45 years old) 　• Having more than 46 years old	-0.5897**
Have you been trained before or during the ISO 9001 implementation? (Ref = No) 　• Yes	-0.8934***
Level of Education (Ref =Having more than second level of education) 　• Having basic education or vocational training	1.3107***
Type of Firm (Ref = Service Firm) 　• Manufacturing Firm	0.2366
Max-rescaled R-square	0.1685

Source: MQS 2007 data base.
Sample size (number of employees) in 251 for the service firm and 111 for the manufacturing firm.
Notes: (*), (**) and (***) indicate parameter significance at the 10, 5 and 1 percent level respectively.

3. CONCLUSION

Our study seems to support the view that in the case of Montenegro, train their workers during the implementation of quality norms like ISO 9001 is a good way to ensure the success of this implementation. Indeed we show that the coefficient associated with the training variable is on average about -1.44 and is significant at a level of 1%. That is workers who are not trained during the ISO 9001 implementation are strongly less involved into the quality management process of their firms. This result is in accordance with Vujovic (2008) who using an expert system predicts that a major vector for Montenegrin firms to improve their performance during the implementation of a quality norm is to be oriented on employees' suggestions and involvement.

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