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THE IMPACT OF EFFECTIVE QUALITY MANAGEMENT ON THE IMPROVEMENT OF THE SUSTAINABILITY OF SMEs

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Abstract Small and medium-sized enterprises represent a significant factor in the development of the Serbian economy. These companies also play a key role in the global economy and in order to become competitive they must be able to deliver high quality products and services. In response to competitive pressures and customer demand, most SMEs strive to improve their competitive advantage by improving the quality of their products and services. Modern business practices, strong competition and openness of the international market require SMEs to apply the modern concept of quality. The aim of this paper is to examine the impact of effective quality management on improving the sustainability of small and medium-sized enterprises in the Republic of Serbia.

Keywords: Quality management; ustainability; SMEs.

1. INTRODUCTION

In today's business environment, quality stands out as the most important factor in the competitiveness of small and medium-sized enterprises, and understanding the concept of "quality", taking care of it and the complete philosophy related to quality directly affect their market position. The key elements of the modern understanding of quality are: responsibility for quality, quality control, consumer orientation, quality improvement [1]. Effective quality management involves rigorous processes that are able to continuously increase the economic and quality value of products or services.

Concept of sustainability has been studied extensively from various aspects in last two decades. Analysis of the sustainability concept depicts that there is no unique definition, model or solution. Large enterprises usually have appropriate and unique management approach for maintaining sustainable development but SMEs cannot simply apply those approaches because of different characteristics [2]. In [3] authors imply that SMEs need to develop practical implementation knowledge required for managing their sustainable success.

In order for SMEs to achieve sustainable success in today's highly volatile environment, they are forced to regularly monitor, measure, analyze and review their performance. In order to achieve sustainable success, it is essential that the organization continually works to meet the needs of its users and all stakeholders in a long-term and balanced manner.

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2. LITERATURE REVIEW

In order to meet the demands of consumers, SMEs are increasingly focused on improving the quality of their products and services [4]. Total quality management philosophy and its positive impact on sustainable development has been widely studied and confirmed in [5, 6, 7, 8]. According to [9] major motivation for SMEs to implement total quality management philosophy is the implication that it will bring significant benefits. TQM in an organization enables it to achieve a high level of quality by applying certain methods and techniques, constantly improving with the participation of all employees. In this way, it will also achieve a competitive advantage, which is very significant today [10]. In work [11], research outlines certain aspects of the impact of quality management on enterprise performance and growth. In [12] analyzed is the relationship between quality management and organizational performance in transition in a sample of 160 organizations in Serbia, finding that there is a significant relationship between the individual dimensions of quality management and emphasized that the relationship between quality management and performance should be investigated considering the conditions which houses the organizations.

The implementation of quality programs or quality improvement models, on which existing and proposed models can be based or can be developed for a particular company, often lead to major changes within the organization [13,14,15]. The research of [9], which included 4798 enterprises has given evidence that enterprises had significant improvements after winning Quality Awards, so the proposition that effective quality management program will lead to an improvement in profitability is proven correct. This raise the question does the effective quality management improves sustainability of SMEs on the territory of Republic of Serbia.

3. CASE STUDY

The impact of effective quality management on improving the sustainability of small and medium-sized enterprises in the Republic of Serbia as the subject of this paper was examined by empirical survey. Survey included 152 respondents who were employed in leadership positions in SMEs in the Republic of Serbia.

In this Section, hybrid model which integrates three variables is shown on fig. 1. Variables which are included in model are:

- Dominant Quality Factors (in figures DFK),
- Management and Organization Factors (in figures FMO),
- Organizational Context Factors (in figures FKO), as independent variables and,
- SMEs sustainability enhancement factor (in figures OU).

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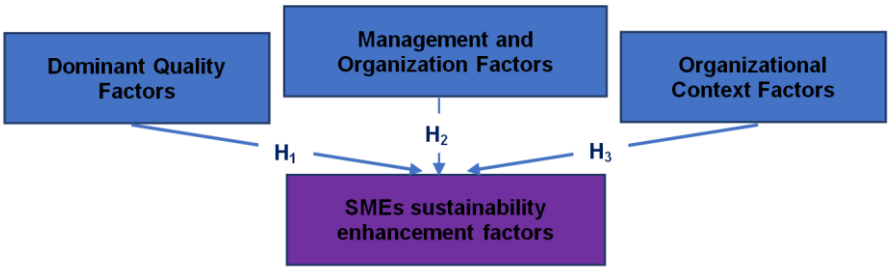

Figure 1. The impact of effective quality management on the improvement of the sustainability of SMEs.

Respondents were given survey, containing four main categories (fig. 1), to asses, with following components:

Dominant Quality Factors:

- The organization has the necessary competent staff
- Necessary staff competencies have been identified within the organization
- The organization is reviewing existing knowledge
- Measures are taken within the organization to acquire the necessary competencies
- The organization has provided all the necessary resources needed to establish, implement, maintain and continually improve quality
- The organization has provided the infrastructure for the implementation of operational activities
- The organization identifies and selects opportunities for improvement
- The organization shall ensure that non-compliant output elements are identified
- The organization has identified ways of external communication
- The organization has identified methods of internal communication
- The organization manages external processes, products and services
- The organization provided the people needed to effectively apply quality

Management and Organization Factors:

- Top management promotes the use of a process approach
- Top management ensures availability of resources for the quality management system
- Top management communicates the importance of effective quality management
- Top management ensures the integration of quality management system requirements into the organization's business processes
- The organization identifies the processes required for a quality management system
- Top management ensures that the quality management system achieves the intended results
- The organization determines the boundaries and applicability of the quality management system
- The organization maintains documented information on quality objectives

Organizational Context Factors:

- Top management maintains a focus on customer satisfaction

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- The organization monitors information from an external environment
- The organization monitors information from an internal environment

SMEs sustainability enhancement factors:

- Responsibilities for processes in the organization are assigned
- The performance of the process is compared with that of leading organizations and the results are used in process planning
- The organization regularly measures, analyzes and reviews its performance
- The organization collects and analyzes key performance indicators
- Organization learning is the foundation for the process of improvement and innovation
- Comparisons are made with other organizations to improve, innovate and learn
- Innovation is used to improve the way an organization operates
- The organization involves stakeholders in its audits to improve capabilities

The hypotheses arising from the designed research model are:

- H1: Dominant Quality Factors, influence SMEs sustainability enhancement factors.
- H2: Management and Organization Factors, influence SMEs sustainability enhancement factors.
- H3: Organizational Context Factors, influence SMEs sustainability enhancement factors.

The main hypothesis of the research is H0: Dominant Quality Factors, Management and Organization Factors and Organizational Context Factors, have influence on SMEs sustainability enhancement factor.

4. RESULTS

In table 1 are given values of descriptive statistics for all variables. The highest value has the variable OU and is 3.99, and the lowest value is the variable FMO and it is 3.90.

Table 1. Descriptive statistics covering all variables.

	DFK	FMO	FKO	OU
Mean	3,9692982	3,9046053	3,9824561	3,9991776
Std Dev	0,6648488	0,7099892	0,7396969	0,718934
Std Err Mean	0,0539264	0,0575877	0,0599973	0,0583132
Upper 95% Mean	4,0758459	4,018387	4,1009988	4,1143929
Lower 95% Mean	3,8627506	3,7908235	3,8639135	3,8839624
N	152	152	152	152

The values of the correlation coefficients for all variables are given in (figure 2).

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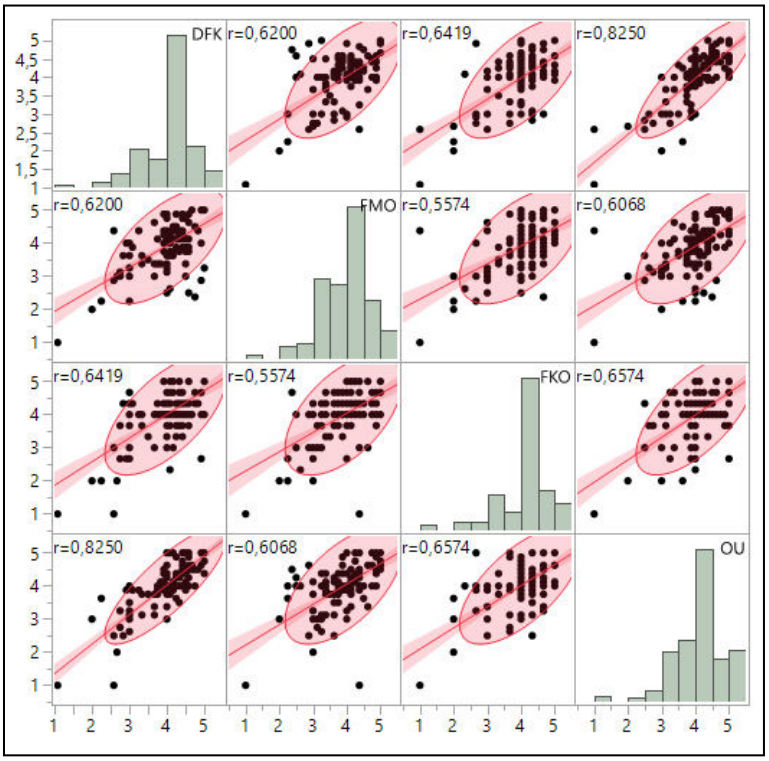

Figure 2. correlation coefficients covering all variables.

The correlation coefficient between the independent variable DFK and the dependent variable OU is r = 0.8250 and it is strong and the direction of the relationship is positive. The correlation coefficient between the independent FMO variable and the dependent variable OU is r = 0.6068 and it is medium strong and the direction of the relationship is positive. The correlation coefficient between the independent variable FKO and the dependent variable OU is r = 0.6574 and it is medium strong and the direction of the relationship is positive.

In Table 2, the model is evaluated and the coefficient of determination r2 = 0.680707 is calculated and it shows us that 68.07% of the variability of the dependent variable OU can be explained by the independent variable DFK.

Table 2. Model evaluation for variables DFK and OU.

Rsquare	0,680707
RSquare Adj	0,678578
Root Mean Square Error	0,407593
Mean of Response	3,999178
Observations (or Sum Wgts)	152

In Table 3, the model is evaluated and the coefficient of determination r2 = 0.368203 calculated and it shows us that 36.82% of the variability of the dependent variable OU can be explained by the independent variable FMO.

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Table 3. Model evaluation for variables FMO and OU.

Rsquare	0,368203
RSquare Adj	0,363991
Root Mean Square Error	0,573351
Mean of Response	3,999178
Observations (or Sum Wgts)	152

In Table 4, the model is evaluated and the coefficient of determination r2 = 0.432171 is calculated and it shows us that 43.21% of the variability of the dependent variable OU can be explained by the independent variable FKO.

Table 4. Model evaluation for variables FKO and OU.

Rsquare	0,432171
RSquare Adj	0,428385
Root Mean Square Error	0,543552
Mean of Response	3,999178
Observations (or Sum Wgts)	152

Estimates of the statistical significance of the independent variables DFK, FMO, and FKO and the dependent variable OU are given in Table 5 (ANOVA).

Table 5. ANOVA.

Source	**DF**	**Sum of Squares**	**Mean Square**	**F Ratio**
Model DFK OU	1	53,126990	53,1270	319,7880
Error	150	24,919782	0,1661	**Prob > F**
C. Total	151	78,046772		<,0001*
Model FMO OU	1	28,737027	28,7370	87,4179
Error	150	49,309746	0,3287	**Prob > F**
C. Total	151	78,046772		<,0001*
Model FKO OU	1	33,729514	33,7295	114,1638
Error	150	44,317258	0,2954	**Prob > F**
C. Total	151	78,046772		<,0001*

On the basis of statistical significance, it can be said that all the hypotheses raised can be accepted as follows:

- H_1: DFK has influence on OU,
- H_2: FMO has influence on OU, and
- H_3: FKO has influence on OU.

Coefficients for the independent variable DFK and the dependent variable OU are given in (Table 6).

Table 6. Coefficients for the variables DFK and OU.

Term	**Estimate**	**Std Error**	**t Ratio**	**Prob>|t|**	**Std Beta**	**VIF**
Intercept	0,4579	0,20077	2,28	0,0240*	0	.
DFK	0,8921672	0,04989	17,88	<,0001*	0,82505	1

On the basis of these coefficients, a regression equation (1) was prepared, which reads as follows:

$$OU = 0{,}4579 + 0{,}8921672 \cdot DFK \quad (1)$$

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Coefficients for the independent variable FMO and the dependent variable OU are given in Table 7.

Table 7. Coefficients for the variables FMO and OU.

Term	Estimate	Std Error	t Ratio	Prob>|t|	Std Beta	VIF
Intercept	1,6000251	0,260781	6,14	<,0001*	0	.
FMO	0,6144418	0,065717	9,35	<,0001*	0,606797	1

On the basis of these coefficients, a regression equation (2) was prepared, which reads as follows:

$$OU = 1{,}6000251 + 0{,}6144418 \cdot FMO \tag{2}$$

Coefficients for the independent variable FKO and the dependent variable OU are given in Table 8.

Table 8. Coefficients for the variables FKO and OU.

Term	Estimate	Std Error	t Ratio	Prob>|t|	Std Beta	VIF
Intercept	1,4546114	0,242196	6,01	<,0001*	0	.
FKO	0,6389439	0,0598	10,68	<,0001*	0,657397	1

On the basis of these coefficients, a regression equation (3) was prepared, which reads as follows:

$$OU = 1{,}4546114 + 0{,}6389439 \cdot FKO \tag{3}$$

Figure 3 shows graphically regression equations for the defined independent variables DFK, FMO and FKO and the dependent variable OU.

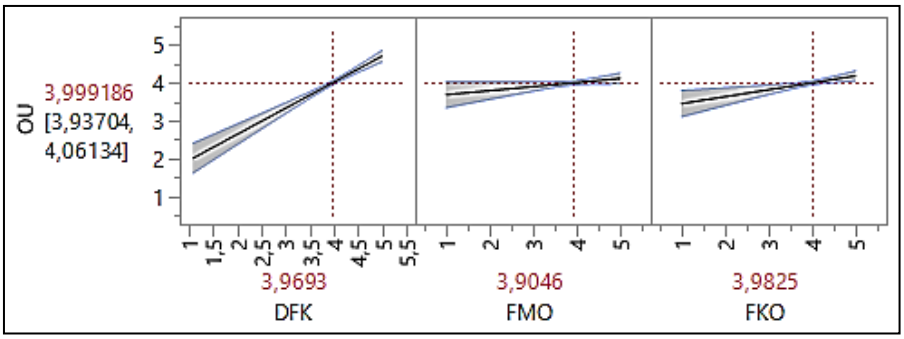

Figure 3. Graphic representation of regression equations.

Globally speaking, it is also possible to analyze the joint impact of the independent variables DFK, FMO and FKO on OU by compiling a multiple regression equation to test the stability of the solution. In Table 9, the multiple model is evaluated and the multiple coefficient of determination r2 = 0.714904 is calculated and it shows us that 71.49% of the variability of the dependent variable OU can be explained by the independent variables DFK, FMO, and FKO.

Table 9. Model evaluation for variables DFK, FMO and FKO on OU.

Rsquare	0,714904
RSquare Adj	0,709125
Root Mean Square Error	0,387741
Mean of Response	3,999178
Observations (or Sum Wgts)	152

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Estimates of the statistical significance of the independent variables DFK, FMO, and FKO and the dependent variables OU are given in Table 10. (Multiple-way ANOVA).

Table 10. Multiple-way ANOVA for all variables.

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	55,795939	18,5986	123,7077
Error	148	22,250833	0,1503	**Prob > F**
C. Total	151	78,046772		<,0001*

Based on the statistical significance obtained, it can be said that the main hypothesis from the research model can be accepted:

- H_0: DFK, FMO and FKO, have impact on OU.

Multiple coefficient values for the independent variables DFK, FMO and FKO and the dependent variable OU are given in Table 11. We can see that the largest influence in the equation is the independent variable DFK 0.638301 or 63.83%.

Table 11. Multiple coefficient for DFK, FMO and FKO on OU.

Term	Estimate	Std Error	t Ratio	Prob>|t|	Std Beta	VIF
Intercept	0,1105667	0,209414	0,53	0,5983	0	.
DFK	0,6902264	0,067923	10,16	<,0001*	0,638301	2,0481797
FMO	0,1072608	0,058743	1,83	0,0699	0,105926	1,7470609
FKO	0,1833254	0,057696	3,18	0,0018*	0,18862	1,8293071

Based on these multiple coefficients, a multiple regression equation (4) is constructed that reads:

$$OU = 0{,}1105667 + 0{,}6902264 \cdot DFK + 0{,}1072608 \cdot FMO + 0{,}1833254 \cdot FKO \quad (4)$$

However, the independent variable FMO has negligible influence, and therefore multiple regression equations are adjusted, so this variable is excluded from the research and only the independent variables DFK and FKO are left. This means that the hypothesis H0, now H01: DFK and FKO, have influence on OU.

In Table 12, a new multiple model is evaluated and a new multiple coefficient of determination r2 = 0.708481 is calculated and it shows us that 70.84% of the variability of the dependent variable OU can be explained by the independent variables DFK and FKO.

Table 12. Model evaluation for DFK and FKO on OU.

Rsquare	0,708481
RSquare Adj	0,704568
Root Mean Square Error	0,390767
Mean of Response	3,999178
Observations (or Sum Wgts)	152

Estimates of the statistical significance of the independent variables DFK and FKO and the dependent variables OU are given in Table 13 by a new multiple-way ANOVA.

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Table 13. Multiple-way ANOVA for DFK and FKO.

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	55,294688	27,6473	181,0583
Error	149	22,752084	0,1527	**Prob > F**
C. Total	151	78,046772		<,0001*

Based on the statistical significance obtained, it can be said that hypothesis derived from H0 can be accepted:

- H_{01}: DFK and FKO, have impact on OU.

The values of the new multiple coefficients for the independent variables DFK and FKO and the dependent variable OU are given in Table 14. We can now see that the largest influence in the equation is the independent variable DFK with value 0.685533 or 68.55% of the equation.

Table 14. Multiple coefficients for DFK and FKO on OU.

Term	Estimate	Std Error	t Ratio	Prob>|t|	Std Beta	VIF
Intercept	0,2154587	0,202952	1,06	0,2901	0	.
DFK	0,741301	0,062379	11,88	<,0001*	0,685533	1,7008221
FKO	0,2112451	0,056067	3,77	0,0002*	0,217346	1,7008221

Based on the new multiple coefficients, a multiple regression equation was prepared that reads:

$$OU = 0{,}2154587 + 0{,}741301 \cdot DFK + 0{,}2112451 \cdot FKO \quad (5)$$

It is no longer necessary to adjust the new multiple regression equation since both independent variables contribute significantly to the equation. The 3D model of the multiple regression equation is given in (Fig. 4.).

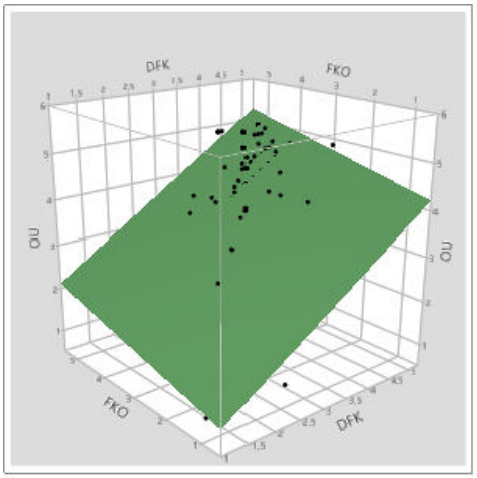

Figure 4. 3D representation of a new multiple regression equation for DFK, FKO and OU variables.

The expected height (OU) at each value of FKO and DFK is shown in fig. 4.

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3. CONCLUSION

There is no improvement in the sustainability of the SME sector, which is actually the goal of integration, without stable and strong quality management [16]. SMEs are the cornerstone of the most developed regions and generator of GDP in transition countries such as Serbia. All businesses must possess the appropriate competencies for management to have a positive impact on their sustainability. For sustainable success, effective quality management has become a key component in the development of the SME strategy. This research implies that quality factors and effective management have largest impact on sustainability enhancement factors which confirms research of [5, 6, 7, 8]. Dominant quality factors and organizational context factors have the largest impact on sustainability enhancement factors. With appropriate management of DFK and FKO the SMEs in Serbia can obtain significant step in acquiring global market requirements and sustainability.

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