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THE INTEGRATED QUALITY MANAGEMENT SYSTEM IN FUNCTION OF ENVIRONMENTAL PROTECTION: MONTENEGRO AS A CASE STUDY

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Abstract

The paper was created with the main target of environmental protection through the quality improvement and establishing an optimal approach for the integration of few quality management systems. Subject under consideration is a very important natural area in Montenegro, with all available resources and the existing organizational structure. The data base for analysis, from where experimental data arise, comes from 28 firm in area of Lake Skadar, as well as from general organisational structure of National parks in Montenegro. In this paper, methods of expert analysis and multicriteria decision tools are applied in order to finding optimal approach to integration, defining areas and measures for improvement in function of integrated environmental protection. The paper also analyses the world experiences in the application of integrated quality management systems, as well as other management systems, and on the basis of the mentioned methodology, an original approach for implementation and improvement environmental protection for the considered subject, and similar world areas, has been established.

Key words: *Integrated quality management systems; Resurs; Environment protection; Multicriteria decision.*

1. Introduction

This paper deals with the possibilities of developing an integrated quality management system at one of the most important area in Montenegro and in the function of generating profits for a wider range of stakeholders. Namely, the complex systems and natural resources that Lake Skadar area in Montenegro has at their disposal, represent an excellent basis for analyzing the possibilities of

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implementing an integrated management system, which leads to a model of overall performance and process management in order to continuously monitor performance indicators, continuous system upgrading and improvement from the aspect not only tourist, but also any other economic and socio-economic valorization of this area. In that direction, the best world experiences in the implementation of integrated systems were considered, with the aim of identifying the optimal conditions for valorisation and systematic management of natural resources and potentials of mentioned area.

In this sense, there are examples that many municipalities or cities implement and certify integrated management systems. For example, in the Montenegro neighbourhood, according to the requirements of the QMS were certified municipalities of Novi Beograd, Vračar and others. More broadly, examples are the city of Pula in Croatia or the city of Vienna in Austria that have a certified integrated management system. Precisely, in this paper we want to point out the contemporary approaches, advantages and disadvantages of implementation of integrated systems, with the aim of improving the management of natural resources, based on systemic approach in order to create a system of measurable perfomances, that is, systematic and continuous improvement.

The importance and necessity of establishing an integrated lake basin management system, due to identified problems of pollution, erosion, endangered flora and fauna and others, has been recognized on the example of Lake Toba in Indonesia, primarily through the activities of establishing educational centers, and better communication of the administration at the local and state level (Saragih, Sunito, 2001). The integrated quality management system, also contributed to better control of water pollution, reduction of costs and efficiency of water resources use, for example, in Ingjing Lake in China (Zheng, Jiao, Zhang, Sun, 2017). Additionally, integrated management systems must also have processes related to cost management and risk analysis, as well as to use modern information and communication technology for efficient resource management (Arabatsis, Manos, 2005). For Lake Trasimeno in central Italy, using computerized decision support system, enable to monitor the quality of water flowing into the lake, but also the use of water resources, depending on the needs of different stakeholders and in that sense to do one optimization through an integrated management system (Casadei, Pierleoni, Bellezza, 2016). Also, for the subject under consideration, environmental policies should be developed in a contextual decision-making process regarding local environmental concerns emphasizing the economic, technical, social and institutional considerations (Kardel, Mirosła-Świątek, Chormański, Okruszko, Wassen, 2009).

The goal of this paper is to provide the basic prerequisites for achieving the excellent performance of a single system, and to define priority measures and guidelines. In general, the aim of the paper is to point out the importance of integrated management systems, analyze and select the optimal implementation approach and recognize the contribution to improving the performance of the system - subject under consideration.

2. Experimental

The data base for analysis, from where experimental data arise, comes from 28 firm in area of Lake Skadar, as well as from general organisational structure of National parks in Montenegro.

A significant number of literature sources indicate that there are three strategies for the implementation of integrated quality management systems: the first implementation of QMS, EMS and other, either first EMS or QMS or at the same time both or more system (Karapetrovic, Willborn, 1998). Additionally, the literature sources indicate that the first strategy is most applied, but also that the third strategy gives the highest degree of integration and the most efficient system (Santos, Mendes, Barbosa, 2011 and Bernardo, Casadesús, Karapetrovic, Heras, 2012). Other sources point to two approaches in the integration of different management systems (Shahin, Dabestani, 2011, Vicencio-Ortiz, Kolarik, 2012, Zelnik, Maletič M, Maletič D, Gomišček, 2012 and Pho, Tambo, 2014). Following the first approach, the process is carried out through documentary implementation in accordance with the similarity of individual standards, while the second approach is to adopt the concept of total quality management that integrates all elements of individual standards into itself. According to this scenario and in one of the presented ways, QMS, EMS and OHSAS are first implemented, and then other systems potentially and where necessary could be join, for example the next:

- Energy management system (ISO 50000),
- Food Safety Management System (ISO 22000),
- Road traffic safety management systems (ISO 39000)
- Information Secure Management System (ISO 27000),
- Social responsibility system according to ISO 26000 standards and other.

Some authors (Mohammad, Osman, Yussuf, Sani, Jalil, 2013) suggest experiences in implementing integrated systems through two approaches:

- First implementation of individual standards, and subsequently their integration or
- Parallel implementation and integration of all systems from the beginning.

In this approach, experience indicates a significant dominance of the first, and additional experiences individually for each of these approaches are shown in Table 1.

In the process of implementing integrated management systems, it can also be said about integration at different levels, for example, at the level of processes, goals and resources.

Then we can speak of the degree of integration, that is, of full integration at all levels or of partial integration at only some of the predicted levels (Karapetrovic, 2003 and Bernardo, Casadesús, Karapetrovic, Heras, 2003).

Regarding to the implementation of integrated systems, many authors emphasize integration levels. In this sense, strategies from two (Simon, Karapetrovic, Casadesus, 2011) to five (Wilkinson, Dale, 1999) levels of integration are highlighted.

Table 1. Approaches and experiences in the implementation of integrated management systems

Implementation approach	Benefits	Common sequences in the integration of the management system
Individual implementation of the standards, and then their integration	When an organization has experience in implementing a single system, it can more easily associate others This approach requires less time	First implement the QMS, then EMS and join it, then OHSAS
		First implement individually QMS, EMS i OHSAS. Then integration.
		Start by implementation at least two systems, for example, QMS and EMS in particular, and at the same time. Then their integration, and after that implementation OHSAS and join it.
		First implemented EMS and OHSAS, as separate systems and at the same time. Then their integration, and after that implementation of the QMS and join it with previous system.
At the same time, the integration and implementation of individual systems from the beginning	Significant synergistic effect is obtained It is not necessary to implement an individual implementation at the beginning	Integrate QMS, EMS, OHSAS simultaneously from the beginning
		Integrate QMS and EMS simultaneously from the beginning, and then join OHSAS
		Integrate EMS and OHSAS simultaneously from the beginning, and then join to this system QMS

In this way, an interesting scale has been developed that shows the levels of maturity, i.e. the scope of integration (Table 2) (Abrahamsson, Hansson, Isaksson, 2011).

Implementation of integrated systems can also be carried out based on the harmonization of the norms defined in the QMS approach, with the approach of total quality management, especially emphasizing the process model, decomposition and accountability, as well as strong IT support that especially relies on the databases (Benhima, Reilly, Benhima, 2012). Certainly, the method of implementation and the number of individual systems that make up the integrated system depends on the object singularity. For example, a number of organizations are implementing integrated systems with a special emphasis on EMS and OHSAS norms as well as a risk management system (Rebelo, Santos, Silva, 2015). In general, and especially important from the point of view of this study, the implementation of integrated management systems brings significant profit for all stakeholders, in the broader sense so in Table 3 it is also shown on the example of profit, individually in relation to different stakeholders (Rebelo, Santos, Silva, 2014).

Table 2. Levels or scope of integration

Level of integration	Description	Comment
0	Processes and organization management are not based on any standard	
1	An integrated management system has not been established, but organizations operate on the basis of individual standards	Individually implemented e.g. QMS, EMS and OHSAS
2	Process identification has begun and around 30% (thirty percent) of identified risks are managed through an integrated management system	
3	An overview of all risks in the organization has been adopted and they have been identified. With more than 70% (seventy percent) of all identified risks being managed within an integrated management system	For example integration of QMS, EMS and OHSAS
4	More than 90% (ninety percent) of all identified risks are managed through an integrated management system	
5	All aspects of stakeholders are managed and controlled through an integrated management system	

According to the fact, mentioned above, it can be concluded that, literature sources indicate that integrated management systems are established primarily in the implementation of the main standards in terms of the needs of organizations or systems, such as: QMS, EMS and OHSAS, by different approaches. Primarily, integration is carried out on these standards, because they are very similar in structure, and subsequent integration of other standards is carried out. Also, the authors agree that there is no single method, model or standard for the implementation of integrated systems. Also, in the literature, it is often possible to find harmonized attitudes that point to the fact that there is no complete consensus on what is actually the integration of the management system and what is the unique methodology.

For the purposes of analyzing and selecting an optimal solution for the implementation of the integrated system, and according to the specificities of the considered subject, the AHP methodology (Analytic Hierarchy Process) and the associated Expert Choice software were applied in creating approach for integrated management system in the function of Lake Skadar valorisation.

Most of the world scientistics considered this approach as most efficient Decision Support System (DSS) and in the background of this approach, there is a mathematical mechanism based on 4 axioms: the reciprocity axiom, the homogeneity axiom, the axiom of dependence, and the axiom of expectations (Saaty, 1987, Harker, Vargas, 1987, Alphonce, 1997 and Eslaminasab, Dokoohaki, 2012).

Table 3. Significance of integrated management systems from the aspect of different interested parties

Interested parties	Benefits
Society	Business continuity and innovation, compliance with legal regulations, social responsibility, positive attitude towards tax and regulatory policy, environmental protection and social status, transparency, energy efficiency and others.
Customers	Guaranteed and harmonized product quality, competitive price
Employees	Motivation, employee satisfaction, transparency, fairness and the conduct of an ethical codex
Owners	Continuous orientation to improve performance, continuous improvement of partner relationships, productivity and financial stability, inventiveness development
Competitors	Guarantee of respect and relation to ethical principles
Partners	Strengthening cooperation on the principle of mutually beneficial relations, governing ethical principles and secured continuity

3. Results

According to the researched literature mentioned above, mentioned experimental data base and in relation to the goal for research object, and on the way of benefits for all stakeholders, as well as the efficiency and effectiveness of the integration process, 7 (seven), so-called alternatives (A – aleternative), are defined. They are:

- (A1) First implement the QMS, then EMS and join it, then OHSAS and ISO 39001
- (A2) First implement individually QMS, EMS, OHSAS and ISO 39001. Then integration.
- (A3) Start by implementation at least two systems, for example, QMS and EMS in particular, and at the same time. Then their integration, and after that implementation OHSAS and ISO 39001 and join it.
- (A4) First implemented EMS and OHSAS, as separate systems and at the same time. Then their integration, and after that implementation of the QMS and ISO 39001 and join it with previous system
- (A5) Integrate QMS, EMS, OHSAS and ISO 39001 simultaneously from the beginning
- (A6) Integrate QMS and EMS simultaneously from the beginning, and then join OHSAS and ISO 39001
- (A7) Integrate EMS and OHSAS simultaneously from the beginning, and then join to this system QMS and ISO 39001

Additionally, in order to make an assessment of the alternative, for the Lake Skadar area, 4 criteria (C - criteria) are defined (Table 4). From the aspect and the aims of this paper, and because importance of wider range of staceholdel, under fourth criteria, additionally 5 subcriteria (SC – subcriteria) for the Lake Skadar area

was defined (Table 4). Then was initiated an assessment for the subject of the research and his specificity. The assessment was conducted particularly and independently in the following way:

- Evaluation of the sub-criterion in relation to the goal,
- Evaluation of criteria in relation to the goal and
- Evaluation of alternatives in relation to criteria and sub-criteria, in accordance with the defined goal (one example in Table 5).

Table 4. Criteria and sub-criteria for research subject

CRITERIA	SUB-CRITERIA
(C1) Easy of implementation	(SC1) Impact on society
(C2) Effectiveness	(SC2) Impact on users
(C3) Efficiency	(SC3) Impact on employees
(C4) The importance of stakeholders	(SC4) Impact on owners
	(SC5) Impact on partner

During the process, a continuous assessment of the consistency of the decision-makers reasoning was carried out. At all stages, it was noted that the parameters are within the permissible tolerance limits. Based on the above methodology, Figure 1 shows the relationship between criteria and related alternatives, taking into account main goal.

Table 5. Example of evaluation alternatives in relation to criteria and sub-criteria

Crit. / Alter.	C4					C1	C2	C3
	SC1	SC2	SC3	SC4	SC5			
A1	2/1/2/1	3/1/2/2	3/1/3/1	2/1/1/1	2/1/1/2	3/3/3/2	3/2/2/2	3/3/1/1
A2	1/3/2/2	1/3/3/2	1/3/2/1	2/3/1/2	2/3/1/1	1/1/2/2	1/1/2/1	1/1/1/1
A3	1/2/2/2	1/2/2/2	1/2/2/2	2/2/2/2	2/2/2/1	1/1/2/1	1/1/2/1	1/1/2/2
A4	1/3/1/2	1/3/1/1	1/3/1/2	2/1/2/1	2/1/2/1	1/1//1	1/3/2/1	1/2//1
A5	2/3/2/3	3/3/3/2	3/3/1/3	3/3/3/2	3/3/3/3	3/1/1/1	3/3/3/2	3/2/3/2
A6	2/3/2/2	2/3/2/2	2/3/2/2	2/3/2/3	2/3/2/3	2/2/1/2	2/3/3/2	2/3/2/2
A7	1/3/2/2	1/3/2/1	1/3/2/2	1/2/2/2	1/2/2/2	1/2/1/2	1/2/3/2	1/1/2/1

Legend:
rating for every singular alternatives in sense of impact to the every single sub-criteria (1- low, 2 – good, 3 - excellent)
facilitator/participant1/participant2/participant3

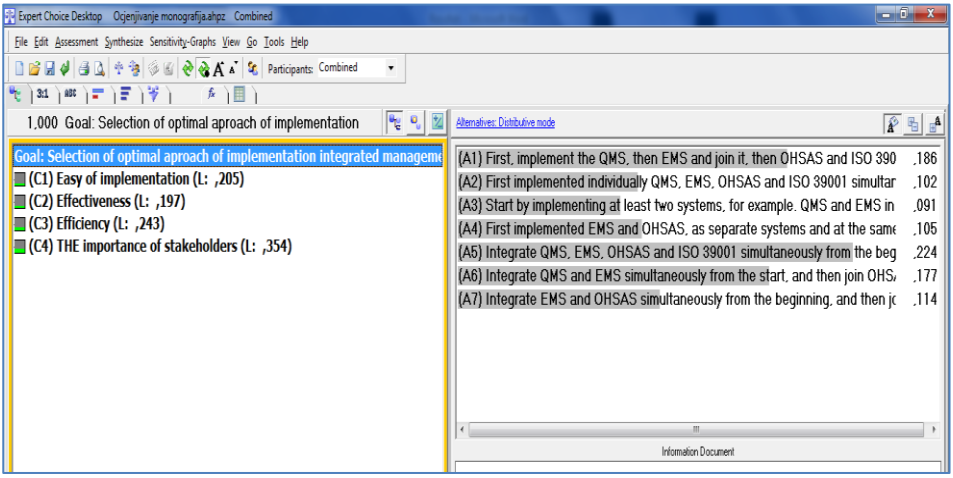

Figure 1. Criteria and alternatives in the applied methodology

After the calculation, the results, ie. coefficients of significance for each of the alternatives, criteria and sub-criteria are shown in Table 6.

Table 6. Coefficient of significance by alternatives, criterias and sub-criteria

	C1	C2	C3	C4				
				SC1	SC2	SC3	SC4	SC5
A1	0,851	0,554	0,582	0,285	0,493	0,582	0,225	0,285
A2	0,285	0,225	0,164	0,494	0,642	0,434	0,494	0,434
A3	0,225	0,225	0,285	0,345	0,345	0,345	0,405	0,345
A4	0,225	0,434	0,285	0,434	0,373	0,434	0.285	0.285
A5	0,373	0,851	0,703	0,703	0,851	0,791	0,351	1,000
A6	0,345	0,703	0,554	0,554	0,554	0,554	0,703	0,703
A7	0,285	0,494	0,225	0,494	0,434	0,494	0,345	0,345

By analyzing the obtained results, it can be concluded that, as an optimal approach for Lake Skadar, from the aspect of the specificity of the subject of research, as well as to the importance for a wider range of stakeholders, it is necessary to adopt an approach in the implementation of integrated systems, which consists of, simultaneously from the beginning, implementation of the following structurally complementary standards and that, QMS, EMS, OHSAS and ISO 39001 (alternative A5) with Coefficient of significance: 0,224. Further, by analyzing the obtained results, using Pareto methodology, or better say ABC analisis and 70/20/10 distribution, taking into account the specificity and state of the implementation of the subject systems in our environment, it can be concluded that the approach, which is very close to the previous approach, is the following: First implement the QMS, then EMS and join it, then OHSAS and ISO 39001 (alternative A1) with Coefficient of significance: 0,186. Bearing in mind the criteria and sub-criteria, and in relation to the identified priority approach to implementation, based

on the applied methodology, the situation can be analyzed according to the results shown in Table 7.

Table 7. Impact factors of the chosen alternative to criteria and sub-criteria

Alternatives	Criteria	Sub-criteria	Impact
A1	C1		0,049
	C2		0,024
	C3		0,037
	C4	SC1	0,005
		SC2	0,010
		SC3	0,008
		SC4	0,003
		SC5	0,004
A2	C1		0,016
	C2		0,010
	C3		0,011
	C4	SC1	0,009
		SC2	0,013
		SC3	0,006
		SC4	0,006
		SC5	0,005
A3	C1		0,013
	C2		0,010
	C3		0,018
	C4	SC1	0,007
		SC2	0,007
		SC3	0,005
		SC4	0,005
		SC5	0,004
A4	C1		0,013
	C2		0,019
	C3		0,018
	C4	SC1	0,008
		SC2	0,008
		SC3	0,006
		SC4	0,004
		SC5	0,004
A5	C1		0,021
	C2		0,037
	C3		0,045
	C4	SC1	0,013
		SC2	0,017
		SC3	0,011
		SC4	0,011
		SC5	0,013
A6	C1		0,020
	C2		0,031
	C3		0,035

Alternatives	Criteria	Sub-criteria	Impact
	C4	SC1	0,011
		SC2	0,011
		SC3	0,008
		SC4	0,009
		SC5	0,009
A7	C1		0,016
	C2		0,022
	C3		0,014
	C4	SC1	0,009
		SC2	0,009
		SC3	0,007
		SC4	0,004
		SC5	0,004

Hence, by applying simultaneous and from the beginning integration of all four systems (Alternative A5), it can be concluded that this is approach that will be primarily efficient (Impact factors is 0,45), i.e. that it will immediately give indisputable results in the environment, and that its secondary aspects are effectiveness and ease of implementation.

Also, in relation to the identified stakeholders, this recommended optimal model will primarily contribute to users (Impact factors is 0,17), and then to all other stakeholders, i.e. on society and partner, after that on employees and owners.

Very close approach is: first implement the QMS, then EMS and join it, then OHSAS and ISO 39001 (Alternative A1) which is much more easy for implementation, and also it will primarily contribute to the users (Impact factor is 0,010), and then to all other stakeholders.

4. Discussion and conclusions

The application of integrated management systems in developed economies is inevitable, and the benefits of such approach are multiple. This is evidenced by many scientific and expert papers that emphasize the importance of implementing such a management system, starting from the benefits for a wider range of stakeholders, the benefits for the organization and employees, to the proven profit of a financial nature.

Based on the available literature on the Lake Skadar, as well as the findings from practice, and from database from 28 firms in area of Lake Skadar, indicate that the mentioned approach of integration of several management systems based on some approach was not applied. On the contrary, they can even identify: non-systemic and non-standardized production approaches, insufficiently good environmental impact indicators, inadequate system of internal and external communication of stakeholders, then aspects of equipment management, infrastructure, workforce, and others. This state and conditions, with the additional demands of international organizations, as well as the experience of prestigious destinations in the world, must be an incentive to change the situation in the

direction of implementation of integrated management systems, based on internationally prescribed norms.

Application of integrated management systems in the Lake Skadar area is a way to improve the existing situation and create conditions for: improvement of business processes, risk reduction, systematic environmental management, improvement of parameters of protection of health and safety, traffic safety, as well as to provide greater recognition and trust on the international plane.

In this sense, there are different approaches to implementation, and from the aspect of efficiency, effectiveness and profit for a wider range of stakeholders. Namely, each of the approaches listed in the literature and applied in practice gives different results and benefits to stakeholders, but also has different parameters in terms of implementation costs, financial indicators, efficiency and effectiveness.

In this study we revealed that the best model for implementation integrated management system is one which is selected like Alternative A5, an it is: implementation QMS, EMS, OHSAS and ISO 39001 simultaneously from beginning.

Given the peculiarities of national conditions, a very good alternative to this approach is: first implement the QMS, then EMS and join it, then OHSAS and ISO 39001, selected like Alternative A1. Priority approach will immediately give the benefit to the environment, and from the aspect of the process, in the second plan will be its effectiveness and ease of implementation. Also, this recommended approach will primarily contribute to users, and then to all other stakeholders. Second alternative is much more easy for implementation but also it will immediately give results to users.

This approach will ensure that the area of Lake Skadar gets a systematic approach in the continuous improvement of business processes, guaranteed and harmonized quality products, employee motivation, ethics, transparency and fair approach to workforce management, continuous improvement of partnership relations, strengthening cooperation with partners on the basis of principles on both sides useful relationships, constant systematic analysis of aspects and environmental impacts and improvements in this regard, control and monitoring of risks in terms of safety and health, as well as business risk, greater safety in transport, greater international recognition and credibility, and more.

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