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THE IMPACT OF QUALITY COSTS ON THE LEVEL OF IMS MATURITY

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A B S T R A C T

The paper presents an overview of the impact of quality costs on the development and implementation of an integrated management System (ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018). Based on the assessment of the current state, the values of scrap and complaints in production business System s of complex structure were obtained. It is shown how continuous improvements can reduce costs and increase the efficiency of IMS if the causes of their existence are eliminated through improvements. The framework of all three System s functions on the basis of the PDCA cycle of continuous improvement, which is the key to all three standards. This is another reason that has enabled us to combine three System s into one Integrated Management System and to increase the maturity level of IMS through improvements.

1. INTRODUCTION

Integration of management Systems is increasingly being seen as an imperative for optimizing and increasing organizational management efficiency (Wilkinson & Dale, 1999; Abisourour et al., 2020; Ferreira Rebelo et al., 2014). In today's dynamic environment, the question is not whether management (Rebelo et al., 2014; Rebelo et al., 2015). Systems should be integrated, but rather which one is best for a specific organization (Asif et al., 2010; Asif et al., 2013). Since all organizations are different in terms of their goals and established business culture, it is difficult to develop a single integration model that would meet the requirements of all organizations (Samy et al., 2015; Zeng et al., 2007).

For the success of management integration, it is crucial that the company analyzes the situation and ensures that all involved individuals understand the process before the start of the integration process (Asif et al., 2009; Moumen & Aoufir, 2017; Ramos et al., 2020). This is the only way in which the implementation of an integrated management system will become an important factor in achieving sustainability and cost reduction (Oskarsson & Malmborg, 2005; Asif et al., 2011; Asif et al., 2013; Ronalter et al., 2023).

However, first there needs to be a parallel drawn between the concept of management systems and the concept of management (Karapetrovic, 2003;

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Domingues et al., 2015; Talapatra et al., 2019). It is a misconception that these two concepts are identical. They have the same structure, but different perspectives. The management system only encompasses technical resources, while management also manages human resources, with the goal of achieving performance (Salomone, 2008; Jørgensen et al., 2006)

If we focus only on performance, we cannot do business well. The same situation is true for the management process. Isaac Adizes says, "I do not agree with authors whose focus is solely on managing results. It should be managing for results, with appropriate processes." Primary attention is focused on the goal, but not on the means to achieve that goal (Simon et al., 2012). Almost all organizations prioritize financial results as their primary plan. By introducing a quality System into their organizations, many managers think they will solve all problems, including financial ones. Unfortunately, this is not the case, especially in the first years after introducing a quality system, particularly if the quality system is falsely introduced rather than real.

2. CORRELATION BETWEEN COSTS AND LEVEL OF IMS

Performance means achieving specific, measurable results in terms of meeting goals. An efficient management System that supports leadership enables managers to quickly analyze and evaluate achievements or performance in an appropriate form - tailored to their role and responsibility - in accordance with aspects of productivity/profitability, quality, environmental and occupational health and safety. Furthermore, measuring performance in these categories allows a well-founded management assessment of leadership in a pragmatic relationship with specific leadership requirements and established standard requirements.

From an economic perspective, performance focuses on measurements of cost/benefit (productivity, level of performance, yield...) that are suitable for the business model. Goals and measurement parameters need to point towards strategic positioning (cost management, niche positioning, etc.) and orientation. Productivity and quality are closely related according to contemporary understandings of performance. Key performance indicators are considered part of quality indicators. Costs can be shown, but benefits cannot be clearly assigned; therefore, the focus is on cost reduction, not maximizing return on investment.

Observations about the high cost due to a lack of training or personal risks for managers due to non-compliance with legal requirements usually become extremely important only in the case of actual damage. Complaints, waste, environmental damage, and scrap increase the potential for damage, which means that the benefit that arises from consistently applied Integrated Management System is often only visible through potential damage. Figure 1 shows the correlation between the amount of damage (scrap, complaints, rework...) and the maturity level of the Integrated Management System.

3. ASSESSMENT OF THE CURRENT STATE

3.1 Methodology for evaluating the current state

The necessary conditions for a realistic assessment using this methodology are:

- Elimination of the subjectivity of the assessor,
- Analysis of all processes, activities, and accompanying documentation, and
- Direct collaboration and objective relationship between the management and the assessor.

Three business System s were used for the analysis:

System A is a business System with more than 100 employees. This System has decades of experience in cigarette production, with significant production and personnel resources.

The second characteristic System examined is business System B in the food industry with 80 employees. The System has equipment for the production of juices and oils.

The third characteristic analyzed System is System C in the field of paper packaging production.

A very small number of companies track quality costs. Quality costs do not solve the problem themselves, but are just a tool that helps management understand the importance of problems in the process. Therefore, it is necessary to solve the problem of collecting data on quality costs and establishing a relationship between total quality costs, external, internal, and prevention costs.

Table 1. Table for assessing the current state

Grade	Assigning the maximum number of points for a question	Satisfaction assessment	Number of points		
BAD	**WEAK**	**UNCONVINCING**	**BORDERLINE**	**CAPABLE**	**EXCELLENT**
0	2	4	6	8	10
0%	20%	40%	60%	80%	100%

For each sub System of the observed companies, a certain number of questions were formulated. Each question was given attributes in the range from "poor" to "excellent", with a real basis for obtaining an

appropriate rating of both the entire System and its subSystem s, using numerical values from 0 to 10. The rating for each question is recorded in a table as shown in Figure 1. Each question is assigned a certain number of points in advance according to its importance.

After answering questions within a subSystem , the summary table is filled in as in Table 2, with the final evaluation of that request.

Table 2. Table for evaluating requests

Assigned maximum number of points	Earned number of points	Satisfaction percentage	Request evaluation

Results obtained by testing are presented in Table 3.

Table 3. Table for evaluating requests

External costs			
Name	SYSTEM A	SYSTEM B	SYSTEM C
Complaint costs	6.66	7.68	7.98
Transportation and travel costs	2.70	1.69	3.75
Other external defect costs	3.80	1.69	1.25
Total	**13.16%**	**11.06%**	**12.98%**
Internal costs			
Name	SYSTEM A	SYSTEM B	SYSTEM C
Scrap costs	36.18	0	31.92
Rework costs	5.71	29,00	11.92
Other internal defect costs	8.57	9.39	5.29
Total	**50.46%**	**38,39%**	**49.13%**
Preventive costs			
Name	SYSTEM A	SYSTEM B	SYSTEM C
Quality planning	1,6 %	1.9%	1.6%
Personnel training	1.9%	3.4%	5.29%
Process analysis and improvement methods	?	?	?
Quality monitoring	?	?	?
Equipment development and other costs	?	?	?
Total	**3.6 %**	**5.3 %**	**6.89 %**
Assessment costs			
Name	SYSTEM A	SYSTEM B	SYSTEM C
Laboratory testing	8,57	11,95	7,98
Energy costs	?	?	?
Control costs	13,33	7,68	9,32
Depreciation	?	?	?
Service costs	2,6	3,72	2,1
Measurement equipment costs	?	?	?
Material costs	?	?	?
Other costs	?	?	?
Total	**24,5 %**	**23,35 %**	**18,4 %**

BUSSINES SYSTEM A	91,72 %
BUSSINES SYSTEM B	78,1 %
BUSSINES SYSTEM C	87,4 %

From Table 3 it can be seen that for some costs there is no data, so the values for these costs were estimated. Also, it can be seen from the table that the sum of these costs is not 100%, which means that the costs for which there is no data make up the difference up to 100%. If prevention and assessment costs increase, total quality costs decrease. If the scope of preventive activities increases, total error costs decrease. In order to prevent future nonconformities, it may be necessary to modify the project, development process, production, packaging, transportation, or storage, to revise product specifications or revise the quality SYSTEM .

From Table 4, it is noticeable that a high percentage of quality costs for all business SYSTEM s are due to scrap, rework, and repairs, which means that attention must be paid to reducing internal and external errors. For such a high percentage of costs, the optimal strategy is investing in preventive activities which significantly reduces the costs of internal and external deficiencies. It is necessary to define which activities must be carried out to achieve the desired improvement, which would correspond to effective and efficient business operations. Obviously, these activities cannot be achieved without strategic quality planning from which improvement projects arise. Activities within the projects must be implemented step by step, because gradual and careful implementation of each step converges to a positive and efficient solution to the problem.

Table 4 provides values for scrap, rework, and complaint costs in percentage and in euros, while Fig. 2 shows a diagrammatic representation of these costs for all three states. Analysis and reports on quality costs have a purpose only if corrective actions are taken based on them.

Corrective actions can be directed towards:

- Eliminating quality deficiencies that are realized by professional services within normal authorization,
- Eliminating deficiencies based on quality improvement programs. Corrective measures are used when deficiencies are of such a nature that their causes are unknown or are only assumed. In this case, a team of experts from various fields should be formed to conduct analyses and identify causes, and then define measures to solve the problem,
- Regardless of the corrective action taken, the initiative must come from the management of the company.

Table 4. Values of scrap, rework, and complaint costs

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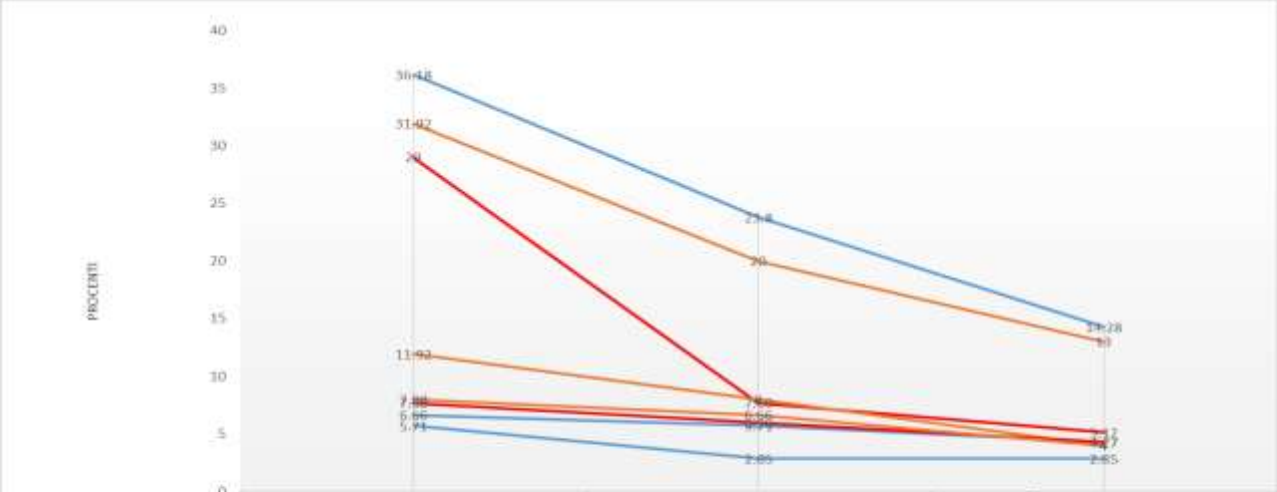
	EXISTING STATE	**IMPROVEMENT DESIRED**	**AMOUNT OF CHANGE**
Scrap			
System A	36,18% 110760	23,8% 72868	14,28% 43721
Savings		12,38% 37891	21,28% 67039
System B	0	0	0
Savings	0	0	0
System C	31,92% 3050	20 % 1906	13 % 1271
Savings		11,92% 1143	18,92% 1779
Correction			
System A	5,71% 17478	2,85% 8744	2,85 % 1023078
Savings		2,86% 8744	2,85 % 8744
System B	29% 12929	7,69% 3422	5.12% 2281
Savings		21,3% 9507	23,88% 10648
System C	11,92% 289	8% 762	4% 381
Savings		3,92% 381	7,92% 762
Complaints			
System A	6.66% 20403	5,71% 17488	4,27% 8744
Savings		0,95% 2915	3,81% 11659
System B	7,68% 3422	5,98% 2664	4,27% 1901
Savings		1,7% 757	3,41% 1521
System C	7,98% 762	6,66% 635	4,0% 127
Savings		1,32% 127	3,98% 381

Based on the values from Table 4, a diagram in Figure 2 was constructed, where the values for scrap, complaints, and rework costs are graphically represented for all three business SYSTEMs.

The results for the case of improvement and the desired amount of change are also graphically presented. As costs decrease, the maturity level of the IMS increases.



	Postojeće stanje	Poboljšanje	Željeni iznos promjene
Škart sistema A	36.18	23.8	14.28
Škart sistema C	31.92	20	13
Dorada sistema A	5.71	2.85	2.85
Dorada Sistema B	29	7.69	5.12
Dorada sistema C	11.92	8	4
Reklamacije sistema A	6.66	5.71	4.27
Reklamacije sistema B	7.68	5.98	4.27
Reklamacije sistema C	7.98	6.66	4

Figure 1. Diagram representation of scrap, rework, and complaints costs

4. CONCLUSION

In order to reduce quality costs, it is necessary to apply an effective improvement strategy. This involves focusing on preventive costs and appraisal costs. It has been proven on a concrete example that this approach reduces scrap and rework costs.

Integrated management SYSTEM can represent a very small, but sufficiently large basis for building business excellence, because it enables the organization to gradually shift its focus from customers only to all stakeholders. Integration of management SYSTEMs is crucial if companies want to achieve greater optimization and efficiency in their management.

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