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Integration Of Management System QMS/EMS/OHSAS/FMS/LMS In Water Supply Organization

Slavko Arsovski

Faculty of Mechanical Enginering, University of Kragujevac, Serbia

Zoran Punosevac

Union of taskmaster Serbia, Serbia

Dragan Rajkovic

Car factory, Kragujevac, Serbia

Abstract: *Level of difficulties arises when goes up number of integrated management systems (IMS). In this paper are given model and empirical research which provide the details of an integrated management system with five component subsystems in area of water supply. Presented model addresses the issues of scope and carracterisctics based on process approach and is tested in water supply organization in Kragujevac, Serbia. Testing in the proposed model is accomplish through realization project of design and implementation of IMS in regional water supply organization in Kragujevac.*

Keywords*: Integrated management system, Water Supply, Quality management system, Process Management*

1. INTRODUCTION

Management concept, system and standards such as ISO 9001, ISO 14001, ISO 18001, ISO 22000 and ISO 17020/17025, have been developed and introduced to deal separately with quality environmental, health and safety, safety food and laboratory issues respectively. The biggest problem in separately design and implementation of previos management system is low level of achieving strategy goals. From other side, arise needs for integration based on process approach and ICT. Integration of these system has not be straightforward. Researchs of Wilkinson and Dale (1999,2000) has shown that:

- parallel exist differences in understanding of term integration and ways of integration (through documentation and TQM)

- differences in the scope the system integration

- organizational culture is very important for success of integration process.

Karapetrović and Willbern (1998.) hade proposed the model based on the requirements of ISO 9001 and ISO 14001 with forming a so-called “system of systems”.

Starting with model of Wilkinson and Dale, autors developed original model based an process approach with strategy development using Critical Success Factors. (CSF).

Presented model addresses the issues of scope and carracteristics based on process approach and is tested in water supply organization in Kragujevac, Serbia. Testing in the proposed model is accomplish through realization project of design and implementation of IMS in regional water supply organization in Kragujevac.

2. STANDARDS AND NORMS FOR AUTOMOTIVE INDUSTRY PRODUCTS

IMS structure is based on Wilkinson and Dale model (Fig. 1) with including Process and CSF strategic approach.
Level of difficulties arises with number of integrated key process and systems. According

practice of Center of Quality in 50 organization with different number of employees, kind of production and service in Table 1 is presented carracteristics of sample.

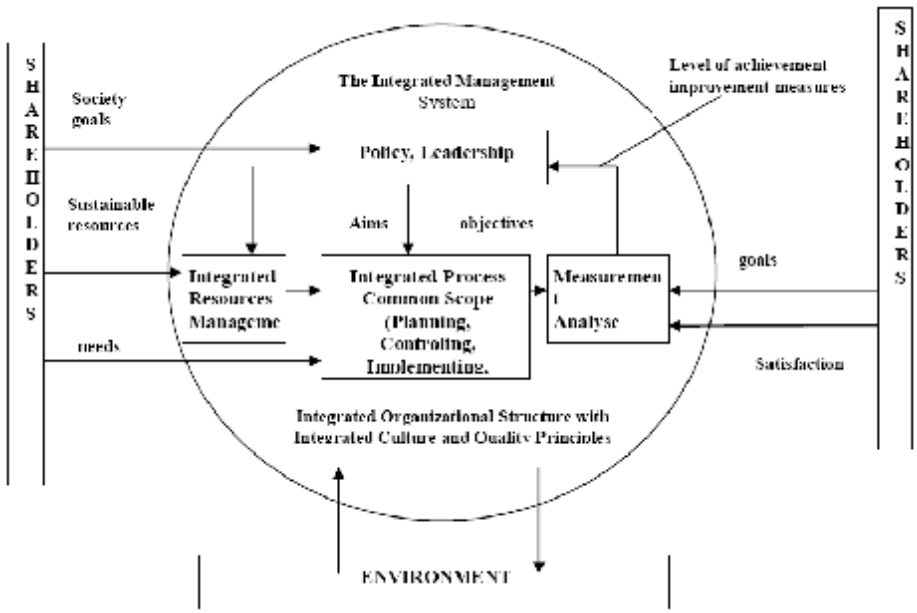

Figure1. Basic model of IMS

Table 1. Characteristics of the sample

% / Number of employees	Area				Total
	Manufacturing	Construction	Service	Food production	
1-9	2	-	14	8	24
10-49	6	2	8	6	22
50-99	10	-	8	-	18
100-249	10	6	-	-	16
250-499	2	-	4	-	6
>500	10	-	4	-	14
Total	40	8	38	14	100

Becouse difficulties of measurement using needed time and cost for design and implementation number of documents (effective) and number of involved experts,so we use model presented on Figure 2.

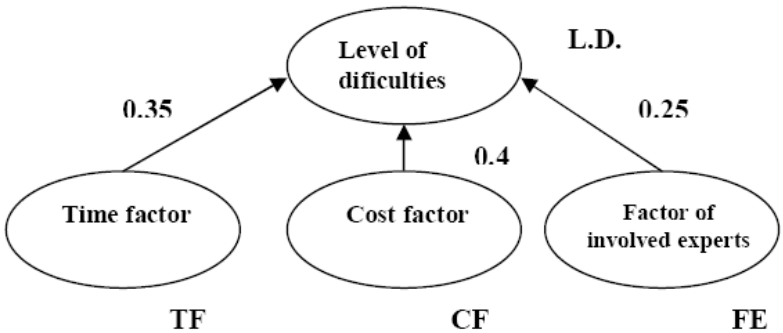

Figure2. Model of dificulties

Level of difficulties have been calculated as:

LoD = 0.35 X TF + 0.40 X CF + 0.25 X FE

Using data about LoD with different number of integrated key processes (NIKP) and particular management systems (PMS) we identife following relations (Fig. 3 and Fig. 4)

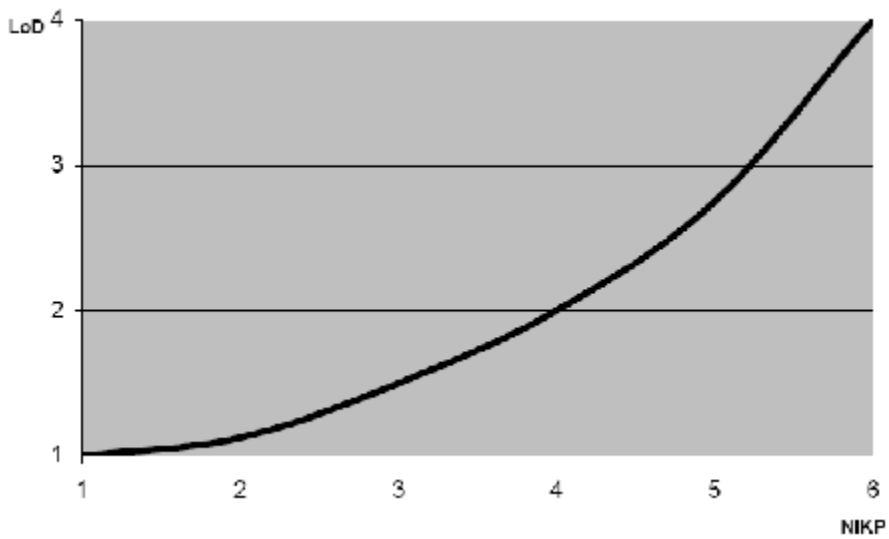

Figure 3. Influence NIKP on level of difficulties (LoD)

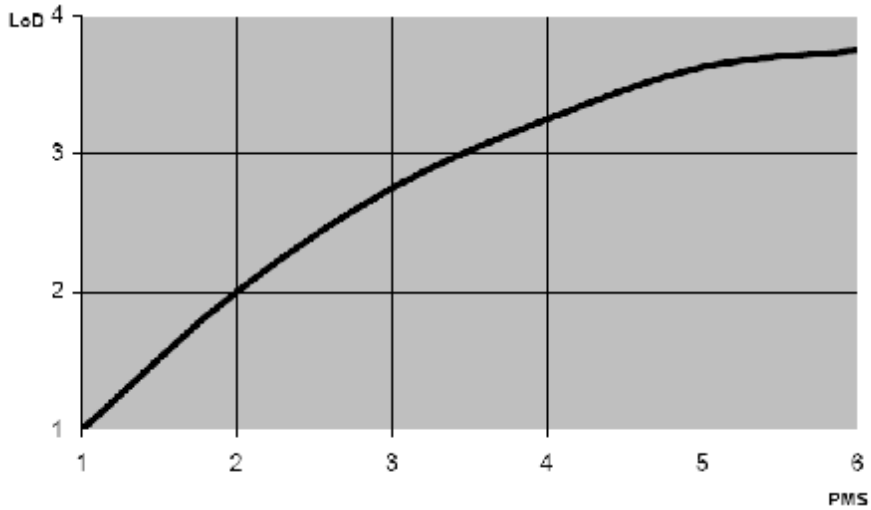

Figure 4. Influence PMS on level of difficulties (LoD)

Number of particular management systems arises from 2 to 5. Most of them in sample is with 2 (88%), then 3 (8%), 4 (2%) and 5 (2%).

In analysed organizations there are a variety of reasons for integration :

- reduced costs of development, implementation and maintenance
- reduced certification cost
- management system compatibility, and because that, more effective and efficient usage
- reduced involvement of scare human resources experts,
- reduced a requisite documentation
- increasing business process transparency

3. WAY TO INTEGRATION OF FIVE MANAGEMENT SYSTEM IN WATER SUPPLY ORGANIZATIONS

In organization theory, there is a basic rule:

1. foremost decomposition of different systems;

2. isolation of key element of integration and

3. integration of decomposed systems.

What is mutual, namely, which integration elements are key for above mentioned area? Above all, those are:

- same stakeholders, that is interest groups (employees, management, business associates, population, state, stockeholders);
- same organization and enviroment processes;
- same method and techniques, theory and practice of management;
- similiar concepts of process management;
- similiar resource management;
- equal measuring, analysys and improvement concepts;
- same top management responsibilties;
- same vision, mision and business politics of oraganization.

These common elements based on observing organization from diffrent views. Besides common IMS elements, we noticed specific elements for every partial management system too. Next, important question, that we need answer to is, whitch of mentioned integrated systems should be”the core” of integration? Answer to these questions depends on:

- already implemented management systems in organization;
- business area, category of documented business procesess;
- predominate stakeholders requests.

However, cause of QMS documented application in accordance to ISO 9000, and cause

of process approach utilized with in represent a good foundation for integration, suggestion is that in a most cases “core of integration” should be QMS. Besides that, other solution sholuld be take in consideration, other ”core of integration”, cause of specific nature of business processes and stakeholder requests.

Example of management integration procedure based on ISO 9001, is making possible

integration of other management system, starting from identification and defining:

- market state and needs;
- politics and goals;
- resources and resource management;
- management systems;
- communication systems;
- process menagement (including actions and operations too);
- measurement, analysys and improving systems;
- reconsidering management systems.

Appreciating integration of different menagement systems has own strategic and tactical

component. Strategic component refers to decision about management system integration, ”core integration” definition, defining integration and procedures, with obligational determination of goals and management system integration strategy. Tactical component refers to plan making and program integration, surveying management system integration procedure, making decisions in particular control points and reporting for strategic level.

4. IMS PROJECT CHARACTERISTICS

As previously stated, IMS project is complex project with recognized risk aspects. Each subproject has own risk in design and implementation, and is recognized risk of integration. Expirience of project teams and management of this project is needed condition, but is not sufficient. It is reason why used team organization with very close connection between consultants and working teams (Figure 5)

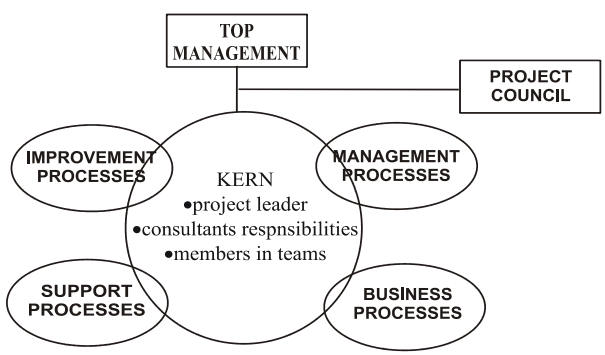

Figure 5. Project organization

For pilot organization in area of water supply and cleaning wasted water we recognized goals, processes based on strategic (top down) approach (Table 2) and folowing strategic statements:

VISION

In West Balkan region be a lider in supplying consumers with necessary quantity of quality and properly healthy water and draining and cleaning of wasted water.

MISSION

Reliable consumers supplying with necessary quantitiy of quality and properly healthy water and draining and cleaning wasted water.

POLITICS

Providing necessary quantity of quality and properly healthy water and draining and cleaning wasted water, with respecting requests of interest groups:

- Founders, from aspect of regular supplying of quality and proper health drinking water and protecting health care protection of population and protecting environment by draining and cleaning of wasted water,
- Employees, from aspect of occupational health and safety, as economical based payment too,
- Residents, from aspect of getting necessary quantity of quality and properly healthy drinking water and draining a wasted water, as protecting environment, with economical acceptable price,
- Business systems, from aspect of regular supplying of quality and properly health drinking water,
- Government, from aspect of harmony development of supplying of necessary quantity of quality and properly health drinking water, protecting environment and health care,
- Management, from aspect of effective and efficious process management of water

supplying and draining and distilling wasted water, with respect of limited water, financial and local resources.

Table 2. Organizational goals and processes

NO	GOAL	PROCESS
1	Increasing of water production	P1: Production and distribution of water
2	High quality of water	P2: Assurance of quality and safety of water
3	Draining and cleaning of wasted water	P3: Collection, draining and Cleaning of wasted water
4	Improvement of support	P4: § Maintenance § Transport § Selling § Purchasing § Etc.
5	Reduction of water loses and electric power and better payment for water consumption	P5: § Registration of water joints § Registration of consumers § Energy reductions
6	Improvement of environment protection	P6: Process of EMS
7	Improvement of safety on work	P7: Process of safety management
8	Accreditation of laboratory	P8: Calibration and Accreditation process

Using top-down strategic approach are determinated quality goals, critical success factors and key processes (Figure 6). Design and implementation of IMS are relized through combination of phase and nucleus approaches with following consumption of consultatnt days (Table 3) during project period.

Table 3. Consumption of consultant days

No	***Phase***	***Consumption***		
		6	**12**	**18**
1	Defining of project organization	2		
2	Realization of project plan	4		
3	Formulating and promotion of quality policy	2		
4	Identification of processes	20		
5	Analyse of existing management systems related to 5 ISO standards	46		
6	Defining the strategy and methods for IMS establishment	16		
7	Education of project Teams	23		
8	Education of employees		46	
9	Realization of documents for project management	8		
10	Detailed definition of processes		10	
11	Writing and adoption of documents		139	
12	Training for internal audit			15
13	Support for internal audit			8
14	Preparation for certification and accreditation			8
15	Sertification support			4
	Subtotal	121	195	35
	Total **351consultant days + 700 user days = 1051 man days**			

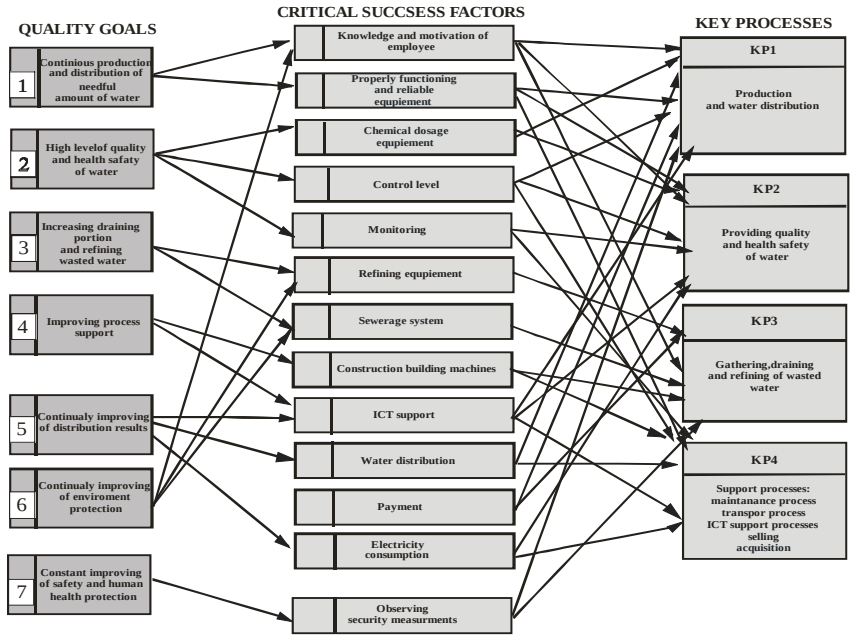

Figure 6. Determination of key processes using strategic top-down approach

In figure 7 is presented planed consultant and total working days during project period.

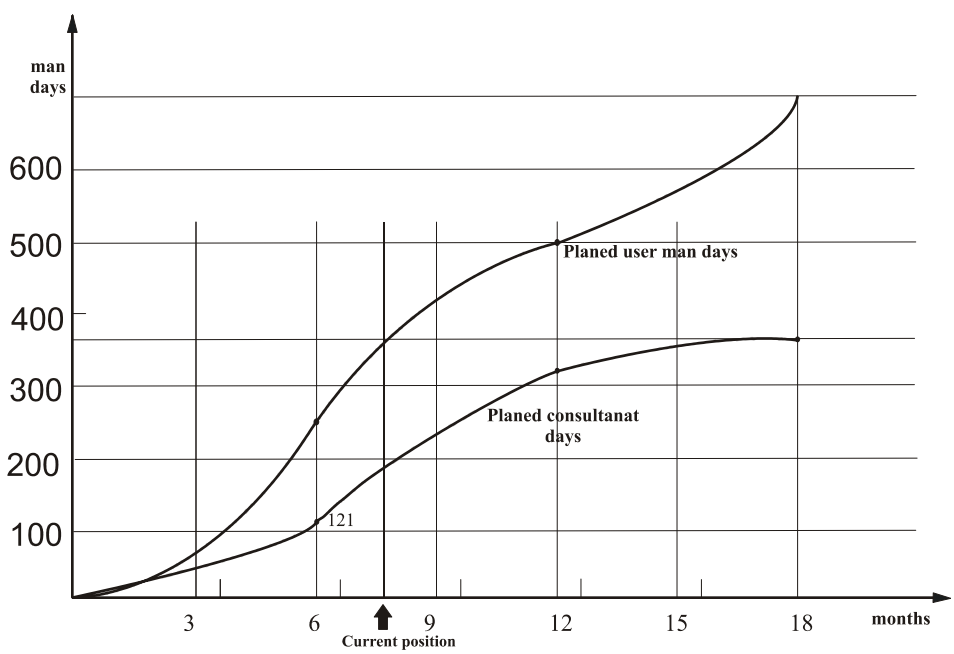

Figure 7. Expected flow of IMS project activities

In realization of this complex project are involved 32 consultants, 13 working teams with cca 42 employees. We expect in next phases engagement all rest employess (cca 700).
In first 3 months dominant role had consultant organizations (Center for Quality, Kragujevac, Serbia), and in next 3 months rapidly grow involvement of pilot organization. At the end of this project we expect total consumption of working (consultanat plus employees) months about 800. It is result of greater expected effort on introduction and final preparing for certification and accreditaion. If analyse this project from financial aspect, we can recognize dominant costs, presented on Figure 8. Characteristic of this project is very intensive engagement of consultant organization.

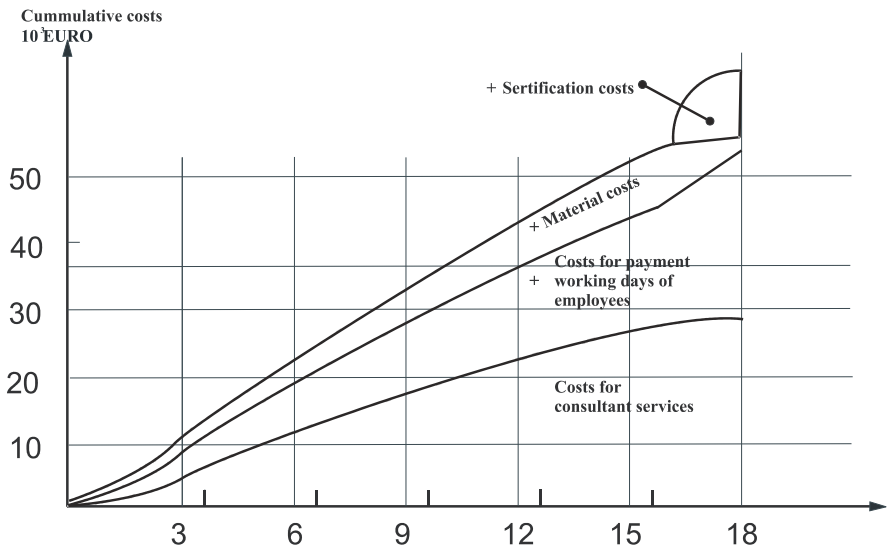

Figure 8. Cummulative costs during project period

5. CONCLUSION

From presented material we can conclude:

- integrated management systems is very difficult for design and implementation,
- using top-down approach from quality goals through critical success factors we can obtain critical (key) processes, and from those all processes related with quality in wider sense,
- for pilot organization, using concept of process management with intensive work of 13 teams,
- IMS project will be realized for 18 months, with 351 consultant-days and in total about 1050 man-days. That means about 1.5 days per employee,
- total cumulative costs is estimated on 65.000 euro, that means cca 4.8 euro per employee per month,
- expected benefit is much higher in area of cost higher satisfaction of clients,
- using cost/benefit analyze we calculate profit after 6 months from project realization.higher satisfaction of clients,
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REFERENCES:

[1] Pingry, D.E., Shaftel, T.L. and Boles, K.E. "Role of Decision – Support Systems in Water – Delivery Design", Journal of Water Resources Planning and Management, November/December, 1992., s. 629-645;
[2] Tang D., Five-year drinking water quality management plan, Sydney water, 2005, www.sydneywater.com
[3] A Brief Guide to Drinking Water Safety Plans, Drinking Water Inspectorate, DWI, 2005.
[4] Sohrab, National Seminar on Integration of Environmental and Quality Management Systems in the ESCAP Region, Bankok, 2003.
[5] Water Made Clear, Australian Government, 2004.
[6] LocalQuality of Life Counts (www.sustainabledevelopment. gov.uk/indicators/local/index.htm)
[7] Local Quality of Life indicators supporting local communities to become sustainable, Audi Commision, London, 2005.
[8] Integrated management systems in local public enterprise for production, distribution and cleaning of wasted water, International Quality Conference, Kragujevac 2006.
[9] Karapetrović S., Integration of Standardized Management Systems: Overview, INLAC World Quality Forum 2007., Ixtapa, Mexico
[10] Hughes L., et all, A Web-based Approach to Integrated Management System, 07 125, 2003.
[11] Wilkinson G., Dale, B., Integrated management systems: a model based on total quality approach, Managing Service Quality, Vol.11, Number 5, 2001, pp. 318-330
[12] Jonker J., Karapetrović S., Systems thinking for the integration of management systems, Bussines Process Management Journal, Vol 10, No 6, 2004., pp. 608-615.
[13] Karapetrović S., Musing of integrated management systems, Measuring Business Excellence, Vol.7, No. 1, 2003. pp 4-13.
[14] Bolognini B., Ciaripica F., Giacchetta G., Strategies for the Integration of Management Standards and Systems, 8th International Conference on Envirom. Science and Technology Lemnos island, Greece, 2003., pp.94-101.

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