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A NEW APPROACH TO QUALITY ENHANCEMENT: A CASE STUDY

Abstract: *There are a number of approaches for quality improvement that start from previously defined goal and definition of activities which lead to achievement of that goal. In this deterministic approach, risk in quality improvement has constantly been reduced by improvement activities, with relatively little increase in goal function. The basic approach is presented in the paper as well as measures and activities for decease of risk and vulnerability of quality improvement. This approach is tested in large company and part of results of model testing is presented in this paper.*
Key words: quality, enhancement, risk, vulnerability

1. INTRODUCTION

Quality has been one of the leading paradigms in the 21 century, specially because of its influence on competitiveness and quality of life. That is important why the constant improvement of the quality is imperative. There are a number of approaches in quality improvement; the most of them are based on Deming's PDCA cycle, in which A (Act) refers on quality improvement. Quality improvement, expressed by specific characteristics of quality or quality goals, express the aspect of quality which is important for customers and organization itself. Problems in quality improvement are: the increased complexity of business environment, dependence of number of external factors and environment so risk in quality assurance emerges as important influential value. The risk refers to internal and external business factors and between risk and quality interconnection exists, which is manifested by vulnerability of organization.

Considering that interconnection of risk – vulnerability - quality - competitiveness is less researched area, authors in this paper started with general idea that important field in quality improvement exists in connection with decrease of risk and vulnerability.

Suggested approach is based in incorporation of risk and vulnerability in quality improvement. The basic approach is presented in the paper as well as measures and activities for decease of risk and vulnerability of quality improvement. This approach is tested in large company and part of results of model testing is presented in this paper.

2. PROBLEM PROBLEMS IN QUALITY IMPROVEMENT

In theory and praxis of ***Q**uality **I**mprovements **(QI)*** there two different ways:

- continuous enhancement *(step-by-step)* which is incorporated in *ISO* series of quality management standards [1, 2, 3, 4, 5, 6, 7, 8, 9, 10],

- breakthrough management (business process reengineering) if is high discrepance in business performance with competitors [11, 12, 13, 14, 15],

Based on those two ways, in this are developed:

- ***T**heory **o**f **C**onstraints (**TOC**)*,
- *Six Sigma*,
- ***CMMI** (**C**apability **M**aturity **M**odel **I**ntegration)*, and
- ***W**orld **C**lass **M**anufacturing **(WCM)***, and many others [16, 17, 18].

Quality enhancement could be initiated in one of the three ways:

1. Strategy – driven projects,
2. Business issue – driven projects, and
3. Process – driven projects [19].

The first approach is presented in Fig.1, initiated by senior management and finalized ***L**aunch **P**ed **(LP)*** by process owners.

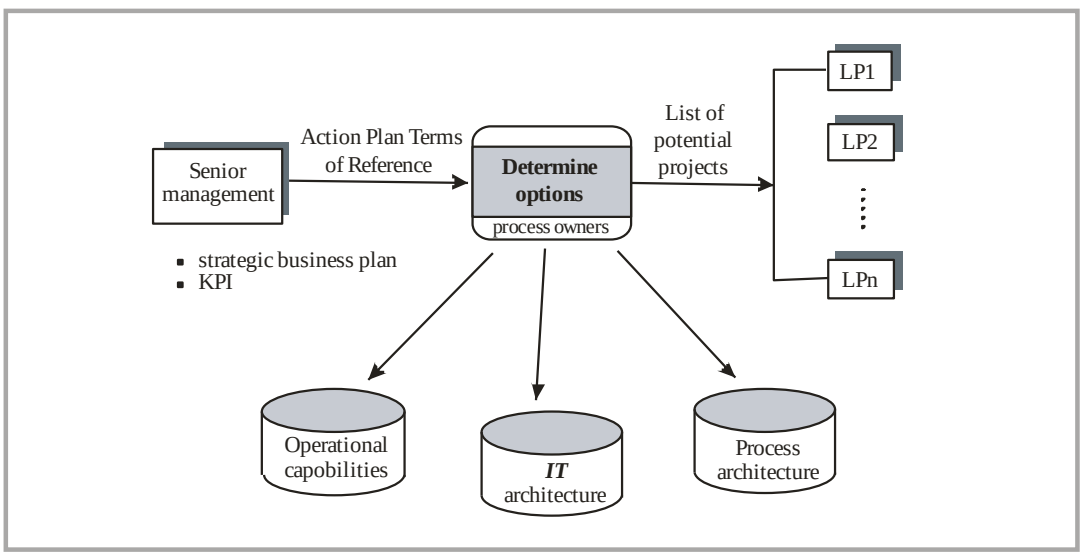

Figure 1. *– Generation of strategy driven projects*

In second approach, initiative is by operational or business unit or department, through coordination with process driven continuous enhancement and driven by business issue.

In a quality literature most favorable is process – driven approach. This approach views process enhancement as one phase in ***B**usiness **P**rocess **M**anagement*, i.e.:

- Organization strategy phase,
- Process architecture phase,
- Launch pad phase,
- Innovative phase,
- People phase,
- Develop phase,
- Implement phase,
- Realize value phase, and
- Sustainable performance phase.

In this approach [21], innovative phase consists from:

- External stakeholder focus groups,
- Initial innovative meetings,
- Future process metrics projections,
- Simulation,
- Create initial people change management strategy,
- Update people capability matrix,
- Capacity planning,
- Analyze of proposed solutions,
- Demonstrate & validate feasibility of proposed solutions,
- Process gap analysis,
- Identify benefits & update business case,
- Approvals, and
- Business requirements achieving.

For each phase of ***P**rocess **L**ife* is related risk. For innovative phase risks are:

1. Unsure where to start,
2. To many changes at once,
3. Selected to many options,
4. Organization has no vision and goals,
5. To small scope of innovative phase,
6. Not considered needs and expectation of stakeholders, and
7. Not enough support from management and vendors.

3. THE BASICS OF NEW APPRAOCH IN QUALITY IMPROVEMENT

The new approach in quality improvement starts from the structure of the participants in quality assurance, where each participant involves certain level of risk and vulnerability and broadly resilience as a capacity of organization to recover after performances failure. Starting hypothesis are:

- **H1** There is a correlation between risk and vulnerability and
- **H2** Decreasing of vulnerability increases level of quality of organization.

If we analyze risk and vulnerability in organization, they could be separated n layers according to participants in defining of quality *(Figure 2)*.

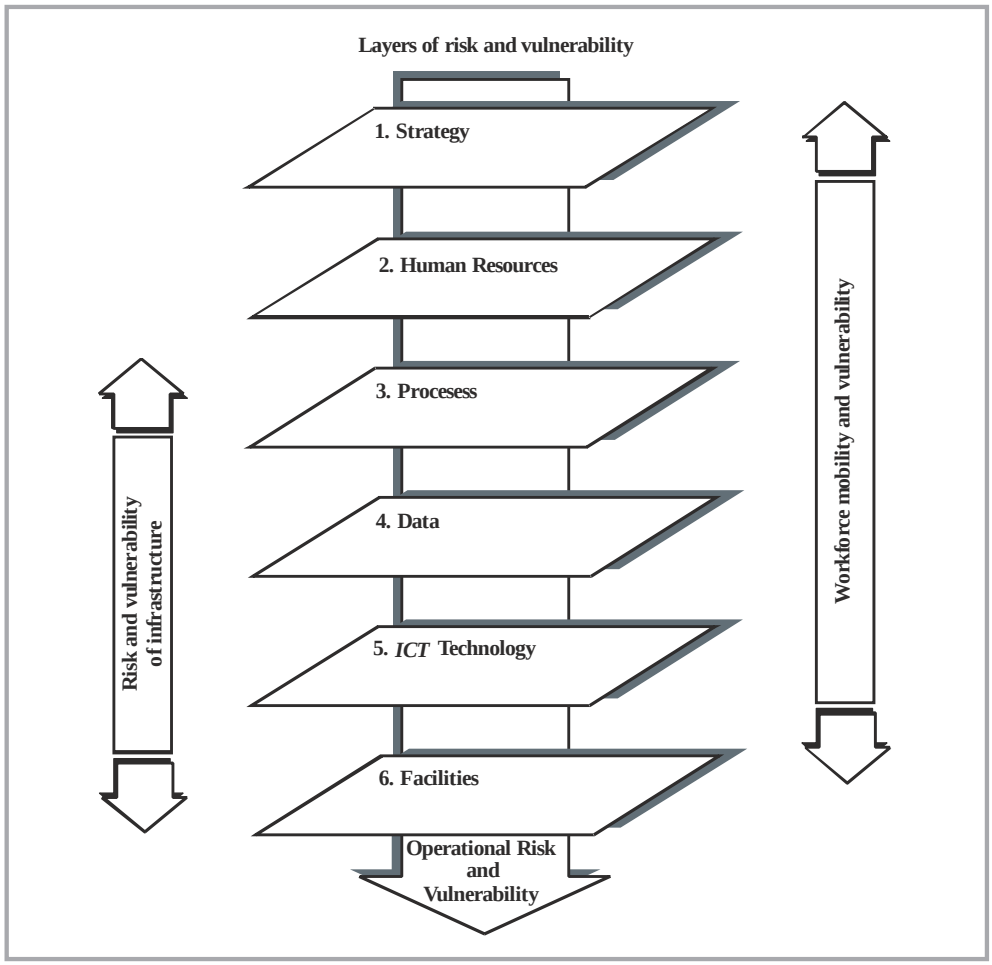

Figure 2. *– Phase of Operational Risk and Vulnerability Planning*

3.1 Risks and vulnerability of processes

Each process is functioning by:

- Inputs,
- Resources,
- Controls,
- Activities,

and outputs and outcomes as results. Inputs is related to data, resources to:

- Energy,
- ***ICT*** technology,
- Facilities,
- Finance,
- Human resource, etc.

On the process level, each input and resources are different, with different kind of risk and vulnerabilities. An example, for one big organizations for water supply, dominant risks are related to:

A - Environment circumstances (rains, floods, earthquakes, etc.)

B - State of pipelines
C - State of facilities
D - Finance,

E - Human resources related to motivation, knowledge and skills

F - Terrorist attack, etc.

Risk is function of frequency of hazard situation and consequence, *(figure 3)*.

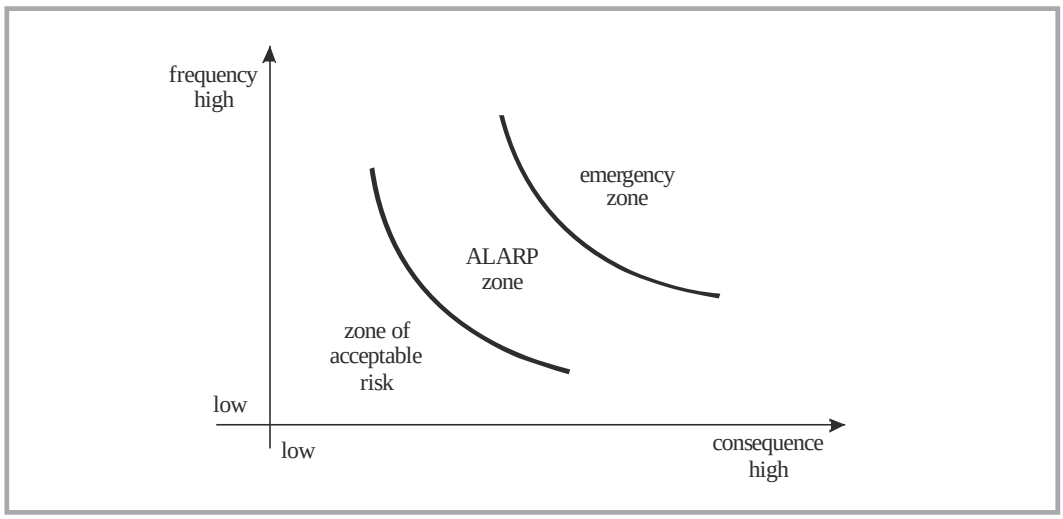

Figure 3. *– Risk function*

Vulnerability is broader aspect because it incorporates indicators:

KV1 - Planning – The extent to which the organization participates in risk management, business continuity and emerge new management planning.

KV2 - Exercises – The extent to which the organization makes external or internal emergency exercises for staff and stakeholders.

KV3 - Internal Resources – The capability and capacity of :

- physical,
- human and
- process,

related resources to meet expected minimum operating requirements in real crisis. If include financial and other economic resources, strengths for earthquakes.

KV4 - External Resources – Availability External Resources to engage in potential crisis.

KV5 - Connectivity – The extent of collaboration and sharing knowledge, skills and other, expert resource in event of a crisis.

On this way we propose a integrative model of risk, vulnerability, quality and competitiveness *(figure 4)*.

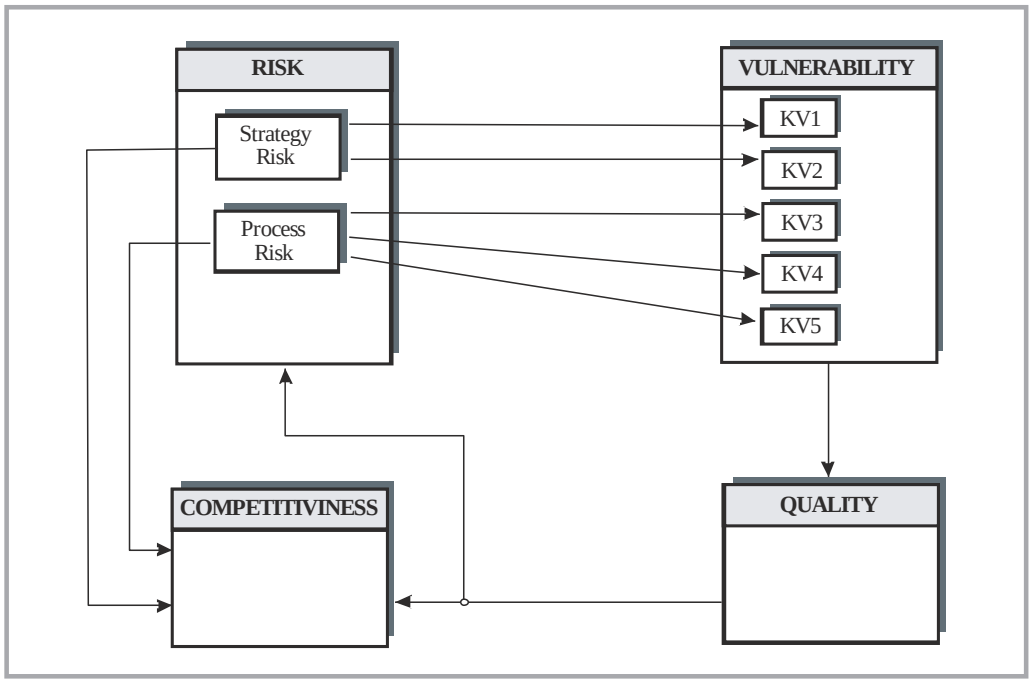

Figure 4. *– Model of integration of risks, vulnerability quality and competitiveness*

4. CASE STUDY

For analysis and testing of starting hypothesis in one large company working in the field of water supply, with introduced ***IMS (QMS/EMS/AHSAS/FMS)*** and two accredited laboratories according to ISO 17020 and ISO 17025 has been tested. The selected organization has high level of quality of its final product (production and water supply and recycling of water).

Strategic risks are identified on figure 5 and risk of processes on figure 6.

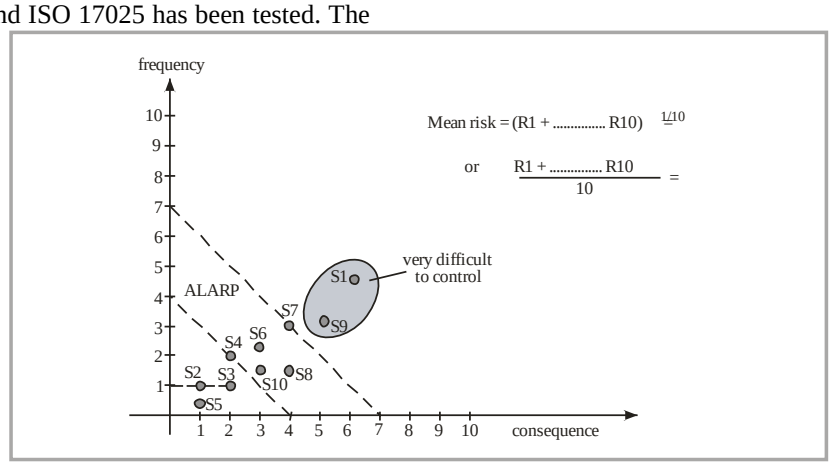

Figure 5. *– Strategic risks (S)*

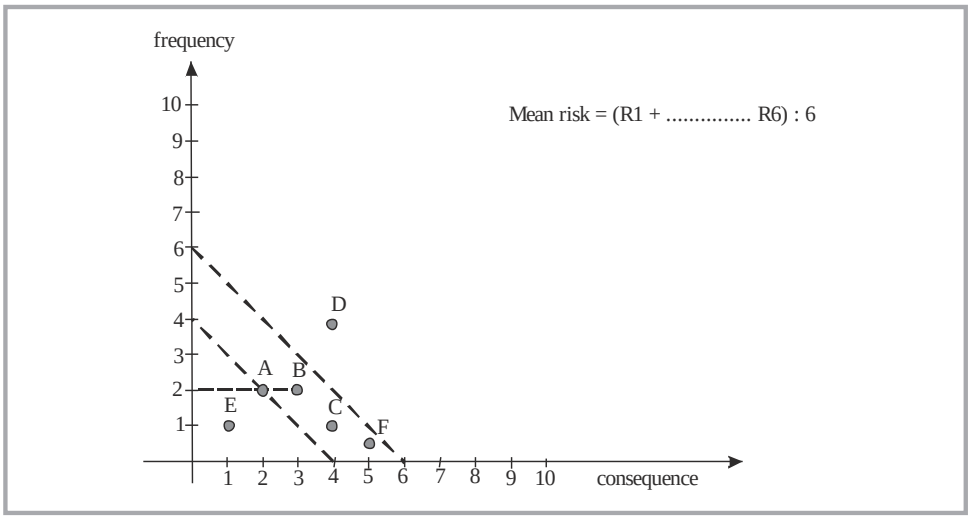

Figure 6. *– Process risks*

Total risk:

$$R = (Rs \cdot Rp)^{1/2}$$

Evaluation of vulnerabilities of organization, in 2010, are presented in table 1.

Component of vulnerability	**Component**	**Evaluation of vulnerability (1-the lowest, 10- the highest**
KV1	Planning	4
KV2	Exercises	5
KV3	Internal Resources	3
KV4	External Resources	6
KV5	Connectivity	2

Level of quality in previous period corresponded to level of risk and level of vulnerability *(table 2).*

Year	**Level of risk**	**Level of vulnerability**	**Level of quality**
2006	4.6	6.0	5.5
2007	4.3	5.2	6.2
2008	3.8	4.9	6.5
2009	3.5	4.5	6.8
2010	3.0	4.0	7.0

In *figure 7* is presented relation between risks and vulnerability, and in figure 7 relation between vulnerability and quality of organization.

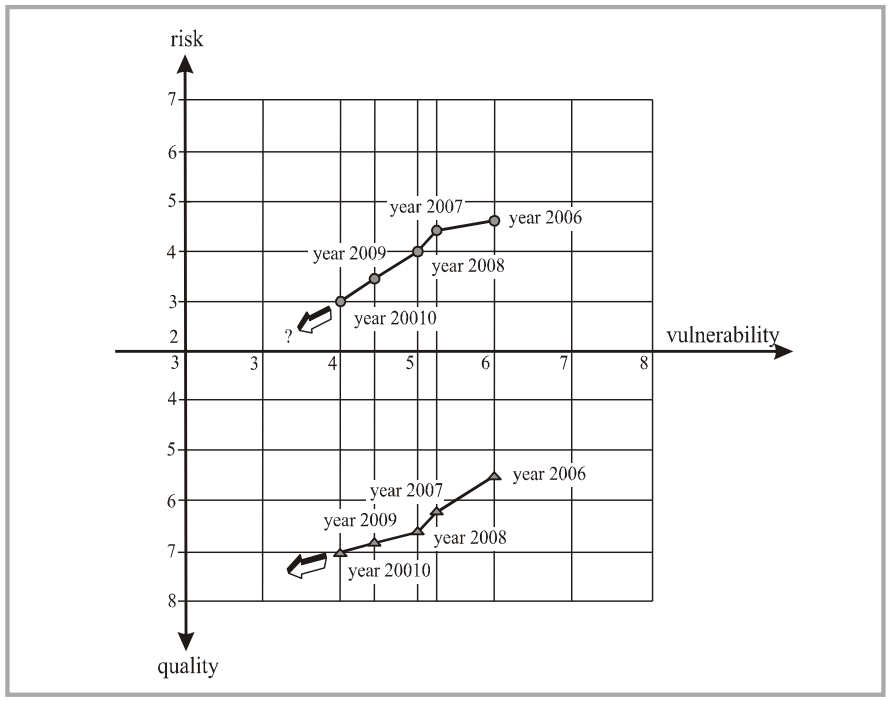

Figure 7. – *Relation between risk, vulnerability and quality of organization*

The first analysis show that starting hypothesis H1 is valid, and positive correlation exists:

vulnerability = f (risk) and

as well as H2:

quality = f (vulnerability).

5. CONCLUSIONS

From the previous analysis the following conclusions could be mad:

- Improvement of quality from the aspect of risk and vulnerability is not researched area;
- There is „strong“ positive correlation between risk and vulnerability, what makes starting hypothesis H1 valid;
- Between vulnerability and quality of organization there is a strong negative correlation;
- In the structure of the risks, in the observed organization, strategic risks connected S1m S9 and S7 are dominant, connected with environment and risks of processes connected with finances;
- In the structure of vulnerability the highest values are connected to external resources; and
- All stated implies that it is necessary to improve processes connected with environment (relations with stake holders).

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Acknowledgement
The research presented in this paper was supported by the Ministry of Science and Technological Development of the Republic of Serbia, Grant III-44010, Title: Intelligent Systems for Software Product Development and Business Support based on Models.