CIVIL ENGINEERING'S REEINGINEERING AS AN ESSENTIAL FACTOR OF CORPORATE BUSINESS STABILITY

Zlatko Lacković, DBA, Associated Prof.
Osijek Civil Engineering School

Abstract

The article deals with a new approach to the business system's managemental process improvement thru reengineering. Essentially, it pertains to the radical changes, whereby the new managemental, organizational, and especially decision-making methods are being applied. Thus, the topic contextually deals with the phenomenon, objective, and strategic behavior, i.e., concept, definition. It has been upgraded by process virtualization and an activity method development. In the sense applied, the very process pertains to the construction industry activities, which deserve it due to their dynamics in any case.

Keywords: reengineering, process, organization, development, virtualization

1. Introduction

In modern business transactions of all subjects, including the civil engineering ones, emergent is a need for managemental process dynamism as to secure business stability. In that sense, new methods emerge, whereby permanent improvement, i.e., mistake elimination and innovation introduction, are effectuated. Bearing in mind that civil engineering represents a very dynamic part of economy, the application of new managemental methods and procedures is imperative in this activity.

Civil engineering has special characteristics with regard to other economic trends and activities, especially the following ones:

- Immobility of civil engineering facilities as the work outputs;
- Voluminosity and product inseparability;
- Productional process length;
- Usage of high material quantities;
- Seasonal civil engineering production character;
- Individual civil engineering production character;

- Order-based production;
- High number of complementary production participants.[1]

The adduced civil engineering characteristics necessitate managemental dynamism in the sense of the new method and procedure application. Additionally, one should mention that civil engineering is the main dynamic instigator of the rest of economy and infrastructure. Known is the fact that economic development is significantly influenced by civil engineering dynamism. Moreover, any important economic developmental and infrastructural activity move enables civil engineering activation. One may add that civil engineering engages a large number of complementary participants as well as equipment and reproduction material manufacturers. Therefore, new methods and procedures, notably reengineering, should be constantly introduced especially in civil engineering. Basically, it pertains to a permanent improvement method as well as to drastic changes. Reengineering is actually created as a consequence of the following:

- Organizational crisis;
- Informational crisis;
- Innovational crisis;
- Morale crisis;
- Lack of technical progress.[2]

Pursuant to the abovementioned samples, it is necessary to introduce certain alterations in organization, new system and process creation, as well as other modern managemental innovations. Concretely, the introduction of reengineering implies a definition of fundamental entries, i.e., the concepts. A civil engineering's reengineering process is being established on the basis of a concept. As reengineering implies a permanent activity, it is necessary to define the dynamic, i.e., developmental, elements. A technological progress, especially the informatical technology application, should be taken into account

In all the adduced activities. Additionally, one should bear in mind that all changes are related to the each entity's ultimate business objective, being the satisfaction of desires or consumer, i.e., market, needs.

[1] Medanić, B. (1997), *Management u građevinarstvu*, Osijek, Civil Engineering School.
[2] Ređep, T. (2000), *Reinženjering poslovnih procesa*, Varaždin, Organization and Informatics School.

2. Concept

Rapid changes happening in a business-like environment under an increased impact of technologies, globalization, and market demands pronouncedly emphasize the reengineering process and its overall application. The fundamental Adam Smith's excogitation, whereupon the conventional technical processes were based, is being abandoned. It was fundamented on the following:

- Fragmented tasks are being assigned to the narrowly specialized workers;
- The workers are isolated in various organizational units;
- Effectuation of conflict positions between the main corporate organizational entities (procurement department, sales department, production, blueprint department, distribution, etc.).

The following is needed for the business process reengineering implementation:

- Divide a business process in the parts realizable up to the ultimate time;
- Group them into the subsystems according to the data;
- Define priorities;
- Define subsystems' connections via databases.

All have a congenial goal, being the consumer satisfaction, not the profit yield of the main units competing among themselves and leaving the profit yield obtained thru consumer satisfaction to someone else, what is feasible by virtue of a new radical blueprint, reengineering. That necessitates a process dismantling and its reassembling, denying fragmentation and necessitating teamwork and an overall process-solving approach. A technical process manager has to behave as a trainer who coordinates the operation of all processual parts. That can be performed by the keen, educated, and highly motivated employees who collaborate with the variously profiled specialists and work on the satisfaction of a congenial goal, profit realization. This problem is specially pronounced in civil engineering, where each construction site is a kind of a profit center. Profit distribution according to the results is an additional motive for a successful process realization. The following has to be done:

- Process synthesis;
- Employee classification;
- New employee evaluation method;
- New operational organization setup.

Thereby, one should take into account that a radical process solution approach should not hurt the employees directly, so the lab-based reengineering versions,

whereby the functional checkups are done and mistakes observed and eliminated, have to be implemented firstly, with the reengineering realization coming subsequently.[3]

A reengineering concept is based on processes and characterized by an attempt to make one job out of many while respecting the following procedures:

- Involvement of all employees in a decision-making process;
- Instrumentalization of certain processual phases following a natural, logical, and rational order;
- Acknowledgement that the processes have multiple realization modalities;
- Job operationalization where most adequate;
- Reduction of classic employees control and checkup modes, starting from the employee-oriented confidence;
- Introduction of a hybrid centralized-decentzralized organization.

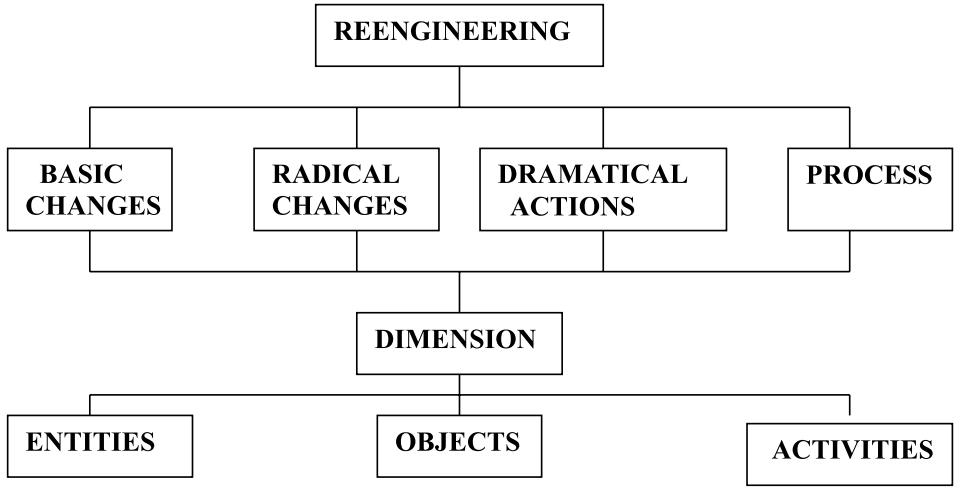

Fig. 1: Notions and activities

Reengineering could be presented by the following notions, as depicted by Fig. 1: the fundamental changes imply reengineering, i.e., one starts from ground zero subsequent to the processor division, and the basic alterations are to be done, a basic technical process objective set, and its exit and its purpose defined. Under a radical change, one implies the way in which that basic goal is to be realized, neglecting

[3] Veljivić, A. (2003), „Reinženjering poslovnih procesa," *BPR i organizacijske promjene*, Varaždin, p. 2.

the heretofore mode that has not produced satisfactory results. The goal realization venue could also be classified among the radical changes, as well as who would realize that goal. For the radical change realization, one should effectuate dramatic moves in the heretofore process in both the quantitative and qualitative sense, also resulting in expected dramatic improvements. The process is being created as a result of an overall activity, an activity set whose mutual interest is the achievement of a preset goal, earning a profit to a general consumer and corporate satisfaction.[4] In civil engineering, it pertains to multiple processes that have to be operationalized toward an ultimate goal, consumer satisfaction.

The dramatic moves' result is the creation of new processes, having completely new dimensions concerning the initial ones. The structure is a processual one, not functional any more. The operation mode is primary. The employees effectuating the change have to be intelligent, trained, highly motivated, and stimulated, aimed at the processual result obtainance.[5] A process created thru reengineering application is comprised of entirely new ingredients, being process-oriented and comprising the tightly interconnected entities.

Total Quality Management (TQM) implies managing the total quality.[6] As to realize it, it has to be incessant, providing for all employees' participance. The TQM has ensued from the following:

- An increased purchaser quality demand;
- Quotidian change monitoring;
- Know-how improvement.

Construction industry has to specially satisfy the TQM guidelines also due to the globalization processes, implying the creation of a common market. This process requires a voluntary employee involvement under a managerial surveillance and direction. It also requires a continuous employee education monitoring, their training, and qualification.[7] The result is a continuous product quality improvement. Fig. 2 depicts a difference between the TQM and reengineering.

[4] Veljivić, op. cit., p. 56.
[5] Rađep, op. cit., p. 8.
[6] Veljivić, p. 2.
[7] Veljivić, p. 3.

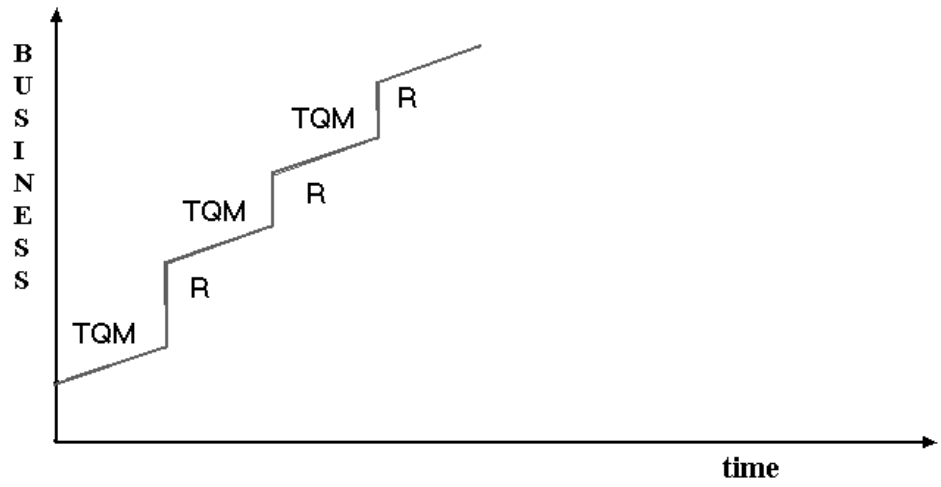

Fig. 2: TQM – reengineering difference

3. Goals

Necessary is an entirely new consolidation, in addition to the innovation-enabled changes. The long-term nonprofit and slow-paced improvements are being replaced while enabling the individual's activity as to improve creativity and self-learning in process participation.[8]

A productivity increase is obtained due to the introduction of information technology (IT). This very fact increases cost-effectiveness, as the first step toward business improvement. The processual investments are reduced, so the investment payoff rate is increased.

By virtue of IT introduction and direct data access and retrieval, both the input raw material resource, maintenance resource, and prefabricated products' differences are reduced. Systemic reliability improvement is increased due to a high IT reliability degree, thus influencing a cut in all processual costs.

Processual improvement and radical changes create a positive climate for further improvement and team and individual collaboration. It leads toward expert qualification and processual activity improvement of both the individuals,

[8] Lacković, Z. (2004), *Management tehničih sustava* (script), Osijek, Electrical Engineering School, p. 142.

stakeholders, and all employees. They become interested in further betterment, for the profit and stimulation and distributed according to the work outputs. The expertly qualified process participants enable the introduction of Computer-Integrated Manufacturing (CIM).

User demand is being centralized, influencing the process and regulating it, so that the process result becomes more competitive at the market.

The IT introduction does not only create an increased process reliability but also an increase in result quality due to the IT-based controls, which also affects market competitiveness.

Thru the introduction of reengineering, one may continue the improvement process at a higher scientific tier. This provides for good predispositions for further upgrades and processual betterments and the improvements of its personnel. Based upon practical experiences in companies wherein business process reengineering is conducted, the following data are being obtained:

- Quality increase by 84%;
- Reduction in product emergence time by 75%;
- Communicational improvements by 61%;
- Developmental costs reduced by 54%;
- Replacement reductions by 48%;
- Profit increase by 35%.[9]

[9] Lacković, ibid., p. 143.

4. Business Strategy in Addition to Business Process Reengineering

Fig. 3 depicts a reengineered business strategy, whereby the IT participation, combined with human resources (HR), domineers.

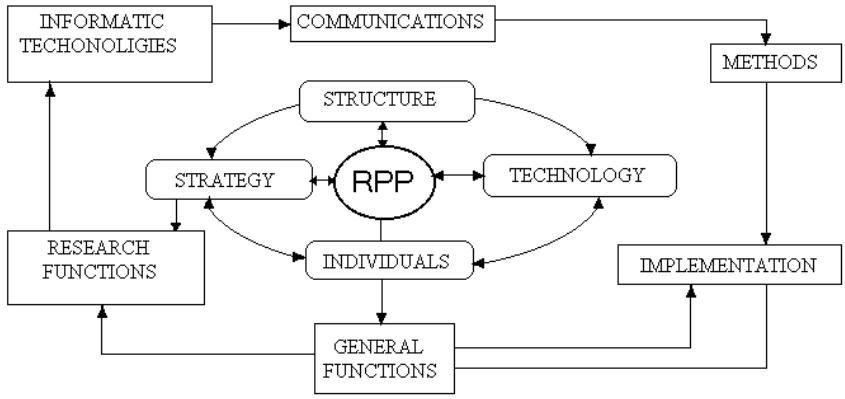

Fig. 3: Business strategy

BPR = INT CIM x (P_i + T_j + I_k + C_l)

BPR = business process reengineering

CIM = computer-integrated manufacturing

P_i = new competitive products (programs)

T_j = new highly productive technologies

I_k = new highly computerized technologies (IT)

C_l = high communication technologies (networks, the Internet)

The BPR is being created as an unavoidable consequence of business activity (CIM), other new competitive products (P_i), new production technologies (T_j), new highly computerized technology (I_k) and high communication technology's (networks, the Internet) introduction.

A new processual structure is created as a result of reengineered application and has a new operational strategy with the new technology application. All the changes positively influence the individuals as the process and its general functions' incumbents. A positive impact is manifested in the instigation of others to further explore, improve, and apply the research processually.

A new process structure enables further improvement at a higher level and an increased IT implementation in all processual segments, leading to the betterment

in both the intern and extern communication. The intern communication improves team coordination within a process, while the extern communication improves environmental analysis, thus inducing a better process regulation and a competitive increase. The improvement process is being continued and the new methods are being found, the implementation of which effectuates a betterment of the general processual functions. Each satisfactory improvement provides an impetus to go forward.

5. Reengineering in the Innovation Process Design

Reengineering represents the basic, radical, and dramatic changes. Thus, it does not introduce a single innovation in a working system but a series thereof, aimed at a business transaction betterment. These improvements are reflected as follows:

- Abbreviation of process completion time;
- Small-value process elimination;
- Productivity increase;
- Communication improvement;
- Further development expenditure cuts;
- Replacement reductions.[10]

As to achieve this, existent is a rational series of activities, depicted by a diagram on Fig. 4.

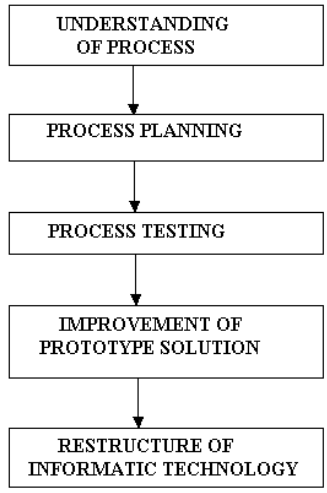

Fig. 4: Innovation process

[10] Lacković, ibid., p. 145.

As to launch a reengineering process, it is firstly necessary to conduct a detailed existent process analysis. Based upon this environmental impact analysis' results, created is a possible new process vision and a new process is planned. By virtue of an applied reengineering, a new processual model is being established. Prior to its processual implementation, it is necessary to develop a processual prototype and its functionality model. Subsequent to a checkup, one should make the possible upgrades and improvements to the prototype solution. Having all the preparations finalized, one should approach the IT restructuralization.

6. Reengineering Development

We live in the time of intensive changes.[11] Indubitably, the monitoring of these changes necessitates constant improvements but fails to achieve results quickly enough. Thru reengineering, we try to anticipate the changes, be visionaries, and effectuate radical processual alterations that would achieve satisfactory results for a company and a client. There are multiple reasons why to solve a business problem while applying reengineering. Firstly, the ever so quick changes that happen in the technical-technological and business field grow following a geometric progression. This alterational progression is observable thru the introduction of IT in all human life spheres, what has enabled the interconnection of heretofore unconnectable or hardly connectable processes, as well as that of human life. Thus, the communication between various fields, as well as a necessary information interchange, is brought to an envy-awakening level. Excogitated is a new common language and its communicational modality. A new processual and business solution model is being created, the fundamental changes have happened. The IT introduction has elevated the quality level, thus inducing an increased purchaser quality and design demand.

Initially, the ITs have been utilized solely administratively, for the automated data processing (ADP). A realization that the entire processual entities, and even the process as a whole, may be virtualized — realized thru the IT — is caused by virtue of their development, so that the organization increasingly becomes virtualized.

By the means of certain entities' virtualization, created is also a possibility of their interconnection, what has created a possibility of direct internal communication. Other processes are also virtualized, so an external communication capacity exists between two or more different processes and the environment.

[11] Idem, ibid., p. 138.

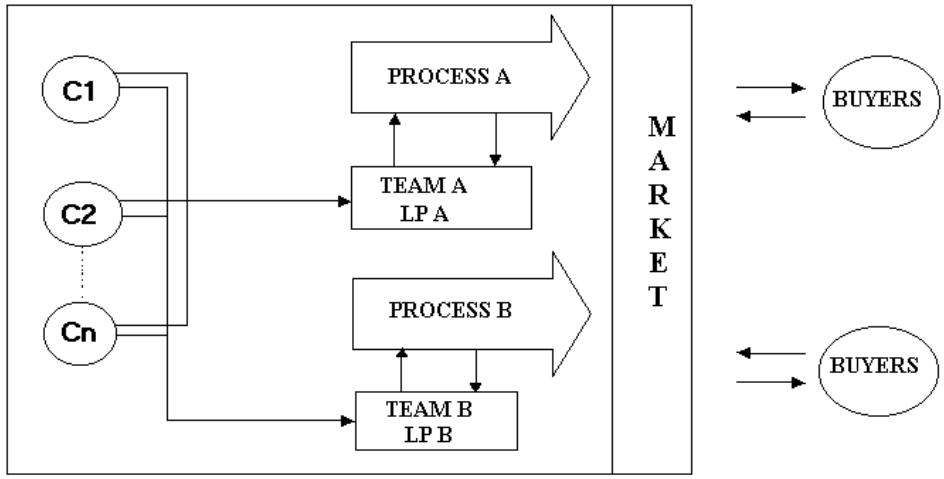

Fig. 5: Virtual system structure

$C_1 – C_n$ = education centers
PO = process owners (leaders)

The whole process was under the Board members' control, while either a product or a service user is in the center of a virtual system attention, determining the main business policy directives. A virtual system structure might be represented by Fig. 5, whereby it is visible that the process leaders are backed by educational centers, which might be located inside or outside a company. The processes exist for a user, and all of them are market- and user-oriented, organized via virtual systems. The systems (processes) dispose of all the necessary operative information directly. The users regulate the process operation, while the guidelines pertaining to further process development are dependent on the market status.

7. Conclusion

The aforementioned debate hypotheses demonstrate that the reengineering implementation represents a complex, permanent, and multidisciplinary process. An activity's complexity depends on the objectives, and the concept and strategic behavior are defined in this respect. A process is therefore a consequence of goals and the concept. It is worth emphasizing that everything proceeds in a spirit of dynamic virtualization, with a constant change tendency. The reengineering application is especially necessary in civil engineering due to its dynamism and this activity's representation in economy and infrastructure.

8. References

Adamović, Ž and D. Stojčević (1989), *Reengineering*, Zrenjanin Technical School.

Lacković, Z. (2004), *Management tehničih sustava* (script), Osijek, Electrical Engineering School, p. 142.

Medanić, B. (1997), *Management u građevinarstvu*, Osijek, Civil Engineering School.

Ređep, T. (2000), *Reinženjering poslovnih procesa*, Varaždin, Organization and Informatics School.

Vajić, I. (1994), *Management i poduzetništvo*. *Mladost*, Zagreb.

Veljivić, A. (2003), „Reinženjering poslovnih procesa," *BPR i organizacijske promjene*, Varaždin, p. 2.