

INDUSTRIAL CRISIS, X AND Y FACTORS, ORGANIZATIONS

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The financial crisis has created an industrial crisis. The typical example of this fact is the almost zero cost of fuel and handling in the shipping containers and freights. Half-empty freighters bring the signal of a worldwide collapse of manufacturing.

Industrial production fell in USA, Great Britain and Europe, in Brazil, China. The manufacturing is still seen and understood as a nationalistic problem, in fact has also the global character.

In spite of financial and economic crisis, the society depends on technological development, especially on new innovations. To provide the technical innovations means to have organizations, social-economic systems that are able to create new management approaches.

The proposal will be dedicated and aimed at new approaches of factors X and Y as well as to managerial strategy.

Key words: crisis, finance, industry, transport, manufacturing, innovation, theory X, Y, organization

1 Introduction

The dominant hard engineering approach has been introduced when for first time management has been taught. Management is rather science discipline then the art one. But, on other hand are coming the disciplines as psychology and sociology showing the further approach to organization and leading – through soft methods.

Both mentioned approaches have found the best classification in “Human Side of Enterprise” author of which Douglas McGregor has divided management style to Theory X and Theory Y, where Theory X represents command-and-control style and Theory Y assumed people will provide self- control and self-direction to achieve the organizational objectives.

University management education needs to connect the organization and leadership theories with the practical training. In many cases is possible to prepare business reality straight in university rooms and to lectures to add simulation game.

The simulation game can provide the training of reality for engineering students and to better understand how to get together hard and soft approaches for better integration of these elements in business and project management.

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2 Characteristics of changes and engineer's role

The phenomenon of global economy will influence the rapid changes in technology development. Global economy brings the new approaches to the business thinking and creates new economic paradigm with changes in the enterprise culture, in its environment, especially in the requirements of suppliers and customers.

These rapid changes do influence not only economic system, industry and enterprises, but also the engineering education system to be fulfilled the economic needs.

Technology is changing the traditional role of the engineer. The technology operations as design, prototype and manufacture of product or services included transportation, logistics, postal services will provide in a fraction of the time. The recent advance in computer and information technology realizes the coordination of all activities. The engineer must take a broader role in business, otherwise will be relegated to the role technicians as a profession.

The problems must be viewed from a system perspective and be able to deal with multidisciplinary. This approach means that engineering student will become not only an engineer but also a manager. He or she must understand besides technical and technology aspects also the social, environmental and political ones of solved problems. In other words, they must do more than design, production or service, but must be involved in all phases of product life cycles while managing complex system (project) with complex persons. All these aspects bring us the challenge for education system.

In the past and current situation, the industry senior engineers who passed technical education and operating experiences have filled these broader roles. These people have been the background in the hard knowledge as the mathematics, physics, technology, statistics, modeling and accounting.

These persons had started as young engineers in designing, and operation activities making mistakes and errors and growing to the position of middle management. Some persons of middle management had continued and worked up through the system and were allowed to train and develop managerial concepts, communication skills and leadership, less the environmental problems connected with the business operations.

To emphasize on profit, the changes coming within the global economy require that the education system must prepare student for complex role at the beginning of their careers. Generally said, the public opinion associates with engineer or engineering student as a person having good technical and technological skills (for these ones is hired), poor social and environmental skills and will be promoted for leadership and management.

3 Technical university education concept and management

Now is questioning how to bring the management changes and reality to the university environment. The approach for university training of engineers is taught them to divide the system or things up to small parts, to provide ways how these parts would be better and finally to put all parts together to whole. Typical approach is a Taylor's measuring of productivity of workers. The improvement was defined by time and motion. Occasionally either new academic disciplines or operation changes of reality in business have pointed out that it is possible something to add to the thinking on organizational improvement. To the hard disciplines as mathematics, technology, accounting, statistics and other technical subjects, new ways of communications, psychology, and sociology can bring better improvement of organizations. The 1990s returned back the engineering renaissance approach as a Business Process Reengineering, in this decade dominant managerial idea. This approach involved reorganizing the business processes (usually purchasing, marketing and distribution) cutting across the traditional organization originally based

product and geography. The division into parts and put together again. But new approaches how to provide the reorganizing of organizations is based on the four assumptions: decision process and rights, information, motivation and structure. The combinations of these elements can create different organization systems which are called organic as an opposite mechanic structure done by clear engineering way.

The history of industrial development was in every stage connected with the managerial changes. The current approach to the future situation is influenced through the following items: the change of environment, the change of customers and the change of competition. All these changes will cause the quite different future development of management. The new organizations must be created to be able to manage the new opportunities. The improvement of productivity was provided by time and motion. But, on other hand are coming the disciplines as psychology and sociology showing the further approach to organization and leading – through soft methods.

The changes in university education system have to be concentrated and aimed at the analysis and comparison from the three points of views:

1. The number of economic and management subjects and contents
2. The consequences of these subjects and integration within other ones including also technical and technology disciplines
3. The forms how the lectures are organized.

The synthesis should prepare the generally approach to the creation of education curricula. Education programs of technical universities have to be aimed at the three areas of subject:

- Technology
- Business and Engineering Economics
- Management Science and Leadership.

The education has to be conducted as an integration and logic consequences of all subjects because the engineering project is an integral set of processes technical, economics and managerial. For better cooperation among people in project, teamwork and communication skills create very important factors for successfully reaching aims of project.

Team is very important base of new organizational structure. Teamwork involves personal and social skills, team creation, interdisciplinary training, conflict solution, encourage ability and to maintain diversity. The teamwork is connected with two problems of education: technical proficiency and interactive problem solution. Technical proficiency is one of set elements called the hard knowledge. This proficiency can be demonstrated through such subjects as mathematics, physics, engineering disciplines, experimental approaches, data interpretation, system construction and application. Interactive method can be demonstrated through effective communication, ability to work together with a team, professional, ethical and social responsibilities, professional development, and managerial behavior.

There are two attributes of communication skills: oral and written expression. The presentation in both cases must be tailored to certain level of readers or listeners. The student must be supported in his/her abilities to communicate well alone or in groups. The student or engineer must be able to formulate and present parts of solved problem in writing or verbally presenting forms. It would be useful to train how to choose, to develop and to employ the suitable technical means of presentation.

Integration of communication skills, management skills, teamwork and leadership into curricula is also needed. Educator would develop implementation and integration and interdisciplinary that will engage students in teamwork. The focus must be aimed at case studies as a useful part of education

project and the possibility how to get the real engineering, management and decision problems to the classroom.

Management performance will influence the complex role of engineer in the following ways: engineering, environmental approach to the certain technology, economics and leadership (managerial behavior). The system approach to the industry and business from the holistic view of management skills falls into two categories: business (enterprise) management and project management.

Business management is aimed at organization to be profitable so that the needed skills include engineering economy, strategic planning, allocation of human resources, leadership and management behavior, teamwork, marketing and quality management.

Project management is connected with specific projects, in which an industrial system has taken the responsibilities. Project management has to be familiar with skills as planning including possible future environmental problems connected with the next activities as design, production, operation, maintenance and investment.

We must take into account the fact that both approaches are very close connected with team of educators and industry participants from all areas: technology, environmental sciences, economy, quantitative methods, psychology, and sociology. It is very important the cooperation and interest of industry to help to train students and self education of the engineers and managers from participating firms.

Education concept discussed in this article can provide the base for general idea of proposal of education system suitable for engineering students. The main problem is in fact how to get real situations to the class. The recommendations that could better serve to broaden skills might include:

- Universities being involved with industry.
- Replication of business whenever is possible. It can be used technical presentation, written or oral work, analysis beyond the technical aspects of a problem, teamwork with team manager. To use case studies with the higher frequency. and simulation game
- Introducing business economy in all solved problems.
- Solution of problems from the point of view of broad skills.
- Making a foreign language a viable elective in the project.
- Developing nontraditional approaches in traditional programs.

4 Conclusion and recommendations

The new ways in global economy and industry recognize that engineering students after their graduation will be more than only production engineers. They have to take into account besides technology competence the knowledge as an economics, management, teamwork, communication skills and leadership. The future engineering managers will be able to solve problems that require integration of technology, environmental sciences, economics, management and public policy.

In the long term, the education process will be influenced by demand of customers (from students to the industry client).

The student profile can be presented by the several groups of subjects which might be divided to the following groups:

1. Science and basic technical subjects.
2. Environmental sciences.

3. Management subjects supporting management knowledge
4. Personal development.

First group of subjects can include such courses as mathematics, physics, computer, general engineering and other courses relating to the engineering faculty tasks. Second group can include such subjects as Damages of environmental life or Management of life environment. Third group is connected with the management knowledge base and is devoted such courses as economics, resource management, time management, cost management. Personal development is oriented to the interpersonal skills, personal skills and ethics including professional, social and personal aspects.

This paper originated as a part of a CTU in Prague, Faculty of Civil Engineering research project on Management of sustainable development of the life cycle of buildings, buildings enterprises and territories (MSM: 6840770006), financed by the Ministry of Education, Youth and Sports of CR

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