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SPECIAL DEMANDS ON THE PROJECT MANAGERS, HOW TO TEACH THEM?

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Summary: Management skills and the use of different management techniques and methods basically influence the activity and future success of the project managers. The rational time, resource and cost management, the correct decision-making process and the selection of the optimal versions are essential in investments. The first aim of this paper is to present and prove how the different methods and computer programs can support the solution of technical-economic tasks in agricultural projects. Some of the most important skills, methods and management techniques are briefly presented. There are a lot of teaching methods in education to inspire students for individual learning, such as, the project method, and the problem-based learning (teaching with cases), etc. The project method is the execution of projects in which a student, or group of students, undertakes to gather and integrate data relevant to some problems. The variants of problem-based learning include the case method, the guided design and simulations. The focus is on the case methods, which are intended to develop students' ability to solve problems using knowledge, concepts, and skills relevant to a project. The second aim of this paper is to characterize these teaching methods in engineering management educational programmes based on literature and gathered experiences.

Keywords: functional management areas, project management skills, teaching methods

1. INTRODUCTION

The project managers' professional knowledge is very important, which means a deep theoretical background and practical skills in agriculture, industry or in services. The technological knowledge is also important because technical resources and equipment play an important role in the whole process of a project. All of these are really necessary, but not enough to manage a complex project successfully, because economic and general management knowledge is also badly needed.

Management skills and the use of up-to-date management techniques and methods basically influence the activity and future success of the young project managers. There is an increasing need to use different types of software for the rational resource and cost management, the appropriate utilization of machinery, the correct decision-making in investments and select the optimal version (Belcourt et al., 2000).

The first aim of this study is to present and prove how the different methods and computer programs can support the solution of technical-economic tasks in agricultural projects. A detailed knowledge of general management is very useful, but a wide range of functional management areas is also essentials. All of these areas have different characteristics and an experienced project manager has to know most of them. In a case of a project these functional management areas are not separated they usually appear as complex tasks. It is not easy to list the most important functional management areas, because they are all necessary ones, but in this paper six of them are examined.

Concerning the successful project management the teaching and improving of these management skills are important tasks. It is especially difficult in the basic (graduate) level of

studies when the students do not have enough experiences in managing and completing projects (Hartman, 1999). In the different courses, it needs different approach, teaching methods and case studies. One of the important goals of education and training is to help students develop the ability to continue learning after their formal education is complete, thus it is reasonable that they should have supervised experience in learning independently. They should gain experience in which the instructor helps students learn how to formulate problems, find answers, and evaluate their progress themselves. We might expect the values of independent study to be greatest for students of high ability with a good deal of background, since such students should be less likely to be overwhelmed by difficulties. Beside this, motivation and work habits are also very important. The second objective of this paper is to characterize these teaching methods in engineering management based on literature and gathered experiences.

2. MATERIALS AND METHODS

Concerning the main objectives of this paper - it is an interesting question - when and how do we teach the six functional management areas for our students, for the young project managers. On our Faculty we offer four different BSc programmes for our students:

- Mechanical Engineering,
- Agricultural and Food Processing Engineering,
- Mechatronical Engineering and
- Engineering Management.

Engineering Management is a relatively modern teaching programme on our Faculty, which provides complex knowledge and skills for the students. Our Institute has more than ten years teaching experience on that field. Comparing the different Hungarian and international curricula of the different programmes and courses it can be seen that the widest knowledge in economics and in general and functional management is provided for engineering managers. Our teachers and students were interviewed about it.
There are a lot of teaching methods in education to inspire students for individual learning:

- Project method,
- Independent study,
- One-on-One teaching,
- Problem-based learning:
    - Case method,
    - Guided design,
    - Simulations.

I would like to focus mainly on the project method, and case method, within problem-based learning. The case methods are also examined which are intended to develop students' ability to solve problems using knowledge, concepts, and skills relevant to a project. Do our colleagues use cases or other problems in teaching? Is problem-based learning a part of our teaching strategies? Our staff members and engineering management students were interviewed about it.

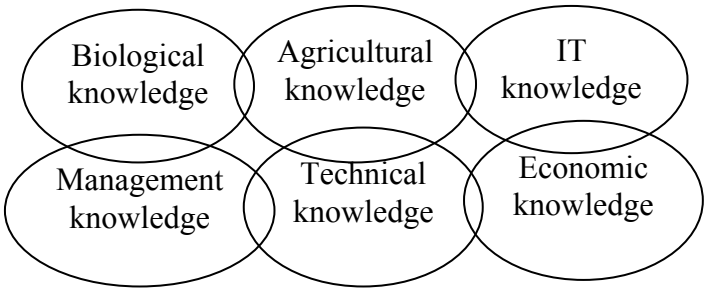
3. RESULTS AND DISCUSSIONS

3.1. THE IMPORTANCE OF DIFFERENT SKILLS

The project managers' different skills basically influence the final result and success of the project. An agricultural project is a very complex task with really different technologies and activities. The planning of the long-term objectives and the organization of the operative tasks all need knowledge, skills and experiences. The appearance of new materials, equipment, devices and technologies require more time to learn them and rationally use them according to the different rules. There is a great number of difficult decisions have to be made concerning technical resources, when we choose, buy or lease them. Applied information technology must be also mentioned as an important area. Without this basic knowledge it is impossible to make the optimal decisions.

All of these are necessary, but not enough to manage successfully an agricultural project. Economic and general management knowledge is also badly needed (*Figure 1*). Strategic-, marketing-, cost-, machinery management mean the most important areas. Management skills and the application of the different management techniques and methods determine the activity and future success of the whole project (Goldratt, 1997).

Figure 1. Managers' specific knowledge to manage agricultural projects



It is really difficult to learn and obtain all these skills, because these scientific areas are rather different ones. One has to have a wide range of interest to learn all of them.

The science of *biology* and *agriculture* can be interested for those who are really close to nature and environment. Mostly they like animals and rural life, but they are not fond of machines, engines or the marketing mix. They do not like manage people either. *Technical science* is hard to learn. Mathematics, physics, mechanics, technical drawing, design, the operation and repair of machines are the basic courses. They usually like engines, vehicles, industrial equipment and the connecting activities very much, but they are not necessary close to nature and hate applied economics and management because they consider them as unnecessary subjects. *IT* is again a very special area, which one has to like and understand.

Economics and *management* is popular today. Many young people choose this field of science all over Europe. They learn macro- and micro-economics, law, finance, marketing, tourism, rural development etc. Most of them like it because it seems to be interesting for them and they try to become as soon as possible a well-paid manager of a company. It is not sure that they like agriculture or they are not fond of machines except their cars. The level of personal motivation to obtain this complex knowledge is changing on a wide range.

3.2. THE ROLE OF MANAGEMENT SKILLS

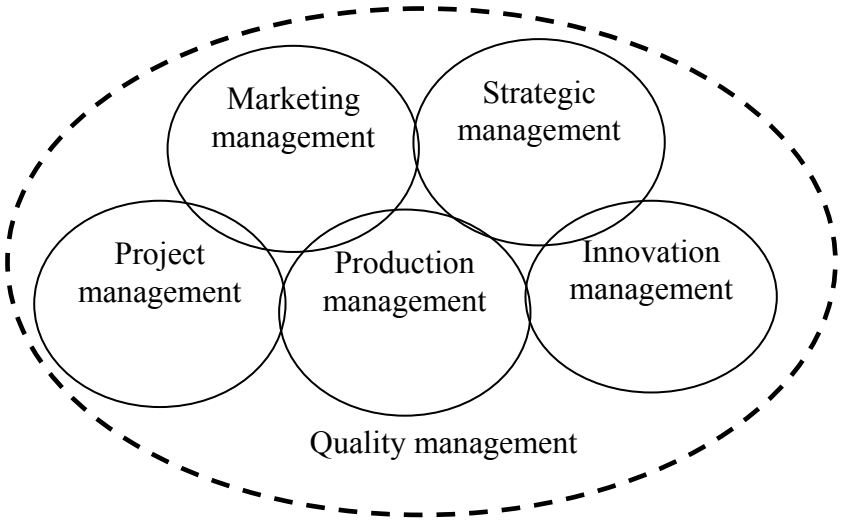
A detailed knowledge of general management is really useful, but a wide range of functional management areas also play important role. All of these areas have different characteristics and an experienced project manager has to know most of them. In a case of an agricultural project these functional management areas are not separated they usually appear as complex tasks. It is not easy to determine the most important functional management areas, because they are all necessary ones, but the following six of them are taught for engineering managers on a BSc or Msc level (*Figure 2*).

Some typical techniques and methods of the following functional management areas are as follows:

- *Marketing management*: Students mostly like this course and they think it is necessary for them *(e.g. marketing mix, PEST analyses, SWOT analyses).*
- *Strategic management* Hungarian enterprises do not pay much attention to strategic planning which makes their situation hard in a crisis. This course is taught on MSc level. *(e.g. BCG, GE Mc Kinsey).*
- *Project management:* Engineering management students learn it on a BSc and MSc level, mostly they enjoy the classes *(e.g. Gantt-chart, CPM/PERT, WBS).*
- *Production management:* Students find some parts of the course material really hard to learn and understand but they do believe that they need this knowledge *(e.g. MRP, TQM, JIT, FMS, CIM).*
- *Innovation management:* Students like it, mostly they understand why they have to learn it, some groups learn it as Technical Development *(e.g. Brain storming, Philips-66, Delphi).*
- *Quality management:* It is an important course of the curriculum, most of the students are interested in it *(e.g. PDCA, Kaizen, Poke-Yoke, QFD).*

Information management, change management and human resource management are also very important areas so they are mostly taught as parts of the General Management course.

Figure 2. Functional management areas (Kocsis et al., 2002)



Project management is a special bridge between strategic and operative management. That is why it has special techniques, methods, approach and requires special skills as well. Relying upon Görög's (2006) findings *Figure 3.* shows the structure of management skills.

There is no need to characterize all the skills so I will choose one or two of them from each group:

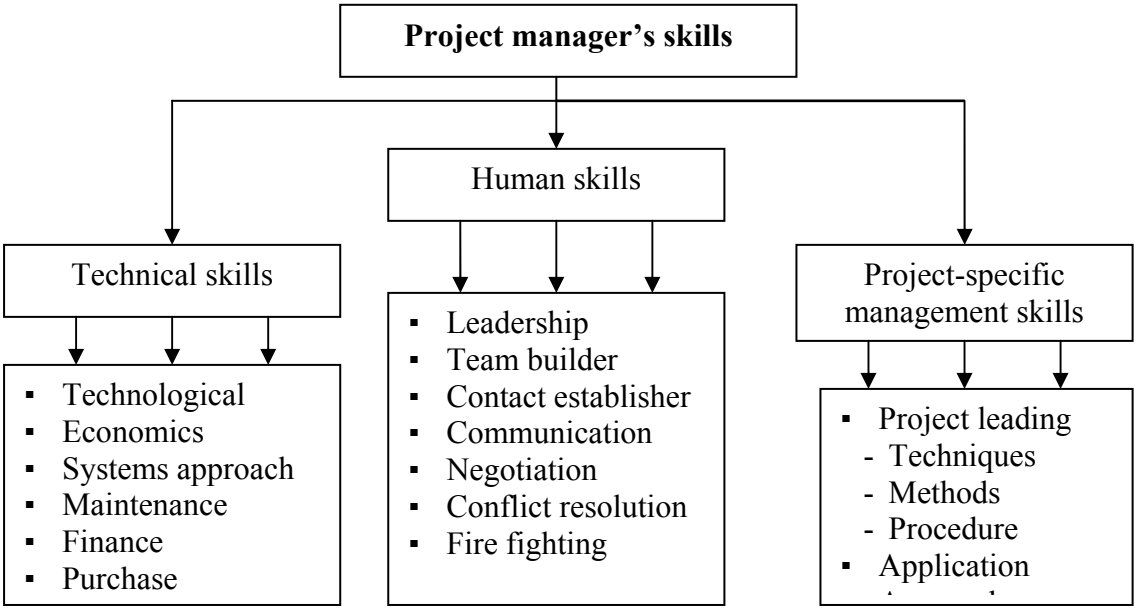
- *Technical knowledge* the project manager (PM) is not expected to have an expert's knowledge of each of the technologies that may be germane to the project. The PM should be able to explain the current state of the project, its progress and its problems to senior management. He should also be able to interpret the wishes of management and the client to the project team.
- *Systems approach* to be successful the PM must adopt the system approach. The project is a system composed of tasks which are, in turn, composed of subtasks, etc. The system, a project, exists as a subsystem of the larger system, a program that is a subsystem in the larger system, a company, which is…etc. The PM must understand the influences and their impacts on the project and its deliverables.
- *Communication* the PM must be a person who can handle responsibility. The PM is responsible to the project team, to senior management, to the client, and to anyone else who may have a stake in the project's performance or outcomes. Much project communication takes place in meetings that may be run effectively if some simple rules are followed. In virtual projects much communication is via high technology channels. Above all, the PM must keep senior management informed about the current state of the project.
- *Negotiation* the acquisition of resources requires negotiation. Dealing with problems, conflict, and fires requires negotiation and conflict resolution. The same skills are needed when the PM is asked to lead the project to a successful conclusion – and to make the trade-offs required along the way.
- *Techniques* for new PMs, training in win-win negotiation is as important as training in PERT/CPM, budgeting, project management software, and project reporting.
- *Methods* several different management methods are used by PMs in strategy oriented project management one of them is the WBS.

A project manager without these skills cannot be successful. In addition, the PM should be a leader, and adopt a participatory management style that may have to be modified depending on the level of technological sophistication and uncertainty involved in the project. Another critical project management skill is the ability to direct the project in an ethical manner (Meredith – Mantel, 2000).

3.3. THE ROLE OF EDUCATION

The large scale of different skills listed above have to be taught for the future managers. Our colleagues usually pay much attention to use the different teaching methods to teach engineering manager students during their university studies (graduate level).

Figure 3. Project manager's skills



3.3.1 Project method

The student who completes a project often has a sense of mastery going well beyond that of completing a conventional assignment. Students working on a project have to solve real problems and to use their knowledge in new ways – characteristics of learning situations that both motivate and facilitate more lasting learning.

- Projects sometimes fail to work well. *What can we do to increase the probability of success?*
  - Be sure the student has a clear question, problem, or goal.
  - Help students be explicit about the strategies they plan to use, about their time management, and how they will monitor their progress.
  - Have students compare notes and get feedback on their progress from fellow students.

3.3.2 The case method

One can write his/her own cases, but one can find cases already written that are appropriate for given purposes and are motivating for the students. Typically, case method involves a series of cases. One of the goals of the case method is to teach students to select important factors from a tangle of less important ones, which may form a context to be considered. Usually cases are presented in writing, videotape or role-play of a problem situation can be used.

- Before assigning the case study, *the following aspects should be clarified*:
  - What is the problem?
  - Develop hypotheses about what causes the problem?
  - What evidence can be gathered to support or discount any of the hypotheses?
  - What conclusions can be drawn? What are the recommendations?

When the teams report, the teacher's role is primarily to facilitate discussion i.e. listening, questioning, clarifying, challenging, encouraging analysis and problem solving, and testing the validity of generalizations. He/she can make a summary of points established, additional information needed, and the evidence supporting alternative approaches.

If the case is one that actually occurred, students will want to find out what actually was done and how it worked out. Sometimes the teacher might bring in someone working in the field so that students cannot only see how an expert analyzes the case, but also ask questions about what really happens in practice (McKeachie, 1999).

Based on our experiences we can state that students coming from grammar schools after graduation, are usually used to have some alternative teaching methods, such as project methods or case studies. They learn how to work with other students in groups, and how to present their findings. These methods make education a lot more interesting and fascinating. Without these, the traditional lecture-discussion education at the university level seems less interesting and motivating for them. University lecturers have to make a lot of effort to raise the students' attention to the course material as effectively as they can. Not only to inspire them to attend their courses but also to have them to pay attention while they are on lectures. According to our experiences, these teaching methods are not so commonly used in higher education.

Besides applying the different teaching methods, it is a difficult task to develop or create a new teaching material.
When developing some parts of the curriculum or course syllabuses the following *"5 Ws+H"* method can be used *(Table 1).*

Table 1. How to follow the "5Ws+H" method?

What is the question?		**What is the answer?**
WHOM?	do we have to teach?	Students of mechanical engineering, engineering management…
WHAT?		Courses/subjects/knowledge/skills…
WHEN?		BSc/MSc/PhD levels, which year…
WHERE?		Classroom/lab/field/workshop/internship…
WHY?		The objective of the course/knowledge/skills…
HOW?		Teaching methods: traditional/project/case method…

Our Faculty is in a better situation because the engineering manager students have to learn economics and management traditionally. We also offer enterprise, innovation, marketing, production, quality and project management courses for them. These functional management areas are really useful for the future project managers. The partly listed management techniques, methods and some special software are part of the curriculum.

Our students have to write special assignments and we ask them to work in teams. We teach the basic rules of teamwork and try to apply the problem solving in the practice. During the summer time our students spend some weeks in a company dealing with professional tasks and real problems. They gain a general overview about the material flow and about the management tasks of the company. They spend some time on the different departments and work with the technical managers. By the end of the practical period, they have to write an assignment or their thesis.

We also offer short-term postgraduate courses in a wide range of topics. It can be connected to a certain functional management area or to a management technique, method or software

package. The teaching method is usually different for them, because after a short theoretical background they get a really practical oriented case study or a special training developed for the daily need of the company. Education and training is very important, but it cannot substitute practice and experience.

4. CONCLUSIONS

Successful project management requires experienced managers with different skills. In the case of an agricultural project, this complexity is even more typical because the technical, agricultural, biological, IT, economic and management knowledge and skills are really essential ones.

In the frame of this paper I tried to prove the importance of the different skills and I have briefly characterized the main (six) functional management areas which are taught for our engineering manager students. Project management is a bridge between strategic and operative management and it plays a very important role in technical development. I have listed in a structured way the project manager's skills. Our students and the future project managers have to learn the related techniques, methods and the use of professional software. A young manager without - at least - the basics of these skills cannot be successful in managing projects. An experienced project manager should be a leader and has to direct the development in an ethical manner.

Well-trained teachers use cases or other problems, problem-based learning. They are valuable parts of their teaching strategies. The general principle is that students like to solve problems that offer a challenge but are still solvable is important. Motivation is not the only reason to use problems. If students are to learn how to think more effectively, they need to practice thinking. Moreover, knowledge learned and used in a realistic, problem-solving context is more likely to be remembered and used appropriately when needed later.

Based on our experiences it can be stated that our students coming from grammar schools after their graduation are usually used to have some alternative teaching methods. They learn how to work with other students in groups, and how to present their findings. When our staff develops a running course or create a new course syllabus for our students, they are recommended to use the "5 Ws+H" method.

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