Researching Competency Models

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Abstract – **In the context of competency based education, the development of competency models is a base for measuring the educational goals. The models can be used to identify the competencies by which employees need to improve performance in their current job or to prepare for another. This research paper presents different competency models. The goal is to point the attention on diversity of the models and usefulness of their application in practice. The discussion is about: spider (Germany), pyramid (USA), ball (UK), T-model (USA), tree (Finland) and onion model (USA).**

Keywords – **Competency, Models, Competencies, Education, Practice**

I. INTRODUCTION

A competency model is a collection of competencies that represent some logical set. The set of competencies within a competency model are created from a particular framework and are instances of the competency types defined within that framework. These competencies define the competency itself and do not contain a specific rating, except potentially something like minimum and optimal requirements. According to T.Lonowski, competency model is a descriptive tool that identifies the competencies needed to operate in a specific role within a job, occupation, organization, or industry [13].

The development of a competency model involves researching the competencies possessed by successful and/or exceptional incumbents, that lead to achieving performance objectives. Competency models are usually developed through a process of planning, competency modeling, validating, and finalizing [1]. The most common approach being used by New York State agencies is: developing a list of potential competencies from a menu of competencies drawn from private and/or public sources; through focus groups, surveys, or interviews, determine which of them to apply [4]. The features of good competency models should be:

• Manageable - too many competencies will become confusing and inefficient, clouding rather than clarifying an organisation's priorities.

• Defined behaviorally - competencies should be described in terms of specific, observable behaviors.

• Independent - important behaviors should be included in just one, not multiple, competencies.

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• Comprehensive - no important behaviors should be excluded.

• Accessible - competencies should be written and communicated in a way that is clear, understandable and useful to those outside of the human resource world.

• Current - competencies should be up-to-date, and reviewed regularly to keep pace with industry and company changes.

• Compatible - competencies should "fit in" with a company`s vision, values and culture [2].

Competency models are often developed by studying what top performers do in the defined job context. The competency model is important because it provides a road map for the range of behaviors that produce excellent performance. It may help employee development efforts to eliminate the gap between capabilities needed and those available [4].

II. KARLSRUHE COMPETENCY EDUCATION MODEL

The Institute for Product Development at the University of Karlsruhe, Germany, has developed an education competency model. It combines three key basic elements education, environment and key qualification [3]. The basic advantages from application of the model is the holistic understanding (emphasizing the organic or functional relation between parts and the whole) of product development and the very important potential which is characterized by power to put something into practice, power to reach a decision, cost awareness and customer orientation, systematic work style, requirements oriented, exposure to emergency situations and frustration tolerance. The positive element of courses is that it was divided into three parts: theoretical knowledge imparted in lectures; tutorials where students work with practical applications of this knowledge and implementation of this knowledge in a workshop with a complex project. The courses are embedded in a realistic and industry-like development environment.

The KaLep was part of an integrated education that is closely associated with materials science, manufacturing technology, engineering mechanics, etc. To ensure a methodical development, the education was separated into three stages that were characterized through different fields of product development-specific knowledge, namely: systems, methods and processes.

In addition to the developed online evaluation system, the institute used the competence spider (Fig.1).
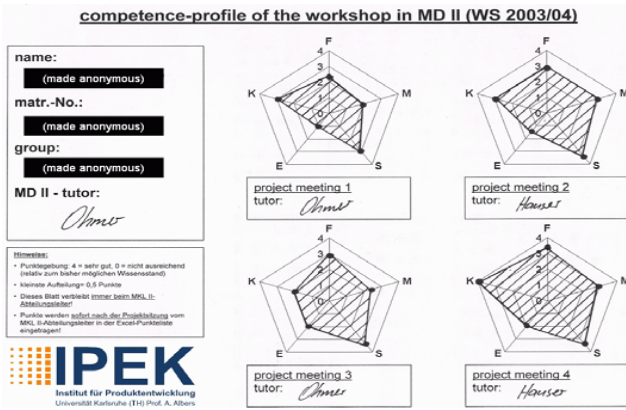
Figure 1 Spider Competency Model

Another advantage of the competency educational model was that after each workshop meeting, e.g. in mechanical design, students were evaluated concerning four different competences and a potential, as follows:

● F: disciplinary competence (basic knowledge, machine parts, foreign language, etc);

● M: methodological competence (development methods, QFD, CAD, etc);

● S: social competence (communication, teamwork, leadership, presentation);

● K: creativity competence (problem sensitivity, creativity techniques, courage for new solutions, etc);

● E: elaboration potential (power to put something into practice, cost awareness, systematic work style, etc).

At the end of the Karlsruhe study was to ensure consistency and fairness. The different competences and potential were clearly defined and a guide was given to tutors that describe the grading of the points, e.g. the elaboration potential is discussed in more detail. Key reason for application of spider competency model is that many companies advance the opinion that key qualifications are a very weak point of entrants in addition to methodology and systematic processes.

III. ADVANCED MANUFACTURING INDUSTRY COMPETENCY MODEL

Advanced manufacturing industry model is similar to previous case study of Karlsruhe that has been developed for materials science, manufacturing technology, engineering mechanics. It is applied at manufacturing industry, USA. A positive effect of the model according to the authors of the research is about industry competency goals, which are linked with dynamic, industry-driven framework for foundational entry level competencies across industry sectors (Fig.2) [13]. This includes consistency across the industry, easily customized within sectors and uncomplicated updating. Industry competency model is a clear description of what a person needs to know and be able to do – the knowledge, skills, and abilities - to perform well in a specific job, occupation, or industry. New workers must be brought into the pipeline, giving older, more experienced workers an opportunity to transfer knowledge and training. Potential candidates must understand the work done in the industry, the skills and

competencies required to perform that work and where the job opportunities are.

A base of the models is personal effectiveness competencies: integrity; motivation; willingness to learn and dependability & reliability. The next levels are: academic competencies; workplace competencies; industry wide technical competencies; industry sector technical competencies; next four levels are united in one group, occupation-specific knowledge areas, occupation-specific technical competencies, occupation-specific requirements and management competencies.

The main benefits from the model concern: business, because of hiring workers who can succeed in the 21st century; prospective workers which skills needed to take steps toward a successful career in high-growth industry; educators and training providers that develop competencies directly relevant to industry requirements and government and workforce professionals which supported training programs are producing workers who will find employment.
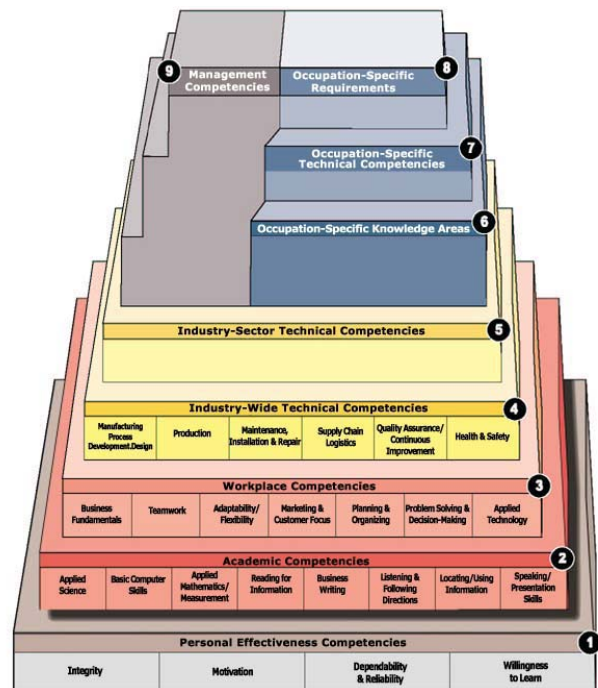

Figure 2 Pyramid Competency Model

IV. THE COMPETENCY MODEL OF INTERNATIONAL TELECOMMUNICATIONS UNION

Another model developed for industry is from International Telecommunications Union, which is an Untied Nation agency and the main international government body of global telecommunications. The competency model, (Fig. 3), includes seven groups with total 27 competencies. There the areas of serving and mastering are rather new ones and certainly something that is needed in future intelligent organizations [14,5].

The seven groups of the competencies are: Professional Experience; Interaction; Managing staff; Self management; Strategic orientation; Customer orientation and Result orientation. The model is developed for service industry and represents all units of the organization. At the center of

the model is organizational and professional culture and in the core is a personal value.
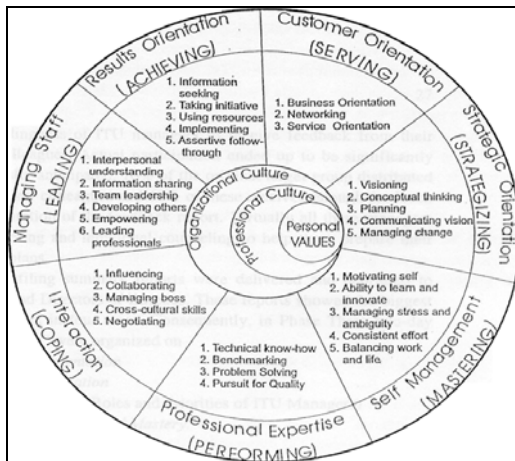

Figure 3 International Telecommunications Union Competency Model

Because of nowadays worldwide economy development that is focused on services, advantage of this model is availability of the customer oriented competencies which are networking, business and service orientation. Another advantage is that it consists of strategic, long term focus that includes visioning, conceptual thinking, planning, communication vision and managing change.

V. T- SERVICE SCIENTIST COMPETENCY MODEL

Linking with the customer oriented competencies from previous "ball competency model", a subject of interest is another conducted research in University of Denver, USA [7]. The main goal of which is creating of program based on competency in Service Science, Management and Engineering (SSME) for master`s level. SSME is a term introduced by IBM to describe Services Sciences, an interdisciplinary approach to the study, design, and implementation of services systems – complex systems in which specific arrangements of people and technologies take actions that provide value for others. More precisely, it has been defined as the application of science, management, and engineering disciplines to tasks that one organization beneficially performs for and with another. Today, SSME is a call for academia, industry, and governments to focus on becoming more systematic about innovation in the service sector, which is the largest sector of the economy in most industrialized nations, and is fast becoming the largest sector in developing nations as well. It is also a proposed academic discipline and research area that would complement – rather than replace – the many disciplines that contribute to knowledge about service. . Four clusters model for service scientist was developed (Fig.4).

The reasons for creation the model are: the nature of the work and competencies required for innovation and productivity improvement as a result of changes of technology and globalization; existing engineering management and system engineering program were designed for manufacturing based economy, while the current context of the economy is service and knowledge based; existing program lack a systematic inclusion of the competency based approach in curriculum development; the origin of current engineering management program was to develop managerial skills among engineering and engineering management programs were not philosophically or theoretically grounded in interdisciplinary and master`s level education is uniquely positioned to developed interdisciplinary professional competencies.
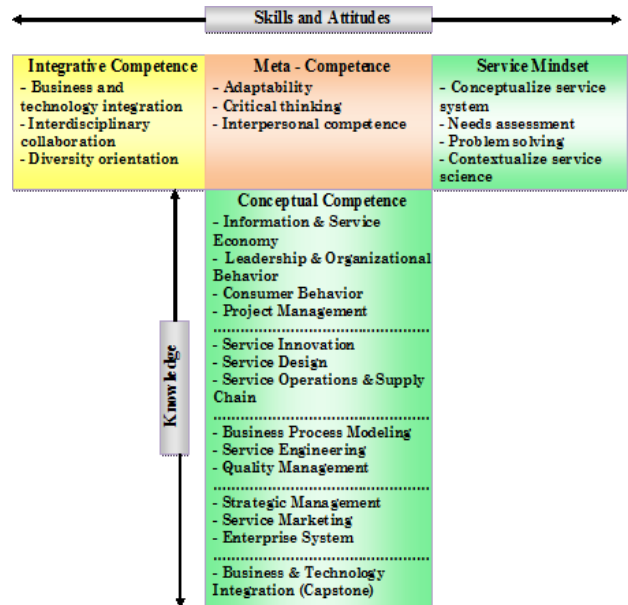

Figure 4 T – Competency Model for a Service Scientist

One of the advantages of the model is using both qualitative and quantitative approaches. Qualitative methods like focus groups and individual interviews may be conducted to gain deeper insights about the rationale for the competencies and courses identified in this study. Other positive characteristics are: quantitative survey of a large random sample of faculty and professionals may be undertaken to identify statistically significant differences in the perceptions about the findings of this study; interdisciplinary curriculum with several obstacles, these obstacles may include program culture and disciplinary differences of faculty, unclear definition of interdisciplinary goals, unsatisfactory reward system, lower recognition for tenure and promotion, and institutional policies; influence of accreditation standards from engineering and management accreditors may also be investigated; specifically, a deeper analysis is required to understand the alignment of the curriculum within the accreditors' expectations and the nature of changes.

VI. LEADERSHIP COMPETENCY MODEL

A four-dimension model is discussed in another research provided at Helsinki University of Technology, Finland [14]. The model is about developing set of competencies for leaders at different management levels and leadership of an organization. The dimensions of the model are self-esteem, interpersonal, efficiency and wellness dimensions.

The authors do point the attention on values that operate in the competency models. They analyzed development of similar models and developed a framework which consists of eight general values that operate in the model (Fig.5).

In the competing values framework there are four management competence models which concerns rational goal, internal process, human relations and open systems model. This competing values framework shows excellently the challenging work environment of today's leaders [14, 15]. Based on these dimensions it has developed "The skill tree of life" (Fig.6), which in one picture tries to summarize the key results of personal key skills study. Self-esteem is its own dimension in this model. There are two reasons for that. Firstly, it is correlated highly to all other skills. Secondly, it seems to have a very important role when developing other skills.
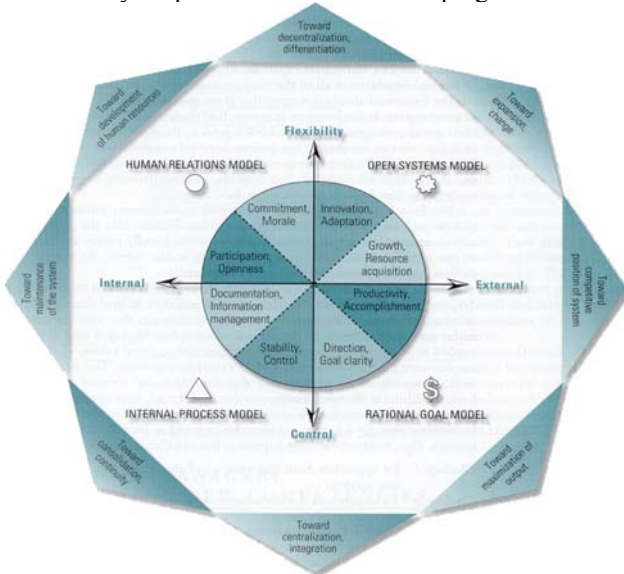

Figure 6 The Skill Tree of Life – Competency Model.

The main advantages of application of the tree competency model in practice are: leadership is area of influence from individuals to teams, to organizations and to societies; it help individuals to develop themselves comprehensively as human beings; it should support working individuals in becoming self-directed teams; it should support organizations in becoming intelligent; it should support us in building intelligent societies, where the economy can be integrate, ethics and ecology.

VII. BERMUDA ONION - COMPETENCE MODEL

Going towards to the personal competencies that we discussed in all previous models the onion model is an object of interest. Most of researches and best practices of developing competency models are in USA. Different point of developing competency model is onion model. This model has been developed in attempted to be defined the competencies in competencies based education programs. In the center of competency model is the element ego development and self determination of the individual. (Fig.7).

Figure 5 The Competing Values Framework

Enough good self-esteem for enables the development of other skills. That is the reason why self-esteem is the trunk in this tree model. The roots of the tree are our personality, attitudes and traits which affect how we are behaving.

This skill tree of life has also functioned very well in practice when I have trained people in personal key skills. This skill tree is also a basis for the competence tree of a leader. According to the researches, this personal skill map research is very important methodological background for the competence part. The personal skill map method is mainly based on psychodynamic, humanistic and behavioristic approaches. In the model there are altogether 26 different competencies which are grouped to six clusters. The clusters and even the competencies can be sometimes overlapping. These competencies are operationalized in a self-assessment tool. The tool has 160 items. Every item describes a certain leadership activity like „I treat people fairly and with respect". All the other competencies are operationalized with five items except professional, physical, mental, social and spiritual condition and self confidence.
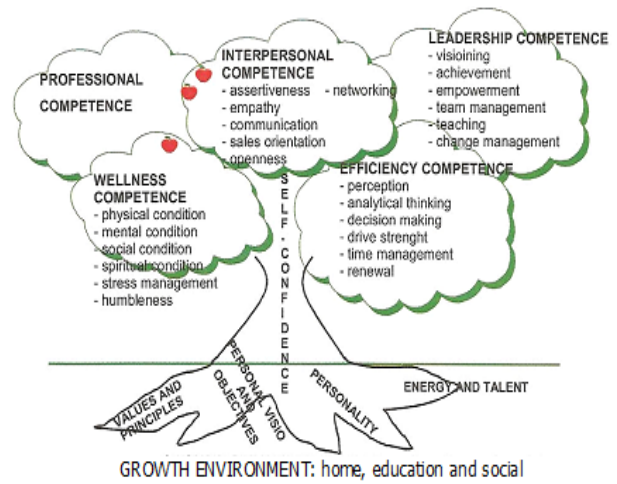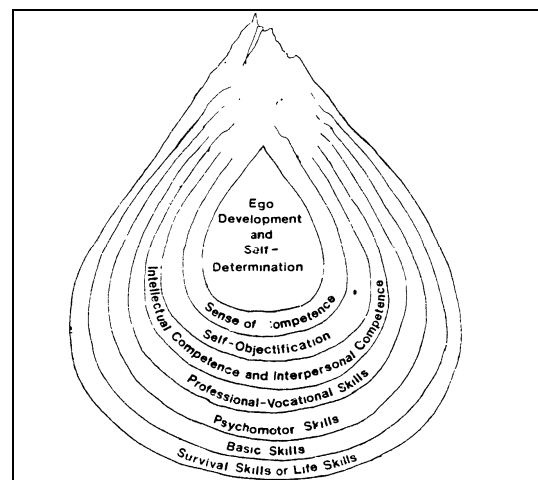

Figure 7 Competency as a Bermuda Onion

They argue that there are eight levels of competencies which have strong order in creation of model. Outside is a survival skill or life skills, and then comes basic skills, psychomotor skills, professional – vocational skills, intellectual competence and interpersonal competence, self-objectification, sense of competence and in the center is ego development and self determination [12]. Even though some authors go beyond the person`s competencies and argue that in developing of competency models it is important to be paid attention on the gender [6].

VIII. CONCLUSION

The presented research of competency models provide pathways for implementing competency oriented approache. Some of basic conclusions from the researched models and their practical application are: development process of the model requires following of a strong order of planning; the areas which they are developed for are all spheres of society; there are differences between the competencies and levels of competencies which is influenced by a concrete job position; competency models are enables as success factor for organization.

The advantages that the organizations gain by application of competency model have strategic effect. The development and application of the competency model are often accepted as investments in competency based education that is critical for the future of the organization. The positive effects differ from model to model but best creative characteristic of each model is that they are focused on human being and its position in society, organization and job. Except all the differences and common characteristics between the models, they are base for next our research which will be focused on the resources that the organization need in other to design, implement and manage the competency models.

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