Competency-based curriculum development,
Experiences in Agri Chain Management in the Netherlands and in China

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Abstract:

Organizations in the field of agribusiness are faced with rapidly changing circumstances. Globalization, focus on food quality, environment, biotechnology and consumer concern make firms to consider their core competences and to seek partners for establishing chains and networks. Organizational core competences however are based upon competencies of individuals and teams.

Human resource departments are seeking for competent graduates who exhibit the appropriate knowledge, skills and attitude to perform tasks adequately and who have the personality and the aptitude to fulfill the tasks in a particular context and within a given organizational culture. Educational curricula will have to keep pace with the changes in agri business.

Universities of agricultural professional education in the Netherlands find competency-based curriculum development a way of preparing graduates to function in a fast changing context. Larenstein, university of professional education, emphasizes the study of agri chains and networks. Not just in its own curricula but also in developing study programs with partners in other countries, China being one of the examples. Together with the Nanjing Agricultural University a competency-based curriculum for agri supply chains is being developed.

This paper describes the growing necessity to define relevant competencies as guidelines for curriculum developments in agribusiness studies. Translating competency profiles into case studies and assessment approaches will be dealt with. Competency lists can be considered as a manner to communicate within an educational organization and between education and labor organizations, as well as between educational institutes from different countries operating in different cultural settings. At the end of the paper some issues are being raised for further investigation and discussion about the professional context guiding curriculum development and assessment.

1. Introduction.

Success of an organization and its competitive advantage is being more and more determined by the innovative ability. This requires a high level of employee qualities as well as an organization that recognizes skills, knowledge and attitude of the individual worker. Developing the appropriate knowledge and skills related to the strategical choices the organization has made, is the main target for in-company training programs. Regular higher professional education is asked to direct the curricula to the professional requirements, to equip the graduates with possibilities to perform well in starting positions on the labor market.

According to the ideas of Hamel and Prahalad entrepreneurial leaders will be judged on their ability to identify, cultivate and exploit the core competences of their organization. Core competences are the organizational abilities explaining the main differences with competitors. These core competences give enterprises access to a variety of markets, they provide added value to the products from the customer's perception and the core competences are difficult to imitate. Core competences result from competencies of managers and employees. Acknowledgement of the significance of core competences rapidly leads to the translation of personnel's competencies. Education and training can establish the conditions for the employee's learning process.

In Dutch agribusiness a growing interest can be observed in applying the concept of competency. Sara Lee/DE, the Netherlands, has implemented a performance management system. This is based on competencies necessary for translating strategy into action according to the Balanced Scorecard approach. Translating mission and strategy into targets for departments, teams and individuals, is made possible by four types of critical success factors. These are seen from a financial perspective, from the perspective of business processes, from customers and from the learning, growth and innovation point of view. Sara Lee/DE has developed necessary competencies to support innovative behavior of employees.

Heineken, the Netherlands, used to be a hierarchical organization. Some years ago technological and market developments made a structural change hardly to avoid. Facing rapid market changes, Heineken needed an organization, which was able to continuously adapt itself to changing circumstances. Mid level management was trained in coaching the development of competencies of their personnel.

Frico Cheese wants its workers to compose a portfolio of acquired competencies. An on-the-spot assessment is part of the procedure and the results are written down in a personal development plan.

Competencies are not new, they used to be called qualifications. New is the use in a much broader perspective and the application of competencies by making systemic connections and interconnections, for example, by linking competencies to HRM activities and strategic business plans.

We see competencies as the capability of people to perform in a function or a profession according to the qualifications they have. These qualifications should be expressed in terms of knowledge, skills and attitude. Additionally, because the environment in which our graduates work is constantly changing, our graduates should be able to adjust to new circumstances. In other words, the graduate should continue to acquire new knowledge and skills, and adjust his/her attitude to a changing working environment after the formal training period is over. Kaplan and Norton in the Balanced Scorecard emphasize this continuous learning process, both for an organization and its employees, as one of the conditions for success.

Like other educational institutes Larenstein has regular contacts with industry and business regarding the qualifications expected from our graduates. Usually, comments from agri business are rather vague and indicate that graduates should have a basic knowledge of the core subjects, have the right attitude and be flexible. A considerable amount of the training will be on the job. For us, such general comments are not very helpful when developing a curriculum. If the question is re-phrased, and businesses are asked about competencies for specific functions, the desired qualifications and personal talents are described more specifically allowing us to deliver more capable graduates to the labor market.

In this introduction we have described that educational institutes and labor organizations are interested in competencies. In the next chapters we will describe more in detail what competencies are about. Afterwards we will illustrate the ideas concerning the subject in Dutch higher agri business education. Firstly in curriculum development and secondly in assessment. In a joint project Larenstein University

and Nanjing Agricultural University in China are developing a curriculum for agri supply chain management. This will be discussed in chapter five. Finally some issues for discussion are presented.

2. Competency, the concept.

When we think of competencies, what usually comes to mind is knowledge, skills and abilities. Although the concept of competency is used quite broadly, confusion can arise because of different interpretation between countries, originating from various national educational policies and from the interconnection between education and the labor market. Pedagogically speaking, other kinds of differences can be revealed. Behaviorists, cognitivists and constructivists differ in their way of looking at competencies. Even though competencies are by most people defined as individual characteristics, some stress the trainability others argue that competencies partly are given and can not be learned.

Some organizations (e.g. public services) see competencies as aspects of the whole person, comprising
- Aptitude (verbal, numerical, spatial)
- Skills and abilities (thinking, leadership)
- Knowledge (general, profession specific, job specific, level specific, organizational specific)
- Physical competencies (stamina, energy)
- Styles (leader, manager, employee)
- Personality (social orientation)
- Principles, values, beliefs, attitudes and spirituality (fairness, equity)
- Interests (dealing with people, dealing with facts)

In this paper we define competency as the ability of a student/worker enabling him to accomplish tasks adequately, to find solutions and to realize them in work situations.
This definition fits in with the need for describing competencies and assessing them. Competencies consist of components that are trainable (knowledge, skills) and components that are more difficult to alter (attitudes, believes). In addition competencies refer to a profession in organizational context.

3. Curriculum development and competency profiles

Professional practice is a main guideline for the development of curricula. Academic disciplines on the other hand also serves as important input for the curriculum. In this paper we will merely focus on the professional field and the impact on a curriculum. In order to construct a profession profile a set of distinct competencies is needed. In this chapter we will describe the approach we have used to adapt our curriculum to changes in agribusiness such as supply chains and networks.

From experiences of the Dutch Open University we know that there are several methods of investigating the professional practice. One such approach is based upon the concept of core problems. This approach differs from the idea of core competence or key competence. The first one, associated with articles by Hamel and Prahalad, is defined as unique clusters of factors, including human capital, allowing a firm to take a strong competitive position. Key competencies are defined as knowledge, skills, insights and attitudes which enable further professional development, belong to the permanent core of a profession, provide possibilities for transfer to related jobs and enhance career transitions. We follow the Open University approach to consider core problems as an adequate tool for curriculum development because it pays attention to the professional context wherein professionals must perform. We focus on agri business chains as the context.

Core problems are supposed to have three interconnected dimensions:
- *Production dimension*: problems arising from the preparation, fulfillment and control of job tasks related to the main organizational processes.
- *Organizational dimension:* problems originating from organizational choices with respect to the division and coordination of labor.
- *Social dimension* : problems resulting from social interaction with others within the context of a profession, like team members, customers and management.

Work activities always encompass these three interrelated dimensions at the same time. Student's learning activities therefor should be arranged so as to give students the opportunity to recognize and to cope with the various aspects of professional work.

To characterize the professional context we differ in our curriculum between organizational stages of growth, the organizational life cycle: (1) Birth: creativity and entrepreneurship, (2) Growth, collectivity and expansion (3) Mid-life, formalization and control (4) Maturity, elaboration of structure and diversification (5) Decline/renewal, degeneration or revitalization. Organizational life cycle refers to the predictable change in organizations from one state or condition to another. The competencies valued or required often vary according to the current stage of the organization.

Ideally a stepwise approach is used to investigate the required competencies of graduates:
1. consider the level (graduates , starting positions);
2. consider the role (task, process, people oriented) ;
3. consider the stage of organizational development (organizational life cycle);
4. consider other relevant contextual variables (cf. production, organizational and social dimension);
5. identify relevant competency categories and competency clusters (interpersonal, task oriented, intrapersonal);
6. collect additional supporting information;
7. review, finalize, customize;
8. create behavioral indicators (concrete behavioral terms that make the competencies observable and measurable);
9. establish the relative importance and level of mastery of each competency (frequency of use, difficulty or criticality, consequence of error; if a competency is peculiar to a given job, the required level of mastery should generally be set at a low level, job specific knowledge for instance can be developed on the job, this does not imply that the competency is unimportant).

For curriculum development at Larenstein we asked graduates to write down core problems in their current job and to describe the three dimensions of problem. Because we know from OU-research that respondents find it difficult to answer open questions, we have provided a sample of our graduates with a list of alphabetically ordered possible general competencies. Some in-depth interviews by phone will conclude the written interview. For reasons of validity, managers and HRM-staff of the concerned firms review the outcome. The conclusions of the survey are used
- to adapt the learning goals of our curriculum,
- to extend the case-based learning situations,
- and to develop assessment center methods in current professional situations.

4. Competency-based assessment.

A common characteristic of a lot of tests currently being used, is that merely knowledge (and sometimes a limited set of skills) are involved. Now, as interest is growing in learning skills and in developing attitudes ,a growing group of educators is introducing a more comprehensive set of assessment tools.
Assessment and Development Centers (ADC) are considered to be a testing environment for so called authentic testing. The assessment center method is a procedure, at which, with systematic use of individual and group assignments, the qualifications are determined needed for a particular worker. Originally assessment centers were used for selecting higher or middle management. Gradually assessment centers are being used also for career and development advises, which makes the method applicable in higher education. An important basic assumption in applying the assessment center approach is that "behavior predicts behavior": current behavior is an excellent projection of future behavior. Well-trained assessors judge the assignments of the participants in an ADC. These assessors carry out four tasks: observe, register, classify, evaluate.

Agricultural colleges for higher education in the Netherlands have jointly developed an ADC called "The Thirsty Monk" , about a small brewery, making abbey beer, taken over by large brewing company. Students are asked to practice exercises like in-out postal bin, dialogue, group assignment, presentation and fact finding. The core problem approach we have mentioned in the previous chapter is

suitable to find authentic professional situations, which can be used to develop a curriculum, to design case studies and to organize an assessment and development center.

Now, that e-learning is introduced in regular full time education, answers are sought for the question how to use e-learning for assessment centers as opposed to digital multiple choice testing.

Learning processes are very much guided by the moment and the way tests are organized. It speaks for itself to integrate learning and testing activities. In competence-based learning environment students are expected (and trained) to take responsibility for the own learning process. This implies that self-management competencies are appreciated: acting with confidence, initiating, managing own learning, demonstrating flexibility and being self-motivated.

5. Experience in China

In April 2000 Larenstein University and Nanjing Agricultural University launched a joint project to develop a Masters course in Agri Chain Management. During the current two-year period from 2000 the two universities are working together closely in China to develop the course along problem based and enterprise learning methods. The Masters course should start in 2002. Entry requirements are a BSc degree, preferably in agricultural sciences, and working experience. Three Chinese and two Dutch companies from the seed, food trading and retail sectors are also participating in the project. They are contributing by making demonstration materials (case studies) available and by organizing courses. The general aim of the program was defined as follows: Participants should be trained for positions as managers so that they may develop the appropriate professional attitude and approach and become skilled in the use of applied research and chain management. Graduates should have acquired a thorough conceptual knowledge of integrated chain management. They should be able to influence, to steer the course of and to lead those processes integral to chain management.

The project activities are as follows:
- Curriculum development by joint teams of lecturers from the two universities
- Compilation of cases by joint teams of lecturers and students from the two universities
- Training of lecturers in the Netherlands
- Study tour in the Netherlands for lecturers and management of the three Chinese agri food companies
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Education
Academic education is at a high level in China. There is a more than 2000-year tradition of entry examinations for government functions that command considerable respect. At present there is a huge shortage of educational facilities at academic level. This results in fierce competition for a limited number of places. Teaching is mostly conducted through formal lectures. Other methods such as projects, and problem based learning methods are not often applied. American textbooks are frequently used for relatively new courses such as business studies. Though these books are sometimes translated into Chinese, the examples presented often refer to an American situation. At Nanjing Agricultural University the Masters course will, unusually, be offered by a number of faculties.

Agri chain companies
China has a great number of state owned conglomerates that cover all activities in the food chain. However, these activities are often independent of each other and consequently do not constitute an integrated chain. This differs from the situation in the Netherlands where there are many independent companies in the food chain but, driven by market forces, they try to co-operate and form chains. Consequently, the Dutch food sector has developed considerable expertise in chain management. The last decade has seen the emergence of supermarkets in China, a big rise in exports of food products, and an increasing awareness of food security. Consumers want to know where the food comes from and what guarantees can be given that food is not contaminated in some way. Because of increasing competition between supermarket organizations, quality and efficiency will be key goals. Consequently, specialists in food chain management should be in demand.

Curriculum development
The activities in the first year of the project were concentrated on defining the course and its contents. In developing the course the following sequence was applied:

1. Definition of professional requirements in terms of knowledge, skills and attitude (competencies)
2. Determination of professional requirements, learning objectives and attainment targets
3. Translation of learning objectives and attainment targets into a learning plan describing topics to be taught, teaching approaches and assessment targets
4. Construction of a plan for quality maintenance of the course.

Two teams of lecturers from two different cultures had to agree on a common level for the course. In order to define the professional competencies the managers of the companies were interviewed. Chinese companies do not have function descriptions in the way we are used to and to talk about professional requirements is difficult.

Larenstein University and Nanjing Agricultural University staff held workshops to evaluate the present curricula in relation to the learning objectives and attainment targets of the new program. Most of the subjects prescribed for the new Masters course are already offered but in other contexts. Adaptation to chain management is needed and case material must be developed. As students may have different backgrounds, supplementary courses should be introduced in order to introduce students to unfamiliar subjects. This year (2001) a number of lecturers are developing the course content. Special attention is being given to linking theory and practice in China.

Observations of the Larenstein team were:
Nanjing Agricultural University staff members are very enthusiastic and cooperative. Besides their activities for the masters course, lecturers had to perform their normal teaching tasks; consequently they had a time problem. A situation not unusual in teaching. In the Netherlands we are used to present a rather detailed outline of the course to our students before the lectures start. Another cultural difference between the Dutch and the Chinese is that lecturers find it hard to use examples of every day life.

Development of case studies
Last year (2000) a team of lecturers and students from Larenstein University and Nanjing Agricultural University spent three weeks conducting a survey of the vegetable chain in Jiangsu Province to collect material for a case study. The survey was executed as a rapid rural appraisal. Here again, lack of time was a problem for both Chinese students and lecturers. Because the lecturers will become the users of the case material, it will still take considerable time to make the collected materials suitable for a classroom situation and include the required competencies for the graduates.

6. Discussion:

We want to take the opportunity to present some discussion issues related to the use of competencies in curriculum development.

♦ Case studies are particularly suitable to provide students with a learning situation which closely resembles the organizational context and the professional requirements. Case studies therefore are the cornerstones of competency-oriented learning. Case writers find themselves in a position where they are supposed to explicitly add to the learning objectives the contextual competencies. Agreements on the contents of teaching notes concerning the competencies could be elaborated.

♦ Electronic learning environments are used more frequently as teaching and learning tools. Digital student portfolios are being used for filing the progress (growth) a student undergoes. Rating the level of competencies not just for qualification but for stimulating student's further development and describing the portfolio entries needs extra attention.

♦ Assessment and development centers confront students with real life professional situations. Case studies used for teaching could also be used for assessing when they are properly designed. As students often seem to be test-oriented learners, a case study, which also serves as assessment context, can be expected to be studied thoroughly. When writing cases the possibility should be investigated to whether the case situation is appropriate for assessment.

♦ Core competencies are said to be important drivers in establishing agri chains and networks. Strategy and operations of collaborating links in a chain should be tuned to one another. As there are great differences between agri chain cooperation in different countries, required chain competencies for graduates can differ as well. A set of well-defined competencies for graduates can be valuable as a means of communication between teachers and as a way to distinguish between educational institutes, implying a difference in core competence between faculties.

♦ Every organization has its own culture to which graduates are introduced during in-company training. Companies from different countries have their own methods how to use job profiles not even to talk about competency profiles. Describing a job profile in the Netherlands is different from how they do it in another country. Because there are so many organizations, there is a danger that in drawing up competency profiles the university is only focusing on a small number of organizations, consequently limiting career possibilities for graduates applying for positions elsewhere.

♦ Competency profiles emphasize the role of the labor market. There could be a danger, in the university is paying too little attention to its own views of future developments.

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