

Long program description

CEEPUS network name: **Technical Characteristics Researching of Modern Products in Machine Industry with the Purpose of Improvement Their Market Characteristics and Better Placement on the Market**

1. Network topic introduction

Market globalization has affected product assortment extension on the market, which brought many benefits to the consumers. They are enabled to buy products of different quality, price, design and terms of delivery. Major manufacturers have received globalization with great pleasure because globalization enabled them to expand the market and all the preferences that follow this. Small and medium manufacturers are the most affected by globalization, because of the presence of concurrents, so they can't place their products anymore in such amounts as before, or even they can't do it at all. Due to globalization, they had to reduce their assortment and intensively develop existing products, so they could become more competitive. All who didn't succeed in this had to change their production program, or simply close their factories.

The global world brings global problems in industrial production. Economic pressure urges producers to make more customized products of high quality, in smaller series, with shorter lead time and of course, without increased costs. Time is becoming one of the most important points of the company's strategy. Costs are also important. More important is competitive price and the most significant are marketability of manufactured products. Therefore producers look for different ways (new designs, modern tools, etc.) to increase the competitive advantage of their products.

In most of the cases, leading concurrents bought all perspective companies (their potential concurrents), so they continued to produce, but, after this, different products.

So, if small and medium manufacturers want to stay in a globalized market, they intensively and incessantly must develop their products, apply new technologies and nourish aggressive marketing, because it is the only way to subsist in the market.

When some product is being analysed, it can be discussed its aesthetic characteristics (shape, colour, style), its technical characteristics (dimensions, mass), its service characteristics (capacity, energy consumption), functional characteristics (principle of functioning), design (construction and performance way). However, when the product occurs on the market, its market characteristics become very important. It is necessary that manufacturers always have to develop market characteristics of their products in order to encourage potential customers to choose their products. The final selection of the products and producers by consumers is dependent on the market characteristics of the product, the ability of marketers and retailers or buyers and sellers to point out those characteristics and use them in forming the prices and other sales aid activities (delayed payments, credit, exchange etc.)

Market characteristics are the following: nature and complexity of the product, specific characteristics, variety of the palette of products, quality, design, price, product brand, image of the product, packaging, production date, distinctiveness and protection of the product, sales brochures and catalogues, marketing support, availability of the product, customer service, timing of product delivery, warranty terms, technical support, service support, etc.

The majority of market characteristics are influenced by the producers themselves, and they have the biggest responsibility for the sales of their own products. However, the role of the retailers is also important, which leads to the conclusion that the sales problem should be tackled with a complex approach, with the full cooperation of all involved parties. This is especially relevant today, when the increase in the sales of domestic products is a priority and all the relevant information regarding the quality of the products should be disclosed. Also, it is very important to secure the availability of the domestic products supply, keep the public informed of where those products are sold, ensure that they are recognizable in retail outlets, label separately that they are produced domestically, outline the reasons why consumers should choose them over competition, train the sales staff in detail about the advantages of the domestic products and encourage

them to present that to the consumers. All of these factors can have a significant influence on the consumers, and in addition to affordable pricing, credit financing, attractive design and good image, they can play a determining role in decision-making regarding the purchase of domestic products by the consumers. It is also important to accentuate the high impact of the image of the product, which is dependent on the image of the producer, the image of the current customer base, the product design image, the packaging image, the image of the visual graphics displayed on the product and packaging, image and perception of pricing, image of retail outlets, image of the promotional activities, image of the after-sales support services etc.

Technical characteristics depend on the nature of the product so with sports equipment importance is in design, comfort, recognition and price; with household appliances importance is in design, ease of handling, low weight, easy maintenance, low noise and price; with transport vehicles, design, comfort, fuel usage, low emissions and environmental issues; with working machinery, capacity, precision, and the degree of automation; with generators and energy converters, power, and effective utilization which show the degree of perfection of converting the energy. Technical characteristics can significantly improve the market characteristics of the product and such can influence the better placement on the market.

Taking into account all the above-mentioned aspects of technical and market characteristics of the products, the following subject of a new research project to be realized within the framework of the CEEPUS program has been proposed:

Technical Characteristics Researching of Modern Products in Machine Industry with the Purpose of Improvement Their Market Characteristics and Better Placement on the Market.

The proposed CEEPUS network will connect partner institutions with the ultimate goal of achieving high product quality in the mechanical industry and its competitiveness in the market of the entire region. According to this, Central European countries, and especially Western European countries, need a connection and support between the academic community and industry that will lead to the creation of new joint curricula in the field of product quality management and its marketing. Therefore, the main content of the proposed network based on product development and marketing will cover not only the development of contacts between participating universities, but also the creation of contacts between companies and universities, both within one country and companies and universities from other countries. Different countries are characterized by different requirements for the quality of the same product, but often similar requirements and their opportunities for different markets (European, American, non-European). The proposed network will use product life cycle management and enable different products of the mechanical industry to have the best development and placement. The central theme is to identify common critical issues at the local and regional levels and then compare or propose solutions and approaches that could facilitate the development of joint study programs that will promote effective knowledge transfer between academia and industry. Those joint study programs should lead to wider applicability of product life cycle management that can better stimulate product development and market placement.

2. CEEPUS network goals and activities

The universities included in this network have been collaborating with each other, though not always formally, for several years. Several partners have experience and achievements in the CEEPUS projects cooperation. The CEEPUS project represents a very useful formal way for cooperation between the partner institutions. The network assures an efficient possibility for students' and teachers' mobility, which contributes to mutual acquaintance and valuable educational and research program development. The exchange of knowledge and experience is very important for each university teacher and student. Not only acquisition of necessary information have big significance but also dissemination is characteristic of universities and other scientific institutions. Another important possibility is the possibility to create joint programs of study and common evaluation of diploma and PhD works. The exchange of knowledge, experience and various information is crucial for each university teacher and student, as well as for university progress. The creation of Joint Programs of study and PhD works is also significant. It is also possible for students and young scientists to participate in scientific seminars and conferences, as well as at workshops especially organized in the frame of the network. One main advantage of the developed new network is that almost all involved partners know each other. They have been collaborating with each

other, though not always formally, for several years. Some of the partners participate in other networks, others have only one network, but they all have mutual scientific and teaching cooperation from conferences and official meetings in previous years. A profit of importance for each partner in this network of the CEEPUS program is also the possibility to create new beneficial partnerships and relationships.

During the mobility, students and teachers will participate in different meetings, symposiums, workshops and conferences with the participation of colleagues from industry and universities. Therefore this CEEPUS network will be a common platform where all participants will share information, experiences, perspectives, and opinions in a collaborative and professional environment.

During the applied academic year, all initiatives will be organized that are directed towards the next focus areas: developing the product through regional and European markets, mutual collaboration between universities and universities and industry, international profiling of study programmes and research, competency and capacity building for internationalisation and business-oriented study programmes.

Cooperation of partner universities of the proposed network in the realization of these activities shall reflect, first of all, in mutual visits as basic aspects of joint activities and cooperation of institutions from different countries. Therefore, the proposed CEEPUS network will facilitate a productive relationship between partners through various types of mobility as a different structure of partner knowledge and experience exchange.

In that way, network partners will have various benefits, such as communication with researchers from different countries on issues specific to sustainable partnerships between academia and industry, meeting each other at professional events, privileged access to network partner's previous research work, literature, equipment, project, and internal standard in creating new curricula.

3. CEEPUS network results

The most important result of this project is enhanced internationalization of each institution obtained in the form of teaching, learning, researching, common PhD topics, and common PhD joint programs which are fully compatible with the needs of industry. Expected results are as following: specification of conditions and needs for organizing study programs from the students aspect with special attention on creating university environment significantly more accessible to foreign students and employees through internal information in English, specification of conditions and needs for organizing study programs from the aspect of industry, in order to offer students quality opportunities to develop skills relevant for business sector, specification of possibilities for organizing study programs from the professional aspect of the teaching staff and technical equipment of university institutions, reviewed and revised portfolio of student exchange agreements in order to intensified work on establishing partnerships and beneficial exchange agreement with partner universities, specification and development of ways for sustainable cooperation among universities and industry, specification of structure and modality for carrying out curricula, specification and development of quality control and monitoring, establishing network for comprehensive product research.

4. Developing the joint activities

This CEEPUS network will generate a specific base of practical knowledge in the frame of developing the product and its high market placement which is offered through:

- teaching (at least 6 teaching hours per week), mainly in the areas that professors from the host faculty do not cover;
- joint MSc and PhD thesis supervision (during the mobility period);
- working and developing on joint program for PhD studies (Optimization of Gear Transmissions) between the given partner institutions and also preparation of a formal framework for formalizing Common elaboration of PhD thesis - "These en cotutelle" program and signing official agreement;

- working and developing on joint program for MSc studies (Design of Products and Machines in the Frame of Industry 4.0);
- developing new teaching methods and materials based on the newest literature and research of partner institutions;
- joint work on research papers and research project proposals (mutual application for EU-funded projects) – as a long-established network, each year colleagues from partner institutions have many scientific papers jointly written and published in conference proceedings and scientific journals and signed Erasmus + project agreements between partner institutions;
- preparation of study materials in English language for joint programs (including e-materials);
- preparation for e-learning through appropriately selected e-learning platform and set-up proper conditions for virtual mobility;
- organization of conferences and workshops with representatives of some of the leading companies within the product development industry (KOD, IRMES, COMETa, DEMI, MMA, MSE, CoSME);
- expanding and advertising association ADEKO (Association for Design, Elements and Construction) between partner institutions;
- organization access to network partner's previous research work, literature, project and internal standard in creating new Curricula (regularly updating the knowledge base);
- developing plans for improving cooperation between partner universities, considering lifelong learning courses and studies.

Achievements: a rich previous experience with university internationalization, several finished PhD theses, published monographs, the exchange of academic materials, training for other mobility programs, the activity of network partners, large number of courses provided by network partners offered in English, university to industry partnerships confirmed by existence of silent partner from industry, ability to make impact relevant to educational goals of partner countries, increasing the ranking of the participant university and creating international recognition, the effective collaboration and communication of the local PPU to establish protocols of network management.

Challenges and obstacles: large network, but it functions for a long period, students' participation in the network is lower, difficulties to get all of the members of the network governance consortium to meet together in some regular manner, lack of control of various policies and decisions of the partner universities, additional encouragement of students to participate (English language barrier, fear of preventing students from graduating on time because of absence from the home faculty and obligation of mobility completion; general unwillingness to travel abroad), vague definitions of internationalization strategy among partner institutions, one network partner can contribute less than the other.