INTERNATIONAL COOPERATION IN ENGINEERING EDUCATION

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ABSTRACT: In the era of global economy, intense commercial transaction of goods and services among several countries are the common practice since the end of twentieth Century. In this Century, not only the goods are marketed worldwide, the mobility of professionals is also taking place in this scenario. Demand for experienced professionals with sound understanding in international working environment is devised. This paper intends to report a successful experience in engineering education by the international students exchange program carried out during two years (2001 – 2002). The program between CEFETPR/BR and WHZ/DE that exchanged 15 engineering students of final year from both countries is the main focus. They participated actively in study program and professional training in industry to gather information to produce the thesis for the graduation requirement. Due to the remarkable outcome from the students involved, mainly for the opportunity to be trained in the international environment over cross-cultural factors, social behaviors, living habits, industrial training and so on, that could not be possible to be achieved in their own country. Such pilot program can be also run among several countries other than Brazil and Germany.

1. INTRODUCTION

The process of structuring the globalization of the economy demands new knowledge and new professional skills to work in the international business environment with more broad insight than those professionals of the past. Nowadays, companies to stay competitive, search to establish the strategic plans to hire professionals trained in the multidisciplinary framework, including the cross-cultural factors in the business environment among several societies that are involved in the transaction of supply and demand of goods and services.

Academic institutions devoted to train professionals with forerunner capabilities, as well as the research centers acting in the innovation or absorption of new technologies, must find a suitable solutions that could face the demand for skillfully trained professionals.

In the recent decades, according to Bruno [1] the situation has changed significantly for these types of practices of business transactions involving developed and developing countries.
Since the beginning of the 90’s of the last Century, several companies with international share holders started the business in Brazil, due to several reasons, such as the needs to position in the niche of emerging market, to take an advantage of tax exemption conceded by the public authorities, to set up and operate industrial plants with advantageous business activities, among others. This fact, the emerging of new economy, gave the place to start the sharp demand from the society of trained professionals to face the new paradigm in the production process, such as the introduction of automated processes, acquisition of parts through e-commerce, and the intense application of logistics operations in the supply chain management. As the part of the mission to the society to train professionals to enable to act in projects that involves multinational companies, CEFET-PR had already celebrated the academic and professional exchange program with institutions of professional training of several countries, and also with companies that make a business worldwide.

This paper intends to present the performance of the exchange program with German Institution, WHZ-Zwickau, which offers professional training program very similar to those offered by the Brazilian Institution, CEFET-PR. The program carried out serve also to incentive researchers and institutions of countries, other than Brazil and German, to take an initiative to design the exchange program and celebrate the agreement to collaborate on the task of professional training to enhance skills for an international business.

2. THE PROJECT

This project was started by the initiative of two researchers, one Brazilian and other German, that using the mechanism of already existing broad agreement established between Brazilian and German governments, elaborated one project of exchange program to share experiences among professionals and students of each country concerned.

This academic exchange program was targeted to better the socio-economic conditions of the regions involved (Paraná and Saxony) through the exchange of experiences in the professional training with strong emphasis in the management of international business and knowledge over the cross-cultural factors of several societies that impacts the management of supply chain and logistics in the international environment [3].

3. JUSTIFICATION

Since the beginning of the decade of 90’s, in the State of Paraná it has implanted automobile assembly and parts suppliers companies coming from several countries, adding to eminently agricultural practice, the segment of industries for production of goods, demanding specialized human resources.

Presently, these companies operate with specialists from the countries of origin (Sweden, USA, France, Germany and others) that gradually must be substituted by Brazilian specialists in the near future. In other hand, the economic development stage of the State of Saxony keeps certain resemblance in terms of setting and operating new industries in 90’s, mainly in the automobile sector.

Due to the resemblance of socio-economic, the concentration of the automobile industries, the demographic structure, the resemblance of universities and economic blocks, it has noticed that these scenarios offer the opportunity to form the strategic alliance between the State of Paraná and Saxony aiming to create the value chain.

In the manufacturing industries such as automobiles, electromechanical appliances, communication apparatus, etc. set in regions of both countries, the supply of materials and parts had changed from the service function to the function to participate in development process in partnership, aggregating value in all supply chain. These results in lean production,
in modular production and JIT production, changing the past logistics that was linear and sequential to the supply chain of borderless worldwide enterprises. In this present reality, new requirements emerge as the needs for human resources with skills to perform efficiently in the business environment whereby persons of different cultures act to reach the common objective, translating into the form of prosperity to the competitiveness of companies.

4. METHODOLOGY

The object of the development of this exchange program was limited to the studies of regions of the State of Paraná and the State of Saxony where the covenant institutions are located. The development of the work was the mix of the field survey, academic lecturing and industrial training. The program with forecast for three years duration, started in 2000, with total participation of two academic staff and twelve students, one academic staff and six students of each covenant country. For the academic staff of each country had the incumbency to coordinate the program, to make the field survey, to plan courses and to lecture classes of the interest of participating students.

To the students of each country were required to engage in language learning, to attend the class on cross-cultural themes, themes of technical training and industrial practice training in the automobile company. The Coordinator of each country established the criteria to select the object of theme to be developed, student selection and the search for the financial support that could become viable the participation of students in the training program.

The academic and professional exchange program between CFET-PR and FHZ followed the objective to adapt the qualification profile of professionals to the requirements of the market in this context. The participating students acquired specific knowledge for the local and global market, through special qualification program in the partner institution, and through practical experiences in companies of automobile sector in the market of both regions. New tools for efficient domain of challenges of the world of industry and economy that always are in permanent mutation were also available. Students had an opportunity to learn most updated theories, such as the ‘Supply Chain Management’ and ‘Knowledge Management’. These theories offer methods to enhance the structuring the process of globalization [2]. Apart from the ‘hard skills’, for example, one solid qualification in engineering techniques, today’s engineers must have a varied of ‘soft skills’ that surpass the social competence required up to now.

In this exchange program participants were sensitized to be ready for the possibility of the cross-cultural problems and potential synergies, not discovered yet. Theories over ‘soft processes’, ‘cross-cultural’ and also one orientation program ought to sensitize students to the peculiarities of the global and local processes of the companies during their industrial practice. Forerunner theories were discussed with the Research Fellows of the University of Aberdeen and the University of Edinburgh by the use of video-conference. During the training discussions were carried out, on line and via videoconference among students and Coordinators.

The practical training in the companies was carried out as a case study where the students analyzes the results with the support of new theories. From these observations, students devise necessary solutions to enhance enterprise processes.

5. DEVELOPMENT

The project work has started soon after CAPES (Coordenação de Aperfeiçoamento de Pessoal de Ensino Superior) and DAAD (Deutscher Akademischer Austauschdienst) have approved the exchange program. The work schedule of each Coordinator of host countries
was programmed. It was decided to perform two work missions for each Coordinator to be carried out during the duration of the exchange Program. The work mission was started with the trip to Brazil of the Coordinator of the German Institution in September 2000.

5.1 WORK MISSION

During year 2000, two work missions of program Coordinators were performed to the covenant countries. These were to get an acquaintance about the academic structure of each institution, types of courses offered, work methodology, as well as to visit companies of automobile sectors located in the region of both institutions, and other public sector responsible to support the human resources training for the emerging companies.
The duration of the work mission was 6 weeks, whereby each Coordinator had an opportunity to program the formal meeting with the top managers of each institution of concerned countries, as well as to visit around 15 companies of automobile sectors with potential chance to offer practical training to the exchange students of both countries.

5.2 STUDIES AND TRAINING MISSION

Students of engineering and management courses of both countries were involved in the academic and training missions. During first six months, students were involved in the language training and also to have an acquaintance about the tradition of the host countries, before the industrial training in the companies. Students performed their training in the companies to gather information to write the graduation paper (Diplomarbeit) and submit to exams as the case study of the international business environment.

5.3 DIFFICULTIES

As the exchange program was developed involving people from two different countries, each one with own language, living customs, distinct political system, academic structure, working habits, enterprises culture, and other factors, always it was prone to operational difficulties that had to be solved by the use of common sense and international experience of Coordinators from both countries. The dialogue between Coordinators was established by the use of English language, but the students ought to have a fair command in the language of the host countries. Not always the managers of the host institutions had the fair command in English, thus requiring the help of the translator in the case of the needs of formal approval to develop the program.

Other common difficulty noticed was, and still is, the student selection about the previous knowledge in German language of the Brazilian students and the Portuguese language of the German students.
The same difficulty was also to establish the schedule to develop the exchange program due to the distinct academic structure and term calendars being very distinct in each of the countries involved.

5.4 ADVANTAGES

There are no questions about the advantages obtained by institutions and by students that participated in the program, once activities developed gave the unique opportunity to have an acquaintance of cultures of different societies whereby productive activities should occur aiming to socio-economic prosperity of the regions involved in each country.
The institutions involved have benefited with the exchange of academic staff, that in ultimate analysis, performed the knowledge up dating activities in their fields of expertise, participating as listener or lecturing courses for the classes in the charge of lecturers of both institutions.

For the participating students of the exchange program, learning and improvement of foreign language, German language for Brazilians and Portuguese for Germans, as well as the knowledge of the culture of each country has been the pillar of the exchange program.

The effective participation of the transnational companies complemented the training activities for industrial training of students, enabling them to work in the activities that require a sound knowledge about the mechanism of international transaction of goods and services.

6. RESULTS

The development of inter-institution exchange program with the involvement of specialists from other countries, with the focus on the training professionals for emerging demands by the companies of the automobile sectors, despite the difficulties in the initial stage, it was possible to gather enough information to elaborate three distinct training programs.

- Program to train logistics operators;
- Program to train logistics supervisors;
- Program to train supply chain and advanced logistics, this in the post graduate level.

Students of both countries that were involved in the academic and industrial training in this exchange program have a broad opportunity to exert duties in the companies that make business in the worldwide scope.

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REFERENCES

