

# UNIVERSITY–INDUSTRY COOPERATION FOR SUPPORTING SECTOR RESTRUCTURE: WOOD INDUSTRY CASE STUDY

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## Abstract

The central aim of this article is to demonstrate how a University-Industry European funded project investigated and proposed best practices for restructuring the wood processing sector in 5 EU countries with a view to reduce the consumption of energy in processing wood. The study refers to the cooperation between universities and industries and the presentation of a successful experience in which the joint action of individual institutions led to technological gains for both parties. The data was collected from 600 companies. The results obtained showed not only the efficiency of the joint research but also the success of the cooperation and the identification of the best practices of new approaches raised in recent studies. Thus, by studying the experience of these institutions in technological cooperation, we can see that the productivity and efficiency of the cooperation between the university and the company open up possibilities for contributing to the technological development of the country.

Keywords: technological innovation; cooperation between university and company; energy efficiency.

## 1 INTRODUCTION

The relevance of the restructuring process in a company has been reflected by the strategic importance of the innovation process for the companies themselves. The relationship between the competitive capacity of companies and countries with the knowledge and its management have made the importance of structures like scientific and technological research through partnerships between universities and companies increasingly evident. These partnerships contribute to the development of science, its applications and the appropriation of innovations resulting thereof, and progress from the paradigm of industrial society to the society of knowledge ([1]) can be seen as a crucial factor in the economic, social and cultural growth of nations and organizations.

Furthermore, as stated by [2], current restructure of companies sees innovation management as one of the most relevant administrative practices for business success. [3] and [4] mentions the existence of efforts and initiatives for cooperation between organizations for Research & Development (R&D) in recent years, despite the absence of policies to stimulate technological development in certain companies.

This concern has brought universities and companies together, while in almost all countries this closer relationship between these institutions is already a reality and has grown and intensified over the past twenty years. One of the main reasons for this is the ongoing technological revolution, which makes processes and products become obsolete more quickly. In this way, new technologies bring about new industrial sectors that are strongly marked by the incorporation of scientific and technical knowledge. Furthermore, when it comes to multinational companies and their subsidiaries, and these companies can prevent their subsidiaries from establishing interaction with local organizations for carrying out research because they fear that their knowledge and strategic technologies could be leaked to their competitors, although the authors also affirm that:

In addition, the relationships between universities and industries, besides facilitating the best diffusion and transference of new knowledge, can lead to the creation of jobs and increased income when a company is faced with restructuring, which means measurable gains for these institutions (Johnston et al, 2003). Therefore, this inter-institutional arrangement for joint research emerges as an important model for development, for both universities and companies.

This paper refers to cooperation between universities and companies and the presentation and description of a successful experiment in which the joint action of different institutions led to greater success in restructuring organisations in the wood processing sector. The central aim is to show the

development and characteristics of an inter-institutional relationship with the common goal of sharing best practices and innovation approached in systems for reduced consumption of resources and also the adaptation of the case to the most recent preconceived ideas of the development of Etzkowitz's Triple Helix.

## **2 COOPERATION BETWEEN UNIVERSITY AND COMPANIES**

Cooperation between university and company is an important instrument in the generation of science and technology since by splitting costs and sharing risks between the two institutions, cooperative research allows for greater investment in the development of new technologies for products and processes that guarantee greater competitiveness to organizations and the broadening of the scientific knowledge.

The connection between universities and companies do not take place overnight. It is an ongoing process. Inter-organizational relationships such as cooperation between industry and university can be structured in a variety of ways. According to [5] these relationships can have various degrees of formalization and standardization, frequency of transactions, perceived relevance by each party and a different degree of symmetry of information and transactions.

### **2.1 Cooperation between University and Industry in wood processing sector context**

A study developed during a EU project entitled 'Wood2Good' (Progress VP/2012/009) researching the process of university-company cooperation in the wood processing sector setting, identified the main variables considered relevant to the processes of cooperation in partner countries. The study identified the main motivators, barriers, facilitators, elements of the cooperation process and the resulting satisfaction pointed out by interviewees from the academic and business community, thus delineating the profile of the technological cooperation industry business and university.

The project survey identified the main motivations for universities and these were; additional financial resources, additional material resources, the fulfillment of the social role of the university, the prestige that would fall to the researcher, spreading the university's good reputation, obtaining practical knowledge of existing problems and the incorporation of new information to the teaching and research processes of the university. However, the factors: fulfilling the social functions of the university; obtaining practical knowledge of existing problems and the incorporation of new information into the university's teaching and research processes were the most commented on to by the interviewees.

For the companies, the motivations were; access to the highly qualified human resources of the university, the reduction of costs and/or risks involved in R&D projects, access to more recent knowledge in the academic community, the identification of students from the university for future recruitment and the solution of technical problems that led to the need for cooperative research. The strongest motivation was the access to highly qualified human resources and the solution of technical problems that led to the need for further research.

The main barriers mentioned by the study were university bureaucracy, the lengthy time required for the project and differences in the level of knowledge between the people at the university and the people at the company who were involved in the cooperation. As for facilitators, government support funds for research were most mentioned. The study provided insight into how both the universities and companies have agents and/or organizations that participate in the cooperation process, acting as an intermediary for the relationship between partners. At the universities, all the institutions selected have at least one organization for this specific purpose and, at the companies, the majority mentioned the existence of such an agent.

The main instruments utilized to cement cooperation were: informal personal relationships, formal personal relationships and formal agreements with a defined aim. However, none of the instruments affected more than 50% of the projects, either at universities or companies, there being no single dominant instrument identified in the processes of cooperative research. Nevertheless, later studies showed that informal contacts are one of the most significant forms of relationship between university and industry on a worldwide scale ([6]). Furthermore, other studies developed by [3] and [4] classified the connections that take place in the relationships established between universities and companies as formal, informal and human resources for both technological development and other ends, and that includes a wide range of relationships that may occur among these actors, which can or must be termed as technological cooperation between universities and businesses ([7]).

## **2.2 The Transfer of Knowledge**

Cooperation between industry and university does not represent only improved technology of products or the creation of innovations in restructuring a company. It also means an exchange of relationship in which the transference of knowledge between parties is very important, as it is through this transference that both parties might achieve better results in the research process. For this reason, transference of knowledge must be structured and encouraged from the beginning of the program so that frequent and open communication should take place between the two groups. Success in the transmission of knowledge is fundamental for adequate growth of the knowledge base of both participants.

Therefore, the choice of the most appropriate instrument for the type of relationship that is established between institutions is very relevant and must contemplate the type of relationship that they desire and which they consider most suitable to achieve their aims. Several descriptions of the possible types of relationships established between the university and the company for joint research into the best way to restructure a company can be found in literature. There is no consensus or strict standard for the types of relationships that must be made as they are relationships that involve different groups of people from different backgrounds and researching new subjects. New styles of work should arise naturally according to the demands of the process, which may require more complex structuring of these relationships.

Besides the definition of the type of relationship to be developed, the universities may also develop a specific structure to aid them in the cooperation process. [8] conceives of these structures as interface structures, which would be institutional mechanisms developed to promote and facilitate cooperation. The author mentions the following example of interface structure: transference offices, associated foundations, business structures with a mission to interact with the academic sector, non-profit research institutes, technological institutions, third parties and other institutions. These structural bodies would be the responsible for administering some aspect of the cooperation process such as the collection, administration and distribution of resources, making public that lines of research of the university, contact with potential business partners, the facilitation and maintenance of communication between parties.

## **3 METHODOLOGY**

The method adopted to uncover data was an extended structured survey with 600 companies involved in partner countries, which is recommended for studies on which one works with a dynamic scenario as is the case of restructuring a industry sector, that is considered typical or ideal to explain a certain situation, being useful when it is in its early stages of investigation or seeking to broaden the knowledge we have of a certain topic.

The restructuring phenomenon was studied and analyzed in its real context, seeking to assess the decisions that were made, why certain attitudes were taken and what their results were. In this way, the causes and consequences of the phenomenon and its development were made clear, always at the time and under the circumstances in which they occurred.

As a basic purpose, this study was the search for information on the process of cooperation between universities and companies established between the Wood2Good project and participant companies and its contributions to the growth of the participating institutions, it was necessary to choose a method of presenting ideas and signs of how the process took place and developed at the organizations involved. To this end, we opted for the use of in depth interviews with those in charge of the research. The questions were prepared using a rigorous criteria developed for the central aspects of the subject.

### **3.1 The cooperation between the Wood2Good and companies**

#### *3.1.1 Wood2Good*

Wood is one of the most important industrial sectors in Europe, with close to 3 million workers in EU27, and 380,000 enterprises generating an annual turnover of 300 billion euro. Since this sector is mainly made of SMEs, it plays an essential role to achieve EU2020 objectives and especially the flagship initiative "An industrial policy for the globalization era", that states the improvement of SMEs to foster the development of a strong industry based on innovation.

The wood sector is currently affected by the crisis, especially due to the contraction of the construction sector, key market for wood products. However, the wood sector currently faces new challenges and opportunities, to implement innovative solutions to answer the fight against climate change and become the competitive sector it is expected to be in Europe.

In this context, the project Wood2Good had as a main objective to analyze the current situation of restructuring in the sector and establishment of recommendations to ensure a responsible change of wood SMEs oriented to the Green Economy. W2G will facilitate the comprehension of the employment situation in the wood sector, enlightening the role of each stakeholders to anticipate changes and restructuring in a socially responsible way, providing an analysis based on restructuration cases, dialogue between experts and best practices and innovative proposal exchanges, leading to a series of recommendations.

The Wood2Good partnership from six countries (UK, Spain, Belgium, Hungary, France and Italy) included universities, chambers of commerce, professional associations and research institutions.

As the restructure process is imposed by the growing demands of competitiveness, it was seen that there was a need to observe the process in the sector context and determine the best practices in order to propose recommendations and present innovative solutions derived from a number of representative case studies.

The initial objectives when the survey was designed were:

- To identify and understand the opportunities presented in the sector: The opinion of the sector's agents about the real situation in the industry, focused on environmental issues.
- To cross analyze the results of the survey with the bibliographical review and ascertain if companies are making responsible changes aiming towards the sustainability, green economy and environmental care, and to identify what are these changes and/or recognise good practices.
- To obtain answers from all the stakeholders. To have answers from different company size, different subsectors and workers from different functional areas and professional categories.

The survey had four sections:

- Sector situation: With four questions to find out the general opinion of the wood sector.
- Actions that companies are carrying out: With four questions about concrete actions concerning sustainable development, natural resources, furniture finish tasks,
- Respondent's Opinion: With two questions to know the individual opinion about the reason for environmental measures.
- Two questions to know the opinion about the consequences of the responsible changes orienting towards sustainability

The survey took place in five languages: English, French, Spanish, Italian and Hungarian. The survey was sent to all agents in the sector: Employers, employees, technicians and researchers, scientists, representatives of business associations and trade unions, etc.

The completed survey's representation was made of 46% employers, 29% employees, 13% Business Association and Trade Unions and 11% Research environment. 76% of responses were from people working in SMEs in the Wood sector (employers and employees), and 24% from stakeholders.

Within this context, an integrated survey for evaluating the environmental performance of participating SMEs was created. The main part of this integrated survey was a matrix that covered data identification, sector perception, actions taken, market opinions on those actions take and consequences of the implemented restructuring actions.

The project was initially programmed for a period of one year. Its main goal was to perform studies focused on the restructuring of the wood sector in Europe. Within this study, two main lines of research should be mentioned. The first was the review of sector changes. The second was the development of scenarios derived from best cases and innovative solutions that were to be proposed as recommendations for new or existing SMEs.

The completion of the project supplied the sector with knowhow on the actual state of affair across Europe. During its life Wood2Good enabled an exchange of information between SMEs and the

universities which culminated in cooperative research on energy reduction and sustainable manufacturing techniques.

The case described in this article, the fruits of the collaboration between all partners, led to the development of innovation knowledge that resulted in measurable outputs on energy consumption in the wood sector as a result of technological restructuring. This was relevant not only for the competitiveness of SMEs partners but also led to promoting Industry-University approach on finding sustainable solutions on a reduced cost basis with R&D support.

### *3.1.2 The Joint Research*

In May 2013, the first conversations between the Wood2Good and stakeholders took place, with the companies' interest in reducing energy consumption the motivation for the first contacts made by the team to provide the research potentials at the participant companies. These were followed by the focus group meetings in each partner countries to discuss a possible partnership between the institutions.

Later, there was a period for the exchange of information via a structured survey that led to the definition of priority terms for joint research. In this way the project was begun, which involved the reformulation of these proposals many times to establish the lines of research of the study. Besides the factors related directly to the research, this phase also involved continued discussions over the clauses of the contract concerning intellectual property of the results obtained, the type of information to be supplied by parties, control over activities and others.

To protect IP Wood2Good and survey participants as well as Wood2Good and case studies for best practice and innovation drew up confidentiality agreements.

Wood2good was responsible for the development of a book of recommendations derived from best practice across the sector and an Innovation book called 'Innobox Book' that summarised the case studies innovative approach to restructure.

Throughout the two year duration of the project significant advances were made in the understanding different approaches in restructuring the wood sector with SMEs of various sizes. However, during the initial months, the lack of familiarity between the parties slowed the process down and it was necessary to get to know each other better to establish trust and also develop a common language and more cooperative attitudes. This characterized the occurrence of a situation of conflict since the difficulty in communicating compromised the progress of activities within the expected time frame.

The survey follow up with companies strengthened the partnership, leading to greater trust and collaboration among the participants and the development of a common language, which greatly facilitated activities throughout the remainder of the project. According to the interviewees, this process was instrumental in the project's achieving the success that it did.

This joint research between the universities and companies resulted in the development of incremental technological innovations, because it inspired changes that led to the improvement of existing products in addition to the transfer of knowledge between the two parties, since it was necessary for the university to become familiar with the features of the product, the production process, the technology that is used and the market of its partner, which would interfere in the application of its highly specialized knowledge in the generation of innovations. Likewise, the company needed to perfect its competences to understand and dominate the new knowledge generated and thus absorb the new approaches adequately for a successful restructure.

Considering the more macro-economic aspects, the interviewees also mentioned the contribution given to the scientific community and the European job market: the former being an area of knowledge that has few insight references, but now new data have been made available as a result of this joint research; and the latter, due to the defining of training required for the sector, has improved productivity as well as causing SMEs to comply to being more corporately socially responsible.

In terms of documentation, three internal technical reports have been written, and the joint analysis of these helped participant SMEs to make improvements concerning the reduction of energy and use of environmentally friendly materials.

## 4 CONCLUSION

The analysis of the survey results allows us to identify that the improvements in companies aimed at protecting the environment contribute to the creation of a model of employment growth, based on competitiveness and productivity.

Motivation for cooperation between companies and universities is considered to contribute to the protection of the environment. Competitiveness is seen to increase the employment of innovative ways to manage waste, including using certified timber. Much more needs to be done across the sector to implement the production processes which will progress real measures for environmental improvements and energy saving. These need to be supported by investment, staff training and incentive measures.

By investing in environmentally friendly technology and processes the wood processing sector will contribute to the creation of an improved model of employment growth. Most companies comply with legal requirements on environmental issues; one of the aspects that need to be improved is the sectorial qualification of human resources through training. The lack of information and training of human resources is an issue that was revealed consistently in the survey, so this can be turned into an opportunity for improvement.

The study demonstrated the use of different forms of interaction between university and business for the consolidation of cooperation, such as the financing of scientific research at the university by the company; the providing of services of the university to the company; the formal personal relationship created by providing company workers with a course at the university and the research itself that was carried out jointly.

The results of the cooperation can be seen in the two products – the Book of Recommendations and the Innobox Book (<http://wood2good.gva.es/en/>). There are also other results to consider, such as the incremental consideration that was done, i.e. the improvement of energy efficiency; the exchange of knowledge and the training of workers.

Furthermore, the advantages that were obtained were clear. The companies that participated in this study obtained new perspectives and benefits. This has allowed for simulations on the restructuring process providing a competitive advantage for products by making them more efficient. Efficiencies can be gained with energy consumption, environmental friendliness. This has shown to be both prudent and expedient, especially at a time when these two aspects have become strategic in maintaining and increasing sales in a market that requires SMEs to be more social responsible.

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