Unite
University and Industry for the modernisation of textile manufacturing sector in Belarus

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1 - INTRODUCTORY REMARKS

Since the development of the high education institutions, when considered in their modern concept of knowledge centers and the emergence of consolidated industries with large scale production capabilities that they, apparently, pursue opposite goals. The formers are focused on the generation of scientific knowledge for all branches of human activity whereas the latter are more oriented toward the fulfillment of their customers' needs and in the realization of a maximum profit.

In the early beginning of the 80s, and encompassing the profound transformations of rules and regulations in the international trade, along with the accentuation of a worldwide globalization and the consciousness of the scarcity of resources, a new vision regarding the key role of knowledge arose, placing it as another production factor besides capital, land, work and raw-materials (Toffler, 1999).

It was the beginning of a new era with a more structured and deeper relationship between companies and universities. However, historically, this type of partnership could be found in the XIX century, mainly in Germany and Japan.

The most important results of such liaison are: innovation, new knowledge, generation of intellectual property trough patents, a better understanding of the companies' needs by the university, and the development of products/services technologically more advanced and with added value. All these outcomes are essential to maintain or achieve the leadership of the market and to support the competitiveness of the company.

2 – KNOWLWDGE AS A FACTOR OF GROWTH AND INNOVATION

Accordingly to Zawislak (1995) all kind of development - social, political, economic, scientific, technological, - is a direct function or a derivative of some sort of knowledge.

In is most broad sense, knowledge can be subdivided in two distinctive types: empirical knowledge and scientific knowledge. The former one, most commonly found in the

majority of the textiles and apparel mills, is a technical knowledge acquired and related with the daily praxis and based on practical experimentation. The latter one is founded upon a theoretical rationalization, grounded on analytical methodology and largely dependent on scientific research. The process is documented and transmitted through formal channels such as universities, research centers, papers, seminars, workshops, etc.

Combining these two dimensions of knowledge is a faster and safe way to develop applied technology, with meaningful purposes, so as to satisfy specific demands required by companies of the textile rank. Bearing this premise in mind, the transformation of knowledge into development may be triggered by a problem solving method; an innovative breakthrough or from some technological improvement.

The cooperative and collaborative research between high education institutes and companies, research centers, socio-professional associations and even unions is, currently, and by far, a strategic asset for the all major textiles groups, as it is evidenced by the outcomes and level of satisfaction attained with conjoint research projects in a national or international level. Statistical information gathered by different scientific metrics are all pointing for the same conclusion. A dynamic company-university relationship allows leveraging resources, splitting risks, defining suitable patterns and carry out in-depth researches. In the end, it is possible to come out with new improved and/or innovative products, which guarantee the success and perpetuity of the company in the market.

3 – UNIVERSITY-COMPANY LINK

As aforementioned, it was in the late 70s and early beginning of the 80s that major textile group leaders start to see the linkage with universities as strategic alternative to

revert the decline of productivity and overcome the competitiveness drawbacks of their companies. More advanced countries introduced a series of programs to promote and

stimulate the cooperation between companies and universities. Since that time, this relationship has been known as a growth factor for the economy and a potential new source of products and enterprises (Etzkowitz and Leydesdorff, 1998).

With this specific configuration a new way of partnership has born and became commonly recognized as the "triple helices" system, for it involve the integration of three components: Government; Companies and Universities.

Each partner has his own specific role. Universities are seen as source of knowledge and information; companies are regarded as a new font of technological resources and funds whereas the government acts a mediator, injecting some stimulus and driving the research for more strategic areas with new laws or increasing the applied funds.

Taking into account what has been outlined, it is possible to summarize the main reasons of interest for the existence of these partnerships.

REASONS OF INTEREST FOR THE UNIVERSITIES

- Raising of funds for research and to buy new scientific equipment;
- Developing new areas of interest and potential research fields;
- Carry out some practical tests on developed researches;
- Looking up for business opportunities;
- Gaining new knowledge on practical problems that might be useful for teaching;

- Generating opportunities to obtain scholarships and internships for their students

REASONS OF INTREREST FOR THE COMPANIES

- Conducting and reorienting internal R&D towards new technologies and patents;
- Developing new products, processes or services;
- Solving technical problems;
- Improving their products quality;
- Gaining access to emergent know-how within their field of operation;
- Recruiting very highly qualified personnel;
- Having financial benefits and tax discounts.
- Improving their competitiveness;
- Increasing their external credibility.

4 – COOPERATION BETWEEN HIGH EDUCATION INSTITUIONS AND INDUSTRY – UBI CASE STUDY

The University of Beira Interior has an office called GAPPI - Project Support and Promotion Research Office which is a structure that makes possible the interface between the university and the companies or other entities of the involving way, wants through the popularization and implementation of programs co-financed that you/they

stimulate the cooperation, wants through the popularization of the investigation results and of the promotion of the services and potentialities of that near the companies and other institutions of the civil society.

GAPPI is a structure, created in the end of 2002, direct and organically coordinated by the Rectory of UBI, namely in the dependence of the Vice-rectory for the Cooperation with the Exterior. On the other hand, it assumes narrows articulation with the services related with the financial execution of the programs and contracts, namely the Accounting and Planning. It is a light, flexible and functional structure, making possible the necessary articulation and cooperation university-companies and understands two structures, namely the Tech Transfer Unit (OTIC) and the Industrial Property Unit (GAPI). This structure is an interface between the university and the companies and other entities of the involving way, promoting the connection to the society, above all in the slopes of the science and technology, contributing, like this, for the national and regional development, through the improvement of competitiveness of the organizations and of the increase of the competences.

This unit operates with 5 consultants, assuming as main sub-units and respective activities the following ones:

1) INDUSTRIAL PROPERTY UNIT, which it assumes the following, functions:

- Promotion and diffusion of the Industrial Property (PI), near the community academic and business;

- Registry of the rights of PI of the University near the National Institute of Industrial Property (INPI);

- To support the business and institutional community in the registry of the rights of PI;

- To render support on juridical aspects of the PI;
- Valorization, transfer and commercialization of the rights of the PI (support to the commercialization of the scientific-technological capacities of UBI);
- Technological surveillance;
- Elaboration and administration of contracts of R&D;
- Licensing.

2) TECH TRANSFER UNIT, which assumes the following functions:

- Elaboration of the catalogue of the scientific-technological offer of UBI - database of knowledge infrastructure and scientific-technological offer of UBI;
- Identification of possible results of transfer, generated by the investigation groups;
- Valorization, transfer and commercialization of the scientific-technological capacities of UBI;
- Promotion of the constitution of consortiums university-company, necessary for the resolution of concrete problems of the companies;
- Service of Scientific-technological Prospective;
- Detection of needs of involving business;
- Identification of packages of specialized formation in the areas of the creation, development and commercialization of new technologies and innovative services, entrepreneurship and technology transfer and knowledge;

- To promote a larger cooperation between the university and the companies;
- Invigoration of the position of the investigation groups of the university at national and international level;
- Promote the creation of spin-offs.

3) LIFELONG LEARNING, with the following functionalities:

- To identify the business and institutional needs of lifelong learning of the human resources;
- To develop and to accompany lifelong learning courses;
- To organize and to develop packages of specialized lifelong learning courses to the business sector, in the areas of the creation, development and commercialization of new technologies and innovative services, entrepreneurship and technology transfer and knowledge.

4) PROJECTS AND SERVICES

- To contribute for the increase of the participation in European projects of Investigation and Development, on the part of Investigators of the University;
- To identify technological requests of the business sector and, subsequently, to transform them in innovative projects of technological development that can be executed by the University;
- Elaboration of r&d contracts, technical support and of consultancy between the university and firms;
- Find proposals and organize the call process to national and European programs.

PIRAEUS UNIVERSITY OF APPLIED SCIENCES - GREECE

FOREWORD

It is obvious, without teaching no research, as we understand it today, but nevertheless for that same reason there will not be much to teach without research.

Thinking and talking about nowadays' research needs, the understanding right from the start that research is not a prerogative of the academic world. High quality and advanced research is carried out in many industries and already this has urged to cooperation between universities and industry towards a mutual benefit. Apart from this also the place and role of universities in society as the incubation spot as well of talented young people of which many will become a vital part of the human resources in industry urges to safeguard the collaboration in between and to improve it where needed so.

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1 – PROJECT REFERENCE

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Number of countries involved: 5

2 - PROJECT TEAM

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3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

UNITE Council will be a body consisting of representatives from Academia, Industry and government with the main objective to promote and support the modernisation of HE in textile sector in Belarus. The Council will have a strategic decision making role and it will set the ground for the more active involvement of enterprises in higher education. During the project the members of the UNITE Council will be appointed, the statute, processes and procedures for its operation will be produced.

The conditions for the development of a Council between Academia and Industry are favourable, due to the on-going programme for the modernization of textile sector in Belarus and the strong commitment of Bellegprom. A key pillar for the modernization of industry is the cooperation of higher education with textile industry and there is stated interest from all stakeholders to this direction.

4 – PROJECT DESCRIPTION

Good practice report, including case studies of cooperation between Academia and Industry. The case studies are focus on experiences on the textile sector cooperation. The report includes a number of seven case studies and a synthesis of the results including main challenges, impacts and recommendations. The final report has a length of about 100 pages, developed in English and translated to Russian.

1.1 Good practices in EU countries

The EU partners had gather good practices related to the establishment, function and evaluation of Councils between Industry and Academia. The activities involved was desk research to identify these good practices followed by in-depth interviews and focus groups of stakeholders participating in sector Councils or other cooperation schemes. The role of institutes and technology transfer organizations is also be explored. The result of the activity is a report that will serve as a basis for the establishment of the UNITE Council.

1.2 Identification of stakeholders in Belarusian textile sector – Consultation

The Belarusian partners have to identify and map the stakeholders in the country textile sector: companies, company representatives, trade unions, research institutes, universities, governmental organizations etc. A consultation round will be organized, with a distribution of a questionnaire and meetings. The consultation will have as an objective to gather the different views and opinions on the role of UNITE Council including its vision, mission, management, activities and expected results.

1.3 Establishment and formalisation / institutionalisation of UNITE council

Following the first two tasks, the UNITE Council will be established (members, statute, processes). The details of the UNITE Council will be defined following the review of the good practices from European countries and the consultation process in Belarus, thus it will take into account the experience of EU countries as well as the reality and needs of Belarusian textile sector.

5 – RESULTS AND IMPACTS

5.1 HIGHER EDUCATION IN GREECE

The Greek educational system is mainly divided into three levels, primary, secondary and tertiary, with an additional post-secondary level providing vocational training. Primary education is divided into kindergarten lasting one or two years, and primary school spanning six years (ages 6 to 12).

Secondary education comprises two stages: Gymnasio (variously translated as Middle or Junior High School), a compulsory three-year school, after which students can attend Lykeion (an academically-oriented High School) or Vocational training.

Higher Tertiary education is provided by Universities and Polytechnics, Technological Educational Institutes (T.E.I., 1983 ~ present) and Academies which primarily cater for the military and the clergy. Undergraduate courses typically last 4 years (5 in polytechnics and some technical/art schools, and 6 in medical schools), postgraduate (MSc level) courses last from 1 to 2 years and doctorates (PhD level) from 3 to 6 years. All levels are overseen by the Ministry of Education and Religious Affairs.

The Ministry exercises centralised control over state schools, by prescribing the curriculum, appointing staff and controlling funding. Private schools also fall under the mandate of the Ministry, which exercises supervisory control over them. At a regional level, the supervisory role of the Ministry is exercised through Regional Directorates

of Primary and Secondary Education, and Directorates of Primary and Secondary Education operate in every Prefecture.

Tertiary institutions are nominally autonomous, but the Ministry is responsible for their funding, and the distribution of students to undergraduate courses. Currently the Greek government only recognises the degree programmes offered by the state-run

universities although there are several private universities and colleges offering degree programmes that are validated and overseen by American, British and other European universities.

All levels of education are catered for by both private and public schools. State-run schools and universities do not charge tuition fees and textbooks are provided free to all students, although, from 2011 onwards, there has been noticed a shortage in new textbooks, forcing students to either buy stock books from bookshops, or participate in parent-teacher association-run book trades.

There are also a number of private tutors schools, colleges and universities operating alongside the state education and providing supplementary tuition. These parallel schools (Greek: φροντιστήριο, frontistirio (singular)) provide foreign language tuition, supplementary lessons for weak students as well as exam preparation courses for the competitive Panhellenic national examinations.

Most of the students typically attend such classes (and examinations) at the tutors schools in the afternoon and evening in addition to their normal schooling. Higher education in Greece consists of two parallel sectors: the University sector (Universities, Polytechnics, Fine Arts Schools) and the Technological sector (Technological Education Institutions and the School of Pedagogic and Technological Education). Higher Education Institutes are self-governing legal entities under public law, supervised and subsidized by the state through the Ministry of National Education and Religious Affairs.

The main source of funding is the state budget through the Ministry of Education and European funds. Additional funding is provided by National and European Framework research projects (RTD), through other ministries and third bodies that receive services provided by the Higher Educational Institutions. Greece has a binary system of Higher

Education, designed to ensure maximum flexibility and to respond to the wide variety of social and economic requirements.

The Greek Higher Education system is highly diversified offering a wide range and type of courses. The universities are essentially involved with undergraduate and postgraduate programmes, along with basic and applied research. The same goes for the T.E.I.s but with a smaller number of post graduate programmes developed autonomus or with Greek or other European universities and a growing involvement in European Framework research projects (RTD).

The basic requirement for admission to tertiary education is the achievement score on the 'Certificate' *(Bebaiosi)* which includes grades in six general education and 'stream' subjects that are examined at the national level. The general achievement score on this Certificate takes into account final year school grade, (school level evaluation) and grades on the six subjects of the national level examinations. The number of students admitted to each university and Technological Educational Institute department is based on ranking of students' performance and the general score obtained on the leaving certificate.

Moreover, in Greece there are 22 Universities, including Polytechnic Schools, the School of Fine Arts and the Hellenic Open University (EAP), 14 Technological Educational Institutes (T.E.I.) and the School of Pedagogic and Technological Education (ASPETAI). The internal structure, organization, and operation of administrative, financial and technical services; overall teaching and research policy; planning; the procedures and requirements for hiring personnel for such positions; the

allocation of funds, etc, are determined by the respective provisions and the internal regulations of each university or T.E.I.

Greek Higher Education Institutes develop their own curricula which are published in the Official Journal of the Greek Government and come up for review every two years, by law. Course validation and accreditation is subject to the advisory body of The

National Council of Education (ESYP). However, Greek Higher Education Institutes award their own qualifications (Degree, Diploma, MSc, Doctorate). Greek educational institutes are entitled to formulate autonomous policies for achieving their specific educational goals and in fulfilling their mission. A national credit system has existed in both sectors of higher education since the beginning of the 1980s.

This is in fact an accumulation system in which the credits are directly equivalent to the weekly hours of instruction (e.g. a course of four teaching hours per week corresponds to four credits). However, ECTS is used by institutions in both sectors as a transfer system for European mobility programmes. The new 2005 law on Quality Assurance in Higher Education makes the use of ECTS for transfer and accumulation compulsory in two-cycle programmes at all higher education institutions. Currently, ECTS is fully implemented and both systems are in use. Higher education institutions are encouraged to set up their own internal quality assurance mechanisms to provide a sound basis for external evaluation. The aim is to combine institutional autonomy and accountability effectively within the national quality regulations framework. Each institution has the right to independent decision-making and is therefore responsible for devising its own quality assurance system for assessing education and administrative and research functions, although general provisions are set out in the legislation. Teaching and administrative staff as well as students are the main participants and contributors in this process.

5.1.1 Universities and Technical Universities

All the Higher Tertiary state-accredited universities in Greece are public. The duration of the undergraduate degree programs for most disciplines is 4 years (full-time).

Programs in engineering, dentistry, pharmacology, agronomics, forestry, along with some programs in fine arts, have a duration of 5 years (240E.C.T.S - 300E.C.T.S ISCED 5A). Medicine is the only discipline with a duration of studies of 6 years.

Agricultural University of Athens
Aristotle University of Thessaloniki (campuses: Thessaloniki, Serres)

Athens School of Fine Arts
Athens University of Economics and Business
Democritus University of Thrace (campuses: Komotini, Xanthi, Alexandroupoli, Orestiada)
Harokopio University
Hellenic Open University
International Hellenic University
Ionian University
National and Kapodistrian University of Athens
National Technical University of Athens
Panteion University of Social and Political Sciences
Technical University of Crete
University of the Aegean (campuses: Mytilene, Chios, Karlovasi, Rhodes, Ermoupoli, Myrina)
University of Crete (campuses: Heraklio, Rethymno)
University of Ioannina
University of Macedonia
University of Patras (campuses: Patras, Agrinio)
University of Peloponnese (campuses: Tripoli, Korinthos, Kalamata, Nafplio, Sparti)
University of Piraeus
University of Thessaly (campuses: Larissa, Volos, Karditsa, Trikala, Lamia)
University of Western Macedonia (campuses: Florina, Kozani)

5.1.2 Technological Educational Institutes

All the Higher Tertiary state-accredited Technological Educational Institutes in Greece are public. Technological Educational Institutes were initially established in 1983. They currently offer a 4-years (full-time) undergraduate degree programs equivalent to Honours Bachelor's Degree (240E.C.T.S ISCED 5A) and since 2008 they are also

allowed to run on their own postgraduate that lead to a Master's Degree and PhD programs.

Alexander Technological Educational Institute of Thessaloniki (campuses: Sindos, Katerini, Kilkis, Nea Moudania)

Higher School of Pedagogical and Technological Education

Technological Educational Institute of Athens

Technological Educational Institute of Chalkida (campuses: Chalkida, Thiva)

Technological Educational Institute of Crete (campuses: Heraklio, Chania, Rethymno, Agios Nikolaos, Ierapetra, Sitia)

Technological Educational Institute of Epirus (campuses: Arta, Ioannina, Preveza, Igoumenitsa)

Technological Educational Institute of the Ionian Islands (campuses: Lefkada, Argostoli, Lixouri, Zakynthos)

Technological Educational Institute of Kalamata (campuses: Kalamata, Sparti)

Technological Educational Institute of Kavala (campuses: Kavala, Drama, Didymoteicho)

Technological Educational Institute of Lamia (campuses: Lamia, Amfissa, Karpenisi)

Technological Educational Institute of Larissa (campuses: Larissa, Karditsa, Trikala)

Technological Educational Institute of Western Greece (campuses:Patras, Missolonghi, Pyrgos, Aigio, Nafpaktos and Amaliada) (Created by the union of T.E.I. of Patras and T.E.I. of Missolonghi)

Technological Educational Institute of Piraeus

Technological Educational Institute of Serres

Technological Educational Institute of Western Macedonia (campuses: Kozani, Florina, Kastoria, Grevena and Ptolemaida)

Students who successfully complete their studies in universities and T.E.I. are awarded a *Ptychio* (degree) which leads to employment or further study at the post-graduate level. University and T.E.I. graduates can continue their studies to attain an MSc and a PHD provided they meet the criteria set by each department running the courses. According to the Constitution of Greece, higher education is public, is provided solely by the state and is provided free of charge at the undergraduate level. Fees for some MSc courses are set by the departments running the courses.

The State Scholarships Foundation (IKY) provides scholarships to students who wish to study at tertiary education institutions. Scholarships are also granted to graduates of universities and technical education institutions for post-graduate or post-doctoral studies in Greece and abroad based on academic achievement of undergraduate studies. Additionally, students (at any level) can receive mobility grants to study at other European Higher Education Institutes under the Lifelong Learning Programmes (LLP). The first cycle leads to the first degree (*ptychio* or *diploma*) in both sectors of higher education, i.e. the university and technological sectors.

The second leads to the second degree, which is called a postgraduate specialisation diploma (equivalent to the Master's degree), and the third degree (doctorate). Studies in the fields known as regulated professions (medicine and surgery, agriculture, arts, dental studies, pharmacy, veterinary medicine and engineering) last for five to six years.

A doctorate is obtained after at least three years of original research, including the preparation and writing of a thesis. In some doctoral programmes, theoretical courses are compulsory and are taken prior to individual research. Under the 2004 law, a new international scheme for joint Master's degrees has been established. This provides for cooperation between institutions to work out the details concerning the organisation and functioning of postgraduate study programmes which lead to joint qualifications. Art. 23 of law 3404.

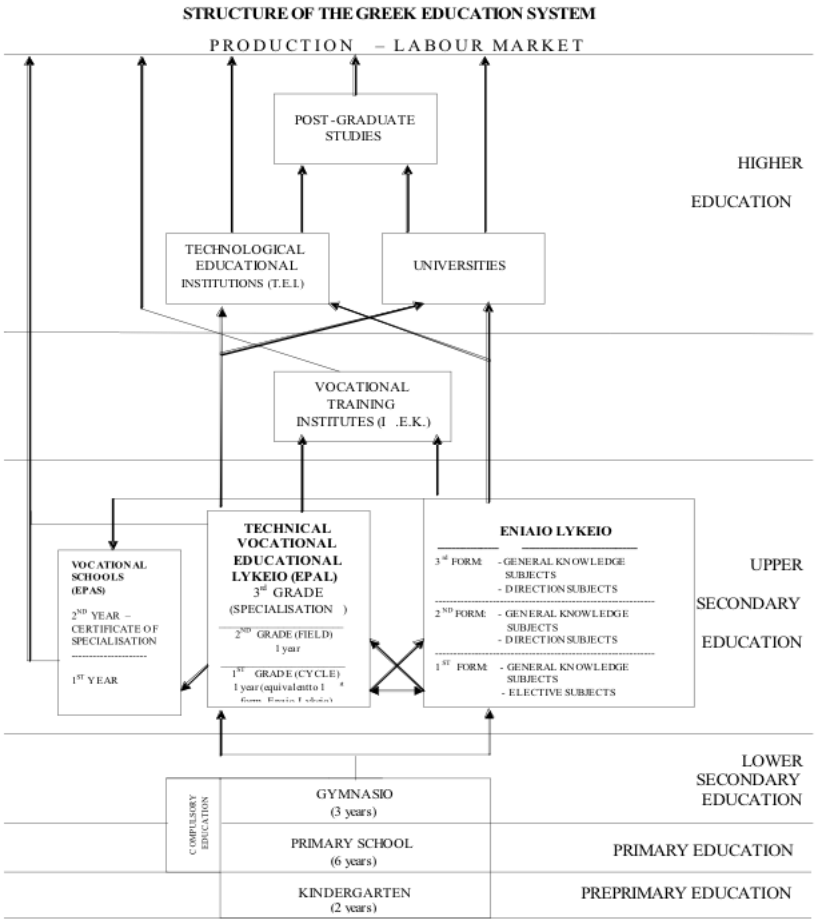

FIGURE 1: STRUCTURE OF THE GREEK EDUCATION SYSTEM

TABLE 1: UNIVERSITIES & TECHNOLOGICAL EDUCATION INSTITUTES OF GREECE

UNIVERSITIES & INSTITUTES	WEB SITE	STRUCTURE OF EMPLOYMENT AND CAREER/CAREER OFFICE/ LIAISON OFFICE

NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS	http://www.uoa.gr/	CAREER OFFICE http://www.uoa.gr/foithtes/symboyleytikes-yphresies/grafeio-diasyndeshs.html LIAISON OFFICE http://www.uoa.gr/to-panepistimio/yphresies-panepisthmiakes-monades/grafeio-diamesolabhshs.html
NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA)	http://www.ntua.gr/	CAREER OFFICE http://career.central.ntua.gr/ LIAISON OFFICE http://liaison.ntua.gr/core/portal.asp?cpage=NODE&cnode=1
AGRICULTURAL UNIVERSITY OF ATHENS	http://www.aua.gr/index.php	CAREER OFFICE http://www.career.aua.gr/
ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS	http://www.aueb.gr/	CAREER OFFICE http://www.career.aueb.gr/
PANTEION UNIVERSITY OF SOCIAL AND POLITICAL SCIENCES	http://www.panteion.gr/	CAREER OFFICE http://www.panteion.gr/index.php?p=content&section=20&id=143&lang=el
ATHENS SCHOOL OF FINE ARTS	http://www.asfa.gr/	CAREER OFFICE http://www.dasta.asfa.gr/frontend/articles.php?cid=2
UNIVERSITY OF PIRAEUS	http://www.unipi.gr/	CAREER OFFICE http://career.unipi.gr/
ARISTOTLE UNIVERSITY OF THESSALONIKI	http://www.auth.gr/	CAREER OFFICE http://dasta.auth.gr/cmsitem.aspx?sid=2&id=155
UNIVERSITY OF MACEDONIA	http://www.uom.gr/index.php	CAREER OFFICE http://career.uom.gr/careerindex/index.html
UNIVERSITY OF WESTERN MACEDONIA	http://www.uowm.gr/	CAREER OFFICE http://dasta.uowm.gr/career/
UNIVERSITY OF PATRAS	http://www.upatras.gr/	CAREER OFFICE http://www.upatras.gr/index/page/id/104
UNIVERSITY OF PELOPONNISOS	https://www.uop.gr/index.php	CAREER OFFICE http://career.uop.gr/
UNIVERSITY OF IOANNINA	http://www.uoi.gr/gr/	CAREER OFFICE http://www.uoi.gr/gr/facilities/career_office.php LIAISON OFFICE http://liaison.uoi.gr/
UNIVERSITY OF CRETE	http://www.uoc.gr/	CAREER OFFICE http://www.dasta.uoc.gr/career/
TECHNICAL UNIVERSITY OF CRETE	https://www.tuc.gr/2969.html	CAREER OFFICE http://www.career.tuc.gr/3532.html LIAISON OFFICE http://www.liaison.tuc.gr
UNIVERSITY OF THE AEGEAN	http://www.aegean.gr/	CAREER OFFICE http://career.aegean.gr/

DEMOCRITUS UNIVERSITY OF THRACE	http://www.duth.gr/	CAREER OFFICE http://career.duth.gr/cms/
IONIAN UNIVERSITY	http://www.ionio.gr/central/	CAREER OFFICE dasta.ionio.gr/liaison
UNIVERSITY OF THESSALY	http://www.uth.gr/	CAREER OFFICE http://www.career.uth.gr/
HELLENIC OPEN UNIVERSITY	http://www.eap.gr/	CAREER OFFICE http://career.eap.gr
INTERNATIONAL HELLENIC UNIVERSITY	http://www.ihu.edu.gr/	CAREER OFFICE http://career.duth.gr/cms/
THENOLOGICAL EDUCATION INSTITUTE OF ATHENS	http://www.teiath.gr/	CAREER OFFICE http://www.career.teiath.gr/Career/Articles/215.html
TECHNOLOGICAL EDUCATION INSTITUTE OF WESTERN MACEDONIA	http://www.teiwm.gr/index.php?lang=el	CAREER OFFICE career@kozani.teikoz.gr
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TECHNOLOGICAL EDUCATION INSTITUTE OF KALAMATA	http://www.teikal.gr/	CAREER OFFICE http://dasta.teikal.gr/Career/default.aspx
TECHNOLOGICAL EDUCATION INSTITUTE OF CRETE	http://www.teicrete.gr/tei/en/index.php	CAREER OFFICE https://dasta.cs.teicrete.gr/web/career-office/ LIAISON OFFICE http://www.liaison.teicrete.gr/
TECHNOLOGICAL EDUCATION INSTITUTE OF WESTERN GREECE	http://www.teiwest.gr/index.php/en/	CAREER OFFICE http://www.teiwest.gr/index.php/el/home-2/dasta-gr
TECHNOLOGICAL EDUCATION INSTITUTE OF PIRAEUS	http://www.teipir.gr	Structure of Employment and Career (S.E.C.) http://www.teipir.gr/index.php?option=com_content&task=view&id=90&Itemid=84 Liaison Office http://gdias.teipir.gr Counseling and Psychological Support Center counseling@teipir.gr Practical Training Office http://apollon.teipir.gr/praktiki/ Innovation & Entrepreneurship Unit http://www.teipir.gr/mke/ European Programmes and International Relations Office, http://euoffice.teipir.gr/ T.E.I. Piraeus Alumni Association http://gdias.teipir.gr/alumni

TECHNOLOGICAL EDUCATION INSTITUTE OF CENTRAL MACEDONIA	http://www.teiser.gr/	CAREER OFFICE http://diasyndesi.teicm.gr/
SCHOOL OF PEDAGOGICAL & TECHNOLOGICAL EDUCATION http://www.aspete.gr/	http://web.aspete.gr/aspete/index.php	CAREER OFFICE http://dasta.aspete.gr/Career/default.aspx

5.2 ECONOMY & INDUSTRY IN GREECE

The economy of Greece is the 42nd or 45th largest in the world at $249 billion or $286 billion by nominal gross domestic product or purchasing power parity respectively, according to World Bank statistics for the year 2012. As of 2013, Greece is the thirteenth largest economy in the 28-member European Union. In terms of per capita income, Greece is ranked 37th or 40th in the world at $22,083 and $25,331 for nominal GDP and purchasing power parity respectively.

A developed country, the economy of Greece mainly revolves around the service sector (80.6%) and industry (16%), while agriculture made up an estimated 3.4% of the national economic output in 2012. Important Greek industries include tourism and shipping. The Greek Merchant Navy is the largest in the world, with Greek-owned vessels accounting for 15.17% of global deadweight tonnage as of 1 January 2013. With 15.5 million international tourist arrivals in 2012, Greece was the seventh most visited country in the European Union and sixteenth in the world.

The country is also a significant agricultural producer within the EU. With an economy larger than all the Balkan economies combined, Greece is the largest economy in the Balkans, and an important regional investor. Greece is the number-two foreign investor of capital in Albania, the number-three foreign investor in Bulgaria, at the top-three foreign investors in Romania and Serbia and the most important trading partner and largest foreign investor of the Republic of Macedonia. Greek banks open a new branch somewhere in the Balkans on an almost weekly basis.

The Greek telecommunications company OTE has become a strong investor in Yugoslavia and other Balkan countries. Greece is classified as an advanced, high-income economy, and was a founding member of the Organisation for Economic Co-operation and Development (OECD) and the Organization of the Black Sea Economic Cooperation (BSEC). The Treaty of Accession of Greece to the European Communities was signed in Athens on 28 May 1979, and the country formally joined what is now the European Union on 1 January 1981. On 1 January 2001 Greece adopted the euro as its currency, replacing the Greek drachma at an exchange rate of 340.75 drachmae per euro. Greece is also a member of the International Monetary Fund and the World Trade Organization, and is ranked 31st on the KOF Globalization Index for 2010 and 34th on the Ernst & Young's Globalization Index 2011. The country's economy was devastated by the Second World War, and the high levels of economic growth that followed throughout the 1950s to 1970s are dubbed the Greek economic miracle. Since the turn of the millennium, Greece saw high levels of GDP growth above the Eurozone average, peaking at 5.9% in 2003 and 5.5% in 2006.

The subsequent Great Recession and Greek government-debt crisis, a central focus of the wider Eurozone crisis, plunged the economy into a sharp downturn, with real GDP growth rates of −0.2% in 2008, −3.1% in 2009, −4.9% in 2010, −7.1% in 2011 and −6.4% in 2012. In 2011, the country's public debt reached €355.141 billion (170.3% of nominal GDP). After negotiating the biggest debt restructuring in history with the private sector, Greece reduced its sovereign debt burden to €280.4 billion (136.5% of GDP) in the first quarter of 2012. Between 2005 and 2011, Greece has had the highest percentage increase in industrial output compared to 2005 levels out of all 27 European Union members, with an increase of 6%. Eurostat statistics show that the industrial sector was hit by the Greek financial crisis throughout 2009 and 2010, with domestic output decreasing by 5.8% and industrial production in general by 13.4%.

Currently, Greece is ranked third in the European Union in the production of marble (over 920,000 tons) after Italy and Spain. Between 1999 and 2008, the volume of retail trade in Greece increased by an average of 4.4% per annum (a total increase of 44%), while it decreased by 11.3% in 2009. The only sector that did not see negative growth in 2009 was administration and services, with a marginal growth of 2.0%. In 2009,

Greece's labor productivity was 98% that of the EU average, but its productivity-per-hour-worked was 74% that the Eurozone average. The largest industrial employer in the country (in 2007) was the manufacturing industry (407,000 people), followed by the construction industry (305,000) and mining (14,000). Main industries: shipping (4th; 2011), tourism, food and tobacco processing, textiles, chemicals, metal products; mining, petroleum.

5.2.1 Textile Industry in Greece

Textile constitutes an important sector of Greek manufacturing industry, which includes many individual sub-fields as the spinning, the weaving, the clothing and other sectors which are correlated. According to data of the Greek Textile manufacturers, the sector of textile contributes with roughly 15% in the configuration of GNP of the country, while it occupies 70.000 workers, including the personnel that is occupied in the sector of clothing also.

The total number of workers approaches the 120.000 individuals representing the 28% occupied in the domestic industry. The exports of textile manufacturing products and ready clothing classify this wider sector as the bigger export of the domestic manufacturing industry, representing the 23% of total exported products or the 47% of exported industrial products and participating with 28% in the industrial production of country, developing the domestic raw material, the cotton. The textile in Greece presented important rythms of growth at the decades '60 and '70, period at which it maintained powerful place in the domestic industry.

Since then, it entered in period of recession, with important reduction of domestic production and investment activities, so that it is led to shrinkage and a lot of textile manufacturing units suspend completely their work. However, the most important problem is focused in the competition that Greek products mainly accept Third

Countries (from Turkey, Pakistan, India, China) in the Greek market and in European market, as well. Today the number functioning spindles in the spinning is calculated around 750.000-800.000, lower comperativly to 1,5 million in the beginning of 80's.

It is however pointed out that, the majority of the spindles are of modern technology with higher speeds, and are installed in new spinning units replacing the old ones.

According to marketing sources , in the sector have remained henceforth the healthy enterprises, while it should pointed out that the possibility of investments was increased mainly because of the capital that was drawn Stock Exchange Market. The continuing modernisation of productive units is essential, in order to achieve reduction of cost of production, improvement of quality and specialisation in products of great added value. In this way Greek enterprises strengthen their competitiveness in Greek market, ans in international markets, as well.

Already, large enough companies of the textile sector produce high quality products. First place in the domestic production of ginned cotton. Market Share 8,5%. Second place in the domestic production of yarn. Market Share 10%. First place in the export of yarn. Market Share 15%.

5.3 COOPERATION BETWEEN UNIVERSITY & INDUSTRY

Observing university industry cooperation models is reserved to the following section of the report. The next section reports the Greek model of cooperation between universities and industry especially in an EU (projects) context. In this case the model gives information how to improve cooperation possibilities in a rapid developing economy and with an impetus from the EU. Let’s not forget the four strategic objectives that EU focuses through operational programmes such as:

- 1st Strategic Objective: "Upgrading the quality of education and promoting social inclusion ." Strengthening human resources and decentralized structures

of the educational system, to improve its quality, to upgrade services and better meet the needs of modern society and economy.

- 2nd Strategic Objective: "Upgrading the systems of initial vocational training and vocational education and online education with the labor market" Development of human capital in the context of upgrading the initial vocational training and vocational education, with opportunities for continuous improvement of the qualifications and skills of young people. Under this axis, including special attention to the promotion and mainstreaming of gender equality and equal opportunities.

- 3rd Strategic Objective: "Strengthening lifelong adult education" Widening participation in staffing actions lifelong education, to acquire knowledge, skills and competencies that will promote personal growth, increase active participation in the labor market, especially women and contribute to strengthening social cohesion, reducing the social exclusion and facilitating access to education. Towards this puts the inclusion of socially vulnerable groups, people with disabilities and women in lifelong learning activities.

- 4th Strategic Objective: " Strengthening human capital for the promotion of research and innovation" Developing human capital through a) the promotion of research and innovation, and b) the quality improvement and targeted thematic orientation of graduate studies in Higher Education Institutions, independently or in collaboration with other research centers and research and technology organizations in order to further enhance the research potential, according to the perspectives of science and the needs of the productive sector.

Starting from the identification of the relative position, missions and flows of activities within the University and Industry sectors in the knowledge based society, a systemic representation is proposed as a starting base. The cooperation with the industry creates a more complex environment with more parameters that makes more complex the

synergetic effects and synergy processes. To cope with these new challenges, the entrepreneurial university is presented in the context of the knowledge based society.

An industry in a globalised economy depends critically on innovation and its ability to increase productivity through process innovation. Innovation itself depends on the creation, application and diffusion of new knowledge. Since an advanced economy can only compete by creating new product and technology, the creation and diffusion of the knowledge on which this is based has become a factor of utmost importance.

A significant part of the knowledge is produced in the academic research sector. New knowledge and ideas, generated "for the sake of the art", i.e. remaining separated from innovation, are economically worthless. In a globalised economy, when the governmental funding has become chronically insufficient, Universities cannot afford to ignore this aspect and remain separate from industry.

Therefore a fundamental changed attitude is Society needed, as well as new schemes of cooperation, which should be attractive for the industries. The production of new knowledge has therefore to be integrated into the mainstream of economical resources. This requires a structural connection between the universities and economic systems of society.

The traditional division of labour and functions between academic science, academic teaching and industry (applied research, development, innovation) seems to be already obsolete at least from the university point of view. Since the 1980s, Higher Education in Europe has had to respond to increasingly complex and varied needs of society.

The economic progress of the society and a reconsideration of its theoretical background has directly affected the university sphere. Accordingly, higher education must face a number of new problems. First, the demands of society are such that higher education institutions do not have sufficient capacity to respond. On the other hand,

cuts in public spending have meant fewer funds for the University and even the existing funding is increasingly subject to the outcomes produced.

The concept of Accountability has appeared, and this means that universities are required to justify themselves to society. All this is aggravated by the fact that knowledge now exceeds resources and this has created a huge pressure on the universities to market the new knowledge they traditionally produce. Faced very often with institutional inefficiency, the response of many universities has been to adapt to the circumstances and develop an entrepreneurial response.

The entrepreneurial attitude is seen as one of the possible solutions for the university to cope with the ever increased complexity of the economic mechanisms. This means that the university should foster on the application of the new knowledge through *innovation* in order to take full advantage of its creation.

According to the definition, in order to become entrepreneurial, a university should focus on the application of new knowledge i.e. innovation and this could be approached in three possible scenarios:

1. To transfer the knowledge to incumbent firms;

2. To transfer the knowledge to individuals starting a new firm;

3. To establish a new firm by himself.

Of course, the keyword here is transfer of knowledge. Various success stories from Asian countries and USA could be evocated to illustrate the theory: the industrial platform model (very successful in Taiwan for example), the entrepreneurial model of Stanford (Silicon Valley) and MIT, where the application of knowledge is an essential part of the institutional mission and is very careful assessed and explicitly encouraged etc. These success stories are examples of technology transfer by using the university as fertile field for industrial platforms creation.

We will call this a top-down approach since it is based on the principle of creation of a hyper-innovative environment, able to feed continuously initiation and rapid grow of new businesses. Entrepreneurial activity has traditionally occurred at 2 different levels within universities: (i) Individual activities of teachers and students: consultancy, grant acquisition, firm creation, (ii) Entrepreneurial universities = Organizational entrepreneurship with the following features: Support services for individual activities,

Professional education, Real estate and other financial investments, Commercialization of tuition, Excellence in research and education, Consultancy, Community service.

Partnerships between the University and Industry sectors, either at national or European level, were given policy priority in the E.E.C. since more than 3 decades. The target was to liaise the Universities and their courses to the socioeconomic needs, the regional development strategies and last but not least to the industry. The University potential in collaboration with industry staff, is expected to contribute to regional development and high Quality Education and Training, through various innovative efforts and initiatives, planned by several partnerships.

In the relation between Universities and Industry in Greece cooperation is a key issue. This is done in different ways: academic infrastructures, academic programs, common research projects, internships, seminars etc.

Examples range from support for individual spin-off companies, over strategic collaboration with well-known research institutes to networking in the universities. With the use of EU funds, our country managed to raise the knowledge bar to levels competing the most advanced countries in the world. Focusing on Higher Education, actions were funded, whose results are reflected in various ways such as research & innovation promotion, well- equipped libraries, operation of new departments, upgraded undergraduate and postgraduate studies. However, since the requirements in knowledge grow by leaps and bounds and we certainly should harmonize with the rhythms of the season, the continous support of the Higher Education and the

cooperation with the market & the industry becomes necessary with the ultimate challenge of achieving the specified objectives in order to prove to the Community co-financing, the value of investment & co-financing in the Greek society. In the above context, they have been in opertaion and still go on several actions designed to link education and the labor market and to encourage research. Indicatively, we mention Structures of employment & career, Liaison Offices, Practice, Entrepreneurship, Hrakleitos, Thales and Archimedes.

The rational implementation of the above results in upgrading the quality of education by promoting spiritual values and helping to shape a society ready to gestate "ideal

citizens" as well as reinforcing the market and the industry by promoting innovations and by creating a new healthy economic environment. However despite the EU funding (at 75%) autonomus viability of most of the above structures is trying to be achieved in the University World. Besides that the recent laws concerning the University framework and the relations to its stakeholders encourages the last decade especially the cooperation with the industry and not only. Most of the above mentioned structures are parts of the organisational structure of the Universities & Institutes.

5.3.1 Good practices of cooperation between HEI & Industry - Greece Case Study

Societies are rapidly changing, the status of labor relations is changing and the public sector is shrinking everywhere. Graduates of Greek AEI-TEI are invited to a build a career in a completely new working environment with high uncertainty and low employment prospects in the public sector but also in the old private sector with the high recesion.

With this in mind, the development of self business' capabilities by taking innovative business activities has become the last years, crucial for Higher Education Graduates and Greek economy in general. Even those who attend schools that produce Teaching Staff or skills that are not directly related to the economy, need studies that highlight and unravel all aspects of their creativity. Entrepreneurship and Innovation in Education

and consequently the synergy between HEI & Industry should therefore not be uniquely associated with the concept of profit business, but also with the deeper human need of emergence of individuality and personal completion of each.

Conversely, lack of entrepreneurial initiative, research leads inevitably to the employment of the dependent jobs and last but not least to services vs production –with high uncertainty nowadays. All the structures mentioned above, among other things, aim to support the cooperation between HEI & Industry and stress through publicity actions the good practices. One of the objectives is to reassess the concept of entrepreneurship which must gain a friendlier content for its stakeholders.

This primarily means, changing mentalities that incumbent associate career, first of all, with the State and face the market, the industry and the profession as a source of risk and uncertainty rather as a starting point for personal fulfillment and offer opportunities. This section examines the current situation in Greece concerning the good practices of cooperation between HEI & Industry. For this purpose, summarized, in principle, the previous structures, actions implemented in Greek higher education today, will be presented.

Liaison Offices: The purpose of these Offices is to support the members of the University community and the creation of appropriate partnerships for further development of innovative research results. They usually offer the following services: Continuous recording of interesting workshops and opportunities for participation in programs, System targeted information on interesting workshops available funding, but requests for cooperation from other agencies, based on their interests and abilities, Counseling and support for participation in proposals, Assistance in finding suitable partners, Finding partners, Counseling in signing the agreements on intellectual property and cooperation agreements in the context of equity -funded programs, Contact with local businesses who are interested in cooperation with the University, Creating networks with other Liaison Offices in Greece and abroad, Establishing relationships with regions, municipalities and other bodies involved in the development of the region, Establishing relationships with our nearby universities and colleges,

Organisation of information days for researchers, Organisation of information days for local entrepreneurs, Information, education staff on issues related to the better functioning of the office, Search for funding to enhance the function of that office, Contact with the local press, Production of information material, Maintain updated website, Continuous recording of useable research laboratories results to find suitable mode of recovery and appropriate method of financing, Providing legal advice and assistance for the registration of a research and cooperation agreements: Copyright, Trademark, Draft , Patents, Confidentiality Agreement for preliminary discussion exploitation investigation, Technology transfer agreements or technology to third parties, License Agreement, Cooperation Agreements, Surveys, Support in applying for patent, Investigate the existence of another patent, Decision on Greek or other patent,

Assisting in the preparation of the patent application, Applying patent, Find programs or other funding agencies for exploitation of research results, Financing of current programs, Funding from specific industrial or other entities) that are in contact and may be interested, Funding from Venture Capital, Funding bodies warmers, Find partners through participation in targeted Investment Forums.

Career Offices: Have been operating the last two decades aiming to offer a source of up to date and accurate advice and information on a range of educational, career guidance and counseling issues, a meeting point between education and the labour market, an opportunity to get in contact with public sector bodies, in general, a bidirectional node between the Academic Society and the production sector to create partnerships, a contact point between Universities and other educational institutes throughout Greece and abroad. More specifically, the most important services offered by the majority of Career Offices of the Universities of the country are Counseling Services (Divided into actions of group and individual counseling concerning on resume writing, cover letter, job interview personal, career search techniques, career decision), Services in connection with the labor market (Include activities aimed at market approach, Working primarily through the development of contacts and cooperation with enterprises and employers' organizations, as well as the communication of available work positions), Services related to Postgraduate Studies

and Scholarships, Services to faculty members and departments of their institutions, Services to the Secondary Education, Events – Events, Entrepreneurship Services etc.

Structures of Employment and Career: With the continuation of the funding in the frames of NSRF (National Strategic Reference Framework) and the operational programme for education and life -long learning, co-financed by Greece and European Union, a new structure is developed the Structure of Employment and Career which is established and is active since 2007 in Higher Education and is responsible for organizing, supervising and coordinating all individual structures / programs relating to the connection of higher education to the Labour Market and Industry. Career Offices, Practical Training Offices, Innovation & Entrepreneurship Units, Counseling and Psychological Support Centers are seperate parts of Structures of Employment and Career (S.E.C.).

Practical Training Offices: Practice is an important part of the Higher Education regarding the contact between students and the Labour Market. It is a way of linking theory with practice. The actual application of knowledge in labor market can be reached in the development of entrepreneur-graduates and creating new jobs. Also, the acquisition of such experiences can help in the proper orientation of a student in many cases. The Practice aims to achieve two-way feedback between Higher Education and the workplace. The intervention sought the essential connection between education and production to such an extent that the practical training is not only a request from Institutions to Labour Market but also from Labour Market to the institutions. It contributes to achieve bidirectional communication between the Higher Education and the Labour Market, Industry.

Innovation & Entrepreneurship Units: All programs included activities such as: Introduction of entrepreneurship courses (The type, structure and number of courses vary between programs, and the audience addressed), Production of educational material for educational purposes, Visits to businesses and other organizations associated with the object of study of the students, Seminars for entrepreneurs and

business executives, virtual enterprises and / or developing simulation exercises and website development both for information and for distribution of educational material, Development of case studies refering to specific existing companies or specific business issues, Development of business ideas and business plans, Prizes of Entrepreneurship, Creation of Figures mentoring within the contact between students & business executives and organizations, Networking (Includes participation in events and conferences of organizations implementing entrepreneurship programs, contact with alumni networks, with incubators of new businesses - technology parks, with new centers of entrepreneurs), Activities for the promotion and publicity of the program as conferences, workshops and display production and diffusion of printed promotional material.

Vocational Training Centres-Technological Research Centers-Institutes for Lifelong Education-Research programmes (Hrakleitos, Thales and Archimedes etc): All these structures or programs play an important role in the HEI-I synergy and reinforce their cooperation through different kind of actions (seminars, creating innovation, targeted workshops and research etc.)

Entrepreneurship services: Programs to encourage entrepreneurial activities, innovative applications and elective courses, Organization of annual National Competitions for development of innovative and pioneering business plans, Workshops and round tables for transmission of specialized knowledge and in-depth discussions with people who have experience in business, Seminars on acquaintance with the experiences entrepreneurs, Library to study the theoretical part, Case studies for acquaintance with the history of real business, Simulated exercises for immediate understanding and addressing individual problems, Virtual simulation companies for the understanding of the overall ups, Visits to enterprises (and if possible practice) for experiential understanding of business operation, Edit business ideas (possibly innovative) to exercise to capture opportunities for new products and services, Prepare business plans of learners with approach to actual conditions, Figures mentoring for the transfer of experience of business, Counseling and guidance to better understand the

design of business activity, Participation in business innovation contests and competitions for gaining experience etc.

European Programmes and International Relations Offices: contribute in their own way through special programmes or actions to the Higher Education and Industry cooperation emphasizing in the European dimension (Erasmus, Erasmus plus for young entrepreneurs, Leonardo, etc).

Last but not least, we can't doubt the supporting role that some other structures, programs such as **Mentoring programs, Alumni Associations, Horizontal Action bodies** play.

5.3.2 Results and Impacts

In the implementation of the previous related structures, programs, actions in the Institutions of Higher Education observed from different point of views and approaches there is a variation in the success and the achievement of the objectives.

Through these different approaches, however a series of "good practices" can be traced, which can be analyzed and exploited (when it is possible or where adjustments are applicable) in the synergy of Higher Education Institutions & Industry. The "good practices" identified concern both Incentive Programs, Business activities, innovative applications, actions of entrepreneurship, Liaison Offices etc discussed below. The result is identified in realizing stable and long-term partnerships between education and production (at local, regional or national level).

The stability and duration of these partnerships have enabled substantial involvement of stakeholders and people outside of institutions and provided substantial incentives for their participation in program activities. At the same time, it was a factor of activation for local communities (in an extent) as to be interested and be involved, while this helped significantly the diffusion and dissemination of programs and results. At the

level of cooperation and networking, a good practice in relation to cooperation and joint activities within the institutions themselves but also with others.

The development and monitoring mechanisms for the progress of the programs and the achievement of objectives in relation to the qualitative characteristics can be identified as a good practice (for example questionnaires surveying business attitudes of students / students before and after monitoring entrepreneurship courses), which served as an effective tool of monitoring the achievement of quality targets and feedback of strategy for the stakeholders. Of particular concern in this case, is far beyond, the manner used to attract the stakeholders and involve them and the way the different disciplines, both in terms of knowledge and attitudes are used. Supporting students, graduates, new & old entrepreneurs, creating spin off companies was of particular importance and increased efficiency. Finally, as good practice we can consider the involvement of more teachers, business-mentors and others in the process of drafting business plans. A broader and more effective transfer of knowledge and experience took place, with wider contribution and acceptance of both the academic programs and the industry.
In conclusion, there are a lot of deliverables produced all these years with a large geographical and sectorial impact along with enabling market potential for SME and inducing benefits such as job creation, triggered investment, trained people etc.

5.3.3 Lessons learned and replicability

Universities, all over the world, exist to fulfil three main goals: educate future leaders of their communities, promote the advance of knowledge in every academic field (research), propose an offer of continuous education to practitioners. We can see these three purpose in the statements of the Mission of our institutions as well as, in the introductory chapters, in Universitary Laws in every country. Since the decade of 1990 there has been in Europe (EU) a reinforcement of the role that research must play in universities and research is becoming an increasingly important task for university teachers. This is true in every academic field and also in Industrial Engineering and in Operations Management as a branch of it. The university-industry relationships is

important in many academic fields but especially in Industrial Engineering and so in Operations Management. The issue is to build a strong rather than a faint relevance of university research results and industry, something which is not always effectively done. Another issue is the knowledge management operation deriving from all the different structures/programs/actions which in some cases overlay each other and do not encourage scale economies.

In conclusion, there are a lot of lessons to be learned from all the analyzed structures/programs/actions and there is a variety of key factors of success. Most of the analyzed structures/programs/actions either already exist in other European countries or can be created in the future as long as there are adjusted to the specific circumstances.

5.4 ONE GOOD PRACTICE OF COOPERATION BETWEEN DEPARTMENT OF TEXTILE ENGINEERING OF TEI PIRAEUS AND VOSTEX

The Technological Educational Institute of Piraeus has created 1)smart textiles, electrically conductive yarns and fabrics by the method of metal coating deposition (electroless deposition), 2)a network of wireless sensors, 3)has implemented infrastructure wireless data communication. The Technological Educational Institute of Piraeus operates with high standards in education and research. Aiming high knowledge and development responds largely to the increased demands of a modern society to create strains with serious scientific infrastructure technology and applications. It Implemented conductive textile sensors with innovative method globally (team ESTHIS) etc.

One of the many good practices of cooperation that we will shortly analyse further is the one between Department of Textile Engineering TEI Piraeus and Vostex concerning technology transfer. The project entitled "Development of textile materials for use in telematics applications' was implemented under Action Innovation Vouchers for SMEs, between the innovation organization TEI Piraeus and the beneficiary enterprise AFI

Vostantzoglou OE (distinctive title "VOSTEX"), with two months duration (15/4/2011-15/6/2011) and a small budget of EUR 7,000. Work packages realized by the beneficiary institution, VOSTEX and implemented under the project were a) Set textile with metallic threads b)Set with textile filaments which have been coated with metallic copper or gold while the Work packages realized by the institution innovation, TEI Piraeus were a)Production of metal and coated yarns for the project's needs b) Organization of the production process and c)Technical instructions.

5.4.1 Research - Formulation and documentation of the problem

The VOSTEX company manufactures textiles, including belts, curtain, rubber cords. VOSTEX expressed interest to acquire expertise in the development of textile products using electrically conductive textile materials like conductive elastic belts, straps or curtain, which would have augmented properties and can be applied in the field of smart clothing with a variety of uses. By using electrically conductive yarns in the weave, as well as in combination with conventional yarns, for the production, the company was keen to produce products with metal fibers, yarns and fiber containing conductive polymer material and yarn containing coated metal fibers.

The goal was to make the company able to manufacture products that can be used in smart clothes for telematics applications (remote monitoring, remote control and telemetry), in medicine, defense, personal protection, etc. Specifically, the company sought expertise regarding the use of electrically conductive wires in strands and in combination with conventional threads, for textile production for niche applications. The intention was to produce products using metal fiber, mixed fiber yarns and conductive polymer material and coated with metal fibers. Following an investigation on existing know-how, this company came into contact with the Technological Educational Institute of Piraeus and the Department of Textile Engineering consequently, which is active in the relevant field, has conducted similar projects in the past and has the appropriate expertise. The relevant preliminary discussions were performed, the object was determined and finally the cooperation within the action

"Innovation Vouchers for SMEs" was confirmed.The project team was established, consisting of personnel of both the Technological Educational Institute of Piraeus and staff of "AFI Vostantzoglou OE". Preparation steps took place as well as execution and management of the work program in accordance with the project objectives. People in the project team were familiar with the technical and practical parts of the issue.

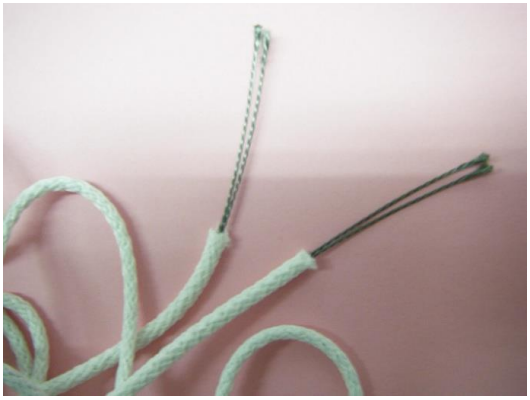
5.4.2 Experiments - Testing - Development of prototypes

The data of the beneficiary company were identified and analyzed. Upon completion of the problem investigation, the project team worked with the identification and mapping of potential solutions as a function of the existing infrastructure. In the business infrastructure automatic weaving machines and semi-automatic are included.

The use of both metallic yarn and metallised yarn presents several difficulties which have to do with winding the bobbin, which creates undesirable shifts that result in cutting the thread, the management of the crossings which are impaired by metallic threads, by interweaving metal, metallized and conventional synthetic yarns. Preparation was carried so as to provide the necessary resources, infrastructure and technical assistance required for the project. We studied the thread process structure and management. The filament path was analyzed and critical areas were identified. Problems were identified; the preparation and pretreatment of yarns were completed. The textile machines were adjusted by making the necessary changes and interventions-designed standards required products with electrically conductive regions woven. Production proofing followed in semiautomatic and automatic machines as well as construction of three kind of essays using metallic thread, using mixed yarn fibers & conventional conductive polymer material, and essays using metal-coated fibers.

Weave of metallic yarn

Woven lanyard with core consisting of yarns includes metal strands. Electrically conducting with a very low electrical resistance. Absolutely flexible.



Woven lanyard with core consisting of yarns include metal strands, close view.

A model of processes was developed for the use of materials in automated processes. Procedures were repeated and the business ability of processing the application procedures was verified. Last but not least, the processes on the data recorded throughout the course of implementation were analyzed. Moreover a technical manual was written and advisory regarding the above was performed.

5.4.3 Results - Project Review and Evaluation

The project "Development of textile materials for use in telematics applications' which was implemented by the cooperation of business Vostantzoglou BROS OE with the Technological Educational Institute of Piraeus, gave the company the necessary expertise to develop and produce a range of products which differ from the usual

textiles produced in the Greek territory. These products allow the company to increase its competitiveness in so far as it is a unique supplier of the relevant market in our country. During the project, essays of woven straps, and curtain cords using metal yarn, thread and fiber conductive polymer material and coated with metal thread were produced. These new textiles produced in the frames of the project, incorporating augmented properties with respect to the operation and use. Consequently, textiles with electrical conductivity properties for obtaining biological signals (electrical potentials) of the human body were produced. These products are used for building intelligent, multi-functional garment for receiving and recording biosignals from the human body. The production process of multi-functional textile products was formulated to yield products with quality features as specified.

5.4.4 Benefits for the company

The transfer of know-how for the implementation of new technologies and materials in the production of knitted multifunctional products from 'AFI Vostantzoglou OE' was completed successfully. A report was delivered on the results and the critical points that need attention. Moreover, directions were given to overcome technical difficulties and problems such as the use of special equipment and techniques for guiding the yarn to the machinery to minimize damage. Last but not least a manual with instructions and specific technical clarifications was written, education and counseling was held regarding the above so as to enable the contracting company to design and solve technical problems and to proceed with the production of goods. The capability of processing the application procedures of the business was verified. Plus the "AFI Vostantzoglou OE 'has the expertise and ability to produce a range of multi-functional textiles with electrical conductivity properties which keep the other properties of the fabric. This differentiates it significantly from other firms of its kind and supports making the specific know-how acquired in the framework of the project "Development of textile materials for use in telematics applications' significant competitive advantage.

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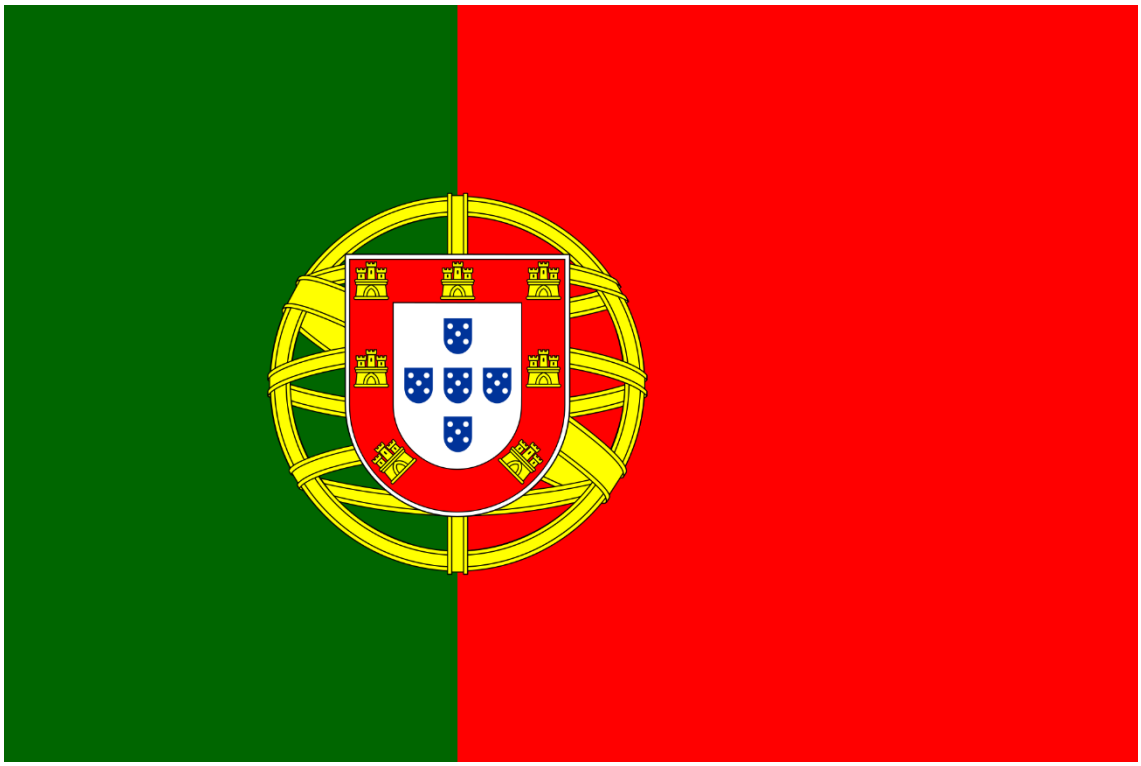


UNIVERSITY OF BEIRA INTERIOR – PORTUGAL

CASE 1 – PROJECT REFERENCE

INPROLAN Project

Start Date: June 2001

End Date: June 2003

Duration: 2 years

Number of participant institutions: 16

Number of countries involved: 1

2 - PROJECT TEAM

ANIL – National Association of wool Entrepreneurs

UBI – University of Beira Interior

CITEVE – Technological Centre for the Textile and Garment Industries

CILAN – Professional Training Centre for the Wool Industry

ASSEC – Company Assistance and Consulting

ASSEC SIM – Information Systems and Multimedia

Textile Companies:

A. Saraiva, Lda

Albano Antunes Morgado, Lda

Alçada & Pereira, Lda

Álvaro Paulo Rato & Filhos, Lda

Campos Melo & Irmão, Lda

Famir – Têxti Fábrica Mirrado, Lda

Fiper – Fiação de São Pedro, Lda

J. Gomes, Lda

Lanifícios Império de Esteves Santos & Botelho, SA

Sotave – Sociedade Têxtil dos Amieiros Verdes, SA

Several consultants, textile experts and stylists

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

In this new millennium, the national textile and garment industry, continuing to play a dominant role in the Portuguese economy on employment, the gross value of

production, the number of companies and significant contribution in the equilibrium of the balance of current account, faces a significantly different economic

environment than in the last decades. It is essential that this industry remains dynamic, similar to that in other developed countries, but is necessary at this time of great change, act on vectors capable of promoting firms to adapt to the market.

The textile and clothing industry, particularly the sub - sectors most sensitive to the phenomenon of fashion, which are traditionally known for its rapid changes, is today an industry that is being dramatically modified by the turbulence of the striking developments in the environment as are new technologies, globalization of markets and the shift in values and attitudes of consumers.

To all sub-sectors of the industry are placed new demands of rapid change and adaptation to the new competitive challenges. Advances in terms of transport and communications technologies have made the sector a global industry with productive characteristics and distribution network across the globe. Simultaneously, the new technologies allowed, on the one hand, a better and clearer understanding of consumer needs and, second, to reduce the response time of production and logistics to these new needs.

Thus seems to be able to say that in the ability to monitor these trends lies, in this new millennium, the key to competitive success of the textile industry.

On quality, design, diversification and sophistication of the product, environmental issues, market access, etc. detected weaknesses that need to be fixed. The pursuit of this objective entails the implementation of measures of innovation and development, involving research and experimentation, consulting, seminars and missions.

With this project conceives a structure for the development of innovative products and processes in the Portuguese textile and clothing industry in order to streamline the interface between business and technological knowledge and design, which is a

fundamental commitment to sustain improvement of image and competitiveness of companies.

The coexistence of a passionate textile secular culture with the innovation and creativity in leading companies who tread the correct path in strategic terms, the existence of competent support and even some horizontal structure in the wool industry, as well as small and medium enterprises, some of them providing production services, with a versatility and potential capacity to create new product lines, are arguably strengths to develop.

In order to characterize the current situation and future prospects of the wool industry, was conducted a survey whose responses formed the basis for development and implementation of the work performed, envisaged in the project.

We sought, therefore, to know the opinion of entrepreneurs and major players of this industry on the strengths and weaknesses as well as future expectations of the wool and domestic garment industry. The universe of companies surveyed was associates of ANIL (National Association of Wool Entrepreneurs) and the quantity of responses received close to 30%, which is considered normal in this type of investigations.

A review of the current situation of the domestic wool industry is illustrated in Table 1.

Classification	Respecting company	Respecting sector
1 – Bad	11.1	11.1
2 – Not Satisfactory	5.6	50.0
3 – Satisfactory	66.7	38.9
4 – Good	16.7	0.0
5 – Very Good	0.0	0.0

Table 1 - Opinion of entrepreneurs on the current situation of the national wool industry

The importance of some parameters in the difficulties faced by companies is shown in Table 2.

Parameter	1 Low	2	3	4	5 High	NR
Quality adequate to product	0	17	0	39	44	
Sales price competitiveness	6	6	11	33	44	
Delivery deadlines satisfaction	5.5	5.5	17	28	44	
Market stability	0	22.2	22.2	22.2	33.3	
Competition	6	0	33	28	33	
Producing versatility	6	11	22	33	28	
Finance aspects	0	28	22	22	28	
Backlog	6	6	33	33	22	
Design of collections	6	22	28	22	22	
Specialized human resources	0	17	28	33	17	5
Portuguese products image	0	5.5	55.5	22	17	
Machine park	6	17	33	33	11	

The most important products and their weight on wool production companies are shown in Table 3.

Also, other aspects, as:

- the main raw materials and compositions of yarns and fabrics produced by the wool business as well as their weight relative to the total production;

- the importance of the various parameters that, according to the opinion of entrepreneurs, contribute to product development and design companies in the collections;

- the future prospects, about 88% of the 25 companies agree that the development of new products and processes is a competitive strategy necessary for the consolidation of companies. In this framework, new products / processes that companies consider of greatest interest were taken into consideration.

Finally, in order to overcome the difficulties in implementing a policy of innovation and development, companies find it more convenient to take the actions listed in Table 4.

Given the results of this study and taking into account the changes in the economy and the national interest, the Portuguese textile and clothing industry as well as its various sub-sectors should continue to be able to respond to the challenges of global competitiveness. The industry must be able to respond proactively to the demands of markets, increasingly in places geographically distant and unable to focus their attention on understanding and meeting the consumers efficiently.

Men articles – 60% of companies production					
Product type	Suit	Pant	Coat	Overcoat	Sportswear
Producing companies (%)	44.4	44.4	50.0	16.7	22.2
Weight on total production (%) of companies	25.0	25.0	28.1	9.4	12.5
Women articles – 40% of companies production					
Product type	Skirt/coat	Pant/coat	Skirt/pant	Dress	Overcoat	Sportware
Producing companies (%)	38.9	33.3	22.2	16.7	16.7	16.7
Weight on total production (%) of companies	28.0	24.0	16.0	8.0	12.0	12.0

Table 3 - Most important products and their relative weight in the production of woolen goods companies

Measures to follow	**Companies considering the measure relevant**	**Importance of measure in global context**
Pro-active actions by industrial firms	61.1	34.4
Investment in partnership with other companies	50.0	28.1
Investment in partnership with R&D institutions	50.0	28.1
Private investment	16.7	9.4

Table 4 - Measures companies find more convenient to overcome the difficulties in implementing a policy of innovation and development.

The national supply of wool and garment focuses mainly on men's apparel, being necessary to diversify products, including women's fashion and casual wear. The vast majority of companies should invest in more sophisticated, more elaborate and more

incorporation of technology products to have added value. These major objectives include a new strategic vision and the manifestation of courage in risk taking: the adoption of a management philosophy based on the binomial experience and knowledge, tradition and culture, creativity and innovation, experimentation and development, design and marketing. In this context, the duly qualified human resources at all levels, are essential to achieve success.

The global textile industry is surplus exists, therefore, a high competitiveness in the markets where it operates a large part of the national wool and clothing companies, thus the adaptation to circumstances must go through product and service differentiation and improving productivity by incorporating design methodologies, corporate culture facing the client and scientific and technological knowledge. Only this way, one can gain competitiveness and acquire advantages in business.

The partnership between associations representative of the wool (ANIL) and clothing (APIV) industries, and two state agencies aimed to encouraging the development of Portuguese Industry (ICEP Portugal and DGI) based on an innovative structural concept and reflects the interest institutions seek to create conditions that will underpin an image of excellence of companies, giving them technological, design and management capacities to face competition, both in foreign markets as to satisfy domestic demand.

Among the main objectives for this partnership and this developing project of innovative products and processes stands out immediately, improving the image of wool and clothing Portuguese industries and therefore of Portugal, by increasing the overall quality products and services, with consequences on the financial appreciation of wool and clothing, strengthening the competitiveness and sustainability of enterprises.

Promoting the growing and organized structuring actions of innovation and development in supporting decision-making, encouraging cohabitation between the

textile culture and innovation, including the University / Industry link a comprehensive concept and the implementation of appropriate design methodologies in business and human resources development are other important objectives.

More specifically, the main objectives are improving collections of yarns and fabrics with gains in terms of diversification and sophistication of products, by incorporating high technology, fashion and quality concerns; and the exploitation of niche markets,

with sharp interest, through the creation of conditions for the use in an organized way by marketing companies, becoming proactive in relation to markets.

The terms innovation, design and marketing have been commonly used as key components in the solution to the competitiveness of the national textile and garment industries. Interestingly, they have been used mainly by public or private institutions related to industry or the experts of management and strategy. A large part of the business world have not given in practice, importance, or because they are aware of other concerns, or because does give its real meaning.

According to the study done in the wool business, under INPROLAN project, evidence of openness to the adoption of a management based on innovation, design and marketing arise. For this reason and in order not to fall into the common senses, it is necessary to give substance to these concepts in order to understand how they should be used by companies in a conjugated form.

Innovation is the act of introducing new products or changes in thoughts, behaviors, products, technology, services, etc. According to this concept, anyone can innovate, we are all creative. The secret is not to innovate for innovation, but in meeting the needs and desires of people and organizations. The innovation, creative ability, must respond to market trends, should cause the difference that people are waiting or surprise them in a positive way. Here is combining innovation and marketing.

The marketing fits the study of the behavior of individuals and organizations as consumers of products and services and simultaneously provide strategic guidance for the positioning of the companies face to meet the needs identified, including forms of promotion to create attractiveness, knowledge and desire, people. It is the person, the consumer, the management strategy center.

How do organizations following correct marketing policies, having at their service creative personnel, able to cope with innovation, can they succeed? The answer lies in

the adoption of management by design. It is needed that market knowledge and innovative capacity translate into thoughts, products or services with more cultural, aesthetic, artistic, functional and economical value. Here is the combination of innovation, design and marketing.

4 – PROJECT DESCRIPTION

The Inprolan project comprises the development of good practices in the different stages of the National Textile Industry, including the development of innovative yarns, fabrics, dyeing and finishing procedures, garments, organizational procedures and industrial management philosophies

Innovative Products

Yarns:

In the field of innovative products for the national wool industry yarns, fabrics, garments, processes and organizational procedures were developed.

- Worsted yarn: 3/30 Nm, composition: 10% wool / 90% alpaca;
- Worsted yarn: 1/30 Nm, composition: 50% wool / 50% kid mohair;
- Worsted yarn: 2/64 Nm, composition: 70% wool / 30% silk;

- Worsted yarn: 2/30 Nm, composition: 40% wool / 60% linen;
- Worsted yarn: 2/80 Nm, composition: 60% wool / 40% polyester;
- Worsted yarn: 2/60 Nm, composition: 100% lambswool;
- Worsted yarn: 2/36 Nm, composition: 100% wool;
- Woolen yarn: 1/18 Nm, composition: 70% wool / 30% cashmere.

As an example, following it is shown the wool/alpaca yarn.

Figure 1 – Worsted 3/30Nm 10%wool / 90%alpaca yarn.

Worsted yarn: 2/60 Nm, 100% Lambswool- ref. WO01

Characteristics of raw materials
Wool
Natural fiber, protein of animal origin and providing from Australian ship hair Fiber count: 19 µ Barbe: 78.5 mm High: 67.8 mm CVH: 39.8% Fibers shorter than 25 mm: 2,2% 5% of fibers with length > 115.4 mm Fibers shorter than 40 mm: 17.7% 1% of fibers with length > 132.0 mm

Yarn characteristics			
Composition: 100% lambswool			
Yarn count: 2/60 Nm	Twist: 700 t/m Z	Twist coef.: α: 90.4	Ply twist: 650 t/m S
Uster evenness, CVm % = 14.1		Qualitative appreciation: Yarn of high evenness quality	

Breaking strength: 214.3 g Elongation at break: 15.9%	Qualitative appreciation: Yarn with breaking strength and elongation among normal values

Innovation characteristics during yarn conception
Yarn composition incorporating very thin 19 µ wool fiber, concerning the usual procedure in the Portuguese wool industry.

Table 5 – Characteristics of raw materials and worsted 3/30Nm 10%wool / 90%alpaca yarn.

Fabrics:

The fabric as finished product of wool industry or as raw material to manufacturing industry is based on design, comprehensively understood the success of its competitiveness.

The national wool and garment industries, in the current context, cannot be based on the selling price factor, their deployment strategies in the markets.

For this reason, the fabrics must be developed in an environment of modernity where punctuate the aesthetic creativity, technological innovation, the aggressiveness of the marketing and the consistency of the management.

It was in this sense that they were developed within the INPROLAN project, a set of fabrics using in the initial phase of the same new technologies CAD in order to save time and materials, making decisions about choosing colors, aesthetic aspect and fabric technology in simulations with high degree of approximation of the actual fabric. The developed fabrics are mostly worsted, as follows:

- Woolen fabric, composition: 70% wool / 30% cashmere;
- Worsted fabric, composition: 60% wool / 40% alpaca;
- Worsted fabric, composition: 100% lambswool;
- Worsted fabric, composition: 100% wool;
- Worsted fabric, composition: 70% wool / 30% silk;

- Worsted fabric, composition: 56% lambswool / 31% wool / 13% cashmere;
- Worsted fabric, composition: 56% linen / 32% wool / 12% viscose;
- Worsted fabric, composition: 100% cotton;
- Worsted fabric, composition: 74% wool / 26% moher;
- Worsted fabric, composition: 60% wool / 40% polyester;
- Worsted fabric, composition: 45% wool / 30% polyester / % nylon;
- Worsted fabric, composition: 90% wool / 10% polyester;
- Worsted fabric, composition: 47% cotton / 37% wool / 16% silk;
- Worsted fabric, composition: 97% cotton / 2% viscose / 1% linen;
- Worsted fabric, composition: 73% wool / % moher / 2% nylon;
- Worsted fabric, composition: 68% viscose / 30% linen / 2% elastomer.

As an example, following it is shown the 100% wool fabric, tweed for sport jacket.

Worsted Fabric: B/739, 100% wool - Tweed, sport jacket				
Yarn characterization				
	Yarn ref.	Yarn count	Composition	Colour
Warp yarns	WO04	2/9 Nm	100% wool	A
	WO03	2/56 Nm	100% wool	B
Weft yarns	WO04	2/9 Nm	100% wool	A
	WO03	2/56 Nm	100% wool	B

Fabric characterization			
Total warp yarns: 1530	Comb: 45/2		Warp width in comb: 170cm
Finished fabric	Density of warp yarns: 11.3 yarns/cm	Density of weft yayns: 11.4 yarns/cm	
	Width: 1.52 m	Weight m^2: 312.3 g/m^2	Weight/m: 474.7 g/m

Colour sequence in warp and weft															
Colour															Total
A	2														2
B		2													2
															4

Weave

Characterization of wear behavior properties

Test			Unit	Value	Tolerances AEIH* Woolmark Company	Test Method
Tear strength	Warp	Kg	Sup. 6.4	Min. 1		ASTM D 1424 NP EN 13937-1
	Weft		Sup. 6.4			
Breaking strength	Warp	Kg	46.6	Min. 10		NP EN ISO 138934-1
	Weft		50.2			
Breaking elongation	Warp	%	24.4	12.5 - 55		NP EN ISO 13934-1
	Weft		38.3			
Seam slipage	Warp	(1)	10.0	Max. 10		IWS TM 117
	Weft	mm	10.0			
Abrasion strength		cycles	10,000	Min. 10,000		EN ISO 12947-2 IWS TH 196
Pilling formation strength		(2)	3-3	Min. 3-4		EN ISO 12945-2 IWS TM 196

Legend: * Association Europeène des Industries d´Habillement
(1) Warp value (slippage of weft yarns)
Weft value (slippage of warp yarns)
(2) Photographic scale 1 to 5, being 5 the best value.

Figure 2 – Representation and characteristics of 100% wool tweed fabric.

Garments:

There is, increasingly, greater competition and aggressiveness of markets where must prevail a definition of strategies that aim to the best way to make quick decisions. The quick answer is one of the main critical factors for success of brands and distribution companies. The market appreciates this ability to respond quickly to some conditioning factors such as the quality, design, fashion and the delivery time.

Figure 3 – Illustration of innovative wool garments.

Until the garment becomes the final product of garment industry and to reach the consumer, several tasks were achieved, particularly those related to the conception, design, procurement, production, promotion and marketing of products, as regards the design, research, planning, development and technical specifications of the products and the coordination of collections.

Within the INPROLAN project and in accordance with this philosophy, conceived a series of garments, depending on the various fabrics developed, using the new CAD technologies. This integrated system provides powerful tools to support all the interactivity of the design since, experimentation, conceptual modelling, graduation and planning to cut of collections and merchandising in retail outlets-shops. This high-tech system offers its user (designer, stylist and technician), in an innovative environment, creative, flexible, and technological design, develop and simulate quickly in various contexts, the desired products.

After this stylistic proposals and innovative study of the transformation of fabrics, it moved to the achievement of the garment, first in prototype and then made the necessary corrections, in industrial environment.

Innovative manufacturing processes

Several innovative spinning processes were developed for the national wool industries, in order to be able to use the different fibers, as alpaca, mohair, silk, linen and other fibers, having special characteristics and in relative large amounts relative to what is generally is usual.

The finish is a fundamental parameter of design, overall quality and behavior in using the fabrics. The importance is such that, without finishing, a fabric does not have commercial value and fabrics alike before the finish may yield completely different ones, if subjected to different finishes. For this reason, the finish is a factor of attractiveness and the etching business decision between specialist manufacturer and producer of fabrics.

Beyond the aesthetic effect and the pleasantness of use that gives the finishing to fabrics, dimensional and surface stability, as well as a correct performance in manufacturing are of fundamental importance.

Under the innovative processes for the wool industry, national printing of yarns, according to current trends, presents a good potential. The available equipment offers machines for this purpose, according to two automated processes properly.

The obtaining of these yarns is possible, either by the fixed system by continuous system. These new technologies provide greater speed and efficiency in comparison with ancient and traditional methods for the same final results.

Industrial management philosophies

The INPROLAN Project has a vital importance for the competitiveness of national wool and garment industries as it contains a number of fundamental objectives that have to build the Portuguese economy.

The opportunity of this project becomes even more glaring when it is known that one of the main problems of the Portuguese economy lies in lack of productivity and that the textile and clothing industries in general and the wool and garment in particular suffer currently a huge competition from developing economies, urging it to develop a cohesive effort resulting in the sustained growth of the Portuguese competitiveness.

In this perspective the national enterprises should not only focus on innovation in terms of products, but also adopt innovative methodologies at the level of processes, distinguishing thus form competition.

In this study, sought to develop new organizational models, but only adapt the wool and garment sub-sectors some methodologies tested successfully in several extremely competitive sectors.

Innovation is considered as the result from implementation of these methodologies in wool textile and garment sub-sectors the necessary adjustments and to which it has granted and can be tailored to their specificities.
The choice obeyed to precise criteria, taking into account the needs detected.

With the exception of 5S, SMED, MRP and Kanban methodologies are fundamental tools for the implementation of JIT-Just-in-Time, philosophy that in his fullness still becomes difficult to implement on most wool and garment companies, but that should be a goal to reach through businesses looking to be competitive.

Currently the Portuguese companies can only be competitive with differentiated products, either by using of noble fibers, either by offering design and innovative fabrics. This reality obligates Portuguese companies have flexible processes, in order

to change often the manufacturing series and thus offer products over a period of time increasingly reduced.

The time needed for the preparation of a machine or process to produce a product (ex: preparation of a loom), called set-up time, becomes progressively more relevant in the cost structure of the companies.

It is necessary to look at the set-up time not as a constant, as traditionally viewed, but rather as one of the parameters in which it is necessary to interfere.
In fact, is crucial to reduce the unproductive time spent in preparation of a machine to batch change, because the average size of the lots is becoming smaller.

Thus, to reduce the time set-up, is crucial to act in a coordinated way, privileging the transformation of internal operations (performed with the machines stops) in external operations (possible to perform with the equipment in operation).

Fabrics project optimization

Fabrics must respond to various requirements of use such as good behavior in garments, protection, comfort, durability and aesthetic appearance. The behavior of the fabric, for these functions depends on its construction technique and defines its quality. This performance is evaluated through the fabric behaviour in relation to wear properties.

To assess the level of quality of its products, fabric producers follow the recommendations of specialized textile institutions, such as the Woolmark Company and the European Association of Industrial Garments, without knowing its positioning vis-à-vis competing products. When one improves the behavior of a fabric in relation to a given property, a producer makes it empirically, changing one or more structural features, not always finding the best result for all properties. Thus, to improve (or guarantee) the quality of the fabric requires control of their wear properties relating them with the structural characteristics.

With this study we intend to emphasize the variables which most influence in each property for use, with the aim of having the necessary resources to improve the design of the fabric in order to evaluate the influence on several properties caused by any structural alteration.

During the design phase of the fabrics, based on knowledge of the interdependence between the structural characteristics and behavior properties, it is important to optimize the overall performance simulation of fabrics, always taking into consideration the production costs.

Having regarded this study that must take into account multiple factors, some showing adverse effects, it was developed of a software application for fast response and safeness. In this way, conditions have been created to form a practical application with industrial interest based on a study of innovation and development.

The study was carried out in a set of 51 worsted and 31 woolen fabrics, having different structural characteristics. The only common feature to all fabrics is the existence of wool in their compositions. Thus, fabrics have been selected with different compositions, weight per square meter, yarn types, covering factors, weaves and finishing types, in such a way as to be representative of the wool industry production.
Structural characteristics were, some evaluated in laboratory, other calculated from the first. The behavior properties to use were also determined in the laboratory and were divided into three large families: mechanical properties, comfort properties and mechanical properties and performance – FAST – parameters.

It was correlated each property with the structural characteristics in order to obtain explanatory statistical models of each property. Based on the results of this study, percentiles tables were determined for each fabric property. The percentile values for each property, for different percentages of fabric sample studied, give a perspective of the quality of this set of fabrics.

The simulation process can be repeated several times to achieve an optimized stage. After this process, the program draws up a report comprising the percentile charts for the overall quality, initial and simulated, as well as the values of the initial characteristics and simulated properties.

Future developments provide for the inclusion of variable production costs, update the database with the automatic redefinition of statistical models and automatic simulations in the direction of obtaining the optimal solution according to a set of constraints specified by the user.

Marketing

In view of the current situation and the future trend with regard to wool and garment industries will have to follow the only path that allow their survival and sustenance, which passes through:

- A clear strategy of product differentiation;
- A policy of quality and permanent innovation;
- A clear emphasis on products that incorporate a strong design component;
- A marketing strategy to promote the company and its products;
- Use of efficient and effective processes.

In fact, Portuguese wool and garment companies are facing a decisive stage in its process of affirmation in more demanding markets, because, if on the one hand continue to sell traditional products (fabrics and/or clothing), on the other they will have to penetrate markets that not only appreciate the price factor, but which they consider as fundamental innovation and distinction.

The developing a marketing campaign aimed at the introduction of innovative products on the market should, in a first phase, through objective characterization of the target market and the market segment that wants to achieve.

Target market and market segment (identify threats, opportunities, strengths and weaknesses):

- Consumer needs and desires to be fulfilled with the introduction of the new product;
- Size/value of the market segment and potential;
- Positioning and performance of products and competing brands;
- Strategies adopted by competing brands;
- Ethnographic, demographic and geographic characteristics.

This characterization is the starting point for a marketing strategy definition and subsequent developments.

5 – RESULTS AND IMPACTS

The practice of textile and clothing design should be based on culture, should be able to establish bridges between tradition and reality of the world around us, should be able to understand that organizations exist because they have a market, so you should always be attentive to their evolutions, must accept that products and services must have a function and a suitable price, those that the market absorbs, which should be guaranteed by the proper use of technology and available resources in companies.

The success of organizations resides in people and in the right combination they are able to make between the three functions, innovation, design and marketing. The responsibility then lies with the top management in order to have the courage to create the functions of marketing and design in organizing their businesses and providing them with responsibilities for objectives. These functions must have limits as the budget allocated to the aims set and cohabitation with proper engineering and, as is common, not protectionism. The innovation key is the ability to demonstrate that managers enable and encourage that the people have ideas, develop and implement them. Should not forget that any element of an organization may have a brilliant idea (innovative) even that he had been encouraged to have many.

This pursuit of excellence needs an evolution on the part of entrepreneurs, to believe and to be receptive, by the State, in order to create conditions for the further training of personnel and their insertion in the labor market, by the Business Associations in order to continue to promote the circulation of information and partnership between companies and / or agencies and by schools, towards updating and adapting the training to change, at the level of technological courses and degrees in initial training and corporate " masters " in recycling and enhance knowledge of companies. Also, the approach between companies and schools, based on contracts for applied research and development, it is essential to support a new development model.

New methods of organization emerge due to the need for businesses to adapt to profound changes in the market and technology. The effects of globalization require

mastery of organizational and production techniques capable of causing the differentiation in terms of quality, flexibility, responsiveness and customer service, rather than the strategy based on the price factor.

There are methodologies, policies and management philosophies that when combined are capable of adapting to wool sector, and from this perspective, with your application perfectly delineated and specified to every organization, the change can be translated into success. Alongside, the organizational processes are important research of segments of vertical markets, distribution strategies with global logistics systems.

6 – LESSONS LEARNED AND REPLICABILITY

The Inprolan project contributed, in a decisive way, to greatly improve the quality of products manufactured in the Portuguese Wool Industry and learned best practices and procedures.

It seems reasonable that this initiative could easily be applied in other countries/regions, if one takes account of their particularities.

CASE 2 – PROJECT REFERENCE

E-VESTE - DISTANT QUALIFICATION AND TRAINING FOR THE CLOTHING INDUSTRY

Start date: June 2002

End date: November 2006

Duration: 51 Months

Number of participant institutions: 5

Number of countries involved: 1

Global financial involvement: 446.000,00€:

2 - PROJECT TEAM

1 - CIVEC - Center of professional qualification for the clothing and aparell industry.

2 - UBI - University of Beira Interior.

3 - ANIVEC/APIV - National Association of the Clothing and Apparel Industries.

4 - FESETE - Textile workers Union Federation.

5 - AEP/CESAE - Center of services support for the industry.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The project aimed at the development of new products and training solutions based upon new technologies.

Conceive e-Iearning modules in areas such as product conception and development, quality organization and management, in order to increase the sector SME competitiveness.

Try out new training practices in the area of the ICT in the enterprises, in order to test training methodologies and learning models for active workers.

Create professional training offers that answer to today's realities and market requirements and that have into account the intrinsic constraints of the target population in the access to the professional training and the limitations of space, time and geographic localization of the enterprises.

Fight the inequalities verified in the sector, mainly feminine, characterized by low qualifications, with difficulties of access to training and professional qualification and with the consequent negative effect in the professional career evolution.

Improve the employment capacity, guaranteeing chances equality in the access to the ICT. Contribute for the increase of the workers effectiveness, endowing them with abilities to "Iearning to learn".

Promote in the trainer's teams the generation of new knowledge and new training methodologies that make possible new approaches and allow harnessing its work in the current context of the information technologies.

Contribute to dignify the workers of the clothing sector, establishing a bridge of flexible training possibilities that allow the acquisition of technical skills, improving its image.

Elaborate a manual/guide with the good practices of professional training focused to the active workers of the sector, including methodologies of e-Iearning. This instrument intends to be an important contribute to the professionals of the sector, enterprises and training professionals..

4 – PROJECT DESCRIPTION

The Portuguese enterprises, as well as the textile sector, cross a period of deep changes, facing the globalization process and the markets opening. The increased competition and the development of new information systems are two of the most visible elements of those changes.

The displacement of the production, in function of criteria connected to production costs, the competition on leveis never known before, the vertiginous development of the systems and information technologies and the deep and complex mutations in the markets structures, leads to the necessity of strategies redefinition.

On the other hand, when one is in an environment where competition is bigger, it's necessary to use factors that allow getting an advantage. Design, factor connected to innovation, quality and marketing, can be an advantage face to the constant alteration of demand, to the reduction of the life cycle of the products, to the requirements of the consumers for products differentiated, innovative and of quality.

In the current conjuncture, the only valid alternative to enterprises survival and to maintain themselves competitive in the world-wide markets, resides in the development of quality and a strong capacity of innovation. This can only be obtained with an ample and highly skilled work force.

It is the paradigm of the knowledge society imposing itself, with its three well clear vertices: high-skills, high-tech, and high-wages. ln effect, the adaptation in a context of generalized change is twice as difficult, but it will have, necessarily, to be made, or it will compromise definitively the utility of a know-how accumulated throughout many generations and often underestimated.

Thus, the competitiveness of the clothing industry is seriously threatened, if persists in an optic of offers based exclusively in the production, practising prices permanently threatened by competitors who make use of much more cheap production factors. The domain of new products and collections conception and development process becomes vital for the reply to the significant reduction of the product life cycle.

The textile and clothing industry is constituted by some thousands of enterprises with diverse insertion levels, of differentiated dimensions and objectives, characterized for

a generalized dependence of orders, of international partners, fact that moves it away, gradually, from the final markets and the commercialization and distribution structures.

The success examples that, fortunately, are happening in the Portuguese CAI (Hereinafter Clothing and Apparel industry), on national and international level, demonstrate that an increasing number of enterprises became aware of the importance of the use of these resources.

In this context, the prospective analysis of the enterprises, the threats, the potentialities and the challenges which they face, also passes by the evaluation of the workers capacity to update competencies and to manage change factors.

The computerized systems are widely used by the CAI in the whole world, namely in high income EU countries. ln Portugal they are often used for the accounting, for the wages processing and the staff section. The use of computer systems in the clothing industry production units is still scarce according to the following data:

- Production Control – 37%
- Cutting Planning – 41%
- Production Planning – 52%
- Cad – 47%
- Design – 23%

The computer assisted design systems can be used for clothing design in sufficiently developed versions, constituting essential tools to improve efficiency and quality.
ln what concerns the communication between customers and suppliers there are some types of computerized systems that are becoming more common, but in Portugal it is also very reduced the number of companies who use the electronic data transference.

The CAI productive capacity is to also diminishing due to the fact that the Portuguese industry is not competitive in the world-wide market, for what it contributes its low

technological leveI. It can be concluded that the technologicallevel of the clothing industry in Portugal is well below the EU average, situation that relates to machinery and hardware as to the management systems and software.

Regarding the sector human resources, we register some data that allows summarily characterizing the work market:

- The age average level is of 32 years in the apparel industry and the great majority of workers are women, with low qualifications, low wages, and constraints and limitations accessing professional qualification, career evolution and personal development.

- The average and superior staff and the highly qualified professionals are1% only.

- The workers lower school level (<1st cycle and 1st cycle) still represents 55%.

- It's verified, however, that the workers with the secondary 3rd cycle, and with superior education have a value of 20%.

- The workers qualification levels are low, representing average staff 1%, people in charge 3%, qualified 58%, half-qualified professionals 15%, not qualified professionals 2%, and apprentices 17%.

In Portugal, this sector, that for years presented advantages in terms of abundance and workmanship costs, has been losing competitiveness in the international market, not only due to the increase of the wage costs, but also, because new suppliers with lower wage costs have appeared. In spite of a loss of the relative importance of the whole textile rank industry in Portugal productive structure, this industry still withholds a dominant position in production, jobs and exportations terms.

In the whole of the transforming industry, textile (4.649 enterprises) and clothing (12.358 enterprises) represent, respectively, 5.8% and 14.9% of the enterprises, 11.3% and 15.4% of staff and 7.3% and 6.8% of the VAB and present a strong exporting component (70% to 80% of the national production) and a great dependence of the communitarian market, that make the sector particularly vulnerable to the alterations of the international frame.

In the last years, we have verified that CIVEC can't answer to all the companies which have personnel qualification needs, sometimes individualized, and that due to its geographic localization cannot take part in training programs that are carried out in the training centre or its delegations.

We are referring concretely to companies located in Leiria, Oliveira do Hospital, Arganil, Guarda and Viseu, (48 SMEs) where the qualifying offer is practically inexistent. It should be stressed that the request for better qualifications was an independent initiative, led by workers, revealing their strong necessity for knowledge update and skills evolution.

The project aimed, essentially, to minimize these constraints and to facilitate access to professional qualifications to workers.

5 – RESULTS AND IMPACTS

We know that distance training can be an adequate reply to the qualifying needs of the adult population, since it allows to win time and space barriers, to exceed access to information and culture regional asymmetries (over all in a very centred country as Portugal).

The concept of "Iife long training" implies the constant adaptation of the skills demanded by the technologies evolution, providing permanent learning chances, so next as much possible to the subjects in its enterprises and supported by ICT structures.

In this perspective, it is fundamental that training systems adapt to the needs and individual requirements.

Professional training is facing decisive changes in the next decades, trainers must, gradually, become guides, mentors and mediators of the learning process, having the trainees to manage and to participate in the construction of its development model.

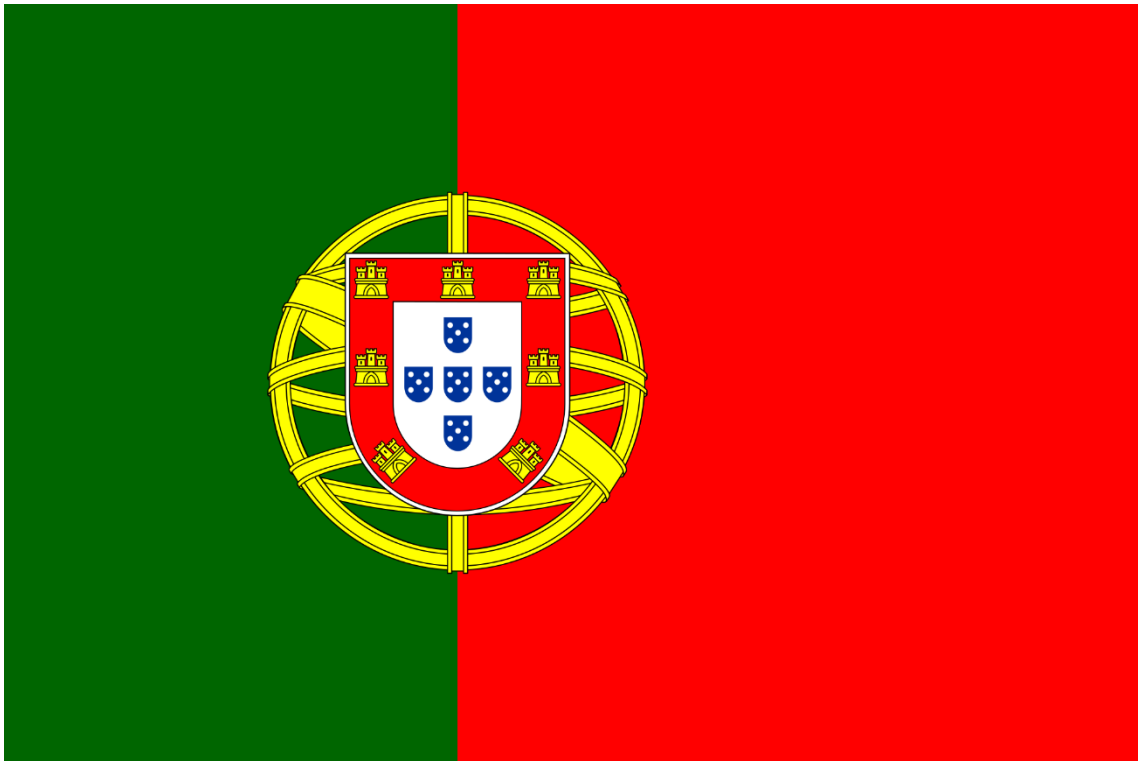
In the end several modules of training software have been developed and a electronic platform made available for the involved partners. The produced learning materials are also available in the format of Interactive DVDs.

An informative website was also carried out: www.e-veste.pt

6 – LESSONS LEARNED AND REPLICABILITY

Portuguese clothing and apparel industry has been experiencing some difficulties in the past recent years. The main reason is related to the inability of local producers to compete with imports from Southeast Asia. According to the plans of some of the greatest Portuguese companies, there is a need to use the experience of the HEI, adopting a problem-solving approach and converting the conventional textile industry into a more innovative industry, and being able to make real competition to foreigners.

Taking in account these considerations, the proposal represented a change in the paradigm of knowledge management and access, contributing to increase the competitiveness, quality and market adjustment of those companies. The platform may evolve in a heuristic way integrating many other modules, covering all areas of the textile rank, notably, a very strong technical textiles module, which represents a strategic bet for the future. This e-learning solution may also incorporate up-to-date statistics, market analysis and benchmarking information, becoming a strategic information system for a new business model.



CITEVE – PORTUGAL

CASE 1 – PROJECT REFERENCE

Project /action Title and acronym: E-learning Programme for Skills Development in Textile Defects Analysis (SKILLTEX)

Start Date: December 2007

End Date: December 2009

Duration: 24 months

Number of participant institutions: 6 participants

Number of countries involved: 6 countries

Global financial involvement: 257.386euros

2 - PROJECT TEAM

CITEVE – Coordinator, Portugal

Citta Studi – Italy

IAT – Polonia

INCDTP – Romania

INOTEX – Czech Republic

STPKC, Swedish TelePedagocic Knoledge Center - Sweden

Textile Centre of Excellence – Great Britain

The consortium established was represented by 6 partners from 6 European countries.

The conception of the consortium had two main purposes, first purpose was to have an European dimension and representativeness covering all fields of the value chain having partners across Europe with operational background in terms of user's needs, R&D organizations to make the project developments that could at the same time involve SMEs to support the acquisition of the results achieved.

The second purpose was in order to efficiently cover all the technical expertise needed for the project development avoiding unnecessary overlapping.

According to this purpose, the consortium was created combining expertise in textile product development, ICT technology, training experience, in a way to ensure that all major stockholders of the project would be able to contribute in completely areas to develop potentialities and to implement the major outcomes of the project.

Getting this partnership together united key players in the sector, who have the necessary expertise to fulfil the project objectives. Another significant aspect is that most of the partners have already worked together having good experiences from the work performed and the results accomplished before.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The main goal of the project is to develop an e-learning course related to Textile Defects/faults Analysis that will promote equality at eLearning and ICT, especially among textile workers, unemployed textile workers and students. This project consists in using the deliverables of the SMADETEX, FIBRIN and QUALITEX projects and creating a system with the objective of establish a dynamic and cohesive learning network, a Network Learning Environment, more concretely an e-learning Programme for Skills Development in Textile Defects/faults Analysis.

With this project it was aimed to create a true Networked Learning Environment, and this happens when any trainee or trainer can see the learning contents, collaborate with tutors, evaluate its progress in his learning process and accede and share the contents of the institution or colleagues, at any time, to reach its learning objectives. Thus, this project created:

- Learning System: web platform for the creation of courses and training management based on an open architecture facilitating its customization and interoperability integrating the discussion forums, online evaluations and working groups;

- Management of Learning Contents: Repository that stores contents in the form of reutilized learning contents, allowing the control de Access of this objects and permits the management of portfolios;

- Learning Communities: Management of learning communities allowing the integration through an common interface of access to administrative and training services

4 – PROJECT DESCRIPTION

Main problem to overcome:

In textile enterprises the defects/faults are a big issue related to industrial competitiveness. The knowledge and experience of the workers operating in textile production areas are very important to ensure a "zero defect" approach, nevertheless with the constant changing in equipment technology the training of operators and the knowledge of the causes of possible defects are relevant topics that can contribute to a decrease of the number of defects and to ensuring quality and, as a result, best products and company competitiveness.

Therefore, better understanding of textile processes is encouraged meaning that SKILLTEX can be an important information tool so that operators, technicians and commercial departments can be better prepared to guide and/or to offer technical support during the production phase avoiding defects/faults.

This project consists in using the deliverables of the SMADETEX, FIBRIN and QUALITEX projects.

The SMADETEX project produce a multilingual training tool aimed at resolving issues related to product defects/faults in the textile industry. The project developed methodologies for the analysis of defects within a laboratory environment and will work towards determining the cause/origin of individual defects.

The aim of the QUALITEX project was the investigation of defects in textile yarns and fabrics then to develop procedures for recognition, classification and detection of

causes and establishment of influences on quality parameters with the development of procedures for preventing and remedying negative effects.

The aim of the FIBRIN project was the investigation of the physical and chemical properties of some modern textile fibres in order to develop advanced methods and norms for distinguishing them from raw materials and woven fabrics.

The combination of the 3 above mention projects resulted in a new project called SKILLTeX, that define as a major goal create a web environment where companies could have support on the the resolution of problems related with the defects that can appear in the textiles products.

The general objectives of the project were:

- Contribution to the enrichment of essential knowledge about the defects of textile products in various stages of the technological process and the preventive measures to be implemented;
- Increase of the capabilities of the operators and their stimulation in an ongoing learning process;
- Contribution to the solution of problems that arise between different partners of the production process;
- Promotion of the improvement of the product quality and increase of the companies' competitiveness;
- Guide for the personnel qualification and training that allows each person to learn in its own rhythm, according to possibilities;

- A more attractive presentation of the training, using nonconventional resources that are based on information technology.

The main beneficiaries of this project are the enterprises in the textile and clothing field: companies and employees, students and higher education teaching staff, research centers, producers of equipment and chemical products etc.

5 – RESULTS AND IMPACTS

Skilltex project's final product is an e-learning training course about textile defects/faults that is be available in 6 languages, allowing to overcome the language barriers related to the uniformization of textile defects analysis across Europe. It is important to note that the course is accessible to any person, irrespective of the geographical distance. This eLearning course was created based on the textile workers needed competencies according to Professional Profiles defined in each country involved in the project. Furthermore, after having the final product it was tested and validated by 40 textile workers in each country involved in the project.
As impacts, the project is expected to:

- Increase the active workers skills, citing lifelong learning as a major training tool;
- Contribute to the problems resolution between the varied agents of the productive process;
- Promote product improvement and increase the competitiveness of companies;
- Support qualifications and personal development;
- Make training more attractive through nontraditional resources and the use of ICT.

Through a dedicated training programme, it was anticipated that the Skilltex Project would:

- Assist with the enhancement of training for all textile and clothing workers and their ability to identify and rectify faults in the industry;

- Contribute to a decreasing level of defects through knowledge enrichment and contribute to quality assurance procedures within the textile industry;

- Improve skills development and knowledge transfer in universities and technological schools through dedicate training packages;

- Assist machinery and product manufacturers understand the complexity of machine setup and work closely to achieve the desired outcome by promoting a better understanding of textile faults in machinery.

6 – LESSONS LEARNED AND REPLICABILITY

The learning contents arising from the project are very relevant and are a good way to support enterprises and operators to avoid mistakes and defects during the production process.

Nevertheless the quick changing environment in the production process does not give the possibility to workers of the textile industry to get time to do training or to access SKILLTEX and understand the base of a concrete problem. During the application in real situations we found out also some difficulties interacting with computers mainly when it comes to textile operators with low ICT knowledge.

CASE 2 – PROJECT REFERENCE

Project /action Title and acronym: Textile Excellence in EuroMed Partners (TEMP)

Start Date: December 2010

End Date: November 2012

Duration: 36 months

Number of participant institutions: 6 participants

Number of countries involved: 3 countries

Global financial involvement: 886.041euros

2 - PROJECT TEAM

The partnership has the following members:

CITEVE – (Coordinator / Portugal)

ATP – Portuguese Textile Association (Portugal)

CETTEX - Centre Technique du Textile (Tunisia)

Treviso Tecnologia – Italy

NTT - Next Technology Tecnotessile Societa Nazionale di Ricerca (Italy)

IPI - Industry and Innovation Promotional Agency (Tunisia)

The consortium established is represented by 6 partners from 2 European countries and 1 Mediterranean Partner Country.

The conception of the consortium had two main purposes, first the innovation environment of the partners countries because it's important for the project to have a large critical mass in terms of the Textile & Clothing industry, ensuring that the project results could have a multiply effect along all countries involved. The second purpose was to establish complementary backgrounds between the partners. According to this purpose, the consortium was created combining Textile Technological Centres that work as a Research Organizations, Public Bodies and Textile Associations in a way to ensure that all major stockholders of the project will be able to contribute in completely areas to develop potentialities and to implement the major outcomes of the project.

The participation of the selected partners in the consortium was an added value because Textile Technological Centres are very close to SME's sharing their problems and needs, being able to create a bridge between them and the project results. The roll of the Public Bodies and Associations in this project was to exploit and make use of their network to export/import the outcomes of the project to other business sectors and even to other MPC.

As so, the partnership created provided a broad-based segment approach to exchange human and material resources between partner's organizations, disseminating scientific information and knowledge as so as the results of S&T research projects, and finally supporting a large involvement of SME's and other related institutions among EU countries.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The TEMP Project main goal was to enhance the S&T cooperation in the Textile & Clothing field between Portugal, Italy and Tunisia by reforcing strategic partnerships between 3 research organizations and 3 Innovation Promotion Associations.
The TEMP Project focus on improving the in the field of textile & clothing, promoting a closer cooperation between complementary organizations, namely in the following topics:

- Development of Scientific and Human Potential;
- Exchange know-how and best practices;
- Increasing S&T research capacities.

4 – PROJECT DESCRIPTION

Problem to tackle:

Nowadays the textile & clothing industries faces an unprecedented challenge regarding the global competition for every single market across the world, namely from Asian or Far East countries. In the recent past the EC and several European Countries (in a bilateral approach) tried to establish partnership agreements at different levels and

scopes with several MED countries, in the sense that the complementarities and geographical proximity between those two regions could be a clear advantage in a win-win strategy to strengthen the economic performance of the united region (EUROMED) reducing of course the existent asymmetry between both sides of the Mediterranean sea. For such a strategy to make sense it is inevitable that industry and its supporting organizations within the EUROMED region should achieve a well-balanced and equivalent set of competences and strategies without disregarding a local action focus, aiming the success of any common entrepreneurial, technological or marketing strategy.

This project tries to give a relevant contribution to achieve such balance, once it brings together relevant organizations within the textile and clothing EUROMED scenery and namely from 3 of the most active and important countries regarding textile and clothing business: Italy, Portugal and Tunisia. The impacts of the project should be divided in different fields. From such experience and knowledge resulting from the TEMP project it is expected for the Tunisian organizations supporting industry (Research centres and associations) to supply local industry with a better and more evolved technological offer, which will certainly contribute to improve the competence level of several Tunisian companies, which can more and more be a real business partner of European companies, and not a common subcontracted part of the global business. This impact should be more evident in SME's which normally have a higher need of technological support than bigger companies. In the same sense goes the expected impact in the relation between research organizations itself, which will in the future benefit from a more equivalent scientific and technological balance that is one of the key factors to improve the setup of common research and technological projects. In this particular field, the Portuguese experience and knowledge (CITEVE) can clearly have a positive impact in CETTEX (Tunisia) and Treviso Tech. (Italy), as members from the staff of both organizations have confirmed in loco that potential in a recent mission to CITEVE, where testing, research and industry support were identified as excellent cooperation opportunities.

Other source for an important impact of the project is one of the key competitive factors from the Italian industry, which is the proximity between machinery/technology developers/vendors and industry. It is expected that the knowledge and experience from Treviso Technology and Tecnotessile in this field could have a very positive impact both in CITEVE and CETTEX, namely improving the number of technological developments in the machinery and productive systems area resulting from a closer cooperation with those research organizations.

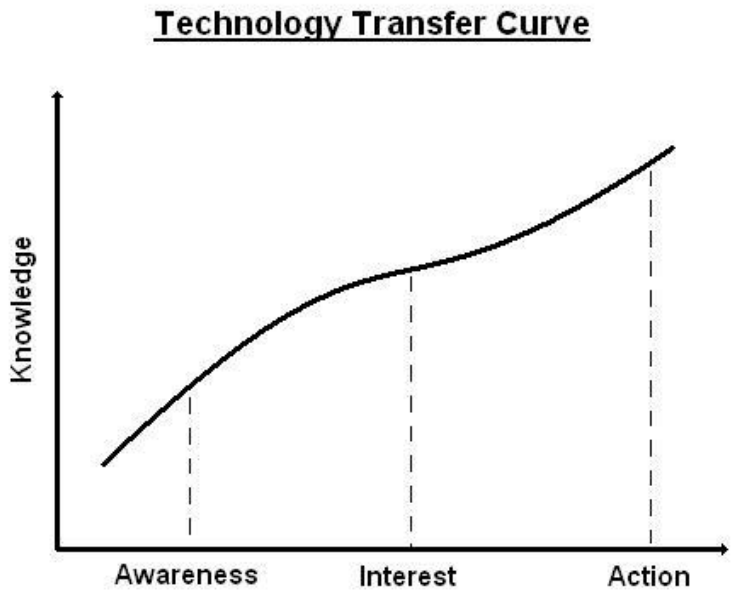
It is also expected that the higher cooperation environment to be induced by the project can be transported to an entrepreneurial level, since every organization working directly in the TEMP project had very closed relations with industry and other relevant stakeholders in the textile & clothing business. Another important impact is at the educational level. Either CITEVE and TVTEC are involved in training and technological education activities, which means that the improvement in the scientific and technological profile of CETTEX can clearly have an impact in the education and training programs in Tunisia, which will also benefit from an student exchange program to be set up in parallel.

The project objectives are also oriented to SME's in the Textile Industry. The workshops that the project will develop will have a great impact in small SME's mainly in Tunisia that are not aware of research and knowledge potential of the RTD performers like CETTEX.

Below it is shoed the impact that the project pretends to get among T/C companies that slowly will capture their interest in the field of Technology and Best Practices Transfer. To attract the interest in SME's, partners will have the important role of working together with SME's providing support and linking companies to RTD's putting them in contact with the workshops that are going to be performed, and new technologies will be presented.

It's important that companies could comprehend that the transfer of new technologies can make the difference in the development of their enterprises.

Today it's impossible for a textile and clothing company to have success without apply innovation in their products. If companies' owners could have the knowledge and understand the importance of innovation then they will be able to act in the adoption of new technologies.



The project main goal was to enhance the S&T cooperation in the Textile & Clothing field between Portugal, Italy and Tunisia by reinforcing strategic partnerships in this 3 research entities and 3 Innovation Promotion Associations.

This was achieved by combined actions and activities, such as:

- Exchange and mobilization of human and material resources between partner's organizations;

- Knowledge transfer in the field of water management; environment performance; scientific laboratorial analysis; IPR; and other S&T expertise areas;

- Disseminating scientific information and knowledge as so as the results of S&T research;

- Implementation of RTD past project results and best practices in the textile and clothing industry of the MED country and convergence region;

- Provide technical assistance and training aspects to enhance the knowledge transfer;

- Definition of specific S&T priorities in partners regions, creating a research agenda for the period of 2010-2015, in total coherence with the SRA (strategic research agenda) defined by the European Technological Platform for the Future of Textiles & Clothing, but considering the individual situation and challenges of the regions involved in the TEMP project. This should induce the launching of research projects within 7FP.

- Create a Contact Platform with other scientific fields of knowledge or even other industrial sectors (shoe manufacturing, machinery manufacturing) of mutual interest, aiming to improve contacts in all the fashion industry along the partner's countries.

5 – RESULTS AND IMPACTS

The major expected impacts in the future of the TEMP Project are:

- Better integration of EU and MED countries strategies;

- Improved S&T capacities in the MPC (Mediterranean Partner Country) country and convergence region;

- Reinforcement of the regional economic and social development;

- Stronger and more effective link between partner's organization and further RTD organizations in the partner's countries.

The work performed in this project was extremely significant to increase the innovation and technology transfer adoption what indirectly can improve the competitiveness in MCP.

An ambitious mobility programme was established to facilitate the exchange of researchers and technical staff between European and Tunisian centres. As a result, the project defined research priorities and an innovation roadmap tailored to the region's textile interests. These plans focused on integrated cooperation and resulted in the exchange of environmental knowledge and best practices in energy. This promises to have an impact in the leverage of MPC companies towards European standards of sustainable production. An important outcome was the agreement to provide a future joint service offer between one particular partner and different European R&D centres also involved in the project.

Another important value that the project pretends to assure is the continuity of the web platform – Gateway Cooperation Platform - after project financing. We believe that this platform will be of the best interest of RTD performers not only in Tunisia but in all MPC around, and that it will be a powerful instrument to disseminate technology transfer and improving the participation on Mediterranean Partners Countries in the FP7 networks and RTD projects.

The Gateway cooperation platform

The gateway EU-MED cooperation platform is one of the TEMP project deliverables and it is a centralized hot spot where you can find all relevant information regarding scientific and technological cooperation within the EU-MED area.

The Gateway website was developed upon the contribution of all TEMP project and will be the result of a combine effort in the field of technology, business and funding opportunities scouting, promoted by all partners and other organizations that might want to join in the future. By access the Gateway it is possible to have immediate access to a wide range of privileged information such as:

- Funding, investment and cooperation opportunities;
- Information on key research topics;
- Knowledge and technology resources available within the TEMP partnership;
- Links to relevant organizations within the EU-MED Textile world;
- Highlighted companies and its products/technologies;
- Potentially transferable technologies and methodologies;
- Events & News.

6 – LESSONS LEARNED AND REPLICABILITY

Cutting-edge research infrastructures need a broad range of expertise in order to develop themselves. If a research infrastructure is known as a top research institution at the same time it will have the ability to attract better researchers from different countries and regions. As so, with this project we believe that we supported CETTEX to improve their RTD capacity becoming a Centre of Excellence that can attract researchers with better skills and from different fields of science.

To ensure the sustainability of the results achieved its important to maintain close contact between RTD institutions and continue to exchange best practices among countries so that the level or technology performance can be levelled for the upcoming years.

POLYTECHNIC UNIVERSITY OF VALENCIA - SPAIN

CASE 1 – PROJECT REFERENCE

Project /action Title and acronym (If applicable)	***DIVERSIFICATEX***
Start Date:	*2010-09-01*
End Date	*2011-07-20*
Duration:	*18 Months*
Number of participant institutions:	*3: UPV, ATEVAL and FOMENTEX.*
Number of countries involved (If applicable)	*SPAIN*
Global financial involvement:	*€ 60,000*

2 - PROJECT TEAM

UPV (Polytechnic University of Valencia, Alcoy Campus) is a public educational institution which offers modern, flexible degrees that are designed to meet the demands of our present society as well as official postgraduate programmes that are subject to demanding educational quality control systems. It has three campus: Vera in Valencia, Alcoi and Gandia.

ATEVAL (Valencian Community Association of Textiles Firms). The private ATEVAL Association was established in 1977. For more than 25 years this organization has been developing their activities mainly within the textile field in the Valencian Community. Their activity is related to the development of the home textiles in Spain and their counselling role between enterprises and the administration. Nowadays more than 570 textile companies take part in the association's activities.

FOMENTEX (Development and Promotion of the Textile Sector in the Valencian Community). Coming from ATEVAL, FOMENTEX has focused on organization, booting and development of the Valencian textile industries. Moreover, they bet on the cooperation with Spanish and foreign firms promoting innovation in products, new materials, processes and adapting textile firms to the new changes in the textile field. FOMENTEX also helps textile firms to apply for public or private grants and projects. Another aim of FOMENTEX is to favour continuous training, innovation, internationalization and cooperation.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The project target is to develop a virtual platform which allows Valencian SMEs to consider the possibilities to diversify in their textile products. This would consist of manufacturing more technical textiles rooting from their real production facilities or with slight modifications to be made.

With funds coming from ATEVAL, IMPIVA and Regional Development European Funds, '*Diversificatex'* is helping SMEs to acquire the necessary knowledge to auto-diagnose about the new technical possibilities of their facilities. If necessary, they will have to carry out technological adaptations in their infrastructure. Studies about new prospective markets are considered as well as the fundamental tools to increase competitiveness in a traditional sector as the textile sector is.

By means of the developing of the project, new functions and applications of the textile produce are discovered so as to reach non-conventional markets. To reach this stage, IT (Information Technology) tools have been used as the quickest and updated vehicle.

To know more about the project: http://www.diversificatex.com/

4 – PROJECT DESCRIPTION

The main phases of the project were:

Phase 1: Firm classification according to their technological capabilities, existing processes and machinery available.

Phase 2: Inventory of existing technologies and their productive capabilities.

Phase 3: State-of-the-art technology of non-conventional textiles.

Phase 4: Construction of a virtual Technology-Product matrix, which permits the rapid appreciation of the necessary technologies required by every product.

Phase 5: Grouping the productive solutions.

Phase 6: Deep technical commercial diagnose divided in two stages. The first one analyzing the present commercial structure and the second one focused on the prospective markets.

Phase 7: Design of the necessary tools for the SMEs to expand commercially.

Phase 8: Starting-up of the virtual platform 'DIVERSIFICATEX'.

Phase 9: Dissemination of the project to the participating firms and the others in the sector.

5 – RESULTS AND IMPACTS

The target of this project was to provide with strategic thinking techniques to Valencian textiles SMEs. These firms always need to adapt themselves to the sector requirements in order to grow as businesses as their technology and infrastructure do.

This study has permitted the creation of a virtual platform to analyze the present situation of the companies in the region and to introduce their textile products in new potential markets. Textile technology available in each company had to be taken into account.

The project has supplied the firms with a mechanism to assist them in making strategic decisions towards diversification. Moreover, it offers the traditional textile firms the possibilities to manufacture and market more technical textiles. The information provided about new markets with higher value-added products helped the SMEs to find new market opportunities for their potential technical products.

The strategy of product diversification to higher value-added markets helped the Valencian SMEs to boost business cooperation towards innovation and commitment to internationalization.

Other possible future research could be found in the extrapolation of the tool to other specific areas of the textile industry.

6 – LESSONS LEARNED AND REPLICABILITY

As the most notable experience, we consider the determination of the production capabilities of the textile sector in a particular area or region. This analysis allows knowing the competitive advantages that the firms in the region possess, resulting in synergy among them. This way, the SMEs can work on joint projects to develop new products in need of technological facilities which cannot be found in one only firm.

The most important lesson learned is that companies have to combine their technological capabilities to develop new products for a more exigent and demanding market.

1 – PROJECT REFERENCE

1 - PROJECT REFERENCE

Project /action Title and acronym: Work risks at Textile Industry - (PRL Industria Textil)

Start Date: *1998-10-01*

End Date *2002-12-31*

Duration: *4 Years*

Number of participant institutions: **2 - UPV; AETA** (Agrupación Empresarial Textil Alcoyana) and More than 50 firms.

Number of countries involved: 1 - *SPAIN*

Global financial involvement: *€ 80,000*

2 - PROJECT TEAM

The Universitat Politècnica de València **–UPV-** (Polytechnic University of Valencia) is a public educational institution that offers modern, flexible degrees that are designed to meet the demands of our present society as well as official postgraduate programmes that are subject to demanding educational quality control systems.

UPV has three campus sites: Vera (inside the city of Valencia), Alcoi and Gandia. The Alcoi and Gandia campus offer the same quality standards that have made **UPV** a market leader, but with a more individual training regime given by smaller group sizes. The AGRUPACIÓN EMPRESARIAL TEXTIL ALCOYANA **–AETA-** is a wide-experienced association of textile firms with an intense and dynamic activity within the textile market. The focal objective of the association is to assist and develop the textile sector businesses. They offer a wide variety of specialized services related to firm administration, duties and responsibilities. Initially, the organization had a local domain, although nowadays their services are offered to textile firms all over the Valencian Community.

The association has adapted its administrative and legal services to firms according to their requirements and demands and the implementation of new environmental and administrative laws. In the beginning the AETA assisted textile businesses of the sector recording and checking buying and selling prices, their associate's production figures, certifying the products' origin and their quality, etc. Additionally, the AETA offered legal assistance and representation to their associate members.

The AETA has adapted its firm services to new times and regulations and, in addition to the mentioned assistance services, it has incorporated new departments. These specific sections are mainly focused on energetic and environmental projects.
For more information: AETA homepage: http://www.textilalcoyana.com/

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The main project objectives were the improvement of the working conditions of textile workers analyzing the work risks that occur in the firm textile operations of the South-Eastern Spain.

The Valencian Community textile sector has the following productive activities to name but a few: spinning firms, looming, knitting and weaving, dyeing and printing, finishing, etc.

The fundamental market for these textiles is the household. Due to mass production in the Middle and Far East, nowadays the industry of the area has turned to a more technical use of textiles.

In this context, after the enforcing of the Spanish *Work Risks Prevention Act* 31/1997, AETA incorporates the counselling for prevention to their associate members as one more of their tasks.

4 – PROJECT DESCRIPTION

The main phases of this project were:

Phase 1: *ANALYSIS OF THE INDUSTRIAL SECTOR AND INVENTORY OF EXISTING TECHNOLOGIES*

Detailed description of textile processes and technology available in the industries taking part in the project. Elaboration of an up-to-date and complete inventory of the participant textile industries.

Phase 2: *ADAPTATION OF THE WORK RISKS PREVENTION ACT TO TEXTILE INDUSTRIES*

Examination, analysis, interpretation and adaptation of the Work Risks Prevention Act and the derived laws related to the textile sector.

Phase 3: *PROPOSED ANSWERS TO TEXTILE WORK RISKS*

Elaboration and analysis of a list of proposed answers to the textile operations work risks. These are to cover all the machinery used as well as all the textile processes associated.

Phase 4: *DEVELOPMENT OF THE MANUAL OF WORK RISKS PREVENTION IN THE TEXTILE INDUSTRY*

Composition of a manual on work risk prevention in textile industry. It is divided into six volumes, each of which devoted to a different textile sector. Doctors and professors from the UPV Textile Department have contributed with their experience, both as tuition professionals and firm experts, to the elaboration and reviewing of these six manuals.

Their titles and scopes are as follows:

Volume I - *Introduction and main aspects.*
Volume II - *Spinning.*
Volume III - *Looming.*
Volume IV - *Dyeing and starch processes.*

Volume V - *Printing and finishing.*

Volume VI - *Knitting and sewing.*

Phase 5: *ASISTANCE TO TEXTILE SECTOR BUSINESSES*

Once the study aforementioned had been finished, it was implemented in the firms associated to AETA. The following steps were applied: identification of the derived risks in the whole variety of jobs, evaluation of the work risks according to the level of danger, and finally, a proposal to modify the activities which were risky in any way.

Phase 6*: DISSEMINATION OF THE PROJECT*

Presentation and dissemination of the project to the Valencian Community textile firms and the associations related.

5 – RESULTS AND IMPACTS

Risk assessments were done in more than 50 firms corresponding to different activities inside the textile sector. Every one of them was given adequate preventive measures so that, being compatible with the different productive processes, they could avoid every risk derived from work in their enterprises.

The firms considered these manuals of invaluable help in order to improve the security in the different occupations of the textile sector.

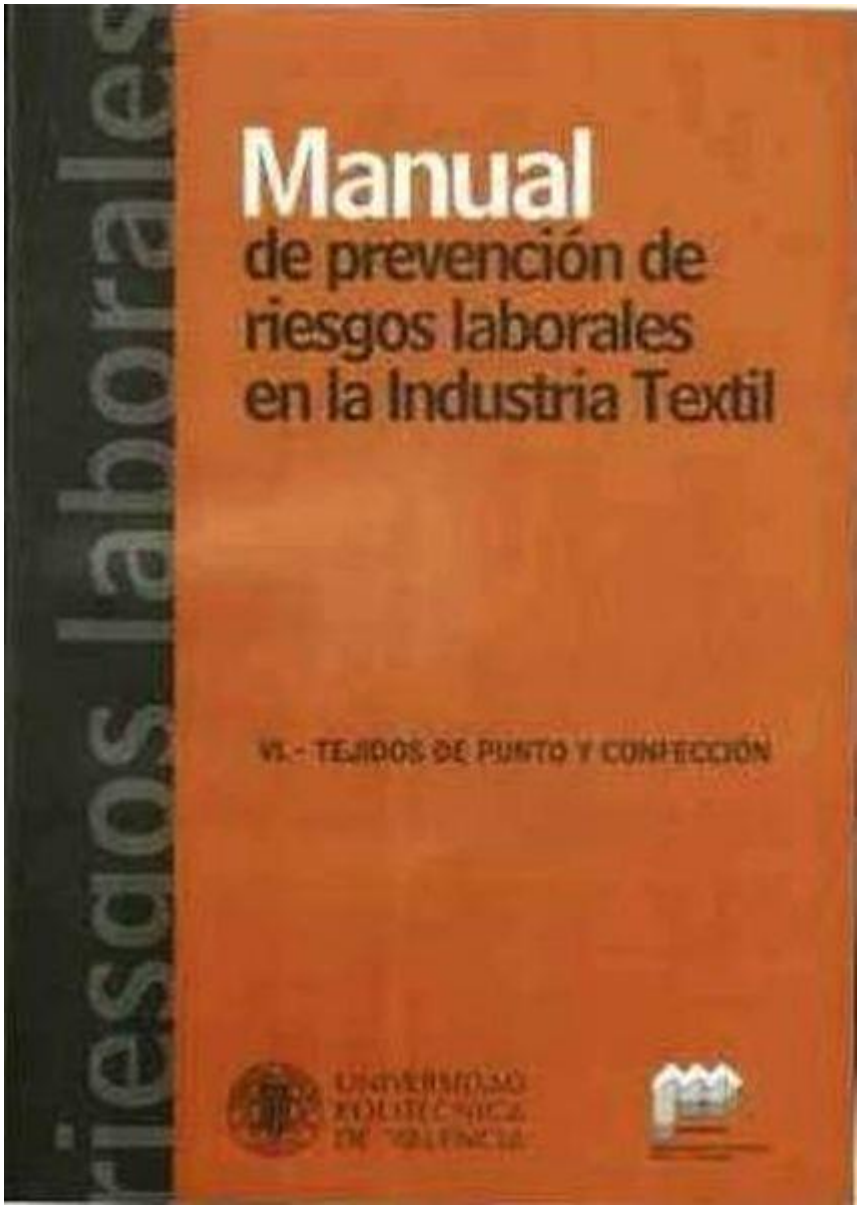
6 – LESSONS LEARNED AND REPLICABILITY

As the most notable experience, we consider the determination of the production capabilities of the textile sector in a particular area or region. This analysis allows knowing about the risks in textile firms of the South-Eastern Spain. The aforementioned preventive measures guarantee absolute security during textile operations, taking into account the perilous chemicals and machinery used.

The most important lesson learned is that companies have to bear in mind that secure working conditions will improve their productive processes. All this will result in longer machine durability, as well as, and principally, avoid unwanted accidents that can cost lives and money.

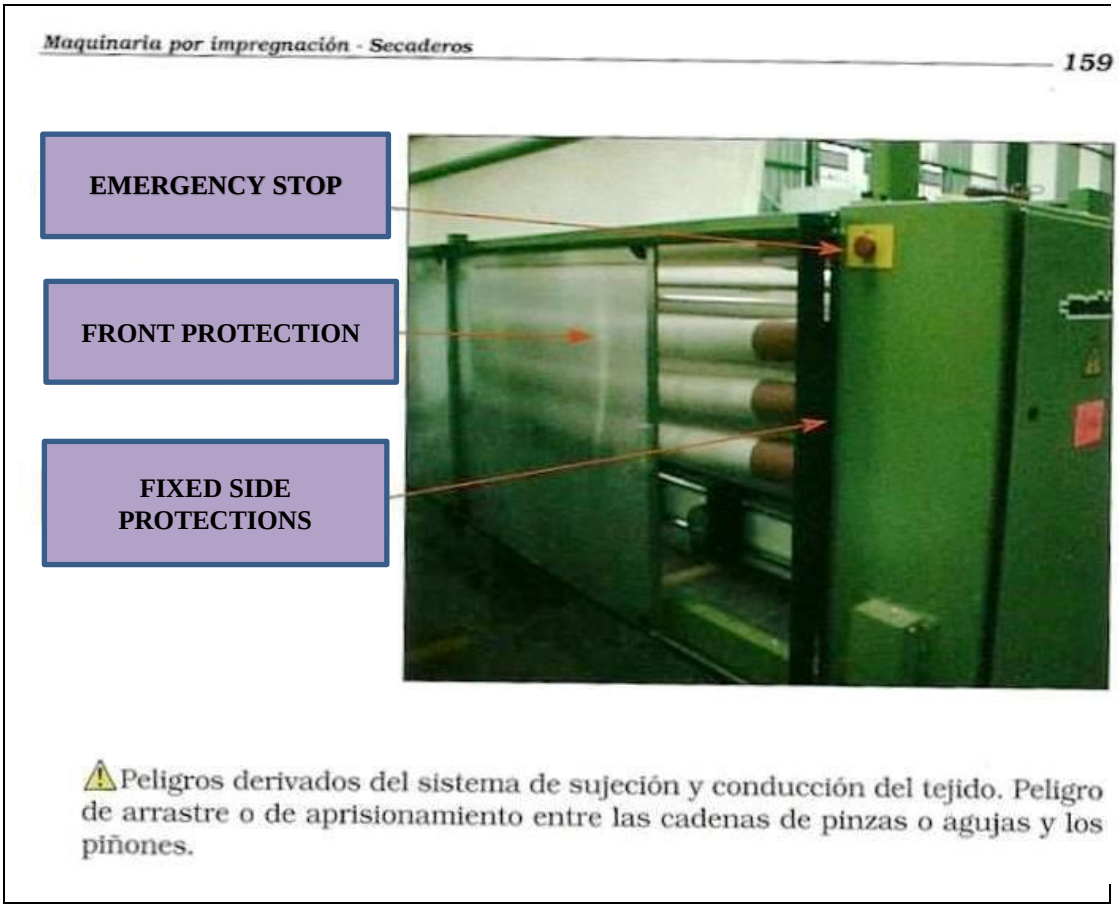
MANUALS OF WORK RISKS PREVENTION IN THE TEXTILE INDUSTRY

MANUAL VI


riesgos laborales
Manual
de prevención de riesgos laborales en la Industria Textil
VI.- TEJIDOS DE PUNTO Y CONFECCIÓN

Example images from the manuals illustrating some textile operations work risks and the proposed actions:

- Trapping dangers

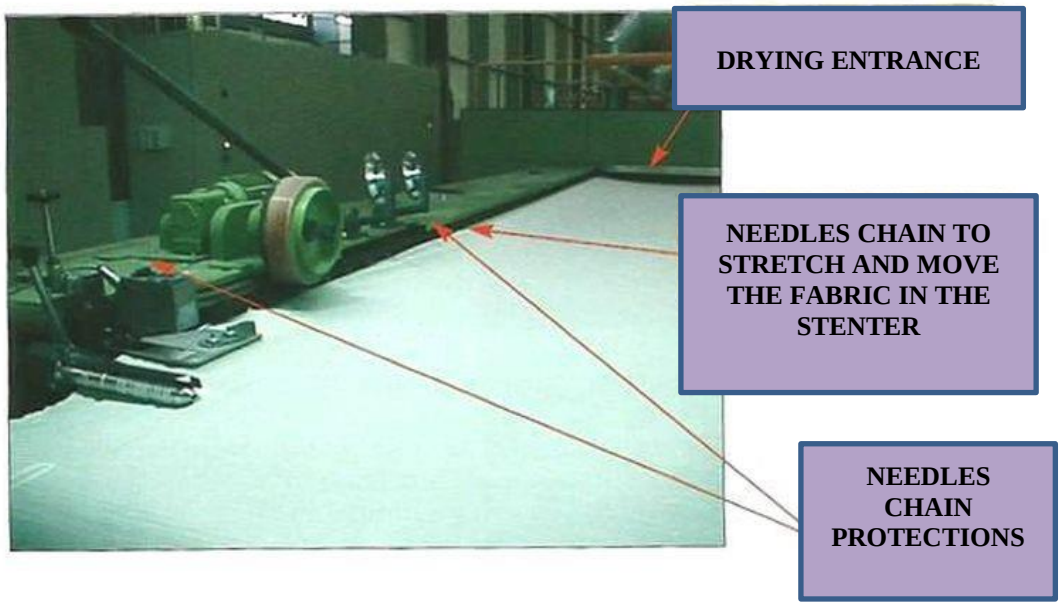


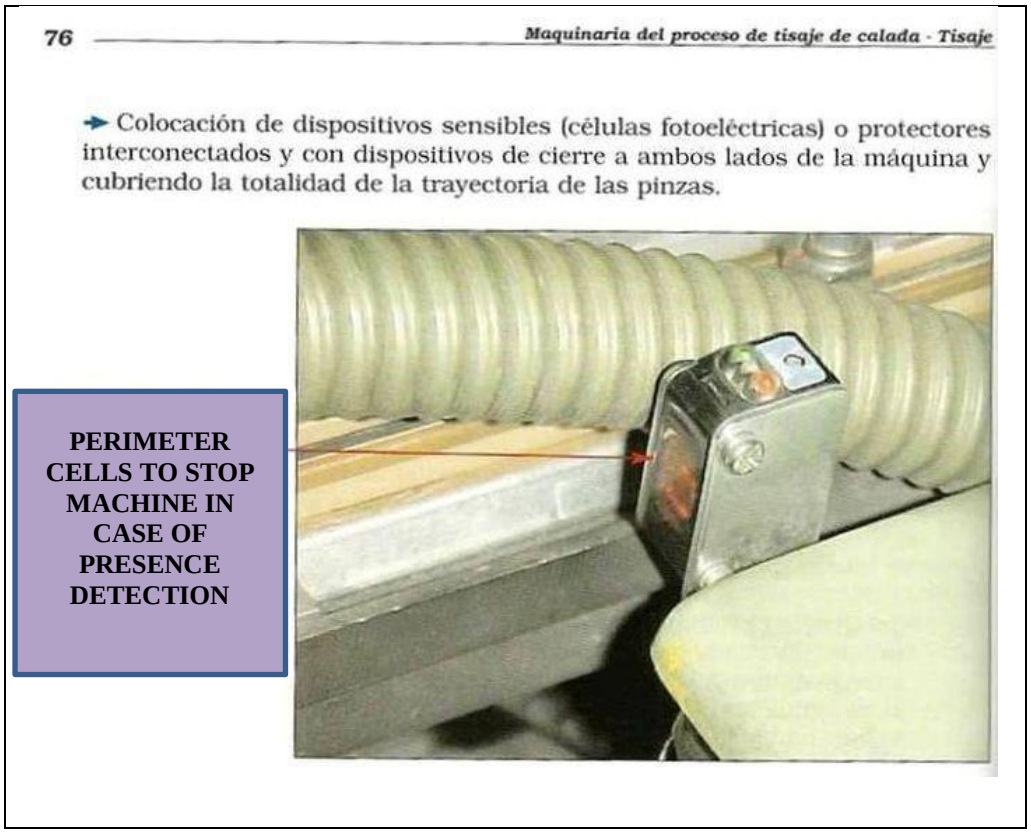
⚠ Peligro de cizallamiento e impacto debido a los mecanismos de arrastre de las pinzas (lanzas o cintas).

➔ Colocación de resguardos fijos de protección en el caso de la inserción por lanzas y protectores (carenados) que cubran a las cintas en las zonas laterales (fuera del batán) y a las ruedas dentadas impulsoras de las cintas.

⚠ Peligros derivados del sistema de sujeción y conducción del tejido. Peligro de arrastre o de aprisionamiento entre las cadenas de pinzas o agujas y los piñones.

➔ El rame debe estar equipado en esta zona con resguardos fijos o protectores de mantenimiento a distancia.





- Collapse and trapping dangers

- Deben disponer de plataformas de trabajo que permitan la llegada de los operarios a los distintos lugares de intervención. Pueden ser plataformas con sistemas motorizados, cestas o dispositivos adecuados y certificados como implementos en las carretillas de transporte interior. O escaleras manuales adecuadas.

⚠Peligro de golpe o aplastamiento por caída imprevista de los plegadores durante la evacuación o colocación de los mismos.

AITEX - SPAIN

1 – PROJECT REFERENCE

Project /action Title and acronym (If applicable)

Start Date: 2003

End Date 2007

Duration: 4 years

Number of participant institutions: 20 companies

Number of countries involved (If applicable): Spain

2 - PROJECT TEAM

Twenty SMEs located in the region of *l'Alcoià-Comtat* and la *Vall d'Albaida* participated in this project. This core region is characterized by the high implementation of the textile industry as a base of its economy.

The majority of these companies are dedicated to the manufacture of the home textile products such as tapestry, bed linen, tablecloths, carpets, etc. and in complementary processes which integrate its added value chain (spinning, weaving, finishing and confection), representing the three quarters of this subsector of habitat of the Spanish production.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

This case study involved the definition and implantation of customised innovation plans for SME's in the textile industries which were aimed at promoting the diversification of their business strategies towards the technical textile sector. It was a long-term plan involving AITEX and 20 Valencian SME's and ran from 2003 to 2007.

China's entry into the WTO in 2001 was the backdrop for the project, and the Asian giant's entry into international business, coupled with its fiercely-competitive prices for low-quality goods, has forced many manufacturers in other countries to diversify their product lines in order to be able to compete.

With the help of AITEX, the SME's who participated in the project were able to diversify their product lines with minimum investment and managed to overcome the difficult situation they found themselves in. The project involved the transfer of knowledge and innovation to textile manufacturers through made-to-measure innovation plans.

The project finished in 2007 with the implementation of 20 MADE-TO-MEASURE INNOVATION PLANS from 2003.

These made-to-measure innovation plans, were framed in the plan of consolidation and competitiveness of SME - PLAN de CONSOLIDACIÓN y COMPETITIVIDAD de la PYME (PCCP)-; founded by the Economy Ministry, the Valencian Government and by the European Regional Development Fund (ERDF).

4 – PROJECT DESCRIPTION

The action stems from the urgent requirement for textile manufacturers to confront the changes that the textile market has been undergoing in recent years. It is clear that if a manufacturer is to survive, he must offer consumers innovative products with a high added-value factor and that requires research into new products using currently-available technologies. The search for new markets for their products or making the step towards the diversification of their existing product range to face up to the added concerns of new players entering the textile marketplace.

The aims of the project were to provide the partners with the means to incorporate innovation into their products and processes and to diversify their activities by means of a coherent strategic option involving every facet of the company's activities. This would include studying resources, life cycles and market maturity, risk assessment, influences and trends, and analysis of the market and competitors, which would be based on qualitative and quantitative studies at a level permitting a product innovation plan to be drawn up.

The project had two well-defined facets; one the one hand a specific element which would offer companies consultancy in order to be able to carry out the customised innovation and diversification plan: this was extremely important owing to the fact that manufacturers' needs for consultancy and guidance is growing every year. The other facet was more generic and clearly oriented towards the detection of innovation in the textile industry as well as the identification and classification of possible applications. The innovative aspect of this element was the idea that through this action, the project partners would be able to produce articles aimed at new markets and the search for new applications and markets for their existing product lines could be carried out without the need for major investment in manufacturing processes.

AITEX was project leader and from among its principal functions, the following can be highlighted:

- The **specific element** was run individually for each partner and was designed to help them introduce themselves into new markets or design new products with a greater added value factor. This required case-by-case assessment which was used to analyse the processes, products, target market, distribution networks, etc. the results were used to create personalised innovation plans to orient manufacturers and advise them on the best options available depending on the idiosyncrasies of each company and their products. The assessment was well-received by the partners and continues to be a strategy followed by companies in the sector.

- The **generic element** was of vital importance in the creation of a study which expresses the theoretical and practical knowledge relating to the evolution of textile innovation in general and technical textiles in particular. AITEX was the conduit through which this knowledge, so vital to the sector, could be transmitted to manufacturers, allowing them to benefit from the experience gained.

Due to the diversity of the fields of applications in conventional and technical textiles, each partner worked with a group of experts within its specialised field and focused on an analysis, study and evaluation of the options available.

The final aim of the project was to gain a personalised assessment in the search for a technological strategy in technical textiles, clothing and decorative fabrics for each partner, by analysing the technological capabilities it possessed at the time and the general strategies which could be applied and to draw up a Product Innovation Plan using the strategies selected.

5 – RESULTS AND IMPACTS

Obviously, the socioeconomic impact was self-evident for the project partners.

The execution and transfer of the results obtained by the project represent an exceptional opportunity for the Valencian textile industry and by extension, for the whole of Valencia. The project objectives were in harmony with the Valencian Business Competitiveness Plan as it ensured increased capabilities within the textile industry and as a consequence, its sustained socio-economic resurgence, leading to increased employment.

The result was a restructuring of the sector. Companies in the developed world must take on board the necessary changes, if they are to maintain their competitive edge, and adapt to the changing aspect of international markets where Asian manufacturers and those located in developing nations and economies are taking full advantage of their competitive position.

In general terms, eminently manufacturing-based sectors such as textile in developed countries cannot compete on price due to the higher social and environmental costs they must bear.

In our case, companies at whom the present project was aimed are located within the Region of Valencia, particularly the counties of *l'Alcoià-Comtat* and *Vall d'Albaida*, in the centre of the region, an area characterised by the strong presence of the textile industry within the local economy.

From a socio-economic point of view, textiles are key to development in the Valencian region. Activity within the sector is highly centralised, with the highest employment rates registered in *L'Alcoia-El Comtat* and *Vall d'Albaida,* particularly in the towns of Alcoy, Ontinyent, Cocentaina, Banyeres, Albaida, *Bocairent*, *Muro de Alcoi* and surrounding towns. Textile activity is also fundamental for other surrounding areas such as *Crevillente*, *Canals*, etc. and smaller towns like *Cheste* and *Villafranca*, which are in other counties of the three Valencian Provinces.

While every subsector is represented in the Valencian textile industry, the region is most noted for its production of home textiles such as upholstery, bedding, tablewear and rugs and in other areas of the value chain including spinning, weaving, finishing and garment manufacture; three quarters of Spanish home textile production comes out of Valencia.

Textile and garment-making industries represented at the time, 9.3% of industrial employment in Valencia – more than 38,000 people, although companies with more than 200 employees only represented less than 1% of the total workforce.

Faced with the new reality, our textile manufacturers must continue to learn new strategies for diversification, invest in their human resources through training programmes, increase their technical capabilities, R+D+I and reinvestment in manufacturing equipment and other measures to create more competitive products with higher added value, better design and higher quality.

The project was of vital importance to increasing competence and innovation in the Valencian textile industry.

6 – LESSONS LEARNED AND REPLICABILITY

Thanks to the development of this project, AITEX concluded with its own methodology in which to help textile companies during the definition and implementation of its made-to-measure innovation plans to for their business lines diversification. This methodology is easily applicable in other countries and adaptable to several typologies of companies.

This methodology is being used from the finalisation of these projects in a success way and it has been added to AITEX catalogue services. In this aspect, every year innovation plans are carried out with contracts with companies which conduct to the implementation of new productive processes and/or to the development of new products focus on the application of technical textiles.

With these actions, AITEX contribute to the technicisation and modernisation of the textile sector and increase their technical ceiling, in order to manage new business opportunities which represent these new markets.

1 – PROJECT REFERENCE

TECHNOLOGICAL DEVELOPMENT PLANS BASED ON OPTIMIZATION OF STOCK MANAGEMENT IN THE TEXTILE SECTOR

Start Date: 2009

End Date 2010

Duration: 1 year

Number of participant institutions: 14 companies

Number of countries involved (If applicable): Spain

Global financial involvement: 168.000,00€

2 - PROJECT TEAM

A total of 14 textile SME's participated in the project from the *l'Alcoià-Comtat* and *la Vall d'Albaida* regions of Valencia, in an area known locally as the Central Valencian Counties, a nucleus of the textile economy in the region.

Most of the partners are involved in the manufacture of home textiles including upholstery, bedding, table-wear and rugs, complementary processes in the textile value chain such as spinning, weaving, finishing and making-up and children's wear and other products representing three quarters of Spain's home textile sector.

The partners wanted to improve the organisation of their products to improve productivity and eliminate unnecessary costs created by poor stock management, and become more competitive against competitors who already had such systems in place. At the same time they would serve as an example to the rest of Valencia's textile industry by spreading know-how of improved management techniques to enhance Valencian industry as a whole.

This project was cofounded by the *Conselleria de Indústria, Comerç i Innovació* by the *IMPIVA* and cofounded by ERDF founds of the European Union.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The textile industry is a mature market which is currently immersed in a crisis without precedent with a range of causes, among which are changes in consumer tastes, strong competition from South East Asia, obsolete business models and of course, the global financial crisis.

One of the areas where companies can become more competitive and "trim some fat" is in stock control and improving service times. The textile sector has a rate of stock possession of nearly 25% and a stock volume of more than 30% that of invoicing. These figures have a lot of financial leverage and also lead to additional storage and obsolescence costs, with a rate of obsolescence of 23% of the average annual inventory. The general objective of the project was to draw up plans to improve individual technologies to optimise stock based on the needs of the partners through an in-depth study of the partners and their business culture. The specific objectives were to reduce as far as possible, demands and ensure just-in-time raw materials supply to production or end users. In order to diagnose the logistical and stock situation of each partner, an IT tool developed by AITEX was used which is capable of detecting a company's needs and avoid stock shortages.

4 – PROJECT DESCRIPTION

The project was based on the completion of personalised recommendations to each of the partners and the development of a stock control tool to ensure that the improvement schedule was met - although this did not initially form part of the project.
The project phases have been divided into three blocks: an initial period where the objectives were analysed, textile manufacturers were encouraged to take part and stock management was analysed, followed by the developmental phase during which specific requirements were analysed to develop solutions and draw up industrial improvement plans. After this, conclusions were arrived at which included assessment and diffusion of the results.

During the initial phase of the project, the objectives of the project were identified in a document which is available for partners or any interested party to consult. The second phase was aimed at involving companies interested in the project; as well those who simply seek improved stock control methods. Then a study into stock control was carried out including each factor which influences it.

During the development block, the first phase was an analysis of the requirements of companies to ensure successfully completion of the project. Thanks to the above data, a stock control tool was developed: this phase was not initially contemplated but was deemed necessary to meet the established objectives. Having developed the tool and having put it into practice in the project partners, a global vision was obtained of stock control procedures in each of the partners. The information was used to establish customised technological improvement plans.

Finally, companies were presented with the following documentation to successfully implant the improvements: recommended improvement report, stock-control report, stock-control tool and a user manual. The working group also drew up manuals and technical documentation to disseminate the results and contribute to the transfer of innovative technologies to the textile sector.

5 – RESULTS AND IMPACTS

The socio-economic impact was clear to the project partners: at the time the textile industry represented nearly 16% of the regional GDP and employed around 16% of the working population. Textile output in Valencia was 24% of the national output.

The completion and transfer of the results represented an exceptional opportunity for the Valencian textile sector and Valencian industry as a whole, as it ensured improved capabilities within the sector and its socio-economic resurgence, maintaining and even increasing employment in the sector.

While the results can be applied to any textile manufacturer, the target of the project was Valencian textile companies.

The project, and the customised improvement plan, has allowed the partners to take advantage of the recommendations made for stock management techniques. This has provided the partners with a range of advantages detailed below:

- Flow and cost management and a response to the premise of customer service;
- Efficient stock administration: responsibility for raw material stocks, components and finished goods;
- Sales forecast analysis: interpretation of commercial data and the ability to make suggestions based on it;
- Appropriate factory planning: sales forecasts can be used to reduce stocks and apply stock-management policies;
- Supply planning: this affects material as well as subcontractors;
- Storage policies: where, when, how much and how;
- Distribution plans: time and cost management

Each partner used the stock management tool, and based on the information obtained created a series of personalised results which were then used to plan improvements.
The improvements are expected to enhance the competitiveness of each partner, as the level of stock in a warehouse represents a large part of a company's investment, and poor management is an economic handicap.

This project was vital to increasing competitiveness and innovation in Valencian textile companies.

6 – LESSONS LEARNED AND REPLICABILITY

Through this project, AITEX developed an IT tool to help textile companies diagnose their logistics and stock situation, which helped detect their needs. Both the methodology and the tool are easily replicated in other countries.

The tool has since been successfully used in other projects and now forms part of AITEX's catalogue of services and each year improvement plans are carried out which lead to the implementation of new stock management processes and the development of new methods, aiding the continued advance of related technologies. This is one more way in which AITEX contributes to the technical advance and organisation of the textile industry, raising the technological ceiling so that industry can profit from the opportunities offered by emerging markets.

KAUNAS UNIVERSITY OF TECHNOLOGY – LITHUANIA

1 – PROJECT REFERENCE

Project Title: Leonardo da Vinci Project "European Textile Learning Tools" (D.Mikucioniene): 2004–2006, duration: 3 years.

Number of participant institutions: 7, number of countries involved: 6

2 - PROJECT TEAM

KLITRA (United Kingdom), EURATEX (Belgium), University of Leeds (United Kingdom) Kaunas University of Technology (Lithuania), Technical University of Liberec (Czech Republic), Protect International (Poland), Baltika Ltd. (Estonia) – 3 Universities, 1 educational training company, 2 SME's;

EURATEX is the European wide trade association for the industry. Each of the partner countries has their own trade associations which are members of EURATEX. The trade associations support the principles of training and education for the sector.

The project was led by KLITRA limited who was the project promote and coordinator. Each of the partners had a representative on the project Steering Group. This Group met twice a year to provide an opportunity to review project progress. All partners had an active role in helping the project to achieve its aims and objectives

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The project was supported by the EU Leonardo da Vinci programme and has been borne out of the need to update and extend learning packages to embrace new technologies, and this research suggested that over 80% of manufacturers believe that training programmes in production and management processes can improve competitiveness.
The target sector for the project was the textile industry in Europe. Within this sector the project targeted technical/craft workers primarily in SME's. The need to help increase the level of training undertaken in SME's in the textile industry has been

identified through primary research conducted by KLITRA and Euratex, supported by desk research which analysed the existing knowledge base.

The training tools developed was built upon previous European work which has developed tools for people working with fibres in the textile sector. This project was focused on the skill needs of technicians/craft workers further down the textile chain for achieving relating to textile production and hosiery manufacture.

The project specific aims were to:

- Improve the skills of technicians/craft workers in the European textile sector;
- Establish the picture of the materials available to textile technicians/craft workers in participating countries;
- Develop new transnational learning modules in textile production, which complements qualifications of participant countries;
- Develop interactive European wide learning material to provide textile technicians/craft workers with the underpinning knowledge to support them in achieving national qualifications in textile skills;
- Test the material developed on a selection of 50 technicians/craft workers in textile sector;
- Promote Equal Opportunities within the textile sector;
- Increase the recognition of qualifications in the European textile sector across international borders;
- Promote health and safety issues within the European textile sector;

- Promote vocational training and improve access to skills in the European textile sector;

- Map the Interactive module to the relevant textile qualifications in partner countries;

- Disseminate examples of good practice to potential users of the project across Europe;

- Help to improve access to qualifications for textile technicians/craft workers via Internet support;

- Contribute to labour mobility within the European textile sector;

- Establish closer links between the textiles sectors in Western European and Central and Eastern Europe.

4 – PROJECT DESCRIPTION

The project was operated with seven partners and has been delivered through six work packages with aims:

WP1 – To undertake research into ICT tools available in textiles to support vocational learning and development for technical level learning in partner countries;

WP2 – To develop a new learning module in carpet production; ~

WP3 – To develop a new learning module in hosiery;

WP4 – To produce a research report into how learning materials can be delivered via the Internet;

WP5 – Map the Interactive CD to the relevant textiles qualifications in the partner countries;

WP6 – Dissemination Strategy;

Work programme have been designed to optimise partner expertise whilst maintaining the involvement of all partners. The aim of this research was to undertake research into ICT tools to support vocational learning in the target areas and to develop an interactive textile training tool with Internet support.

This interactive learning tool supports knitwear and hosiery across Europe and offers the underpinning knowledge to help technicians in the industry across Europe to achieve qualifications at the UK equivalent of NVQ3. The tool helps provide evidence towards achieving the appropriate qualification. The health and Safety and risk management were integrated into the training tool also.

This project aimed to map textile technicians' qualifications across the partner countries. This project surveyed learning materials (in English, French, Czech, Lithuanian languages) for teaching/training purposes for technicians/craft workers available in the European Textile sector – Textile companies (especially SME's).

5 – RESULTS AND IMPACTS

The challenges in the partner countries are different because textile manufacturing is a developing market. Educational Institutions have traditionally delivered full/part time study with academic awards for successful students. Vocational qualifications are not currently available for textile workers and the concept of delivering training and vocational qualifications in the workplace is a new concept.
The internet based learning materials that are being developed in the project were aimed at level 3 or equivalent learners who are working in or wish to work in the textile industry.

The courses were mostly delivered by traditional methods through courses of study either in a full time or part time mode. The learning material is available on CD ROM or on the internet. This project improved the links between industry and education

This project was directly targeted equal opportunities for women and men, with a view to combating discrimination in training provision. All materials produced by the project are designed to act against stereotyping, prejudice and discrimination.

The project made an original contribution to the European Strategies for vocational training by developing new materials, which help workers in the textile sector adjust to technological changes whilst also promoting Equal Opportunities.

The innovation contributed by this project is that it applies the use of new technologies supporting the development needs of technicians/craft workers in the European textile sector. This project also contributed innovation by supporting a network involving the European Representative Body for textiles, sectorial training bodies, employers and trade Union representation.

6 – LESSONS LEARNED AND REPLICABILITY

The results of had short and long term impact on users such as training providers, Universities and sectorial bodies.

The partners had fruitful experience of working together.

1 – PROJECT REFERENCE

Project Title: Leonardo da Vinci Project „Textile Production and Garment Technologies Project“(D.Mikucioniene): 2007–2009, duration: 3 years.

Number of participant institutions: 8, number of countries involved: 7

2 - PROJECT TEAM

KLITRA (United Kingdom), EURATEX (Belgium), University of Leeds (United Kingdom) Kaunas University of Technology (Lithuania), Technical University of Liberec (Chech Republik), Protect International (Poland), Baltika Ltd. (Estonia), University of Suleiman Demirel (Turkey) – 4 Universities, 1 educational training company, 2 SME‘s, 1 Assotiation. The project was led by KLITRA limited who was the project promote and co–ordinator. Each of the partners had a representative on the project Steering Group. This Group met twice a year to provide an opportunity to review project progress.

The partnership has previously worked together on other Leonardo da Vinci project („European Textile Learning Tools“), which developed materials for hosiery and carpets manufacture. This project has been highly successful and so it was natural for the partners to look for further opportunities to work together for the benefit of the sector. As a group the partners had considerable experience within their ranks of project management and experience of transnational co–operation. The Universities and sectorial training bodies brought with them considerable expertise of working in partnership with organizations to develop and use interactive training materials. They worked closely with the manufacturers and employers.

3 – SUMMARY INCLUDING CONTEXT AND OBJECTIVES

The project was supported by the EU Leonardo da Vinci program and has been designed “to develop new European wide interactive learning tools on-line for textile

training and develop new learning modules for dyeing and finishing and garment technology manufacture which will be transferable across all partner countries".
This project was focused on the skill needs of technicians/craft workers further down the textile chain for achieving relating to textile production, garment technologies and other textile manufacture. The target groups are training organizations, universities SME's in textile sector (technicians/craft workers in the European Textile sector), textile representative bodies.

4 – PROJECT DESCRIPTION

The project was operated with eight partners and has been delivered through five work packages with aims:

WP1 – To undertake research into ITC tools available in textile production and garment technologies in partner countries;

WP2 – To develop a new learning module in textile production (Dyeing and finishing);

WP3 – To develop a new learning module in garment technologies;

WP4 – Map the learning tool to the relevant textiles qualifications in the partner countries;

WP5 – Valorization plan.

The aim of this research was to undertake research into ICT tools to support vocational learning in the target areas.

This project surveyed materials for teaching/training purposes for technicians/craft workers available in partner countries.

The quality management plan was managed by an Evaluation Focus Group which was led by KLITRA. A process of initial, formative and final evaluation was applied to the project so that lessons were learned throughout the project duration.

5 – RESULTS AND IMPACTS

The internet based learning materials that are being developed in the project were aimed at level 3 or equivalent learners who are working in or wish to work in the textile industry in either dyeing and finishing or garment technology. The research showed that qualifications are available for learners who wish to study also at level 4 and 5. These qualifications were supported by courses.

The courses were mostly delivered by traditional methods through courses and by on–line training. The learning material is available on CD ROM or on the internet. This work-based learning programme is aimed at students currently working in the textile, clothing, footwear and related industries. In geographical terms the learning modules are translated into the languages of countries in the EU, which have a textile and apparel sector.

The innovation contributed by this project is that it applies the use of new technologies supporting the development needs of technicians/craft workers in the European textile sector. The project contributed to innovation by developing new transnational learning modules in garment production and finishing for the first time. These modules complement exsisting national qualifications in the project partnesr countries.

6 – LESSONS LEARNED AND REPLICABILITY

The new learning enable training providers to meet skill needs not currently met in the textile and apparel industry.

The target groups and users had a critical role in the evaluation, quality control and testing activities.

GHENT UNIVERSITY – BELGIUM

1 – EDUCATION

UNIVERSITY EDUCATION

UGent offers diploma of:

- Bachelor of science in chemical engineering and material science
- Master of science in material engineering
- Master of science in textile engineering (European master E-TEAM)

Bachelor and master programmes fall under levels 6 and 7 of the European qualification network (highest educational level is 8: PhD).

How is the programme being established?

There is a wider framework consisting of 4 structural levels:

1. European qualification framework for lifelong learning EQF (level 6 bachelor and 7 master) http://ec.europa.eu/eqf/home_en.htm;

2. Flemish qualification framework (Flemish translation of EQF, organized at Flemish level) http://www.ond.vlaanderen.be/kwalificatiestructuur/vlaamse-kwalificatiestructuur/achtergrond-en-doelstellingen/ (in Ducth);

3. Domain specific teaching outcomes DSO (programme outcomes on Flemish level, coordinated at Flemish level by the interuniversity council VLIR):
    a. established by ad hoc working groups consisting of representatives of specific programmes in each university;
    b. representatives of UGent: L. Van Langenhove for material engineering (including textiles) and P. Kiekens for European master textile engineering;

c. VLIR asks feedback from industry federations.

4. Programme outcomes at UGent PSO (programme outcomes with focus of UGent programme):
    a. set up by programme board (UGent programme board material sciences OCM chaired by L. Van Langenhove; E-TEAM programme board chaired by P. Kiekens);
    b. OCM is composed of professors, assistants, students and industry representatives;
    c. OCM establishes study programmes which have to be approved by university management.

So industry is involved in levels 3 (indirectly) and 4 (directly). In some of the courses students have to carry out project work. The topic of such projects can be inspired on real cases from industry. Company visits are part of the courses.

Cross course student activities include textiles, business and product design. Students work together in designing, developing, testing and evaluating textile products supported by business plans. This requires market exploration for instance by discussions with end users and textile companies.

Internships in industry are part of the programme as elective course (3 or 6 credits). Students can contact companies directly or can count on faculty support. A faculty committee in which industry representatives take part streamlines this process.

Students wishing to set up their own business during their studies can apply for the label of *student-entrepreneur* which gives him or her additional flexibility in terms of attending lectures and exams. In addition they can count on support in developing their business plans.

UGent also has the possibility of organising courses on demand in the framework of lifelong learning. The institute for Lifelong learning IVPV has been created to this end

(http://www.ivpv.ugent.be/en/index.htm). These courses are fully driven and funded by industry. The courses are of post academic level. Students who pass the exams receive a certificate, no diploma. Course programmes vary each year according to industry needs.

Other forms of lifelong learning are workshops, seminars etc. They are often organised within the framework of research projects and/or in cooperation with other unviersities/institutes from Belgium and abroad.

UGent has participated in more than 20 local, regional and international educational projects, of which many with industry participation. Such projects target development of innovative teaching tools, training the trainer, high level advanced training of academic staff. Gender is a particular field of interest of L. Van Langenhove.

UGent support in these projects:

- EU office for EU funded projects;
- Internationalization office:
  - direct administrative support,
  - contracts
- Tech transfer office:
  - search for specific companies
  - contracts

One of the professors of the department of textiles (L. Van Langenhove) has spent 5 years in industry. It can be concluded that dialogue with industry is strongly entangled with the whole process of developing and organizing education in textiles.

NON UNIVERSITY HIGHER EDUCATION

The college of Ghent is part of the Ghent University Association. The college offers professional bachelor in

- textile technology
- fashion technology

Similar to Ghent University, the education is connected to research and industrial servicing. The degree of professional bachelor can also be achieved through evening classes in a range of fields in several local schools:

- Textile production technology;
- Design and textiles;
- Chemistry and textiles;
- Textile machinery;
- Weaving;
- CAD/CAM;
- Software for textile design.

EDUCATION AT SECONDARY SCHOOLS

Textile education is offered at technical and professional level in following areas:

- Textile and design;

- Textile and chemistry;
- Textile machinery.

This education is organized in close cooperation with industry.

COBOT

Cobot is the training sector of the textile industry. (www.cobot.be, only in Dutch). They offer introductory courses for new employees as well as general, advanced and specialized professional training for workers. Some courses are organized on a regular basis, others only on demand. An example of the training agenda can be found under *opleidingskalender*.

General

The industry provides sponsoring for student activities. This includes a fee for student excursions, participation in fairs (eg Techtextil in Frankfurt). Funds are provided by:

- Profortex (promotion de la formation textile – promotion of textile education);
- Fedustria (federation of the Belgian textile industry) (www.fedustria.be).

Unitex is the Belgian association of managers from the textile industry (http://www.unitex.be/). Unitex is chaired by prof. Van Parys of the college of Ghent. They publish a journal in which textile companies, suppliers of raw materials, chemicals, machine manufacturers and researchers publish latest developments in their fields. Unitex organizes a monthly evening workshop that combines presentations and networking opportunities.

It can be concluded that there is a broad range of textile education and that textile education is strongly linked to industrial activities.

RESEARCH

Research at UGent

The department acquires more than 90% of its operational costs through co-operation with industry. Out of 40 members of the department, only 8 are being paid directly by UGent. The other members are being funded by a variety of projects from UGent, national or international funding agencies and industry. Consequently the activities of the department have to be industry oriented. This has always been the case. The annual report of the department can be found at http://www.ugent.be/ea/textiles/en/about-us
The department carries out several types of research, ranging from basic to applied research, long term to short term projects.

The involvement of industry depends on the type of research and requirements of funding agencies.Some typical examples:

- Basic research (PhD type) with no rules regarding industry involvement (UGent funds, special research fund http://www.ugent.be/en/research/funding/phd/bof or grant from fund for basic research (www.fwo.be);

- Basic research (PhD type) granted based on positive evaluation of research plan and exploitation plan (IWT grant, agency for promotion of innovation in industry, http://www.iwt.be/english/funding/subsidy/sb);

- Research with clear industrial applicability (on behalf of industry), funded through one or more companies (IWT project, http://www.iwt.be/english/funding/subsidy/industrial-projects);

- Joint research with companies (research and innovation projects in Horizon 2020);

- Networking projects targeting surveys, sector analysis, roadmaps, policy plans etc.

Networking projects:

- www.systex.eu:
  - smart textiles
  - survey and interviews
  - data base with projects, contacts, demonstrators
  - training materials, training week (smart textiles salon http://www.smarttextilessalon.com/)
  - market analysis and roadmap

- www.2BFUNTEX.EU:
  - Functional textiles
  - Data bases with projects, training materials, contacts
  - Workshops
  - MDT multidisciplinary teams (Antimicrobial textiles, Nanotechnologies, Smart textiles, Electrospinning + Plasma, Flame retardancy, Sustainable textiles + Biotechnologies)

- www.colae.eu
  - Commercializing organic large area electronics, ao in the textile sector
  - Business cases, feasibility studies
  - Training

Networking projects always include strong industry participation. They target identification and matching of market opportunities, technology potential and industry

needs. The department works with the European Enterprise Network (http://een.ec.europa.eu/) which brings together business support organisations from more than 50 countries. They can help find international business partners, source new technologies and receive EU funding or finance.
As funding depends to a large extent on industry support or industry participation, research themes have high relevance for the textile industry.

Research activities are supported by several UGent services:

- Research coordination office: http://www.ugent.be/en/ghentuniv/administration/doza
  - Information on funding opportunities: electronic newsletter, info session;
  - Support in setting up proposals
- EU cel:
  - Information on funding opportunities: electronic newsletter, info session;
  - Financial support for project coordinators;
  - provides support during project preparation, contract negotiations, administrative and financial management, reporting
- Tech transfer office: http://www.techtransfer.ugent.be/en/
  - Contacts with industry;
  - Contracts;

- IPR issues;
- Valorization projects;
- Electronic news letter.

Textile research in Ghent

Other research centers in Ghent are the college of Ghent and Centexbel. Although their focus and mission is different, their interaction with industry is similar. In addition Centexbel is the research center of the Belgian textile industry, meaning for instance the board of directors is composed mainly of industry members.

INDUSTRIAL SERVICING - http://www.ugent.be/ea/textiles/en/industrial_services

A significant part of the budget of the department is acquired by industrial servicing. This is an important source of daily contacts with industry. It gives an excellent picture on the activities and evolution of companies as well as on their current problems.
The department has an ISO17025 accredited lab. It is the only university lab in the world with FIFA accreditation.

3 – SOME CONCLUSIONS

Nowadays it fundamental to be prepared to operate in a in a worldwide market which demands a high level of specialization. The company´s R&D departments play a very important role in this process by serving as a knowledge platform, which support the transformation of new resources into new business opportunities and end up conquering some highly valued niche markets.

In today's particular harsh environment, companies are driven by a rapidly changing market demand. To face up this situation, they are obligated to a constant update and innovation. The generation of partnerships with high education institutions and, in the best cases, with government support, configures the best solution to enhance company's competitiveness.

It is proven that in a more dynamic environment the preponderant factors for the company's success is precisely the ability to renovate, developing new skills, and integrating/reconfiguring internal resources. All these key issues were tackled by the case studies provided by the contributors.

The reported examples comprise a wide variety of forms of cooperation between companies and high education institutions. All those different kinds of contributions seek to solve particular problems felt by the participating companies or aim at developing new innovative solutions to support the qualifying and training of their personnel.

Simultaneously, they also evidence the involvement of a vast number of other institutions, namely, socio-professional organizations and unions, gathered in a conjoint effort to increase the competiveness of their enterprises.

Despite of being a complex process, the described examples of relationship between companies-university demonstrated some possible strategies to overcome the existing

weaknesses of the textile and apparel industry, particularly, from the more conventional and with intensive manpower textile industry.

Globally and when considered in their particular field of intervention, the presented examples can be seen as guidelines for the improvement of the Belarus textile and apparel industry. They objectify a series of tools to overcome some eventual lacks such as:

- ✓ Outdated strategies highly influenced by mass production principles and by a short term vision;
- ✓ Technological fragilities in the development of new products or processes;
- ✓ Difficulties to deal and absorb emergent know-how;
- ✓ Negligence with the up-to-date training and qualification of their personnel;
- ✓ Generalized lack of cooperation: internal or external; horizontal or vertical.

Obviously, the reported models have to be adjusted in conformity with the Belarus socio-economic reality. Notwithstanding, they are to be seen as good practices, already developed and tested in other countries which, contribute to strengthen their local textile and apparel mills at different levels, namely:

- ✓ Strategic use of technology and information so as to attain competitive advantages;
- ✓ Use of innovative human resources policies to achieve the employees best qualification;
- ✓ Better understanding of the relation suppliers-companies;

- ✓ A constant search to improve quality in all their dimensions;
- ✓ Some indications that might lead to cost reductions;
- ✓ Development of proprietary knowledge and expertise in their fields of operation;
- ✓ Minimize investment risks grounded upon the direct involvement of workers;
- ✓ Possibility to have in their ranks top skilled professionals;
- ✓ Generation of spin-offs and start-up companies;
- ✓ Development of patented products or processes.

Based upon the above considerations a consolidated Companies-University partnership has all the potential to trigger and promote some cultural, organizational and operational changes that encouraged by information and knowledge exchange, contribute decisively to the competitiveness and survival of companies in a globalized market.