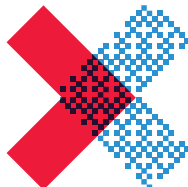
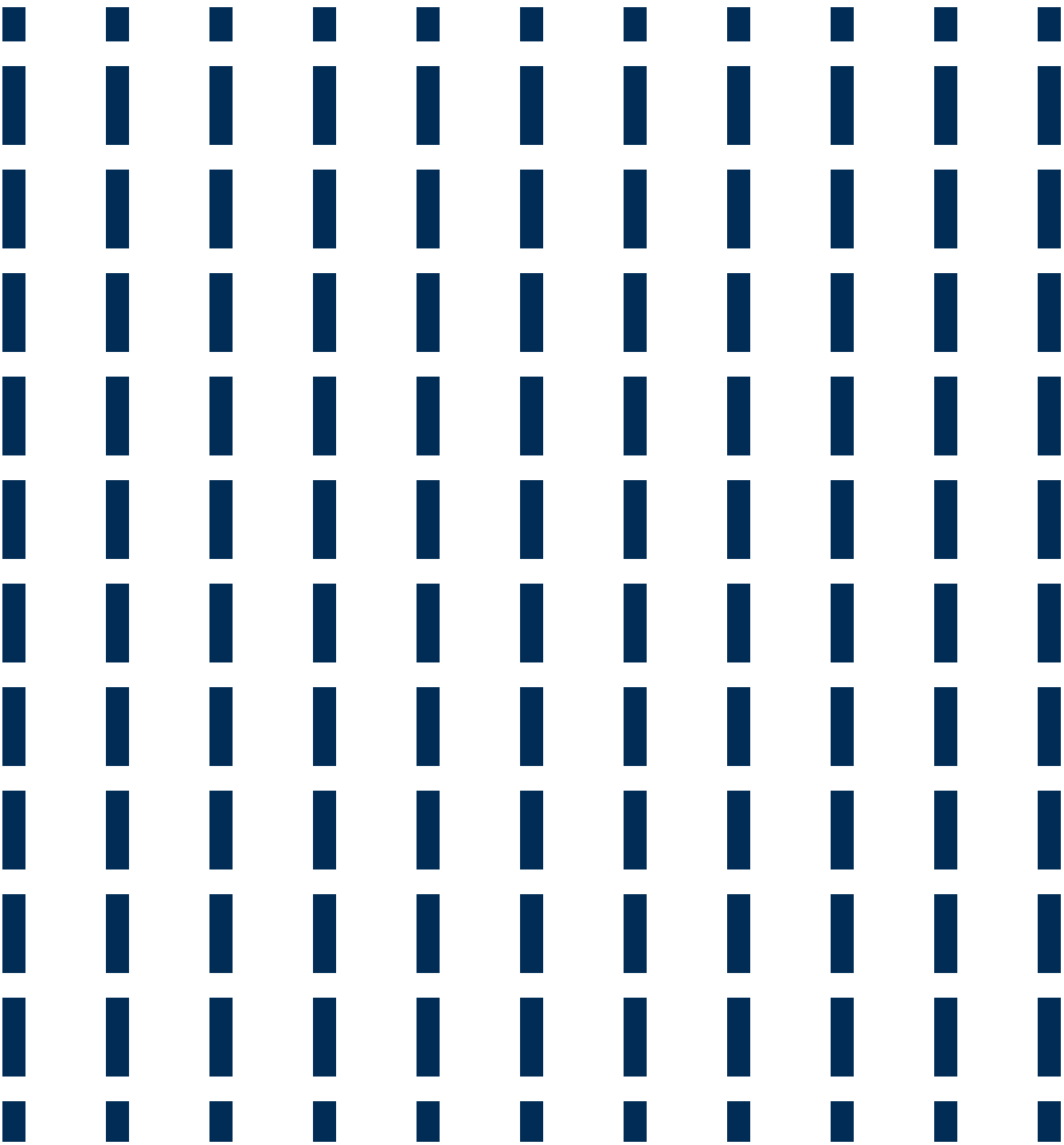


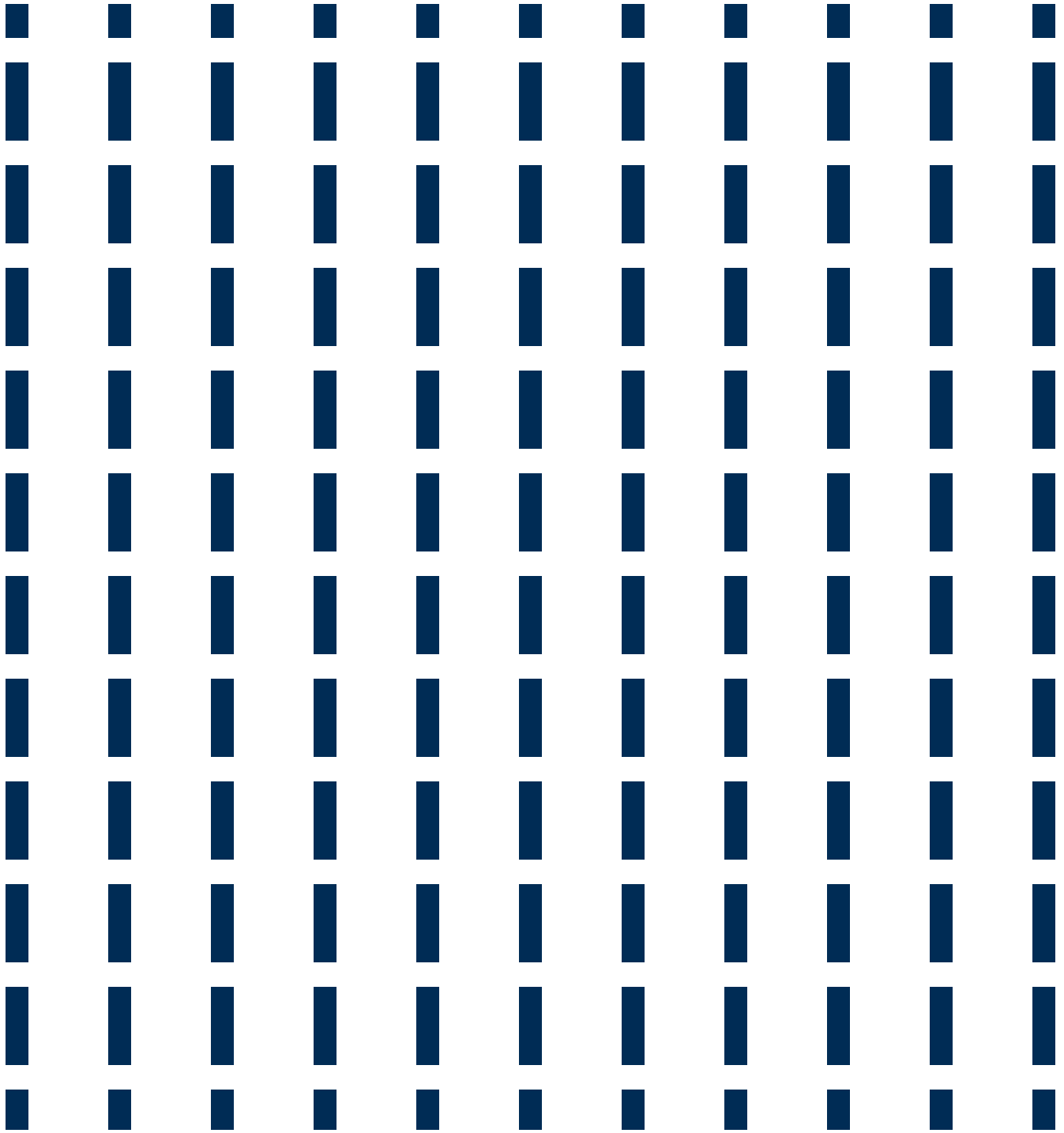
The Vision of Future Manufacturing Industry in EU



COTEC
Europa
Meeting
Lisboa
Feb 12th
2014
Re-
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TECNOLOGICA





**A VISION OF MANUFACTURING INDUSTRY
IN ITALY, PORTUGAL AND SPAIN**

COTEC

FONDAZIONE PER L'INNOVAZIONE TECNOLOGICA

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1. Introduction

Re-Industrialization is now the main pillar of the economic policy of the EC and, following its pioneering view, of all European Countries. Anyway some very relevant questions arise when designing and implementing the Re-Industrialization process: which kind of industry is going to be built? Which are its sector specializations? Which features and factors are going to make it competitive at international scale?

Certainly the European industry of the future must be innovative, either in terms of new sectors to be developed and of a strong renewal of existing sectors.

Even if innovation has to be the landmark of the industry to be built, the answer to those questions must take into consideration the starting point, the state of today's industry in the EU Countries and its capabilities and resources; so the answers have to be Country and even region specific. Many statistical indicators show that the industrial system, first of all, its manufacturing component, of the EU Countries are very different in terms of sector composition, capital and labour productivity, R&D intensity, export. The same indicators show that there are large areas of similarity in the industrial systems of Italy, Portugal, Spain.

So, in the following, a vision of industry will be proposed by focusing on manufacturing and on Italy, Portugal, Spain, even if the main features of the vision are common to all EU countries.

The proposed vision and the strategy and actions that are needed to implement it, are then specialized regarding the durable consumer product sectors, that are a large component of the manufacturing industry of Italy, Portugal. Spain in terms of added value and employment.

Before describing the vision, it seems worthwhile recalling some reflexions on the need of re-industrializing EU in order to stop the negative impacts on economy, society and citizens of our Countries from the decline of Manufacturing in EU, and to reverse the trends.

2. Why Re-New-Industrialization of EU

The on-going economic crisis of most Countries of EU is certainly a complex process with many causes, but it is undoubt that among them the most important one comes from the financial sector and the overwhelming (and oversized) focus of business strategy that has been put on financial factors and their performance, even in industry. This widespread altitude of policy makers and business community has led to undermine the role of industry, especially manufacturing, in creating wealth and employment in our societies. Really manufacturing is the central engine of the economy of our Countries and plays a vital role in creating social and individual benefits in terms of welfare and quality of life.



First of all, manufacturing requires labour skills much higher than those of any other sectors in terms of both type of needed knowledge and level of competence and abilities. Manufacturing creates a lot of additional activity in other parts of the economy, specially in a wide range of high value-added services, which require qualified personnel.

The average new manufacturing job leads to the creation of from two to five additional jobs in other sectors. This multiplier effect is substantially higher than that of the service sector.

Moreover manufacturing jobs pay better than comparable jobs in other sectors.

All of this helped to consolidate a broad middle class, which is the basis of modern societies and provides the most of domestic demand of products and services.

Secondly, manufacturing industry provides a disproportioned share of new products and related added value services, which are critical for the productivity growth of all other economic sectors, first of all the service one, and the performance of their output.

Moreover, the outputs of manufacturing industry allow to provide effective and continuously improved solutions to individual and societal problems (in the areas of healthcare, mobility, energy, security and so on) and to improve the quality of life in all areas of society, so being an essential element in any national strategy that seeks to address economic inequality.

Thirdly, manufacturing firms pay for and performer the most of total industrial R&D of our Countries, with a much higher share of their weight in the economy.

These linkages between manufacturing and R&D and innovation mean that the success of knowledge based services often depends on the success of domestic production activities.

This fact challenges the assumption, widely held for many years even by leading policy makers, that Countries could reduce manufacturing and concentrate on the delivery of knowledge and services, without lowering GDP and wealth creation.

Quite the opposite, some experiences show that, when Countries offshore their manufacturing, they do not just loose their manufacturing capacity, but in a few years they loose their manufacturing capacities to design, to develop and to engineer new products and services and to sustain this economic model in a global market.

Notwithstanding the role and the contribution of manufacturing to economy and society, there has been a general decline of its level of activities and performance in EU Countries, vis-a-vis the dynamic of industry at global scale.

Few data are enough to illustrate this decline.

As shown in Fig. 1 EU share of global industrial output has dropped steadily since 1970 to 2008, similarly to USA, while China has remarkably increased its share.

More than this, as shown in Fig. 2, the EU manufacturing share of added value has steadily decreased since 1980 to 2010, even it in the last year there has been a slight increase.

The reasons of this decline are manifold (including offshoring of manufacturing towards low labour wage Countries), but the most relevant one is the lower performance in terms of labour productivity and, in some cases, of capital productivity, of manufacturing firms of most EU Countries, than the global average values.

It's worth noting that the average hourly compensation in manufacturing for mast EU countries (with the exception of Eastern Europe) is much higher than that of developing areas of the world such as Latin America, India and China (see Fig. 3). So this unbalance, together with the lowering labour and capital productivity of EU countries, has driven the offshoring of manufacturing activities from industrialized EU countries and the shift of production capacity towards those areas, mainly in the case of low value added products.

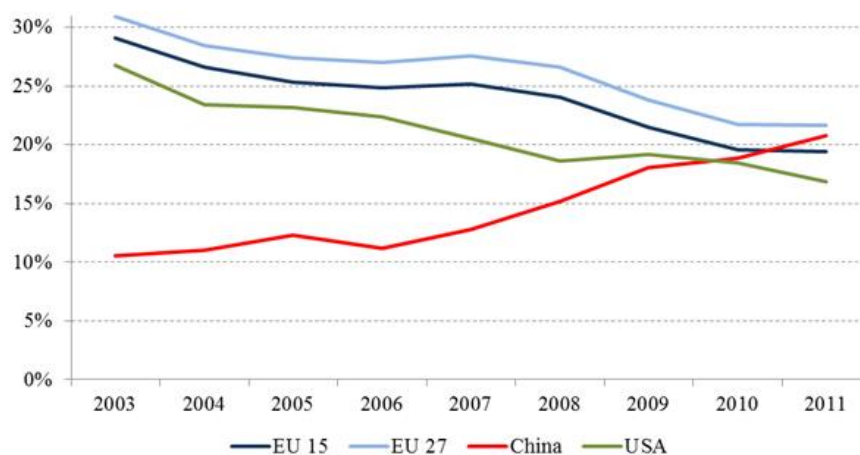


Fig. 1 Manufacturing share of value added, 1980-2010, EU and other economies

Source: Bruegel on the basis of World Bank and OECD

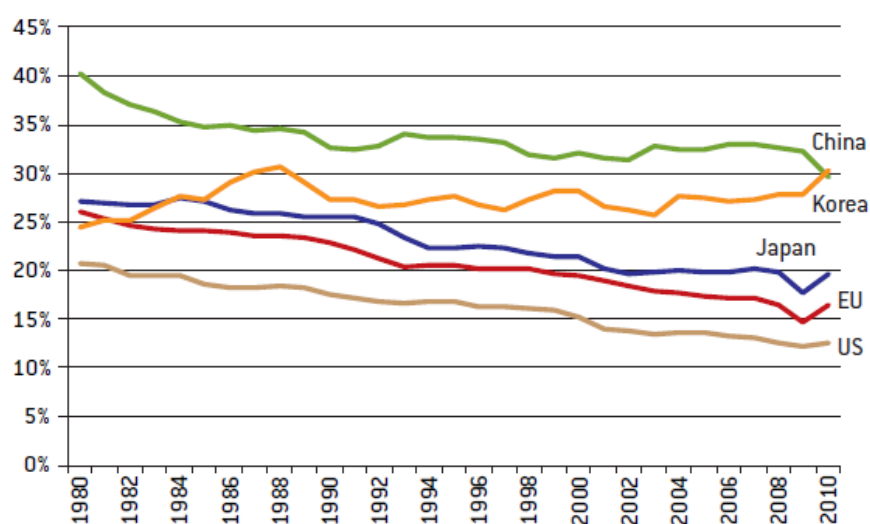


Fig. 2 Manufacturing share of value added, 1980-2010, EU and other economies

Source: Bruegel on the basis of World Bank and OECD

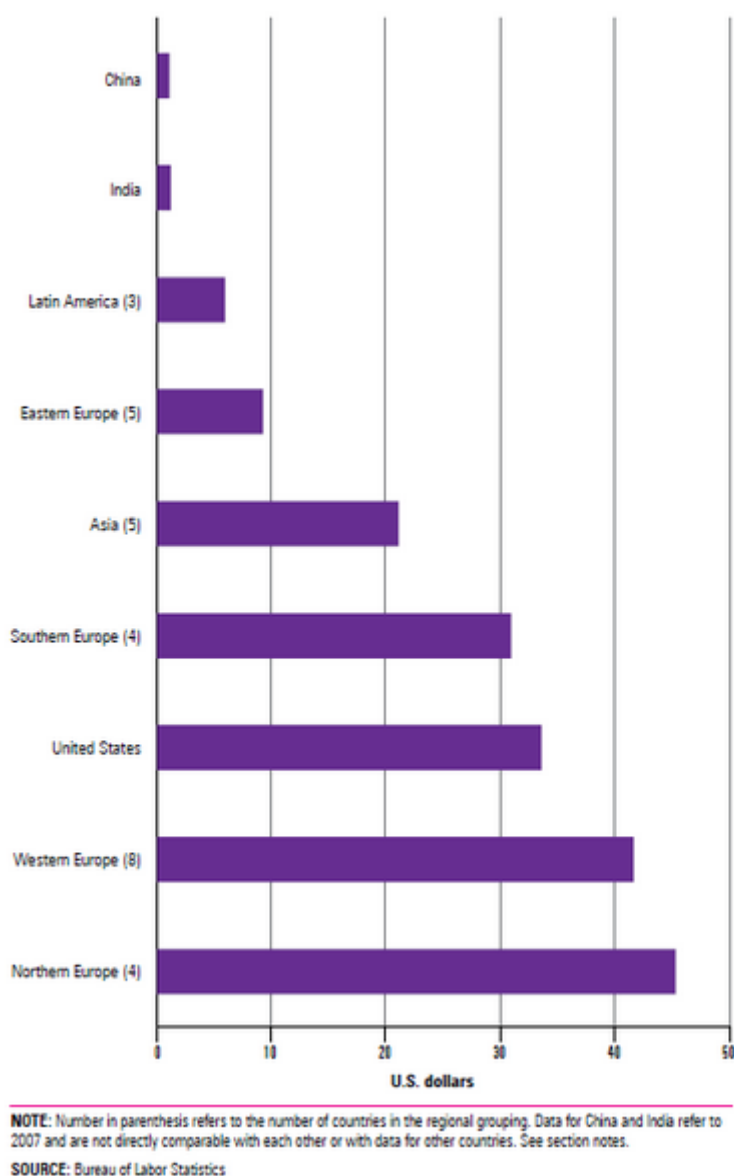


Fig. 3 Hourly compensation cost in manufacturing, selected regions 2009

At the bottom of this situation there is a significant lack of investment in Europe. In fact, on one hand, European industry is becoming more international than ever before. Despite the crisis European firms intensified their engagement abroad; especially foreign direct investment in BRIC countries as well as in Central and South Africa increased remarkably during the last years.

Unfortunately, on the other hand, this flow of European investment abroad was not counteracted by increasing passive direct investment in the European economy. Except for China and India, investments in EU from BRIC countries as well as from Central and South Africa have decreased in the last years.



So Europe runs the risk of marginalization of its business location and attractiveness for foreign individual inventors.

In order to reverse the decline of manufacturing, Europe needs a broad and coherent industrial policy. The objective of EU of increasing the share of industry from around 16% of GDP to 20% by 2020 represents a strong political signal. Industry and its competitiveness must be back at the centre of EU's policy making and be improved through an appropriate mix of tools.

But European industry must grow not only in quantitative terms; it is necessary to conceive and to build a new model of manufacturing industry, which combines an increased competitiveness within the global landscape with a better response to individual and societal needs.

3. The general vision

The analysis of today structure of manufacturing industry worldwide shows that deep modifications have occurred, with a growing shift of production capacity from the Atlantic area to the Pacific area and the rise of new industrialized Countries in the South East Asia (China and India in the first place, but also South Korea, Hong-Kong, Taiwan and Singapore), which have gained a strong position in the international trade by focusing, at least for now, on mass products with low prices and often low quality, mainly in terms of safety and environmental impact.

These structural changes require a new strategic posture of manufacturing industry of advanced Countries, by moving towards a business model based on both Innovation, and Sustainability (economic, social, environmental, energy-wise, ethical). A new paradigm has to be developed and implemented by coupling two main features: Competitiveness (the traditional one, but pursued through Innovation, mainly technological, with new approach and tools) and Sustainability, (the innovative one) with a Global perspective, in order to provide highly performing solutions to the main societal challenges and to win the competition from newly industrialized Countries. So the new Manufacturing Industry must be Competitive, Sustainable and Global.

New highly performing and knowledge intensive products are to be designed in order to respond properly to grand societal challenges (in the areas of mobility, energy production and use, security, health, inclusion) and to the changing needs of consumers, which require customized items, with a higher content of services, a larger set of functions and a greater environmental quality all over the product life cycle.



New business models and manufacturing systems are to be conceived and realized, by making an intense use of many advanced technologies (first of all, ICT, new materials, nano and bio-technologies).

By implementing this strategic pattern the manufacturing industry of advanced Countries is transforming itself into an industry delivering “products + services” to customers ready to pay a higher price for more performing goods.

But not all companies are following this pattern: many of them have implemented different strategies in order to survive in the global competitive environment. So many manufacturing plants migrated towards Countries and regions in Europe and outside Europe with lower labour wages and less strict environmental norms and regulations. These firms try to compete with newly industrialized Countries by adopting the same business model, based on “cost efficiency” and a lower concern of environment.

But this approach turns out to be short sighted as, sooner or later, the labor wages of these manufacturing platforms are going to be raised and stricter environmental regulations are going to be established, so offsetting the local cost advantages and requiring the migration of plants towards other Countries and regions.

There is a more complex and sophisticated global business model than this one, that has been followed by some manufacturing firms: some critical functions, such as RDTI in a close relationship with strategy formulation and marketing, are kept within advanced Countries, while manufacturing is relocated in Countries offering favorable conditions regarding costs of labor and natural resources.

But this model of Globalization may turn out to be not fully suited to the Competitive Sustainable Manufacturing paradigm, as the increasing content of services of manufactured products require a strong interaction between manufacturing and marketing, on one side, and manufacturing and RDTI, on the other side, which can be really effective and efficient only if they are carried out in proximity.

So one can foresee that, for at least highly innovative and sustainable products, tailored for either R&D and knowledge intensive firms and higher income and environmentally aware consumers, critical functions (RDTI, marketing, assembly of final products) are going to be kept mainly within industrialized Countries, by implementing at the same time a global outsourcing strategy for acquiring specialized components and subsystems and manufacturing products worldwide, while satisfying customers (firms, consumers) almost anywhere.

So firms are setting up complex cooperative networks of many different players (R&D centers, specialized SMEs, technology providers, etc), distributed all over the world (which we might name “constellations”).

In order to throw some light on the possible structure of the future globalized manufacturing industry it’s worth citing some hypothesis that have proposed in the literature*.

Five broad groups of manufacturing industries have been identified, with very different characteristics and requirements regarding where to carry out R&D, to build factories and to go to the market. These groups are illustrated in the following table, together with some hypothesis about the leading roles of Countries.

Group	Industry	Intensity or density of given factor ¹					
		R&D intensity	Labor intensity	Capital intensity	Energy intensity	Trade intensity	Value density
34% Global innovation for local markets	Chemicals	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
	Motor vehicles, trailers, parts	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
	Other transport equipment	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
	Electrical machinery	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
	Machinery, equipment, appliances	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
28% Regional processing	Rubber and plastics products	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Fabricated metal products	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Food, beverage, and tobacco	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Printing and publishing	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
22% Energy- and/or resource-intensive commodities	Wood products	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Refined petroleum, coke, nuclear	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Paper and pulp	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Mineral-based products	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Basic metals	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
9% Global technologies/innovators	Computers and office machinery	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
	Semiconductors and electronics	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
	Medical, precision, and optical	Very high	Moderate to low	High to moderate	Moderate to low	High to moderate	Moderate to low
7% Labor-intensive tradables	Textiles, apparel, leather	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low
	Furniture, jewelry, toys, other	Moderate to low	High to moderate	Moderate to low	Moderate to low	High to moderate	Moderate to low

¹For methodology, see *Manufacturing the Future: The next era of global growth and innovation* available on mckinsey.com.
Source: 2010 Annual Survey of Manufactures (ASM); 2007 Commodity Flow Survey, US Census; IHS Global Insight; Organisation for Economic Co-operation and Development (OECD); McKinsey Global Institute analysis

The largest segment of industries by output (gross added value) includes automotive, chemicals, and pharmaceuticals, machinery. These industries depend heavily on global

* McKinsey Global Institute, *Manufacturing the future: The next era of global growth and innovation*, November 2012



innovation for local markets (they are highly R&D intensive) and also require close proximity to markets.

The second-largest segment is regional processing, which includes industries such as printing and food and beverages.

The smallest segment, with just 7% of global manufacturing added value, produces labor-intensive tradables.

Each segment is multilevel, concerning R&D, manufacturing and marketing. Those concerned especially with Sustainable Development, play a relevant role, and are connected to the global level, more concerned with competitiveness.

Even if some of the features of these types of industry can be questioned for appropriateness (e.g. not all textile and leather goods are exposed to price competition, it depends on their added value, related to their design and technology based innovation; more than this, is automotive industry really R&D intensive?), nevertheless it's apparent that different types of manufacturing activities (in terms of R&D intensity, marketing focus, resource dependency, complexity) require different distributions of functions at global scale.

Whatever the globalization pattern that EU Manufacturing ecosystem is going to follow is, it has to satisfy two basic requirements: Competitiveness, as a key driver of economic development and growth, higher value jobs and income creation, and Sustainability, as a key driver for improving the standards of living of citizens (either workers and retired workers) in terms of active social and environmental conditions.

A survey carried out by CIRP in cooperation with Manufuture – EU, shows that some advanced and emerging countries (EU, USA, Canada, Japan, Russia, China, Brazil, India, Korea) are already addressing sustainable development as a move towards Sustainable Globalization.

The 2012 issue of Countries Scanning by the World Economic Forum, concerning, singularly and combined, Competitiveness, Social and Environmental Sustainability, has made evidence that some Countries are moving towards sustainable development, as shown in the following Fig. 4.

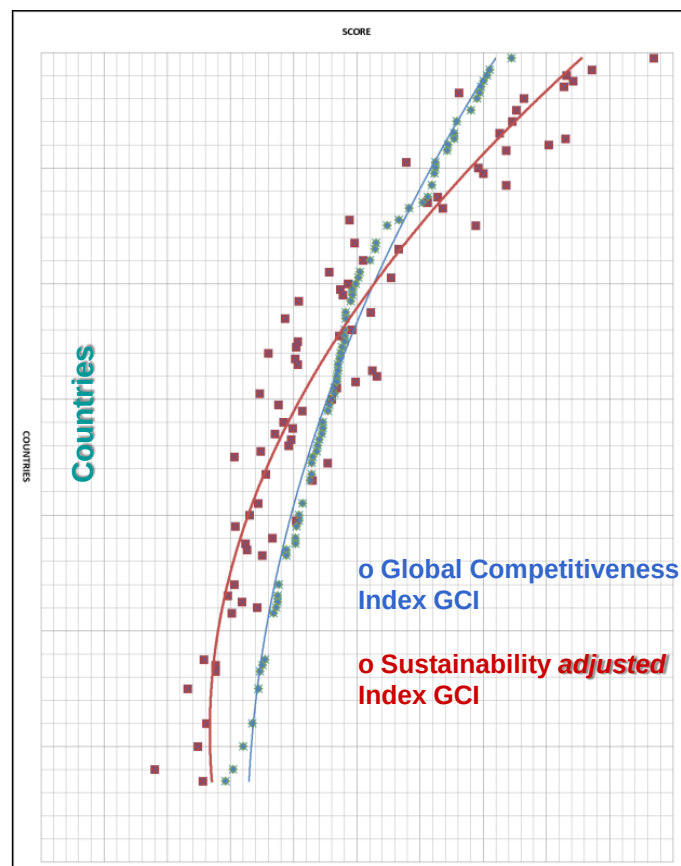


Fig. 4 Source: F. Jovane's elaboration of WEF Countries Scanning Report (2012)

The blue curve regards the Country Competitiveness index, while the red curve regards the combination of Competitiveness and Sustainability indexes. There is a clear trend from Competitiveness towards Sustainability which involve Countries with a high level of economic development, and is driven by innovation rather than by seek of efficiency.

4. The main features of Competitive Sustainable Manufacturing Industry in the context of Globalization

As outlined before, the new Competitive Sustainable Manufacturing Industry is characterized by a deep and widespread innovation of products/services it delivers, and of their production process. These innovations are made possible by the development, through the use of advanced knowledge, of a wide set of factors, regarding Products and Processes, within the framework of an appropriate set of Enablers. More than this, these factors have to be conceived and implemented through an integrated process, which, by considering the interactions among the various factors, allow to fully exploit their potential contribution to innovation towards Competitiveness and Sustainability.



4.1 Product innovation

The innovation of products, which are designed to offer high performing solutions to a large range of individual and social needs, follows primarily two guidelines:

- a) Development of “smart” products
- b) “Product-Service” integration in all phases of product life-cycle

a) Smart products incorporate some sensors and actuators which allow a high level of automation of the following functions:

- Monitoring the surrounding environment
- Learning
- Adapting to critical states
- Controlling, by means of cognitive systems, physical, chemical, biological processes
- Optimizing performance (consumption of resources, emissions, etc.)

b) The integration of products and services allow to offer more satisfying solutions to customers’ needs, to lower total costs all over the life-cycle, to avoid the problems associated to today widespread models of “purchase - use – disposal” of products.

By providing services to customers in the phases of design, purchase, use and recycle/disposal of products firms can gain the following benefits:

- Widening the range of their offer to customers
- Establishing stronger ties with customers
- Receiving meaning full feedbacks from customers.

4.2 Process innovation

The new model of Manufacturing Industry is based also on the innovation of the structure and the tools of production processes, giving rise to new manufacturing systems. They are shaped as adaptative, adjustable, networked systems, which make use of digital tools and technologies, by integrating knowledge from many different fields (physics, chemistry, biology) at an increasing smaller scale (from micro to nano).

Adaptability of the new production systems means that they are able to respond automatically to the changes of the environment in which they work by making use of smart process control technologies, which incorporate formal know-how and competences; the new systems allow flexible and low scale (even one piece only) production.



Adjustability of the new production systems is strongly related to their adaptability and allows to manufacture very customized products, with short response time to changing and diversified demands from the market, associated with a high productivity.

Network structure of the new production systems means abandoning the traditional pattern of the production process (a sequence of phases of activity), by integrating many agents operating in different firms and countries into a cooperative network. The network structure is dynamic and easily allows either new agents to be inserted into the network and older agents to be dismissed, according to the changing market demand.

Digitalization of the new production systems means the widespread and intensive use of many ICTs in all the functions, from product/process design to production programming and control, with the aim of improving efficiency and making all other features (adaptativity adjustability, network structure) feasible.

All these features make the new production systems a more complex and improved version of the traditional CIM (Computer Integrated Manufacturing System), with the full integration of different subsystems (such as CAD/CAM, NC/CNC, Robot, Planning and Control) in an open architecture.

The production technologies of the new systems are the results of the convergence of technologies based on different scientific fields, such as ICT, materials, life sciences, nanosciences, giving rise to processes at an increasingly smaller scale (micro and nano).

These technologies allow to get:

- New products with very specific features in terms of size, flexibility, etc.
- Scalability of quantity
- Improved performance (in terms of speed, cost, quality)
- Low consumption of energy and materials
- High precision (zero defect)
- Low impact on the environment in terms of waste and emissions.

4.3 Enablers

The implementation of the product and process innovations that characterize the new model of Competitive Sustainable Manufacturing Industry requires, in order to be effective, that properly related actions are taken regarding many other factors, the so called Enablers. They involve either manufacturing firms and the economic and technical environment in which they operate and with which they interact.



The Enabling factors fall in the following areas:

- Technology
- Economics-Management
- Framework

Technological factors

The product and process innovations require in the first place, the development of advanced applied and even fundamental knowledge in many different scientific and technical fields.

The fields which are most relevant for the development of the new production technologies are:

- Advanced materials (first of all, nanomaterials)
- ICT (first of all, for Ambient Intelligence)
- Life sciences
- Nanosciences
- Cognitive sciences
- Modelling and Simulation.

The new production technologies are the output of a complex process of convergence, hybridization and integration of technological factors falling into different domains, such as mechatronics that makes use of biotechnologies, or smart materials inside micro-systems. To this aim there is the need of a new approach to research, really interdisciplinary and interinstitutional.

The technological factors can make diverse impacts on manufacturing: some provide many new functions (e.g. nano-biotech materials), some others allow strong product customization, with a large variety of solutions responding to specific needs of customers. Their impacts are on diverse areas of a firm: mainly product design, production process, function integration.

Non-technological factors

In many industrial sectors, mostly specialized in manufacturing durable consumer products, technology hasn't been the main factor sustaining product innovation. Non-technological factors, such as design and creativity, are equally, if not more, relevant for competitiveness. What is needed for implementing the paradigm of Competitive Sustainable Manufacturing is a strong integration of technological and design-creativity factors, specially in the phase of conceiving and developing new products. This requires setting up cooperative networks, among creators, technology experts and research centres, industrial producers and marketers,



working together, specially in the first stages of the products life-cycle, but taking into consideration all the other phases (up to disposal/recycle). These networks must be flexible and expandable in order to be able to respond to the changes in the environment of the firm, specially in the customers' demand which is evolving in terms of cultural and emotional aspects, product self-design, intuitive and simple use, service adaptation.

Customers are also to be involved in these networks through appropriate and innovative tools (e.g. social network), in order to really implement co-design between producers and end-users.

Economic - Managerial factors

The model of Competitive Sustainable Manufacturing Industry requires a new strategic posture and management capacity of firms of all sizes and sectors, that have to abandon the innovation strategy based mainly on incremental improvements and cost-efficiency, and to pursue radical innovation in all areas and functions of the firms.

Only by adopting this strategic posture and management capacity it will be possible to implement the new business model and to grasp all the possible benefits from network integration, cooperation with public research sector, joint design involving manufacturing firms and end-users, etc., within the new global competitive landscape.

SMEs are likely to find the adoption of this strategic posture and management capacity rather difficult, for many reasons:

- Limited resources (financial, organizational, managerial)
- Limited knowledge management capacity
- Inability to provide services to distant foreign markets
- Fragmentation of the value chain (from suppliers to end customers).

So it's necessary to set up a virtuous circle, that allows SMEs to evolve from the state of "smart artisans" to follow a managerial approach to doing business effectively in a rapidly changing and complex global market.

Framework factors

The virtuous circle cited above is not likely to start by itself as there exist many barriers (cognitive, behavioural, economic, institutional, etc) inside and outside firms, that impede the evolution of entrepreneurs towards the new model of Manufacturing Industry. So appropriate actions are to be taken inside firms and in their surrounding environment.

First of all, teaching and awareness raising actions are to be delivered to entrepreneurs and managers so that they can build a strategy design capacity.



More than this, organizations and programs are to be designed and implemented outside firms for “facilitating” and supporting entrepreneurs and managers in their efforts to elaborate new strategies and to set up cooperative networks (involving universities and public research centres, large firms, SMEs, technology providers, financial institutions, etc.) at a global scale (the “constellations”), which are necessary for implementing the new business model.

So interinstitutional innovation has to be developed so that the “constellations”, involving all the players needed to implement the new paradigm of Manufacturing Industry, are built in an effective way. Large firms can promote building the constellations, but their efforts cannot be enough, due to the complexity of this task and its need of large amounts of resources (financial, organizational): so “facilitators” and facilitating programs should be established by public policies and with public support.

5. Globalization and regions

Paradoxically, even if manufacturing and innovation have become globalized, the role of regions as the critical nexus for innovation-based economic growth has increased.

Regional economies are keys to innovation and growth. Evidence and practical examples confirm that regions and cities play an important role in developing innovation by being the home of industrial clusters, competence centers, incubators, technology parks and many other types of formal and informal innovation processes and structures.

Referring to Europe, the European Commission remarks that successful regions and cities become European or global nodes of innovation, technology networks and value chains. Regions and localities also play a significant role in pursuing sustainable development, mainly due to their proximity to many environmental problems, as well as to local know-how on the ways to prevent and to adapt to environmental challenges.

Regions are important to sustainable growth. This significant role of the local level was confirmed as long ago as 1992 with the introduction of local actions into the UN Agenda. The need to connect innovation and sustainability agendas was confirmed in the mid-1990s when the concept of eco-innovation was first defined.

However eco-innovation took about a decade to be considered seriously by regional and national policy-makers. Only in recent years, more European Regions have recognized the needs to tap innovation potential to address social and environmental challenges.

Many innovation policy-makers started following a challenge-driven approach to innovation policy by channeling public support to respond to challenges of environmental sustainability, in particular climate change, resource efficiency and biodiversity.

Regions are well positioned to tackle both innovation and sustainability, as:

- On one hand, regions have an insight into their own innovation systems, as well as the capacity to mobilize regional innovation stakeholders through specific policy instruments;
- On the other hand, regional stakeholders have a good understanding of regional environmental performances, as well as the capacity and competences to take local action to promote environmental sustainability.

Eco-innovation, like any other innovation, should be understood as “occurring because of what are often geographically proximate concentrations and interactions amongst small, fast-moving systems of innovators and their networks”.

In short, geography matters. It can also be argued that geography matters more because eco-sustainable growth require both a good understanding of regional innovation systems and a good knowledge of the environmental and sustainability challenges.

Regional Competitive Sustainable Manufacturing can create new jobs for supported activities within the region and the community need to help closing resource loops, partnering to develop renewable energy use, etc.

6. The consumer goods industry in Italy, Portugal and Spain: a case of Competitive Sustainable Manufacturing

Industries manufacturing durable consumer goods (furniture, textile-clothing, shoes, eyewears, etc) account for a very large part of the industrial systems of Italy, Portugal, Spain in terms of added value and employment.

As shown in Table 1 the two most relevant industries manufacturing durable consume goods (textile-clothing, leather and shoes, furniture) account for 15,2% of GVA of manufacturing industry in Italy, 25,1% in Portugal, 12,1% in Spain, against 8,7% in France and 6,5% in Germany.

	Germany	Spain	France	Italy	Portugal	UK
Manufacturing industry	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
Food-Beverage-Tobacco	7,8%	19,2%	17,2%	11,2%	16,3%	18,6%
Textile-Clothing-Leather-Shoes	1,4%	4,1%	3,0%	9,1%	13,3%	2,2%
Wood-Paper-Printing	5,1%	8,0%	5,7%	6,1%	11,8%	7,1%
Coal and oil	1,3%	2,0%	1,5%	0,9%	2,8%	1,7%
Chemicals-Pharmaceuticals	11,4%	10,7%	12,7%	8,7%	6,2%	13,5%
Rubber and Plastics	4,8%	5,1%	5,6%	4,9%	5,0%	4,8%
Non-ferrous minerals	2,8%	6,4%	4,1%	5,0%	8,2%	2,9%
Metals	3,9%	4,5%	3,2%	4,0%	1,8%	2,8%
Mechanical goods	9,2%	10,6%	9,3%	12,1%	11,2%	8,0%
ICT	5,0%	1,8%	5,0%	3,5%	1,8%	6,3%
Electrical equipment	8,0%	4,3%	4,2%	4,9%	4,6%	3,1%
Other machinery and equipment	15,4%	5,6%	6,2%	13,8%	3,4%	8,3%
Motor Vehicles	14,7%	7,6%	7,2%	5,1%	5,9%	6,8%
Other Transportation equipment	2,0%	3,3%	5,4%	2,7%	0,4%	5,7%
Other manufacturing products	4,2%	3,8%	3,7%	4,9%	4,3%	4,5%

Table 1. Sector distribution of GVA for some EU Countries (2010)

Similar is the situation in terms of yearly manhours (see Table 2)

	Germany	Spain	Italy	Portugal	UK
Manufacturing industry	100,00%	100,00%	100,00%	100,00%	100,00%
Food-Beverage-Tobacco	12,3%	19,1%	10,1%	16,2%	17,1%
Textile-Clothing-Leather-Shoes	2,0%	6,8%	12,3%	26,0%	3,6%
Wood-Paper-Printing	8,3%	16,0%	19,5%	35,0%	13,6%
Coal and oil	0,3%	0,4%	0,5%	0,3%	0,4%
Chemicals-Pharmaceuticals	6,5%	6,5%	5,0%	3,0%	6,2%
Rubber and Plastics	5,8%	5,0%	5,0%	3,6%	6,4%
Non-ferrous minerals	3,3%	6,7%	5,4%	7,0%	4,0%
Metals	3,8%	3,4%	3,5%	1,3%	3,0%
Mechanical goods	11,6%	13,6%	13,7%	12,3%	11,7%
ICT	4,5%	1,7%	3,1%	1,2%	5,0%
Electrical equipment	7,2%	3,7%	4,5%	2,8%	3,7%
Other machinery and equipment	15,3%	5,4%	12,7%	3,1%	7,7%
Motor Vehicles	10,8%	6,9%	4,4%	4,4%	5,6%
Other Transportation equipment	1,9%	2,3%	2,5%	0,6%	5,7%
Other manufacturing products	5,3%	5,9%	6,5%	6,6%	6,1%

Table 2. Sector distribution of yearly manhours for some EU Countries (2010)

	Germany	Spain	Italy	Portugal	UK
Manufacturing industry	44,6	32,3	36,5	14,9	37,1
Food-Beverage-Tobacco	28,2	32,5	40,4	15,0	40,4
Textile-Clothing-Leather-Shoes	31,8	19,7	26,8	7,7	22,4
Wood-Paper-Printing	35,9	28,3	31,0	19,5	26,3
Coal and oil	178,3	150,1	67,7	159,0	159,4
Chemicals-Pharmaceuticals	78,4	53,5	63,7	31,4	81,0
Rubber and Plastics	37,1	32,8	35,7	20,7	27,7
Non-ferrous minerals	39,0	30,9	34,0	17,5	27,2
Metals	45,7	43,5	41,3	21,2	34,6
Mechanical goods	35,6	25,3	32,2	13,5	25,6
ICT	50,4	33,9	41,3	21,3	46,9
Electrical equipment	50,0	37,2	39,7	24,5	30,6
Other machinery and equipment	44,8	33,4	39,5	16,3	40,2
Motor Vehicles	60,5	35,7	42,2	20,2	45,7
Other Transportation equipment	49,1	45,8	39,3	9,8	37,0
Other manufacturing products	35,1	20,4	27,3	9,7	27,5

Table 3. Labour productivity for some EU Countries (2010)

But the comparison of these sectors among these Countries in terms of labor productivity is not favourable to Italy, Portugal, Spain, as shown in Table 3: for these Countries there is a gap, in some cases very high, relative to Germany.

The comparison with the average global value of labor productivity shows a remarkably improved position of Italy for both sectors and of Spain for the furniture sector, while there is a significant gap for both sectors in Portugal.

Traditionally the competitiveness of these sectors has been based on design, creativity, quality, which made many firms very successful all over the world.

Now the competitive landscape is radically changing: firms from newly industrialized Countries (first of all, China) are eroding the market position of the firms of our three Countries, that manufacture mass or low performance products (low price, low quality).

More than this, customers in industrialized Countries are also changing their consumption patterns: they have more sophisticated needs (e.g. for health and well-being), they require services together with goods and a large variety of options (towards self design), they make their choices on the basis of cultural and emotional aspects and new values (sustainability). Also the demography of consumers is changing, with an increasing share of long (and healthy) living people.

So if these industries are to go on existing in our Countries, they have to innovate their strategies and business model, by following the paradigm of Competitive Sustainable Manufacturing.

The main pillars of these strategies can be:

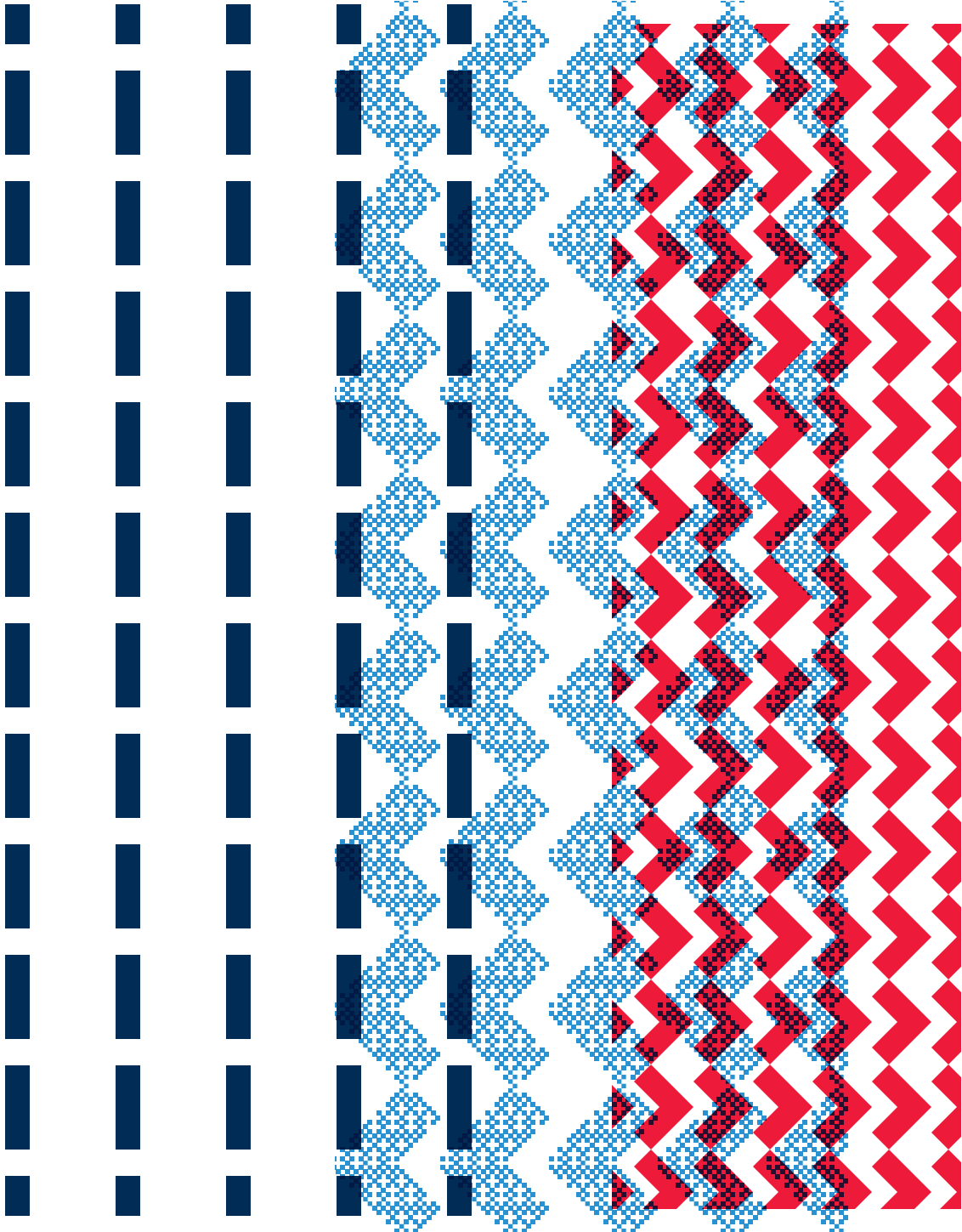
- *Creativity and design based innovation integrated with technological innovation*
- New ideas/designs conceived by creative talents and skills inside, but also, at a large, outside the firm should be turned into high performing products by using advanced technologies (e.g. biobased renewable materials, ICT for smartness, etc)
- *Social and user-oriented/driven innovation*
- Advanced ICT and web based services are used for interacting with customers (e.g. user communities) and for enabling customers to influence the design and manufacturing process (e.g. co-design);
- *Eco-innovation*
- By using new materials and manufacturing technologies products with high environmental features (from design to recycle / disposal) are produced;
- *Adaptive, adjustable, networked, digitalized manufacturing*



By using advanced ICT based manufacturing systems production on demand or in small batches for special needs can be realized, so satisfying the customers' fragmented demand. More than this it will be possible to implement rapid product design and to launch it on the global market, by means of a global networked production, supply, marketing and distribution chain.

The implementation of these strategies require a new entrepreneurial approach to doing business in these industries, quite different from the traditional one.

New multidisciplinary professional skills are required for the personnel of the firms, so enabling them to understand and to master the interfaces between design, materials, processes, ICTs.





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