



## Present and Future of EU Furniture Sector

Lead  
Partner

José Teixeira  
[jose.teixeira@cm-pacosdeferreira.pt](mailto:jose.teixeira@cm-pacosdeferreira.pt)

Lead  
Expert

Miguel Sousa  
[Miguel.sousa@inovamais.pt](mailto:Miguel.sousa@inovamais.pt)

<http://urbact.eu/en/projects/urban-renewal/wood-footprint/homepage/>

## Context

This case study intends to study why the European Union (EU) furniture industry is in decline yet foreign furniture imports are growing in an expanding EU market. The problem was addressed during the Wood FootPrint Local Support Group (LSG) meetings and it reflects the thoughts and know-how of furniture business owners from the following cities, Paços de Ferreira (PT), Monaghan (IR), Yecla (SP), High Wycombe (UK) and Tartu (EE).

The methodology to trigger the discussion was based on a set of questions that the LSG leaders launch to the discussion.

- Is it the lack of investment in technology that has brought this demise or is it the effect of the change in customer expectations?
- The European designers are losing influence in setting up the sector tendencies?
- Costs are the main driver for retailers take decisions about the furniture that they would like to sell?

The goal is to understand why Europe made a shift in other traditional sectors such as textiles, shoes, motorcar, but it seems powerless to apply similar measures to the furniture industry. Could lessons be learnt from this?

The five cities engaged in this study have a long tradition in the furniture sector. Paços de Ferreira is known as the Portuguese Furniture Capital, Yecla is known by the large number of furniture manufactures in the region, there are almost 500 companies dedicated to the manufacture of furniture and upholstery. High Wycombe was known as the chair making capital of England. The famous chair arches were constructed in High Wycombe in 1880 for the visit of the Prince of Wales and in 2000 for the Millennium celebrations to represent its proud traditions. Monaghan and Tartu in the nineties were the leading cities in their countries in the furniture sector.



The decline of the furniture sales in EU is not a local or a country problem. The EU furniture industry has been in decline since 2000, but the sales have grown significantly due to foreign imports.

As mentioned by the UK LSG members, *“not only is imported furniture cheaper than UK equivalents it is often more innovative. Many UK furniture retailers are now having their designs manufactured in countries like China at a fraction of the cost the same items could be manufactured in the UK”*.

## The role of Technology

### Academic Approach

In the paper entitled ‘Upgrading Strategies in Global Furniture Value Chains’ for the United Nations Industrial Development Organisation (UNIDO) Professor Kaplinsky, from the Open University, lists six key changes in technology that are affecting the furniture industry.

1. ‘Computer-numerically-controlled (CNC) woodworking machinery enhances productivity, reduces waste, improves time-to-market and facilitates modular production of non-standardized items.
2. Computer-aided design and manufacturing (CAD and CAM) allow designs to be fed to manufacturing firms anywhere in the world, giving significant improvements in quality and productivity.
3. The introduction of flat-pack or RTA (ready-to-assemble) furniture led to an important change in furniture production methods. RTA-designed furniture, with standard shapes and sizes and high volume demand, allowed factories to take advantage of design-for-manufacturing processes. It also dramatically cut the cost of shipping bulky products.
4. The development of flat-pack furniture was critically dependent on advances in material technology, such as MDF (multi-density fibreboard), which, in addition to using offcuts and waste, allows the optimal use of forestry products.
5. Flexible manufacturing systems (FMS) and cellular plant layout improve the flow of furniture parts through the plant, enhancing flexibility and quality, and reducing inventories and costs.
6. Made-to-order and just-in-time distribution systems reduce inventory levels of raw material inputs and finished items.

In no branch of manufacturing does the application of labour-saving machinery produce, by simple means, more important results than in the working of wood.

– Joseph Whitworth

This summary outlines the technology changes that are taking place in the furniture industry. It shows that it is not just the investment in computer technology; there also has to be investment in modifying product design, material choice, factory layout and the type of service provided to the customer.



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Kaplinsky rates the furniture industries in many of the leading countries in the world against the criteria. He finds that some sectors of the EU furniture industry had performed well in product and process upgrading but, equally, nearly half of the sectors had not. He criticised the UEU for its poor export performance. The stellar performers in the EU were Poland and the Czech Republic and, in the rest of the world, were Brazil, China, and Slovakia.

**Working with the LSG**

The LSGs put in practice the six criteria for technology change and collect evidences about the technology role in the furniture sector.

**1. Computer-numerically-controlled (CNC)**

Over the last 25 years, there has been a move from basic Numerically Controlled (NC) machines to sophisticated Computer Numerically Controlled (CNC) machines in the automation of repetitive manufacturing operations. In some advanced cases, manufacturers have incorporated computer controlled robotics and materials handling in the machining and assembly processes. Computer controlled machines can come in many forms. In the furniture industry, there are many different types of CNC machines in operation - spindle routers, edge banders, turning centres, robot welders, sanders, material handling centres and packing systems.

Ercol (UK) ([www.ercol.com](http://www.ercol.com)) has been using numerically controlled machines for nearly 25 years, but it is only in the last 10 years that its designers started to use CNC machines. Ercol has virtually eliminated manual component machining process with the introduction of a variety of CNC machines. As Vicky Tadros from Ercol explained, ‘We took the opportunity of investing in modern equipment when we moved to our new factory in Princes Risborough in 2002. We increased the number of CNC machines and changed our production processes.’ Ercol uses CNC machines to produce most of its furniture components, when they go into stock ready for final assembly, finishing and upholstery all of which are still manual tasks. Significant savings in manual labour have been achieved with its CNC machines but it still bears the cost of manual labour for the assembly and final finishing processes.

**2. Computer-aided design and manufacturing (CAD and CAM)**

All of the furniture factories represented in the LSGs use some form of Computer Aided Design. Some have been using the technology for nearly 15 years, others are only recently coming to terms with it. One of the driving forces behind the take-up of CAD by the larger companies has been the move to numerically controlled machines. The other has been customers, like Architects and Interior Designers, who use AutoCAD and prefer to send their designs in a digital format to the furniture makers rather than drawings.

Production engineers have moved from the direct programming of NC machines to Computer Aided Manufacturing (CAM) software for the programming of CNC machines. Associated with that trend, designers have gradually moved from the drawing board to Computer Aided Design (CAD) software, for the design of manufactured items, which enables a digital output of the design to be used by the CAM software.



### 3. RTA (ready-to-assemble)

Storing and shipping furniture is an enormous problem for furniture manufacturers and retailers. Furniture makers have been encouraged by retailers to make knockdown (KD) or ready-to-assemble (RTA) furniture that can be assembled by the retailer or the customer. The famous Thonet No 14 bistro chair designed by Michael Thonet and introduced in 1859 was an early KD design. This was a major move away from tradition fully assembled furniture and led to innovation in design methods – especially in the contract furniture industry where components are shipped in bulk. The modern development of this for the retail consumer is flat-pack furniture (FP), which takes some of the skill out of furniture manufacture by getting the customer to assemble the furniture. It also enables the flat-packs to be transported and stored more cheaply. Today flatpack furniture using flat panels and home self-assembly is the typical product from the Swedish company IKEA, one of the largest UK furniture retailers.

LBS (PT) (<http://www.lbsmobiliario.com>) new range of furniture is designed for flat-pack distribution and retailer assembly factory. Historically LBS had made traditional fully assembled furniture, but they created a modular range of furniture ideally suited CNC manufacture and flat-pack distribution. LBS modular furniture is more expensive than IKEA's and is often assembled on site by the retailer. Key to LBS flat-pack modular design were several patented components that allowed the furniture to be easily assembled whilst providing strength and aesthetic design. In order to obtain the economies of production associated with this type of product, LBS invested in a sophisticated packing machine that took the finished components and automatically packed and boxed them according to their specified size.

### 4. Material Technology

Most of the furniture makers use plywood and veneered MDF for cabinet structures and table tops. Hands of High Wycombe still specialise in elaborate hand-cut veneers for its executive and boardroom tables and desks. IKEA has used Melamine Faced Chipboard (MFC) extensively in its range of flat-pack furniture. It uses both plain white MFC as well as patterned MFC panels, which are printed to look-like wood-veneers. IKEA traditionally uses panel fixings, which are obtrusive. Burgess (UK) (<http://www.burgessfurniture.com>) has made extensive use of aluminium and steel sections for its chair frames and collapsible tables. Its new range of chairs uses plastic moulded chairs that use a softer plastic to provide lumbar support and comfortable seats. Cutting Edge has taken the use of modern materials even further and has fabricated Corian and other man-made materials into signs, logos and furniture. Most of the factories in the 5 cities use composite flat panels, but they rarely use modern materials. None of the traditional makers could handle plastic moulding – when required this work was sub-contracted to specialists. Most of the furniture makers visited are tooled-up to use wood-based materials and have not invested in machinery for modern man-made materials.

Developments in wood technology have produced more stable materials in the form of flat panels. The early developments in plywood transformed cabinet making. Developments that are more recent have been flat panels made from wood fibre – Medium Density Fibreboard (MDF), used for cabinet carcasses; and from wood chips with a hard surface Melamine Faced Chipboard (MFC) used for cabinet doors. Flat panels are also often supplied veneered with high quality wood veneers or in some cases inexpensive laminates or paper. Some panels have been designed to be wrapped around curves but usually in one plane only.



## 5. Flexible Manufacturing Techniques

The layout of the factory is also very important to get the correct flow of materials and components to the production route. Often traditional craft-based factories are not ideally suited to the demands of efficient material flows.

## 6. Made-to-order and just-in-time

Traditionally the larger manufacturers in the furniture industry used batch production techniques. This technology required quite large stocks of components to act as a buffer for fluctuations in customer demand. Modern production methods have developed from the Kanban system of visual production control, developed for Toyota, to the latest 'Just-in-time' (JIT) or 'Lean' technology, which is used extensively in the motor industry. These systems minimize buffer stocks, reduce storage space and improve product flows, but they can also handle sophisticated made-to-order techniques.

There are examples in the five cities of new factories designed around modern production methods, with ample space on a single floor level. In Yecla, companies such as Muebles Nogal [www.nogalyecla.com](http://www.nogalyecla.com), has divided its factory floor into sections. The first section is for the machining of the components, which then go into a buffer stock located in the second section. The components are then drawn from stock, assembled and finished in the third section. The fourth section is for storage of the finished products. However, the majority of the manufactures was still operating in their original premises and was unable to justify the relocation to new factories. Only two of the larger manufacturers had been able to redesign their factories for modern production techniques. They had improved production efficiencies and reduced buffer stocks.

The larger factories all had some form of production control, but only a small number had tackled 'Lean' production management. There are some examples of SMEs that are using these techniques in a very efficient manner such as Tarmeko <http://www.tarmeko.ee>.

### The Learning

The six headings for technology change outlined by Kaplinsky have enabled a balanced review to be undertaken of the state of the furniture industry. It has showed up deficiencies in the companies visited and highlighted the gains to be made from investment in technology. The outcomes of the LSGs work shows that to get the benefits of modern technology it is not just an investment in CNC machines or computers; there has to be a holistic investment in product design, materials, processes as well as manufacturing techniques. Only one furniture company visited, LBS (PT) (<http://www.lbsmobiliario.com>), had implemented all six recommendations and it was reflected in its significant growth in sales in a depressed market. However, technology change was not the only reason for company's growth. The key catalyst for change was the product range. When the product range can be adapted for modern technology as well as satisfy the needs of customers, then the benefits of technology change can be realised. Not all products can be made with CNC machinery or supplied in a flat pack. It



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is only by the elimination in manual processes that costs can be reduced to more effectively compete with imports from countries that compete based on lower salaries.

## The Future

The future of the furniture sector in Europe depends on 3 aspects, design, materials and commercialization channels. In the 19th and early 20th centuries, tastes for fine furniture brought prominence to makers who made full use of the crafts of veneering, carving, and inlays. But these craft skills have almost disappeared, as the bulk of wooden furniture made today rarely requires any of these handcrafted embellishments. Modern tastes have changed through the influence of new designers and although some traditional reproduction furniture is still being made by boutique makers, the most popular crafted designs are contemporary and without embellishment. Companies like IKEA have changed peoples taste in modern furniture. IKEA has promoted a contemporary Scandinavian style based on flat panels and simple to assemble designs. Its furniture is sold in its own shops worldwide and manufactured by independents in many different countries. The key requirement of its manufacture is CNC machine capacity not skilled crafts. More expensive fully assembled furniture is still built and finished using traditional manual techniques but the cost of labour affects its price.

The scope for new designs in furniture is endless and fuelled by advances in materials, machines and technology. No longer are designers constrained by making furniture out of solid wood. From the factory visits made during the Wood FootPrint transnational meetings, we have seen how composite panels made from wood by-products, (plywood, MDF and MFC) have simplified cabinetmaking and tabletop design. The use of these materials is not limited to low cost furniture. But furniture manufactured by CNC's is not only restricted to flat panels and right angle joints. The use of CAD in design also enables complex shapes to be developed that can be easily manufactured using CNC technology. Curved furniture is being manufactured using CNC technology by several of the furniture makers visited. With the increase in the moulding of furniture from foam, plastics and fibreglass, it is CAD that has enabled complex moulds to be designed on a computer.

Almost any modern piece of furniture can be made using modern technology if it is designed accordingly. The chair that caused a stir recently is the Branca chair designed by Sam Hecht. It won the Brit Insurance design Award in 2011; it is manufactured and assembled using CNC machinery. The chair breaks away from traditional chair design with its rounded stick-like structure. Nothing like it has been previously made using CNC technology. In the video about its design and manufacture, posted on Vimeo, it is mesmerising to watch the robotic arms of the 8 head 5-Axis CNC spindle moulder dance around the components being formed. It is also interesting to see how manual operations (such as sanding and shaping) are still required in the modern Mattiazzi factory in Italy. There are many independent designers working with furniture manufacturers. These designers often pride themselves on their ability to design



furniture remotely that can be sent in an electronic format to the furniture maker, anywhere in the world. The design can be put into production immediately without physical contact between the designer and the manufacturer.

As Ronen Kadushin, the Israeli designer said about his Twirl lounge chair, ‘What is important to me is the fact that my design was sent as an email for direct manufacturing – no tooling, no moulds and in the end, there’s a complete product that is repeatable and modifiable.’ His Twirl lounge chair was cut from a block of 4 glued layers of polyurethane foam. The chair was designed using CAD software.

It can be seen that an increasingly wide variety of furniture can be made using modern technology and materials. Designs are no longer restricted to flat panels and right-angled joints. Furniture makers are not now limited by the skills of their designers. Furniture makers can commission independent and talented designers.

## Wood FootPrint

The “Present and future of EU furniture sector” case study is based on visits to Wood FootPrint Local Support Group members from 5 countries (PT, SP, UK, IR and EE). In undertaking this case study, it soon became obvious that the companies visited were all survivors of a massive consolidation in the furniture industry brought about in the last 20 years. Perhaps they had survived because they had adapted in some way. But in fact, few had invested in redesigning their product ranges to take advantage of modern manufacturing technology. However, the ones that had could show significant benefits from the investment, in terms of lower production costs and flexibility of design opportunities, resulting in strong order books.

The research shows the inroads that foreign imports are making to the EU furniture market, which is still strong. These imports are a reflection of the low costs of production in third-world countries due to their low wages. A large section of the worldwide furniture industry is still dependent on craft skills to manufacture and build furniture. The exception to this rule is the growth of flat-pack technology that can be manufactured using modern CNC equipment, which eliminates the need for craftsmen to build the furniture.

This case study provides important inputs for the 5 thematic groups that are being worked out in Wood FootPrint project, in particular for TG 4: Diversification, by highlighting the role of technology in increasing the global competitiveness of the European furniture sector.

