Small and Medium Sized Wood Businesses – Opportunities and Challenges for a Sustainable and Regional Development

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Abstract – The paper reports on the challenges and opportunities for small wood businesses and crafts for a sustainable and regional development. Besides large industrial entities small businesses and crafts can not only survive in niche markets, but in certain areas of carpentry, joinery and cabinet making, they even fulfil a key role within the wood manufacturing sector. Modern CNC technology and machining concepts make it possible for small businesses to be very flexible and cost-competitive in their production. The concept of wood cluster structures supports small businesses to build up a network for production and services to the customer and to large industries in order to become an important part within the whole wood processing chain.

Keywords: CNC-production / wood crafts / wood cluster

1. INTRODUCTION

Forest based industries cover a huge range of businesses and enterprises from primary and secondary wood processing, wood based panels, pulp and paper industries, wood energy plants to the manufacturing of wood components, furniture, other final products, wooden constructions and buildings. As shown by Teischinger (2009) the whole forest-based sector is one of the most important industrial sectors in the EU following the food/beverage and automotive sector. The whole array of the sector’s enterprises derives from two main professional sources: craftsmanship and foundation of modern industrial plants.

Pulp and paper industries and modern wood based panel industries rather developed from industrial foundations whereas sawmilling, furniture production, wood components production (flooring, windows, doors etc.) and timber construction businesses derived from crafts and still today keep their roots in craftsmanship. It can be further shown that enterprises in the forest based sector are frequently situated in remote areas and contribute to a rural structure of villages and smaller cities by providing different jobs for skilled labourers, middle management, technicians and engineers and owners of crafts, small and medium sized enterprises.

In some areas of the wood business we can see both systems in a successful co-existence (carpentry, furniture) whereas in other branches (e.g. sawmilling) small sawmills have been reduced to a pure niche-market. Considering that most of wood and wood-based products are bound for the building sector in general, which includes construction (carpentry), joinery and indoor design (windows, doors, flooring, wall cladding) and furniture (cabinet maker), refurbishing more and more becomes a big issue (Achleitner 2011) and a big business for specialized crafts and firms (fig. 1). What are the reasons for the current development and what future development can be expected?
The current paper focuses on modern and innovative crafts and small and medium sized enterprises in the wood businesses with respect to regional aspects, covering challenges and opportunities.

2. CRAFTS VERSUS INDUSTRIES – A REVIEW

Nowadays economic issues and economic policy is strongly related to industrial production, the energy sector and to services (comprising the whole tertiary sector). The importance of crafts within the production sector is quite often neglected. Regarding the employment (expressed as full-time equivalent of self-employed and employed persons) in Austria one can summarize as follows (Teischinger et al. 2009):

- Full-time equivalent forestry (primary sector) 18 400
- Full-time equivalent wood industries 30 422
- Full-time equivalent wood crafts (joinery, carpentry etc.) appr. 80 000

These numbers show the importance of the various wood-based crafts within the Austrian forest-based sector.

Quite often there is a discussion on industrial production versus craftsmanship and this discussion is carried on issues such as wood industries associations, standardization, economic policy and regulations etc. On an intellectual level a thorough discussion on the importance of crafts in the wood business is given in a special issue of the pro:Holz series “zuschnitt”, issue 26 (Anon. 2007), where many aspects of crafts are discussed in detail (fig. 2).
It is shown that in the public opinion crafts are frequently seen as a synonym for tradition, nostalgia or local service. In an essay Christine Ax (2007) discusses the crafts from different points of view. As an expert on crafts she develops a philosophy of crafts such as: “… a sustainable economy needs crafts, needs regional and efficient energy supply, … society needs a “better” rather than a “more” … Would crafts be on the stock market I would suggest to keep these stocks, as a stock prize gain can be expected”. Ax emphasises the strong interaction of the customer and the craftsman as one of the main features of craftsmanship. New technologies such as information technology (IT) and computer controlled manufacturing could definitely support this interaction in the future.

3. CHANGES IN THE STRUCTURE OF THE WOOD PROCESSING SECTOR

Due to the rising costs for labour, mechanization and automatization of manufacturing was also a crucial point during the 1970s and 1980s in the wood industries. The introduction of the CNC-Techniques (Computerized Numerical Control) in wood machining, in the early 1980s for furniture manufacturing and late 1980s for carpentry joining, was a chance for a flexible and individual manufacturing method with reasonable low production costs for small and medium sized enterprises, too. This was a turning point in modern manufacturing from industrial mass production to a more flexible productions based on individual orders.

In modern CNC systems, computer-aided design (CAD) and computer-aided manufacturing (CAM) programs are combined. Two different systems can be distinguished: stationary processing and put-through processing. The various programs produce a computer file that is interpreted to extract the commands needed to operate a particular machine via a postprocessor, and then loaded into the CNC machines for production. Since any particular component to be produced might require the use of a number of different tools such as drills, saws, etc., modern machines often combine multiple tools into a single machining centre. This enables the machining of components for furniture, windows, doors, stairs, building component in one single machine (Fig. 3).

![Figure 3. Various structural wood members, specifically machined after a structural design (Source: Hundegger Maschinenbau)](image)

As the introduction of the CNC techniques was an essential innovation step in wood industries and crafts as well, it was a very important development for crafts to become efficient, cost-competitive and flexible in their businesses. Geise (2000) thoroughly the
discusses advantages of CNC techniques in joinery crafts such as cost-efficient production, precision, reproducibility etc. In specific wood machining journals examples and best practice reports on applications of CNC techniques in crafts are presented (e.g. HOB Die Holzbearbeitung) (Bucki 2011).

Specific CAD/CAM software solutions are already available (Anon. 2009) and they still have to be further developed, for product and production planning and cost accounting calculation as well, which is specifically applicable in small crafts and enterprises. In joinery and cabinet making CAD/CAM solutions are already well established in large manufacturing entities and small businesses as well (fig. 4).

![Figure 4. CAC/CAM feature in cabinet making comprising 3D/CAD drawing from the first sketch and planning to photorealistic presentation and integration into CNC-manufacturing and assembling to the final product and cost accounting as well (source HOMAG eSolutions)](image)

4. CLUSTER INITIATIVES AS A STIMULATING NETWORK OF SMALL AND MEDIUM ENTERPRISES (SME)

Clusters make it possible for small and medium-size businesses (including crafts) to work together both with each other and with large companies e.g. in a subdelivery and service system. Cooperation with institutions of research and education is stimulated, too. The concept of an economic cluster refers to any number of companies situated in geographical vicinity to one another and whose activities complement each other along a certain value chain, or are related to one another and form a network. The active participation in a cluster yields synergy effects resulting from geographic and thematic proximity. The competitiveness of an individual company can be enhanced by its access to the know-how of other companies and new and shared markets can be entered. Improvements in product, product development and processes can be carried out jointly and mutually beneficial qualification measures can be implemented.

Cluster members often exploit shared communication platforms for example to establish international contacts in order to open up new distribution channels abroad, of for joint promotional campaigns. By cross-linking within clusters, frequently there is an easier access to funding opportunities for innovative business plans and other developments. In Austria various clusters in different economic branches have been established in the last years, mostly supported by the local governments. A very detailed analysis of the economic impacts of the various clusters in the province of Lower Austria is given by Berrer et al. (2011), which revealed a mostly positive impact of the cluster initiative on the cluster partners involved.

What are the benefits of such a system of small and medium sized industries?

One of the main advantages could be named by the term “smart grid of production”, where many actors are participating in a network instead of a large-scale enterprise (which sometimes becomes trust-like). The smart grid of partners may also be distributed over a
certain region (cluster), even in remote areas, and is not concentrated in urban and suburban areas (because of specific infrastructure and human resources etc.). Many of the small businesses can further exist as free and independent firms which also has a societal effect within a specific region.

In Austria the establishment of so-called wood clusters was a big support of this development, which had the target to cluster small and medium enterprises even within bigger industrial compounds and/or to cluster small enterprises into a general supplier (e.g. by linking different crafts). A lot of pre-justice had to be overcome, but many of these clusters have become very successful in supporting the various cluster members. Such wood clusters, mainly focused on a specific province, are:

- Holzcluster Steiermark (Styrian Wood Cluster): http://www.holzcluster-steiermark.at/
- Möbel- und Holzbaclusters Oberösterreich (Furniture und Wood Construction Cluster Upper Austria) http://www.m-h-c.at/
- HTT15 Holzbauteam Tirol (Timber construction team Tirol): http://www.htt15.at/
- Holzcluster Salzburg (Wood Cluster Salzburg): http://www.holzcluster.at/de/

Each of these clusters has a slightly different scope and different topics due to the regional situation and structure of the wood industries, the market situation etc. As one of the big disadvantages can be seen in the very strong commitment to a specific region (via support of the local government) and there is only a very weak overall network of the various wood clusters.

5. CHALLENGES AND OPPORTUNITIES IN THE FUTURE

The future challenges can be summarized by the issue of the further development of adequate technologies (machines, equipment, services etc.) for smaller production entities, the initiation and strategic and financial support for a specific research, development and innovation including product design and marketing concepts.

New chances and opportunities for wood products (including services) for crafts and small and regional acting enterprises can be seen in the following markets and developments:

5.1. Homing

There are many reasons for a new wave of “homing” such as insecurity, stress, changes which lead to security, cosiness, new aims in life etc. This results in the demand on green materials, cooconing, wellness in private homes, but also retro design using old materials, refurbishing old furniture and buildings, handmade products etc. – a huge opportunity for crafts.

An aging society with related changes in society develops different consumer demands concerning home and living (Schwarzbauer 2008). Specific demands such as high-end furniture, direct contact and service, helpdesk services etc. are supporting small and regional structures, too. One has to emphasize that there are many other trends in our society such as “sociotainment”, simplicity, “optionism”, self-staging etc.

“Homing” and privacy support the use of bio-based materials such as wood but also comprises high-tech solutions, retro and modern smart materials as well. This can be seen as challenge and opportunity for tailored wood solutions. The direct and personal contact and service from crafts, for instance, is reflects by the current public relation campaign “Ihr Tischler macht´s persönlich (your joinery at your service) (fig 5).
5.2. Customization

More and more customers demand an individual design and customization of the products (e.g. concerning furniture, indoor design, architecture etc.) but at reasonable prizes. Modern IT-based manufacturing enables customization concepts in wood businesses, too, as shown in Fig. 6.

Customization processes may support an individual production such as by crafts but they may also be seen as industrial mass customization, where industrial production becomes very flexible and responds to the individual demand of the customer. One example of mass customization in wood industries has been elaborated by Gronalt et al. (2006) and Teischinger et al. (2007) addressing an individual parquet floor design (Fig. 7).

5.3. New materials and technologies

Most of the final products such as furniture, doors/windows, floors, claddings etc. basically consist of a body built up with the substrate wood and/or wood-based materials and a surface which has aesthetic and protective features. Therefore the substrate material performance and the development of the materials and surface solutions are of great importance as well.
In many fields within the wood sector solid wood was and still is the main material to be used. The emergence of wood based materials such as plywood, fibre board, particle board led to a dramatic change in wood manufacturing and product design. Currently the wood-based material sector shows rapid developments such as light-weight approaches (Müller et al. 2011) and Engineered Wood products (EWP) which open the door to new manufacturing systems, to new product design and architecture. The development of wood as a building material (e.g. glued structures, engineered products etc.) can be pursued in the pro:Holz series “zuschchnitt” (http://www.proholz.at/zuschchnitt/ausgaben/). Since the year 2001 the various issues of “zuschchnitt” have pursued the technological development and create new design approaches with wood and wood-based materials.

Despite of the tradition and the natural origin, wood and wood based materials pass through an enormous innovation process, which includes traditional solid wood, too. A lot of information about new wood-based materials available, but “zuschchnitt” has a certain focus on the philosophy on the use of wood and innovative wood products in architecture and design. The discussion includes issues of industry and crafts, regional uses and global markets as well.

New surface solutions for wood and wood-based materials are a huge area of research and development. Current innovation processes in the field of nano-structured surface solutions are addressed by Rössler (2005) and the current developments in surface technology can best be followed up in technology transfer publications such as the “Surface”-Edition of the annually edited supplements of Holz-Zentralblatt (DRW-Verlag Weinbrenner).

5.4. Knowledge-based society and mastery

Our society has undergone various changes and transitions from an agricultural economy (pre-Industrial Age, largely the agrarian sector) to industrial economy (with the Industrial Age, largely the manufacturing sector) to post-industrial/mass production economy (mid-1900s, largely the service sector) to knowledge economy (late 1900s – 2000s, largely the technology/human capital sector). This stage has been marked by the upheavals in technological innovations and the globally competitive need for innovation with new products and processes that develop from the research and development community. In the current so-called global knowledge-based economy, the specialized labour force is characterized as computer literate and well-trained in handling data, developing algorithms and simulated models, and innovating on processes and systems.

But we also have to consider, that global economies have to be connected locally with linked industries, manufacturers and other entities that are related by skills, technologies, and other common inputs. Hence, knowledge is the catalyst and connective tissue in modern economies, skills and local mastery still are important items for the welfare of a society. Ax (2009) suggests a society of skills beside the knowledge-based society in order to contribute to the cultural heritage of Europe and a new approach to an economy of personal freedom as well. According to Ax (2009) the “economy of skills” can be seen as a new and smart attempt in order to escape the current global performance society which increasingly becomes a threat to the environment, resources and societal stability. Regionality and craftsmanship are the main features of such an economy of skills. Wood and wood-based crafts – covering a wide array of societal demands (concerning building and living) - can be seen as an important role model for these new thoughts.

New developments in wood machining and IT-solutions for crafts and small businesses are part of international wood machining fairs, such as the LIGNA Hannover (Schneider et al. 2011). Modern crafts are even important enough in order to organize a specific European trade fair for machine technology, equipment and supplies for wood crafts (fig. 8).
6. SUMMARY

Wood industries comprise a huge array of process chains and different enterprises. Wood manufacturing in the field of construction components, indoor design and furniture is a major part of this industrial sector. Some parts of this sector such as sawmilling and wood-based panels industries are mainly large scaled industries (but mostly situated in rural areas), whereas timber construction businesses, joinery products and furniture manufacturing can be on an industrial scale and crafts as well. It can be shown that crafts in the wood business face challenges and opportunities in the future as they comprise many features such as direct contact to the customer, regional presence (including short transport distances). New technologies in manufacturing (CNC machining) and IT-solutions, regional economic clusters support smaller production entities to be competitive in certain market sectors in relation to bigger industrial production units.

Besides appropriate techniques (machines, infrastructure, IT-solutions) economic clusters and other initiatives are means in order to support regional manufacturing structures and the development of crafts.

One can close and summarize with some thoughts from Kentzler (2011) who sees modern crafts as an import driver of innovation, but important innovations in the past have been performed by craftsman also. The regional activities and the focus on crafts is not an antithesis to globalisation but a key for the solution of many global challenges. Crafts are anchored in the region and therefore represent a stable and sustainable development with strong impacts on a regional community.

References


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