Sustainable Practices in Furniture Design: Can Green Practices Influence Competitiveness?  
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Introduction
Furniture represents a significant component of hardwood utilization and production internationally, and sustainable design practices are becoming more widespread in response to increased consumer demand for green products. In this research, we consider ecosystem services - the benefits people derive from ecosystems - from a secondary wood products perspective. We review and synthesize the literature surrounding the design, use, and disposition of wood furniture and related products in global markets. An overarching theme is to consider how firm competitiveness can be influenced, or even enhanced, by green practices in design and associated communications with consumers.

Ecodesign vs. Traditional Design

Drivers of Sustainable Design
• Green manufacturing becoming increasingly important in effective marketing  
• Small firms can use sustainable design strategies to become globally competitive  
• Effective eco-design often requires commitment early in product design process  
• Role of designers can vary from firm to firm

Furniture Design - Vertical Supply Chain Considerations
• Standard-driven greening (design plays a key role)  
• Mentor-driven greening (relationships and interaction based)- environmental impact reduced due to flexibility and innovation  
• Retailers communicate environmental initiatives to consumers  
• Retail buyers use different cues that manufacturing personnel (supply chain challenges)

Marketing Sustainable Design – Green Communication
• European eco-labels for flooring and furniture  
• Eco-labels can increase consumer confidence  
• Effective eco-labels are simple-use fewer materials, have shorter supply chains, favor solid wood  
• Effective eco-labels should evoke an emotional connection with potential customers (Fig. 5)

Methods
• Reviewed literature regarding ecosystem services derived from furniture design and manufacture, focusing on the influence of design on product competitiveness  
• Included key terms green manufacturing, green supply chains, eco-design, sustainable materials, biomimicry, and eco-labeling  
• Literature search carried out using Google Scholar in early 2020  
• Other articles based on cross-referencing/author knowledge  
• International in scope, focused on recent publications (79 articles included)  
• Most papers based on research conducted in N. America, Europe, and Asia

Results and Discussion

Green Manufacturing and Supply Chains
• Product design can be an important enabler of sustainable supply chain mgmt.  
• Eco-design extends traditional design (Fig. 2)  
• Eco-design principles include: use of recycled materials -low energy consumption -reduced product weight -less waste during manufacture -greater use of reusable packaging -longer life-spans

Biomimicry in Furniture Design
• Often mimic plant structures (rather than animals or insects)  
• Furniture designs can include living organisms within the product (Fig. 4)  
• Contemporary designs often preferred to traditional designs  
• Driven by high level of innovative design, leading to low environmental footprints and aesthetic appeal  
• Wood and fabrics often the preferred materials  
• Biomimicry is still very much an evolving field for furniture design

Ecodesign (Floors & Furniture Example)

Conclusions
• Sustainable design can help competitiveness -well designed / emotionally appealing -longer lifespans can lead to greater environmental benefits  
• Designers can work directly with consumers (make-to-order)  
• Designers can help create computer programs for consumers to rapidly customize furniture  
• Sustainable design is most effective when companies commit early in product development  
• Sustainable design drivers can be market-based and/or regulation-based  
• Creativity and imagination is key to successful design of high value hardwoods

References
European Commission. EU Ecolabel. 2020. Available at: www.ecolabel.eu