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A Model for Operational Mass Customization Based Recent Studies in Furniture Manufacturing

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Introduction
The view among some experts that mass customization (MC) can improve the competitiveness of the US furniture industry (Bullard and West, 2002; Schuler and Buehlmann, 2003; Lihra, 2005), has implications for systemic changes in an industry that has traditionally pursued price-based competition. In this study, we examine the applicability of MC as a value-delivery strategy for furniture manufacturing, and model a framework for making its principles operational in that context. We propose an operational baseline for researchers and manufacturers exploring a link between MC and competitiveness in wood products manufacturing. This framework can be extended to other industries, given comparable manufacturing principles.

The apparent overlap between the market challenges currently confronting furniture manufacturers, and the historical development of furniture clusters in the United States informs our approach to this study. It is our considered opinion that significant lessons may be gleaned from a retrospective view of furniture manufacturing to guide the competitive strategies of contemporary manufacturers. Historically, competitiveness in US furniture manufacturing has been linked to geographic locations with lower-cost factors of production from the East Coast, through Ohio to Michigan (Ingerman, 1963; Cater, 2005). However, the pursuit of value-delivery and the necessary technology to create that value, enabled the furniture industry in Michigan to survive even though new manufacturing centers subsequently opened in North Carolina and Virginia (Sligh, 2005). To the extent that offshore production cost advantages exist the critical question, for which we draw historical parallels, is whether the increasing shift of operations offshore is based on long-term competitive strategy, or is a knee-jerk reaction to price-based competition.

Given the non-static business environment and the unfeasible prospect of US furniture manufacturers competing on price alone, it is imperative to proactively adjust the business model(s) of companies within the industry. Our objective is to examine the

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extent to which a value-delivery strategy is applicable to contemporary furniture manufacturing in the context of a comprehensive implementation framework.

Methods
1. For the purposes of delineating our scope we first provide a definition of MC based on previous research and available definitions (Pine, 1993; Alford et al, 2000; Mann and Domb, 2001; Anderson, 2003; Tseng and Piller, 2003): “the fulfillment of customized orders for defined segments of mass markets, at costs and lead times that communicate value rather than an associated penalty for personalization or order size”. Our definition captures the fundamental concept of offering products that better fit the needs of customers on a large scale, while accommodating the perspective of segmentation theory (Jiang, 2000) – the view that heterogeneous markets comprise a number of smaller homogeneous markets. This view tones down the assumption of perfect heterogeneity of customers, and enables the provider of customized products to pursue its objectives (profit maximization, brand image enhancement, etc.) by crafting a tactical response to the demands of the smallest viable market segments. In this way, we avoid the situation where customized furniture is sourced only for orders that are not time-sensitive, and by customers that can afford the characteristically high premiums. Implicit in our definition are the strategic deployment of technology, improved manufacturing processes, and cultural change mechanisms which make MC cost effective for a business.

2. We review lessons from MC studies in other industries (Pine and Pietrocin, 1993; Kubiak, 1993; Kotha, 1996; Duray, 2002; Fogliatto et al, 2003; Whitelock and Bardakci, 2005, Feitzinger and Lee, 1997) to examine how in operational terms, MC might be integrated into the business and practice of wooden furniture manufacturing. Market opportunities presented by increased customer choice constitutes a threat for manufacturers that are unwilling to change their processes, because the demand for product variants adds significantly to manufacturing costs by increasing stock keeping units (SKUs), increasing setups and reducing average production runs. Capacity utilization targets which are common in furniture manufacturing also result in excess finished goods inventory and force organizations into a ‘push mode’. There is little room for reactive organizations to improve their competitive positions in markets characterized by increased turbulence driven by globalization and advancing technology (Huber 1984, Skinner 1985, Jaikumar 1986). On the other hand, by adopting alternative business models, local manufacturers can improve their capacity to respond quickly to uncertainty in the marketplace (Zhang et al, 2002), and develop a combination of distinctive competencies that position them to use increased customer choice to an advantage. Thus, in the context of market volatility MC provides a strategic framework to develop sustainable competitive advantage.

3. Given a selected MC implementation mode we make a case for preceding the introduction of advanced manufacturing technology with fundamental transformations of the manufacturing system. Without preparatory process transformations, the level of complexity arising from the advanced manufacturing technology necessary to successfully implement and orchestrate MC would sharply increase internal costs to manufacturers. Mass customization gives significance, not only to transformations that
prepare the company to adopt technology-related capabilities, but to reengineering the entire manufacturing system. We propose an operational baseline in terms of a 3P Model (Figure 1) setting out the interdependencies between the elements of preparation, perception and processing that can facilitate a sustainable offer of customization in a market environment that reflects changing customer preferences and business pressures.

The core organizational characteristics that foster long-term competitive resilience based on this model are responsiveness to variable demands of customers, flexibility in the operations of the manufacturing system and across the supply chain, and ability to adapt to changes in the market environment. Thus, we demonstrate the non-trivial interaction of specific principles for making MC operational in a manufacturing context, and contribute to the discussion on bridging the gap between the strategic and operational considerations of MC (Åhlström and Westbrook, 1999).

Figure 1: Kodzi’s 3P Operational Baseline for Mass Customization

Conclusion
The 3P model provides a baseline to empirically explore the path to implementing MC successfully, and the associated link to competitiveness in wood products manufacturing. We advocate the use of defined possibilities of module combinations to assure product integrity for collaborative customization in a furniture manufacturing scenario. To the extent that outsourcing and offshore manufacturing strategically enhances the responsiveness of the furniture supply chain, rather than completely substitute domestic products, MC can help to retain local manufacturing profitably. As in the historical
analogies previously discussed, value-delivery is superior to price-based competition in a dynamic market.

References


Other references are included in the full paper. Contact authors at ekodzi@purdue.edu