Overview of mass customization for the wood products industry

Urs Buehlmann and Torsten Lihra
Overview

• The Future…
• Mass Customization (MC)
• Does MC pay off?
• Success Stories
• MC revisited
• Summary
The Future...
The Future...
The Future...
CHANGE!

- The Internet
- The long tail (niche markets)
- The green movement
- Globalization – WTO
- Containerized shipments
- Global capital investments
- Currency exchange and tax rates
MASS CUSTOMIZATION (MC)
Definition of MC

Mass Customization is the “fulfillment of customized orders at an industrial scale with competitive prices and competitive lead times.”

- ... customized orders
- ... industrial scale
- ... competitive prices
- ... competitive lead times

- customization, cost efficiency, short lead times
MC framework

Customer

Customer demand for mass customized products

Producer

Level of mass customization offered by producer

Factors

<table>
<thead>
<tr>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Time</td>
</tr>
<tr>
<td>Difficulty to communicate personalization</td>
</tr>
</tbody>
</table>
What is the single most important question to be asked to assess the benefits of mass customization?

**Does MC pay off?**

Only your client can give you the answer!
Consumer survey on MC in New England states

- Survey of 349 people in New England
- Consumer survey on the importance of 7 furniture customization types
  - Accessory choice: different kinds of handles
  - Color choice: 30 colors to choose from
  - Configuration choice: different product configurations possible
  - Dimension choice: overall product dimension can be freely chosen
  - Decoration service: free assistance to help for interior design
  - Adjustment: product may be adapted to future needs
  - Rent & Exchange: the product is rented and can be exchanged after 2 years
Consumer survey on MC in New England states

Results

<table>
<thead>
<tr>
<th>MC Type</th>
<th>Mean*</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colors</td>
<td>6.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Dimensions</td>
<td>5.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Accessories</td>
<td>5.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Configuration</td>
<td>4.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Adjustment</td>
<td>4.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Decoration</td>
<td>4.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Rent &amp; Exchange</td>
<td>2.7</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*On a scale 1 = Not important at all to 7 = Very important
Consumer survey on MC in New England states

Two groups within the respondents:

- Customization lovers
- Indifferent buyers
Consumer survey on MC in New England states

Customization lovers (n=200)

- Mostly women (65%)
- They particularly like color, accessory and dimension choice.
- Rent & Exchange is of little interest.
Consumer survey on MC in New England states

Indifferent buyers (n=149)

- These respondents are not interested in customization.
Furniture Customization – Delay – Price

What’s the value of MC compared to other product attributes?

• WEB survey of 1201 consumers all through the USA
• Focus on Boston, New York, Chicago, Houston, Los Angeles, Miami
Furniture Customization – Delay – Price

The following product attributes were considered:

• Product customization
• Time required by the consumer to customize the product
• Shipment delay
• Price
Furniture Customization – Delay – Price

Customization levels:

• No customization
• Accessories
• Accessories+Colors
• Accessories+Colors+Configuration
• Accessories+Colors+Configuration+Dimensions
Furniture Customization – Delay – Price

Customization time levels:

• None
• 15 minutes
• 30 minutes
• 60 minutes
• 90 minutes
Furniture Customization – Delay – Price

Shipment delay levels:
- None
- 1 week
- 6 weeks
- 12 weeks
Furniture Customization – Delay – Price

Shipment delay levels:

- Base price
- Base price + 5%
- Base price + 10%
- Base price + 20%
- Base price + 100%
Furniture Customization – Delay – Price

Conjoint Analysis
• Statistical method to assess the importance of product attributes on buying decisions.
• Widely used by consumer goods manufacturers to successfully introduce new products.
• Conjoint Analysis Software needs powerfull computers to be run.
Furniture Customization – Delay – Price

If you were to buy master bedroom furniture and if these were your only options, which would you choose?
Choose by clicking one of the buttons below:

- **No options**
  - No time to customize
  - No delivery time (carry home)
  - Base price

- **Accessory options**
  - 15 minutes customization time
  - 6 weeks delivery time
  - Base price + 10%

- **Accessory + Color + Configuration options**
  - 60 minutes customization time
  - 12 weeks delivery time
  - Twice the base price

- **Accessory + Color + Configuration + Dimension options**
  - 30 minutes customization time
  - 1 week delivery time
  - Base price + 5%

Definition of terms:

OPTIONS: the possibility to modify certain aspects of the product to better fill your needs.
ACCESSORY: you have a choice of different handles, hardware and other accessories that go along with the furniture item.
COLOR: you have a choice of 30 colors for the furniture items.
CONFIGURATION: you can configure the product. Examples: a dresser may have doors or drawers or open shelves; doors may be of glass or wood; you may have a choice of different legs.
DIMENSION: the overall dimensions (height, width, length) of the furniture items can be chosen to fit your space or body size.
CUSTOMIZATION TIME: time you have to spend in a store or at a computer to find out about product options and to customize the product.
DELIVERY TIME: time it takes to receive the product after ordering it.
PRICE: price to pay for the product (the base price is the lowest price offered to you).
## Furniture Customization – Delay – Price

### Relative attribute importance

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Mean (%)</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization</td>
<td>21.5</td>
<td>13.1</td>
</tr>
<tr>
<td>Customization time</td>
<td>9.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Shipment delay</td>
<td>22.1</td>
<td>12.6</td>
</tr>
<tr>
<td>Price</td>
<td>47.4</td>
<td>17.5</td>
</tr>
</tbody>
</table>
## Furniture Customization – Delay – Price

### Consumer preference simulations for different products

<table>
<thead>
<tr>
<th>Product 1</th>
<th>Product 2</th>
<th>Product 3</th>
<th>Product 4</th>
<th>Product 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>ACC</td>
<td>ACC+COU</td>
<td>ACC+COU+CONFIG</td>
<td>ACC+COU+CONFIG+DIM</td>
</tr>
<tr>
<td>None</td>
<td>15 minutes</td>
<td>30 minutes</td>
<td>60 minutes</td>
<td>90 minutes</td>
</tr>
<tr>
<td>None</td>
<td>1 week</td>
<td>6 weeks</td>
<td>12 weeks</td>
<td>12 weeks</td>
</tr>
<tr>
<td>Base</td>
<td>Base + 5%</td>
<td>Base + 10%</td>
<td>Base + 20%</td>
<td>Base + 100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>26.6%</strong></td>
<td><strong>43.6%</strong></td>
<td><strong>19.7%</strong></td>
<td><strong>3.2%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product 1</th>
<th>Product 2</th>
<th>Product 3</th>
<th>Product 4</th>
<th>Product 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>ACC</td>
<td>ACC+COU</td>
<td>ACC+COU+CONFIG</td>
<td>ACC+COU+CONFIG+DIM</td>
</tr>
<tr>
<td>None</td>
<td>15 minutes</td>
<td>15 minutes</td>
<td>60 minutes</td>
<td>60 minutes</td>
</tr>
<tr>
<td>None</td>
<td>1 week</td>
<td>1 week</td>
<td>6 weeks</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Base</td>
<td>Base + 5%</td>
<td>Base + 5%</td>
<td>Base + 20%</td>
<td>Base + 20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>21.0%</strong></td>
<td><strong>17.4%</strong></td>
<td><strong>44.1%</strong></td>
<td><strong>4.6%</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>12.9%</strong></td>
</tr>
</tbody>
</table>
Furniture Customization – Delay – Price

Impact of socio demographics

• Women appreciate customization more than men.

• The 25 – 34 year olds want a maximum of customization and are ready to pay the price.
Furniture Customization – Delay – Price

Impact of socio demographics

• Importance for customization and fast shipment increases with education level and annual income.

• Boston is the prime city to sell mass customized products.
Furniture Customization – Delay – Price

Three consumer groups:

1. Customization lovers
2. Impatient buyers
3. Price buyers

Socio demographics do not characterize the groups, except for gender.
## Furniture Customization – Delay – Price

### Customization lovers (n=436)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Mean (%)</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization</td>
<td>35.2</td>
<td>9.8</td>
</tr>
<tr>
<td>Customization time</td>
<td>11.0</td>
<td>6.3</td>
</tr>
<tr>
<td>Shipment delay</td>
<td>16.7</td>
<td>7.0</td>
</tr>
<tr>
<td>Price</td>
<td>37.1</td>
<td>10.7</td>
</tr>
</tbody>
</table>
## Furniture Customization – Delay – Price

**Impatient buyers (n=367)**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Mean (%)</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization</td>
<td>15.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Customization time</td>
<td>9.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Shipment delay</td>
<td>36.4</td>
<td>10.1</td>
</tr>
<tr>
<td>Price</td>
<td>38.7</td>
<td>11.3</td>
</tr>
</tbody>
</table>
Furniture Customization – Delay – Price

Price buyers (n=398)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Mean (%)</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization</td>
<td>12.2</td>
<td>6.9</td>
</tr>
<tr>
<td>Customization time</td>
<td>6.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Shipment delay</td>
<td>14.9</td>
<td>7.4</td>
</tr>
<tr>
<td>Price</td>
<td>66.6</td>
<td>11.3</td>
</tr>
</tbody>
</table>
Furniture Customization – Delay – Price

Conclusion

• Price counts for about 50% of the buying decision.
• Shipment delay and customization counts for 40% of the buying decision.
• By targeting specific consumer groups, customization and shipment delay equals or exceeds the importance of price.
• MC for a higher price is for niche markets.
Furniture Customization – Delay – Price

Conclusion

TALK TO WOMEN, NOT TO MEN!
Success Stories...
Performance of Industries

U.S. market share of imports 1992 - 2008

Data Source: U.S. Census Bureau 2009, ITA 2009
Performance of Industries

U.S. market share of imports 1992 - 2008

2004 - 2008

- Nonupholstered imports +21%
- Upholstered imports +65%
- Office imports +5%
- Kitchen cabinetry +2%

Data Source: U.S. Census Bureau 2009, ITA 2009
CABINETRY AND OFFICE

Kitchen Cabinets

Office Furniture

source: Kitchen Craft

source: Herman Miller
OFFICE FURNITURE EXAMPLE

The story of a successful transformation

Grand Rapids before WWII - the U.S. furniture capital!

source (both pictures): C. G. Carron, Grand Rapids Furniture 1998
FURNITURE MOVES SOUTH

the call of the South:
- cheap lumber
- cheap labor
- investment in new technology

source (both pictures): C. G. Carron, Grand Rapids Furniture 1998
THE ONES LEFT BEHIND ADAPT

Grand Rapids is adapting - moving into contract…

and office furniture…

source (both pictures): C. G. Carron, Grand Rapids Furniture 1998
INNOVATE

innovations keep coming - color choices…

movable walls creating our beloved cubicles…

source (both pictures): C. G. Carron, Grand Rapids Furniture 1998
REINVEST PROFITS

allowing the industry to make profits…

and to keep plants and employees up-to date and competitive…
OFFER MASS CUSTOMIZATION

starting with basic modules…

…allowing customers to configure and accessorize their products

source: http://v2.steelcase.com/
… AND INNOVATE AGAIN!

go ing green before anybody else...

...and shifting business to the next areas of growth early...

source: http://www.buildinggreen.com

source: http://www.hermanmiller.com/Healthcare
MC
REVISITED
Definition of MC

Mass Customization is the “fulfillment of customized orders at an industrial scale with competitive prices and competitive lead times.”

- ... customized orders
- ... industrial scale
- ... competitive prices
- ... competitive lead times

- customization, cost efficiency, short lead times
Challenges

Implementation of MC is challenging

• Make-to-order (MTO)
• Small batch sizes
• Supply chain management
• IT
• Marketing
• Customer interaction
• …
COMPETITIVE ADVANTAGE

• The only two SUSTAINABLE competitive advantages in a time of global competition are:

CLOSENESS TO CUSTOMERS and INNOVATION
Firms in the US need to leverage their main competitive advantage of **being close to customers** through **innovations** in product customization, faster delivery, convenient return and repair policies, and offer services in all other areas where customers expect value!
THANK YOU!

Questions-Discussion

Source: Uli Stein & Gerd Koch Cartoon Edition GmbH, Isernhagen