Mass Customization
Does it Exist?
Are we there yet?

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Abstract

Mass Customization - Does it Exist?/Are we there yet?
Bart L. MacCarthy

It is now almost a quarter of a century since the publication of the book that challenged the dominant 20th century paradigm of Mass Production and heralded the arrival Mass Customization (MC) - a new era in how customized products would be produced on a mass scale. From the outset there were strong advocates for MC in both the practitioner and academic communities but also sceptics, and some advising caution. From the outset there was also a plethora of definitions on what constituted MC. In particular the meaning of 'customization' and its enactment in different sectors proved much more complex than first imagined. The dominant literature on MC emanated from the Operations community with only a sideways glance at Marketing.

So has it happened? The truth is that the revolution has not happened in the way imagined. Of course one can point to many examples where some level of customization is offered but many major product sectors have remained stubbornly 'volume driven'. For instance the clothing sector, which was identified as having strong potential for Mass Customization, remains essentially a volume business, dominated by retailers and brand owners that control supply global networks – only in rare cases are we customizing clothing. Time to market has proved a stronger operational imperative than the offer of customized products.

Here we examine critically why the Mass Customization revolution has not happened the way many predicted, what has happened, and what is emerging in the new era of digitally-enabled operations. MC is analyzed from the perspectives of strategy, operations, and marketing. For instance the burden of choice, well known in marketing, militates against providing high levels of customization for consumer products. Some of the strongest examples of MC occur in fact in industrial B2B markets, which is explainable when a wider lens is used.

But are we still wedded to a mid-20th century Mass Production paradigm? Not quite. We see burgeoning levels of product variety and high levels of new product introduction in many sectors. The automotive sector for instance has come up with innovative ways to meet the desires of highly heterogeneous customer populations whilst maintaining the economies of scale required in a volume business.

Most exciting are the massive changes taking place with the digital revolution. For instance, with omni-channel retailing the customer can order anytime, anywhere, on any device and request fulfilment in a myriad of different ways, which can be seen as form of service customization. The retailer’s challenge is do it cost effectively on a mass scale. Mass Customization needs to be reinterpreted for a truly digital landscape. We examine the big shapers of the digital era – mobile access, cloud technologies, cloud-based serves, and most importantly the power of platforms and how they will shape the customization landscape in the future for product-service bundles.
Mass Customization - Does it Exist?/Are we there yet?

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1. What is it? Where did it come from? What do we know?
2. Do we know this? Why has the take up been weak?
3. Consumer product sectors – Clothing, Auto industry, Consumer electronics
4. The Paradox of Choice
5. Some successes - B2B
6. Mass Customized services - opportunities
7. Messages
1. What is it?

Where did it come from? What do we know?
Mass Customization (MC)

- Terms originated by **Davis (1987)**
  ‘Could a shirt factory produce 5,000 individual shirts rather than 5,000 identical shirts?’

- The production of **customized** products and/or services on a **mass scale** with **mass production efficiencies (MC)**
Out with the old!

Mass Production - **profitability premised on volume**

Mass Customization - **profit from customer differences but** with mass production efficiencies

A new **PARADIGM** - lots of industrial interest from the beginning

Can we find the sweetspot?
Extensive MC literature

**Reviews** - Da Silveira, G., Borenstein, D., & Fogliatto, F. S. (IJPE, 2001); Fogliatto, Da Silveira, & Borenstein (IJPE, 2012)


- **More limited discussion** economics of MC (Piller et al. 2004, Tu et al., 2007), what customizations to offer (Valenzuela et al., 2008) , quality management (Brabazon & MacCarthy 2007)
Types of Mass Customization


• Pure standardization, segmented standardization, customized standardization, tailored customization and pure customization (Lampel & Mintzberg 1996)

• Collaborative, Adaptive, Cosmetic, Transparent (Gilmore & Pine 1997)

• Different operational modes

MacCarthy et al. (2003)
A taxonomy - five fundamental MC modes
• Catalogue MC
• Fixed resource design-per-order MC
• Flexible resource design-per-order MC
• Fixed resource call-off MC
• Flexible resource call-off MC
2. Do we know this?

Why has the take up been weak?
• **Examples** - **trivial** ‘customizations’ nothing really new?

• **Economics are wrong** - not a viable or effective strategy for many enterprises

• **Customers** - prefer quality, performance, innovation and brand rather than customization

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‘Do not be seduced by the lure of Mass Customization’  
– Zipkin 2001, SMR

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What is ‘Mass’?

‘Mass’ can be interpreted in different ways

- **Mass Production economics**
  - minimal additional cost overheads in producing customized products

- **Mass Production characteristics**
  - guaranteed response times and quality levels

- **‘Mass’ scale**
  - the amount and extent of customization offered
  - a significant proportion of customers should avail of the customization potential on offer

- **MC does not mean necessarily order sizes of one**

- ‘Mass’ judged in **relative terms**
What is ‘Customization’?

- Which **attributes** should be ‘customizable’ and what **does this mean**?
- Broadly three categories
  - Function
  - Aesthetics
  - Value and service
- The **customization potential** of a product may be **unbounded**!

**FUNCTION**
- Fit/ shape/dimensions
- Performance
- Functionality - hardware
- Functionality - software
- Properties

**AESTHETICS**
- Styling/Design
- Personalization
- Packaging

**VALUE & SERVICE**
- Delivery
  - Pricing/ contractual issues
  - Service and after-sales
What customizations are relevant?

• MC limits the degree of customization offered to enable ‘Mass’ characteristics to be preserved (economics, response time and quality)

• The producer needs to decide the type and extent of each customization
  • discrete option choices?
  • continuous measurable scale?
  • extent of the choices or scale?

• Mass Customizers seek to offer a significant level of relevant customization to a significant proportion of customers whilst retaining the standards of efficiency, productivity, quality and responsiveness typically associated with Mass Production

(MacCarthy, 2013)
3. Three consumer product sectors

Clothing, Auto industry, Consumer Electronics
Retailer-driven International clothing supply networks

- International supply networks
- Various forms of ownership/relationships
- Retailer/brand-owner driven

MacCarthy & Jayarathe (2010)
Integration and planning postponement in clothing supply networks

Has remained a stubbornly volume business

UPSTREAM integration

DOWNSTREAM integration

MacCarthy & Jayaratne (2013)
The falling price of clothing - fast fashion

**Figure 2.5: Real clothing and footwear prices**

Fast Fashion has trumped customization

[Graph showing real clothing and footwear prices from 1970 to 2010 for UK, US, and France.]

*Source: Cambridge Econometrics.*

**Zara - Rapid-Fire Fulfillment** Ferdows, Lewis, Machuca, HBR 2004

**Primark** only expanding clothing retailer in UK – The Guardian 18/1/18
Mass Customization challenges in automotive

My car purchase, August 2016
Desired
BMW X1
Petrol, Black or Navy,
Leather seats, Manual,
Pop up display.

…………………………
Settled for
BMW X1
Petrol, Black, Leather
seats, Automatic,
no pop up display,
manual wing mirrors.
Automotive vehicle market

Body style | Series | Engine types | Engine size | Transmission
---|---|---|---|---

Exterior colour | Interior Trim | Wheel type | options

High variety on offer – Alford et al. 2000; Holweg and Pil, 2005; Fredriksson and Gadde 2005; Stablein et al. 2011; Brabazon & MacCarthy, 2012

Heterogeneous demand – different types of customer with different desires and behaviours

Large scale systems – (very) long pipelines
• Maintain a ‘build-to-forecast’ system for stability. Satisfy customers from the pipeline or by BTO
• Serve heterogeneous markets with different types of customers
• Improved revenue potential in meeting the desires of customers with different needs

V – variety level
P – pipeline length
S – stock level in the system
V/P ratio determines the behaviour of the system

Brabazon & MacCarthy (2006)
Brabazon et al. 2010
MacCarthy et al. 2012
Brabazon & Maccarthy 2017
Lawson, Pil, Holweg, 2018

There are alternatives to ‘Pure’ Mass Customization
Consumer electronics

Massive levels of variety – how much customization?
Customise your iMac Pro.

3.2GHz 8-core Intel Xeon W processor, Turbo Boost up to 4.2GHz
32GB 2666MHz DDR4 ECC memory
1TB SSD
Radeon Pro Vega 56 with 8GB of HBM2 memory
Magic Mouse 2 - Space Grey
Magic Keyboard with Numeric Keypad - British - Space Grey

https://www.apple.com/uk/
Which customizations, when?

- Customization potential and desirability change
  - New technologies, materials
  - New tastes, new fashions
- Some may become fixed standards, expected

Markets are dynamic, expectations change

Competition may influence which customizations are offered and when


Toyota - 1967

Toyota - 2009

Toyota - 2018

Markets are dynamic, expectations change

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Markets are dynamic, expectations change

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Markets are dynamic, expectations change

Competition may influence which customizations are offered and when

4. The paradox of choice

Peak stuff?
Are you a Maximizer or a Satisficer?

Barry Schwartz,
https://tinyurl.com/j4asubv

Sheena Iyengar
https://tinyurl.com/lh2sepv
Have we experienced peak stuff?

Peak stuff
The idea that people own enough to meet their needs, with 34% of people preferring to spend on experiences over objects.

https://tinyurl.com/yd5tubde

https://tinyurl.com/ybof2yr3

https://tinyurl.com/yd5tubde
5. B2B

The Mass Customization success story
B2B – commercial vehicles

https://www.ford.co.uk/vans-and-pickups/new-transit-custom

https://configure.deere.com/cbyo/#/en_us/products

- Functional customizations – must haves or highly desirable
- B2B Manufacturers have transitioned from pure customization to Mass Customization

Scania truck: Modular design since the 1950’s, Jan Olhager
A spectrum of fulfilment strategies for variety and customization

- Fixed variety
- MTS
- Mass Customization
- ATO
- Form postponement
- Late point different.
- Rapid & reactive NPI
- Locate to order LTO
- Available to promise (ATP)
- Multi-mode fulfilment
- Open pipeline planning
- ATO Form postponement
- Late point different.

Superficial customisers
- Personalisation/ aesthetics

Functional/ dimensional customisers
- ETO within design envelope
- Customize/ differentiate for major customers

Mass Customization

Summary:
- 'Pure' MC is a niche activity amongst a spectrum of methods to deliver variety and customization

MacCarthy, IJPR (2013)
6. Mass Customizing Services

Precision logistics downstream – digital and omni-channel
Digitization

+ 1. Mobile access

+ 2. Cloud storage

+ 3. Cloud-based services

+ 4. Platform commerce

• Digital offers opportunities to customize services on a mass scale through platforms

Digital products and mobile access - opportunities

- Digitizing assets
- Augmentation of products
- Combining data within and across industries
- Trading data
- Codifying a capability

No, iPhones Aren't Luxury Items.
• 03.07.17

Wi-Fi Market worth 15.60 Billion USD by 2022

Precision fast delivery – mass customized

Call Centre India

Call Centre NI

Email Confirm next day delivery

Text from DPD – driver, David on his way

Text Phone delivered

https://tinyurl.com/ybm bckda
Omni-channel retailing

Consumers now **expect**

- **Browse, purchase and return** goods across a variety of channels
- **Very different customer journeys! - channel agnostic**
Omni-channel fulfilment

The supply/distribution chain has to reach beyond the retail store to the home and dedicated pick-up points. Many different models. Many missteps by retailers.

Finer granularity and scale add to costs.
The consumer is reluctant to pay.
Efficient physical logistics is key - can we have lean omni-channel fulfilment?

Multi-,Cross-, and Omni-Channel Retailing

From: Beck and Rygl (2015)
Saghiri, et al. (2018). IJPDLM Special Issue
7. Messages

Don’t throw out the Mass Production benefits with the Mass Customization bathwater
To conclude

1. **MC** is a **niche activity** in the **B2C economy**
   - Very relevant for **B2B functional customization**
   - Many **opportunities to mass customize digital services**

2. **B2C** – beware the **burden of choice**! many of us don’t want to be product designers/customizers

3. **Don’t forget**
   - the **benefits of good design**, reassurance that the producer knows what they are doing
   - the **many benefits of Mass Production**

4. **Technology is powerful** – everything could change (Porter & Heppelmann, HBR, 2014).
   - The world is complex, things evolve, see **MC in its historical context**. Is it a **generational thing**?
Questions/discussion
FedEx Shipment 772488081641 Delivered

19/6/2018 09:27

Your package has been delivered

Tracking # 772488081641

Ship date: Mon, 6/18/2018

Delivery date: Tue, 6/19/2018 9:22 am

Delivered

BART MACCarthy
25 PORTLAND ROAD
CLARENDON PK
LEICESTER, LE23AB
GB

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number: 772488081641

Status: Delivered: 06/19/2018 09:22

AM Signed for By:
B.MACCarthy

Signed for by: B.MACCarthy

Delivery location: LEICESTER.
References


References


References


References


