«Don’t judge a book by its cover»
How Big Data changes decision processes of marketing managers.
Global Marketing Conference 2018
Tokyo, 28th July 2018
Christoph Wortmann/Peter M. Fischer/Sven Reinecke
Agenda of today’s presentation.

1. Problem definition
2. Theoretical background
3. Conceptual framework & hypotheses
4. Empirical findings
5. Contribution & Further research
Big Data: A crucial issue in practice.

- Availability of new data sources (social media data or sensory data) → improving decision making and firm performance (**360° customer view**) → individual customer targeting (Barton & Court 2012).
- Recent research has found great potential for **generating insights and better decision making** (LaValle et al. 2011; McAfee & Brynjolfsson 2012) especially in stable environments with relatively little uncertainty (Gigerenzer 2014).
- Besides, it seems that the implementation of Big Data solutions **positively affects firm performance** (Mueller, Fay & vom Brocke 2018).

![Application of Big Data](chart.png)

**Application of Big Data**

- 35% Big Data in use
- 23% Big Data in planning
- 18% Discussion of Big Data
- 24% No Big Data

![Important decisions are increasingly based on data insights](chart2.png)

**Important decisions are increasingly based on data insights**

- 2015: 37% fully agree, 38% rather agree
- 2016: 40% fully agree, 40% rather agree

Source: Bitkom 2016
No substantial contribution in the four top-tier marketing outlets (JM, JMR, JCR and MS); exception: Marketing Science → but no focus on managerial decision-making
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Decision-making in marketing: Three different options.

### The Subjective Marketing Decision Modeling Approach

- **Management (Marketing) problem**
- **Managerial Judgment**
- **Decision**

*Source: Lilien 2011*

*e.g. Wübben & v. Wangenheim 2008*

### (Traditional) Marketing Decision Modeling Approach

- **Management (Marketing) problem**
- **Model**
- **Managerial Judgment**
- **Decision**

*e.g. McAfee & Brynjolfsson 2012; Müller, Fay, & vom Brocke 2018*

### Automated Marketing Decision Modeling Approach

- **Management (Marketing) problem**
- **Model**
- **Decision**

*BIG DATA?*

Algorithm aversion *(Dietvorst, Simmons, & Massey 2014)* vs. algorithm appreciation *(Logg, Minson, & Moore 2018)*

*Source: Lilien 2011*
Decision-making properties depend on hierarchy level.

Top-Management

- Due to the postulated **high superiority of Big Data**, top managers might be inclined to use it → **defensive motifs**/playing safe/justification (Ashforth & Lee 1990)
- Top managers have **less time and resources** to critically investigate Big Data (Barton & Court 2012; Stone 2014)

Lower-level Management

- Lower level managers might perceive facts and figures generated by Big Data Analytics as an **identity threat** (Dalton & Huang 2014)
- Lower level managers **have more time and resources** to critically investigate Big Data (Barton & Court 2012; Stone 2014) → questioning of the “buzz word” Big Data
Why do top-managers rely on Big Data?

Two different and competing approaches … but the same outcome

Big Data
(existence in company)

Prevention focus (Higgins 1997)
e.g. need for security; fulfilment of duties

Defensive decision-making

• Defensive-decision making is characterized by risk aversion and joint decision-making (Ashforth & Lee 1990)

→ Big Data: “playing safe/scapegoat”

Promotion focus (Higgins 1997)
e.g. maximizing success; risk acceptance

Non-defensive decision-making

• In contrast to this, non-defensive decision-making is characterized by egocentric behavior and risk affinity

→ Big Data: Feeling invincible

Reliance on Big Data
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Study 1: Conceptual framework & hypotheses.

**Hypotheses:**

**H₁a/₁b** Marketing managers have a greater (lower) tendency to accept recommendations for action derived from Big Data compared to recommendations derived from market research or practical experience.

**H₂** Top-executives in marketing have a greater tendency to accept recommendations for action derived from Big Data than lower-level managers.
Study 2: Conceptual framework & hypotheses.

**Hypotheses:**

H$_{3a}$ Top-managers resort to Big Data, as it activates their prevention focus, thus making them more defensive and cautious in decision-making.

H$_{3b}$ Top-managers resort to Big Data, as it activates their promotion focus, thus making them less defensive and cautious in decision-making.
Study 2: Conceptual framework & hypotheses.

Hypotheses:

H$_{3a}$  Top-managers resort to Big Data, as it activates their prevention focus, thus making them more defensive and cautious in decision-making.

H$_{3b}$  Top-managers resort to Big Data, as it activates their promotion focus, thus making them less defensive and cautious in decision-making.

Perceived maturity of Big Data in own organization (Germann et al. 2014) + Situational Promotion Focus (Pham & Avnet 2004) - Decision behavior (degree of defensive and cautious decision-making)

Only for top-level executives (CMO, CEO, Head of Sales)
Study 3: Conceptual framework & hypotheses.

Replication of the results found in Study 2 through experimentation and moderation

Hypotheses:

$H_{3a}$ Top-managers resort to Big Data, as it activates their prevention focus, thus making them more defensive and cautious in decision-making.

$H_{3b}$ Top-managers resort to Big Data, as it activates their promotion focus, thus making them less defensive and cautious in decision-making.
Study 4: Conceptual framework & hypotheses.

Hypothesis:

$H_4$ Top-managers resort to Big Data, as it activates their prevention focus, thus making them more defensive and cautious in decision-making.
Study 4: Conceptual framework & hypotheses.

Hypothesis:

$H_4$ Top-managers resort to Big Data, as it activates their prevention focus, thus making them more defensive and cautious in decision-making.
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Study 1: Methodology and results.

A controlled **paper-and-pencil experiment** («between subject design»; **n= 94 marketing executives**)

**Main manipulation:** Recommendations for action for a new product proposal based on different information sources

**Dependent variable:** Agreement with product proposal

**Independent variable:** Information source

**Moderator:** Hierarchy level (Low-level management 55.3 %; top-level management 44.7 %)

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<tr>
<th>Information Source</th>
<th>I fully agree</th>
<th>I agree but I have change requests</th>
<th>I disagree</th>
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*Linear-by-Linear Association: p=0.057; γ=-0.324, p=0.036*

*Contingency table: Experimental condition and agreement with product proposal (n=94)*

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<td><strong>7</strong></td>
<td><strong>42</strong></td>
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*Linear-by-Linear Association: p=0.016; γ=-0.519, p=0.003*

*Contingency table: Experimental condition and agreement with product proposal (top level, n=42)*

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*Linear-by-Linear Association: p=0.926; γ=-0.027, p=0.920*

*Contingency table: Experimental condition and agreement with product proposal (low level, n=52)*
Study 2: Methodology and results.

- (Correlational) field study \((n=159\) marketing top-executives)
- **Dependent variable**: Defensive and cautious decision-making (e.g. Ashfort & Lee 1990; \(M = 3.70\); \(SD = .904\); \(\alpha = .539\)).
- **Independent variable**: Perceived maturity of Big Data in own organization (adapted version of the 3-item customer analytics scale by Germann et al. 2014, \(M = 2.67\), \(SD = 1.57\); \(\alpha = .910\))
- **Mediator**: Situational regulatory focus (\(M = 2.15\), \(SD = .919\); \(\alpha = .568\))

**Bootstrapped mediation analysis**
(Hayes 2009)

\[ \beta = .052 \text{ (df = 1; p = .013)} \]

\[ \beta = -.065 \text{ (df = 1; p = .169)} \]

\[ \beta = -.408 \text{ (df = 1; p = .028)} \]

Indirect effect \((\beta = -.021, SE = .0135; 95\% CI [-.0523, -.0003])\)
Study 3: Methodology and results.

Online experiment («between subject design»; \(n = 121\) marketing top-executives)

**Manipulation (1):** Information source and customer targeting; **Manipulation (2):** Prevention-focus prime

**Dependent variable:** Estimation of future visitor numbers of a new amusement park

**Independent variable:** Information source (Big Data vs. market research)

**Moderator:** Prevention focus-prime vs. control

**Manipulation** of regulatory focus \(\rightarrow\) \((M_{\text{NoPreventionPrime}} = 2.44; M_{\text{PreventionPrime}} = 2.05; F(1, 119) = 4.33, p = .040)\)

A contrast analysis revealed the following results:

\(M_{\text{Big Data – Control}} = 39.7\) million vs.
\(M_{\text{Big Data – Prevention}} = 39.7\) million \((F(1, 119) = 6.72, p = .011)\)

\(M_{\text{Market Research – Control}} = 1.19\) million vs.
\(M_{\text{Market Research – Prevention}} = 9.9\) million \((F(1, 119) = .344, p = .559)\)
Study 4: Methodology and results.

- Online experiment («between subject design»; n= 126 marketing top-executives)
- **Manipulation (1):** Lay-Belief Manipulation (unrelated study); **Manipulation (2):** Information source and customer targeting
- **Dependent variable:** Advice taking (joint decision-making)
- **Independent variable:** Information source (Big Data vs. market research)
- **Mediator:** Situational regulatory focus (M = 2.49, SD = 1.01; α = .687); **Moderator:** Lay-Belief Manipulation

**A contrast analysis revealed the following results:**

- $M_{\text{Big Data}} - \text{Control} = 0.95$ vs. $M_{\text{Big Data}} - \text{Deactivation} = 0.70$ ($F(1, 123) = 5.86, p = .017$)
- $M_{\text{MR}} - \text{Control} = 0.66$ vs. $M_{\text{MR}} - \text{Deactivation} = 0.77$ ($F(1, 123) = .950, p = .332$)

**Results of a moderated mediation analysis:**

*Index of moderated mediation analysis:*

$\beta = .3157, SE = .2039; 95\% \text{ CI} [.0123, .7938]$
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## Contribution and future research.

### Implications for research & practice

**Research**
1. Tackling the research gap concerning Big Data and Marketing
2. Investigating how the perception of Big Data influences managerial decision making
3. Scale development: defensive decision making
4. Big Data – Regulatory Focus – Decision Making
5. Debiasing mechanism: lay belief (the more, the better)

**Practice**
1. Big Data might change decision making approaches (especially problematic in innovation management)
2. Consequences for working behavior (risky and egocentric behavior of top-executives)

### Future Research

1. More context-specific research concerning the usefulness of Big Data
2. Investigating other potential mechanisms that might explain the superiority of Big Data: commitment level with an organization etc.
3. What about the respective creativity of the managers?
4. Investigating the use of Big Data in lower-level management (usage vs. identity threat)
Thank you for your attention.

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