Big data analytics-enabled supply chain management
[Powerpoint Presentation]

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Big Data Analytics-Enabled Supply Chain Management

Presented by: Dr R. Meriton at the University of Seychelles on 11 April 2017
Research Questions and Framing

- What is the potential of BD & BDA in the SC to improve performance?
- Are there any barriers to adopting BDA in SCM, and if so what are they?
Big Data

Large amount of data which requires new technologies and architectures so that it becomes possible to extract value from it by capturing and analysis process (Katal et al., 2013)

- The 5 Vs of Big Data
  - Volume
  - Velocity
  - Variety
  - Veracity
  - Value

- Structured vs. Unstructured
The process of using analysis algorithms running on powerful supporting platforms to uncover potentials concealed in big data, such as hidden patterns or unknown correlations (Hu et al., 2014).

Potential application areas of big data analytics:
- Smart homes, finance, log analysis, security, traffic control, telecommunications, search quality, manufacturing, trade analysis, fraud and risk.

Increasingly being used in supply chain management:
- E.g. Japan’s Fukushima Daichi nuclear plant in 2011, sensors were used to take radiation measurements without human intervention.
Methodological Approach – Phase 1

- Systematic literature survey utilising: “big data” and “supply chain” as keywords in Scopus database;
- Visualisations and concept maps, term analysis, cluster and sentiment analysis in VOS MAX & Leximancer;
- Detailed content analysis of the “journal articles”
Findings of “key word” search – Journal articles

Distribution of publications by year

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Publication</th>
<th>Percentage</th>
<th>Number of Articles (incl. in press)</th>
<th>Percentage</th>
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<tr>
<td>2012</td>
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<td>2013</td>
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<td>2015</td>
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<td>2016</td>
<td>36</td>
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<tr>
<td>Total</td>
<td>139</td>
<td>100</td>
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</table>

Analysis of 139 articles (Scopus.csv)
### Publication by subject area

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Number of publications</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Computer Science</td>
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<tr>
<td>Engineering</td>
<td>69</td>
<td>24</td>
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<tr>
<td>Business, Management and Accounting</td>
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<td>13</td>
</tr>
<tr>
<td>Decision Sciences</td>
<td>31</td>
<td>11</td>
</tr>
</tbody>
</table>

- Computer Science
- Engineering
- Business, Management and Accounting
- Decision Sciences
- Mathematics
- Social Sciences
- Economics, Econometrics and Finance
- Materials Science
- Energy
- Chemical Engineering
- Environmental Science
- Physics and Astronomy
- Agriculture and Biological Sciences
- Arts and Humanities
- Medicine
- Multidisciplinary
- Chemistry
- Nursing
- Psychology
Publication by country

<table>
<thead>
<tr>
<th>Country/Territory</th>
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<th>Percentage</th>
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<tbody>
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<td>China</td>
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<td>United States</td>
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<tr>
<td>United Kingdom</td>
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<td>5</td>
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<tr>
<td>India</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

China

- United States
- Germany
- United Kingdom
- India
- Taiwan
- Netherlands
- Singapore
- Hong Kong
- Czech Republic
- Pakistan
- Russian Federation
- South Africa
- France
- Brazil
- Belgium
- Malaysia
- Sweden
Key authors network
Heat map - Keywords analysis of all articles
Leximancer Workflow

ICL:

Build your model

Select Documents → Generate Concept Seeds → Generate Thesaurus → Generate Concept Map

Results

Concept Map

Data Exports

Text Processing Settings

Concept Seeds Settings

Concept Seeds

Thesaurus Settings

Compound Concepts

Concept Coding Settings

Project Output Settings

Processing complete, outputs ready. (Cluster: complete. (4 seconds 4023 ms))
Concept map – Empirical works
Traditional Content Analysis: BDA-Enabled Capabilities

<table>
<thead>
<tr>
<th>1&lt;sup&gt;st&lt;/sup&gt; Order Capabilities</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Order Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Product tracking</td>
<td>- Resilience Capabilities</td>
</tr>
<tr>
<td>- Risk management</td>
<td>- Dynamic capabilities</td>
</tr>
<tr>
<td>- Market intelligence on consumer behaviour</td>
<td></td>
</tr>
<tr>
<td>- Demand shaping and sales</td>
<td></td>
</tr>
<tr>
<td>- New product/service development</td>
<td></td>
</tr>
<tr>
<td>- Predict customer purchasing patterns</td>
<td></td>
</tr>
<tr>
<td>- Logistics planning and scheduling</td>
<td></td>
</tr>
<tr>
<td>- Optimisation of pricing</td>
<td></td>
</tr>
</tbody>
</table>
BDA-enabled Performance

1\textsuperscript{st} Order Performance Benefits

- Cost efficiencies
- Reduce the bullwhip effect
- Flexibility
- Responsiveness
- Speed

2\textsuperscript{nd} Order Performance Benefits

- Asset productivity
- Business growth
- Competitive advantage
Barriers to adopting BDA in SCM

- Costs
- Data quality
- Organizational readiness
  - Inexperienced staff
  - Time constraints
  - Lack of integration with current systems,
  - Change management issues (culture)
  - Lack of appropriate predictive analytics solutions
  - Perception of SCM predictive analytics
BDA-enabled Supply Chain Capabilities Framework

- Visibility
- Supplier selection
- Risk management
- Collaboration

BDA-enabled supply chain capabilities

- Dispatch scheduling
- Logistics planning
- Anticipatory shipping
- Freight optimization
- Warehouse automation
- Product tracking
- Risk management
- Visibility

Material

- Waste minimization
- Factory automation
- Lean manufacturing
- Risk management

Information

- Market intelligence
- Demand shaping
- Pricing optimization
- Predict behaviour
- New product/service
- Visibility

- Repair/servicing
- Remanufacture
- Recycle

Procurement → Manufacturing → Marketing and Sales → Distribution → Reverse Logistics
Websites

- http://www.vosviewer.com/
- http://info.leximancer.com/
- https://www.knime.org/