WANT TO STAY AHEAD OF YOUR COMPETITORS? THEN INVEST IN LOGISTICAL DATA ANALYTICS CAPABILITIES!

A WHITE PAPER ON BECOMING RESILIENT AND GAINING COMPETITIVE ADVANTAGE

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WHY YOU SHOULD INVEST

Should you invest in developing data analytics capabilities? According to this study, you should! In fact, developing data analytics capabilities in logistics companies leads to achieving a competitive advantage that your customers will definitely notice. Are you interested more in being resilient during these uncertain times where disruptions in your supply chain are more and more common? Yet again the study proves that developing data analytics capabilities results in higher resilience. If all these terms are new to you, keep reading! The study highlights why you should invest in developing data analytics capabilities, how to do it using a fail-proof plan and notable examples of companies who possess and benefit from these capabilities.

BUZZWORDS BREAKDOWN

What is data analytics capabilities (DAC)? Firstly, it is defined as an organization's ability to process, organize, visualize, and analyse data, resulting in insights that enable data-driven operational planning, decision-making, and execution. This includes the use of data visualization tools (e.g., dashboards) to quickly share and access relevant information from databases, as well as advanced information from internal and external sources to inform complex decision-making processes [1].

What about the data-driven culture (DDC)? This can be referred to as the length to which members from top to lower levels within a company condone in data-driven decision making, based on the valuable insights extracted from data. Moreover, it also covers to what extent the usage of data is integrated within the organisation and to which extent employees from each level are actively encouraged to make decisions based on data [2].

[1] Rameshwar Dubey, Angappa Gunasekaran, and Thanos Papadopoulos, "Green Supply Chain Management: Theoretical Framework and Further Research Directions," Benchmarking: An International Journal 24, no. 1 (February 6, 2017): 184–218, https://doi.org/10.1108/BIJ-01-2016-0011.
[2] Manjul Gupta and Joey F. George, "Toward the Development of a Big Data Analytics Capability," Information & Management 53, no. 8 (December 2016): 1049–64, https://doi.org/10.1016/j.im.2016.07.004.

Supply chain resilience is a hot topic as well for logistics companies. Resilience is defined as the ability of a system to adjust to temporary disruptions [3], such as the Covid-19 supply chain crisis or the Suez Canal blockage.

Being resilient can make or break a company's recovery from a disruptive situation and can help companies be a step ahead of their competitors [4].

Thus, resilience is closely related to the term of 'competitive advantage'. This is defined as to when a company has the edge over their competitors within the industry [5]. A word association for competitive advantage which is more common is value creation. In other words, competitive advantage can be considered as who brings the greater value to the table to a certain client [6].

IS DATA RELEVANT TO LOGISTICS?

Speaking with supply chain and logistics professionals of multiple levels, they expressed that their companies have a competitive advantage and are resilient partly due to developing data analytics capabilities.

Decision-makers like you were the source of our data. In the graph you can find the overview.

Operations 7%
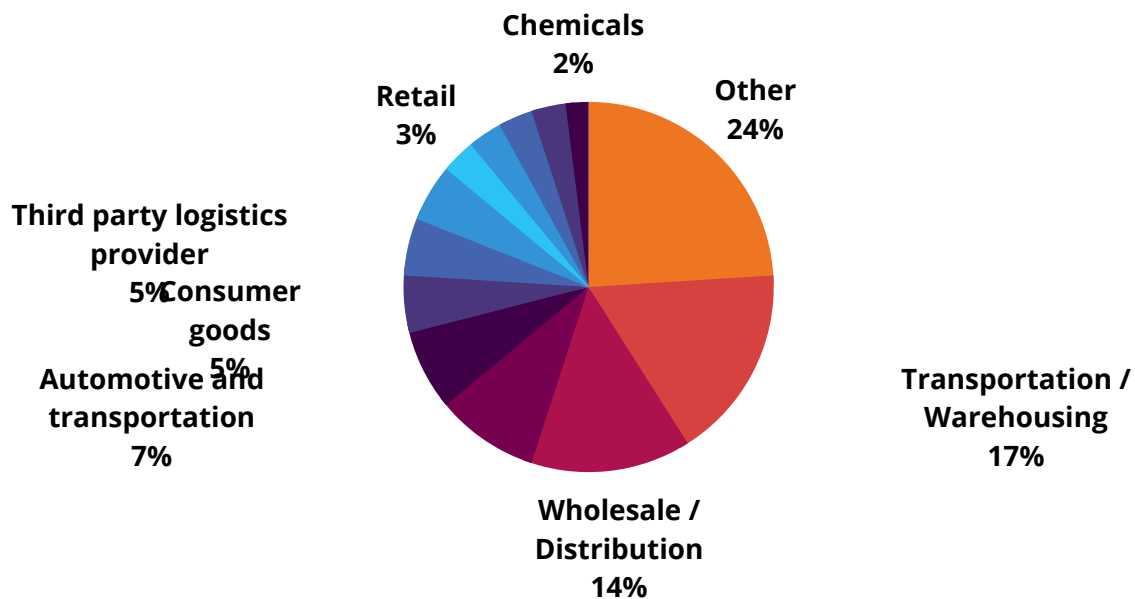
Other 17%

Middle management 46%

Top management 23%
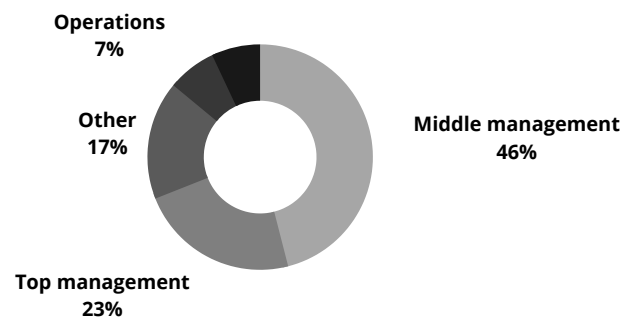
[3] Chiung-Lin Liu et al., "Supply Chain Resilience, Firm Performance, and Management Policies in the Liner Shipping Industry," Transportation Research Part A: Policy and Practice 110 (April 2018): 202–19, https://doi.org/10.1016/j.tra.2017.02.004.
[4] McKinsey. (2021). McKinsey on Risk, Number 11, August 2021 | Risk & Resilience | McKinsey & Company. https://www.mckinsey.com/business-functions/risk-and-resilience/our-insights/mckinsey-on-risk/mckinsey-on-risk-number-11
[5] Muhammad Azeem et al., "Expanding Competitive Advantage through Organizational Culture, Knowledge Sharing and Organizational Innovation," Technology in Society 66 (August 2021): 101635, https://doi.org/10.1016/j.techsoc.2021.101635.
[6] Rumelt, R. P. (2003). What in the World is Competitive Advantage? Policy Working Paper, 2003(105).

Chemicals
2%

Retail
3%

Other
24%

Third party logistics provider
5%

Consumer goods
5%

Automotive and transportation
7%

Transportation / Warehousing
17%

Wholesale / Distribution
14%

HOW TO GET STARTED?

As described previously, investing in data analytics capabilities (DAC) is most likely to create added value and competitive advantage. This is therefore the aspect that is recommended to invest in. There are four steps that need to be followed for the implementation of DAC, which can be seen in the figure "Steps to Data Analytics Capability". These steps have been created based on existing change models and the findings of the research.

THE FIRST STEP

towards implementation of DAC, is to

map out the current situation.

To get started on this, it is important to know that DAC consists out of three parts, namely, tangible resources, human resources and intangible resources. When mapping out the current situation, document which resources are available, which resources are available but not efficiently used, and which resources are not available yet. This should be done for the following resources [7]:

1. **Tangible resources:**
   - **Data**

Data is a collection of facts, such as numbers, words, measurements, observations or just descriptions of things. Do not only map out internal data, but also think about data from your partners, stakeholders, competitors, customers, etc. Additionally, try to find out how data from different sources is combined.
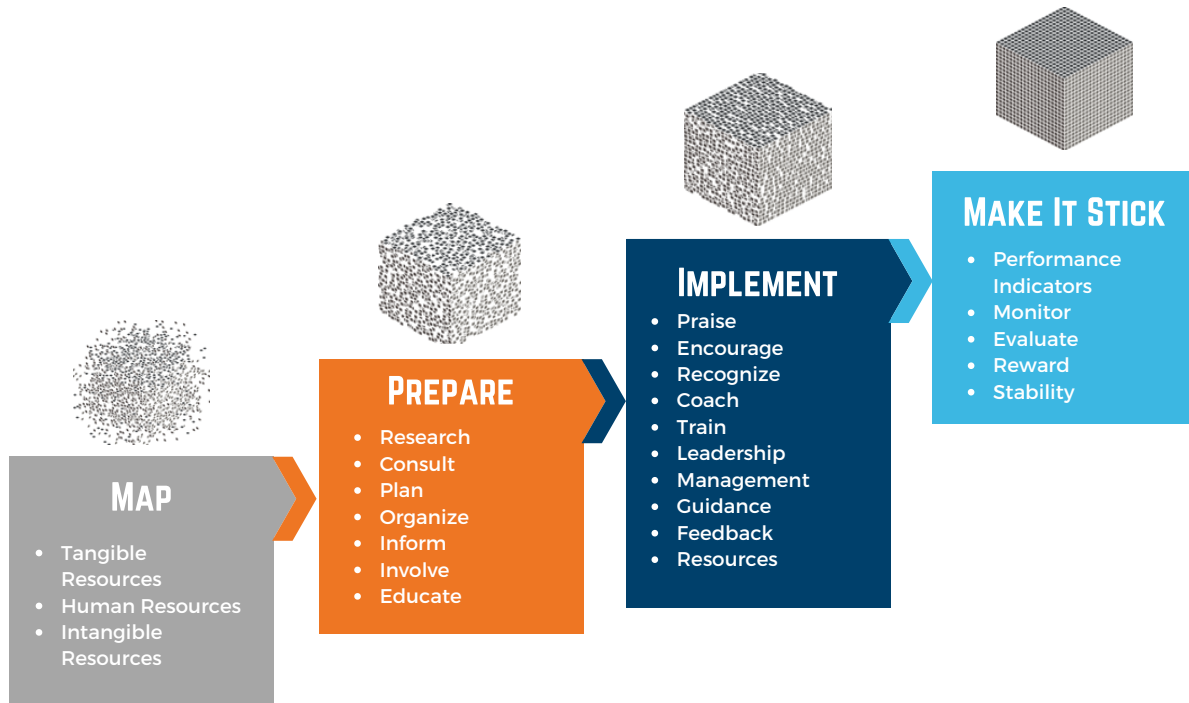
   - **Technology**

Technology refers to the software that is used. Which different systems are used within the company (Transport Management System/Warehouse Management System)? And how are these systems built up (which coding language do they use, which sources do they get their data from, etc.)?

   - **Time**

How much time is spent on using

[7] Manjul Gupta and Joey F. George, "Toward the Development of a Big Data Analytics Capability," Information & Management 53, no. 8 (December 2016): 1049–64, https://doi.org/10.1016/j.im.2016.07.004.

Steps to Data Analytics Capability

MAP
- Tangible Resources
- Human Resources
- Intangible Resources

PREPARE
- Research
- Consult
- Plan
- Organize
- Inform
- Involve
- Educate

IMPLEMENT
- Praise
- Encourage
- Recognize
- Coach
- Train
- Leadership
- Management
- Guidance
- Feedback
- Resources

MAKE IT STICK
- Performance Indicators
- Monitor
- Evaluate
- Reward
- Stability

and/or developing DAC? How many employees are available and for how much time?

  ○ **Budget**

How much money is being spent on developing DAC? How much budget is there that can be spent in the future?

2. Human resources:

  ○ **Managerial skills**

Is/are the manager(s) capable of working with DAC? Does/do the manager(s) actively promote working with DAC?

  ○ **Technical skills**

Are there employees who have the right knowledge and skills to work with DAC? Are there trainings and/or other educational programs available for employees to improve their skills and knowledge?

3. Intangible resources:
- **Data-driven culture**

Are decisions generally based on data rather than on intuition? Are employees stimulated to work with data and base decisions on data? Is data seen as a valuable asset?
(The research has proven DDC by itself does not have an impact, however, DDC on a smaller scale is part of DAC and will therefore still need to be adopted if wanting to implement DAC effectively)

- **Intensity of organisational learning**

Is the organisation shaped to support the ability to explore, store, share and apply knowledge regarding DAC?

To create efficient DAC, all resources stated above need to be present and used correctly. So, the following steps have to be applied to all resources which are not up to the required standard yet.

The Second step

towards implementation of data analytics, is to

create readiness to change.

This means that the company is prepared for change and that there is a planning on what will happen and how it will happen. To create readiness to change, the following actions must be done [8]:

1.Research
Based on which resources need to be improved, an investigation needs to be done for each of those resources into how it can be improved and what is the best way to do that.

2.Consult
Within this action, it is important to seek views and ideas of other people, and to allow all persons involved thinking time. This will create space to come up with new and creative ideas. Also, look at what has been done before by other companies, you do not have to reinvent the wheel if it is already there.

4.Plan
Create a plan. Set objectives and translate those into a timescale. Define how the objectives will be measured and what your budget is. Also clearly describe which resources will be needed.

4.Organise
Create a work planning, appoint leaders, managers, teams and key individuals.

5.Inform
Inform all employees what will happen and why it will happen. Make sure to convey the urgency of the

change so employees understand that the change is important. Also disclose when and how it will happen.

6.Involve
Create an environment in which employees are part of the change. Make sure employees feel like they have influence on what happens and how it happens.

7.Educate
Make sure all employees understand what they need to understand and can collaborate towards a changed and improved environment.

After establishing readiness,

The third step

is to implement the plan.

During the implementation phase it is important to praise and encourage employees that are involved and give them the recognition they deserve. This will ensure employees feel comfortable with the change and will keep them motivated in the future. Moreover, it is important to provide coaching, training, guidance and help where necessary. Lastly it is important to lead with dedication, provide feedback timely, and make sure all required resources are present.

The last step

is to "make it stick".

This phase ensures that the implementations that have been done will be used as planned and that value is added to the business. To enable "making it stick", the following actions should be done:

[8] Bernard Burnes, "Kurt Lewin and the Planned Approach to Change: A Re-Appraisal," Journal of Management Studies 41, no. 6 (September 2004): 977–1002, https://doi.org/10.1111/j.1467-6486.2004.00463.x.

1.Set performance indicators

Define for each of the implementations how the performance will be measured and what will be seen as acceptable.

2.Monitor & evaluate performances

Monitor whether the implementations are having the desired effect and adjust where necessary.

3.Rewards for new behaviour

Reward employees that are making use of the implementations and are therefore showing new behaviour. By rewarding those that are showing the desired new behaviour, others will be motivated to do so too.

4.Create a period of relative stability

Make sure there is enough time for employees to get used to the new way of working, before changing something else. This will help them accept and adjust to the change and create renewed stability within the company.
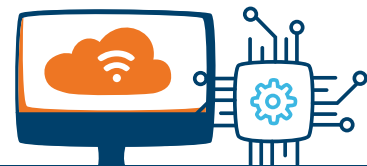
WHAT'S THE SCIENCE BEHIND THIS?

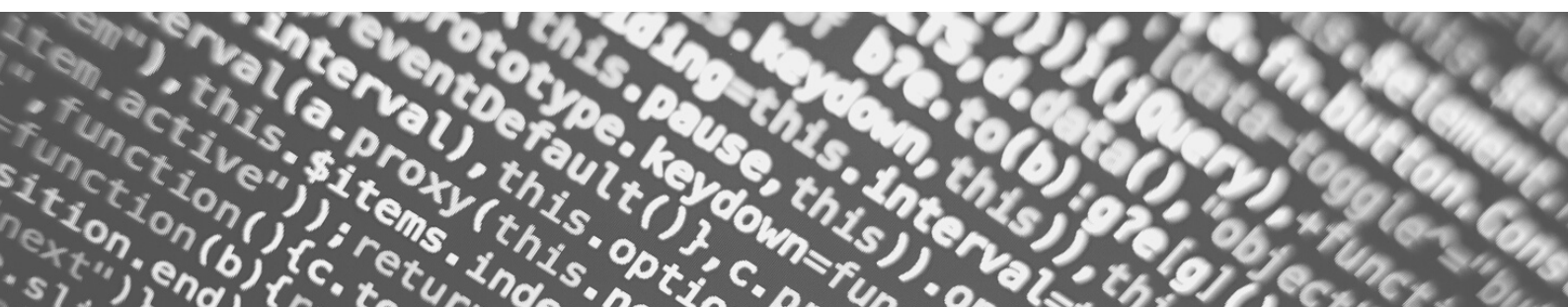## WHAT DO THE SCIENTISTS THINK ABOUT THIS?

Previous research on data analytics capabilities (DAC) has revealed that companies that have developed their DAC more than their competitors, have a competitive advantage. Moreover, it was found that DAC can be used to construct more efficient, productive, and reliable networks [9]. Another study shows that DAC has a positive effect on global sourcing as well as the company's performance [10]. A third study confirmed that DAC increases resilience by enhancing innovative capabilities. Moreover, DAC leads to increased information quality which ultimately leads to improved performance [11] .
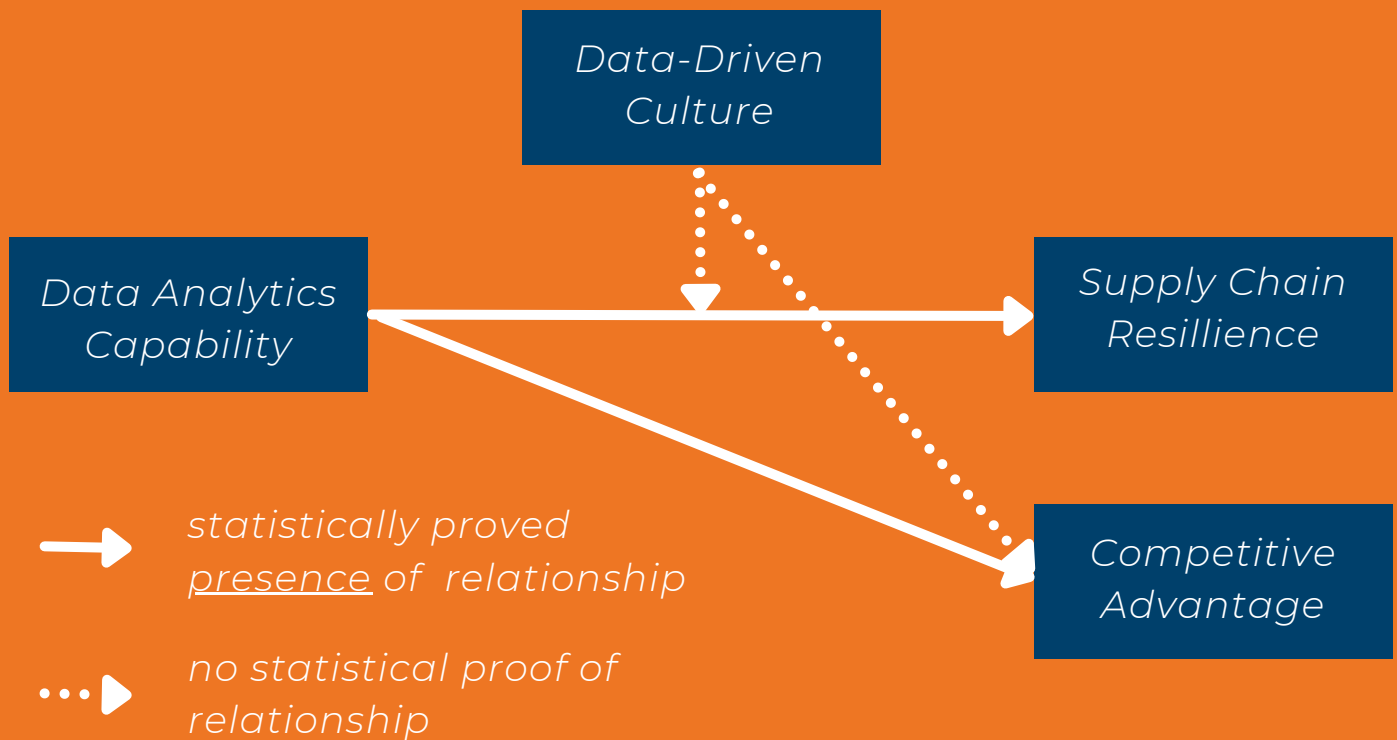
[9] Ashish Kumar Jha, Maher A.N. Agi, and Eric W.T. Ngai, "A Note on Big Data Analytics Capability Development in Supply Chain," Decision Support Systems 138 (November 2020): 113382, https://doi.org/10.1016/j.dss.2020.113382; Manyika et al., Big Data: The next Frontier for Innovation, Competition, and Productivity (Lexington, KY: McKinsey, 2011).

[10] Shokouh Razaghi and Sajjad Shokouhyar, "Impacts of Big Data Analytics Management Capabilities and Supply Chain Integration on Global Sourcing: A Survey on Firm Performance," The Bottom Line 34, no. 2 (September 9, 2021): 198–223, https://doi.org/10.1108/BL-11-2020-0071.

[11] Mohamad Bahrami and Sajjad Shokouhyar, "The Role of Big Data Analytics Capabilities in Bolstering Supply Chain Resilience and Firm Performance: A Dynamic Capability View," Information Technology & People ahead-of-print, no. ahead-of-print (September 7, 2021), https://doi.org/10.1108/ITP-01-2021-0048.

The study' results have aligned with the views of the scientists

Data-Driven Culture

Data Analytics Capability

Supply Chain Resillience

Competitive Advantage

→ statistically proved <u>presence</u> of relationship

▸ no statistical proof of relationship

The main finding of the white paper is that DAC is indeed significant for the creation of competitive advantage.

The results show that out of the companies surveyed, 20% of the improvements in their competitive advantage can be attributed to DAC.

Therefore, if a company aims to have a greater competitive advantage, they should invest in DAC.

Besides this effect, a relationship between DAC and resilience is also proven.

This relationship shows that for the organizations surveyed, 10% of the increase in resilience can be explained by DAC.

In other words, if you want that your company's resilience to increase you should invest in developing DAC.

Looking at the effect of DDC showed that no definitive link can be proven between how data-driven an organization's culture is and the effect it has on competitive advantage or resilience.

Professionals from the field agree too

Several interviews were conducted to validate the results of the questionnaire. Professionals from various industries were interviewed such as: logistics & supply chain, electronics manufacturing, and wholesale & distribution. The participants held operational to managerial positions in companies with 1000 to 4000 employees. During the semi-structured interviews, it was discovered what type of competitive advantages companies can gain by

utilizing DAC. The most significant reason for businesses to use or invest in DAC are the strategic benefits that they bring. According to the professionals in the interviews, the following strategic benefits can be achieved with the use of DAC:

1.Efficiency
Interviewees have agreed that basing decisions on data rather than intuition leads to higher efficiency. However, they also mentioned that the data needs to be up to date and well-kept for it to reflect the reality.

2.Growth in sales revenue
Building data analytics capabilities led to developing new business opportunities, which led to a growth in sales revenue in the case of the participants.

3.Better customer engagement
They also agreed that data helped them to better understand their customer's needs, which ultimately enhanced customer relations.

4.Higher responsiveness to the market
Interviewees noticed a higher responsiveness to the market once they developed big data capabilities. This is because their short-term strategies can be adapted faster with the use of data based on the current market.

5.Creating the big picture perspective
Having dashboards, balance scorecard and KPIs statuses provide valuable information to supply chain professionals with regards to where their business is heading.

All these tools were reported by the interviewees to be extremely useful in keeping their business on track to achieve their goals.

Real-life business examples that support these findings

Rolls-Royce
Rolls-Royce has used big data analytics to improve the design process, reduce product development time, and boost the quality and performance of its goods [12]. In addition, using big data analytics to diagnose, repair, and prevent failures from recurring has 'significantly' lowered expenses. The lack of skilled and experienced data analytics professionals, however, was a difficulty for Roll-Royce throughout the implementation of big data analytics.

Walmart
Another example of how big data analytics can be used to connect the supply chain is Walmart [13]. Walmart collects a large amount of customer data, which is analysed and used by management to support supply chain decisions of all kinds. Walmart optimizes their product assortment to be market responsive by using big data analytics. In addition, Walmart's analytics extend to all its suppliers, providing them with a view of in-store demand. As a result, rather than waiting for an order, suppliers now know when stores need to be replenished in real-time. The challenge of implementing big data

[12] Bernard Marr, "Big Data in Practice," 2016, 323.
[13] Marr; Nada R. Sanders, "How to Use Big Data to Drive Your Supply Chain," California Management Review 58, no. 3 (May 2016): 26–48, https://doi.org/10.1525/cmr.2016.58.3.26.

analytics within Walmart was finding the right people with the right skills, as this had been difficult due to the rapid expansion of big data analytics [14].

UPS

Since UPS focused on improving logistics operations, their big data analytics has provided superior customer service [15]. They use the ORION (On-Road Integrated Optimization and Navigation) technology to help transport drivers discover the most effective route in their delivery locations.

Amazon

Amazon uses big data analytics capability to monitor everything from browsing on the site [16]. With this data, they can forecast stock levels according to what a consumer will buy and where they will buy it. The most important lesson Amazon has learned from big data analytics is that the more information they have on a client, the better they can sell to them.

A CALL TO ACTION

Findings of this paper and the literature give a multitude of reasons why developing data analytics capabilities (DAC) is critical for logistics companies if they want to stay on top of their game. Real-life cases of companies have yet again proven that DAC leads to resilience and competitive advantage. Finally, the action plan we have developed should give you a good start in developing your data analytics capabilities. What happens next is up to you!

[14] Marr, "Big Data in Practice.", pg 5
[15] Sanders, "How to Use Big Data to Drive Your Supply Chain."
[16] Marr, "Big Data in Practice.", pg. 187

APPENDIX

Interested in the results behind this paper? Cronbach's alpha was used to determine the accuracy of the scales used in the survey. All the Cronbach's alpha values were above 0.7 indicating that they are valid.

LINEAR REGRESSION RESULTS

DAC TO CA

TEST	VALUE
T-VALUE	3.972
P-VALUE	0.0002024
R-SQUARED	0.203

Resilience to CA

TEST	VALUE
T-VALUE	3.029
P-VALUE	0.003687
R-SQUARED	0.1235

DAC to Resilience

TEST	VALUE
T-VALUE	2.700
P-VALUE	0.009111
R-SQUARED	0.09784

DAC to CA with DDC Moderator

TEST	VALUE
T-VALUE	-0.026
P-VALUE	0.979547
R-SQUARED	0.1963