A DynaSys White Paper for Supply Chain Analytics

Supply Chain Analytics

DynaSys
A DIVISION OF QAD

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SUPPLY CHAIN ANALYTICS

FROM EFFICIENCY TO AGILITY

One does not need to look far to find confirmation that supply chains are changing dramatically. At the present time we observe three forces of change in global supply chains: consumer driven forces, geopolitical changes, and technology and the digitalization of supply chains.

Dramatic increase in demand volatility and consumer demand is shifting fast; we observe product proliferation driving supply variability as manufacturers struggle to manage a larger variety of products. Global supply and demand networks are changing rapidly due to protectionist trade-policies and additive manufacturing. Meanwhile, companies embark on their individual digital transformation journeys that embrace all manner of new technologies.

The ideal strategy to survive and thrive in this changing environment is to have an agile supply chain that is conducive to change. An agile supply chain requires the ability to rapidly identify, evaluate and execute alternative supply chains scenarios. However, being agile contradicts what many practitioners have been taught over the past decades. Supply chain experts have traditionally focused on efficiency and consequently pursued the lowest unit cost dream. By utilising optimisation techniques, we have sought to minimise procurement costs absorbing larger order quantities and longer lead-times; we plan for longer manufacturing runs to drive a higher return on assets and full-container load land and marine freight to reduce transportation costs.

Agile supply chains exist almost as the anti-thesis of efficient supply chains. Agility requires the ability to detect, analyses and execute the best possible business decision regardless of traditional sources of supply and demand.

"Agile" supply chains exist almost as the anti-thesis of "efficient" supply chains.



SUPPLY CHAIN ANALYTICS

An agile supply chain has four key properties

- End-to-end visibility
- Actionable insights
- Analytical decision support
- Decision execution

FROM VISIBILITY TO ACTIONABLE INSIGHTS

We are experiencing unprecedented volumes of available data, more than can be realistically digested manually. We are drinking from the proverbial data fire hose, however, the data challenges are greater; not all of the data is structured and a large amount is unstructured, not all of the data is relevant, and not all of the data is decision grade quality. Data is changing in real-time, and the volume keeps increasing. Around the world, the Internet of Things (IoT) poses an opportunity for organizations to transform their business model using connected solutions.

Although there are unprecedented volumes of data, there are unprecedented expectations of the problems the data can help solve; there are insightful sales trends to identify, predictions to make, outliers to examine, exceptions to initiate action, and no end to these types of critical questions in supply chain planning. How much will I sell? How much effective capacity will I have? How long will it take to deliver? What will be the results of a new product launch? The importance of a timely and accurate response is critical to business continuity.

A key challenge in supply chain practice is how to provide supply chain visibility while not omitting a decision influencing data point.

When adopting a supply chain visibility strategy, it is important not to "save the world;" do not take on everything that is possible. A good litmus test for data inclusion is the customer service criterion, "Can this data help serve my customer better?"

This enables the company to leverage their data assets to the value of the customer. Also, it is important to experiment. Traditional supply chain analytics have evolved around traditional data models, however, traditional data models have changed. Modern analytical solutions provide powerful what-you-see-is-what-you get (WSIWYG) dashboards to provide an aerial view of your data; use the capabilities to build out appropriate metrics.

However even if sufficient data visibility can be provided across the supply chain, how does this support rapid insightful decision making? Numbers are not enough; it is the meaning of the numbers that must be understood.

It is critical to ask the right questions of the data; only then can intelligent analytics identify trends and correlation to drive prescriptive actions. Modern analytical technology is capable of digesting millions of data points capturing outliers, trends, and step-changes; only some of this will result in actionable insights.

A simple example would be a negative step-change in consumer scan data which is out of correlation with the manufacturer's demand forecast and the retailer's replenishment orders. The actionable insight would assess competitor activity, adjust forecast, and possibly expedite a line-extension

> When you have mastered numbers, you will in fact no longer be reading numbers, any more than you read words when reading books. You will be reading meanings.
>
> **-W. E. B. Du Bois Historian**

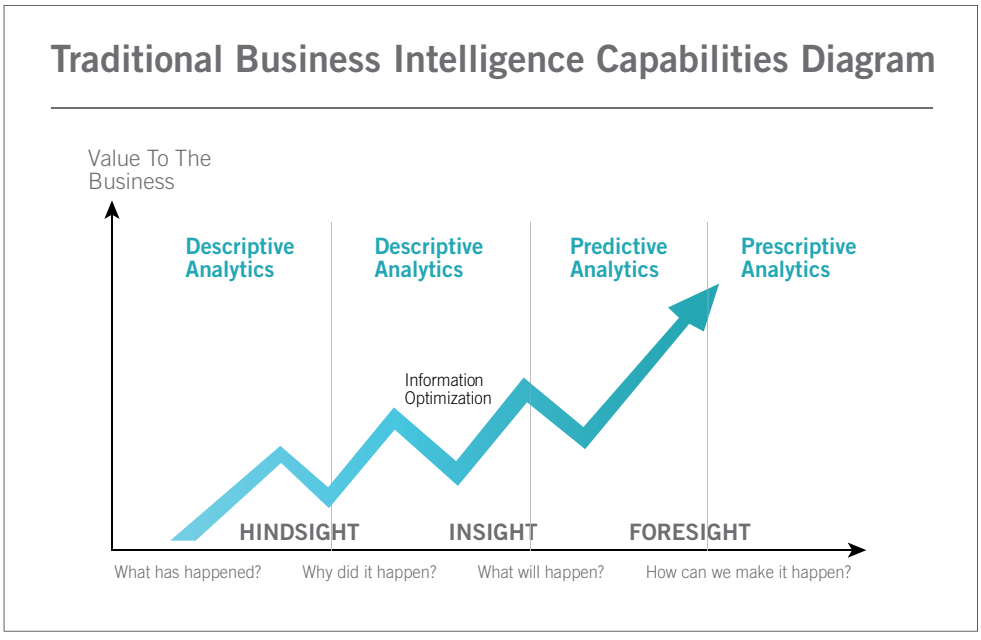
product launch. Although there are many types of actionable insights that could be generated from advanced analytics, in practise it useful to maintain a realistic number, i.e. no more than 15. Actionable insights also enhance the value of a supply chain segmentation strategy; a potential insight of a key segment may be noise for another segment.

Actionable insights must be profiled and triaged. If everything is important, then nothing is important. Actionable insights may be operational (expedite replenishment as a stock out is predicted within the frozen horizon), tactical (adjust supply parameters as average actual lead-time is excessive), or strategic in nature (expedite product launch to cover demand shortfall).

FROM DESCRIPTIVE TO PRESCRIPTIVE

According to a key analyst, the supply chain analytics market is composed of solutions that provide analytics that can be categorized as descriptive, diagnostic, predictive and/or prescriptive analytics. This is best explained by how one would answer a simple question; for example, "How do I get home by 10am?"

- **Descriptive.** This details historic trips home with averages and totals and milestones. What are the historic routes taken? What was the average cost/duration? This is potentially interesting to read but does not support any decision making.
- **Diagnostic.** This may further analyse the descriptive data to determine that the slowest trips all passed through a particular junction. This is marginally more useful than descriptive analytics and an insight may be available but not overtly.
- **Predictive.** Based on all possible routes, predicted current traffic levels, known accidents, scheduled road works, and predicted weather; the following is a list of routes in least time sequence. This is a useful level of analytic to execute action but offers little action.
- **Prescriptive.** You should leave the office no later than 9am, meet your arranged ride-share and use the tunnel not the bridge which ensures you make your destination on time. Prescriptive focuses on the outcome, not the question. The outcome is an action, i.e. to arrive home by a certain time, the rest is noise.



SUPPLY CHAIN ANALYTICS

In a supply chain context, the question may be how to improve market ranking, market share and profitability. The question that is posed is critical; for example, is it better to present a question on how to improve profitability rather than improve sales forecasting? Some metrics do not act in the company's own interest.

SUPPLY CHAIN KPIS – THE SELF-INFLICTED WOUND

Business metrics must be aligned across functional silos to minimise target conflict and work to the best interests of the business as a whole. Too often the supply chain is the first to feel the heat from misaligned and often conflicting metrics. Merchandising teams are rewarded for minimal excess inventory while manufacturing is rewarded for utilisation, i.e. long run lengths. Procurement is rewarded for lowest material cost (long lead time and high MOQ) while distribution is rewarded for delivery-on-time-in-full; the list of potential conflicts is endless.

Some successful KPIs are less obvious on how they create unnecessary pain to the supply chain. A company with monthly or quarterly sales incentives will invariably have a spike in sales correlated to the end of the sales periods. Supply chain practitioners struggle with the unnecessary variability. They expend effort and adopt all manner of tools to provide a meaningful demand plan while responding to the variability by carrying safety stock or expediting freight. This KPI is an example of a self-inflicted supply chain wound.

A more common practise for multiple KPIs is presented using balanced scorecards that focus on a small number of measures that transcend functional silos. This is effective to incentivise behaviour and decision making that works to the benefit of the enterprise as a whole.

THE TECHNOLOGY

As supply chain analytics have matured along the journey from descriptive to prescriptive, it has taken on a new role. The methods of presenting exceptions, trends, and insights have evolved. Traditional dashboards have given way to embedded geographic maps, counters, heat-maps, and combinations of charts, shapes and colours to maximise the value in the most intuitive manner possible. Modern analytics use funnel-style charts to visualize business process metrics and Waterfall charts to show trends changing over time. Also, prominent use of infographics for cross business function metrics.

A major change in supply chain analytics is the move from a "reporting" role to an embedded role. Analytics is no longer a standalone capability but is embedded within the supply chain system of a record providing decision supporting insights at the point of decision making. Embedded analytics are crucial for demonstrating a what-if impact of a potential change in real-time.

The logical next step from embedded analytics is augmented analytics. Augmentation uses machine learning techniques to provide deep insights on supply chain decisions. A simple example is the demand planner building a sales profile for a new product. Traditionally they are armed with alike sales behaviours of products of the same flavour, size, brand etc. But which attributes influence the new item in what manner? Augmented analytics use correlation and causation techniques to predict sales volume and a sales profile considering pipe-fill and launch phases. This drastically improves the forecast accuracy and reduces the risk associated with product launches. Successful product launches drive revenue and higher margins.

Another important factor is the context of the analytics consumer. Analytics are no longer isolated to a centre of excellence; scorecards are shared across the business in real-time. Interactive advanced analytics can be consumed on mobile devices using real-time data for agile decision making.



THE FUTURE

The analytics roadmap in the near future promises great things. The underpinning premise of advanced analytics is about answering a question, not just providing the data. The methods involved in determining the answer will adopt more intelligent means while the data grows significantly in volume, complexity and type.

The role of qualitative data will change. There is valuable qualitative data which is ignored because it cannot be easily represented in numbers. However, the supply chain in 2018 is no longer just about numbers. Information about risks and opportunities contribute value to the decision making process. The IoT provides access to large amounts of qualitative data from social media and RSS feeds. Sentiment analysis and other methods to quantify qualitative data will come of age in the near future elevating the role of advanced analytics further to the forefront.

The future of supply chain analytics will include natural language processing (NLP). Actionable insights and other compelling decision supporting prescriptive recommendations may be suppressed if the planner manually designates the type of analytic. For example, a trend cannot accurately be portrayed if the pre-designated graphic is a pie graph. Conversely, proportions cannot be accurately portrayed if the pre-designated graphic is a scatter diagram. Advanced analytics focuses on the question. NLP, whether it be speech or text, is important to pose the question. The engine will determine the most appropriate method, or graphic to provide the response. For example, the question, "What are my most profitable product categories?" will automatically use the most appropriate presentation means available to best answer the question. The question, "Which region has the largest proportion of sales from organic products?" would present the results in a totally different manner. It is not restricted by a human, demanding the response in pre-determined format. The engine knows best how to answer the question.

NLP assumes minimal prior knowledge of data structures. Therefore, it lends itself well to external supply chain stakeholders (customers and suppliers) and those that consume analytics intermittently.

CONCLUSION

Companies are now treating their data differently. It is no longer an IT necessity and expense, but a valuable asset from which to leverage actionable business insights. Such insights can be used to grow the business, exploit opportunity and mitigate risk in this disruptive age.

Strong advanced analytics and end-to-end stakeholder collaboration forms are the basis of modern supply chain planning technology. As digitalization continues to disrupt, supply chain technology must be hyper-connected, highly-automated, and produce actionable business insights that promote the value of the enterprise and ensure business continuity.

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