BUSINESS ANALYTICS

TOOLS AND APPLICATION FOR STRATEGIC DECISION MAKING

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PREFACE

Analytics is something every business needs to stay competitive in today's data- filled world. every manager needs to at least understand the basics of analytics and when and where to apply it. this is where this book comes in: it provides a complete roadmap of the key areas where analytics can be used in business as well as an overview of key analytics techniques. the book will help you to understand some of the most important analytics techniques, which areas in business to apply them and how to get the data to run the analytics. It is impossible to open a leadership or management journal without reading something on the explosion of 'Big data', 'Analytics', 'Business Intelligence (BI)', 'Knowledge Management', 'Data Mining', 'Data Discovery' or 'Decision Support'. There is often a great deal of confusion around these terms and often they are used synonymously and interchangeably, which can often amplify the confusion. this book is designed to eliminate some of that confusion and help you understand the crux of analytics so you can ignore the buzz words and hype and appreciate what it is and why it's a vital component of modern business. And perhaps most importantly you will become familiar with the various key analytic tools available to you and when and why you might use them.

Analytics can improve performance in every business regardless of size but in order for it to deliver its promise we first need to understand it and dispel some of the fear around it – and that's where this book comes in. in essence, analytics is about data and how we can use it to improve business success and performance. This book provides the strategic view on what's required to enable rapid learning and ultimately value creation. Making decisions using huge, noisy, messy data requires business analytics. Business analytics, as portrayed by these analytical thinkers, is about value creation. Value creation can take different forms through greater efficiency or greater effectiveness. Better decisions to reduce costs, reveal opportunity, and improve the allocation of resources can all create value. The authors provide valuable business analytics foundational concepts to help organizations create value in a sustainable and scalable way.

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He is one of the author of Book Titled, "Service Operations Management". He has been an Editor for Book Titled, "Management Analytics and Software Engineering". He has contributed for Book chapter titled, "Trends and Methods to evaluate Online Assessments" in Management and Engineering Research Tome. Published patent titled, "BLOCK CHAIN-BASED SHOPPING CART" and received Grant for international patent titled, "BLOCK CHAIN BASED RICE ATM". He has been a NPTEL MOOC Translator for the course, "Operations and Supply Chain Management". He is a member of Editorial Board of 'International Journal of Research Publications'. He is a qualified trainer on "Entrepreneurship Development Programme" (Learn-Wise course) by EDII. He is currently exploring research on MOOC and Online Learning platform in the educational field.

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This Book is Dedicated to

All Managers and Teachers of Business Administration

CHAPTER 1

DATA ANALYTICS FOR BUSINESS

1.1 Business Experiments, Experimental Design and AB Testing

Business experiments, experimental design and AB testing are all techniques for testing the validity of something – be that a strategic hypothesis, new product pack- aging or a marketing approach. Business experiments tend to be the blanket term for this type of testing in business; experimental design is testing that occurs in product development; while AB testing is the term applied to tests that occur in marketing activity. regardless of the term the principle goal in this type of testing is to extract the maximum amount of unbiased information regarding the various factors being tested so that the best course of action can be determined before implementation. TV shows run this type of testing when they create a 'pilot' show to gauge audience reaction and interest before spending a huge amount of time, money and effort creating the whole series. these analytics tools are the same for business.

In order to grow and develop as a business you need to innovate and take a few risks now and then. But innovation, product or service development or strategic changes can backfire because of faulty assumptions or information or your customers may simply not react the way you expect. Some sort of business experiment can help to reduce that risk considerably. It should be used if you have two or more options to decide between and getting it wrong would pose a serious problem for your business. running a test between the various options on a smaller, more manageable scale can allow you to work out which one is likely to yield the best results plus, the feedback from the experiments can help you to further refine and improve the winning option making it even more effective.

In essence, business experimentation can help you to decide which option to get behind when you are faced with one or more choices. For instance, it can help you to answer:

- Which of these options will increase sales?
- Which of these products should we focus on releasing first?
- Which of these products do our customers prefer?
- Which marketing campaign produces the highest response rate?
- Which recruitment channels are most effective?

The detail will depend on what methodology you use and what you are trying to achieve but the basic process, outlined by analytics expert Thomas H. Davenport, is essentially the same:

1 Create a hypothesis.

2 Design the experiment.

3 Run the experiment.

4 Analyse results and follow up.

Create a hypothesis

Consider what it is you are testing and create a hypothesis around that outcome. For example, you might be keen to test changes to your product packaging to see how it affects sales. Chances are you already have an idea about how the test will work out – that's your hypothesis. So in this case your hypothesis might be, 'I believe that less packaging on our products will be appealing to our customers and increase sales'; or, 'I don't think changes in the packaging will influence sales at all'. Perhaps you want to refresh your website but you're not exactly sure what you should change and what you should leave the same. So you decide to test it and your hypothesis is, 'Moving the "buy now" button from the bottom left to the top right will increase sales.'

When you are creating your hypothesis make sure:

Whatever you are testing can be accurately measured for 'better' 'worse' or 'pass' 'fail' otherwise it's pointless. The test fits the team's or business's overall strategy & values never run a test that could damage your reputation even with a small group of people. The test will add value to your business. Part of this stage is figuring out how you will measure your hypothesis so you need to know what success looks like. So, in our earlier examples, the test around packaging will have been proven successful if the product with less packaging yields more sales than the standard packaging, and the website redesign test will be considered successful if moving the 'buy now' button generates more sales.

Design the experiment

Next you need to consider how to conduct the experiment as cost-effectively as possible and decide how long the experiment will take. Some experiments are easier to design than others. If you are making a change to a product or service then you simply assess results prior to the change, make the change and then assess results after the change, comparing the two results. If, however, you are testing a modification to an existing product or existing marketing campaign then you need to ensure you can accurately measure the impact of the change and compare like with like. For example, if you were testing modifications to a product, you couldn't test the standard product against the modified product with five modifications because you wouldn't know which modifications were making the impact. this is where AB testing comes in because it allows you to test version A against version B where version B has only one modification; that way you know with a high degree of certainty that any difference in result is due to the single modification.

Only test one aspect at a time and where possible keep your experiments as simple as possible. this is not only to maintain accuracy over the results, but generally speaking the more complex the test the more expensive the test.

Run the experiment

Make sure you tell people about the experiment – especially those that will be affected by it. Make sure people understand why you are running the experiment and that they have plenty of advance warning. Once the experiment is live simply monitor what's happening to make sure nothing has happened during the test period that could distort results. For example, if you are testing a product with less packaging and that product runs out for four days in the middle of the test, if you don't know about that from dispatch then you could assume that the product did not sell as well as the alternative. The truth, however, is that customers couldn't actually buy it for four days!

Analyse results and follow up

The only purpose of doing the experiment was to test your hypothesis and use the results to guide your decision making, so, as soon as the experiment is over, analyse the results thoroughly. Compare actual performance and outcomes against your hypothesis to establish whether or not your assumptions and expectations were proven accurate or not. Whether you were proven right or wrong, consider the reason for the result. Was the experiment a success? and remember you can be proven wrong and still have a successful experiment. If you think moving the 'buy now' button on your website will increase sales and it doesn't, well at least you know something you didn't know before and you don't have to consider that option again. Success in any experiment is a conclusive result one way or the other.

When you are assessing results look out for any unintended consequences that occurred as a result of the experiment that you did not expect. Consider how you could better manage them if you roll out the results or how you could take advantage of them for even greater reward then consider what you've learned about the process of experimentation that you can apply for better results in the future.

Some experiments will be clear-cut and the result will point to one course of action over another. In those cases, you can move forward

with the implementation of the best idea as soon as possible. In other instances, you may need to conduct additional follow-up tests before knowing for sure which option to pursue. For example, if the first product modification doesn't yield any difference to sales then you would need to test the control product against the second product modification and so on across all intended modifications so as to identify the one that makes the biggest positive impact on sales.

Practical example

Say you are the fundraising manager for a large environmental charity. You know direct marketing is a great way to raise funds and you have a 'control' campaign that works extremely well, but you want to see if you can lift response because direct mail can be very expensive and you want to ensure you get the most bang for your buck. So you decide to test a few different approaches to see if any alteration can cost-effectively increase results.

You have three hypotheses that you want to test:

1 'Handwritten sticky notes with a personal "ask" attached to the letter increase response'

2 'Pre-paid return envelopes increase response'

3 'Changing the order of the "ask" so that a high donation is asked for first will increase the gift size on the response form'.

To run the experiment four randomly selected files of 2,000 customers are selected from the customer universe of 500,000 active customers. One group of 2,000 customers received the control pack which is currently working well. One group of 2,000 customers gets exactly the same pack except there is a handwritten post-it note on the letter; another group of 2,000 customers receives the control pack with a pre-paid return envelope included; and the last group of 2,000 customers receives the control pack with a change to the size of initial donation request on the donation response form. Whereas the control pack provides four tick-box options starting with Rs.20, going down to Rs.5 with a box for 'Other', the test pack starts at Rs.50. All the

test mailers are sent their pack on the same day so the only difference between each test is the specific issue you want to test for. After three weeks you check on the results and find that the post-it note increased response rate the most; adding the pre-paid return envelope did not increase response at all; and the average gift size increased dramatically when you changed the order of the 'ask' on the response form. this information is of course very useful.

While the handwritten personalise ask on a post-it note increased response significantly it also increased the cost of the mailer significantly, resulting in a slight net loss. So this was shelved as a useful idea to be used for high donors only, where the additional expense would be worth it. the lack of difference in response by excluding a return envelope meant there was no need to include it, thereby making the mailer less expensive to produce. and finally the increased initial ask was implemented across the roll out which resulted in significantly more money raised.

Using business experimentation allows you to test things without the expense or risk. For business experiments to be useful you can only test one thing at a time and you must compare like with like. Seek to ensure that everything about your test is the same bar the one element you are seeking to test. For example, in the scenario above if the fundraising packs were sent on different days then that could influence the result and you might assume it was the test element and so roll out the wrong change. Marketing tests are much easier to facilitate than product development or design tests. If you want to test prototypes, then they must be of the highest quality other- wise it will skew the results. and this takes time and money.

1.2. Visual Analytics

Data can be analysed in different ways and the simplest method is to create a visual or graph and look at it to spot patterns. This is called visual analytics and is an integrated approach that combines data analysis with data visualisation and human interaction. Data is produced at an alarming rate. In 1981 futurist and inventor Buckminster Fuller proposed the 'knowledge doubling curve' to explain the fact that the more knowledge we accumulate the faster we create more knowledge. Up until the end of the nineteenth century human knowledge doubled every one hundred years or so. By the end of the Second World War the total knowledge of mankind was doubling every 25 years. Today it is thought to be every 13 months and IBM have already predicted a point where our knowledge will double every 11 hours. Now that's a lot of data! Unfortunately, our ability to collect and store that data is increasing faster than our ability to analyse it. And while there have been a number of tools developed to automatically analyse some of it, the complexity of the data and the questions being asked means that human beings still need to be involved to bring their creativity, flexibility and background knowledge of the situation to the process. Visual analytics therefore allows decision makers to combine human input with the enormous storage and processing capacities of modern technology to gain insight into complex problems using advanced visual interfaces to help them to make better decisions.

The most appropriate time to use visual analytics is when you are trying to make sense of a huge volume of data and/or if the complexity of the problem you face could be assisted by some additional computational horsepower. Visual analytics is therefore a useful tool when you need to attack large, complex and interrelated problems where there is a lot of data to analyse. Technology is clearly essential to analytics but technology will probably never replace human beings because it's not yet possible for technology to get a 'big picture' grasp of the problem and what needs to be done from multiple different angles. Visual analytics seeks to take the best of human intellect and technology to combine them in a way that allows the technology to

do most of the hard computational work while ensuring that it is solving the right problems and the end result is palatable and useful for the human being that will have to interpret it.

Technology can therefore amplify human cognitive ability by increasing cognitive resources, expanding working memory, reducing search time and enhancing pattern recognition capabilities across large data sets. Using visual analytics when turning data into pictures and graphics would help tell a more complete story and help to reveal the patterns and trends hidden within that data, which could in turn aid decision making at all levels of your business.

Essentially, visual analytics can help you spot patterns in data and allow you to make vast amounts of data accessible and understandable to anyone regardless of whether they are a data scientist or statistician or not. It can help you to answer:

Where are my best customers located?

What is the profile of my best customers?

Is my market share increasing or decreasing?

Is there any connection between factor X and factor Y?

Visual analytics also allows you to answer these questions faster and provide the answers in a visual, more engaging way. According to the European project VisMaster, there are four separate stages in the visual analytics process – data, visualisation, knowledge and models. The first stage is the input and transformation of the data. Often the source data exists in different formats and in different locations so it first needs to be integrated before visual or automatic analysis methodologies can be applied. Other typical pre-processing tasks include data cleaning, normalisation and grouping.

The next step is to run the automatic analysis, which will often use data mining methods to generate models of the original data. Once a model is created you must then evaluate and refine the models. Visualisations then allow you to interact with the automatic analysis

and play around with the data by modifying parameters or selecting other analysis algorithms. Model visualisation can then be used to evaluate the findings of the generated models. Alternating between visual and automatic methods is characteristic for the visual analytics process and leads to a continuous refinement and verification of preliminary findings. Remember, it is the combination of human and technology that makes visual analytics so useful. If something doesn't look right to the human eye then it can be checked, refined or new analysis run.

Ultimately it is the user interaction with the visualisation of the data that is needed to reveal insightful information, for instance by zooming in on different data areas or by considering different visual perspectives. Essentially, knowledge can be gained from visualisation, automatic analysis, as well as the preceding interactions between visualisations, models and the human being doing the analysis. Thankfully there are many commercially available visual analytics tools on the market.

Practical example

Swedish medical doctor and academic Hans Rosling is Professor of International Health at Karolinska Institute. He is also a statistician, data guru and brilliant public speaker. If you want to see the power of visual analytics then I recommend you watch any of his really interesting, funny and engaging Technology, Entertainment, Design (TED) talks.

In one (http://www.ted.com/talks/hans_rosling_at_state), he talks about how his students often discuss 'them' and 'us' in terms of the developed world and the western world or developing world. So he asked them to define exactly what they meant by these labels. They had all learned about them in college and were confident they knew what they meant. Dr Rosling pushed for a specific definition, and one student suggested that the developed world was characterised by 'long life and small families' and the developing world was characterised by 'short life and large families'. It was a neat and concise definition but was it true? Dr Rosling decided to test the

hypothesis. Obviously in order to test such a theory an enormous amount of data was required to process. He needed mortality rates per country, birth rates per country and all that data every year for decades. To look at that data in its raw form – perhaps in spread-sheets or databases – would have yielded very little in terms of insights. The human brain would not have been able to process such massive data sets and come up with any meaningful conclusions – and yet Dr Rosling did using visual analytics. He found that the notion that his students held about the nature of life in different parts of the world was fundamentally flawed. He created a visual map that showed the correlation between 'children per woman' versus 'life expectancy' for countries across the globe and animated the chart to move through the years. Watching the visual animation of the data, viewers could tell that initially looking at data from 1950 the definition was largely accurate but by 2007 it simply wasn't true any more. And yet here were young students being taught this definition as though it was still a hard, fast and accurate definition.

Granted there were still countries such as Afghanistan where that definition still held true but the vast majority of countries had significantly reduced family numbers and were living much longer than their grandparents. That is the power of visual analytics: it allows mind-boggling data sets to become genuinely useful and can help us to change out mindset about what is really happening in our business.

When creating the visual analytics make sure that the key strategic question the data is answering is stated clearly on the page or screen. This will help to focus the reader's attention on the data's purpose so they don't get lost in the graphic or visual representation. The key danger with visual analytics is that you can end up becoming obsessed with the visual part of the equation and slice and dice the data a thousand ways. Visual analytics is extremely useful for bridging the gap between the data and the insights but only when you stick to what's needed when it's needed. Just because a visual analytics program can present and manipulate the data a thousand different ways doesn't mean you need to present and manipulate the data a thousand different ways. Stay focused on what needs to be answered.

1.3. Correlation analysis

Correlation analysis is a statistical technique that allows you to determine whether there is a relationship between two separate variables and how strong that relation- ship may be. This type of analysis is only appropriate if the data is quantified and represented by a number. It can't be used for categorical data, such as gender, brands purchased, or colour. The analysis produces a single number between 11 and 21 that describes the degree of relationship between two variables. If the result is positive then the two variables are positively correlated to each other, i.e. when one is high, the other one tends to be high too. If the result is negative then the two variables are negatively correlated to each other, i.e. when one is high, the other one tends to be low.

So, for example, if (as a hypothetical example) correlation analysis discovered that there was a correlation of 10.73 between height and IQ then the taller someone was the higher the likelihood is that they also have a higher IQ. Conversely, if that correlation was discovered to be 20.64 then the taller someone was the more likely he or she was also to have a low IQ. A positive score denotes direct correlation whereas a negative score denotes inverse correlation. And zero means there is no correlation between the two variables. The closer the score is towards 1 – either positive or negative – the stronger the correlation is. The result is considered 'statistically significant', i.e. important enough to pay attention to if the result is 0.5 or above in either direction.

Correlation analysis is most useful when you 'know' or suspect that there is a relationship between two variables and you would like to test your assumption or hypothesis. For example, you may believe that temperature is affecting sales. An ice-cream seller will definitely sell more ice cream in hot weather but is there a correlation between your product and service and temperature? Correlation analysis would allow you to work that out.

Alternatively, you can use correlation analysis when you want to know which of several pairs of variable shows the strongest correlation. So you may want to see whether temperature affects sales more than time of year for example. And finally you can use this type of analysis speculatively on quantifiable data sets to see what emerges. Sometimes correlation analysis will highlight an unexpected relationship that could warrant further analysis and potential exploitation. For example, Walmart discovered an unexpected relationship between the purchase of Pop-Tarts and a hurricane warning. Apparently when there was a severe weather warning in the US, the sale of Pop-Tarts increased. This knowledge allowed Walmart to position Pop-Tarts at the entrance of the store following a hurricane warning, further pushing up sales. An unexpected correlation was also discovered between beer sales and nappy sales in the United States. Presumably the father sent to buy nappies would be reminded that he wouldn't be going out this weekend and bought some beer instead. These types of insights can of course be extremely useful and lead to even higher sales with a little in-store product positioning.

Essentially, correlation analysis can help you to make connections between quantifiable variables that can help you to make better decisions and improve performance. It can help you to answer:

- Are our most loyal customers also our most profitable?
- Do customers purchase more when the price is lower?
- Does pay influence length of tenure?
- Does number of annual holidays influence absenteeism?
- Is there any relationship between factor X and factor Y?

Correlation analysis can be essential for testing assumptions prior to alterations in strategy or product mix. If you are feeling brave and you have a scientific calculator in hand, then you can use what is known as 'Pearson's correlation coefficient'.

1. First you need to gather your data for the two variables you want to analyse. You can calculate the correlation for any quantifiable data set.

2. Create a spreadsheet or table that lists the data sets vertically in columns. In the first column, labelled x, add all the data for your first variable (x) and in the second column, labelled y, add all the data for your second variable (y).

3. Label column three, four and five 'x y', 'x x' and 'y y' respectively.

4. Perform the relevant calculations in column three, four and five, i.e. 'x y' 5 x multiplied by y, 'x x' 5 x multiplied by x, and 'y y' 5 y multiplied by y.

5. Add all the values in each column and add the total at the bottom of each column.

6. Insert the numbers into the equation to establish the correlation between the variables under investigation.

Alternatively, you can use software and there are many correlation tools on the market. You can make your life a little easier by using desktop software such as Microsoft Excel that contains pre-installed formulas to calculate your correlations. There are many simple online tutorials available to explain how you use it.

Practical example

Say you wanted to find out whether there was a relationship between the price you charged for your product and the number of units sold at that price. Often the assumption is that the cheaper a product is the more units of that product you are likely to sell, but that hypothesis does not always hold true. Considering how important price and sales are to revenue and growth you decide it's time to actually establish if that assumption is true or not. If you already have the data, you might like to try some speculative correlation analysis to see if you can find unexpected relationships or connections that you could exploit for additional sales. If two variables are correlated that does not imply

that one caused the other, it simply means there is a relationship between them. Don't be caught out by assuming causation. Equally, just because two variables are not correlated does not mean they are independent of each other. Remember, establishing a correlation between two variables is not a sufficient condition to state categorically that there is a causal relationship between the two. A business experiment would help to clarify if a causal relationship does exist.

1.4 Scenario analysis

Scenario analysis, also known as horizon analysis or total return analysis, is a method of projection. It is an analytic process that allows you to analyse a variety of possible future events or 'scenarios' by considering alternative possible outcomes. By planning out the detail required to implement a particular decision or course of action you can observe not only the final potential outcome but also the viability of the path leading to that outcome. Often it's only when you really consider what would be involved in the actual implementation of an idea that you fully appreciate the scope of that idea. Scenario analysis therefore allows you to improve decision making by fully considering the outcomes you expect and their implementation implications without the cost and time involved in actual real-world implementation. Scenario analysis does not rely on historical data and doesn't expect the future to be the same as the past or seek to extrapolate the past into the future, rather it tries to consider possible future developments and turning points.

Use scenario analysis when you are unsure which decision to take or which course of action to pursue. It can be especially useful if the implications of the decision are significant. For example, if the decision would cost a great deal of time or money to implement or if the ramifications of getting the decision wrong could be fatal for the business then scenario analysis can be a very powerful tool. It can be used to assess the possible likely future of different strategic choices

or it can be used to generate a combination of different scenarios that look at the same scenario but from three different perspectives – the optimistic version of events, the pessimistic version of events and the most likely scenario. It is also a very useful tool if you are unclear about what is going to be involved in the execution of a strategy or decision as the process required pushes you to really engage with the scenario you are testing. This amplified engagement can help to anticipate more of the pros and cons of each scenario therefore reducing risk and directing you to the best choice.

Scenario analysis can help the decision-making process by looking at the likely implications of that decision and how it might or could pan out in the future. It can help you to answer:

- Which strategic direction do we take?
- What are the best countries to expand our business into?
- Do I open in a new location or upgrade or expand the retail stores I currently have?
- Do I invest in a new market or seek to increase market share in the one I'm already in?

Scenario analysis can help to prevent errors of judgement and direct strategy.

Essentially, what you are doing in scenario analysis is attempting to work out if the world would turn out a certain way if certain conditions were met. The process usually consists of a five-stage process:

1 Define the problem.

2 Gather the data.

3 Separate certainties from uncertainties.

4 Develop scenarios.

5 Use the outcome in your planning.

Define the problem

Obviously the only reason you would use scenario analysis is if you were trying to gain insight into a particular challenge. The first step is therefore to define the problem you are trying to solve or gain greater understanding of it so that you can make the best decision. It is also important to think about the time horizon. Most decisions need to be made within a timeline so make sure you have enough time to conduct the scenario analysis before the decision needs to be made.

Gather the data

So what is going to affect or influence the scenario you are considering? Identify what data and information you need to make the analysis as realistic as possible. You may, for example, consider trends and what uncertainties exist around your scenario. You could use PESTLE analysis as a guide in gathering data – what could affect the outcome when you consider politics, economy, social, technical, legal and environmental issues? Also seek to identify the key assumptions on which the plan might depend. Separate the certainties from the uncertainties. You will invariably come into the analysis process with a host of assumptions and preconceptions about how the analysis will turn out. It is important that you become aware of what those assumptions are so you can really shine a light of enquiry on to those assumptions and separate the certainties from the uncertainties.

Take a moment to challenge all your current assumptions and decide if they are certainties or uncertainties. It is always best to err on the side of caution; that way if the outcome is better than expected it's a bonus, whereas an outcome worse than expected could be a disaster and would negate the whole purpose of running the analysis in the first place. List the uncertainties in order of priority with the largest, most significant uncertainties at the top.

Develop scenarios

Starting with the top uncertainty – what would you consider to be a good outcome for that uncertainty? What would be a bad outcome?

Once you've done this develop a story of the future around each that marries the certainties with the outcome you've chosen. Do the same with each of the major uncertainties you've listed. Use the scenarios in your planning. This process will give you much more knowledge and clarity around the situation you face and you can use the scenarios to influence and guide your planning. There are commercially available scenario analysis tools on the market that can make scenario planning much easier.

Practical example

Scenario analysis is essentially a planning tool that can allow you to identify various factors that could affect a proposed plan and assess how those factors may play out in the future so you can see which alternative is most likely to work out well. Say you are planning to start a new business that helps clients implement a specific new software program. You want the business to be turning over £1 million within five years. But is that feasible? A friend suggests that you run some scenario analysis to help you get a clear picture of that challenge and how likely that outcome really is. You gather data on trends and current realities. Among other things, you dis- cover that people tend to hold off on buying new hardware and software during a recession and you are currently in a recession. That said, economic pressure also increases potential customers' desire to increase productivity and your software can meet that need. The software vendor is also working on an upgrade that is already at beta testing, so your clients could potentially reap even greater rewards. The only possible challenge is that your software is quite new and innovative so you are unsure how quickly you could recruit consultants to implement the software.

Next stage is to separate certainties from uncertainties. The current economy is an uncertainty, but the recession has definitely increased the number of people looking for work so you can feel more confident that you can find the necessary employees to make this work. You realise you haven't actually seen the beta version of the upgrade so you visit the vendor to see what's in the pipeline and are certain that

the new version will be even more beneficial to your clients. What is uncertain, however, is whether or not any other software company is working on anything similar or better that could seriously undermine your planning and potential outcome.

Based on what you've discovered you create three scenarios to test:

*Best-case scenario assumes that the economy pulls out of recession and grows steadily over the next five years. It also assumes that you've chosen the right software and that no big company swoops in and surpasses your software.

*No great scenario assumes the recession continues for at least another two years, which would probably mean that at least 25 per cent of your clients would choose to defer their investment.

*Worst-case scenario assumes that a global software giant does enter your market and establishes itself within two years. This would definitely put pressure on your new business.

Having looked at the scenarios and considered their planning implications you realise that most of the risk is in the short term. While the economy is a challenge, you could take advantage of this by educating clients in the productivity improvements that software will deliver. The bigger issue is the possibility of another player entering the market with better software, so you decide to make the business flexible by hiring a mix of full-time and contract workers so you can scale up and scale down quickly depending on what actually happens. Additionally, you need to keep a very keen eye on what rival software companies are doing so you can cross-train personnel if necessary. By appreciating the very real threat a rival software company poses to your business you can anticipate that challenge, and are well positioned to monitor it closely so that it does not have the chance to de-rail your plans.

While the outcome of scenario analysis can greatly facilitate better decision making and help to reduce the risk of big decisions, the process of the analysis is probably more important. By creating a few

scenarios – even the out of left-field scenario – you can end up uncovering new information or insights that were previously unknown that can not only assist the outcome but what's happening in the business right now. That said, it's easy to assume that what you think you know about the current situation is true and jump to conclusions, or automatically assume that you are certain about some of the influencing factors. Scenario analysis will always yield the best results when you challenge all your assumptions in the process.

1.5 Time series Analysis

To understand what time series analysis is you must first understand what time series data is. Essentially, time series data is data that is collected at uniformly spaced intervals. For example, the closing value of the FTSE is time series data, or the annual flow volume of the Thames is time series data because the data is measured consistently at particular times to plot the changes. Time series analysis explores this data to extract meaningful statistics or data characteristics. The data collected is not random but rather it is based on the assumption that successive values in the data file represent consecutive measurements taken at equally spaced time intervals. Time series analysis is a forecasting methodology that seeks to forecast what will happen in the future based on what did happen in the past. By analysing time series data, the idea is that you will be able to identify patterns that can then be extrapolated into the future.

You would use time series analysis when you want to identify the nature of the phenomenon represented by the sequence of data observations in order to assess changes over time. Or it can be used when you want to forecast the observable phenomenon into the future. Both of these goals require that the pattern of observed time series data is identified and formally described. Once the pattern is established, we can interpret and integrate it with other data such as weather, season or sales figures to come up with a theory that can then be tested. Time series data is usually plotted via a line chart and this

type of analysis is frequently used in statistics, pattern recognition, mathematics and finance, and in weather forecasting such as severe weather or earthquake prediction. Time series analysis can help the decision making to predict the future. It can help you to answer:

- What will be the economic performance of a business, region, country over the next months?
- To what extent will I be able to improve my production process for this product over the next months?
- What will be the demand for jobs in our sector over the coming years?

You need to gather time series data and seek to remove any errors. Most time series analysis techniques involve some form of filtering out errors, often known as noise, in order to make the pattern more noticeable. The identified patterns can be described either as a trend or seasonality. Essentially a trend represents a general systematic pattern that changes over time but does not repeat within the time range. Seasonality may have a similar nature over time but it will repeat itself in systematic intervals. Both may coexist in real-life data. For example, sales may grow steadily over time and also spike consistently around Christmas. Two of the most common processes for conducting time series analysis are:

- Autoregressive process;
- Moving average process.

The equations for these calculations are not for the faint-hearted but if you would like to know more, refer to the references and further reading section at the end of this chapter. Alternatively, there are many commercially available time series analysis tools on the market.

Practical example

Perhaps you've been asked to provide quarterly forecasts of sales for one of your products over the coming year. These forecasts are important because they will influence production schedules, the purchase of raw materials, inventory and ware- housing policies, and

sales quotas. If you get the forecast wrong then too many or too few products could be made, which would affect the sales department and warehousing not to mention what could happen to your brand and reputation with your customers. You could rely on good judgement, cross your fingers or hope for the best, or you could conduct some time series analysis to identify trends or changes to sales based on seasonality so that you can more accurately predict sales in the coming year. Because you have historical quantitative data about the variable being forecast, and it is reasonable to assume that nothing out of the ordinary is going to happen in the coming year and that therefore the past results will provide a useful projection into the future, then time series analysis can certainly help to reduce the risk.

Time series analysis can be a quick and insightful way to identify trends in results but its accuracy comes down to the quality of the data and an appreciation of 'other' factors that could be influencing the trend. For time series analysis to be genuinely useful you will need to be very confident in the accuracy and reliability of the historical data the analysis is based on. Plus, it is easy to mistake cyclical trends for long-term influences. You may, for example, assume a dip in sales over a few months is some sort of cyclical glitch when it could in fact be due to the impact of a new competitor. By making the assumption that it is a glitch you could forecast too high. If your market or business is going through a period of change then forecasting the future based on the past is probably not going to be the best forecasting technique.

1.6 Data mining

Data mining is often used as a buzzword of generic description applied to any form of large-scale information processing, but this is not very accurate. The term itself is actually a misnomer because it implies that the goal is the data extraction rather than the insights that data can yield. More accurately, data mining is an analytic process designed to explore data, usually very large business-related data sets

also known as 'big data' – in search for commercially relevant insights, patterns or relationships between variables that can improve results and elevate performance. Data mining is essentially a hybrid of artificial intelligence, statistics, database systems, database research and machine learning. And the actual process is the automatic or semi-automatic analysis of large data sets to extract previously unknown yet interesting patterns, anomalies or dependencies that could be exploited. The ultimate goal of data mining is prediction, so you would use data mining if you had large data sets and wanted to extract insights from that data that could help your business in the future.

Clearly in business, being able to predict the future is helpful and can not only reduce costs and assist with planning and strategy, but insights gained from data mining could potentially change the direction of the business. Insights extracted from data mining can also guide decision making and reduce risk. It is important to appreciate, however, that data mining may throw up patterns, anomalies or inter-dependencies, but it will not necessarily tell you the reason for those patterns, anomalies or inter-dependencies. Additional analysis will be required if the 'why' is still important to you.

Data mining can help the decision maker to predict the future. It can help you to answer:

- What are the key factors that our most profitable customers have in common?
- How could we categorise our customers in the smart watch segment?
- What factors are common in fraudulent transactions?
- What are the key patterns people use to navigate our website?

There are three stages in data mining:

The initial exploration; Model building and validation; Deployment.

Stage 1: Initial exploration

First you need to prepare the data, which involves cleaning the data, data trans- formations, selecting data subsets. If the data sets are large and have large numbers of variable fields then some sort of preliminary feature selection will be required to bring the variables to a manageable range. Then, depending on the nature of the analytic problem, initial exploration may involve a simple choice of straightforward predictors for a regression model all the way to elaborate exploratory analyses in order to identify the most relevant variables and determine the complexity and the general nature of the models that can be taken into account in the next stage.

Stage 2: Model building and validation

Next you need to consider the various models you've identified in stage one so you can choose the best one based on their predictive performance. This may sound like a simple operation, but in fact it sometimes involves a very elaborate process. There are a variety of techniques developed to achieve that goal – many of which are based on so-called 'competitive evaluation of models', i.e. applying different models to the same data set and then comparing their performance to choose the best. Core techniques of predictive data mining that are the most popular include: Bagging, Boosting, Stacking and Meta-Learning. For more information on these see the 'Statsoft' website link at the end of this chapter.

Stage 3: Deployment

The final stage of data mining involves using the model selected as being the best from the previous stage and applying it to new data in order to generate predictions or estimates of the expected outcome. The best way to capitalise on data mining is to invest in one of the many data mining tools on the market.

Practical example

Data mining can throw up unusual and unexpected connections between variables that can then be exploited to increase results. Using data mining Walmart discovered that the sale of Pop-Tarts increased whenever there was a hurricane warning. Increased sales in flashlights may have been expected but why people suddenly felt the urge to stock up on sugary breakfast treats was not. But Walmart didn't need to know 'why' there was a connection only that there was a connection. By positioning the Pop-Tarts display at the front of the store whenever there was a hurricane or severe weather warning Walmart were then able to boost sales still further.

More and more people are more and more concerned about the data that is held on them inside big business and what those businesses are doing with it. These concerns are only going to grow so always use data ethically and transparently. Tell your customers what you want to do with their data and make sure that the outcome delivers value to them as well as your business. Consider anonymising the data so that the information is not traceable to a particular person. Often the insights are not customer specific. For example, Walmart didn't need to know who bought Pop-Tarts in a hurricane they just needed to identify the trend to capitalise on it. Never underestimate the value of the data you hold or your obligation to protect it. Data is the new currency and you need to protect the privacy of your customers internally and externally.

1.7 Regression analysis

Regression analysis is a statistical tool for investigating the relationship between variables. It identifies the relationships between two variables and plots the course of that relationship which can then be predicted into the future, whereas correlation analysis explores the strength of that relationship. Regression analysis is a mainstay of economics but has become an increasingly important technique in other fields such as law and government policy. The findings of

regression analysis have, for example, been offered as evidence of liability, evidence of racial bias and evidence of voting violations in legal cases.

You could use regression analysis if you believe that one variable is affecting another and you want to establish whether your hypothesis is true. In order to do so you need to assemble data on the underlying variables you are interested in so that you can employ regression analysis to estimate the quantitative effect of the causal variables upon the variable that they influence. You can also gauge the 'statistical significance' of the estimated relationships. In other words, how confident you can be that there is a close and therefore predict- able relationship between the variables.

Regression analysis can help the decision maker to identify relationships and help predict the future. It can help you to answer:

- Is customer loyalty or customer satisfaction driving profitability?
- Is our brand image and reputation leading to increased sales?
- Is the quality of our products leading to increased customer satisfaction?
- Are engaged employees more loyal?

At the start of any regression analysis you need to formulate a hypothesis about the relationship between the variables of interest. You may, for example, believe that the more educated someone is the more money they will earn. The tentative hypothesis for this assertion could be 'higher levels of educational attainment cause higher levels of earnings where all other things are equal'. You would then need to test this hypothesis using a regression model. Regression models involve the following variables:

i. The unknown parameters, denoted as b;
ii. The independent variables, X;
iii. The dependent variable, Y.

A regression model relates Y to a function of X and b.

$Y = f(X, b)$

Obviously it gets considerably more complex than the above equation. The general computational problem that needs to be solved in regression analysis is to fit a straight line to a number of variable and non-variable points usually visualised in a scatterplot diagram. This can be done via a number of approaches including:

- least squares;
- the regression equation;
- unique prediction and partial correlation;
- predicted and residual scores;
- residual variance and R-square;
- interpreting the correlation coefficient R.

If you want to know more about these explore the links at the end of the chapter. Alternatively, there are many commercially available regression analysis tools on the market that can help you.

Practical example

An estate agent might use regression analysis to understand more about his market and increase sales and revenue. For example, the agent might collect data for all his listings including the size of the house in square metres, number of bedrooms, number of reception rooms, average income in the respective area according to census data, how long the property was on the market and any subjective rating about the appeal of the house. He could then use regression analysis to measure whether and how these variables relate to the price the house is then sold for. He might, for example, learn that the number of bedrooms was a better price predictor than how long the property was listed for. Or that the square metre age predicted price far better than whether the subjective measure suggested the home was attractive or not. The agent may also be able to use regression to find anomalies and price those properties higher because he understands the market in more depth.

The advantage of regression analysis is that it's a familiar technique and it is powerful and flexible. But familiarity can breed contempt, so you need to check the validity of your source data and really question the assumptions that you hold around your hypothesis. For example, you could assume that the higher the education the higher the salary, but there are a multitude of other causal factors that could distort your findings. The biggest traps regarding regression analysis are the assumptions you make and the quality of the data you use. Check both.

1.8 Text analytics

Text analytics, also known as text mining, is a process of extracting value from large quantities of unstructured text data. Most businesses have a huge amount of text-based data from memos, company documents, emails, reports, media releases, customer records and communication, websites, blogs and social media posts. Until recently, however, it wasn't always that useful. While the text is structured to make sense to a human being it is unstructured from an analytics perspective because it doesn't fit neatly into a relational database or rows and columns of a spreadsheet. The only structured part of text traditionally was the name of the document, the date it was created and who created it – all of which could be searched for easier retrieval at a later date. Plus of course you can search a document to find a particular word or phrase, but this type of enquiry requires us to know already what we are looking for. Text analytics is now capable of telling us things we didn't already know and, perhaps more importantly, had no way of knowing before. Access to huge text data sets and improved technical capability means text can be analysed to extract additional high-quality information above and beyond what the document actually says. For example, text can be assessed for commercially relevant patterns such as an increase or decrease in positive feedback from customers, new insights that could

lead to product tweaking or other interesting anomaly. And these insights can be incredibly useful in business.

There are a number of reasons why you might use text analytics. Essentially, there are five main text analytics tasks:

- Text categorisation;
- Text clustering;
- Concept extraction;
- Sentiment analysis;
- Document summarisation.

Text analytics assigns a document to one or more classes or categories according to the subject or according to other attributes such as document type, author, creation date, etc. Text categorisation applies some structure to the text which can then be used for analysis or query. This can be helpful if you have a huge amount of text data that needs to be classified for easier access and usability. Spam filters use text classification to assess the text within incoming emails and decide if the email is legitimate or not. Email routing also uses this technique to re- route an email arriving at a general address to a more appropriate recipient based on the topic discussed in the text of the email. Text clustering allows you to automatically cluster huge amounts of text into meaningful topics or categories for fast information retrieval or filtering.

Search engines use text clustering to deliver meaningful search results. For example, if you enter ‘cell’ into a search engine the results would be clustered around ‘biology’, ‘battery’ and ‘prison’ – all of which use a different definition of the word ‘cell’. Concept extraction is particularly useful if you have a great deal of data that you need to access but need to do quickly to deliver results. These techniques are used in law firms, for example, where there are literally millions of past case documents from their own and other legal cases. Concept extraction analytics can hone in on the documents that are likely to be most relevant to the new case, thus saving expensive personnel a huge amount of time trying to locate documents to use in court.

Sentiment analysis is particularly useful if you want to discover trends, patterns and hidden consensus within text over and above what the text actually says. Sentiment analysis, also known as opinion mining, seeks to extract subjective opinion or sentiment from text so that you can extract whether the data is positive, negative or neutral. Finally, data summarisation allows you to automatically summarise documents using a computer program to retain the most important points from the original document. This can be really useful if you have a lot of reading to get through but not enough time. Search engines also use this technology to summarise websites on result listings.

Text analytics is particularly useful for information retrieval, pattern recognition, tagging and annotation, information extraction, sentiment assessment and predictive analytics. In essence it's about getting more information from text and helping text to be even more useful over and above the actual meaning of the text.

As such, it can help you to answer:

- What do my customers/employees think of my product? (See 1.9 sentiment analysis)
- What is the perception of our employment brand among Twitter users?
- What are the most important issues customer's complaint to us about?
- What are key trends based on the search terms people use on our website?

First, the text that you want to analyse must be datafied not just digitised. This is an important distinction. By some estimates more than 130 million books have been published since the invention of the Gutenberg printing press in 1450. By 2020 the Google Book Project had scanned over 20 million titles or more than 15 per cent of the world's entire written heritage! That's a lot of text. If you copied a page from a book as a jpeg file or took a picture of a page in a book you would technically have a digital copy of the text but that would

be of no value to you if you wanted to run text analytics. What you need is datafied text like the text we see in many e-readers. E-readers such as the Kobo or the Amazon Kindle are not just allowing you to read a digital image of the page, you can interact with the text. You can, for example, change font size, add notes, highlight text or search for specific words and phrases in the book. For most businesses their text will already be datafied, but if you store old customer records in paper files or even microfiche then that needs to be datafied – and that doesn't' just mean taking an electronic copy of the document: it effectively means re-creating it in digital form. It is also important to remove 'stop words' from the text being analysed. A stop word is a word like 'a', 'the', 'of', etc., which appear frequently in all text but don't communicate any unique information about the content or meaning of the text. Once the text is ready there are a number of text analytics options open to you and which one you use will depend on your objectives.

Practical example

You may be concerned about the level of employee engagement and decide to conduct an employee engagement survey. The easiest way to collect this type of data is to create some form of quantitative survey that may ask employees to rate their employer and their opinion on a scale for a number of different questions. But the real nuggets of wisdom usually come from open-ended questions that allow employees to elaborate on their opinions and provide examples. But that type of qualitative data is much harder to assess. You could read through hundreds of questionnaires and that might give you some good ideas, or a sense of who is happy and who is not, but it wouldn't really give you any indication of trends or what the collective was really feeling. Text analytics would allow you to assess all that free-flowing unstructured text and establish trends or clusters of opinion in the business, divisions and within specific teams. The surveys could, for example, be converted into a word cloud which would collate all the text data from the questionnaires and distribute that data according to how many people mentioned that word. The biggest word in a word cloud therefore refers to the word that was

used by the most number of people. If the largest word on an employee engagement survey word cloud was ‘resentment’ or ‘unhappy’ then clearly you’ve got problems. Some organisation that uses text analytics to avoid having to do these types of surveys in the first place. Instead they simply scan and analyse the content of emails sent by their staff as well as the social media posts they make on Facebook or Twitter. This allows them to accurately understand the levels of staff engagement without the time and expense of a traditional survey.

Just because you have text data doesn’t mean you need to apply text analytics to it. Make sure you know what you are trying to discover or be otherwise clear about your objective and the reason for the analysis. Often business owners or senior executives can get really excited about text analytics, especially when they consider the vast amount of text-based data that exists in their archive room or basement. But converting paper-based text documents into something that can be used for text analysis can be a very time-consuming and expensive process, so make sure you have a really valid reason for doing it. Besides, most data have a shelf life so if it’s too old it won’t help you that much anyway. Focus on the new text data you already have access to.

1.9 Sentiment analysis

Sentiment analysis, also known as opinion mining, seeks to extract subjective opinion or sentiment from text (Chapter 1.8), video (Chapter 1.11) or audio data (Chapter 1.12). The basic aim of sentiment analysis is to determine the attitude of an individual or group regarding a particular topic or overall context. The sentiment or attitude may be a judgement, evaluation or emotional reaction. For example, we have known for decades that the words we use to communicate and express ourselves and our opinions only account for 7 per cent of comprehension. The vast majority of our communication is picked up non-verbally through body language and

tonality. Most of us have, for example, experienced asking our children to clear the dishes, or asked an employee to stay late at work and although the words coming out of their mouth may indicate they agree – we are left in no doubt about what they really want to do!

Sentiment analysis seeks to get to the real truth behind communication so that businesses can make better decisions by working out if stakeholders feel positively, negatively or neutrally about our products, business and brand. You would use sentiment analysis when you wanted to know stakeholder opinion. Say you have a lot of text data from your customers. That may originate from emails, surveys, social media posts, etc. There are several hundreds of thousands of words in the English language and while some are neutral, others have a distinctly positive or negative vibe. This polarity of sentiment can therefore be applied to your customer text to establish what your customers as a stakeholder group really think of you.

There are number of software tools that can help you to measure text sentiment around your product or service. Twitter, for example, allows you to separate the positive tweets about your company, brand, product or service from the negative and neutral tweets so you can see how well you are doing in the Twitter verse. Sentiment analysis can help you to gauge opinion, which can in turn guide strategy and help decision making. It can help answer:

*How positive do our customers feel about our brand?

*How does the perception of our product compare to that of products from our competitors?

*What is the perception of our employment brand?

Obviously what someone thinks and feels is very subjective so the data you have in order to analyse this subjective element would need to indicate sentiment in some measureable way. This could be text, audio or video. You can, after all, tell whether someone is happy, angry, happy, excited, etc., by the words they use, the pitch and

tonality of their speech, and their facial expressions. As a result you can apply sentiment analysis to text, speech (audio) and visual interactions (video). Advanced, 'beyond polarity' sentiment analysis can also go further by making a classification as to the emotional state involved. For example, text, audio tonality or facial expressions can determine whether the person is 'frustrated', 'angry' or 'happy'. This type of analytics is becoming increasingly popular with the rise of social media, blogs and social networks where people are sharing their thoughts and feelings about all sorts of things – including companies and products – much more readily.

It is also being used to measure emotional charge on telephone waiting queues or insurance claims lines. Tonality of voice may, for example, indicate that someone is getting upset or it may indicate that they are telling a lie! In the current business landscape, it is increasingly important that we know what our customers, competitors and employees think about the business, products and brand, and sentiment analytics can help us do that – often relatively inexpensively.

Practical examples

Researchers at the Microsoft Research Labs in Washington discovered that it was possible to predict which women were at risk of postnatal depression just by analysing their Twitter posts with text-based sentiment analysis. The research focused on verbal cues that the mother would use weeks before giving birth. Those who struggle with motherhood tended to use words that hinted at an underlying anxiety and unhappiness. There was more negativity in the language used with an increase in words such as 'disappointed', 'miserable', 'hate' as well as an increase in the use of 'I' – indicating a disconnection from the 'we' of impending parenthood.

Co-director of Microsoft Labs Eric Horvitz acknowledged that this type of information can be incredibly useful in reaching out and helping women at this vulnerable time and also to help break down the stigma around postnatal depression. It would be a relatively simple step, for example, for a welfare group to create an app that

could run on a smartphone and alert pregnant women to the onset of potential postnatal depression and direct them to resources to help them cope. NVivo software also used to analyse qualitative data received from customer reviews, tweets and comments in other social medias.

Audio sentiment analytics is also being used to measure stress levels in call centre's so that customer service representatives can measure how upset the caller is and intervene earlier before things escalate. For example, people often talk into the receiver, even when they are on hold or listening to the soothing music; they can also make various sounds such as heavy sighing which can indicate the caller is getting increasingly frustrated.

Sentiment analytics is pretty funky stuff because it can tell us things we didn't know and had no way of understanding in the past. This makes it appealing and sexy so make sure you are not just sucked in because it sounds like a useful thing to do. Like all analytics it is only useful if there is a commercially viable reason for doing it. Make sure there is.

1.10 Image analytics

Image analytics is the process of extracting information, meaning and insights from images such as photographs, medical images or graphics. As a process it relies heavily on pattern recognition, digital geometry and signal processing. In the past the only analysis that was possible on images was via the human eye or if computers were used they could only really assess the name of the image or any of the meta-tags that are stored against the image such as the date of creation, amendment, the owner of the image and the name it was given. For example, if you enter 'pink elephant' into an online search engine the search engine isn't scrolling through the index to find pictures that match the description of a pink elephant, it is scrolling through the index to find meta-tags that match 'pink' and/or 'elephant'. In other words, when the person who uploaded the image

uploaded the image they added descriptor key words to the image to help people find it. That said, just because the tag mentions pink elephant doesn't mean that the image will relate in any way to pink elephants. As a result, any analysis was basic and prone to errors. Now image analytics is considerably more sophisticated.

For example, image analytics is now being used on medical images of biopsies to help doctors identify cancer. In the case of photographs, a digital photograph contains a lot more information than you might imagine; it will record when it was taken as well as where it was taken based on GPS coordinates embedded in the photo. All those additional properties can be analysed to extract more information above and beyond the actual image. Plus, one of the most exciting, and some would argue scary, developments in image analytics is face recognition. There are many applications for image analytics that could prove commercially relevant.

Face recognition analytics, for example, can automatically identify or verify a person from a digital image or video frame. This can be useful if you want to introduce an extra layer of security to your factory or premises. There could be an image of all your employees and image analytics would grant those people and only those people access to the premises. In addition, image analytics can potentially be used for marketing. Facial recognition algorithms used to pick out facial features and analyse their relative position, size, shape, etc., or it would take a gallery of face images, normalise them and only save the distinct elements for facial recognition. These algorithms were therefore either geometric, which looks at distinguishing features, or photometric, which is a statistical approach that distils an image into values and compares the values with templates to eliminate variances. Advances in 3D face recognition technology mean that face recognition is now much more accurate.

Unsurprisingly, companies like Facebook are already ahead of the curve when it comes to face recognition because of the vast image data sets users willingly upload. Indeed, Facebook researchers have reported that their DeepFace pattern recognition system is achieving

near-human face recognition accuracy. It is now possible, for example, for Facebook to recognise a face, compare it to previous photographs of that person and 'decide' if that person has put on weight. If they have, that data could then be sold to a weight loss company who would advertise on that users Facebook page.

Image analytics can help you secure your premises and help you to know more about your customers and what they are buying. Image analytics can help you to answer:

- What and how many photographs contain our brand name?
- Who are the customers that use our products?
- How do we increase the security and improve access control?

Obviously in order to use image analytics you need to have images to analyse. If you do have images or you already do have recorded video footage of your stores or premises, then you could use that video footage as your source data. Alternatively, if you have access to other images such as medical images then you could use image analytics to extract insights. Of course there are tight laws around the use of data including images, so you will need to be mindful not to infringe on those laws. Although image analytics can be incredibly useful in detecting patterns or anomalies in medical images and face recognition can be used for security and customer insight it's probably not that appropriate for most businesses.

Practical example

Casinos are currently using image analytics to identify high rollers for special treatment and presumably to identify people they want to keep out of their casinos, too. In Japan, grocery stores even use this technology to classify shoppers and blacklist serial complainers or shoplifters. The biggest concern, especially around face recognition, is that it can be used without the person's knowledge or consent. From a safe distance someone can covertly identify an individual by name which then connects to intimate details about that person such as home address, dating preferences, employment history and religious

beliefs. In 2011 researchers at Carnegie Mellon reported that this was not a hypothetical risk when they used a face recognition app to identify some students on campus by name, linking them to their public Facebook profiles and, in some cases, to their Social Security numbers. It is especially potent because of the internet. There is now so much image data online that businesses don't even need to hold that data themselves for it to be useful. It is possible therefore to use image analytics to effectively scan the internet to gain insights and information about your customers and what offers or promotions they may respond to. In many ways image analytics represents a brave new world and it may only be a matter of time before legislation adds more controls and consumer safeguards.

Like all analytics, image analytics is only really going to be useful if it helps to answer key strategic questions that you have as a business. The biggest trap is privacy. Just because you can get your hands on images to analyse doesn't necessarily mean you should, or that what you are doing is ethical. Make sure you have a specific reason for using image analytics that is morally defensible and where the outcome will deliver additional value to your customers.

1.11 Video analytics

Video analytics is the process of extracting information, meaning and insights from video footage. Of course video analytics can do everything that image analytics can do plus a bit more. Whereas image analytics looks at a still image – either that of a photograph or medical scan and seeks to find patterns, anomalies or identify faces in the pictures – video analytics can also measure and track behaviour. Traditionally, video data was only really gathered on CCTV for security purposes to monitor retail or business premises for shoplifting, malicious damage or employee wrongdoing. The purpose of the video footage was to protect the business and provide evidence if something happened. If nothing happened the recordings would be erased so the tape or digital hard drive could be re-used over and over

again. All that data wasn't saved because a) there was too much of it and b) there was no way to use it. But again all that has changed. Increases in storage capability and analytics techniques mean that all that video footage is now very useful.

Video analytics can now be used for:

- Identification (face recognition);
- Behaviour analysis;
- Situation awareness.

You may want to consider using video analytics if you want to know more about who is visiting your store or premises and what they are doing when they get there. Face recognition can maintain security and also you can use face recognition (see Chapter 1.10) to find out more about your customers. But because video data is dynamic, not static like image data, you can also use it to monitor your customers' behaviour and learn more about how they react to offers, etc. It is, for example, now possible to collect data from different CCTV cameras in a retail environment, upload that data to a cloud server without additional infrastructure costs and analyse the footage to see how your customers behave and how they move through the store. This data can help you to see how many people stop at a particular product display or offer for example, how long they engage with it and whether or not it is working and converting into sales.

You could also use video analytics to reduce costs, risk and assist decision making. For example, there is now software that allows you to automatically monitor a location 24/7; that video footage is then analysed using video and behavioural analytics solution and alerts you in real time to any abnormal and suspicious activity. Once installed and provided with the initial video feed, the software observes its environment, learns to distinguish normal behaviour from abnormal behaviour and sends relevant, real-time alerts to security personnel. The system is also self- correcting, which means that it continuously refines its own assumptions about behaviour and no human effort is required to define its parameters. Video analytics

can be incredibly useful in business to increase security and understand more about customer behaviour. It can help you to answer:

- Who is using our product (e.g. brand scanning in YouTube videos)?
- How effective is our shop/warehouse/airport/etc., layout?
- How can we analyse the behaviour and performance of our employees?
- How can we improve security?

In order to use video analytics, you need video footage. Most businesses, especially in a retail environment, already have this data but they don't use it behind the basic security backup should something go wrong. If you already have this data then you may want to consider applying some analytics so you can use it more effectively. Plus because of advances in data storage and technology like cloud computing you don't need to invest a great deal more in order to yield some really powerful insights. Data from multiple CCTV cameras can easily be uploaded to a cloud server for analysis and insight that can help you to deliver better service and provide more enticing offers that your customers respond to.

For example, you have a display in your store but no one is stopping at it or picking up the product, you can see this within a matter of days and change the display until it does work.

Practical examples

I worked with a global retailer to help them utilise video analytics more effectively. Originally they approached me to help them discover how long their customers waited in a queue because they wanted to reduce the waiting time at the till. We were able to answer this question by using the CCTV footage that was already being recorded. Prior to our involvement each CCTV camera in every store had its own database and it would record the images for a week and then overwrite those images with new footage. Realising that this data held far greater value than simply preventing theft, the retailer

decided to connect all the cameras in all its stores to one big cloud database that holds all the CCTV camera data. Specialist software then puts it all together to recognise movement and pat- terns as well as face recognition. Not only was the retailer able to identify how long people were waiting to queue and reduce that wait time, it was also able to combine all the images from different cameras to see how individuals walked through the store, which aisles they visited and which promotions were working and which ones were not.

Another customer of mine is Prozone, a leader in sports analytics. They collect data gathered from a number of cameras placed around a football or hockey pitch, for example, and track players. The system creates over 10 data-points per second for each player on the field and allows coaches to analyse all activities, on and off the ball, to answer questions like: miles covered by each player, successful and unsuccessful passes or tackles for each player, and even which players best attract opposition players away thus creating new spaces and attacking opportunities?

Video analytics can also assist decision making in complex, highly fluid situations such as aviation, air traffic control, ship navigation, power plant operation and emergency services. Using technology and video footage to alert personnel to changes or anomalies can also help to save lives and prevent crime. This type of analytics where it can all happen without a person's permission is currently a grey area in law. But there will come a time when it won't be, so always deliver best practice, treat all data with respect and privacy and ensure that if you are using your customers' video data then you are making sure the outcome is ethical and adds value to them not just your business.

1.12 Voice analytics

Voice analytics, also known as speech analytics, is the process of extracting information, meaning and insights from audio recordings of conversations. This form of analytics can analyse the topics or actual words and phrases being discussed in a conversation. This can be extremely useful for security purposes and certainly counter terrorist units inside most governments monitor a lot more of our conversation than we might imagine in order to identify people talking about things that they either shouldn't be talking about or to help identify potential treats. Voice analytics can also be used to analyse the emotional content of the conversation above and beyond the actual words and phrases being discussed. When we get angry, for example, the pitch and tone of our voice changes, this is also true for most of us when we lie and so voice analytics can identify these changes in emotional state.

All businesses need to keep their customers happy if they want to stay in business and stay ahead of the competition. If you have a product or service that requires technical assistance or you have large customer service call centres then this type of analytics can be really useful in maintaining and building ongoing customer relation- ships as well as highlight issues that need to be addressed. You could, for example, use voice analytics to help identify recurring themes around customer complaints or recurring technical issues. These insights could help you to spot these potential pitfalls quicker and solve them before your customers take to social media to complain.

Voice analytics can also be used to help you identify when your customers are getting upset. By analysing the pitch and intonations of conversations taking place in your call centre you can gauge the emotional state of your customers and intervene earlier when they are getting angry or frustrated. The amount of speech and location of speech versus silence, i.e. call hold times or periods of silence, can also help customer-facing businesses provide better service and keep their customers happier. As a result, the conversations we've been told 'may be recorded for training purposes' can actually be used for

training and provide useful insights instead of being lost or recorded over. This type of analytics is also very useful in helping to identify underperforming customer service representatives so they can receive additional training or coaching, and can automatically monitor the level of customer service provided on calls, i.e. does the emotional customer end the call still upset or are they calmer and much happier? This is important information for customer retention and loyalty building. Voice analytics can help you to answer:

- What do customers really think about our brand/product?
- How can we identify the customers that are upset and likely to leave?
- How can we identify lies (used in police forces and border agencies)?
- How can we make our operations more efficient (and cut down on, for example, form filling)?

Voice analytic tools can spot spoken keywords, phrases or emotional tonality either as real-time alerts on live audio or as a post-processing step on recorded speech. It is actually this type of analytic ability that helps live TV and radio shows manage the unpredictability of guests. Obviously it's important that people don't swear on live shows, especially before the watershed, so voice analytics can help to recognise speech patterns that may be leading up to swearing and cut that person off before any damage is done. Clearly if you want to use voice analytics you need to have voice data to analyse either as live audio or recorded conversations. And the more recent that data is the better, certainly for ongoing extraction of commercially relevant insights. The most obvious source of voice data is from call centres or customer services departments which are interacting with customers all the time. In more cases, certainly within large businesses, this data will already exist and customers in call waiting queues are usually told that the conversation may be recorded. If this data already exists then it makes sense to use it more constructively in order to discover strategically significant information about products, processes, operational issues, areas for improvement and customer service performance. Voice analytics can provide you with

information about what your customers really think about your company, products and services without much additional investment in market research. It is essentially about leveraging data you already have.

If you don't currently record your customer conversations, then you may want to start. Technology for recording conversations is very common and inexpensive and so long as you tell your customers that the calls are or may be recorded then you can use that data to extract additional value from a service that you are already providing.

Practical example

Voice analytics can be used to extract value from what's being said and how it's being said in a way that simply wasn't possible a decade ago. There are many social and commercial applications for voice analytics because it can help us to identify when someone is stressed, scared, happy, sad, or even when they are lying. For example, voice analytics is already being used by insurance companies to help detect insurance fraud. If someone calls up a claims line and tells a representative about a new claim for a car accident or damage claim on their home, then this type of analytics will help to detect who is lying and trying to commit insurance fraud. Insurance fraud is a huge ongoing problem for the industry that customers often end up paying for through increased premiums. Voice analytics is helping to identify the cheats, which will hopefully help everyone else. As well as providing useful business insights voice analytics can be seen commercially in voice recognition software for Dictaphones and smartphone dictation apps. Plus, it is this analytic capability that you are using when you talk to Siri on Apple's iPhone or Microsoft's Cortana which is available on new Nokia phones. By talking into your smart device the technology will decipher what you said and either take you to a specific website or remind you to send a birthday card to your friend. Also many modern cars offer a text-to-voice feature so that if you get a text message to your phone the car will convert the text to speech so you can hear your message without disrupting your driving.

For voice analytics to be truly effective and useful the voice data needs to be clear and crisp so make sure you invest in quality equipment. And use the data to answer specific strategic questions and seek constant improvement rather than just seeing what the data tells you. Recording conversations can make people nervous. For employees it can feel like a 'big brother' intervention that is designed to monitor what they are doing and saying. It is important therefore that any decision to record calls is positioned correctly for both the customers and the employees. Be sure to share the insights you learn with your people so they can appreciate that you are not listening to their every call but listening to what's going on behind the call and you can't record people without their permission so you need to tell your customers and employees that they are being recorded and allow them to opt out if they want to. Make sure you stay apprised of any changes to the law that could affect voice data and always err on the side of ethical caution.

1.13 Monte Carlo simulation

The Monte Carlo simulation is a mathematical problem-solving and risk assessment technique that approximates the probability of certain outcomes, and therefore the risk of certain outcomes, using computerised simulations of random variables. The probability-based technique is used in fields such as finance, project management, manufacturing, engineering, research and development, insurance, oil and gas and transportation. It is useful for any industry or business that needs to assess risk of a future strategy or plan.

When you are seeking to forecast or predict the future to assess risk you need to make some assumptions around that scenario. For example, if you want to forecast the return on investment on your share portfolio you will need to make assumptions about the economy, return on investment and perhaps some assumptions about the businesses or markets where you hold shares. If you want to forecast the implications of moving premises or building a new plant

then you will need to make assumptions around how long it will take, the impact it will have on business and the cost of borrowing, etc. Obviously these are often little more than educated guesses. There is no certainty around these assumptions and yet the assumptions that are made can massively impact the result.

The Monte Carlo simulation allows you to estimate ranges of values instead of a single guess. This creates a far more realistic picture of what might happen in the future. For example, you could estimate that the new plant will be ready in 12 months, 14 months, 16 months or 24 months. As such, this technique provides the decision maker with a range of possible outcomes and the probabilities of each outcome for any choice of action. The technique is named after the casino-rich resort town of Monaco. It was first used by scientists working on the atom bomb and since the Second World War it has been used to model a variety of physical and conceptual systems.

You could use the Monte Carlo simulation if you want to better understand the implications and ramifications of a particular course of action or decision. It is especially useful when there is a high degree of uncertainty around some of the assumptions you need to make. For example, if you were considering launching a new product there are many unknown variables to consider. You don't really know how long the product will take to perfect, you don't know how long it will take to manufacture the product and iron out the glitches. Where many of the assumptions you need to make fall within a range rather than being a best-guess assumption you are confident in then the Monte Carlo simulation could help limit the risk so you are able to execute the strategy with more certainty and awareness of the best-case and worst-case scenarios. In essence this technique illustrates the extreme possibilities that could occur. Looking at the implications from worst-case scenario through the middle ground and into best-case scenario, along with the probability of each of those scenarios happening you get a much better idea of the risks and rewards of your proposed intervention.

Monte Carlo simulation can help the decision maker to get a much clearer, broader understanding of the risks and rewards of a particular course of action. It can help you to answer:

- Which product should we launch next?
- Which investments will yield the highest returns?
- Should we acquire this company or not?
- How long is a complex project or programme likely to take or cost?

If you are using a Monte Carlo simulation you are building a model of possible out- comes by substituting a range of values known as a probability distribution for any unknown or uncertain factor. The result of the model is recorded, and the process is repeated over and over again. Depending on the number of uncertainties within the simulation and the ranges specified for them, the simulation can involve hundreds, thousands or even tens of thousands of calculations. Each simulation calculates the model using different randomly selected values. When the simulation is complete there will be a large number of results from the model, each based on random input values. These results are used to describe the likelihood of the variables actually happening. And the Monte Carlo simulation produces distributions of possible outcome values, which can aid decision making and help lower risk.

Practical example

Say you have an upcoming project and you really need to know how it's going to pan out because the success of the project has far-reaching consequences for your business and therefore your career. A normal forecasting model would start with some fixed estimates around a number of variables but you don't feel suitably confident that the fixed estimates are correct. There are three parts to the project and each must be completed before the project is finalised, so in a normal forecasting model there would be three fixed estimates and a total estimate. You would feel happier if you could also figure out the likelihood that your estimates were correct. The Monte Carlo

simulation allows you to do that because you can enter a range of completion times to cover the best- and worst-case scenarios for the completion of the project. The simulation will then run and provide you with the probability for each variable. So, for example, if you thought the total completion time would be 15 months the Monte Carlo simulation would tell you that there was a 42 per cent chance of completion in 15 months and there was an 82 per cent chance it would be finished in 18 months. That sort of insight and understanding can certainly help to manage the project and determine the impact of those additional three months that you hadn't accounted for. The key feature of a Monte Carlo simulation is that it can assess ranges of variables and, perhaps most importantly, the likelihood of each estimate or assumption in that range actually happening. And that can give you a significantly better under- standing of the risk and uncertainty involved.

Like any forecasting model or predictive technique, the Monte Carlo simulation is only as good as the estimates and assumptions you put in. Use your past experience, historical results and expertise to create a realistic and plausible range to test. Remember, the simulation only represents probabilities and not certainty, but it is still a powerful tool for helping to navigate an unknown future.

1.14 Linear programming

Linear programming, also known as linear optimisation, is a method of identifying the best outcome based on a set of constraints using a linear mathematical model. It allows you to solve problems involving minimising and maximising conditions such as how to maximise profit while minimising costs. For example, taking the limitations of materials and labour you could use linear programming to determine the 'best' production levels in order to maximise profits under those conditions. It was originally developed in 1937 by Leonid Kantorovich during the Second World War as a way to plan expenditures and returns so as to reduce costs to the army while

maximising the losses incurred by the enemy. The method was kept secret until 1947 when it was simplified by George Dantzig and moved out beyond the military.

Today, linear programming is used extensively in various fields including business, economics and engineering to identify the optimum solution among various linear relationships and constraints. Linear programming is part of a very important and useful area of mathematics called optimisation techniques. Clearly being able to optimise your resources is an important skill in successful business and beyond. As such you would use linear programming if you have a number of constraints such as time, raw materials, labour, profit margin and you wanted to know the best combination or where to direct your resources for maximum profit. Linear programming is essentially a resource allocation process that can help guide decision making and increase revenue.

It is possible to model many diverse types of problems such as planning, scheduling, routing, assignment and design using linear programming. Industries that use this technique effectively include transportation, energy, telecommunications, and manufacturing.

Linear programming can help you to decide how best to allocate your resources to maximise your outcomes. It can help you to answer:

- How do I best allocate resources to optimise processes?
- How do I best deploy resources to maximise returns?
- What is the optimal delivery route, given our constraints?
- What is the optimal level of energy to use to maximise output?

The first step in linear programming is to define your control variables (typically quantities of X and Y). You then need to define the objective function. In other words, identify what you are trying to maximise or minimise. Next you need to write the constraints as inequalities in terms of the control variables. And finally solve the problem graphically. The resulting graph visualises the inequalities, known as constraints, to form a ‘walled-off’ area on the x,y-plane.

This walled-off area is called the 'feasibility region', which then allows you to figure out the coordinates of the corners of this feasibility region. This is done by finding the intersection points of the various pairs of lines. Once you know those you test these corner points using the optimisation equation to identify the highest or lowest value.

Practical example

The following example and graphs were sourced from http://www.thestudentroom.co.uk/wiki/revision:linear_programming . Say you run a manufacturing plant making two main products – product X and product Y. You only have so many employees on the production lines and the production lines are only able to make one product at a time. There are only so many employees capable of working so many hours and the raw materials used to make each product are the same yet the sale price and units sold are different. You're not really sure how you should allocate the various resources in your factory. You use your expertise and look at historic data to help, but you can't help feeling that there has to be a better way and decide to use linear programming to help direct your decision making. Your controllable variables are product X and product Y. And your objective function is to figure out how to maximise your profit and identify your constraints:

"Product X takes 6 hours to create and generates £12 profit; Product Y takes 4 hours to create and generates £6 profit; Due to various limitations the most of either that can be produced is 400 units; There are 1,700 assembly hours available". How to Maximise Profit?

The resulting feasibility region is shown on the following graph:

Control variables

Let x be the number of widget X produced.

Let y be the number of widget Y produced.

Objective function

Maximise $12x + 6y$

Constraints

$$x \geq 0$$

$$y \geq 0$$

These are the non-negativity constraints

$$6x + 4y \leq 1700$$

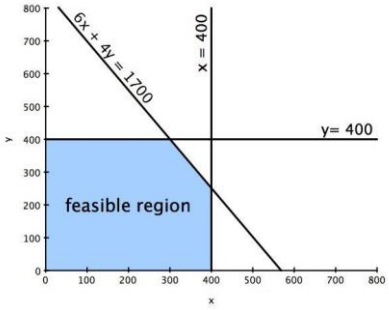
6 hours of X plus 4 hours of Y must total less than 1700

$$x \leq 400$$

$$y \leq 400$$

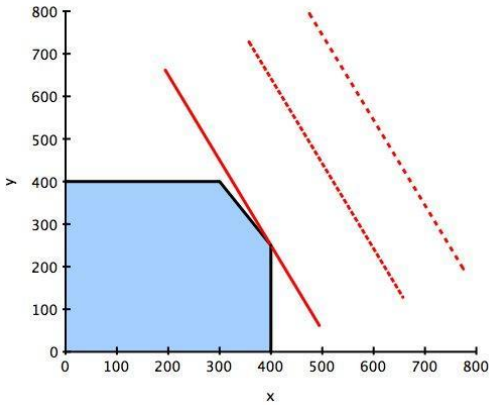
At most, 400 of each item can be produced

Graphically, The feasible area is shown on the graph below.



Profit is maximised at one of the corners of the feasible region (the nodes). To find out which one, consider the objective function. Draw on a line with the gradient of the objective function (in this case, -2). As you move the line closer to the feasible region, which node will be hit first? This point is the one where profit is maximised.

(Alternatively, plug the x and y values of the nodes into the objective function and choose the largest value).



In this case profit is maximised at (400, 250). Therefore, 400 of widget X and 250 of widget Y should be made. This would give a profit of £6300:

$$400 \times 12 + 250 \times 6 = 6300$$

Blending problems

You may be told that one component must be at least x% of the total product. For example, at least 30% orange juice in a juice drink. In this case formulate it as follows:

$$0.3x \geq x + y + z$$

Where x is the quantity of orange juice and $x + y + z$ is the total quantity of all ingredients.

In the production process it is very easy for bottlenecks to occur and it's always a constant dance to figure out how best to use the resources you have. If you don't watch production closely, machines can lie idle while others are overused. Linear programming can help you to

highlight these challenges so you can make the most of what you have. Of course it is only really useful for problems that can be expressed as linear equations (represent a straight line). Not all constraints are as helpful, in which case linear programming will not work. Plus, there are always other factors that you may need to take into consideration such as weather conditions or wider market conditions. Use it as a decision-making tool but don't rely on the results totally without considering how other uncertain factors could impact those results.

1.15 Cohort analysis

Cohort analysis is a subset of behavioural analytics which allows you to study the behaviour of a group over time. The groups or cohorts in this context are aggregations of data points, or relevant stakeholders in your business, and the data may come from e-commerce platforms, web applications or sales data. The groups being analysed usually share a common characteristic so that you can compare cohorts and extract some potentially meaningful insights. The behaviour being assessed can be anything that is of interest to you and your business. The goal of any business analytic tool is to analyse data and extract actionable and commercially relevant information that the business can use to increase results or performance. But a database full of hundreds of thousands of entries relating to all users, across many different categories and time spans can make it difficult to extract much in the way of useful insights. The universe of data is too large and too jumbled. What makes this technique so useful is that it allows you to see patterns in the data more clearly – patterns that would otherwise be missed if the data was not clustered in cohorts. By drilling down into each specific cohort you can gain a much better understanding of that group's behaviour. Obviously when you understand what a specific cohort or group is doing you can modify your approach to improve results. Cohort analysis is especially useful if you want to know more about the behaviour of a group of your stakeholders such as customers or employees. Rather than having to

take a broad brush look at what all your customers are doing or how they are reacting to a new product or change in service, or, for example, looking at absenteeism across all your employees, you can get a much more accurate picture of what's really going on if you can divide those stakeholders into groups that share similar features. Cohort analysis is therefore more commercially relevant and can help you identify problems and make better decisions. Cohort analysis can help guide decision making, especially around decisions that could alter behaviour in important stakeholder groups. It can help you to answer:

- Who are my most profitable customers?
- What characteristics do my different customer groups share in common?
- How do particular groups of my customers behave?
- What characteristics do particular groups of employees share in common?

There are four essential steps in cohort analysis:

1 You need to determine what questions you want answered. What are you trying to find out about your stakeholder group or sub-groups? The whole point of analysis of any type is to provide answers to strategically important questions so you can identify what needs to be done differently or what opportunity needs to be exploited in order to improve some element of your business.

2 Next you need to define the metrics that will be able to help you answer the questions you've identified. Cohort analysis requires the identification of the specific properties you are going to examine in the group. For example, gender, date of first or last purchase, level of purchase, etc.

3 Next you need to define or identify the specific cohorts you are going to assess. This will often require you to perform attribute contribution in order to find the relevant differences between each group or sub-group so that you can use that difference to explain the difference in their behaviour.

4 Finally you perform the cohort analysis. The findings are often then visualised in a graph or table. This visualisation can help spot the patterns that will then shape decision making.

Practical example

Perhaps you want to know more about who is buying your products. You can look at sales data to see how many sales you've made and you can look through demographic data, but if you looked at all the data as one data set if wouldn't necessarily be obvious if you were selling more to one market segment than another. Cohort analysis allows you to create and assess the sub-groups or cohorts that exist within the single large data set called 'customers' and drill down to see if there are any additional insights that could improve your results.

You might, for example, discover that you have groups or cohorts that outsell all the other groups combined. If you discover that most of your sales are made to women between 35 and 45 then you can tailor your marketing and advertising to further tap into that lucrative market and increase sales. Cohort studies are based on past result data or what your group under investigation did in the past. This can be a trap because what happened before will not necessarily happen in the future.

1.16 Factor analysis

Factor analysis is the collective name given to a group of statistical techniques that are used primarily for data reduction and structure detection. In modern business we are inundated with data. New data, old data, new types and formats of data – we are literally drowning in the stuff. And having too much data can be just as useless and debilitating as having too little. Factor analysis can reduce the number of variables within data to help make it more useful. This reduction in variables within the data also makes it much easier to detect a structure in the relationships between those variables which makes

the variables easier to classify. This is made possible because of a key concept – that multiple observed variables have similar patterns of responses because they are all associated with a latent variable, i.e. a variable that isn't or can't be measured. For example, people are likely to respond similarly to questions about personal income, education and occupation because those questions are all associated with the latent variable of socioeconomic status. It originated in psychometrics and is often used in behavioural and social sciences, marketing, product management and operations research. It is particularly useful when you have large quantities of data to analyse and draw insight from.

You would consider using factor analysis if you need to analyse and understand more about the interrelationships among a large number of variables and to explain these variables in terms of their common underlying dimensions or factors. For example, if you have gathered a treasure trove of quantitative and qualitative data about your customers and what they think and feel about your product offerings, this is potentially very useful. But only if you can unravel the interdependencies and appreciate what variables affect what outcome. This can be very difficult when there are a lot of potential variables and a lot of potential outcomes. Factor analysis can help, condensing the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information.

Factor analysis can help you extract insights from huge data sets. It can also help you to identify causal relationships that could direct strategy and improve decision making. It can help you to answer:

- What factors have my least loyal customers in common?
- What are the factors that make our youngest customers buy our product?
- What factors are associated with high staff turnover?

Say you were going to use factor analysis for marketing purposes; there are four basic steps:

1 Identify the relevant attributes your customers use to evaluate your products in any product category. Anything from five to 20 attributes can be chosen such as colour, size, weight, price, ease of use, etc.

2 Use quantitative market research techniques to collect data from a sample of your customers to establish how important they rate your identified attributes.

3 Input the data into a statistical program such as SAS or SPSS and run the factor analysis process. The program will then yield a set of underlying interdependencies between the attributes or factors. For example, colour may positively influence sales, or weight may negatively influence sales.

4 Use these factors to improve your products and or marketing message.

Practical example

Factor analysis can be used to improve employee engagement because it allows you to analyse the structure of the interrelationships or correlations among a large number of variables by defining a set of common underlying dimensions, known as factors. If you realise that your staff turnover is too high but you are unsure why, you may conduct exit interviews and initiate an employee survey. But the data alone may not tell you very clearly what is happening in the business. By identifying all the salient attributes that you can think of that may be causing the high turnover you can then use factor analysis to assess the correlations and identify patterns that can help you to solve or at least reduce the problem. This is particularly useful because both objective and subjective attributes can be used provided the subjective attributes can be converted into scores. Often in issues such as staff turnover or high absenteeism it's the qualitative subjective data that holds the key to solving the issue. This technique can also identify relationships and latent dimensions or constraints that direct analysis may not.

So long as you have the right statistical program factor analysis is very accessible. It's easy and inexpensive. That said, its ultimate usefulness depends heavily on the researchers' ability to collect a sufficient and relevant set of attributes. If important attributes are missed or ignored, then the value of the analysis is significantly compromised and may lead to poor decision making.

1.17 Neural network analysis

In order to understand what neural network analysis is we need first to know what a neural network is. Essentially, a neural network is a computer program modelled on the human brain which can process a huge amount of information and identify pat- terns in a similar way that we do. Many neural networks also learn as they process like we do and as such they improve over time. Neural network analysis is therefore the process of analysing the mathematical modelling that makes up a neural network. This analytics technique is particularly useful if you have a large amount of data. Because neural networks recognise patterns and learn to improve their recognition ability, their insights can help make predictions. These predications can then be tested and the results used to improve decision making and performance. Neural networks are already widely used in industries such as banking, fraud prevention, medicine and manufacturing.

This type of analysis can be applied to many different systems of data in a wide variety of fields. In business, neural network analysis can help you improve sales forecasting, customer research, and target marketing. Analysis of neural networks can also be helpful in streamlining manufacturing processes and assessing risk. It can also be used to determine the effectiveness of a neural network's ability to learn. Remember, a neural network is designed to mimic the learning and pattern recognition features of the human brain so the results of the analysis can be checked against the results interpreted by a human user to see how close they are. This can guide the ongoing

development of the neural network making it more and more useful and more and more accurate.

Whether helping people to solve statistical problems or creating simulations of complex environments for testing, the analysis is an essential part of making a neural network increasingly useful. There is little doubt that as they advance and evolve, the uses for them will continue to grow. Neural network analysis can help to forecast the future and process large quantities of data. It can help you to answer:

- What products are our customers likely to buy?
- How many products are we likely to sell, especially across a complete portfolio of products with cross-effects?
- What variables influence the buying decision of our customers?
- What is the optimal allocation of advertising expenses?
- Where do we have bottlenecks in our manufacturing process?

First you need to decide what problem you are trying to solve using a neural network and then gather data for training purposes. Essentially you need to train the neural network to process data and decipher patterns so that the result is constantly improving as the network learns. Ideally the training data set should include a number of cases, each containing values for a range of input and output variables. You will need to decide what variables to use, and which and how many cases to gather. Initially your choice of variables will be guided by your own experience of the problem area you are seeking answers on. Let your intuition guide you regarding which input variables are likely to be influential. Include the ones you think have the most impact and test to see if you are correct. Re-test until you whittle down the variables.

Practical example

Neural networks are already used to create models of the human body which allow healthcare professionals to test out the results of certain medical interventions before they are conducted in the real world.

This is of course incredibly useful and potentially lifesaving. These simulations then provide additional information that can help doctors make the right decisions. Google's Science Fair grand prize was actually won by an American teenager who used neural networks to create an app that can accurately diagnose breast cancer in biopsy tissue 99 per cent of the time. With no medical training Brittaney Wenger created the app using a vast amount of different data points, and the neural network is able to learn and detect patterns that can't be detected by the human eye. For years' doctors have found it incredibly difficult to diagnose breast cancer based on a biopsy but Wenger's program is set to change breast cancer diagnosis forever. Neural network analysis is a complex analytics methodology that normally requires the input from experts in neural network analysis as well as the use of specialist software.

1.18 Meta-Analytics – Literature Analysis

Meta-analysis is the term that describes the synthesis of previous studies in an area in the hope of identifying patterns, trends or interesting relationships among the pre-existing literature and study results. Meta-analysis is essentially the study of previous studies. For example, a meta- analysis of lung cancer would synthetize all the studies ever conducted on lung cancer into one meta-study. Often these meta-studies can provide a fuller, richer picture of the research area. You don't always have to conduct your own analysis to benefit from the analysis. If what you want to find out has been the topic of a number of studies, then you can collate all the previous information into one meta study so that you can obtain the insights without conducting any of the original analysis yourself. So long as the analysis is in the public domain or relatively easy to access this approach can be considerably cheaper than running your own analysis.

Meta-analytics can help you to answer:

- What are the trends in market X?

- How is customer behaviour likely to change over the coming years?
- What will be the role of mobile computing in our industry?
- What factors are most important for staff engagement?

Conceptually a meta-analysis is a statistical approach that combines data from multiple sources to provide a broader, richer and potentially more accurate insight into the area being studied. If several existing studies disagree then meta-analysis can highlight these differences and determine the statistical likelihood of which findings are likely to be more accurate. This can then allow you to generalise into a larger population so that you have a better and more accurate idea of what will happen in that larger population. Meta- analysis becomes more precise and accurate the more data is used, which can therefore yield more insights and they can be tested.

Practical example

Meta-analysis could be particularly useful if you were looking to enter into a new market or geographic territory. If you don't already operate in that market or territory, then you may be tempted to make assumptions about buying behaviour and the suitability of your products or services to that market. If, however there have already been some studies conducted on this new market or territory – even if they are focused around different products or services – you could collate these studies and seek to identify patterns of behaviour that could influence your decision making and minimise the risk.

The better the individual studies the better the meta-analysis. Sourcing and validating studies to include is therefore important but can be time-consuming. In addition, if the studies have been badly designed then they can skew results. Only use robust studies that have been methodically designed.

CHAPTER 2

BUSINESS ANALYTICS – PRACTICES AND TECHNIQUES

2.1 Building an Analytics Organization

The analytics team is the only crucial factor for the success of digital analytics. People, one in the P's of analytics, are the key drivers of an analytics team's understanding of performance. In reality, above and beyond infrastructure, systems, data science, big data, optimization and prediction, the analytics team does the hard analytical work. The analytics team provides customers with the critical human interface for analytical projects. The team provides manual processing by which analytical requests are evaluated for viability, prioritised, tracked, delivered, monitored and closed. Most notably, the squad managers assist the front office and serve as the team's representation for the future. Thus, you must hire individuals with the proper mix of technological, market and social skills to provide business people with an efficient and informative analysis.

Digital Analytics Team in Organization

What is the correct mix of technological, corporate and social skills? The response is undoubtedly arbitrary depending on each company's specific needs. Due to the mainstreaming and growing relevance of analytics in the business world today, I often hear the words "data scientist" and "group hacker," along with lists of specialised statistical capabilities, new technological knowledge (for example, Hadoop or Cassandra) or Business Intelligence (BI) software bundles. Even if it is without any doubt essential for the team to obtain the requisite level of expertise and capability to capture, process and handle the technological essence of analytics, such skills are not always required. After all, intelligent (and willing) people who wish to learn will learn even the most esoteric scientific and mathematical abilities.

This being said, the technological expertise and/or resources of the right infrastructure departments should of course, be sufficient, but note that analytics does not require database operations. Take the scarcity of data scientists who appreciate digital data for example. There is no unheard of hiring data scientists with statistical expertise in diverse fields and then training them digital principles for the execution of digital data science.

This chapter offers a structure for developing or restoring an analytics team to concentrate on market value, which must be the end product of effective research regardless of the technology driving the use or analytical approaches used. This organization was structured to include detail subsequent such as:

- The sorts of knowledge that observers may use and the various forms of work and organization tasks typically found in analytic teams
- A debate to devise a corporate rationale for an investment consideration to build a research team and finance acquisitions in analytical technologies and instruments and to introduce them to market participants
- The way to verify and prove that the analytics unit generates market profit – and thus supports the presence of the team
- Management philosophy and structure widely used by analytical teams as well as discussion of positions and duties for and how to build analytical team members

Steps involved in developing the organization with data analytics team

Numeracy: Knows how to use algebra and statistics to deal with numbers. The analytical team must be capable of numerically reasoning and employing mathematical skills.

Sufficiently technical: it is important to know – at a sufficient level of detail to do the job – how to use processes and technology in which digital content is gathered, processed, reported and evaluated, and can be often created from within the team if the trainer and coach already has experience.

Market-focused: Business value research centralising data for cost savings or sales growth. The best analysts recognise the connection between digital research and business strategy, efficiency and profit development.

Data Visualizers: Using tools to specify charts and tables, Digital tales of essential data and data interactions. In addition to the use of software, the best analysts are often able to visually learn about abstract and concrete ideas.

Recognizer Pattern: People who see data and visualisation patterns. Similar to vision, researchers must not only be able to see trends in visualisations, but also in data tables and quantitative associations (and qualitative data).

Multidimensional: know how to work about various definitions and theories that may or may not directly or implicitly apply. The capacity to evaluate, analyse, report, visualise and analyse data in many facets: internal and external data, social and political data, strategic versus tactical, histograms versus dispersions, benefit versus loss, income versus expense, linear versus quadratic data etc.

Curious: an urge to explore new subjects, ideas, topics and buildings. Research needs people who are curious and want to dive deep into both new and current issues that need to be learned.

Inquisitive: Looking deeper into the specifics of what you know and learn. The desire to learn about the inner workings and the underlying evidence and study information is accompanying curiosity. The best analysts are inherently inquisitive and include people who are involved in researching, knowing, conciliating and making suggestions and judgments based on their learning and expertise.

Considerable: Since analytics entail dealing with uncertainty and sometimes less than ideal knowledge, the best analysts are considerate in their approach to problem solving. Furthermore, when addressing evidence, human communication involves a reflective approach. Thus in intellectual talent, a level-headed emotional intelligence that can socialise and persuade people through empathy and alignment is essential. Strong-willed analytics can be a daunting area for several reasons: with weak results, vague criteria, inadequate

structures, lack of funding, etc the best analysts retain strong commitment to do the requisite work. The best analysts continue in their job, programmes, research and advice and remain steadfast in their confidence because they are aware of their correctness. A world-class, effective analytical team is created not just by stardust, magic, and technical or business people's best intentions. It takes years for analytics practitioners to evolve in the right organisations experientially and professionally to increase their abilities to encourage and provide real analytical team grandeur. As leading every team, team psychology, morale, creativity and leadership philosophies are all important for the management of data analytics teams.

The following is achieved by a digital analytics team:

Digital analytics team gathers, collects, monitors, reports and analyses information focused on business questions and business demands, organising activities and initiatives with the appropriate staff. As already stated, the goal of the analytical team is to analyse data and tell the related market data stories that generate value by creating sustainable sales or reducing costs. The analytics team also determines viability, identifies, goals and/or otherwise approves criteria shared by the enterprise and others—and will often help other teams while the analytics team does not specifically construct or engage in data and analyses. the analytics team (in such structures as decentralized analytics organizations). The business analytics team have a cross-company perspective of consumer and user activity internationally in the market. When effectively resourced, a global analytics team will help to understand the macro and micro trends in raw data, which help it identify common behavioural patterns and measure metrics in various business units. Digital research and insights departments may provide an analysis, such as a consumer turnover to the sales force or the lifetime value to the marketing team, a profitability analysis for the management team, etc. The data analytics offer information to drive business-related strategic and operational actions based on evidence. The adage is, "You can't manage what's missing." (The Chief Marketing Officer [CMO] understands, however that half of the marketing budget is wasted.) If a company doesn't have an analytical team, they typically don't manage their data as well as possible, and therefore their organisation

doesn't use analytics to support and direct decision making and preparing for it.

Centralize environment is created while implementing data analytics (as appropriate and as possible research reporting for clarity and precision and provide a self-service environment. Analytical departments would not exist if everyone's job were to work with the data to produce useful reports and convincing market analyses. But without a doubt, if there are a lot of "cooks" in the "date kitchen," there'll be many "stews." And one thing an observer never needs is to simmer so many people around multiple datasets (which are most often contradictory). In particular, the development of an empirical organisation may be popular with several sources that report like or identically called metrics, but are defined differently. Centralized control of analysis is useful in areas where abundance of data can lead to duplication, improperly specified data and uncertainty. Thus the primary function of an analytics unit is, whether the team is centralised or not. Data, monitoring, analytics and analysis from step zero to the final empirical deliverable should be monitored. There is no question that an organisation needs a degree of self-service for regulated and optimised data sources. In fact, certain individuals outside the research team may also need access to raw information and the opportunity to check for it. These cases and demands can be seldom accompanied by a data protection mechanism to permit and facilitate data access for a short amount of time with a good business rationale. Only a large analytics unit, core in the company, biased and away from corporate politics as far as possible, is eventually successful.

Data analytic team engage in the process of developing common data definitions that satisfy consumer data criteria. This method is important for effective research. It is also therefore critical for the leadership of analytics and also key team members to be at the table when decisions are taken on data, data specifications, information definitions, data governance, data audits, data maintenance, data clarification and correction etc. In this way, the research team will be confident that they share in the creation or progression of scientific distribution methods. They coordinate for backend, monitoring and distribution application technologies. While the basic analytical teams may have a small collection or even just one analytical

instrument, various sources of evidence and data are more popular for analytical teams and tools which can gather and record information which is redundant or quite similar. In many technology-rich, diverse infrastructural environments, hundreds or thousands of analytics servers are widely found in a data center and even in cloud environments. As the organisation owner of analysis, you need to consider how the technological world affects the enterprise internally and outside, in adequate depth to be able to determine the equipment to be used and the effects of specific developments. That said, any single technical aspect and complexity is not to be understood. This is a waste of time for your company. Leave the information to technology and IT partners and keep them responsible for providing against an Arrangement at service level (SLA) that at least matches and exceeds SLA of the provider Software as a Service (SaaS) (who can drool in order to replace the analytical obligations of the IT team). Be sure that you have influence in technologies and methods used by the analytics team and if possible, make a final say.

Data Analytics is used to promote quicker, better educated decisions by informing and evaluating functional business partners. An analytics team must be advisory and social. If your analytics team is sitting literally in its cubes, disconnected from the market, is intensely interested in IT and builds its work on the reports of Technical Specifications or some other PMP, your analytics team is probably totally inefficient and probably considered overhead (or soon will be). A squad of "report monkees," who don't go out to "teach research" and cooperate, is not exactly an analytical team in agreement with market partners. This is a glorified community of computer typists who write documentation — or worse a squad of database persons that only ensure that the tables have data but are unsure regarding the usage of and use of data in the organisation. Analytics is a company front office with a vital and essential backend system to generate and report results. In comparison, technicians (who may be termed "analytics," but don't analysis) who handle networks are not actual researchers, but technologists that control server processes, data storage, databases, software and monitoring.

Data analytics includes Push assessment and transparency by setting targets/KPIs and evaluating results. If you "manage what you measure" you will set targets based on past results and goal

performance after or before, preferably). Your analytics unit will allow the organisation to consider historical success and possible priorities. You will then use historical results, parameters and targets in your KPI reporting to assess current performance and forecast potential performance. Analytical knowledge, documentation, consultation and study will then help the organisation understand how the operations achieve the target, and what more can be done to boost its efficiency if not. It helps internal consumers manage data and monitoring review. In the best case, an analytics team is like the Delta Force. They are able to answer market challenges such as cold-calculation of mercenaries and recognise data analytics and analysis required to overcome the business issue with precision and validity. In this respect, the internal analytics team should serve as mentors and help key management members (and the company as a whole) become more fluent, professional and confident in learning how to use the data to "compete" with analytics.

Overall the client partnerships get deepen in organization while implementing proper digital analytics team. Directly applicable to internal demographic, firm-screen, and other data, both pre- and post-sales, customer relationships management (CRM) analytics are an evolving sector where analytics are used to generate, create, improve, sustain and retain customers. A kind of digital research called social analytics exists which refers to using data from social media gathered from different social pages and networks with intersecting CRM data globally and incorporating it into digital experience behavioural data to generate market value. It is used to build additional or current profitable data and research income sources. The best consequence of a good analytical team is to make money for the company—and thereby please customers, managers and workers. Many businesses have the chance to monetize their data, but they do not take action. Customer and customer group data can be marketed to other firms. For example, a job platform may sell information on expertise and labour costs entered by users to businesses who use it for preparing work expenditure. An apparel store will detect trends in global designs early on. Digital data may also benefit from other company functions. Business planners should analyse data that reflect seasonal traffic patterns and buying periods. Strategists may use the data to

produce suggestions for market expansion at the edges. Business line managers can split data related to those products or customers' results.

2.2 Business Analytics at The Strategic Level

This chapter presents a number of scenarios which organise the creation of strategies in a corporation with Business Analytics (BA)'s position in different ways. You will focus on the status of your company on the basis of these viewpoints when reading these scenarios. Similarly, think where the approach falls into this context. It is therefore logical to determine whether the company has grasped and recognised the full value of BA and whether more attempts can be made to drive the implementation of BA Therefore the focus of this chapter is not about how to build an activity plan, as many other books explain so well. Instead, our goal is to illustrate essential connections between overall policies for workplace safety and the knowledge that the BA role may offer in this context. The "Internet of Things" (IoT) enables remote control over devices and vehicles via electronic sensors over the Internet. IoT allows tangible entities to communicate directly without any human involvement, and analytics are becoming increasingly necessary in combination with increased process digitalisation. Digitalisation ensures first and foremost that human costs will be eliminated from operations. Secondly, it means that analytics will be used to make these choices while successful human decision-making takes place—and the accuracy of those decisions is essential to optimization. Analytics not only means automating cost-reduction procedures, but also automatic judgement processes that provide higher income when it comes to which consumers are approached, how pricing can be carried out how to schedule trucks, when stocks and the like should be replenished. This has meant a significant shift in how companies today interpret analytics. Ten years ago, analytics sponsored an exotic judgement that some companies thought to be healthy. Today, the digitalization agenda is a well-understood imperative.

Strategy and Business Analytics Implementation

In order to encourage our discussion of different alignment levels between the strategy and the BA roles, we give an overview of the strategy framework and how it is developed. A policy is a summary of the way an organisation actually works and is to operate. It normally occurs one year at a time. It seeks to adapt the sector, services and activities of the company to the market in which the organisation works. As a general, a plan aims to contend with business challenges shortly while also attempting to create strategic benefits in the long term. Specifically, the approach is formed by identifying a set of specific and achievable objectives to be accomplished by particular organisational parties. The priorities mentioned are also based on assumptions which could be more or less accurate of how the different divisions can meet these objectives. There is also a list of initiatives that identify a plan that wants to bring all company operations to the next level. The strategic method typically takes place once a year and also involves a significant factor of adjusting the plan of last year to the current situations and goals of next year. A company will implement a plan from scratch, but it typically only occurs as part of a full leadership transition, or when the organisation determines that the old strategy has not been successful or is not sustainable. A policy planning phase is a combination of analyses based on multiple data sources or approaches or both. Our priority is BA; hence, we focus on the distribution of electronic data, usually from data stores.

The knowledge is used for modifying and organising business practices in the operating areas of the group in a technical or overall management context. Our use of the term synchronisation is that strategic management cannot be treated as a set of serial steps, but rather as a certain number of simultaneous activities to be organised across a number of divisions. The technique is often said to be like teaching children — it's not important for us to do the right thing, but it's essential for us to be consistent. This ensures that organising events in the company is necessary, so that they all go in the same direction. The purpose of a strategy planning project is to update a range of items, such as the vision of the organisation, around long-term objectives, and to update its mission, which is a brief overview of how people strive to meet these aims. A strategy should not only

reflect the general plans on how to take action in the next few years, but also certain goals which in particular and in numbers, define the expected outcomes of the strategy in the following year.

Strategy and Analytic Business Scenarios

In the following pages, we present four examples demonstrating various convergence degrees between the BA role and the plan of the organisation. The purpose of these scenarios is to allow readers to examine where their company has to do with these scenarios. The scenarios will offer feedback into if the organisation's maximum potential in BA is recognised and realised and whether further effort can be made to maximise and develop BA's implementation.

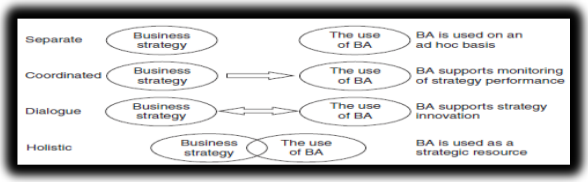


Figure 1: Relation of Strategy to BA

The four scenarios are illustrated in Fig1. The manner in which we explain the relationship between strategy and BA will also form the basis of the remaining chapter.

Scenario 1 is that the approach is not formally related to BA. Companies with no data or minimal data spread through a wide range of source systems that are separated in their strategies are usually not able to relate business strategy to BA. Data are not used for decision-making at strategic level in these organisations. Data was instead used to address specific questions and to simplify processes without any relation to business strategy in connection with ad hoc recovery. Many organisations have recognised that the mission is not accomplished by records, manpower or technology. From a political point of view, a maturing pro-cess may be launched. Alternatively, the organisation just proceeds with an information-driven corporate plan.

Scenario 2 is that BA supports a practical approach. If company orders, in connection with the execution of the strategy, that the BA function track the achievement of goals of the individual functions, we provide cooperation between the strategy and BA. How if BA does not flow back to the strategic stage, then the BA role is reactive to the strategy functionality. In this case, the task of BA is simply to generate reports to support each department's results.

Scenario 3 is the strategy-BA conversation with the functions of the BA. If the company makes sure that each of its functions optimises its working method based on BA knowledge but also that the strategic function participates in the learning loop, we have a BA function which supports the strategic function proactively. A learning process is enabled as the BA feature advises on company goals and analyses and recognises gaps in expectations and actuals to enhance both future plans and the efficiency of particular departments.

Scenario 4 is strategic resource details. The fourth scenario is defined by the fact that intelligence is treated as a critical weapon for strategic determination. In assessing the business opportunities and risks, businesses that fit into this scenario can understand how the details, along with its tactics, will provide them a competitive advantage.

Perspective on consumer relations

This strategy is usually important for businesses that rely on establishing positive relationships with consumers. Banks, insurance firms, and utilities, for instance, in highly penetrating countries, are all good examples. High penetration businesses must maintain current clients and simultaneously draw customers from the market. Other forms of businesses, such as Apple, Nokia, Nike and Coca-Cola, also regularly use customer knowledge. In addition, they have less transactional details about their clients than, say, their banks and the arrangement is less formal than a subscription. It is more a psychological association or a brand. A brand is used with optimistic feelings to wrap tangible goods to improve consumer satisfaction. These businesses conduct usually for "market intelligence" derived market information. Information is generally gathered for this case, often by external collaborators, contestant tracking and questionnaires. So information is not typically processed in a data

centre. The main distinction between the viewpoint of a product and the perspective of the custodian is whether analyses are based on goods or consumers. The empirical base table, which for product viewing is the index underlying the analysis in its less aggregated form, has as many rows as the firm has current and historical subscriptions. Furthermore, their distinctive attribute, for example, is their telephone number. If the study is based on the consumers' viewpoint, it would include as many rows with the same telecom sector as the company has current and historical customers. The distinction here is that one customer will have several telephone numbers. Like us grouping subscribers on the basis of which product they ordered from a product viewpoint, we will divide customers into segments if our base table supports a consumer perspective. In other words, the business wants to know which consumers purchase which goods to plan its research from a customer's point of view. If we assume that we are a supermarket and that the only electronic information we have is whatever goods are sold together, we should plan analyses from a commodity viewpoint only, provided that we only deal with the information in the data warehouse. This is why so many discount retailers offer consumer loyalty cards, enabling the retailer to monitor several transactions in many stores connected by means of a customer code that efficiently customer-oriented research. A first obvious exercise for an objective base table is to execute a value-based segmentation. The consequence of this study is a consumer breakdown of gold, silver and bronze segments (or high, medium, and low). The breakdown is critical as it provides the basis for consumer service. The most important customers must be kept, the middle ones must be cultivated by means of extra promotional efforts and the most valuable – often costing the business – must not obstruct other customers.

Customer-focused companies also strive to collect annual reviews. During these feedback processes, clients are asked for their overall feedback about the company's loyalty, not just about an encounter. In addition to using this feedback from client and customer, this knowledge can be summarised in order to provide important analytical input into what is significant for consumers and how the company relative to competition results on these characteristics. Touchpoint and annual surveys also co-exist in businesses today;

usually process or product owners use the touchpoint surveying (e.g., call centres or product development) and feedback is used to understand the overall nature of what is being provided and to reach particular clients who had negative experiences. The annual survey is important for strategic decision-making support, as it demonstrates the company's general strengths and limitations and customer loyalty values are also seen as a strategic goal. For strategic business strategy purposes, theoretical models are also used to devise strategic business cases. Thus, businesses will rely on their future plans and what leads to consumer value.

Operational Excellence Forecast

When a company relies extensively on organisational excellence, it focuses on efficient approaches to develop and provide programmes to its clients. If a corporation, for example, has established its market place to be the cheapest, it is fair to concentrate heavily on maximising internal processes. Naturally, every company would aim to refine the internal operations. This is a management job every day. The main question is whether this is a crucial strategic metric for the company. Organizations with a logical commitment to organisational success are usually capital-intensive organisations with large initial investments. This makes it essential to achieve an effective return on investment capital. A cement factory is a prime example of a company that can possibly not employ a product leadership approach because the product cannot technologically distinguish itself. A stratum of consumer intimacy also seems not important since the presumption is that the partnerships that one producer can create can be balanced by other cement manufacturers. If the cement factory is, however to ensure its long-term existence, the ability to manufacture and distribute its goods must establish strategic advantages than the competition. Therefore, it makes sense to invest in technologies to optimise internal processes—but this is not a competitive policy of product innovation, as the goods supplied by the manufacturer do not distinguish technologically.

Many firms will compete in scale economies. So corporations would rely in an optimistic spiral: the cheaper it is, the more produced it is. More goods are then marketed and the company will then produce even more. Airlines, restaurants, logistics businesses and engineering

firms are also strong examples of this business model. This is not only about productive output, but about the rate of capacity utilisation having a positive, cumulative effect. Finally, we also see corporate excellence programmes immediately after a merger. These are normal in scenarios where we work to build synergies in a tailored way. Overall, we are talking about organs that use organisational excellence as a main strategic criterion for cost management. Naturally, industry trends are also a driving factor. A busy market in a shrinking market will seek to reduce losses, which requires a heavy emphasis on prices. They claim that everyone can succeed in a growth economy, but firms must demonstrate their importance in a negative market by maintaining their share and market share by constantly adjusting internal processes. We can work with two forms of knowledge at a strategic stage. First of all, the calculation of the goal of internal pro-cessation is the most apparent consequence of current techniques. That's going to tell us where we're. It's as important to know where we might have been and where we need additional money or expertise or both. This knowledge is vital in order to understand the vulnerabilities of the organisation and is also more thorough in the internal review where we see if all aspects of the organisation are in the same direction, dragging. The other sort of information we should concentrate on is the central figures of the organisation. All organisations provide this knowledge, so it tests precisely what we work on with respect to organisational activities excellence. This is calculation by financial statements that we can optimise; details can be used to correlate with the external accounts of rival firms. This is clearly quite interesting in pricing competition, as the fundamental cost structure illustrates the high and weak points of our rivals in this sort of business scenario. We also entered several key metrics on BA-support.com along with instructions on how to quantify and then interpret them. We generally find that process owners use methods such as control charts and other Six Sigma or lean tools at the organisational stage. The ultimate aim is to reduce waste and variation in internal processes by stable and predictable processes, as these are the cheapest processes for handling from performance management in particular. After all they are just unreliable and volatile systems that yield waste from overwork, high inventories and unpredictable waiting times between process phases.

2.3 Application of Digital Analytics to Create Business Value

Business enterprises now must use analytics to generate fresh and improved value. Digital interactions – from blogs, social networks and smartphone apps – became an important and important source of observational data in 2013. In today's economy it is also important for companies to build and expand their knowledge of how digital data is obtained and processed to produce fresh or incremental productive incomes or to minimise costs. While data analysis can dramatically optimise the revenues of dynamic world markets independent of sector or industry, it is a very complex and multifaceted endeavour to develop and run a fully operating digital analytics enterprise. To create a data analytics enterprise, staff, procedures and technologies used in the development of research must be rethought and reengineered. Most businesses agree that digital analytics requires software and technologies (and data processing, such as "tagging"). This conviction is not right. Although the technologies and resources that enable research are essential and important, they are not enough to create market value by themselves. Simply applying a standard generic JavaScript page tag to the digital experience with a free web analytics application and offering report access does not enable information-driven decision-making or offer insights. Some businesses claim that they actually need to have self-service access to business intelligence (BI) resources, which supply departmental reports and dashboards, or the simple vanilla reporting in free or paid analytical instruments. All these methods are beneficial and definitely drive the business to develop a digital intelligence organisation that views research as part of the decision-making process—strategic and tactical. Over all it is certainly important and utterly necessary to provide the company with the tools to gather and disclose data. However, software and reporting are just part of digital analytics. Whether used separately or together, technological work and tooling practices are totally inadequate to establish sustainable market value by digital data use in a business setting. In other words, both technology, servers, tagging and software can allow you to calculate and quantify all kinds of digital metrics and dimensions but do not compensate for any intrinsic actionability or effect that offers an

inherent market advantage on themselves (or even with the default installation). Human beings, computers, software and technology generate value from analytics by analysing data to offer information and responses to market questions, and inside existing and established companies.

Data Analytics and Decision Making

Data analytics teams allow fact-based decision making and assess digital business channels' efficiency and profitability. Digital platform data strengthens offline data, and the synthesis of the two will offer new ideas and opportunities. If your company does not shape an analytics team to work with the digital data, regardless of whether you have Big Data or not it is competitively awkward. A lack of data collection adds to the lack of huge market prospects. A well-resourced, financing, digital research team assisted by cross-functional IT and marketing departments can enable the company to minimise costs, increase performance, produce fresh, incremental sales, improve customer loyalty, raise income and the effect of the digital business channel in many ways.

Digital analysis for Big Data and Data Science

The need for a digital analytics firm is stronger than ever because the volume of data accessible for solving a business problem is more multiple and multivariate than ever in human history. IBM reports that humankind produces 2.4 bytes (1 billion quintillion) of data every day (Every day, humanity generates 2.4 bytes of data. This is the statistic above: 24 billion bytes a day) so much so that 90 percent of the world's data were generated in the last two years alone. Obviously, most of this new data is provided by Internet-connected digital networks or devices. Due to the rapid increase of multiple digital data every day it is utterly important to build observations, recommendations, optimisations, projections and advantages. If large data, data analytics, omnichannel data, media mix modelling, allocation, public intelligence, consumer identification, or predictive analyses focused on the digital data collection, the establishment of a digital data analysis team who is responsible and accountable is important. This research can be used for decision making, strategic

strategy, success assessment, monitoring, merchandising, estimation, automation, targeting and enhancement. Main Performance Indicator (KPI) You will learn how to lay when you read this book. Strong basis for the successful development of a digital analytics enterprise to recognise digital data mining and create value of it.

Naturally, the amount of data currently generated and to be provided in the future is overwhelming even beyond IBM's projections. The International Data Organization plans to double the size of the digital universe by 2020 to exceed ZB 40 (zetabyte), meaning GB 5,247 for every human on Earth by 2020. The behavioural evidence—the existing global behavioural universe and the digital footprints of each person on earth communicating, engaging and conducting of these data—means that more behavioural data is generated increasingly in comparison to the 40 ZB digital universe in 2020 (Figure 1). Data gathered on human behaviour, transactions, and metadata can be much of the web content's size. In other words, if the web page's average size is about 1.4 MB in 2013, the behavioural and transactional data and metadata obtained from users during their visits could exceed hundred or more megabytes—especially with regard to internal and external data integration from sources including ads, audience and Customer Relationship Management (CRM) data. Innovation will encourage the future of analytics, along with all these digitally generated big data from blogs, mobile websites, social networking, ads and any background in the Internet – ranging from immersive TV, video game consoles and Internet-enabled smartphones, mobile ecosystems and applications.

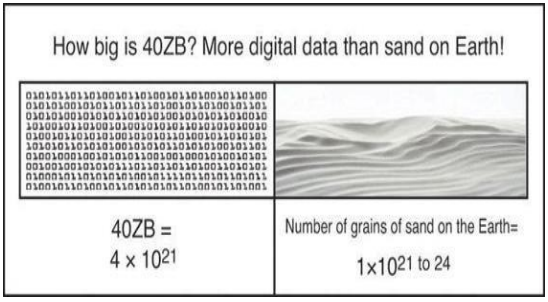


Figure 1 It is projected that four times as much digital data will be usable as all the grains of sand on Earth by 2020.

A organisation can only build a competitive edge in data, of course, if they can recruit skilled individuals with digital analytics. Right now there is a big difference among talented people in evaluating and generating insights from the results, which hinder digital analytics teams. McKinsey predicts from all the big data in the public and private sector that 1500,000 other "data-savvy" administrators (who may appreciate and use analysis) and 140,000–190,000 additional analytical talent positions will be expected to help potential growth in Big Data. In order to grasp all this new data, the digital analyst and the digital research team had barely and definitely not enough to extract value from existing and potential big data. In reality, the industry faces a severe shortage and a massive lack of talent and technologies necessary for the tag and analysis of digital data, amid high-paying and high-wage analytical jobs. It will take months for a young digital researcher to locate managers and other analytical figures. This is exactly why this book will help you and your company navigate and excel in data analytics while taking into account the difference in analytical talents. It's absolutely accurate that you ought to create your own digital analytics company because you sure can't conveniently or efficiently recruit even one analyst and rarely one skilled boss and never a whole analyst squad. This book teaches you what you need to do at the moment to create your own data analytics business and/or what you should do to get your current digital analytics organisation. This business book is about developing a data analytics team and establishing a digital analytics enterprise. The team exists and the organisation exists inside the group. This book therefore concerns far more than digital analytics. The business book is a unique document, drawn from practitioners' real-life practice of recognising what is really required in digital research to create, handle, win, and prosper, while concentrating on analytical insights, approaches and structures that can produce profitable business and shareholder value.

Predictions, automation and market value perspectives

The highest and best use of digital research operation allows businesses to raise sales or minimise costs. Practices in digital analytics require the internal and external integration of systems, staff

and technologies from organisations and vendors to evaluate the company issues, make decisions based on mathematically and statistically rigorous methods and advise business successful activities in many areas ranging from manufacturing to marketing to individuals. Data analytics can in many ways benefit an organisation. The two aims of the maximum and best application of analytics are 1) to achieve sustainable sales and 2) to minimise costs. The McKinsey Global Institute (MGI) estimates that retailer profit profits can be expanded by 60 percent with big data, whereas location-based big data will generate an annual demand of $600 billion. The ability to produce exchange in an ethical and profitable way with digital data is real, but how does an individual, a business and a global corporation get there? This book offers answers to vital and required practices for the processing of data, from technical and process work (requirements, data collection, definition, mining, development, verification and configuration of tools), to analytical approaches for research, monitoring and dash boarding of data. Through gathering data from multiple platforms to establish coherent and meaningful analysis, you can understand how digital data and analytics can be used to respond to market concerns and to provide a framework for fact-based decisions. If it is difficult to deconstruct this last sentence or makes perfect sense, read on, for this book discusses the following subjects:

- The basic building blocks for digital analysis comprehension and methods, called the Chain of Analytics Meaning. The empirical value chain is a modern term I have built to explain the mechanism and work required to achieve operational and strategic success. The Analytical Value Chain continues with market needs and queries, data definition and processing, verification, reporting and research interactions in the next phase of digital data optimisation, prediction & automation using data sciences. Naturally, the purpose of the value chain is to generate economic value through data research.
- Market reasons in order to explain investment in the research team and how investments can be made for the development or advancement of the data analytics team and its operations

- Build technical and strategic scientific team priorities and team roles
- Purchasing or building analytical software and what is needed for implementation and management of tools, including social media and mobile analytics tools
- The value of analytical storytelling and of using EDA to explain digital analytical data;
- The methods for applied analysis as a comparison point for the styles and formats of data providing a business-based study of simple statistics, such as mean, average, standard deviation and variance.
- analysis of the methods of visualisation of data, such as the plotting of statistics, histograms and other charts
- Digital data research for an entrepreneur: data correlation, linear regression and logistic regression
- Good ideas and best practices in data experiments, sampling data and data models
- How digital analytics blends with other areas of study, science, and qualitative fields such as competitive intelligence, business research and consumer voice data
- Data administration and function identifying, gathering, checking, verifying and handling data transition, review and monitoring and the vital role of the Data Governance Team
- How a digital optimization platform should be implemented; an optimization check using digital A/B data (champion/challenger) and Multivariable research during the statistical and mathematical simulations of optimization and optimization engines like Taguchi and Modeling of Preference
- An analysis of common KPIs that are used by experts, brands and specialists — and an evaluation of helpful ways to start developing and growing the KPIs
- Reporting and interpretation relevance and discrepancy between them, including RASTA dash boarding (Simply organised and specific, appropriate, objectively implementable, timeline, annotated and commented) and LIVES reporting (Linked, Interactive, Visually-driven, Echeloned, and Strategic)
- The use of digital data for the different targeting types —

spatial, cookie, behavioural and other. Discussion of omnichannel data and multi-channel data fusion and alignment to consider consumers, media, viewers and to create addressable content strategies through digital data.

- The future of analytics, from encounters in consumer service to the use of customer-interaction sensory and reaction technology and warnings to perceptive analytics
- The analytical economy and the value of user protection and customer ethics inside and into the future of all aspects of digital research

Thus this chapter explores how digital analytics teams are developed and managed to tell "data stories" based on responses to "business questions put by customers to the research team. The theoretical perspectives in these responses will offer management advice and information-oriented directions that can make money for their business. Digital analysts, members of the digital analytics team, can effectively navigate the upstream technological, downstream social and organizational processes of data-driven communication through procedures which unify technology and business teams.

2.4 Development and Deployment of Information at the Functional Level

Business Analytics (BA) can only produce value by optimizing operating procedures, initiating new processes, or making sure BA doesn't do anything. Lead data are used for improving current processes or beginning brand new enterprise processes. Our data lag is used to assess existing procedures, generally by key performance indicators (KPIs). We discuss the various levels in the BA model in this chapter. At this stage, we decide how to determine the knowledge and data criteria by providing any overall priorities for a department. We address the relationship between BA and the organizational level and how strategic plans are linked and how they can be operationalized with a view to the deliveries of BA function. What we're doing is specifying which details we need to meet the

departmental goals on the basis of the last chapter's organizational strategy. Another way of discussing this is to discuss designing an information strategy, insofar when we have to devise a Customer Relationship Management (CRMs) strategy in order to represent the overall strategy and its criteria for the CRM role, we must therefore have an information strategy that represents organizational strategy information and data requirements for the BA function. The relation is seen in Figure 1. In order to illustrate the relations between this and the previous chapter, we have defined in the model how the organizational approach is expressed in the priorities of each function. Both of these divisions needs to establish a practical approach with subsequent knowledge requirements.

This chapter takes its theoretical starting point in a Rockart model used to set up new business processes. We will study the model and provide an overview of how to use it in practice while implementing new procedures in a CRM department. We have chosen this particular example because it is based on consumer information that is stored on the one hand in a variety of data stores, but it can on the other hand be difficult to extract the maximum meaning easily because too much is available. Sometimes a corporation is in the bizarre position of nearly drowning in information, while the enterprise has a hunger for information and comprehension.

It is essential to understand how operational processes can be monitored and improved with performance management, including using an example from a call center. This example focuses more on the optimization of already proven organizational processes. This means that lead information is generated by means of analysis of the process' lag information, which in turn allows for the establishment of learning loops.

Figure 1: From overall strategy to functional information requirements

We also present the concepts of lead and delay information in this chapter, where lead represents something that comes before and lag describes something that follows. This is because we take our starting point in a process-oriented way, where lead describes the information or the knowledge necessary to start a new process or improve an existing one first. The opposite is the lag information concerning the continuous measurement of the development of the process. Therefore, the purpose of lag information is to monitor and monitor if we are achieving our goals or if we need to make adjustments. This information also contributes to the analysis of the relationship between our activities as an organization and the specific and measurable results obtained from these actions. In other words, we talk about proactive knowledge or information to create new processes and reactive information to monitor existing and operating processes. Therefore, lead information is more abstract and is usually knowledge that is imparted through ad hoc projects. Lack information on key metrics, in comparison, is often conventionally automatic, showing whether the procedure achieves its stated objectives. This chapter further explores the relationship between lead and lag knowledge.

Key metrics of success (KPIs)

In general, KPIs define the connection between the operations of the company and its key objectives. KPIs may be financial key, index figures suggested for the case, or other objective SMARTs (specific, observable, accepted, practical, time-bound). What KPIs need is clearly to lay down guidelines for business processes (layer information), on the one side, and to identify the activities that "went wrong" if the process does not achieve its goals, on the other. This means that we still know what consequences would be in the long run, whether we have a KPI and we are below the mark. This awareness helps one to change operations to ensure that the organizational strategy's ultimate goals are accomplished. Therefore, KPIs act as warning signals. In general, if any KPIs do not reach their goals, we must investigate why. Is it a case of a lack of strategy? (i.e., the organization for some reason is not focused in its efforts to meet the strategic objectives). Are the desired activities correctly done, but lack of expertise or capital, which means that the activities do not attain the desired level? Have we not planned anything to alter or was the strategic goal too extended, as sometimes happens? Companies intend to rise past market growth next year, or they will lose their market presence. However, not all businesses will expand faster than the economy.

Another essential feature of KPIs is that they will stop again. It is not rare for CRM teams to conduct several troubleshooting activities. We solve a problem by beginning a new and remedial method. So when are we going to pause these cycles again? If we do not, the CRM approach of the company becomes a patchwork of historical troubleshooting activities. If we continually patch things up, more and more personnel are needed in the enterprise over time to keep these stoppages. KPIs also provide the company with a memory when systemically processed, which ensures learning may be extracted from active initiatives. This can be learnt through analytics, which we discuss in the following segment, but also through keeping people to their promises. It is very normal for people who are exceptionally good at convincing managers to have a good idea for a campaign. And then there are people who make huge cams. Although the two aren't

exactly the same, the calculation of KPIs will say the organization. In the long term, that ensures that we have an organization where the focus is not about what sells internally but on performance.

Establishing Business Process with Rockart Model

The model we use in this section is heavily inspired by the model of the so-called essential success factor and we use it to explain the interaction between the strategic goals and the current processes with the potential knowledge requirements. The annual plan planning phase contributes, to a set of strategic goals that are then conveyed to the organizational level of the enterprise. In order to accomplish these goals, the department must schedule its activities in the next period. This approach is often called a policy, which is only developed at a practical level and is a product of the overall organizational strategy. Therefore, these practical tactics are called CRM strategy, Human Resources strategy, BA strategy, operations strategies, inventory strategies and so forth, depending on their department. Based on the local approach, the Agency must define the essential success drivers that are the components of the plan that have to be successful if the plan in its entirety is to succeed. If we create a sales department, we will therefore be able to recruit successful salespeople as a crucial success factor. If we want a good system installation, it is important for people to use it and for the system to be user-friendly, and the data quality, for example, is high. It is important to remember that the entire plan is supposed to fail if any one of the essential success factors fails, which means that our established goals are not being accomplished. We usually plan to recognize three to five main success stories, but of course there could be major variations depending on the extent of the strategy, on the sophistication, on how we conceptualised the problems and so on. The BA feature is asked to include different forms of knowledge on the basis of essential performance factors. In general, we would continue to attempt to provide lagging details so that the process owners can track the results of the new sales department. The BA role is often requested to provide organizational lead detail. For example, if, as in the following example, we execute a promotional strategy for our current consumer base, we will be asked to include details about which consumers are

involved in which goods on the basis of their usage profiles. In other situations, such as a new Sales Department, the BA role may provide feedback about what a "good" Salesperson usually looks like on the basis of human resource knowledge. Often the BA feature cannot produce the desired information, and the process owner must learn this knowledge from somewhere else. As the example shows, it is almost always important for the BA role to have knowledge lagging behind the big strategic programmes. The concern is whether the BA role will or will be asked to provide lead information for the implementation of new processes.

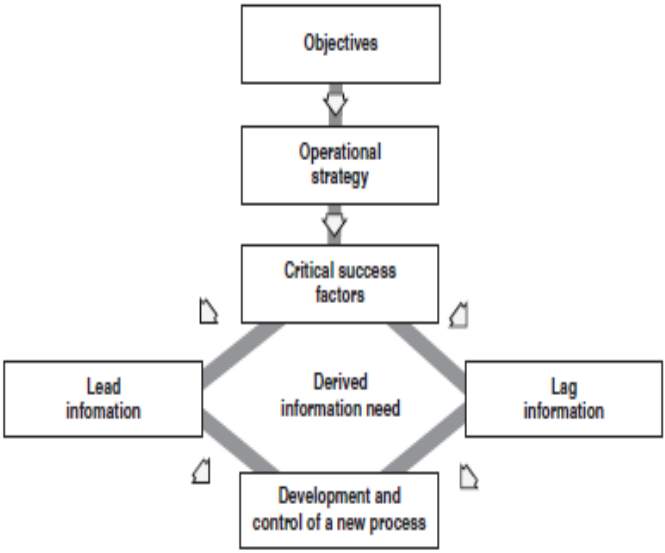


Figure 2: From Departmental Objectives to the Development of a New Process

In this content, we addressed how the BA feature can facilitate the development of new business processes by supplying late data and, in some situations, providing lead information. In this chapter, we explained the difference between lead and lag information as well as

their role in connection with the establishing of processes. Lag information is retrospective information, which we choose to register on an ongoing basis in our data warehouse in connection with performance management. Lead information has a completely different character than lag information. Lead information is used to improve or execute business processes, or initiate new business processes. Lead information in the BA framework is typically created on the basis of an analysis of lag information and is therefore usually not stored in tables, since this information, as already mentioned, is the outcome of an analytical process. Lead information will typically have the character of "breaking insight," which can be used to improve overall business processes, and provide learning loops back to the strategic level. Then we looked at how we can identify critical information in connection with the establishing of new business processes based on a Rockart model. The BA function will often be working with the optimization of existing processes, too, and we showed how to do this based on CPM and our own models. When we work to refine current systems, latency information can be stored over time, and therefore data for research can be created that generate new lead data (breakthrough insights), as we showed in a summer house case study. Of instance, if lag information is not saved over time, no information can be evaluated. Therefore, BA-driven enhancement of the current method includes converting our knowledge lag into lead data and enriching them with new sources. KPIs will show us the connections between the process improvement operations we perform and their effect on the process and the actual KPIs of process operators and eventually tell us if the exercises are worth the cost at all functional level in the organization.

2.5 Assessment and Prioritization of Business Analytics Projects

It is important to decide whether a particular project is strategic when prioritizing projects. If so, we do not need to evaluate whether the project should be conducted on the basis of a business case. Rather, we would expect that this review has already been conducted on the strategic side. However, we must ensure that the project is supported with adequate funding and, if not, we must determine which budgets can meet project costs. However, if the project is not specified within the plan of the organization, it means that the project is needed based on the intention of enhancing business results. This is regarded as a bottom-up initiative, and it comes from the operating environment. On the contrary, it is considered a downward initiative, triggered by the policy. Projects not initiated by the plan are usually prioritized for other projects focused on a business case approach. A business case points out the simple way of defining risks for a project's financial gains; we can thereby determine, solely financially, how the right return on investment is achieved. We also built a small model in Exhibit 8.1 that illustrates how proposals can be compared. Naturally, this model is not exhaustive, but will help you create an outline of multiple project applicants and their various nature. If we have a low cost and high return product, then this project would clearly be preferred to a project with the same costs, but less return. Similarly, high-cost projects with poor returns will be rejected. A project with a high value creation and a high resource use is a final chance. In that case, an investigation should be carried out as to whether the proposal can be transferred into a strategic setting and, if not, if it remains significant. Of necessity, such a proposal would need a lot of money in the agencies responsible for its execution. That is, even though a positive business argument remains for the project, it will need to be dismissed because of the capital demands and because the project process would have a detrimental impact on the agility of the enterprise. By agility, we mean the capacity to make fast decisions and respond rapidly to new opportunities arising from this big project's implementation time. Therefore, the broad undertaking involves some cost benefits for the organization. So we have to weigh the added advantage of any golden opportunity to be missed and the

ability to easily initiate strategic strategies that could arise.

Benefits/ Costs	**Low**	**High**
High	Gold mine	Align with strategy
Low	Maybe	Not interesting

Fig.1 BA Project Costs Compared with Benefits

We should draw on the weighting of the financial benefits and drawbacks of the business case as shown in Figure 1. In ROI (Return on Investment), we split this further, as an introduction to the following pages, respectively concerning costs and benefits. ROI states that costs associated with IT solutions rarely amount to one-off costs; usually we are looking at any additional possible costs. Secondly, the exhibit shows that we have to isolate and organize these by increasing the utility for machine consumers and savings as we look at the opportunities that a single project has provided.

Uncovering project value formation

Business cases for BA projects are challenging because they do not generate demand themselves. It is only after the resulting strengthened decision-making that meaning formation at a corporate level is encountered. Consequently, it might be tempting to list IT and implementation costs on the one side and some days ahead on the other. However, the reality is always more complex, since we generally switch from one market method to another. This means that in order to make a true calculation, we have to know how much costlier the new enterprise would be. As already explained and as a general topic of this book, we can look at BA from a method perspective. Therefore, we present the SIPOC model (Supplier, Supply, Operation, Output and Customer). The model is used for a

method overview. What we are going to do now is to outline a process before and after we have developed a BA system, and to summarize it: what are the one-off costs, what are the differences in driving costs, and what added value is available for the output, both for process users and for those who are carrying out the process. In the following example, we have chosen to introduce BA in an organization with many workers, which finds it hard to maintain them. In the past the organization has built on BA, based on guidance from the Department of Human Resources (HR; supplier), translating data into reports in the Department of BA using a reporting module (Input). This lead to a report (output) being sent to HR and top management (the customer or user of the process). The new mechanism also receives new supplier, finance, who must continuously supply reports on the cost of vacant replenishment.

Today, as before, the mechanism is such that we get details about our staff and who left. Now we are also beginning to build templates that can segment workers with their anticipated departure pattern. We evaluate their actions and plan campaigns that attract workers for each of the essential segments. The campaigns are carried out, tracked and measured. What we've mentioned so far is the method as it was and the end as it was. Based on these definitions, the expense of the business scenario may be defined and connected to new transformed capital. In this situation, this knowledge is easy to obtain and it all requires access to a variety of key financial products, which defines the budgets and a few expense keys on what costs people are expected to perform on various forms of posts. Transforming capital would cost more, as we must purchase data mining tools and train internal users who are expected to cost only one day. In addition, the expense of teaching people to use and operate on new knowledge is involved. Since the solution is inside the current IT structures, we have no costs of that type.

Finally, we can assume that the most important expenses for this business case are not one-off costs, because the big costs involved with this proposal do not go from the old phase to the current one. The highest expenses are correlated with the continuing costs of the current procedure. We would definitely need to use additional human capital in connection with employee retention, which is an ongoing

expense that we have to consider when attempting to make a business case which summarizes the ongoing benefits of the project.
In the grey areas, we illustrated profit claims for the process, which are the useful elements that the current process produces. On the left line, we demonstrate that the gains include increased power and decreased use of energy. Firstly, we intend to spend less hours discussing the workers that we miss in comparison to the numerous meetings and interviews we have previously conducted. Moreover, we expect the mechanism to keep us informed dynamically, so that we will adapt more rapidly in the future. This in essence ensures that by the moment that our workers use it, we will reduce the crucial time window as a company responds to this need. Finally, we have the highest number—the savings was decreased by 10 percent each year. In the right side we list a variety of profit statements for the consumers that are all operations of the business and thus impact the whole company. Therefore, the HR department has not been included here as a client. We may argue that HR would be better off now that more detailed information is available from BA as to which jobs have quit and why, but these incentives have already been included in the cost savings in terms of lowering payroll expenses by 10%. However, other findings can also be obtained from better working environments for workers. They have stronger customer service for one thing. This is therefore part of our enhancement of the method. We can quantify their worth in exact exhibits on the basis of the defined advantages. The individual responsible for the corporate case cannot of course always value relatively hypothetical sums such as the impact of customer satisfaction. In this situation, the Customer Relationship Management (CRM) department would be needed.

<table>
<tr><th>Supplier</th><th>Input</th><th>Process</th><th>Output</th><th>Customer</th></tr>
<tr><td>Internal and external suppliers contributing to the process</td><td>List of deliverables (resources, information, etc.)</td><td>General process description</td><td>List of output</td><td>Internal and external process customers</td></tr>
<tr><td></td><td>Transformed resources
· One-off costs
Transforming resources
· One-off costs</td><td rowspan="2">Ongoing additional costs linked to the new process</td><td></td><td></td></tr>
<tr><td colspan="2">Savings due to improved resource utilization
Less material consumption (less raw materials)
Less machinery consumption (fewer machines needed)
Less staff hours used (process automation and reduction of overwork)</td><td colspan="2">Increased value for the end users
Output that is better designed for the customer in terms of design, flexibility, etc.
Output that costs less to buy for the customers
Output that costs less to use for the customers</td></tr>
</table>

Fig. 2 SIPOC Diagram Focusing on Costs and Benefits (years)

Figure 2 summarizes where the multiple elements for a business case may be identified using a SIPOC model. The white fields include cost components that rely in this sense on the separation of costs into one-off costs and continuing costs. The grey fields also expose the benefits of the company's current method, which ensures that we use the details in a new way. The black fields are not included, but details on who made savings and who received additional value from the process may be given. Finally, the output field tells us what the new output was, but not what its value was. It's blacked out, hence, the descriptive aspect of the company cost/benefit study the definition could look like this in relation to the radio station example:

Title: "Know the preferences of the current listeners and adapt the broadcasts to them."

Present status: The current status is that little is done to change the programming to the needs of current audiences. The news is read and which music is played is absolutely unpredictable. DJs also try to guess who their listeners are at various moments, but they don't focus on factual knowledge.

Implementation consequences: the development department of the radio station cannot work targeted to change the procedures to the needs of new listeners with a view to improving the KPI "Average listening time." The effect is less than ideal publicity sales and less than optimal stock gains. In other words, the development department of the radio station cannot achieve its potential and is thus underperforming.

Critical performance factors: Since a BA programme was first initiated in the development department, the preparation for transition of organizational decision-makers is critical in order to achieve project success. Another important aspect of success is that we can obtain the desired data on the characteristics and desires of our audiences at all times of the day.

Risk probability: If the radio station will, at various times of the day in reasonable condition, gather the desired data on the characteristics and desires of its listeners through a questionnaire on the internet platform of the radio station is unknown. Remember, however, that the station finances sponsors' promotional jobs to inspire listeners to complete the questionnaire consistently and qualitatively. The development staff of the radio station is the BA Initiative target group to improve the overall listening time. Risk is related to data collection by the latest data channel and the automated questionnaire and to the readiness to adjust organizational decision-makers. Note from the show that these occurrences are not thought likely to occur.

The cost/benefit approach used in the business

The project's cost-benefit analysis will consist of an evaluation of the 8 variables in Figure 3 before and after implementation. They were drawn into a radar diagram of numbers from 1 to 4. As shown in Figure 3, a competitive advantage can be applied to the radio station along with increased competitiveness, enhanced procedures, improved awareness and substantially improved operating process assessment.

Drivers	Before	After
Strategic value	1	4
Competitiveness	2	4
Customer relations	2	3
Process improvements	2	4
Increased knowledge	2	4
Performance measurement	1	4
Data quality	2	4
Platform	3	3

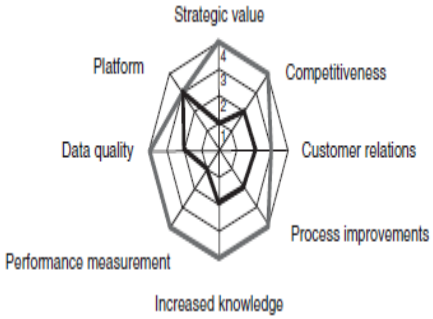


Fig. 3 Outline of Benefits

We have a thumb rule in BA, which says: dream high, start small and deliver quickly. Obviously, this means that we must take a broader perspective of our projects and, to this end, maturity models are tools for use. As previously stated, these models are a corporate part of most IT solution suppliers' market concept and they have many advantages. Second, individual information structures should be put in a broader context (i.e., we can make a development strategy at the information system level and describe the business opportunities that it opens). For example, when we speak about CRM processes, it is difficult to produce campaigns if we don't have a database from which knowledge can be retrieved. It can be achieved, but it also struggles from complexity and data consistency. When a data warehouse is established, we can design individualized campaigns with analysis skills. The campaign generally entails additional revenue or consumer retention; in which we seek to maximize the importance of customer life. We want to develop our knowledge wheel by continuously improving the process by automation (which makes it cheaper) and

through growing its importance.

Finally, maturity models allow one to attach technological solutions to strategic requirements. To improve the satisfaction of our clients, based on our past consumer behaviour, we have to build good analytical capabilities and, for example, a solution to data mining. In comparison, with a departure from the expertise learned about competitor methods, we are able to develop an understanding of which information systems they use and how they use information as a strategic resource. A maturity model also allows businesses to look at where the business will be in five or ten years' time, following the competitive outlook. For instance, if we feel very confident that in future everyone who uses marketing automation as an inexpensive and efficient way to build loyalty in the industry in which we find ourselves would define us, the question is not whether we should invest in this approach. It is clearly a matter of when to spend, since we have to stop losing clients. Therefore, we will have to invest until we have lost so many consumers by providing CRM processes that are lower than industry expectations whether we wish to be market leader in this field or wait in the expectation that the costs of implementation will decrease.

2.6 Business Analytical Tools and Data Collection Methods

Quantitative Survey

A quantitative survey attempts to 'quantify' something numerically or objectively. It may be used to measure the industry size or market share, or to quantify views. The layout of quantitative surveys is distinctive. They ask clear closed questions, and include a choice of responses to be selected by the respondent. Instead, the respondent must choose the answer that is correct or the most correct for them. The systematic methodology and organised responses promote the execution and analysis of quantitative surveys. If you have to classify, count, and then create a mathematical model to illustrate what you have found, you probably need to gather quantitative data automatically by activity or a well-designed survey. This is important because quantitative survey data helps you to get a better understanding of the actions and interpretation of a random sample of a target group or audience. The results can then be predicted for the entire target group to generalise opinions and to calculate the influence of different views or opinions within the poll. This form of analysis can also be useful in figuring out more about such subgroups, in order to appreciate or not like what they want. Moreover, if you periodically start quantitative polls with the same group of individuals, you will track shifts in actions or perception over time. This is extremely helpful if you hold at least some of the same questions and allow reliable comparisons. Quantitative polls and questionnaires are ideal if you want to measure an opinion or the future size of a sector. They are extremely helpful in helping:

- Determine whether or not the goods and services have a niche.
- Decide whether your target knows your product or service.
- Determine how many customers are involved in consuming the goods or service and possible market share.
- Which kind of people are the best clients.
- Define the purchasing habits of your client.
- Find out the target market's shifting desires.

Quantitative polls are very versatile and can help quantify the depth of emotion in a certain field of interest, such as consumer loyalty or

how much a customer likes a product or service. You should also calculate how this opinion evolves over time, so you can get back on track faster. However, they can be very easy to fudge just by skewing the receiver party. Moreover, owing to their versatility, quantitative surveys are commonly used, which ensures that respondents can be loaded with them. You will need an opportunity to encourage enough people to take part to make sure it succeeds. If a quantitative survey aims at 'quantifying' a topic with numbers and statistics, a qualitative survey attempts to 'qualify' the answer with subjective opinions. A qualitative survey lets you consider the real intentions behind the attitudes and activities of a focus audience. For example, it would be helpful to perform a qualitative analysis beforehand if you were thinking about modifying your corporate livery or branding so that your consumer feels strong or unconditionally about the existing branding as well as the opinion and emotional responses it has to the new branding. You may have access to much more complex and accurate statistics about how a target audience believes, feels and behaves about a specific commodity or topic. This style of study is therefore especially helpful in finding problems and helping to generate ideas and theories to try to solve them. It is more difficult to evaluate, though, since the information supplied is unstructured and does not tick a box or recommend rules. This means that you would have to engage in text-based analyses or sentiment analysis for valuable feedback from qualitative surveys. It is important because qualitative surveys provide more subjective insight about a specific shift, issue or topic. They are not as organised as objective polls since the true meaning derives from respondents' desire to say precisely what they want instead of choosing the right answer from a predetermined list. These more detailed and personal details will truly allow the respondent to appreciate a situation and produce suggestions for change and discover patterns in thinking and opinion.

Qualitative Surveys

Qualitative surveys are perfect for learning how someone thinks and feels about a subject. By definition, they are exploratory and perfect if you don't know what you're going to find. They are particularly helpful if you want to know:

- Why your clients chose between the multiple goods or the

competition between you and you. What is their reason to choose you?
● What your clients think about your goods or service and what they know about it.
● How your identity, concept and packaging effect your goods and services to and against your clients.
● Which publicity messages or ads effects most favourably and adversely on the clients and prospects.
● How the price influences the actions of shopping.

Like quantitative surveys, you must know which questions you are searching for answers and build a survey to address these strategically relevant questions. When the survey has been developed, start circulating it online. The bulk of qualitative surveys take place online using web-based surveys such as Survey Monkey to help gather and interpret data. They can often be carried out by telephone, by post or face to face, although this is typically costlier since the findings must then be used in the research method.

Focus Group

A focus group is a type of observational analysis in which a group of individuals specially chosen or randomly selected meet to explore a particular subject. Typically, applicants are selected based on their socioeconomic, psychographic, spending or previous purchasing behaviour. The community facilitator is known as the moderator and will ask questions and participants answer the questions or address the subject with the other members while the moderator listens, observes and poses more questions. There are different types of focus groups:
● Two-way research group – where a focus group focuses at another group and speaks about what they observe. This can be especially helpful if the subject is complicated or difficult, since it may open up fresh avenues of conversation and new ideas for the other party.
● Dual focus group of moderators – where each moderator has a different role: to make sure the group works properly and everyone has the chance to talk, and to make sure that every subject is discussed. This can be especially helpful if a lot of land needs to be covered.

● Respondent Focus group moderator – in which one respondent is asked to serve briefly as moderator. The question is resolved influenced also on who posed the questions, naming one member or welcoming the moderator, new thinking may be introduced and change replies or change answers. This can be especially helpful if the community needs answers.
● Business discussion group of members – one or two client members in the focus group join. Many of the focus groups are held on behalf of an organization such that someone representing the company contributes publicly or anonymously. This can be very informative to the user, particularly when he or she is incognito. It also encourages them to steer conversation to places of special interest.
● Micro focus groups – groups consist of 4 to 5 participants, instead of the normal 8 to 12. This is especially helpful if you need a more personal and thorough approach.

Interviews

An interview is a one-to-one or one-to-many conversation where the interviewer will ask questions in order to understand a topic or gather more information from the person or people being interviewed. There are several types of interviews:
● Casual, conversational interviews – no questions are answered to keep the dialogue free and fluid. The course of the interview will depend on the answers as the interviewed person "goes with the flow."
● General interview guide strategy – Pre-established topic areas have been negotiated to ensure each interview addresses the same general areas. This gives more structure than the casual approach and, if necessary, the interview can be modified.
● Uniform open-ended interview - all interviewees are asked the same open-ended pre-set questions. Job interviews, for example, aim to follow this method such that each employee receives the same questions. It is fairer, simpler and quicker to compare and evaluate.
● Interview closed with a set of answers – the same questions are posed before everyone who is interviewed and each person must respond to the question from the same set of alternative answers.

Interviews matter because they allow for the collection of much richer

data regarding a topic. Interviews tend to be much more intimate and so people can tell you more than they might expect to tell you or want to tell you. The benefits of using interviews to gather data is the ability to dig behind the initial answers to really get to the nuggets of information or useful insights. Interviewing someone allows you to paint a much more vivid picture of what happened in a specific event or situation and allows you to hear the different individual perspectives on that event. Because the interview is usually in person in an intimate setting it is also possible for the interviewer to pick up on social cues such as voice tonality and body language which can help direct the discussion. This intimacy and verbal, and non-verbal, data download can help shed light on otherwise hidden connections between people, emotions, thoughts, events, behaviour and situations, which few other forms of data collection allow. Interviews can be used in practice when you want to understand the meaning of central themes or to understand what the person being interviewed really thinks about certain topics. Questionnaires can be quite impersonal and formulated, whereas if you get people talking they can often reveal far more about what is driving their behaviour or their actions. It is this meaning data that can be particularly useful. In order for them to yield value, however, you need to know what it is you want to know and why. Make sure you are very clear about why you are conducting the interviews. Being able to interview others effectively requires skill. Being able to listen is crucial as is tact and sensitivity. If you don't naturally have those skills, then either consider training or seek to outsource the interviews to someone who is skilled in this area. The effectiveness of this data collection approach will also depend on who is interviewed. Take some time to consider what types of people you want to interview and why. If you are a novice interviewer, and even if you are not, it is always wise to record the interviews so that you can go over them after the event and perhaps pick up additional insights. You can choose to record your interview using audio or video, although audio can be more discrete and tends not to intimidate the interviewee as much as video. Possible data sources include written notes from the interviewer. That said, the inter- viewer's primary role is to direct and manage the interview, so it's always preferable to record the interview to ensure all data is captured. The recordings, either video or audio, can then be partially or completely transcribed for further analysis including text analytics, voice

analytics and sentiment analysis.

Ethnography

Ethnography is the study of people in a group setting. The term is derived from the Greek ethnos and grapho, meaning 'folk, people, nation' and 'I write', respectively. Ethnography is therefore the observation and documentation of the social behaviours, interactions and perceptions that occur within certain groups or cultures. The roots of ethnography as a data collection practice can be traced back to anthropological studies of small, rural, often remote societies that were undertaken in the early 1900s. More recently it has been successfully applied to a variety of other group settings such as urban or corporate behaviour. There are ethical issues around ethnography around whether the study should be declared or undeclared. While it is believed that more accurate information is gathered if the study is undeclared there are ethical issues associated with this approach. For instance, in one well-known example several researchers joined a cult that believed the world was going to end posing as true believers, but their real interest lay in understanding how people respond when something they deeply believe to be true turns out to be false. Of course this raises ethical issues, but they simply would not have been able to study the group accurately if they had declared their true intentions. Ethnography matters because it provides rich, broad and far-reaching insights into people's opinions, views, beliefs, values and behaviour within a particular setting or environment. Rather than bringing people in for interview or asking them questions via questionnaire ethnography allows the researcher to witness what's actually happening in the group as the group goes about its normal daily life. This can often yield far more information and more accurate information. Rather than asking what someone would or might do in a certain situation the researcher witnesses what the various people actually do in that situation. As such, it's more reliable. The aim of ethnography is to 'get inside' the group to see how it operates and really sees the world. Ethnography could best be used in a business setting to observe a group or team working or in an environment where you are keen to figure out how people are interacting with each other. Perhaps you are keen to see how various departments work from the inside and assess the culture of the

business or division. Another way it can be applied is in a customer setting to better understand your target customer groups and their behaviours and belief patterns.

First you need to decide what group you are going to study and in what setting. The idea is that the researcher infiltrates or lives alongside the group as they go about their normal daily activities. Once the group has been identified and the purpose clarified, it is important for the researcher to win the cooperation of the 'gatekeeper' and key stakeholders in the group. Traditionally, the ethnographer selects knowledgeable informants or stakeholders who know the activities of the group well. These individuals are then asked to identify other stakeholders who represent the group. This sampling process can often reveal common cultural denominators connected to the topic being studied. This type of research is data collection up close and personal, which means that getting gatekeepers and key stakeholders on board is very important. Without their agreement and cooperation it will be very difficult to gather the information needed to ensure the study is successful. Developing trust and rapport with the group members being observed is an important part of ethnography studies and it is important to remain open and flexible so that the research can unfold as the events unfold. Ethnography can provide clues to trends in human society; the identification of unmet needs that if identified early enough can be very useful and profitable for business. Advertising agencies often use ethnography to ensure that ads are effectively targeted at a desirable population. Alternatively, product design departments can also use ethnography to assess how a new product is actually used in the real world and how it could be improved. This is particularly valuable at prototype stage when there is a need to understand real end-user needs, or to understand the constraints of using a new product or service by a particular audience.

Text Capture

If you want to run any type of text-based analytics, then clearly you need text to analyse. In most businesses there is already a vast amount of text data available that could be analysed although it will need to be captured in a form that can then be used. This always means

electronically and where the text is datafied rather than just digitised. If you were to scan a text document, you have effectively created an electronic image of the document which means the document is digitised as a soft copy but it is not datafied. You couldn't search that scanned document for a phrase or run any analysis on the text because each word is not stored separately as text, rather it is stored as a single image file. This means that while a human being may be able to open that electronic copy of the document and read it, a machine can't. If you want to analyse, the text must be datafied. Text capture important because advances in analytics mean that there are now many more insights that can be drawn from text than ever before. These insights relate to what the text actually says but also go way beyond the actual words and phrases used to the meaning, emotion and sentiment behind the words. Plus, text already exists in huge quantities inside most businesses. Often it is untouched and yet with a little effort can yield many commercially relevant insights that can improve performance and profitability. There are a number of text recognition and text capture tools that convert physical documents to electronic datafied documents. These include:

● Optical character recognition (OCR) – this technology will capture machine produced characters on a form or a page. OCR systems can recognise multiple fonts as well as typewriter and computer-printed characters. As most text is machine generated via a computer, tablet or smartphone, OCR systems can help in the efficient capture of text for analysis.

● Intelligent character recognition (ICR) – this technology will translate hand-printed and written text. This is more sophisticated because it has to account for variations in handwriting.

● Barcode recognition – a lot of meta-data is often stored on barcodes on documents such as delivery notes, or membership and application forms, which can then be captured and used for analytic purposes.

● Intelligent document recognition (IDR) – these tools can capture 'rule based' text such as postcodes, logos, key words. They also learn as they go along so can become increasingly useful for text capture the more they are used. These types of tools are often used for mail sorting.

There is already an abundance of text data in most businesses that can

inexpensively be used for analysis. The cost will usually accumulate when you need to convert hard copies or scanned documents to digitised and datafied files. That said, there are a growing number of inexpensive tools to help with that process. In addition, voice recognition software and speech-to-text software is very afford- able and surprisingly accurate and effective.

2.7 Targeting and Automation with Digital Analytics

Many digital tools, such as Online Trends or IBM, are now no longer a new concept to be marketed by startups. Many products rely on the use of digital data to identify the user with unique features and send appropriate information and contents in real time—where the information and content may be a web ad, a website entry for content, an e-mail or an application message. Many organizations use data in many respects, even with manual interference. Take for example the target forms for paying search firms like Google and Yahoo, the search results, third party domains and other items like Gmail. Take the search results. Additional examples of targeting are:

• Media platforms aim at visitors' geographically significant content.
• Conventional sources of data, such as sales analysis polls, are used by catalogue marketers to direct multiple consumer messages to particular geographies, regions and communities.
• Consumer e-mails or offline mailings may be targeting special subscriber audiences through paid or regulated circulation teams.
• Small companies will buy email lists from numerous email list providers to deliver messages to prospective clients and use their software to send specific communications to multiple markets on the bought list.
• Sales point (POS) data collected in-store at a Walmart area registry and used to automatically classify and refilled essential product items often purchased such as items on sale within a certain time to ensure inventory availability.
• Pay search providers facilitate various forms of online segmentation and then ad targeting in multiple ways.

Controversy is not targeted. Between 20th January and 19th February the Pew Internet & American Life Project conducted research showing that Americans regard targeting online ads as a violation of privacy and unwanted practice. 68% of those polled said they are "not all right" with targeted coverage, as they don't like it tracked and evaluated their online behaviour. Yet the goal is not without paradox, as the Federal Commission for Communications (FCC) recommends: "Think about the positive benefits of adverts aimed at local news and journalism operations." Sometimes the argument I've found is that if publicities are displayed on the Internet, such advertisements may also be important. Yet many users are wary of precisely what data can be gathered, how data are collected, at what degree of detail and confidentiality, how long data can be kept and for what reason in the future. The objective is to almost certainly boost the commitment in the form of a click, an engagement, an event, an answer or other behavioural event which increases the monetization of digital experience when targeting content or advertising to segments or visitors based on their known attributes. The purpose of targeting is easy to understand: optimise the market performance of advertising or an ad by delivering it to customers at a moment when they are most likely to view a message in such a manner that consumers are enabled to contact the target brand. You might, for example, visit a site and see a kind of ad unit calling you 'meet singles.' You may see ad units for immovable firms and mortgage companies while you are visiting a real estate site. You can land on a platform after inserting a keyword like "car insurance" and clicking on the search results, and either see a car insurance provider advertising or land on a website that persuades you to start the insurance quotation process. Once you have seen a couple of sneakers on Zappos, you can see shoe adverts and shoe deals on several pages. The aim is to define one or more consumer characteristics that last over time and can be used for automatic targeting across territories and interactive experiences based upon customizable company guidelines. The following scenario will allow you to understand what the goal is:

1. The characteristics of Visitor X are these.

2. A business has material or an ad it claims would appeal to the

qualities of Visitor X.

3. Now display the accompanying material or ad. Let us store the visitor characteristic and target the visitor on the same and related material and advertising on our affiliates or network pages, if possible.

Behavioural Targeting

We have learned about certain form of often argued targeting of online advertising: behavioural targeting. Compartmental targeting refers to technology and mechanism by which guests are shown an ad or material based on previous behaviours and responses. The following measures include behavioural targeting:

1. Collect guest behavioural data (that is, clickstreams, interactions, events, and metadata).

2. Identify whether visitors for whom behavioural details have been gathered already access a digital experience.

3. Determine the actual user condition on the web, such as customer intentions and propensities, or even search for a meaning.

4. Detect recent behaviour, activities and transactions of the tourist.

5. Serve in real time appropriate advertising (or content) that fit the actions.

6. Render the same or related advertisements (or content) as your affiliate, advertisement, and partner networks to the same user as you accessed the pages.

The aim is to use historical data to impact the consumer purchasing cycle or the marketing life cycle so that they can reach advertiser and site targets more efficiently and rapidly. Targeting can entail estimation based on a dependent variable, but the match is most likely based on known attributes (that is, independent variables). Then what's digital analytics like? You would think network analytics

technologies digital data would be used to target. After all, the strongest digital intelligence tools hold accurate details on previous actions at guest level. Certainly digital scientific evidence should be used, but it is not in most situations. Targeting is also a feature supported by ad server or network, maybe the ISP or another technology known as a behavioural targeting tool. Digital observational evidence will also be built into behavioural platforms.

You would use the data to make predictive data usable for targeting

1. Defining target segments or recognising target tourists.

2. Feed previous behavioural data on segments or targeting technology tourists.

3. Analyze the category and results of visitors against business, site or advertiser targets after targeting.

Targeting has a proven skill and immense capacity to produce enormous returns especially when paired with rich and comprehensive web analytics behavioural data. As a means to improve website content and advertising, the emphasis on technology combining with web analytics data would become more relevant and an essential "must have" for creative businesses wishing to enhance Internet market opportunities. Targeting can also be used in research and optimization. Targeting is related in data analytics to paying search, advertisement and content optimization based on identification and response of the following attributes:

• Application targeting: Where advertisements and content will only run on varying models of different operating systems such as Apple iOS, Android and Windows Phone.
• Category and subcategory: Conceptual concepts may be tailored for certain types of advertisements or communications such as groups of subjects on a website media or goods on e-commerce. The theory is that if you search your "hardware floors" segment, you can include them a "flooring installation services" ad or content. Targeting can also be focused on complex hierarchical categorisation methods such as taxonomy and topic headings.

• Signals: Wi-Fi targeted content and advertising can vary from 4G targeted content and smartphone ads.
• Geography: Country, territory, city and state are all targeted systems, including designated marketing area (DMA) and metropolitan statistic area (MSA). You can run a sports website to target surfers from 02116 (Boston) on Red Sox advertisements or material of the latest New York Yankees game.
• Internet Protocol (IP) data and browsing environment: such as connection level, device type, operating system, user apps, domain, and ISP. An ISP can target a new service ad or premium upgrade. You will use your IP address to aim.
• Time and duration: the concept of displaying material only in some time intervals is called partition. Popular categories include day- and season-departures. For example, a platform for a corporation (B2B) that prefers to view advertisements for a product of a certain manufacturer site's busiest daytime will be an indication of a day-out during working hours.
• Keyword: There are several common keywords. Search engines target advertising based on question keywords. Content Management Systems target content focused on keywords or keywords scanning. Keywords can be related to site sections or pages as metadata, equivalent to zone or segment on the ad server. After a page is associated with keyword metadata on an ad tag, you can tell the ad server to target advertisements on any page or pages of the tag.
• Language: Whether a language is identified in advance or identified, you will tailor advertisements in your language for tourists.
• Population data: If the ad server is aware of the population of a category such as age, gender, salary, title, purchasing power etc.
• Context: Think about AdSense and how AdSense compares text ads based on in-site content semanticization, emails or the web page summarization. Another example is when a platform gives you free delivery after adding a product to your cart if your overall order hits a price. This is context-focused content.
• Profile: Targeting may be done based on assumptions taken and rules based on person or section attributes (such as purchasing propensity or job title).
• Rules: Rules are structured guidelines which govern an action. Targeting should be achieved on the basis of company rules established by the company. Serve an interstitial ad for users, for

example, who don't have a site cookie package. Or only display a version of the AB test for each new 10th visitor.
• Behavioral: Customers who access blogs, smartphone apps, and other digital experiences may use advertising and content to reach consumers using the data gathered from ads and digital research. The most popular method of targeting that customers see in digital areas is behavioural targeting.
• Events: Events are shifts in which a transition happens between states. Digital review events should be as simple as a click on more complicated events. For eg, a deposit of an account holder. A huge amount of money into his bank account, so on the next login the online banking platform gives him a Deposit Certificate (CD).
• Intent: A more recent method of targeting, as some organisations claim to do, is to refer the data available from the click, the content of the website, the metadata, relationships, third-party attributes and proprietary information.

Targeting in the digital ecosystem takes place in two constructions: advertisement and information. Advertising is by far the position where the bulk of digital targeting takes place, while content targeting is seen less often but at an elevated web-based scale. Behavioral targeting is the most popular form of targeting you learn about. When developers of consumer experiences gather data on customers and then use it to enhance user service and improve the performance of company operations, behavioural profiling has taken place. If a visitor to the website completes a certain series of events and then a personalised user interface is submitted, rules-based targeting has occurred. If a user of a smartphone device was presenting a custom ad or offer to do such acts, promotional targeting took place. When data is paired with a URL or IP address and data sources from third parties, content-based targeting may have happened. When the interactive experience offers a tailored, specialised user experience dependent on those inputs, qualitative focusing has taken place. Many of these targeting themes can be further optimised by adding any of the above principles, such as geography, time and language. It would seldom be relevant to target a non-English speaker on an English ad. In most cases it would not be beneficial to display winter sports promotional material to those not in a wintery environment (unless the targeting was based on intent of the person to take a winter

vacation). Customer awareness and positioning by day or weekend vs weekend will maximise the commitment, click-through and efficiency of advertisements and content. The following list illustrates the typical trends and strategies for targeting in a customer setting. An individual can find these on any range of devices or screen sizes in today's modern world, from immersive billboards to Smartphones, for example:

• View ads: "impressions" web advertising are containers with contents called insertions. Not only should a publisher or advertiser file web ads with multiple insertions, the type of ad and, in some situations, the size can also be regulated. One case for targeting digital display ads will be to show a product advertisement the person looked at before during the recent visit.

• Social networking: social network marketing is popular in 2013. When you log in to your favourite social network, you see in your social diagram supported advertising for goods, programmes, individuals and brands. Social networking goals may include ads for goods for which you have expressed an interest. Or you can rely on material that is important to what you have typed into the social network.

• Content platforms: you can set up a viewer profile or a consumer profile on content media sites, allowing relevant content to be delivered directly to you from any internet-enabled platform. The data from your reactions to the targeted material on media platforms is presumably being used to target you more.

• In rich media such as video and chat: If an individual consumes free, multimedia content, time and attention will be bought and sold by the publisher behind the scenes to marketers. A clear example of this is in a rich media video, where ads can be introduced at different points in the stream on the basis of observations based on collective activity within the video stream. This sounds complex; however, it is easier to explain how video sites know when you play, re-wind, quick-forward, pause, and play back their video content. The details are known by particular frames and timestamps at micro-increment intervals, meaning that online advertisements are incorporated into peak activity cycles not just when viewing the video but also when communicating with controls.

• E-commerce sites: Different ads are displayed to travelers from an e-commerce experience. Depending on what the user wants, the user interface will move and adjust, so can the ads. The commercials may be changed by advertiser control or regulation of the publisher, where the contents, configuration and web flows can be tailored and modified according to rules. When the aim is to market goods as smoothly as possible, the targeting offers a wide variety of choices to create individual customer interactions that inform and trigger conversion. In e-commerce use the styles of targeting approaches already listed to include specific information, discounts, deals, and other rewards for visitors, consumers and consumer sectors to automatically complete the order or force them to return and buy after the transaction has been halted.
• Outbound marketing, such as email: on-site rules and events may activate tailored actions that take place either immediately or in future. A good example is when a visitor walks into the e-commerce site conversion, eventually chooses a product and after connecting it to the shopping cart flow, leaves the site and leaves the site. In a few hours or a few days, the site could deliver a targeted e-mail with a discount deal or coupon to finish the discontinued purchase. This form of shopping cart abandonment targeting also occurs at e-commerce sites.
• Inbound marketing, such as search engine optimization (SEO)/ search engine marketing (SEM), can be used as an input in order to render an experiential ad or target material to the visitor by leveraging information derived from the question string, http headers or other technical information accessible. For example, a business rule can be generated for each fifth guest referred to by a search keyword; the platform can then concentrate on a specific context depending on the meaning of the keyword.
• Set-top boxes, portable TV and immersive billboards: A more modern trend centres on cable, on-demand media experience and on streaming or broadcasting TV. Both cable signals and TV signals are digital in the United States. DVR set-top boxes are very popular. Interactive screens, almost a giant form of outdoor TV, are seen more often in cities all over the world. By recognising the viewer's actions and the use of the DVR, even shows shown in television, the cable provider provides excellent knowledge for the ads of its consumers. The position and level depend on the feedback of the user to an

interactive billboard, various content, whether in population macro levels, can be focused or interacted in a one-to-one or one-to-many relationship by mobile social input.

Retargeting

Retargeting involves the intention of presenting travellers or consumers with ads focused on previously acquired data on visitors, clicks, experiences, activities, habits or reactions to previous targeting attempts. As visitor recognition on websites and mobile phones is difficult, retargeting is typically anonymous and is based on cookies and other identifiers which persist for a variety of durations. Thus, the deletion of a single tag, such as cookies, is one of the most persuasive, cost-effective and modern methods of generating extra value by digital ads. Facebook Exchange (FBX) is also a retargeting network that is largely unknown to Facebook users. Retargeting can also be referred to as redressing or remarketing. The name of the operation – re-focusing – is a significant building. Targeting was addressed earlier, but we did not re-discuss the prefix. For much of the hype, fact and meaning potential may be generated in the "re-" of retargeting. "Re-" refers to the fact that sometime in the past the user, client, prospect, cookie, visitor, browser or computer used the digital experience. During this previous visit, data on the target item is obtained (e.g., most commonly the cookie) and then used as the basis for retargeting. Cookies, like other special identifiers that can be brought through websites by persisting on the user's computer, are also used to mark a particular individual for retargeting. Since user authentication, such as cookies, is sometimes erased, there are businesses that capture anonymous cookies and their relevant use attributes. To make it easier to uninstall cookies, the removed cookies are registered and connected to the current cookie. This historic cookie data and metadata were preserved and used over time to retarget and continue to create richer and richer data sets. Any accessible data collection correlated with the target visitor can be used for retargeting. But since the visitor has already visited the digital experience of the brand, information from various sources can be collected and aggregated, if available, that also touches or records the visitor. These sources may be combined and used with internal and external sources.

Using the targeting profile of the client. Customer relationship management (CRM) framework characteristics, prior sales people's relationships, articulated desires and analysis surveys, the interactive activity clickstream and other demographic and psychographic attributes can be paired with a variety of attributes that form the basis of retrogression laws. Retargeting usually takes place beyond the initial encounter first met by the visitor who introduced the need. Differently, an offer for a similar product, or an offer to buy the abandoned product or shopping cart can be shown on a different platform when a person visits an e-commerce site and abandons a product. You'll leave a pair of sneakers on Zappos, for example, and find a Zappo savings voucher on Amazon.com. Retargeting to the same user on the same website will occur over and over depending on the advertiser's frequency and inclusion rules. While former users and prior customers may be completely caught up on the same platform or within a network of linked websites, it is less popular. It's all focused on ad networks, search ecosystems (such as Google) and other social networks, such as Facebook, focused on advertising. Media and content sites can target unique ads to show more commercials with repeated visitor base in the form of digital interactions reflecting brand desire or interest in a particular product, service or brand. There is a significant opportunity to benefit from retargeting.

Retargeting can take several forms across multiple digital media categories. From Internet-enabled devices in public spaces to private, browser, or device-based interactions, companies may replace digital analytical data with various alternatives. Here is a list of the targeting styles found in the digital ecosystem:

• Mobile retargeting: Anytime a mobile user visits a site, it can be recognised and connected to a profile which can serve advisories relevant to past behaviours, incidents, laws, circumstances, etc.

• Retargeting: latest smartphone targeting through location recognition, global positioning system (GPS), in-store Wi-Fi, signed up or check-in. By way of a position or geolocation or warning service, a cell phone may be sent a promotion or bid based simply on being in a certain location like a department store. A product on your cell phone can be browsed, your mobile coupon scanned, and an

invitation to trade or cross-sell can be obtained directly on your mobile device in real time.
• E-mail retargeting: old-fashioned e-mails are as valuable as modern inventions. Email reloading is focused on the actions and interaction inside an email, and is theoretically aggregated in a guest profile.
Contextual retargeting: Contextual retargeting happened as different platforms collaborated with each other to exchange data about their users, visitors and audiences in order to satisfy the economic value chain. For example, take the airline website which also offers reservations for hotels and rental cars. The businesses will then partner and pull together audience demographics to develop new, creative, dynamic, interactive products as a one-stop shopping stream.
• Retargeting of off-site searches: As a visitor enters the web site it is established the search term. This keyword can be added with other information and used to target the visitor when going across the Site. For example, she may pursue her web-based search for "free video" and a bid for a Netflix trial account.
• On-site search retargeting (SEO/SEM): Search retargeting on-site incorporates information that is accessible from SEO and SEM promotions to guide targeting, in the same manner as search retargeting. Because visitors are likely to be subject to one or more paying search ads, this information can be gathered, used and incorporated into a pay-for-pay search profile to target visitors more intuitively as travelling on the Internet.
• Comparative re-targeting: similar to their previous behavioural targeting, behavioural re-targeting involves taking behavioural data gathered from any variety of inputs through modern data channels available to consumers and leveraging these behavioural data to reactivate an earlier engagement in a product, service or brand.

Input and advice both for targeting and retargeting processes are available to the digital analytics team. Virtual, after all, Data processing is used to (re)target, and digital data are the rules and filters added to (re)targeting. The experience of digital analytics team members in data acquisition, definition, verification, interpretation and collaboration can be useful for the preparation and implementation of target and tailored campaigns. The digital research unit will also play a valuable role in campaigns, services and

initiatives:
• Consumer group focused on known characteristics and behaviours. Customer segmentation research will be a benefit from the digital intelligence unit to the marketing, agency and advertisement departments engaged in targeting and retargeting. The characteristics and typical consumer habits available can be evaluated and recorded to find new insights.
• Recognise common items and effective content. One thing that is useful for the digital analytics team is to order the frequency of basic concepts such as websites, items, guests, etc. Ranking consumer knowledge and goods it buys can aid when preparing projects.
• Monitoring launch and performance assessment. To understand results, both retargeting and targeting campaigns must be monitored and calculated. Digital research software should be used and modified to act as data collection and monitoring tools to explain the success of targeted and reverse advertising campaigns.
• Offer information into visitors' origins and what they do (and not) on the web. Tracking at visitor level, be it anonymous, partly anonymous or not, is a key aspect of the best data analytics platform. Many out-of-the-box reports and personalised reports are available to communicate how the tourist traverses the web and what elements of a digital environment resonate with the public. These results, clickstreams and insights from the data analytics team are important for the programmes.
• Describe the consumer search effect. Targeting and retargeting based on keywords is a fairly common scenario. Digital predictive tools collect and report knowledge and actions, and illustrate how consumers and prospects use quest – both internally and externally. Search analytics data on keywords, web pages with null results and other search activity can be useful if configuring tailored campaigns.
• Show how profitable ad campaigns are. Rather than just every other unit, in addition maybe to financing, the data analytics team is able to grasp the efficiency of all marketing strategies and which of them is the most effective in terms of driving sales, effectiveness and loyalty.

But because of conflicting budgets for the same demographic or different population sets, your workers can use different vendors and systems for targeted retargeting. You do not want to create a scenario in which rival suppliers, departments and technology both work with

and are compensated for cannibalised the target or replacement budget. You want to keep this dilemma from happening. It's never a good day to figure out that you bid yourself for the segments of consumers you desire. One choice is to focus on retargeting with one team or organisation, while another is to ensuring that several teams/agencies are coordinated by reviewing the data and checking that you don't play a game against yourself that you can't win, if only you can lose your money. Track digital analytics performance and attribution. Of course, to calculate your progress, you need to monitor it. Companies will never measure their effectiveness without their campaign codes and other permanent identifiers required for collecting the data concerning actions, interaction and results in targeting and retargeting campaigns. The digital research team should devote money, time and investment to helping the team to capture, calculate, report and interpret the data in response to retargeting. When an organisation or several agencies do something, guarantee that the analytical team provides reports or analysis from the agency. Targeting is one of the newest applications in online marketplaces for digital research results. Many tools are available for targeting and retargeting. There are many ways of targeting and retargeting. Ensure that the marketing analytics team uses its experience and digital data to participate and fuel market operations and generate value from targeting and retargeting.

2.8 Converging Omni Channels and Integrating Data for Understanding Customers, Audiences and Media

The convergence of omnichannel data may sound much like multichannel data integration. While parallels exist, there is a substantial difference. Multichannel refers to the platforms and output of these channels in the sense of a marketing strategy in silos or against one another. On the other hand, Omnichannel integration aims to integrate data from as many sources as possible anywhere the data occurs in a single pooled, client, viewer, or media-driven dataset. Any initiative to merge or incorporate applies to all the processes and

practices related to identifying, processing, converting and loading (ETL) from various and diverse data sources, whether in-house or in-house, in one position, most commonly in a data warehouse (ODS). One explanation why consolidated data is advantageous is that it eliminates the time it takes to compile data before data processing starts. Although the digital analytics team also needs the location of important and unique data for business queries, considerable time and money can be allocated to get data together manually or with any minimal automation for any project. Consider market efficiencies, as the need for manual data integration is more prominent in analytical ventures. By combining data in a shared location and layout, which are important to a particular business purpose, you can increase productivity and gain new insights. Informatics schools around data warehouse, such as Kimball and Inmon, share common ideas about organisational alignment in technology and the application of Business Intelligence and Analytics Data warehouse solutions. The largest data is a huge integration of data from many large datasets. The explanation that analytics teams support giant and complex data inclusion programmes is because analytics criteria also include the search and processing of data from a variety of sources. Furthermore, a database organised and intended for analysis enables the use, often automated with software algorithms, of analytical approaches and strategies to establish associations, trends, observations, suggestions, optimisations and forecasts. Although data integration can be a costly business, it is also important and costly because value can be demonstrated by answering questions which produce economic value, which can be only addressed through the integration of omnichannel data in order to understand consumers, viewers and the media.

Omnichannel Data Types

Omnichannel analytics combines and unifies two or more data streams across various platforms, mostly focusing on the consumer or the shopper, meaning that the comprehensive data sets at customer level are all the items that an organisation may like to analyse to identify and forecast customer relations and insights, categories, behaviours, and purchases. At a macro-strategic stage, Omnichannel Research will treat all sources as really a big source (though distributed in multiple sources) that fresh approaches to find insights

using techniques must be taken together. This market approach is similar to the associated and underlying data warehousing infrastructure platform research technique. BI teams actually create data centres to represent, store and view all-channel data. The omnichannel data forms include:

• Internal data is the form of data produced in or managed by systems within your organisation. This segment usually covers paying and owned media.

• The digital research data, explored in the book, are the web, social network owned, communications, smartphone and other digital formats of behavioural, contact, case, click and transaction data. Digital research data can be defined as user or viewer activity across paying, received and proprietary media.

• Social data is the compilation of data on inputs, executes, clicks, contacts, activities and purchases of users on social media and on social networks. Social data can also be obtained from aggregators like Klout or ShareThis, who collect social data and use their intellectual property to derive new social data forms, such as the Klout scoring.

• Data are also polled, sampled, or paneled on behaviours, patterns, tastes, needs/desires, perceptions and beliefs in an audience through syndicated study. Client data refers to the household and geographical knowledge of persons within or within a particular community, e.g. characteristics of an audience such as household income, family size, race, gender, geography, shopping behaviours and so forth. Public data is also segmented into designated marketing area (DMA) and metropolitan statistical area structures (MSA). Competitive analysis audience data is regularly consulted.

• Financial information is information about creditworthiness, credit ratings, and other domestic financial, banking and investing related information obtained or not from available public and private sources.

• Business-to-business (B2B) information is corporate data, also referred to as corporate graphic data, which is both organised and

unstructured corporate data across continents, countries, economies, cities and so on. Profile data, organisation size, sales and other organisational data which provide the details.

• Advanced and custom analysis data provide perspectives from off-the-box or tailored public research areas. Relevant goods, lifestyles, economies, behaviours, geographies and other geographic segments of the audiences are the target of specialized results.

TV and cable data are directly related to subscription and consumer data which indicate what content and commercials were seen and when they were shown. For the purposes of targeting, consumer data from streaming television and subscriber-based cable networks can be used ('Digital Analytics Targeting and Automation'). As you can see from the previous list, for omnichannel analysis there are several diverse and special sources of data. Not all are helpful or important to each initiative, but the analytical team should consider these sources of data and the data suppliers while planning analytical proposals and research techniques to develop the digital analysis organisation.

Metrics of Omnichannel Data

If data is gathered in one folder, or collected in whatever manner you plan to do so, measurements and indicators are useful. These measures can be interpreted as snapshots, time series, distributions and other observational views. Digital Research Methods and Techniques). Following are some dimensions and metric definitions which can be used in the study of omnichannel data:

• Purpose of doing an analysis, including buying or transforming prediction: Omnichannel data is useful in marketing models which use statistical methods to forecast sales, benefit and/or audience/company propensities and expenditure or investment in business.

• Financial controls: financial measures can be strengthened and properly understood by recognising the expenses and income of operations and the resulting actions of the audience. With incorporation of omnichannel results, Digital channel transactions by

customer should be unified and correlated with expense data in order to truly understand profitability.

• Crowd reach: a deductible sum of participants in the audience – or gathered data, as near as practicable to that total. By mixing an individual with her signature from across platforms, you can de-duplicate the guest and optimise your audience count. For instance, if the same person logs into a website and uses the same mobile application username, he is a recognised entity on both networks. In principle, the Web and mobile data should be brought together at tourist level and the number of individuals visited by both, rather than measuring the same person twice (that is, once on the site and once on the mobile device). The search and decoding of vast data from omnichannel sources is difficult and costly. In some cases, the detection of individuals on the networks for public scope estimations and other applications (e.g. profiling and retargeting) is proposals that involve a thorough discussion of privacy and ethics. In fact, in certain nations, the recognition of persons on digital platforms could be unlawful or a possible invasion of privacy.

Omnichannel Data Integration

Customer research demands that mechanisms for the analysis of paid, exclusive and purchased media be implemented from a separate angle from the ad strategy, platform, smartphone app, publicity experience and power of innovative or interactive content. Naturally, consumer research focuses on the customer who can or cannot produce direct sales for an organisation in the age of "premium" business models. In digital research the consumer is therefore defined as an unidentified individual or organisation producing direct or indirect revenue for a corporation from one or more digital platforms. In order to link data from more than one medium for the digital review, the consumer needs a recognised attribute across channels. Customer analysis is described in this context as follows:

Applied analysis of data from various and omnichannels to address market questions about how current or incremental profits can be produced, cost savings or profitability enhancement for existing, new or future customers. Customer research includes data processing,

management/management, customer reporting, unit data which can be accomplished by cross-functional, analytical and business-wide implementation, marketing, distribution, financing, suppliers and technologies.

Customers data and analytics

The reflection on consumers and their data helps to humanise the research process. Customer analytics would require the customer in the middle and heart of the data instead of interacting with sites, taps, contacts, incidents, purchases and other business data. The client can be unknown, well-known, often nuanced shades of mostly anonymous or known, or PII may fully recognise the client. Regardless of the confidential and vague degree of consumer analysis, the ultimate purpose of market analysis teams remains the same: addressing market concerns that customers have surrounding the effect of their inventions, technologies, programmes, strategies, campaigns and initiatives company efficiency and profitability. These questions may be posed directly or with frustrating generality by stakeholders. In reality, the capacity to assist stakeholders at all levels in asked best possible market questions on available, appropriate and timely digital data is one of the signs of a successful analyst. Interested parties' concerns regarding consumer analytics frequently relate to the ideas and definitions outlined in the list below, but are not so explicitly and straightforwardly requested. The analyst must also support his stakeholder to ask the right questions by simplifying what is being asked. Such instances are as follows:

1. Who are the most important customers?
2. When is it best to participate, sell, campaign, communicate, address or contact consumers (that is, contact)?
3. Where (what is the most successful channel or channel to offer profitable consumer performance?
4. Why did the customer react in one manner (such as an online ad or channel), what have we learnt and what are the next best steps to preserve the relationship with the customer?
5. How do you use client data to enhance client performance, such as customer turnover reduction, customer engagement and customer loyalty improvement, customer participation and conversion?
6. Which habits did the consumer participate in in the past and which

decisions should we make based on the data?
7. Which consumers are the most important in the past and in the future – and how will consumer LTV be maximised?

As you can see from the discussions of the preceding questions, the better consumer insight systems can address what has happened to the customer in the past, what happens now with the customer, how the customer will happen in the future and what are the potential steps and the right measures to follow to accomplish business objectives with the customer. Answering consumer questions can be easy as evaluating the snapshot campaign results in time to correlate over a recent timeframe (such as Month on Month [MoM]).

Companies that expand their analytics teams to add responsibilities for understanding customers and bringing together data from multiple channels or omnichannels can encounter roadblocks and obstacles to taking on this data and analytics challenge. The sources of customer data are not always available or possible to access in the way that is wanted. Sometimes the data doesn't exist in the granularity, the history, or with the view needed to solve for a business problem. Significant cost may be associated with storing detailed and granular customer behavioral data generated from online digital systems and experiences. The cost of data integration projects can easily enter seven figures and have a material impact on the financial performance of a company. Due to the newness of data integration for big data and with customer-level data as well as an insufficiency of qualified resources, it can be challenging to find people who have direct, real, professional experience working with omnichannel data integration. Because of the technical nature of data integration, whether on small data or big data, technical resources are needed, which can often require a commitment from IT (but not always) or at the very least alignment with them. The potential for concern when querying across or integrating omnichannel data is real and must be considered, whether or not you think privacy concerns with digital data are overblown. Omnichannel data contains the clickstreams, patterns, events, behaviors, clicks, interactions, metadata, attributes, sentiment, and information about where people live, what they buy, what they earn and spend, their families, and maybe even who they are. As a result, data integration of digital data requires adherence to existing

rules and forethought about the potential future legal, ethical, and moral implications, ramifications, and potential slippery slopes from bringing data together. It is no different with omnichannel integration and becomes even more important due to the number of sources and teams involved to coordinate cross-channel data integration.

CHAPTER 3

ANALYTICS FOR MANAGERIAL DECISION MAKING

3.1 Customer and Product Profitability Analytics

Customer Profitability Analytics

Customer profitability analytics is the process by which you identify which consumers really make profits for you. In certain companies, there is an expectation that any consumer is a good customer, but that is not always the case. Profitability for the consumer typically comes under the Pareto or 80/20 rule. In other words, 20% of your consumers are expected to make up 80% of your earnings. Conversely, another 20 per cent of your clients are expected to pay 80 per cent of your customer expenses. Knowing what is relevant. Customer profitability is crucial because if you cannot discriminate between the customers who make money and the clients who lose money, then all of the customers will be handled the same and your profitability will decline. If you can segment your clients into categories, your marketing message and service quality can be customised for each category. Profitability research provides you with a deep knowledge of the shopping patterns of your consumers and the costs associated in delivering the goods they order from you. This information will help you concentrate on the highest profits by genuinely helping successful clients and motivating others that pay you money to compete. This calculation is a valuable instrument to be used constantly, but it is extremely important in a challenging economic setting. Obviously this analytic method will be used if profits drop or costs rise and the company is not as profitable as it used to know why and take the action to get the enterprise back on track. You will have the potential to examine and group deeper, by knowing the profitability of such client segments, so that you can recognise any patterns among each group as where they work, when

they first bought or from. For example, your best consumers made their first buy from those ads in a single publication, and your least successful customers come from a list of direct mail campaigns. This information will help to inform your future campaign strategies, so that you do not use the list again and consider the particular magazine for more ads.

Customer profitability analysis offers a rich analytical tool, allowing a thorough evaluation of individual products or transactions and providing a degree of openness that can offer really useful insights. Customer profitability analytics should be used by any company. And non-profit-making organizations like the NHS. While such companies do not have clients as such, they have 'payers' who are certainly interested in expanding their budgets as far as possible so they can support as many individuals as possible because they do not attempt to make a profit. For example, I collaborated with the NHS using this form of research and found that only 5% of their patients were eligible for over 200 accident and emergency visits. They were 'super consumers' who obviously had various challenges beyond their 'day in A&E.' By emphasizing these super-users, they have been able to pursue new support to free up money for others. Customer viability will also help you determine who is using your goods and services regardless of your concept of 'customer.' It not only makes you focus on renting clients but also finds opportunities to save expenses. This kind of analytics is also of great value to broadband companies. Any customers – the super-users – can end up using their unrestricted company so frequently that they are unprofitable. The study of regression, correlation or data mining was also used to distinguish various user/customer classes.

Customer profitability research has been possible since at least the beginning of the 1980s, but it is still not used because of the gold mine of knowledge they are willing to give. This method of research is originally used in banking and helps you to calculate the contribution each customer makes to the total benefit and the main drivers of this profit. It is also known as a consumer version of the P&L comment. If you mention that you supply big corporations with electrical components, you will have 10,000 clients in your database for several years. Via consumer profitability research, you can break those

10,000 consumers into percentage categories from top 10% to low 10% based on a number of flags, such as product, country, market volumes, sales frequency and customer support. You may find that a certain consumer likes your sales staff that it spends too much is a loss-making customer because of the problems they always pose during sales. Although this customer can look nice on paper, more thorough customer profitability analyses reveal that the same customer often spends a great deal of time asking questions and whining about facets of the product or product that make it unprofitable. The main challenge of consumer profitability research comes that you don't take the maximum benefit of a customer for life. If you measure each customer's profitability across the product or service spectrum, the total benefit can be overlooked. In certain businesses, a buyer who purchases five different goods is viewed as five different clients rather than one customer who buys five products, which may lead to unprofitable consumers becoming very lucrative in complete sense. This analytical technique can often easily be overlooked or skipped, because profitability is the area of the financial department, thereby missing the pictures and information of actual consumer profitability. It is critical that the divisions of finance and customer service work together in this manner to obtain useful additional knowledge that can contribute to marketing campaigns and decisions.

Product Profitability Analytics

Many companies realize how lucrative the market is, but very little takes the effort to get into each product or service's individual profitability. As a result, few companies know who is making money from their goods and who is losing money from their products. In addition to genuinely practical and strategically beneficial market analytics beyond profits and gross margins, secret or unique benefit and losses that are important to the product portfolio must be revealed. But that's far better said than done. Many organizations have broad, diverse product lines, and it is also very difficult to distinguish the costs effectively in operating terms across these product lines. For example, approaches for assigning sales, promotion, advertisement or customer care costs to each commodity may be way too random to provide any real meaning. Moreover, many vendors and changing

price prices will add to the uncertainty. However, without knowing which goods are profitable and which products are profitable, bad business choices would certainly be worth the effort. Consumer profitability analytics allow organizations to find profitability insights through the product portfolio so that more choices are taken and profit is protected and improved over time. This is critical because corporations need to be competitive and know where money is made and lost. Product profitability research helps you to affect the actual costs of each product so that changes can be made that have a positive effect on earnings. You might want to support one product more aggressively and to invest in research and development in order to discover fresh, more lucrative products if you find that one product is more profitable than the others. Alternatively, you will either make organizational and production adjustments in order to benefit or withdraw the product from the line if you detect a product failure. Of course, before you make any critical decisions, you can carry out further analyses so that you do not unintentionally damage earnings. For example, there is a supermarket which leased its product portfolio and noticed one of the washing liquids they stocked lost money. It really cost the supermarket money to store the items. Looking at the results in isolation, the store should avoid storing the items. Fortunately, they did a lot of analytics and even found that the individuals who bought this liquid were their top spenders. If they pulled this product from their shelf, it would most certainly have annoyed their most valuable clients who would have wanted to go to another store to buy the particular liquid washing.

When you launch your company or change your product and service offering, you should be using Product Profitability Analytics. You should know what goods your champions, your loss leaders and your pets are at any moment. And you should consider strategically updating this material at least once a year. In addition to your product or service spectrum there are typically substantial expenses, but you want to be completely aware of those you add and continue to pay. Profitability analytics give answers as to which goods or services that you sell make money from you and which lose money. To measure the product profitability, each product must be assessed separately. While the previous approach allowed you to look at each customer separately, the substance needs to be analyzed this time. This includes

a detailed cost assessment. This can be very difficult since similar goods or services would be available in each organization and share manufacturing processes or cost bases. It can also be very difficult to divide and assign costs where economies of scale have affected costs. However, this method can only be helpful if you find a consistent and reasonable way to apportion costs for the different goods. For example, take a cell phone provider. The company is able to develop and market 20 different phone types, ranging from a basic smartphone to state-of-the-art smartphones which can do little but make tea. You will find that the company is doing better if you looked at the sales and the profit and loss statement. Smartphones are popular and the demand is booming. Most people also want to update their new phone, so it's a big continuous market. But the organization does not know which of its phones make the most revenue. You know which versions sold well in volume but never measured the feasibility of the design. The sales manager will define one type of product that outperforms the others by applying product profitability analytics. Furthermore, he describes a group that losses revenue. Although one model sells well, it is high and there is a busy end of the market. Competition with major, well-established brands like Apple is challenging. Moreover, the technology is quickly evolving, meaning high R&D costs.

In the other hand, the easier mobile sells just as well, but has a much better margin and less competition. This product is aimed at older consumers or mobile phones and has found a market and takes advantage of the niche. Additionally, the product managers can see where the costs occur on any product marketed by the company and use this knowledge to change the manufacturing process or processes, so that costs are minimized or the product dropped off the range. These insights have also had an influence on marketing and advertisement, as it helped to develop this model as a cash cow to the older consumer. More detail on the activities of each product helps the sales department to market or sell alternative items, complementary to the cash cow product, in a satisfactory way, after the initial sales. For example, they built a simple, user-friendly tablet to accompany the phone and quickly distribute to pleased current customers.

3.2 Cash Flow Analytics

Knowing how cash flows and how fast it will be to turn your money into cash if you need cash quickly (liquidity) are important indicators that will help you assess the sustainability, profitability, and sustainability of your company. Therefore, cash flow analytics analyse the cash flow of the company and aim to forecast it so that challenges can be eliminated. Cash flow analysis matters that a corporation has a certain amount of cash to keep its cogs in motion: salaries have to be charged, raw materials have to be bought and providers have to pay. It is important to monitor cash flow so that you can handle it effectively in real time and plan for the future or you would quickly run out of money. And money laundering is one of the most common sources of company collapse. To evaluate your current situation, you can use cash flow analytics frequently in your industry to ensure that you have enough resources to manage your company effectively. Furthermore, you can forecast and schedule your cash flow requirements and planned positions in the future so as not to end up sidelining the company.

Cash flow measurement

Cash flow measurement can be performed retrospectively or in actual time by applying cash flow primary success metrics (KPIs) such as the cash transfer period, measuring the amount of days needed to transform money into cash – the working capital ratio, the solvency of cash flow, cash flow and asset returns. Having said that, these KPIs just look at what happened in the past. You will also use historical evidence to extrapolate into the future so you can detect a pattern if you try to forecast future cash flow needs. Alternatively, methods such as regression analysis can be used to forecast potential cash flow. Besides helping a company handle cash flow in real time and ensuring that it has enough resources in the future to lubricate the business, cash flow analysis will also serve a number of business functions. For example, predictive tools can help accounts receivable workers improve the cash flow by prioritizing which clients are approached and when, and also suggests the communication process which is

most likely to be effective and the accounts paid. Any cash flow analysis is based on historical results, so it's always necessary to make the correct decisions when you choose to extrapolate data into the future. This is where the study of scenarios and the simulation of Monte-Carlo will help. Many organizations have a sense of where they are headed and what they are planning to do. For each of these destinations, a strategic map describes the importance generators in the sector is formalized. In other words, the organization has identified the primary leverage to accomplish its strategic goals.

Value driver analytics

Value driver analytics are the measurement and review of these levers to ensure that they ultimately produce the intended effect. Value driver analytics is relevant because if you rely on certain leverage levers and execute a certain approach based on certain presumptions on what different levers can achieve, the assumptions have to be checked from time to time to guarantee that your behavior produce the outcomes you expect. If you cannot use metrics for your value drivers, you might easily presume what facets of your market are going to influence, affect and probably error. If you are wrong, you spend scarce time working on the wrong stuff. At least every year, preferably every six months, introduce worth driver analytics. It will take you long enough to get any data or confirmation that the interventions at the levels you used in your organization yield. You can, for example, use price as a driver and conclude that price has an effect on revenue and income so you must verify that theory with evidence so that you can decide whether or not you are correct. If your theory is correct, then you can confidently proceed with your chosen strategy; if not, you must carefully track the outcomes and, where possible, make improvements to the strategy.

The point of departure for the assessment of value drivers is to realize what your value drivers are. You could assume, for example, that you provide value by cost savings and quality to your customers. This is one theory of your business. You then have to create a basic model or a market test that checks the hypothesis. Scenario analysis can also be used to construct a number of situations around the principles to decide whether the outcomes you imagine can be delivered. The

correlation analysis can also be used to measure the correlation between variables that you assume are related to ensure that X-Wert Drivers really impact Y. What occurs within your sector clearly influences more than just what you do, such the external variables, such as global conditions or the price of oil, must also be weighed. For Example, if you operate a transport company the oil price would have a profound effect on profitability.

The key tip is the right assessment of your value drivers and what you are attempting to do creatively, even though you begin with the key 'stand out' ideals of your organization and test them. The trap is to attempt to classify all your value generators and eventually make a very complicated model. That doesn't have to be complicated, just stick to the principal problems and test your conclusions and comments about how these things affect your customers and how they affect your company. When a company is listed publicly, such analyses are used to help investors and analysts evaluate how good the company is. The effects and interpretation of these instruments will impact whether the shareholders intend to purchase, sell or keep their securities.

Shareholder value analytics

Shareholder value analytics (SVA) is one of the widely used methods. SVA is the estimation of the worth of an entity by analysing its shareholders' returns and essentially calculates its financial guidance. The theory behind this study is that corporate managers will often aim to optimize shareholder value and wealth. Shareholder value analytics are relevant because investors, analysts and media can decide how good the company is on the stock market by the results and perception of its results. Obviously, if analytics are negative, customers will sell their stock to purchase other shares they believe are safer and have positive performance. If analytics are encouraging, it will raise demand and improve the inventory costs. Using shareholder capital analytics more than just benefit and profits. Benefit and income can be deceptive because the measurement of profit does not take into account the expense of equity finance, so profit is easily distorted by imaginative, but legitimate, accounting methods. This method of analytics allows corporate owners to determine the importance of

their plan for shareholders.

You may use a statistic called economic value added to differentiate between value and profit that would imply actual shareholder value (EVA). Basically, EVA measures a business' benefit until the capital expenses are eliminated, because only when the return on the capital invested is greater than the expense of that capital value is ultimately generated. Three key concepts are central to EVA: cash is the best; 'expenses' like research and development and hiring are simply hidden investments; and equity funding is costly. But it is also more useful to forecast shareholder sentiment, so it can help you control sentiment and communications and ensure continuity. There are a variety of methods that can help you apply shareholder value predictive analysis. The underlying theory of shareholder value research is that only when you return on equity is greater than the expenses of your shareholder can you bring value to your shareholders. When the value has been measured, the priorities for change and shareholder value will be used as a metric for success management. That's the idea, at least. The policy of Schlitz Brewing was to slash brewery labour per barrel in the early 1970s. To do this, Schlitz turned to inexpensive hops and halved the brewing time. Shareholders were thrilled with a growth in stock equity, a boost in earnings and a rise in share price of $69. The shareholder value is sadly not the same as the consumer value. While the response was sluggish, concerns about the decrease in product quality were slow and the market share was declining by 1976. 10 million beer bottles were destroyed by Schlitz that failed quality control checks that same year. When management attempted to restore its quality, it was too late and the company did not survive. As the second most popular beer on the market, its ranking slipped to seven and the share price plummeted to $5. Although shareholder value will inform you how your approach performs for clients, you must also evaluate the performance of your customers. You should preferably aim to have shareholder value and consumer value. As can be seen in the realistic case, shareholder value measurement is not a valid method for assessing performance. Additional customer research has to be tempered to ensure that the consumer benefit is not at the cost of the value of the customer. Making sure that you monitor consumer satisfaction along with shareholder value.

3.3 Employee Capability and Recruitment Channel Analytics

Capability Analytics

Capability analytics is a talent management process that helps you to define your company skills or core competencies. After you know what the skills are, the current workers will analyse if you have any capacity holes. Knowing what expertise, you need and what you do have in your company will alert you to challenges that you do not know about, so that you can retrain or motivate individuals to address the holes more efficiently. Capability analytics are critical because your company performance depends on your workforce's level of competence and abilities. We recruit new workers too much without even understanding what skills we already have and what additional skills we need. As a result, we employ based on intuition, whether what is written for a curriculum vitae or how good or otherwise someone is interviewed. When these new hires join the enterprise, you will hope that they blend in well and operate well with the current staff, but you would be almost surely dissatisfied with the appointment if you are not entirely aware of what capacity you want them to be brought to the Table. Capacity analysis helps prevent this, because you know exactly what you need, what you have, and what new resources are needed to employ to close the gap. Or what extra preparation you need in order to close this gap for those who are still in company. This is particularly relevant as the industrial sector or market where it is rapidly evolving.

Capability analytics are often prudent to do at least once a year and definitely before any important or major appointment. Capacity analytics should be incorporated into an ongoing performance assessment to advise continued growth and development programmes for those currently in business. Knowing who can do what can also help you to transfer people around, to offer training or support to others who may transition to a new role or place. And because someone does one job now doesn't mean they can't do another. But

you won't know what anyone is completely capable of without evaluating their ability. Capacity analysis is often responsive if the company transitions and moves to a new region or slightly different direction which needs additional or different capability.

Capacity analytics can be done by questionnaires and interviews of the assessor, as well as the persons who work closely with them. It is always better to understand and admire the talents of someone else than to see ourselves. If you know what expertise and what skills you need, you can build a maturity structure for your business. This will also mean that you ask people again to apply for their jobs, but for workers that doesn't have to be too troubling. If emphasized early enough, the transition into more appropriate and required skills will effectively be part of the ongoing workforce preparation and annual performance assessments via capacity measurement. The speed of transition in the field, both in terms of the technical capability of machinery we use and the conduct of purchasing, ensures that the market is extremely dynamic. Only a decade before, you had ridden high and created big mainframe computers for personal use as well as smaller machines. Yet businesses just don't like huge mainframes anymore. The emergence of cloud computing has transformed the industry significantly. Via thorough capability review, you know that in the next decade the skills that made you a formidable power would make you obsolete. You create a competence structure for your organization that defines such and generic skills to avoid this potentially catastrophic result. For eg, you can understand that everybody in the organization wants to develop their 'customer attention' skills. In addition, you should understand that a new competency needs to be developed within the specialist centers around "big data," which would involve the capabilities of Hadoop and cloud computing that currently do not exist in the enterprise. Consequently, this skills structure guides HR's involvement to include suitable preparation and/or to hire new workers to initiate the skill transfer.

The skills are not just skills and qualifications; they can also contain skills that are not identifiable formally. For starters, you can know that a certain team member builds and manages relationships incredibly well. Although there is no credential to show the skill, this

is a power. Don't throw away the infant in the bathwater. Only because you have workers that do not cover all your talents or will use them in future does not mean that you have to get rid of them and employ others. There is more to workplace performance than ability. Cultural fitness and current partnerships are still very relevant in the squad. It is also much easier to sustain and retrain to develop potential than to discover the skill and expect that people can then blend into society or team. Capacity Analytics attempts to decide if individual workers are operationally efficient. Provided administration time, travel times, etc., a contractor could have 30 possible 'billable hours' per week and the ability analytics will say how much of the 30 potential reviewed hours are eventually paid to consumers and, forever, how much more work he or she still has. Capacity analytics are critical because they impact sales. You can't handle the workforce capacity more appropriately if you don't know what the team is doing and how many checkable hours they currently charge. If a consultant is in full capacity, he or she does not take care of the new customer. When another contractor invests so much time in management, he or she is not efficient or successful. Ability estimation is wise every six months or at least every year. People are people, not robots, so the ability of a person fluctuates all year round depending on a number of factors. This productivity peaks and troughs are common. Ability research will allow you to advise about negative or troubling patterns in productivity. This review helps you to then continue with more preparation or encouragement to help the person get on track before he gets too demoralised or pessimistic. As long as you have a framework that records data on how people spend time, you can use this knowledge to assess ability levels. Data may be created by time-tracking systems (where people inside and outside) or sensors. Some businesses also use RFID sensors (RFID) in name badges to monitor where they are employees and allow them automatically to assign what they do – for example by gathering data from which branch, workplace, machinery, etc. These data will then be used in predictive applications or also for analytical tools such as Microsoft Excel. Say, you are a software engineering company and 20 software engineers are working in your company. Capacity monitoring allows you to watch how long they spend coding and how much time they spend other jobs. This ratio can then be tracked over time to ensure that the real time (compared to the cheap output) expended on programming

does not decrease. It also helps the organization to consider the capacity of new projects. If everybody has 100% power, it is not advisable to do further work unless it can be improved by, for example, hiring new employees. Capacity analytics can also be used to detect employee success patterns and trends, which can be used for optimising recruiting or training and growth. Analytics of ability can make people very anxious. The idea is not to figure out who is more hard to whip, but to define capability holes, which can then be closed to maximize benefit.

Recruitment Channel Analytics

Recruitment channel analytics is the mechanism by which you evaluate the best workers and which recruitment channels are most effective. There are many methods of hiring workers, such as printed ads, articles of technical journals or magazines, directories for recruitment and recruitment contractors. Their costs vary greatly and the time taken to hire through these different networks differs considerably. But it is important to know which one's function and which networks are more cost-effective for ongoing recruiting. Recruitment success was historically calculated simply by counting the amount of applications received or the number of places filled. Modern recruitment is full of data and whilst it helps you to control the scope, effort and expenses per qualified applicant, the ultimate metric is how many candidates are hired effectively and continue in the company. Employees in most professions represent the greatest expense and the greatest potential. The wage bill is by far the most significant cost for most corporations so it is crucial to get the right workers. Furthermost, hiring poorly can be a real concern for an organization. It's now much tougher than it used to be to get rid of bad employers. A bad employee can even interrupt an employee's team and get frustrated when they need to cover their poor results. And unfortunately, it's usually not the one you want to get rid of the leaves. Recruitment channel research will help you attract the best candidates from the outset.

Recruitment channel analytics can be done at least once a year so that you can use the most economic channels to eliminate recruitment channels that either don't work or draw wrong applicant forms.

Recruitment analytics would provide a historical benefit evaluation using primary success metrics such as HCVA and the return per employee (RPE). This lets you recognise who the most active and important team is. Surveys can also be used to obtain more information that can then be mined. You should also carry out admission interviews to find out when a candidate has found the chance or how they have heard about the position. Correlation analysis and regression analysis will also allow you to recognise trends or associations between recruitment networks and high-value hiring processes you may not have known about. Mixing qualitative and quantitative perspectives – from referrals to applicant quality, employee productivity, candidate and manager satisfaction – blend the best outcomes with time-to-hire cost-to-hire details. The goal of recruitment channel analytics is to provide simple recruitment and enable you to use only high-value platforms, while ideally minimizing your need for costly recruitment consultants. Example, Employing workers can be a time-consuming and expensive operation. There are also large costs when you use a recruitment consultant. Although they find appropriate applicants and screen them, which saves you precious time for interviews, costs can be prohibitive, especially for senior positions.

Therefore, analytical recruiting channels will help you identify where your online recruitment is the most successful. Correlation research will reveal that the high-value prospects have already occupied jobs for three years or more before beginning with you. These insights will also be used to finalise the selection process and to exclude any claimant who does not agree with this criterion. Hence it may lead to avoid using your hiring company and shift all of your recruitment to online platforms. Aggregator platforms like glassdoor.com act as a hiring Trip Advisor and will offer unbiased analysis of the recruitment process by businesses. There are still early days for these pages, but in the years to come they will be an invaluable source of information. Sometimes, it is impossible to obtain statistics from candidates who did not go to work or have a career, because much of the data collection is lacking – yet again, websites such as glassdoor.com will help to get information of its sort and social media information.

3.4 Project and Programme Analytics

Project and programme analytics evaluate the effectiveness of the internal initiatives and systems to develop them in the future. There are still three main components to assess successful delivery such as Timeline (Is the project on time?), Budget and Deliverables (Does the proposal deliver the results?). Project and programme analytics measure production against timeline, budget, and product consistency. Project analysis can allow project management to project and retain difficult tasks on time and on budget. Via analytics, project managers can go beyond merely gathering data and as they are finished, finishing assignments. You can now find a host of stuff, including how programmes work and whether they are or not in compliance with the general targets. Analytics allows project management to decide strategically and maximize project success rate

Tunnel Vision and Funnel Vision Application

Organizational programmes cover short-term and long-term projects. As these methods, Project management strategies vary in their techniques. This is the technique to Tunnel Vision with short time and Funnel Vision were implemented for long-term programmes.

Tunnel vision: Most advances in this sort of project are very straightforward and quick limited recording and monitoring track execution. This strategy focuses on the delivery of projects processes and quick distribution assures. Provides short-term initiatives for operation digitalization Real-time web information. Analytics delivers dashboards to enable better decision making.

Funnel Vision: In this approach, project deliverables are long-term and complex in nature. Companies turn up as the project progresses deliverables. Funnel that is large in its future and then narrows down to the current when it recedes. The project manager is at the narrow end of the time. Instead, The Project Manager will see a wide variety of options in front of a limited tunnel vision. The Project Manager achieves not just a strategic aim but also a series of actions, activities, and possibilities. Implications that unfold around. View of funnel significantly increases the capacity to collect both threat and

opportunity signs early enough to respond on them long before they arise. Funnel Vision improves vision, analyses the future, incorporates management of transition, Project revalidates Goals at each level of project, which in turn increases execution and taking decisions.

Data Collection and Prioritization Project Analytics

Project portfolio management is a complex decision-making method that involves a list of current projects Continuously revised, updated. Brand Portfolio Map for current goods and products under production, New concepts are available, while useful knowledge such as Projects is given when mapped (Price, capital, competitiveness of goods, quantities). New ventures are assessed in this phase, picked and assigned priority; acceleration, killing or de-periodization of current projects and services assigned and reassigned to active programmes. Select projects and refine the project portfolio that better suits the strategic of the company project portfolio selection depends on goals.

Advanced Organizational Methods

Project collection involves consumer commodity portfolio, resource optimization, value maximization. Digitized Workflow Project Management provides Project Progress in real time in different fields. The Project Management Dashboard (PMD) is a tailored, quality-based Project MIS. Metrics for project monitoring and monitoring. The PMD helps the project manager to track the life clearly project alerts to early detection of problems and to promptly cause corrective measures. It helps the value of budgeting and estimating data to be seen the effect is more educated and time-consuming strategic decisions at a glance. It reveals complicated financial details in a job style easy to absorb and understand. Show format. An individual will easily get an outline of how the fiscal resources of a project are invested and whose strategic goals are there.

Project Management Software

Project Management software is an everyday tool to manage the day-

to-day operations of the project. The team is kept informed about the latest developments in the project in real time. When analytics feature in the software, it is a boon as it mitigates much of the hassles of manually charting out the updates. Analytics simplifies using the software and makes it more convenient. First let's look at what analytics refers to- it is the systematic quantitative analysis of data or statistics which is set to decipher constructive information for better decision-making. It includes the aggregate use of diverse analytical methodologies, which include but are not limited to statistical and operational research methodologies, Lean Six Sigma, and software programming. With the help of analytics project managers are able to manage complex projects and keep them on schedule and within budget constraints. Analytics provide project management professionals the power to go beyond simply capturing data and ticking tasks off as and when they are completed. Aided by analytics in task management software, project managers are able to make strategic decisions and better the chances of project success rate. With this the project manager can at a glance get a glimpse of how & where the project is in progress. Whether milestones are being met & budgets are in line.

Project Manager Analytics depicts how a project relates to and creates an influence on the entire organization. With the aid of project management analytics, teams are able to gauge whether the task will be completed on time & as per specifications. Additionally, with the help of analytics a project manager can assess and compare the viability of various options available and avoid unforeseen roadblocks which can make the project stuck. These also provide real-time flexibility that can help avert disaster. For instance, project managers can use a burn-down chart, which is a graphical representation of work left to do over time. Deep and insightful analytics can set the stage to improve resource utilization and better forecast revenue and costs. The use of Analytics based on historical evidence, companies use data to forecast trends. With the explosion in quantum of data, in particular the internet penetration & social media visibility. This has made the process of deriving meaningful insights difficult. With the use of analytics, the meaning behind the numbers can be discovered. The outcomes against the variables can be predicted. There is reduction in workload, processes get improved

and also outcome enhancement of the project.

Detailed analytics review will reveal how & whether a tiny shift in focus & approach can have the scope to achieve better outcomes. In other words, how each team member fits into and has an effect on the project. This shall liven up the joy of working together. A whole lot of time is saved when context is given to data. This enables maximization of productivity as tasks can be prioritized better. Analytics can also combine unrelated data streams to offer even better insights. Organizations can, with analytics, have the capacity to expand their perspective and combine unrelated data streams to get in-sync with vision statement. These shall then give way to deep insights into projections and early warning signs in complex projects. The viability of a project can be assessed by the project manager. This helps to gauge which projects adhere to Key Performance Indicators (KPIs) and accordingly stakeholders can be informed as to whether their investment if whether time, money or labour is reaping expected fruits. To gather & record data for all projects is critical, as this will enable the project manager to review whether a change in Project A shall have any possible relational impact on Projects B, C & D. Using analytics, project managers and members can keep an eye out for early signs of slippage in terms of budgets, costs, and timelines and take proactive action. Based on these insights, project managers can instantly arrive at a conclusion whether a project or task should proceed as per plan, variation in course or be shunned altogether. Use of Analytics to Project Outcomes portray the impact of delay in delivery of product or service on company profits to the project manager. With the use of advanced data modeling and data warehousing actual costs will be shown across with possible dates of completion. These are based on current and alternative rates of productivity. Prediction of customer responses to various product offerings, pricing and delivery methods is also made possible.

Project Analytics to Create Strategies

Project Analytics have the power to forecast shortage in resources, equipment failures, asset availability, production and maintenance costs, and certain other competitive factors a business may face. Analytics aid project managers to detect how a potential task affects

certain outcomes prior to their occurrence. Based on the info provided sound, strategic decisions can be made. Forecast which functional areas are most likely to display appropriate participation in future surveys so that a strategy can be developed to improve the future participation. Analytics Tools in Daily Use One such analytics tool is the PERT tool, the Program Evaluation and Review Technique. The technique follows this formula: ET=(OT+4(MLT)+PT)/6 -- Estimated Time equals the sum of the Optimistic Time plus the product of 4 times the Most Likely Time plus the Pessimistic Time, divided by 6. Hence all likely time estimates are considered giving an average portrayal and no estimate is ignored.

Rather than simply gathering data from one project, analytics give the leeway to project managers to better their understanding of how every current and proposed project finds its place in the bigger scheme of things. They also better understand how one project can affect another. Whatever the goal of a project, whether it is to improve quality, resolve a system problem, better operations, or prevent losses, analytics facilitate project managers with the necessary insights which shall make it more successful. The most critical parameter to measure project success upon delivery is- quality. With analytics the quality of the project throughout can be planned for, monitored, and reviewed. Here are some more precise use of project management analytics in brief:1. Objective evaluation of project performance. 2. Rational project decisions with analytical certainty.3. Absolves the need for vague decisions with subjective uncertainty4. Use inferences to develop regressive/predictive models5. Prediction of future audience behaviors based on their past behaviors. As per Gartner, the market for project analytics and business intelligence is predicted to grow to $22.8 Billion by 2020. Whereas the demand for Project Managers will reach to 87.7 million by 2027, as per Project Management Institute. As both these disciplines have seen an explosion in growth rate, it only makes sense to use powerful tools which are interwoven into the organization’s fabric. This shall create a more sustainable & viable competitive advantage. So it is always resourceful and a value add to include analytics in your task management software. It will not only make you a hands-on manager, but also better the chances of the team to perform, integrate, learn & grow together.

3.5 Market Analytics

Competitor analytics

Competitor analytics is important for marketing and strategic planning. It allows you to understand your competitors in more than just a cursory ad hoc way. Not everyone in your market is your competitor; some may sell similar products but to a different audience and some may simply be too small to be your competitors. You need to know who your real competitors are, how they are positioned in the market and in relation to your business.

By understanding their strengths and weaknesses you can identify opportunities to exploit and threats to navigate or mitigate through strategic planning. Plus, competitor analytics pulls all the relevant information on all your competitors together so that you can see the whole picture not just snapshots when you focus on one main competitor.

Competitor analytics matters because your business does not exist in a vacuum. It is part of a dynamic industry where many businesses are all seeking the same consumer spend. If you are to prosper in that dynamic market you need to know what's happening around you and how you and your competitors are perceived by the market. Competitor analytics help you to understand your competitive advantages and disadvantages relative to your competition. It also helps you to predict what they will do in the future and therefore how you can stay ahead. Plus, if you know how they have behaved in the past you can better predict how they will behave in the future and how they may respond to a new product or pricing strategy.

This depends on how changeable your industry is. If there are constantly new companies entering your market and others falling away, then you would be wise to conduct thorough competitor analytics at least once a year. If the industry is fairly stable and your main competitors haven't changed in several years then once every couple of years will probably be enough.

That said, you do need to review your findings when you are making important strategic decisions. That way you can anticipate what your competitors will do if your plans will impact them and how you can counter any competitive move.

Competitor analytics will help you answer some important business questions including:

●Who are our key competitors and why?

●What are the objectives of our key competitors and how does that differ from our objective?

●What are their strengths and weaknesses?

●What threats do they pose?

●What opportunities do they present?

●What strategies are they pursuing and how would they affect us?

●Based on their past action how are they likely to respond to changes in our business?

As always, strong and useful analytics relies on strong and useful information. You can source competitor data from recorded data that is easily available such as annual reports, product brochures and marketing activity. If possible, have an employee, friend or family member to buy a product or service from your key competitors and assess their experience. This will also get that person on their mailing list so you can see all their communication and marketing efforts. Pay attention to business journals and newspapers for any mention of your competitors. You can use media monitor services to find these or simply create a Google Alert which will alert you to any online mention of your competitor.

There is also observable data which is collected from various sources such as competitor pricing data, advertising campaigns, etc. And finally, there is opportunistic data such as trade shows, supplier meetings, and sales force meetings. Your sales team will often meet would-be clients who are already doing business with your competitors – they could be a rich source of information.

This type of analytics used to be quite laborious but so much data already exists online. You can, for example, read competitor product reviews like their Facebook page and see what their customers are saying about them. When you have the data you could conduct text analytics and sentiment analysis to gain insights into what your competitors are doing right and doing wrong.

Practical example

Say you are a mobile phone manufacturer and you wanted to conduct competitor analytics. The easiest way to start would be to use the internet to establish all the other companies that manufacture mobile phones. Most businesses already know who their main competitors are but may not know all their competitors, or may not consider companies that create products that are a substitute for their product. Today more and more people are using tablets or simply making calls via services such as Skype – these are also therefore competitors because they could and do replace the need for a phone at all. So Skype may be an indirect competitor of yours and certainly what that business is doing should be something you know about.

Once you've compiled your list of key competitors and indirect competitors you need to identify the key value drivers in the market. What do customers in this market value the most? What are the features and benefits they are searching for when they buy their product? Are they interested primarily in price, quality, length of warranty, simplicity to operate, etc.? Looking at your own customer analytics can help establish what those features may be. Once you have a full list of features and benefits identify which competitor fulfils which ones. Of course it may be easy to figure out if a competitor product has a particular feature or not, but benefits are more subjective. However, if you look at social media data, for example from review sites, you will be able to establish if each competitor delivers certain benefits too.

Finally, you need to compare your own offering to your competitors – especially your top three rivals and work out what makes you products or services unique. Are those factors important? Do your customers know about them, do they recognise the difference? Again there is a wealth of new data such as social media data and review

data that can tell you a great deal about your competition and what their customers think about their products. And all of this data can be broken down by service, product, competitor or geographic location.

The most useful tip for competitor analytics is to do it! Most businesses don't. Instead they think they have analysed their competitors because they may share snippets of information that a manager might hear at a conference or they may notice a newspaper article and share that in a strategic meeting. And yet this approach places your business at risk of potentially dangerous competitor blind spots.

Don't fall into the trap of thinking that informal impressions, intuition and conjecture is a) all you need and b) competitor analytics. The process is much more systematic and thorough than that, and if you invest the time it will yield reward and inform your decision making.

Pricing analytics

Pricing analytics is the process of analysing price sensitivity in market segments and it is one of the critical territories of business analytics. Pricing analytics has emerged as an important tool to increase profitability, especially in highly competitive markets where everything that can be done has been done.

How much you charge for your products and services will depend on your pricing strategy and whether you are selling low cost high volume, or high cost low volume – or some compromise in between. Traditionally, companies have priced their products and services using a couple of methods: they either calculate their fixed and variable costs to establish how much it costs the business to supply those products or services and add a margin on top as profit; or they don't compete on price and set a significantly higher price than production hoping that they will sell enough to cover costs. In both cases the business will probably pay close attention to what the competition is charging and stay within an acceptable range.

Price analytics matters because it allows you to drive incremental sales and profit in tight markets. In the past no one really knew how much a customer would have been willing to pay for the product or service they bought. And yet if the price was set too low then you've

missed out on profit; too high and you miss out on the sale altogether. There is therefore a fine line and that line shifts all the time depending on each individual customer.

Pricing analytics allows you to tailor your pricing to different segments of your market so you can capitalize on the 'low hanging fruit' and those who are willing to pay more for your product or service. As a result, you can increase volume and profit margin which therefore positively impacts revenue simply by using some clever pricing analytics.

With more and more pricing information available in real time, companies can also dynamically adjust prices and match competitors in real time when they increase or decrease their prices.

The potential benefits of pricing analytics are such that you should use this tool consistently. When assessed on a regular basis the insights it provides allow you to manage your pricing for maximum revenue.

And considering that the insights don't require any further action or initiative other than a change to the price of your product, it's a cost-effective and relatively simple way to increase profit.

Pricing analytics can help you answer business questions such as:

- What's the optimum price to charge to maximise sales and profits?
- Does that price vary according to market segments?
- How can I create price tiers to maximise revenue?
- How do I optimise my dynamic pricing?

Practical example

The insurance industry is a big user of pricing analytics. Insurance is a notoriously volatile and changeable product. For most insurance companies margins are dwindling and competition is fierce. The holy grail is to sell insurance and encourage the customer to elect for automatic renewal. If you have ever elected for automatic renewal – you should know that the insurance company you've bought your

policy from has almost certainly applied pricing analytics to figure out how much they can raise your premium each year without triggering a cancelation. What makes pricing analytics so exciting now is that so much of the necessary data is in the public domain. This data is, for example, already widely used in supermarkets. Most supermarkets offer some sort of price match service to stop their customers 'shopping around'. If a customer buys a product that they could have bought cheaper at a rival supermarket then the customer is given a money-off coupon for the value of the difference that they can then use the next time they visit. This is all made possible by price data in the public domain. There are now third party data specialists that can give you access to this data for a fraction of the cost were you to compile it yourself – and it's kept very accurate and up to date. You can then use this data to analyse your pricing against your competitors.

Chances are that now you know that your insurance company is deliberately squeezing more money from you each year for the same product you might be a little ticked off. Most people are when they understand this analytic process. And insurance is by no means the only sector using this technique. The danger of course is that customers find out about it and feel cheated. Insurance companies for example are in effect taking advantage of their loyal customers. They are making their loyal customers pay more and giving the better deals to those that shop around. This also happens frequently in the banking sector but customers are becoming increasingly aware of the practice.

If you use pricing analytics to improve revenue, make sure you improve the value you add to customers that are paying a little more. Ideally offer them something additional that doesn't cost you any money to deliver. That way those customers who are paying more are also getting a little more, or at least the perception of greater value.

Marketing channel analytics

Marketing channel analytics allows you to assess the different marketing channels available to you and establish which are the most effective. The ideal marketing channel will always be influenced by costs, the demographic of the customer you are seeking to reach and

also what your competitors are doing, among other things. It is likely that you will reach different segments of your market via different channels, but it is still crucial that you know which ones are working and which ones are less effective so you can make better marketing decisions.

Marketing channel analytics matters because there are literally hundreds of possible channels and ways to market your products and services. These range from the traditional print ads, PR, media and direct marketing to home shopping networks, guerrilla marketing tactics, giveaways to online marketing as well as social media and mobile. There is only so much time in the day and only so much money avail- able for marketing so understanding which is going to deliver most bang for your buck is essential. Marketing channel analytics looks at costs and return on investment so that the marketing budget can be used more effectively. It is a good idea to start with a complete analysis of all marketing activity and then create a process for a more ongoing review.

Marketing channel analytics can help you answer business questions such as:

●What type of marketing is more cost-effective for reaching our customers?

●Is online marketing more effective than offline marketing?

●Are our prospects or customers doing what we want them to do as a result of the advertising?

●What marketing channel is most effective?

●What marketing channel is most profitable?

The first step is to list all your current and potential marketing channels. You need to be clear about what it is you are trying to achieve with each channel. So for print advertising you might want customers to call you using the number on the advert. With online marketing you may want the customer to click through to your website or click on a banner advert. Or that may not be enough for you – you may want the customer to then add a product to their shopping basket and complete the purchase.

For each of the current marketing channels, and any potential as yet unused channels, set some conversion rate goals so you know what you want that channel to deliver.

Too often businesses launch themselves into a particular marketing channel without any real idea of what success will look like for them in that channel. And this is why there is the old marketing adage – '50 per cent of all marketing spend is wasted but the problem is we don't know which 50 per cent'. We don't know which 50 per cent because we don't conduct marketing channel analytics and have clear targets for the channel before we begin.

And there really is no excuse for not conducting this analysis any more as so much data is available – especially online to help assess results. Advertising with companies like Facebook, LinkedIn and Twitter have integrated analytics included in the advertising so that you know what happens as a result of that advertising.

Practical example

Marketing channel analytics is not just about identifying the best-performing plat- forms but also the most cost-effective. Say your marketing channel analytics discovered that the most effective method of marketing that you currently use is direct marketing. Your campaigns consistently yield high response rates and generate significant return on investment; a reason- ably close second is your online promotions. When you take costs into consideration, however, the online promotions are a clear winner because although they don't yield as much income they are much cheaper to implement. Direct marketing is expensive whereas online promotions are not.

Market channel analytics is obviously easier online than offline. Online marketing channels are digital and often the analytics are built into the marketing platform. Effectiveness of offline channels such as direct marketing has used different codes on response forms but offline channels are also benefiting from new technology and tools. For example, retailers can put sensors in shop mannequins to count passing traffic, how many people look at the window display and who then enters the shop. The biggest trap with marketing channel analytics is that by definition you are assessing the channels in isolation. And that might be quite misleading. For example, if I

measure the success of my email marketing campaign and it looks positive, I have no way of knowing how many of those customers have already been on my website or seen a few of my blogs or read some of my books prior to getting that email. The email campaign will be credited with the positive outcome, but it might not have been the email campaign alone that caused the outcome. There are now tools that can help to appreciate these interconnections and influences such as multi-channel funnels which show how marketing channels work together to create sales and conversions.

Brand analytics

Brand analytics seeks to determine the strength of your brand compared to your competitors. Your brand is more than just your logo and your commercial livery; it's the look and feel of your products and what they represent to your customers. Contrary to popular opinion your brand is not what you think it is; it's what your customer thinks it is and, more importantly, what Google and other search engines think it is. Knowing what that is, is clearly important and will impact your decision making and strategic direction.

The purpose of brand analytics is to:

●Find out your current market position and what your brand stands for according to your customers and other external sources.

●Investigate your current and future internal brand according to your management and employees.

●If a gap exists between the two – take action to close that gap.

Brand analytics matters because brands matter, and what your customers think and feel about your business and brand matters because it will often influence whether they buy your product or not. Brand fashions may come and go and if your product or service is the current 'must have' product then ride the wave, but even if it's not you need to understand what you are selling above and beyond the product or service. Are your brand young, innovative and creative? Is it secure and strong? Does it spell trust? Knowing these things can make a huge difference to performance and how you position and market your offerings.

Brand analytics is something that needs to be monitored. Thankfully this is much easier than it used to be because of social media. Many companies are not monitoring what is being said about them and therefore what their customers think of their brand via social media posts on Facebook and Twitter. For example, the sports drink company Gatorade has had a social media command center in Chicago since 2010. 'Mission Control' is a marketing 'war room' housed inside the marketing department and it monitors the brand in real time. Gatorade measures blog conversations across a variety of topics and shows how hot those conversations are across the blogosphere. The company also runs detailed analysis around key topics and product and campaign launches. It also tracks terms relating to its brand, including competitors, as well as its athletes and sports nutrition-related topics. Basically, Gatorade knows what people are saying about the company and its products all over the world.

Brand analytics can help you answer business questions such as:

- What do our customers think of our brand?
- Is that impression changing over time?
- What are they saying about competitors compared to us?

Brand analytics is about understanding how your brand is perceived. In order to do that you can source data anywhere your customers and potential customers are discussing your brand. This could include customer service conversations, sales conversations, online forums, blogs, review sites, and social media. You can also install Google Alerts, which will alert you every time someone mentions your brand online. Once you have the base information via text or voice data you can then apply sentiment analysis to keep an eye on whether the overall mood is positive or negative towards your brand.

Practical example

As the owner of a local chain of gyms and fitness centres you are keen to under- stand how your brand is perceived. This is not the first time you analysed your brand. This time you want to use some of the new data sets that already exist and conduct the analysis yourself. You

start by putting your brand into various search engines and seeing what comes up about your brand. Following links and visiting review sites can allow you to see what others are saying about your business and brand. All the text data you discover will then allow you to run sentiment analysis (Chapter 1.9) so you can gauge how people feel about your brand, and also text analysis (Chapter 1.8) to see what they are saying about your brand. There is now so much data online and people are so comfortable (for better or worse) sharing their experiences online that you can easily access data that will help assess your brand. Plus, this data is already out there – it's recent and usually more honest and accurate than many of the traditional approaches.

The internet is a rich source of information regarding how people feel about your brand and your business. People love to share, they especially love to share when someone has upset them, or they are upset about a product or service. You need to tap into this rich vein of information so you can monitor the health of your brand and use the feedback as an opportunity to improve and quickly convert unhappy customers into raving fans. Ironically, if you solve a customer's problem quickly you have an opportunity to not only turn that situation around but win them over completely.

You can, however, get lost down a rabbit warren of data if you are not careful. This process is not simply seeking to find out what everyone has ever said about your brand, it's about gauging the sentiment and how people perceive your brand so you can take action where necessary to improve that perception and add brand value.

Customer satisfaction analysis

Customer satisfaction analysis is the process of assessing whether your customers are getting what they want and expect from your business, product or service. in essence, are they satisfied or unsatisfied with their experience of buying from you, or your product or service?

Measuring customer satisfaction is one of the most common forms of business analysis that companies engage in beyond financial analysis. it allows you to find out exactly what parts of your product or service

are most appreciated by your customers. too many businesses have got into financial trouble because they have made inaccurate assumptions about what their customers want, need or love. Done properly, customer satisfaction analysis can be an extremely insightful management tool because it helps to illustrate any gaps that may exist between current delivery and customer expectations. as such, it allows a business to close that gap more quickly and improve customer satisfaction in the process.

Customer satisfaction matters because, generally speaking, customers who are happy with your product or service and have enjoyed a smooth and problem-free buying experience are much more likely to buy from you again and become a loyal and profitable customer. Maintaining plenty of satisfied customers also helps to keep costs down because it's significantly more expensive to attract new customers than it is to keep the ones you already have. it makes sense therefore to measure customer satisfaction so you know what your customers think and feel about your business, product and brand so you know whether or not you are on track or you are losing too many customers to your competitors.

In the past if you managed to irritate the odd customer you might receive the occasional angry phone call or terse letter, but it wasn't the end of the world. Not anymore! an unsatisfied customer can wreak havoc with your brand and post derogatory reviews that will and do have an impact on future sales. You need to know how happy or otherwise your customers are in real time so you can take action to ensure as many as possible are as happy as possible.

Measuring customer satisfaction should be an ongoing process because the insights represent a huge potential opportunity or threat depending on how effective the analysis is and how often you engage in the analysis. Having an unhappy customer is not necessarily a bad thing. it's part of business life and should be expected. How you as a business then handle that customer, however, can determine whether or not that customer turns into a threat or an opportunity.

I have a colleague who bought a modern but retro record player as a Christmas present. it was one that could also play CDs, plug in an MP3 player as well as play and record vinyl. it arrived on time

and looked fantastic. the problem was that it would turn itself off every now and again. it was quite easily fixed and would start again immediately but it wasn't ideal. My colleague was obviously disappointed and contacted the seller. the seller told her that there were no replacements, she would be issued with a full refund including postage and could keep or dispose of the product as she saw fit. that's customer service! My colleague went from being very dissatisfied to be a raving fan of this company in a heartbeat. the business may have lost that sale but she will buy from them again, and she has since posted glowing reviews on their website and provides feedback that will appear on amazon which will almost certainly drive additional future sales to that business.

Dissatisfaction is not in itself bad. the key is being aware of it quickly enough so that you can take the necessary action to turn dissatisfied customers into satisfied customers and ensure that more are the latter instead of the former. that can only be achieved if you engage in customer satisfaction analytics regularly. Customer satisfaction analytics helps you answer business questions such as:

- are we providing what our customers want?
- are they happy with the products and services we offer?
- are our customers satisfied with the service we provide?
- How well are we satisfying our customers?

Satisfaction is a subjective term which means that not everyone will be satisfied by the same things. this can make the analysis of satisfaction tricky. the most common ways are a combination of quantitative and qualitative surveys. the quantitative element, i.e. 'on a scale of 1–5 (1 being very dissatisfied and 5 being very satisfied) how satisfied are you with X', provides data which will allow you to indicate the customer satisfaction trend over time, whereas the qualitative element will dig deeper into those ranked scores to help you better understand the dynamics of satisfaction.

it is also possible to create a customer satisfaction index (CSI). CSI is simply an average of all the attributes that you believe contribute to customer satisfaction. it is always advisable not to assume what those

attributes are and focus groups and factor analysis can be particularly useful in figuring out all the various aspects of your product and service that a wide variety of your customers appreciate.

Once you know the various factors you then weight them. For example, customer satisfaction for an airline may include on-time departure, quick transit through security, aircraft safety and on-board snacks. Clearly the quality of on-board snacks adds to the sense of satisfaction a customer may experience, but it's probably not considered as crucial as on-time departure or aircraft safety! as a result, the attributes need to be weighted to account for their varying importance. The customer satisfaction index can therefore be a single score generated from your own unique index of factors you've identified influence satisfaction for your customers, or you can use an existing index.

the widely used American Customer Satisfaction Index (ACSI) or the National Customer Satisfaction index-UK generates a single score based on drivers of satisfaction such as customer expectations, perceived quality, perceived value, customer complaints, customer retention, customer loyalty and price tolerance. The beauty of these existing tools is that they ask the same questions (tailored slightly to each industry), which means that you can compare your business to others in your sector and to your nearest competition. In addition to these traditional tools there are now many new, often relatively inexpensive, ways to analyse customer satisfaction using the plethora of new data sets that now exist. For example, you probably post reviews, post on product forums, create Facebook posts about your product or tweet about your product, service or business. Not only is this data already out there but it's also untainted by research conditions – what your customers say about you online is probably the closest you'll get to the truth. as a result, that text data can be retrieved and analysed to gauge sentiment.

Practical example

Many large companies such as Gatorade and Dell track what their customers are saying about them in real time. they monitor social media including Facebook and twitter, blogs and all types of

online discussions. in the same way the Cia can monitor conversation traffic to identify key words of phrases that may alert them to a potential threat we can now monitor whenever anyone mentions a particular product, brand or business. even something as accessible and simple to use as Google alerts can tell you whenever someone mentions your name online or mentions a product or brand!

By accessing data that is already in existence you can then use text analytics to analyse customer satisfaction and sentiment analysis to gauge whether the senti- ment towards your product or service is generally positive or negative. Plus, there is also some very exciting predictive capabilities with this data. As already mentioned, researchers at the Microsoft research Labs in redmond, Washington, discovered that it was possible to predict which women were at risk of postnatal depression just by analysing their twitter posts (sentiment analysis). instead of using an algorithm that looked at searches or purchases of the mother, the research focused on the language and words the mother used in social media posts prior to giving birth.

If this can be done to identify those at risk of postnatal depression before it occurs and therefore offer additional support to prevent it occurring, then there is no reason why it can't be used to identify customers at the risk of leaving a business or bailing out to the competition. Being able to track customer satisfaction in real time is now possible through the vast amount of data that is being created and shared online. these insights can help you stay one step ahead of your customers so that you consistently deliver what they want and need. There really is no need to invest in potentially expensive surveys when there is probably already a plethora of qualitative data that exposes your customer satisfaction. encourage your customers to interact with you via your Facebook page or twitter that data can then be used to improve your business and increase revenue.

the main trap to be mindful of with customer satisfaction is that even if a customer is satisfied – even very satisfied – that satisfaction does not always convert into profit. and it certainly doesn't necessarily translate into loyalty.

Web analytics

Web analytics is the process of analysing online behaviour so as to optimise website use and increase engagement and sales. There are two types of web analytics off-site and on-site. Off-site web analytics looks at what is happening on the internet as a whole and includes the measurement of a product or service's potential audience, competition and online trends. On-site web analytics is the analysis of your own website. This includes collecting data on how many people visited the site, where they came from, how long they stayed, how they navigated the site and whether the visit resulted in a sale. Off-site web analytics is useful for assessing the market and opportunity whereas on-site is useful for measuring commercial results.

Web analytics matters because online sales in just about every industry are increasing. More and more people are connected to the internet via a computer, tablet or Smartphone, which creates a significant online opportunity for just about every business. Most companies have a website but having one is not enough; you need to know how effective it is. Web analytics can tell you. If the results show that your website is not performing, then it is also fairly easy and quick to conduct market research with your customers to either ask them what they want or test some changes to see what elevates performance. For example, you could test new landing pages on your site to see which one attracts more visitors or leads to more sales.

Web analytics is an incredibly cost effective and immediate way to test marketing ideas. Traditionally, when using direct marketing for example a campaign may include a number of different versions to see which version performs the best. That version may then be used as the control and new campaigns would test against that approach to see if response rates could be improved. Now marketers can test campaigns, offers, pricing or headlines online prior to a TV, print or direct marketing campaign to identify the best performers before spending all the money in production.

It's probably enough to conduct off-site web analytics once a year unless you operate in a particularly volatile market. The off-site analytics helps to measure trends in your industry so you can be

alerted of changes in plenty of time to adapt your offering. On-site web analytics should be conducted constantly so you know how many visitors you are attracting to your website and what they are doing once they get there. It can also be beneficial to test various offers and marketing campaigns online before they go live on other more expensive media. For example, you could test your TV ad online to gauge response. Although the costs are still applicable for making the ad, most of the real cost is spent airing the advert on TV – being able to predict response ahead of that investment is very useful.

Web analytics help you answer business questions such as:

- How many people are visiting our website?
- Who are the visitors to our website?
- How do visitors find our website?
- What search terms do people use to find our website?
- What pages are they visiting?
- Are there any pages that are not being used that could be deleted?
- How long do visitors stay on the site?
- What is the conversion rate from visitors to sales?
- What are the online trends in my industry?

There are many web analytics tools and service providers, although Google analytics is probably the front-runner. What's brilliant about these tools is that you just have to set up what you want to measure and asses and the tool will do all the work for you. So while you could easily create your own tracking tools and embed them into your website, for example, it just doesn't make sense anymore. The tools are already available and most of them are also free so wasting time and money re-inventing an already very accurate and sophisticated wheel is not a good use of your resources.

There are also tools such as CrazyEgg which shows you what parts of your website are 'hot', 'warm' or 'cold'. Hot and warm areas of the site indicate where customers are visiting and staying. Cold areas are

where there is no traffic or the customer quickly leaves. These insights can therefore help you to refine your online presence and give your customers more of what they demonstrate they want and less of what they demonstrate they don't want.

Practical example

As you might expect online search engine Yahoo! Inc uses web analytics to impact revenue and profit. As one of the most popular search engines in the world Yahoo! receives millions of hits to its home page every hour. As a result, they have access to a massive amount of data that allows them to test new hypothesis or assumptions very quickly. For example, Yahoo! wanted to know whether alterations to their home page would change visitor behaviour and if so how.

They devised an experiment where they randomly assigned several hundred thousand users to an experimental group, leaving the rest as the control group. This allowed them to establish whether or not the changes to the home page resulted in the anticipated or desired behaviour change or not. The insights gained from this experiment allowed them to optimise their offerings to all users and therefore enhance revenues and profits. Plus the results of these experiments were often visible within minutes, making them an extremely dynamic tool for shaping company strategy and direction. The speed of accurate feedback together with minimal disruption and low cost mean Yahoo! typically runs about 20 experiments of this type at any given time. As well as being cost-effective and immediate, Yahoo! also benefit because they are able to cut out all the lengthy discussions about website design and layout because it's the evidence-based results that drive behaviour and strategic direction and not personal preference, consensus or even a dominant opinion.

The real value of web analytics emerges if you continue to do it and can see how your online performance is changing over time. It is also a fantastic way to run market research without running market research. If you try something online – if it doesn't work you change it. There is nothing printed or distributed, no man power on the streets asking questions – all you need to do is try something, assess the

response and try something else. Make sure to check out your competitor's website too and compare your web performance to your competition. And there are a range of ways to do this (see references)

Social media analytics

Social media analytics is the process of gathering and analysing data from social media. The rise of social media has created a rich vein of data from individuals who are customers or potential customers. Most people have a Smartphone and will share their thoughts and feelings regularly via Facebook, Twitter or many of the other social media platforms. This data can then be assessed to find out what people are saying about your product, service, brand or company.

Social media analytics matters because it offers you an almost real-time glimpse into what your customers or potential customers think and feel about your business. These insights can be used to increase revenue by tapping into unmet customer needs, reduce customer service costs and highlight customer service issues that cause loss of business or reputation. They can also be used by product development to gain real-world feedback on products and services. Often in focus groups people will tell you what they think you want to hear or will tone down their dissatisfaction because they don't want to 'appear rude'. Social media analytics can give you the real unadulterated view – for better or for worse. Whether good or bad, the truth allows you to take action and improve performance or improve on the product in a way that will resonate with your customers. Plus, if you don't know what people are saying about your company or products, you can't step in to solve the issue or turn an unhappy customer into a raving fan.

Social media is a permanent and almost constant feature in millions of people's lives. Those millions of people are posting their opinion on social media via their Smartphones and tablets constantly, therefore you should be analysing what's being said constantly. Many big businesses have social media command centres that are monitoring their products, services and brands constantly and using those insights to inform decision making and direct strategy. But it's not just for big business – social media analytics is essential for all

businesses, large and small. Social media analytics helps you answer business questions such as:

●What are our customers saying about the company/brand/product?

●Are our customers satisfied with their interaction with our business or not?

●Are there any problems or issues being raised by our customers on social media that we can solve?

●If you are engaging in social media – who is reading your posts?

●How many followers do you have on Twitter or LinkedIn, or how many likes do you have on Facebook?

Social media analytics essentially gathers text data from social media posts and blogs and that data is then mined for commercially relevant insights. This can include text analytics and sentiment analysis. Sentiment analysis is one of the most common social media analytic tools as it determines whether customers or potential customers see your brand, product or service positively or negatively, and these trends can aid decision making. You should know the trends around your product or service every week. There are many tools available to help you achieve this such as Google Social Analytics, SumAll, Facebook Insights and Twitter Analytics.

Practical example

Since 2010 sports drink company Gatorade have operated a social media command centre inside its Chicago HQ. Monitoring their brand in real time across social media platforms and the blogosphere has proved invaluable to the company. Monitoring their 'Gatorade has evolved' campaign, which featured a song by rap artist David Banner, they were able to see that the song was being heavily discussed on social media. Within 24 hours, they had worked with Banner to put out a full- length version of the song and distribute it to Gatorade followers and fans on Twitter and Facebook, respectively. The company is also using the insights from the social media command centre to optimise landing pages and ensure followers are being sent

to the top-performing pages. As an example, the company says it's been able to increase engagement with its product education (mostly video) by 250 per cent and reduce its exit rate from 25 to 9 per cent.1

The real power of social media analytics is its real-time immediate nature. If you can spot unhappy customers as soon as they indicate their frustration, then you have an opportunity to turn that situation around and create a loyal customer. That means you need to use it and look at it frequently because the 'shelf life' of the insights are short or potentially short. In addition, you need to empower your customer service team to engage with your customers quickly to solve issues.

The biggest trap for social media analytics is to become obsessed with numbers – how many followers or how many Facebook 'likes' you have, rather than looking more closely to see how many of those followers are customers and how to engage the audience to encourage more people to purchase your products or services.

3.6 Supply Chain and Lean Six Sigma Analytics

Enterprises are facing an important key movement due to transition towards a new normal after covid 19 outbreak. The availability of sophisticated computing tools has made it simpler than ever to capture and interpret data. Questions now depend on how the data can be better applied – or even analyzed first. Lean Six Sigma provides assistance in these areas. Continuous progress in the processes and the ability of state-of-the-art data analytics help companies to boost operations, be it a retailer trying to refine a digital media strategy or a supplier who needs higher rates of return and greater production on the floor. The secret to success is to get the right people educated in the specifics and how to implement Lean Six Sigma processes. In an article on the value of data analytics, Forbes found in recent studies that most companies consider data processing and market intelligence

a priority. Organizations use data mining to simplify anything from procurement procedures to the processing of documentation necessary to comply with federal legislation or audits. Data gleaning ideas have also helped corporations innovate development, inventory control, fleet management and customer support.

Benefits of Six Sigma in data analysis

Forbes has addressed how the analytics influence fields such as sales, banking, accounting, supply chain management, distribution, and operation. This involve the development of cycle time, which is close to Takt time. Takt Time in Six Sigma tests the time between output beginning in one unit and production starting in the next unit. Forbes notes that firms "apply Six Sigma to know the bottlenecks of the process". Another main metric is to guarantee the consistency of the manufacturers' goods. Forbes said, "Almost all manufacturers use Six Sigma programmes to solve problem areas and trouble areas of suppliers which may vary widely in product quality in a given period." Starting with Lean 6 Sigma and Data Analytics, the massive volume of data gathered by an organization will boost Lean Six Sigma tools and strategies by encouraging them to function quicker. The ability to interpret large data sets easily often increases the precision of reports. Thus, Lean Six Sigma's methods and techniques remain the same. These are two which will allow data mining to be used.

DMAIC – Six Sigma stands for identifying, measuring, evaluating, enhancing and regulating. The ultimate aim is to reduce mistakes, reach targets and increase consistency. An additional key metric, dubbed Perfect Order Efficiency by Forbes, tests how much a business delivers a product that fulfils consumer needs and is delivered on schedule.

Value Stream Mapping – This lean tool provides a comprehensive procedure, which can be of tremendous benefit with data analytics. After you get a clear picture of how a process works, you can decide where mistakes are made and what steps do not add value to the finished product.

It is important to build a culture of continual process enhancement in order to effectively fuse Lean Six Sigma with data analytics. This includes many crucial steps, beginning with an overview of why and what you intend to accomplish. It is also important to educate people in the concepts of Lean and Six Sigma. Training and qualification courses provide you with an opportunity to learn what is required to acquire loops from white (beginner) to master black (expert). It is difficult to exaggerate the value of this "people side of Six Sigma." Six ventures from Sigma have much less chance of completion without adequate preparation and buy-in from both staff and administrators. It is also much harder to encourage a continuously changing process climate. Data analytics will develop tools for Lean Six Sigma. Lean Six Sigma will classify regions for data processing. Both can make companies more sustainable, productive and profitable when working together.

Lean Six Sigma Analytics

Lean Six Sigma analytics is the performance and quality analysis method in your company. Lean Six Sigma is also used historically in the automotive sector in service sectors, such as insurance agencies, where the method of managing claims is continuously enhanced. The lean portion of the equation discusses seven different waste forms to define places for improvement:

1 Transportation: Is there an excessive transport or storage of goods that contributes or waste time?

2 Motion: Is the acceleration of individuals or machinery unnecessary? In other words, are there any persons or machinery pushed too frequently or moved too often?

3 Inventory: Is there work-in-progress (WIP) or finished items that do not have a value-adding feature or meet requirements?

4 Waiting: Is any waste created as individuals, parts, processes or services sit idly waiting for the end of a work cycle?

5 Over-productions: Is waste greater or faster than the consumer

demands generated by production? For instance, if the output is greater than ordered.

6 Over-processing: Does any excessive work meet the needs of customers?

7 Deficiencies: Is there any waste that the consumer deems unreasonable.

Lean Six Sigma analytics delivers data on waste rate in the internal processes, which in turn helps you to become more cost-effective. The Six Sigma component focuses mainly on consistency and defect removal. The word 'Six Sigma' is taken from the statistics sector and measures method capabilities. 'Six Sigma' theoretically means that your degree of defect is less than 3.4 per million prospects. In other words, a mistake is rendered less than 3.4 times for a million acts or moves during a manufacturing process! That said, each organization that uses Six Sigma must decide its own acceptable degree of sigma. Six Sigma is such a valuable instrument for evaluating results and mathematical techniques rather than hypotheses and conjectures and for optimizing results. It is a technique for improving performance. Lean Six Sigma analytics matters and in all areas of operation, performance and consistency are measured in order to assess how effective you perform and whether the goods or services are of constant high quality. This is obviously important because you buy a certain quality from your customers and you should know a) what it is and b) whether or not you satisfy your standards. In a profitable sector, operating productivity is also important because it allows you the ability to reduce unnecessary costs and thereby make more profits. We should really know what kind of output you deliver and the reliability of processes. As a consequence, Six Sigma analytics can be used more or less continuously. Lean Six Sigma analytics lets you respond to company questions like:

- What is the good or service standard that we produce?

- Has this changed, has it stayed steady or declined in recent months?

- If consistency improvements have happened, what has caused these

changes?

● Are there any places that could be made more effective in our business?

● Are there any opportunities we don't actually use to save money?

The Six Sigma method (pioneered by Motorola in the late 1980s and successfully embraced by multinational giants, such as General Electric and Honeywell and several other companies of different sizes), tells mankind about the stability and predictability of process performance. The objective is that machine failures or error rates would not be 3.4 times a million times higher. As an example, imagine a football team goalkeeper who plays 50 games in a season and who sees 50 shots from the opposition team every day. If the team scores a defect, a Six Sigma goalkeeper will give every 147 years one goal. It is important to emphasize that Six Sigma is both a metric and a technique to enhance efficiency. Six Sigma as a technique describes a series of instruments that allow for consistent success or ideally a breakthrough. These instruments are based on the concepts of DMAIC:

● Identifying consumer desires (internal or external); this is their process preferences.

● Calculate current performance; what is the defect frequency?

● Examine the gathered data and chart to evaluate the cause and effect, and growth opportunities; why, where and where the defects occur?

● Monitor the process improvements in a different direction; how do we guarantee that the process remains stable?

DMAIC is introduced by an in-house team of Six Sigma accredited workers, called Master Black Belts, Black Belts or Green Belts based on their experience and level of engagement. In essence, the pledge is that the degree of Sigma's success will dramatically decrease customer satisfaction and eventually contribute to superior and

sustainable financial results. You may have a range of retail buyers who purchase the goods to market in their stores as a clothes manufacturer. However, any order can vary slightly, not only in the types and quantities of garments ordered, but also in the tolerance each supplier embraces.

For example, you will distribute jeans to a big store chain, which you then sell as part of your own clothes label. The order from the store may contain 1,000 pairs of jeans in different sizes. If the store asked for 400 pairs of thirty inch jeans, 400 pairs of thirty-two inch jeans and 200 pairs of thirty-four inch jeans, they won't approve the order if anything else is shipped. It can be really pricey for you. Lean Six Sigma analytics guarantees that the requisite tolerances and minimal defects are complied with. The store will accept all 32-inch waist jeans with a tolerance of 0.2-inch. Many consumers know that any pair of jeans created is not 100% similar. If another of the buyers are a high-end store who would apply a high-value brand name to the denim, they may only approve the order if there is 0.1-inch or less resistance. You will handle this method by using Lean Six Sigma analytics.

Conclusion

Six Sigma is generally criticized because projects and programs are usually implemented from scratch. As a result, companies invest a great deal in programs covering small business areas. Thus they choose the lowest fruits, but also skip the major chances. The main advantages of Six Sigma are accomplished by programs connected to the accomplishment of strategic targets. Six Sigma-teams should pick ventures that are strategically important and not necessarily those that yield financial benefits. In accordance with the above, it is worth remembering that, while some of the companies that were Six SIGMA poster boys have in fact secured cost savings from their efforts, at the same time they have become very bad stock executors and are acknowledged for their plan failure. The argument was that these companies were targeted primarily at using Six Sigma to find opportunities for cost reduction rather than as a method for constantly enhancing their efficiency against a strategic target.

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