Forecasting the Future for Profit

Using forecast models to better understand your market and outperform the competition

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Executive Summary

If you really want to understand your market, you need a model. Over the past 30 years, the collection and availability of market data has grown rapidly thanks to technology and, particularly, the internet. As a result the complexity of the information available about the market has grown substantially. However, having 'Big Data' and other information about the market is not the same as understanding the market. To truly understand a market and its dynamics, a company needs to know how all of the structural elements interact, both at present and in the future.

This white paper includes these key points:

- Sources of market data are widely available and varied, but none of them in isolation can provide a full picture of a company's market both now and moving forwards. A market model maps out the interactions of multiple structural elements in the market (such as prices, products, geographies, demographics etc.)

- Time series models (e.g. Box-Jenkins or Holt-Winters) are a useful tool for short-term forecasting and understanding behaviour in mature markets. However, in a fast-growing technology market, a time-series forecast does not take into account market adoption behaviour or demographic data to shape and limit growth. This ultimately restricts its accuracy

- Technology adoption has been observed to follow logistic function (or penetration) curves across many different technologies including cellular phones, personal computers, broadband and the Internet. Combining market volumetric data with demographics, churn rates and Diffusion of Innovation Theory or anchor metrics produces a very good modelling approach for diverse markets across the technology sectors

- Sensitivity analysis can be carried out on a model in order to assess the impact of variable changes on the shape of the future market. This technique determines what effect a small change in an independent variable will have on the dependent variables. Scenario planning is a more involved and powerful way of looking at future possibilities in the market. It uses an understanding of which market drivers are the most important in terms of market impact and also uncertainty of outcome. By exploring how drivers might interact, a range of possible futures can be explored and the most probable identified

- Building a single market model with the purpose of using it across all departments within a company produces strategic and economic benefits. The development of a single organisation-wide model means company discussions can focus on "what are we going to do to win in the market?" rather than "what is happening in the market?" The benefits of a single model include cost reduction, time saving, the ability to use expertise not effort, the potential to derive first-mover advantage, pre-planned reaction to market fluctuations and clearer employee and market communication

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Introduction

There have been a number of famous forecasts that proved to be wrong. In 1895, the President of the Royal Society, Lord Kelvin said "heavier than air flying machines are impossible." Eight years later in 1903, the Wright Brothers flew their first aeroplane at Kitty Hawk, USA. On 16th October 1987, the BBC's chief weather forecaster, Michael Fish, said there was no imminent hurricane. The following day, England was ravaged by destructive winds so severe that it has become known simply as the "The Great Storm." With examples like this, is it really possible to forecast the future with any certainty?

Using the right market intelligence, Kelvin might have known about early flying trials with kites and proto-aeroplanes. The problem of lift had been solved (with the aerofoil) and the remaining issues were optimising design and propulsion. Had the weather forecasters had the models and computing power of today, "The Great Storm" of 1987 would have been forecasted (as was the 2013 UK storm). There is a growing body of evidence to show that using computers to combine data with good models can provide forecasts beyond anything that can be made purely qualitatively.

The book "Moneyball" (Lewis, 2003) describes how the Oakland Athletics baseball team used an analytical, evidence-based approach to assemble a competitive team, despite its disadvantaged revenue situation. Using data about players' activity during the game, Oakland signed seemingly low value players but then outperformed high wage-bill teams and made the US baseball playoffs in 2002 and 2003. The bank, JP Morgan, is equally credited with and blamed for the invention of credit derivatives which lay at the heart of the banking crash in 2008. A credit derivative is a contract between two parties in which the seller agrees to compensate the buyer if a loan goes into default. "Fool's Gold" (Tett, 2009) describes how JP Morgan's models questioned the credit products and sales strategies of competitor banks from 2005. The combination of their models and market experience led the company to change its position. The result was JP Morgan emerged from the crash as the world's largest commercial bank by market capitalisation.

Mapping the future and choosing the route

A market model is a mathematical representation of the market, constructed from historic data about elements such as vendors, price points, geographic regions and technologies over time. The model shows how these different elements interact with each other over time. This is then used to forecast future trends in these elements and the consequences for the market.

This insight into the present and the future enables companies to position themselves more effectively in the market, targeting the segments that are growing or have high growth potential and giving themselves a competitive edge.

The modelling process

To build a model, a company should start with a base of reliable historic information. The technologies and competitors in the market should be reviewed and used for benchmarking. The structural elements to be included in the model (such as price bands, products/services, geographies, customer segments, competitors) need to be decided on and built in in the correct order.

To forecast, statistical techniques are applied to the collected data to create an initial forecast line. This can be created using regression analysis and time series analysis (including Box-Jenkins and Holt-Winters methods). However, the results from statistical techniques need to be altered to take account of the underlying market trends. The art of modelling lies in understanding market behaviour, applying theories such as Diffusion of Innovation and considering the impact of regional market dynamics. Market theories such as penetration curves, market lifecycles and disruption of technology should be considered and integrated into the forecast. This will ensure that the forecast incorporates the longer-term market trends. The company's regional market intelligence and on-the-ground knowledge of the market should be taken account of in the forecast, to ensure the model is fully aligned with the company's own view of the market dynamics and direction.

The model can be refined over time as new data becomes available, meaning the company can test out hypotheses about the market. Measuring forecast accuracy enables a better understanding of the market, as the company can identify how and why the market behaviour differed from their assumptions (if, indeed, it did). Techniques such as sensitivity analysis and scenario planning can be applied to test out the consequences of potential major changes in the market, and therefore the most-probable future can be decided on and modelled. These techniques also allow a company to pre-plan their response to different future developments – both positive and negative.

The modelling process creates one view that can be subscribed to by the whole organisation. This ensures that all areas of the company are using the same information about volumes, prices, values by sector or segment, the company's position within the market and where it is heading. As a result strategic planning will be aligned across departments and the company will move in the same direction as one.

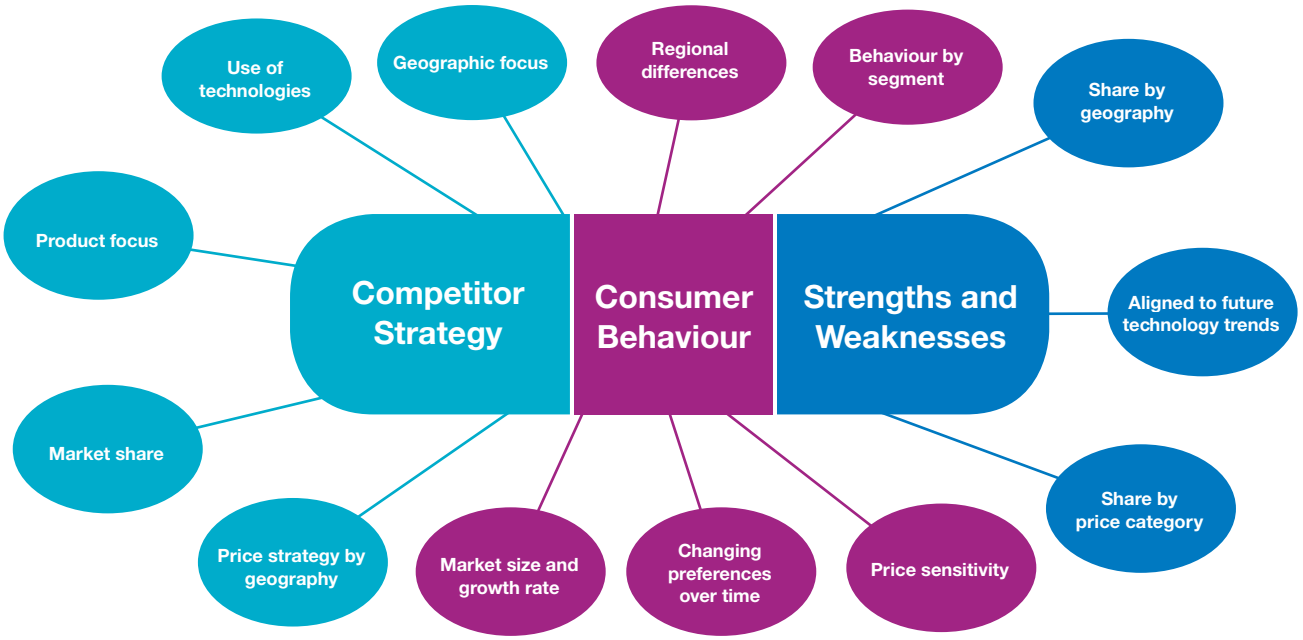

Figure 1 Insights that can be derived from the market model

The Role of the Market Model in Strategy and Planning

Strategising with a model

A market model provides insights that are essential for strategy and planning. Mapping market trends and positions of other vendors allows businesses to understand the opportunities for growth or expansion and reduces the risk of running into unexpected obstacles or giving others a competitive advantage.

The market model will show multiple interactions between structural elements. Examples include: which countries and regions will grow, and where growth will slow or even decline; how the average selling price will alter and how this will be different for differing markets; behaviour of different customer segments; competitor behaviour.

Strategising without a model

It is possible to develop corporate strategy without a market model, but there are problems with these approaches to strategy.

Qualitative view: Purely qualitative descriptions of market behaviour rarely capture all the relevant information. Even when a description is very thorough, it cannot capture the interactions between variables in the way a market model can. A purely qualitative view will therefore not produce such a robust forecast.

Historic view: Whilst historic data provides a useful starting point, it is not always a good predictor of the future. Looking at past information does not provide any significant understanding about the future direction of the market; this requires a different methodology.

Internal view: A company may choose its strategy based on internal information, such as recent sales or brand tracking, and therefore set targets such as 'the previous quarter's sales +10%' or 'launching product X in the next year'. This fails to take account of changes in the market's growth rate or trends towards certain product types or features.

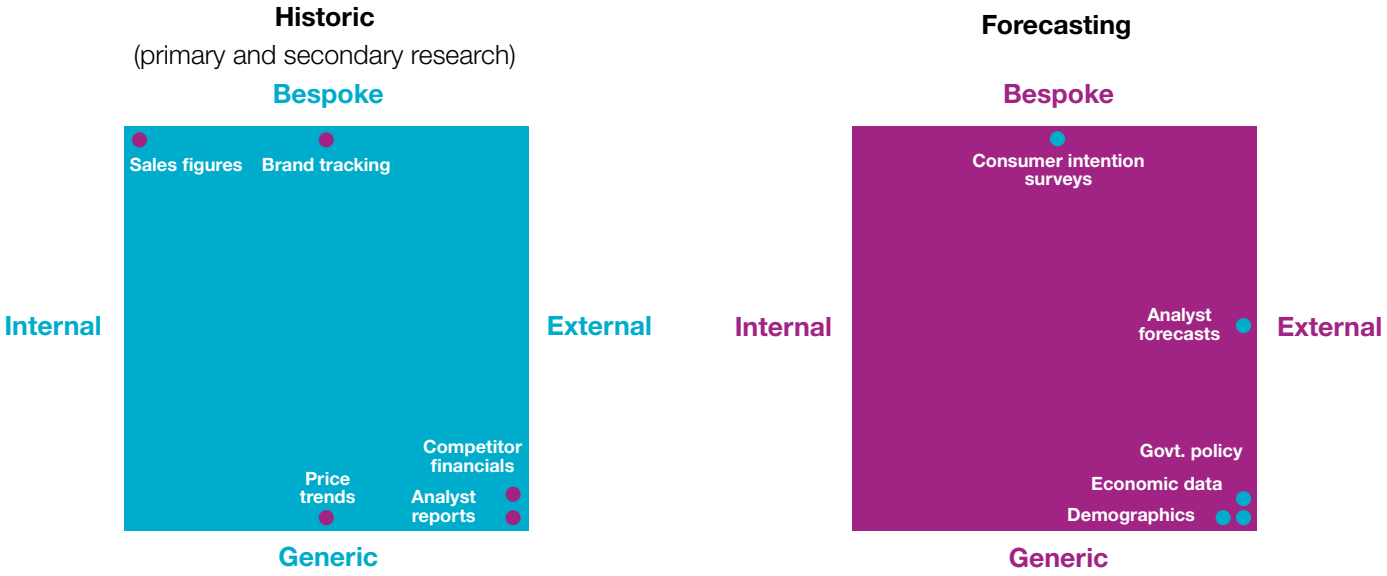

Figure 2 Sources of market data

Gaining market insight

There are various methods of collecting relevant market data, each of which address a specific aspect of a business' future performance. Figure 2 shows some methods and the views of the market that they provide. However, in isolation none of them give a full picture of the long-term market and should not, therefore, be used for developing strategy.

Internal forecasting does not take account of where other companies are positioning themselves in the marketplace, or the wider market dynamics and trends. Primary market research, such as consumer panels, only provides a view of behaviour in the near future.

External information from analyst reports and models is lacking in three areas. Firstly; companies are restricted by the analyst's view of the future, which may differ from the company's own outlook. This is especially important because an individual company's strategy will affect future market dynamics. Secondly; using an analyst's model to formulate their own growth plans gives companies no strategic advantage over their competition, who are able to access the same reference material. Thirdly; analyst reports rarely match exact geographic splits, pricing assumptions or portfolio spreads.

Drawing all the insights together

A market model combines all available insights to show a full picture of market behaviour. It will take into account the qualitative view of what will happen in the marketplace and balance it against the quantitative information to ensure that the model is as accurate as possible. All the insights data (e.g. internal sales data, market research, competitor information) a company holds should be harnessed to ensure an accurate understanding of the 'now', coupled with appropriate forecasting techniques to document the future. Using this, a company can formulate their strategy and test out which approach will be most effective in their market.

Consumption spreads faster today

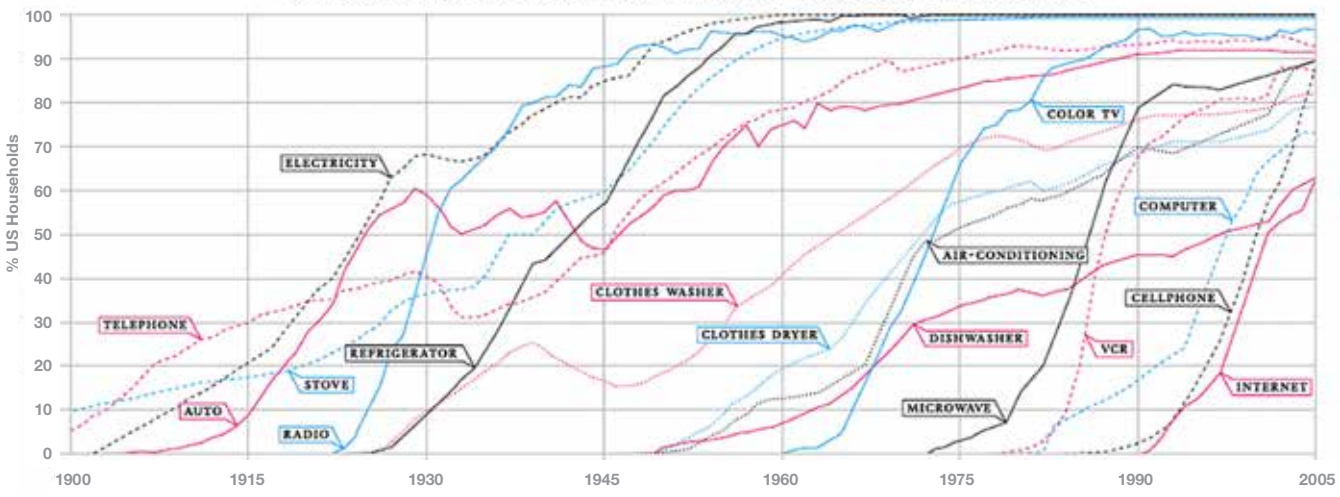

Figure 3 Consumer product S-curves *Source: North (2012)*

Building the Market Model: Market Theory

Penetration curves

Most market growth follows the form of a penetration curve (also called a logistic function curve or S-curve). Figure 3 shows how these are consistent across a range of products. In the early stages of penetration adoption is slow, as many are unaware of the product or unable to afford it. As more people become aware of the new technology, the adoption rate accelerates as customers choose to make their first purchase. When the market reaches 50% penetration the adoption rate slows, as the product is widely known but there are fewer people left in the market to purchase for the first time. As the market approaches full penetration (where the majority of the target population has bought the product) the rate of growth slows and the market is maintained by repeat purchases.

In reality these smooth penetration curves may be disrupted by external influences that the forecaster should take account of. For example, as we can see in Figure 3, during strong growth in the adoption of 'autos' there was a period when penetration declined. This was due to the Great Depression followed by World War II, when metal and fuel were needed for the war effort and the sale of new cars was banned.

Types of market

The market behaves differently depending on its stage of maturity. Broadly speaking, there are three types of market: growing markets, mature markets and declining markets (see Figure 4).

It should be taken into consideration that one market might be growing and maturing in different regions simultaneously. The correct forecasting methodologies need to be adopted depending on the stage of development of the market. Furthermore, not all markets leave the growth stage – some fail to reach maturity stage and move straight to decline (Moore, 1990).

Market Lifecycle – disruption of technology

There is a continuous cycle of innovation and disruption across most markets. The length of time that a market remains in maturity before declining depends on the level of innovation present in or pertinent to the market. "Incumbents lose their market leadership (i.e. dominant market share) when faced with disruptive technological change" (Danneels, 2004). This occurs when customers of a mature market stop buying its products and start to adopt the products from a new, substitute market instead. The shift from film to digital cameras is one such example.

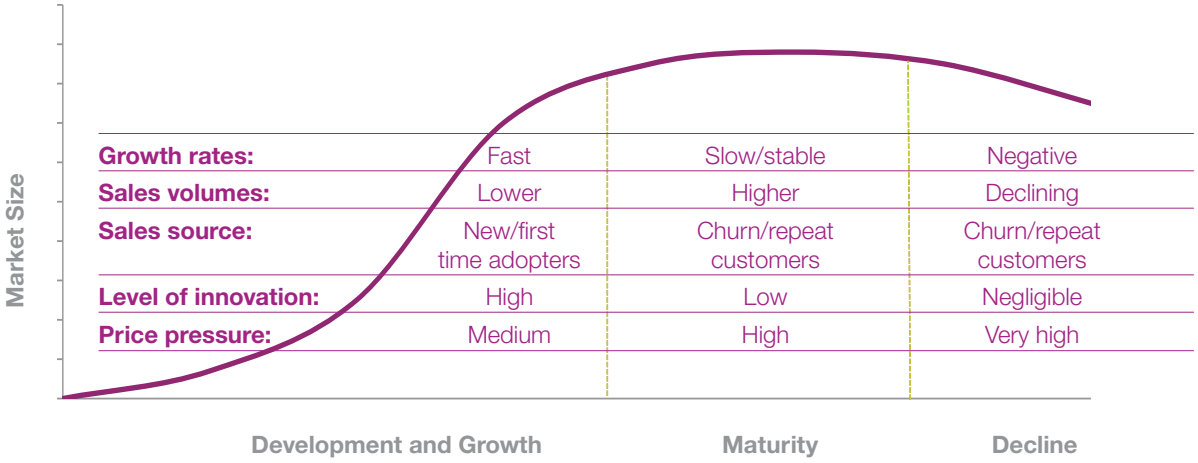

Figure 4 Market Lifecycle *Source: Johnson et al (2008)*

Building the Market Model: Model Theory

Forecasting approaches

There are a number of statistical techniques that may be selected to analyse 'Big Data' and forecast future trends, where appropriate to the stage of market development.

Time series models: The time series methods in market modelling analyse historic data (for a number of months/quarters/years) to identify seasonal and cyclical fluctuations, or long-term underlying trends that can be extrapolated to provide a forecast of future consumer behaviour. In particular, ARIMA models (e.g. Box-Jenkins or Holt-Winters) find the best fit of past values of a time series and use seasonal moving averages in order to make forecasts.

Time series models are a useful tool for short-term forecasting and understanding behaviour in mature markets. However, in a growing market, a time-series forecast does not take into account consumer adoption behaviour or the way in which demographic data shapes and limits growth, which limits its relevance.

Regression analysis: Multivariate regression analysis is a tool that examines historic data to determine the individual effects of different drivers of consumer response. It examines the past effects of a range of independent variables (such as price, advertising, etc.) on a dependent variable (such as total sales) to determine which factors have significant impact and the magnitude of these.

Using this technique, a forecast line is created by simultaneously correlating the independent variables against the chosen dependent variable (e.g. sales), to identify which factors are statistical drivers of the dependent variable. This can be described using a formula:

$$y = c + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \ldots + \beta_n x_n + u$$

where y = sales and x_n = includes variables such as price, distribution, advertising, promotion, competitor advertising, weather etc.

The line that creates the Ordinary Least Squares (OLS) is chosen because it provides the best fit to past market behaviour.

In principle this is a useful approach, however it is not frequently used for modelling markets, principally because the granularity of data for key drivers (such as marketing spend etc.) is rarely available for all competitors and also because the potential for error is greater using this statistical approach.

Forecasting hazards

When forecasting it is necessary to be aware of potential pitfalls in statistical techniques. This is where a forecaster must apply their own skill and experience. Some of these are:

1. Overfitting: Complex equations can be developed that very closely describe historic market behaviour and have very high correlation with the actuals (i.e. R^2 scores of over 0.9). There is a risk however, that the equation can be overly dependent on, and give too much weight to, short-term market fluctuations rather than the underlying trends. This problem is known as 'overfitting'. In Figure 5, the overfitted forecast (a regression analysis based on OLS for periods 1-20) tracked the historic variations well and forecast a sharp market drop for period 21. The actual outcome for period 21 was growth. The problem was that the statistical model simply used the best fit through the historic data to forecast the future and this overfitted model failed to take into account the underlying take-off growth.

$$y = -4E\text{-}06x_6 + 0.0002x_5 - 0.004x_4 + 0.0341x_3 - 0.1171x_2 + 0.1614x + 0.8162$$

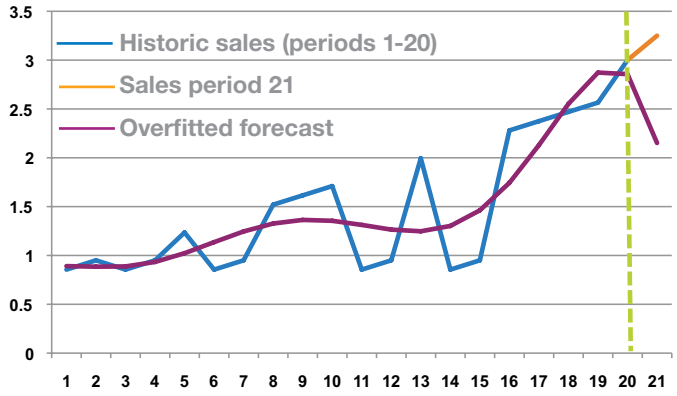

Figure 5 Overfitting does not forecast the future

2. Correlation vs causation: Apparent correlation between two variables does not mean that there is a causal link between them. For instance, in the tablet PC market in the UK there tends to be a spike in sales in Q4 when temperatures are lower and people spend more time indoors. So is weather a predictor of tablet sales or is this correlation driven by Christmas gifting and the autumn release of new models? Temperature could have an effect on tablet sales but a short investigation will demonstrate whether it is causal or simply correlated.

3. Overreliance on demographic data: Over-reliance on economic or population data could lead to misjudgement of consumer behaviour. For instance, when forecasting the take-up of photovoltaic cells in the UK, relying on demographic data about number of households will underestimate the demand for the cells. This is due to government subsidies and activities that have altered the speed of adoption.

Overlaying art to the science of modelling

Statistics-based models can provide accurate short-term forecasts in mature markets. However, research in technology markets shows that purely statistical (quantitative) modelling techniques cannot be relied upon to provide accurate forecasts without the introduction of other techniques. One reason for this is that adoption rates of new technology can grow and decline more quickly than statistical techniques can respond to. What is required is an understanding of the causes of growth at different stages of a market lifecycle.

One very useful tool is Diffusion of Innovation theory, which allows the market modeller to combine demographic data about consumers in a market with historic adoption and penetration levels to understand short and longer term market growth patterns.

Diffusion of Innovation: The Diffusion of Innovation theory (Rogers, 2003) claims that adoption is driven by social influences that affect various consumers (in B2C markets) and enterprises (in B2B market) with or without their explicit knowledge.

Rogers describes five groups of adopters with a different attitude towards innovation. Innovators are the first to adopt new technology and represent 2.5% of the total market. This group is willing to risk failure of a new product because they believe it has, or will have, a high utility. Early Adopters comprise a larger proportion (13.5%) of the market and understand the utility of new technology better because of the experiences of the Innovators. Innovation continues to diffuse through subsequent groups in the population (the Early Majority (34%), the Late Majority (34%), and the Laggards (16%)) with each group taking its lead from the previous group, and from the changes suppliers make to products to make them attractive to the total population. Figure 6 illustrates how progress through these stages significantly affects the market growth rate. The groups have different characteristics, so different market approaches are needed for each.

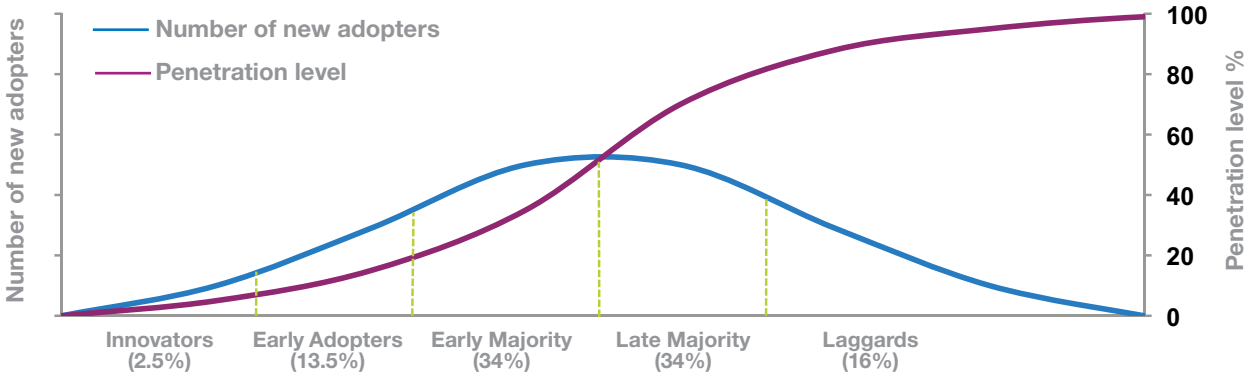

Figure 6 Diffusion of Innovation *Source: Rogers (2003)*

Diffusion of Innovation has been observed to follow logistic function (or penetration) curves across many different technologies including radio, television, VCR, cable, refrigerators, dishwasher, electrification of households, telephone, cordless phone, cellular phone, personal computers, broadband and the Internet (Moore and Simon,1999). Combining market volume data with demographics and Diffusion of Innovation Theory produces a good modelling approach in the technology sectors.

Churn cycle: In the early stages of a market, all sales will be to new users. However as a market begins to mature, existing users will purchase replacement products. This can be driven by product failure, loss or damage or by technology advancements making the original purchase outdated or obsolete. Therefore in order to forecast total market sales, data needs to be gathered to make a hypothesis about the upgrade or churn cycle of users. This information about the market churn rate, expressed as a time period, allows new sales derived from Diffusion of Innovation and churn sales (based on the number of sales from a historic time period that reach the end of their life) to be combined to calculate total market sales.

White noise: The term "'white noise' [is] used to describe functions so erratic that no information is contained in x(time) about the value x(time + δ), no matter how small δ is" (Ramsay and Silverman, 2005). This means that the value of the independent variable in time period 1 does not help us predict the value of the dependent variable in time period 2, i.e. there is very little correlation between the variables. A forecaster must use their judgement to decide which independent variables have a significant effect on the forecast and which are uncorrelated and only produce white noise. Not all potential variables will be relevant to the forecast and they may make it more difficult to see what the market drivers are. For example in the UK tablet market from 1992-2012, yearly mean temperature may have very low correlation with annual tablet sales and should therefore not be included as an explanatory variable in the analysis.

Anchor metrics: In mature and stable markets, alterations in market demand are driven by changes in underlying customer behaviour in the target sectors. An effective way to forecast total market sales in this type of market is to utilise anchor metrics. Anchor metrics are data points that provide information about the production output of a particular sector (e.g. number of cars manufactured), which are correlated to sector demand for a product (e.g. number of car exhausts sold). A multiplying factor needs to be derived to understand the relationship between the anchor metric (cars) and the product (exhausts) in order to calculate total demand. The multiplying factor needs to take into account both new sales (measured by the anchor metric) and churned sales (replacement parts/upgrades). By forecasting changes in both the anchor metric and multiplying factor, the future product demand can be calculated.

Regional market intelligence: If different regions in a model behave differently, they need to be modelled separately. The correct granularity of region needs to be selected to accurately judge the effects of the differing market drivers. On an international scale, government import restrictions, distribution problems and currency fluctuations can all have a major short or long term effect on adoption and sales rates. Quantitative techniques cannot foresee these events and market intelligence must be used to adapt the forecast.

It could be argued that introducing seemingly subjective factors increases the potential for bias to intrude upon the forecast. This argument is relevant when forecasts are provided by financial and banking institutions or large industry analysts who might have underlying interests or prefer to avoid producing a forecast that would differentiate them too much from the estimate of other consulting groups. These organisations may opt for a more conservative approach to forecasting. However, the role of a skilled forecaster is to produce a forecast that is free of personal, political or social bias.

Structuring a Market Model

Defining the market

A company's target market is a section of its larger 'addressable' market, which consists of all the sales of a product or service by all the suppliers (i.e. the company and its competitors) to all the customers in a defined geography over a specific time period. Identifying too narrow a niche in the market means a company may miss the wider opportunities available, lack awareness of potential threats, and have a distorted view of the company's actual performance within the market. Conversely, defining too wide a market will not enable a company to see the finer detail of what their target market is doing.

One compelling reason for a company to build or commission its own model of the market is to define its market more precisely. Often, it is not possible to find or buy a forecast of the exact target market in which a company is operating. For example, a company wanting the smart metering volumes by UK region may only be offered the UK total. Another company wanting the quarterly volumes of the German smartphone market may only be able to find the annual market value.

Identifying the structural elements to track within the market

The core elements of any market model are the product or service volumes. To create a useful model, the volumes can be grouped into customer segments, price bands, technology groups, disease treatment categories, geographies or any structural element.

The more factors the model includes, the larger the size and complexity. Table 1 takes a simple example of a forecast model of the UK PC market with volumes divided into two price bands – under £400 and £400 and over. If the two price groups are then divided into desktops and laptops, the size of the data is doubled. If the data is then split into England, Scotland, Wales and Northern Ireland the market model becomes four times larger. Further elements can be added to look at segments (students, households or business), and the share of 5 other competitors (PC suppliers). If all of the above factors were included over 12 quarters this would result in a 3,456 cell model, before any summarisation.

Structural Elements	PC Market Example
Price bands	<£400 and £400+
Products/Services	Laptops and desktops
Technologies	Touchscreen, number of cores, etc.
Geography	England, Ireland, Scotland, Wales
Customer Segments	Students, households, business
Competitors	PC suppliers

Table 1 Worked example of possible elements in a forecast (PC market)

Despite the challenge of building and maintaining a model with lots of elements, the benefit is a forecast that exactly matches a company's needs over its time frame of interest. It is clear that even with a small number of elements it is not possible to see all the data interactions without a model.

Maximum penetration levels

In most technology markets, the overall growth will follow the penetration curve. To structure the model, it is important to work out the historic trend, the maximum size of the market at full penetration and the time it will take to reach that level. Whether the product or service is for a new market or disrupting an existing market, it is important to define precisely which population is being penetrated and what 100% penetration will look like. For example, for a smart TV company 100% market penetration might be all TV owners adopting a smart TV (which may not be 100% of the population), while for mobile phones 100% penetration might in fact be 120% of the population, as some people own more than one device. The penetration level of the chosen market will set the size of the market opportunity available, and help to determine the rate of growth over time.

Refining the Model

Getting more value from the model

Once a model is constructed, it provides an initial forecast and explanation of how the variables in the market interact. However, there is a great deal more value and competitive advantage to be extracted by refining the model.

Agreeing and modelling the most probable future

Different assumptions about the total market at full penetration or the time taken to reach that level can have substantial effects on volumes in a given quarter. Other assumptions about pricing or product availability in a given geography can also change the model forecasts. The model should forecast the most probable future for the business and its target market. There are tools to help a company understand and agree on the most probable future, such as sensitivity analysis and scenario planning.

Sensitivity analysis – "what ifs"

Sensitivity analysis can be carried out in order to assess the impact of variable changes on the shape of the future market. This is a technique that determines what effect a small change in an independent variable will have on the dependent variables (e.g. price effects on volumes, replacement rates on market value, segment behaviour on market share). In a market model, sensitivity analysis can be used to assess the magnitude of possible changes in market dynamics caused by (for example) changes in vendor strategy, economic slowdown, resource shortages, etc.

Scenario planning

Scenario planning is a more involved and powerful way of looking at future possibilities in the market.

Scenario planning is a formal process to identify and understand the interaction of external variables and their effects on the behaviour of the market. It is particularly useful for describing the attributes of the most probable outcome (which will be the basis of the model) but it can also generate a series of less likely future scenarios which, if they occurred, would have very different effects on sales.

This activity will enable understanding of the market drivers and assess which drivers are the most important, in terms of market impact and also uncertainty of outcome. By exploring different interactions between these variables, businesses can start to understand what all the possible futures might look like; then the most probable future can be agreed upon and modelled.

Scenario planning was first used in industry by Royal Dutch Shell in the 1970s to help understand, model and plan for changes in the oil market (Schoemaker and van der Heijden, 1992). It is credited as one of the most important factors in the company's rise from 5th in the oil market to 2nd during a time of market volatility.

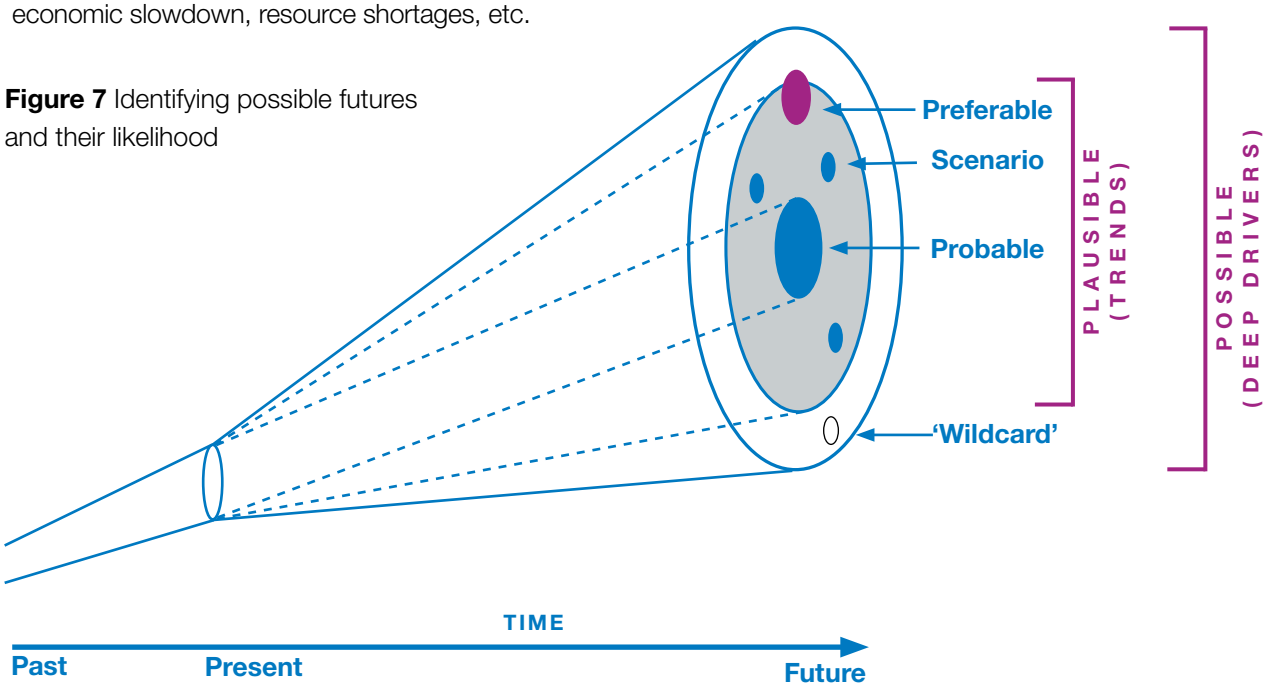

Figure 7 Identifying possible futures and their likelihood

Forecasting accuracy

Forecasting accuracy can be improved by adding new data as it becomes available. The scientific method (hypothesis, experiment, knowledge and refine hypothesis) can be applied to market models (forecast, collect future market data, understand, re-forecast). Regularly updating a model means the forecaster can refine their understanding of the market. This may lead to new variables being added (e.g. moving from country level forecast to individual sector forecasts within the country). Measuring forecasting accuracy enables the forecaster to identify where and how the market dynamics differed from the forecast. In both success and failure it is important to ask questions about why the market behaved as it did and feed this back into the model. This will increase the accuracy of the next period's forecast and help a company to understand current and future customer behaviour better. New hypotheses about consumer adoption rates and competitor behaviour can then be scientifically tested in the marketplace, resulting in greater ongoing market understanding.

Applications of a Market Model

The applications of the data contained within a market model are numerous and are relevant in all departments of a company (see Figure 8).

Here three key applications are looked at individually:

Example 1: Supporting an investment decision

A detailed understanding of the size of the market and its growth rate, coupled with insights about the strength of the competition (market share), should underpin any investment decision. This is because size and growth are key measures of an industry's attractiveness (Johnson et al, 2008). The market size shows the aggregate purchasing behaviour of target customers in a given time frame. This can be measured by the number of units bought (unit sales) and the total money spent (market value). Evaluating the market will de-risk the investment process, as likely returns can be calculated based on a quantified market understanding. This is relevant for both internal investment and private investors or grant bodies.

Example 2: Developing the product roadmap

A market forecast model demonstrates how the buying behaviour of different market elements such as customer sectors, geographies, pricing segments and sales channels will change over time. These market insights can be used to develop rigorous and robust product roadmap plans. For instance if a company wanted to assess the PC market, it could develop a market model that forecasts demand across different elements; product forms (Laptops, Hybrids or Desktop PCs), screen sizes and memory requirements, over a five year period. This data would help the company manage its product portfolio and plan its product development to ensure it had the right products available for the changing needs of customers, at the right time.

Example 3: Identifying new revenue opportunities

The in-depth breakdown of changing customer demand across different market elements (such as sectors, geographies and pricing segments) provides an invaluable tool to identify new sources of revenue. Once the market size has been derived, the company's market share can be calculated across a range of elements. This identifies areas of the market where the company is strong and likewise areas where there is room for development. It will also identify segments of the market that are unattractive now, but which will grow over the forecast period, presenting an attractive opportunity in the future. A long-term strategy and shorter-term sales plan can be developed based on this information, which will allow internal resources to be assigned to opportunities with the greatest potential returns.

Figure 8 The market model has many uses across the company

Benefits of the Market Model

Having ideas about the market are not the same as having a formal market model used across all departments. Revenue and sales targets are based in part on ideas (which may be personal or informal) about what the market is doing or about to do. Having one model providing a unified view about the market is the basis for a company to derive significant strategic and economic benefits. These benefits are as valid for small companies as for very large companies.

Reduce costs

Cost savings can be made by having one model of the market. Often, the cost of having individual models within the budget for each department is not taken into consideration when looking at the 'bigger picture' of the company finances. A single model built with the needs, support and data of all departments will reduce costs.

Save time

Market data is needed by different departments at different times. Long term forecasts may be required for Board strategy, Investor relations or R&D, whilst shorter term forecasts are useful for marketing promotions and temporary personnel recruitment contracts. If each plan or business case requires a trusted market forecast, the process is slowed. A single model therefore saves time.

Align the whole company

When a company uses one model, it allows alignment from top to bottom. A model commissioned by the Marketing department can provide the concrete data and insight and 'One Truth' (a company-wide accepted view) about the market. This can be used by the Board, Finance, Marketing, Sales, Product Management and Development, Operations, Investor Relations, and HR departments (See Figure 8). This means each interaction between each department can start with "what are we going to do?" instead of "what is going on?" The model allows departmental figures to be checked against the model for feasibility, as the model is based on the company's own strategy and fed into by all departments.

Use the best experts, not best efforts

This white paper outlines the complexity and knowledge required to build a market forecast. Given the importance of the forecast and its ability to generate financial benefits, companies should use experts inside or outside the company and not rely on the best efforts of individuals within different departments.

First mover market advantage

Diffusion of Innovation theory describes different types of consumers with different attitudes to risk, product maturity, product features, price and other factors. A well designed model will help predict when the market is entering different stages and allow the company to change sales, marketing, product and distribution plans for maximum economic benefit. First mover advantage can catch competitors off-guard and increase market share.

React faster to the unexpected

Some changes in the market (Political, Economic, Social, Technological, Environmental or Legal) are not under the company's control. A market model can be used to forecast the scale of future opportunities and threats in considerable detail, considering the possible effects of these changes. Pre-organising response plans (e.g. expected price changes by a competitor or availability of new technologies) will allow the company to react quickly and efficiently.

Investors like market models

The information provided by market models is useful for investors in companies of all sizes. In small, privately-owned companies, market models show the company is thinking beyond product development, and demonstrate the size and scope of their market opportunity to investors. When private companies are sold, information from the market model is very important for the Information Memorandum. When companies float or IPO on main stock markets (or lower capital markets such as AIM in the UK), data from the market model is used to describe the target market, give market size and share information and other key disclosures. For publicly quoted companies, data from the market model is used to provide market context to the company's financial performance by the Investor Relations team.

Share the output of the model

It is not necessary for all company employees to directly access or see the sensitive information contained in the complete model. Permissions need

to be set on how much individuals can see of the model and who has access. However, it is important to allow and encourage employees with useful market information to share their intelligence in a timely way so that it can be included in the next iteration of the model to improve forecasting accuracy.

The leadership team can use extracts from the model in the form of PowerPoint presentations to share with teams of employees. Detailed reports (sometimes called Deep Dives) on part of the model can be produced to look at individual countries or sales territories, specific competitors or product sectors. These Deep Dive reports can be shared with relevant teams without exposing the detail of the whole model.

Sharing some of the data with all employees and with the market (via interviews, articles and presentations) is necessary; this increases clarity of understanding and helps to build company reputation.

Conclusions

It is possible to forecast markets accurately

There is good evidence to show that it is possible to forecast markets with a high degree of accuracy using a market model. In mature markets with high levels of market penetration and slow or little growth, there is lots of data and proven mathematical techniques to build good forecasts. In volatile or fast growing markets, accurate market forecasting is still possible. Few companies share their forecasts or accuracy measurement because it is a source of competitive advantage, but authors writing about political elections (Silver, 2012), sport (Lewis, 2003) and banking (Tett, 2009) show that it is possible to forecast the future for profit.

Markets are complex and multidimensional

In a world of 'Big Data' it can be difficult to incorporate all forms of insight into one comprehensive and quantified view of the market without using a model. The interactions between the multiple structural elements of the market are not always immediately obvious. Understanding how elements such as products/services interact with prices, technologies, geographies, customer demographics and competitors is a complex process so it is best to use a market model for better clarity.

Each additional structural element that is included in a model multiplies its complexity. For example, a model with two price points and two products will mean there are 4 interactions to track; mapping these against four territories will produce 16 interactions to track; modelling two competitors for the same elements will produce 48 interactions to track, and so on.

A market model is necessary to understand the complexity

A market model is the only way to fully map the interactions between structural elements in the market, providing a full picture of market dynamics. In much the same way as a five-dimensional shape is near-impossible to visualise, it is equally difficult to picture all of the market elements and interactions without using a model.

Select appropriately from the tools, techniques and models

In order to forecast accurately, a forecaster needs to take into account the market's stage of development and select appropriately from the range of tools, techniques and models available. Applying a one-size-fits-all approach will not lead to an accurate forecast.

There are many statistical techniques for building a forecast model, such as time series methods, ARIMA models (e.g. Box-Jenkins or Holt-Winters) and multivariate regression analysis (e.g. Ordinary Least Squares). These need to be balanced against tools such as penetration curves, market lifecycles, Diffusion of Innovation theory, anchor metrics, churn rates, scenario planning and sensitivity analysis. Forecasters need to use their judgement and market intelligence to ensure the forecast is realistic and depicts the most-probable future.

A market model brings significant demonstrable benefits

Companies have found that building and using a market model has brought them strategic and economic benefits throughout their organisation.

These benefits include:

- **reducing costs**
- **saving time**
- **aligning the whole company**
- **using best experts not best efforts**
- **first mover market advantage**
- **planning for the unexpected**
- **improved visibility for investors**

About

Authors

Jonathan Davenport is the Head of Market Analysis at Milner Strategic Marketing Ltd. He leads the Market Analysis team, directing the construction of market models, forecasting, customer analysis and competitor analysis. Jonathan is a Chartered Marketer, with a strong business to business sales and marketing background, developed over a number of years working in the energy and telecoms sectors.

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About Milner Strategic Marketing Ltd

Milner Strategic Marketing Ltd is a business consultancy. We deliver a range of services from strategic management consultancy through to specific marketing programmes. Our clients come to us because they need help with Market Analysis, Strategy Formulation and Marketing Programmes.

Our clients range in size from small, venture-backed start-ups to large, quoted international companies. Clients are usually B2B focussed and come from three technology sectors: High-tech (ICT); Clean-tech (Renewables, Smart Grid and Energy Retail); Bio-tech (Bio-Medical and Healthcare).

Milner offers a number of Market Analysis services including customer analysis, competitor analysis and market modelling and forecasting. We have extensive experience of building market models on a global scale. In conjunction with this Milner can also provide strategy workshops, product portfolio review and product management training, marketing communications/PR, collateral redesign, and a range of digital market marketing services (including web design, e-newsletters and social media).

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