Abstract:

This is a 25 page brief report to help Senior Management understand the external Macro Environment Factors that play an important role in influencing the decisions. Other section of this report deals with Uncertainty in the business environment and the fact on how to apply different analytical approaches on business statistical data to infer solutions, enhance predictability and help business executive in anticipation and decision making.

Preface:

Decision making has always been the business executives' headache. This decision making comes not from just will of the Manager or CEO of some business body but from the statistical data that is gathered from the running businesses. One of the few most common factors those are involved in is the PEST. Statistical data that we collect from the scenario of a running business bases the foundation of different business analytical models that are applied on various situations to see what's best to do and what's to take in as caution. These methods are those models applied on uncertain set of information gathered by business processes formulated further to derive useful information that can be useful for management in making decisions.

Introduction:

The whole report bases on the single idea of Decision making capabilities of Managing personals to assist the business in safe direction with futuristic approach. Anticipating things before they actually happen is one of the blessings a good Managing personal can count on.

Main Body:

Internal Macroenvironment

Introduction to PEST analysis

The acronym stands for the Political, Economic, Social and Technological issues that could affect the strategic development of a business.

Political / Legal	**Economic**	**Social**	**Technological**
- *Environmental regulation and protection*	- Economic growth (overall; by industry sector)	- Income distribution (change in distribution of disposable income;	- Government spending on research
- *Taxation (corporate; consumer)*	- Monetary policy (interest rates)	- Demographics (age structure of the population; gender; family size and composition; changing nature of occupations)	- Government and industry focus on technological effort
- *International trade regulation*	- Government spending (overall level; specific spending priorities)	- Labour / social mobility	- New discoveries and development
- *Consumer protection*	- Policy towards unemployment (minimum wage, unemployment benefits, grants)	- Lifestyle changes (e.g. Home working, single households)	- Speed of technology transfer
- *Employment law*	- Taxation (impact on consumer disposable income, incentives to invest in capital equipment, corporation tax rates)	- Attitudes to work and leisure	- Rates of technological obsolescence
- *Government organisation / attitude*	- Exchange rates (effects on demand by overseas customers; effect	- Education	- Energy use and costs

	on cost of imported components)		
- *Competition regulation*	- Inflation (effect on costs and selling prices)	- Fashions and fads	- Changes in material sciences
	- Stage of the business cycle (effect on short-term business performance)	- Health & welfare	- Impact of changes in Information technology
	- Economic "mood" - consumer confidence	- Living conditions (housing, amenities, pollution)	- Internet!

Reference No #1

Political and Legal Environment

Organizations must operate within a framework of governmental regulation and legislation. Government relationships with organizations encompass subsidies, tariffs, import quotas, and deregulation of industries.

Four Phases of Government Regulation

1. Antimonopoly Phase -- Its purpose was to break up the huge trusts that controlled so many key industries. Prohibiting certain specific practices where the effect may be to substantially lessen competition or tend to create a monopoly in any line of commerce.

2. Competitor Protection Phase -- Its purpose was to discourage concentration in wholesaling and retailing.

3. Consumer Protection Phase -- Its purpose was to protect consumers from fraud and deceit and unsafe products. The beginning of this phase is generally attributed to President's message to Parliament, in which he outlined the *Consumer Bill of Rights* as:

· The right to safety.
· The right to be informed.
· The right to choose.
· The right to be heard (redress).

4. Deregulation Phase - Its purpose was to remove regulations governing industries. Examples include deregulation of interstate trucking, deregulation of airlines, deregulation of long distance service, elimination of branch banking restrictions and allowing cable companies and phone companies to get into each other's businesses.

The political environment includes governmental and special interest groups that influence and limit various organizations and individuals in a given society. Organizations hire lobbyists to influence legislation and run advocacy ads that state their point of view on public issues. Special interest groups have grown in number and power over the last three decades, putting more constraints on marketers. The public expects organizations to be ethical and responsible. An example of response by marketers to special interests is *green marketing*, the use of recyclable or biodegradable packing materials as part of marketing strategy.

The political arena has a huge influence upon the regulation of businesses, and the spending power of consumers and other businesses. You must consider issues such as:

1.How stable is the political environment?

2.Will government policy influence laws that regulate or tax your business?

3.What is the government's position on marketing ethics?

4. What is the government's policy on the economy?

5. Does the government have a view on culture and religion?

6. Is the government involved in trading agreements such as EU, NAFTA, ASEAN, or others?

The major purposes of business legislation include protection of companies from unfair competition, protection of consumers from unfair business practices and protection of the interests of society from unbridled business behavior. The legal environment becomes more complicated as organizations expand globally and face governmental structures quite different from those within the United States.

Reference No #1

Economic Environment

The economic environment consists of factors that affect consumer purchasing power and spending patterns. Economic factors include business cycles, inflation, unemployment, interest rates, and income. Changes in major economic variables have a significant impact on the marketplace. For example, income affects consumer spending which affects sales for organizations. According to *Engel's Laws*, as income rises, the percentage of income spent on food decreases, while the percentage spent on housing remains constant.

Marketers need to consider the state of a trading economy in the short and long-terms. This is especially true when planning for international marketing. You need to look at:

1. Interest rates

2. The level of inflation Employment level per capita

3. Long-term prospects for the economy Gross Domestic Product (GDP) per capita, and so on

People spend, save, invest and try to create personal wealth with differing amounts of money. How people deal with their money is important to marketers. Trends in the economic environment show an emphasis on global income distribution issues, low savings and high debt, and changing consumer-expenditure patterns. If you consider access to telephones, clothes washers, dryers, microwaves, etc., there is little visible difference between the poor and nonpoor. Indeed, recent figures indicate that the affluent are shopping at discount stores, having adopted some of the shopping habits of those with less income.

Marketers can't control the problems that have cropped up, and that may continue to develop, at various hot spots across the global economy. But they can -- and should -- take proactive steps to shelter their organizations from unwanted consequences of a worldwide downturn. When an organization's underlying financials are strong, it is able to capitalize on competitors' weaknesses, prosper, and continue to grow, even in adverse economic times.

Reference No #1

Socio/Cultural Environment

The social and cultural influences on business vary from country to country. It is very important that such factors are considered. Factors include:

1.What is the dominant religion?

2.What are attitudes to foreign products and services?

3.Does language impact upon the diffusion of products onto markets?

4.How much time do consumers have for leisure?

5.What are the roles of men and women within society?

6.How long are the population living? Are the older generations wealthy?

7.Do the population have a strong/weak opinion on green issues?

Social/cultural forces are the most difficult uncontrollable variables to predict. It is important for marketers to understand and appreciate the cultural values of the environment in which they operate. The cultural environment is made up of forces that affect society's basic values, perceptions, preferences, and behaviors. U.S. values and beliefs include equality, achievement, youthfulness, efficiency, practicality, self-actualization, freedom, humanitarianism, mastery over the environment, patriotism, individualism, religious and moral orientation, progress, materialism, social interaction, conformity, courage, and acceptance of responsibility. Changes in social/cultural environment affect customer behavior, which affects sales of products. Trends in the cultural environment include individuals changing their views of themselves, others, and the world around them and movement toward self-fulfillment, immediate gratification, and secularism.

Reference No #1

Technological Environment

The technological environment refers to new technologies, which create new product and market opportunities. Technological developments are the most manageable uncontrollable force faced by marketers. Organizations need to be aware of new technologies in order to turn these advances into opportunities and a competitive edge. Technology has a tremendous effect on life-styles, consumption patterns, and the economy. Advances in technology can start new industries, radically alter or destroy existing industries, and stimulate entirely separate markets. The rapid rate at which technology changes has forced organizations to quickly adapt in terms of how they develop, price, distribute, and promote their products. Technology is vital for competitive advantage, and is a major driver of globalization. Consider the following points:

1. Does technology allow for products and services to be made more cheaply and to a better standard of quality?

2.Do the technologies offer consumers and businesses more innovative products and services such as Internet banking, new generation mobile telephones, etc?

3.How is distribution changed by new technologies e.g. books via the Internet, flight tickets, auctions, etc?

4.Does technology offer companies a new way to communicate with consumers e.g. banners, Customer Relationship Management (CRM), etc?

Reference No #1

Competitive Environment

Adopting the marketing concept means that an organization must provide greater customer value than its competitors. Being good is not good enough if a competitor is better. It is impossible for an organization to develop strong competitive positioning strategies without a good understanding of its competitors and the strengths and weaknesses of the competitors.

Three levels of competition exist.
1. Direct competitors are firms competing for the same customers with the similar products (ex. grocery stores).
2. Competition exists between products that can be substituted for one another (ex. margarine for butter).
3. Competition exists among all organizations that compete for the consumer's purchasing power (ex. entertainment).

Pure competition has many firms, all selling identical products, and no one firm is powerful (ex. wheat farmers). Monopolistic competition has a large number of firms selling slightly differentiated products (ex. fast food - product differentiation). Oligopoly is a small number of firms selling that can act collusively (ex. long distance telephone). Monopoly is a single firm selling in the market for which there is no close substitute.

Generic competition refers to the competition between all products capable of satisfying the same basic need. Competitive intensity consists of five major forces; supplier power buyer power threat of mobility threat of substitution segment rivalry. **Reference No #1**

Introduction to Sensitivity Analysis:

Sensitivity analysis is used to determine how "sensitive" a model is to changes in the value of the parameters of the model and to changes in the structure of the model. In this paper, we focus on parameter sensitivity. Parameter sensitivity is usually performed as a series of tests in which the modeler sets different parameter values to see how a change in the parameter causes a change in the dynamic behavior of the stocks. By showing how the model behavior responds to changes in parameter values, sensitivity analysis is a useful tool in model building as well as in model evaluation. Sensitivity analysis helps to build confidence in the model by studying the uncertainties that are often associated with parameters in models. Many parameters in system dynamics models represent quantities that are very difficult, or even impossible to measure to a great deal of accuracy in the real world. Also, some parameter values change in the real world. Therefore, when building a system dynamics model, the modeler is usually at least somewhat uncertain about the parameter values he chooses and must use estimates. Sensitivity analysis allows him to determine what level of accuracy is necessary for a parameter to make the model sufficiently useful and valid. If the tests reveal that the model is insensitive, then it may be possible to use an estimate rather than a value with greater precision. Sensitivity analysis can also indicate which parameter values are reasonable to use in the model. If the model behaves as expected from real world observations, it gives some indication that the parameter values reflect, at least in part, the "real world." Sensitivity tests help the modeler to understand dynamics of a system. Experimenting with a wide range of values can offer insights into behavior of a system in extreme situations. Discovering that the system behavior greatly changes for a change in a parameter value can identify a leverage point in the model—a parameter whose specific value can significantly influence the behavior mode of the system.

Reference Below:

Prepared for the
MIT System Dynamics in Education Project
Under the Supervision of
Dr. Jay W. Forrester

By
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Mark Choudhari
September 6, 1996

Example: 1

Financial Plan **(Sensitivity Analysis)**

Having produced a budget and cash flow for your proposed business venture, it is important to assess how sensitive your proposal is to external factors. For example, if the value of sales changes by 10%, how much of an impact would this have on your projected profit figure? If the impact of a small change is very great, this suggests your proposition is not financially robust.

Test the sensitivity of the assumptions used in the cashflow projection by making changes to the items in the cashflow with the largest annual return/cost. These are most likely to be the key factors affecting the success of the business. To conduct a sensitivity analysis on your business proposition try taking 10% off the total sales figure from your annual cash flow forecast. The degree to which the figure changes represents the element of risk. This should be considered when taking the decision to proceed and will certainly be a factor in the decision process of any potential funder. It is useful to apply this analysis to other factors which could affect the profitability of the business, e.g. room occupancy, percentage of market share, number of units sold per annum, unit price etc.

Item	**Change**	**Impact on Profit**
Room occupancy	+/- 10%	+/- £2,000 pa
Rate	+/- £5/night	+/- £3,000 pa

Summary and Conclusions

Your financial plan should include a concluding statement, summarizing the financial information you have gathered and presented. This should include the following:

The level of capital investment required

If loan finance is required, how much

A summary of the current balance sheet situation - ie. total assets, total

liabilities and percentage of assets owned (net worth)

The capital cost required and the amount of loan necessary to fund it

Trends indicated by the 5 year cash flow forecast

The degree of profit or loss indicated by the first year cash flow forecast

The level of sensitivity of your proposal to external factors

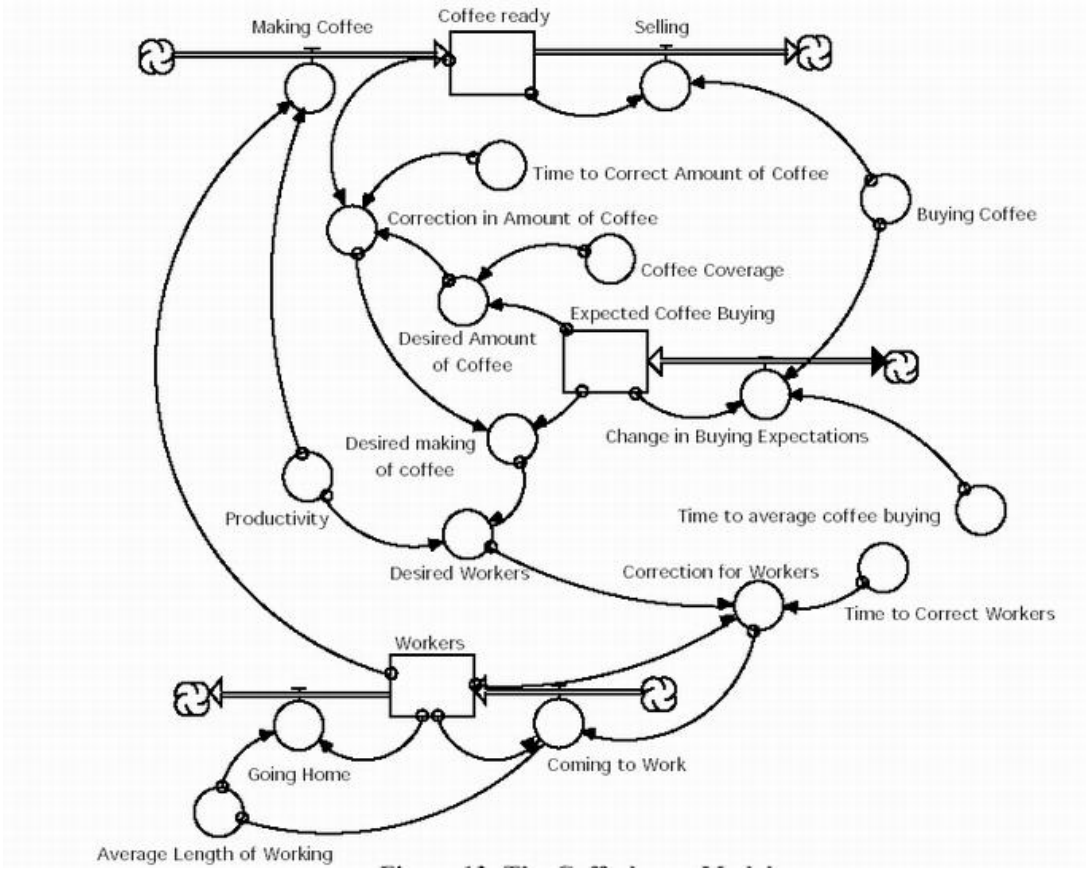
Reference No #

Example: 2

Independent Exploration: Coffeehouse

We now return to Howard, the owner of the lemonade stand on a college campus. Howard realized that it could be more profitable for him to sell coffee because students tend to drink more coffee than lemonade, and they drink it at any time of the day and night. Therefore, he closed his lemonade stand and opened a 24-hour Coffeehouse.

Howard bases the Coffeehouse model on the model he used in his lemonade stand to model the number of cups of "Coffee ready." We will run the simulation over a period of two days, or 48 hours.

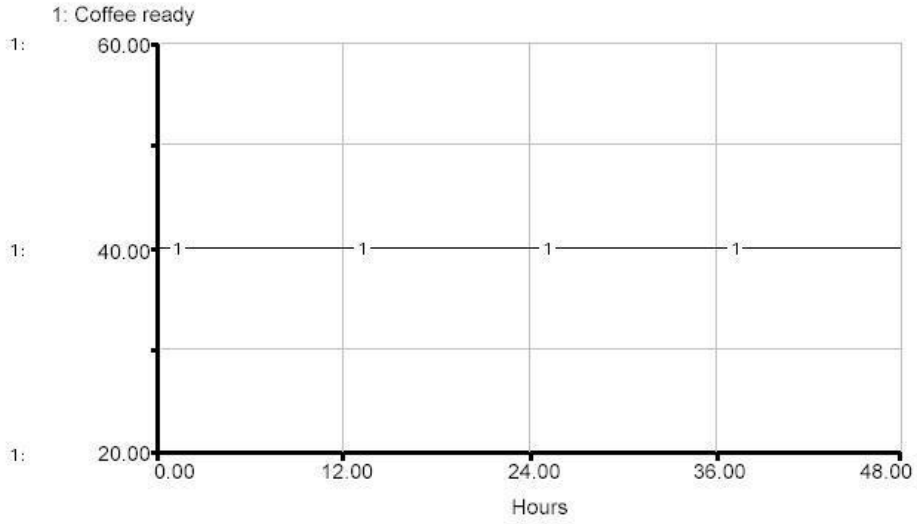


The Coffeehouse Model:

The Coffeehouse model is based on: John Sterman, 1988. Understanding Business Fluctuations—The Causes of Oscillations (D-4149), 15.874, System Dynamics for Business Policy, System Dynamics Group, Sloan School of Management, Massachusetts Institute of Technology.

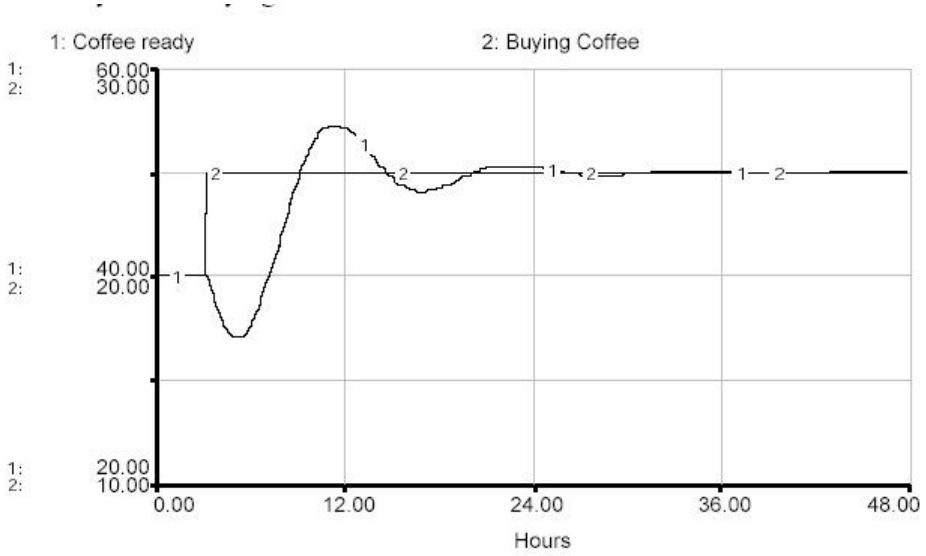
Because Howard cannot work 24 hours a day all by himself, he needs to hire student workers to work in the Coffeehouse. To represent the new situation, he adds a sector to his model for the number of workers. He employs several workers, but not all of them are at work at the same time. The stock of "Workers" in the model measures only the number of workers who work in the Coffeehouse at a specific time. Each worker is able to prepare a certain number of cups every hour, determined by the parameter called "Productivity." In the base run, "Productivity" is 20 cups per worker per hour. When Howard divides the "Desired making of coffee" by "Productivity," he obtains the "Desired Workers," or the number of workers necessary to prepare the desired amount of coffee.
Howard then compares the "Desired Workers" to the actual number of "Workers." The difference between these two values, divided by a time constant called "Time to Correct Workers," gives his hourly "Correction for Workers." The "Time to Correct Workers," 3 hours in the base run, is the time constant that he needs to compensate for the difference between the desired and actual number of workers. It is the time in which he wants to call them on the phone and have them come to work.

Howard then adds the Correction to the number of workers who leave the Coffeehouse every hour. He has to make sure that a corresponding number of workers also come to work at the Coffeehouse each hour—this is the inflow called "Coming to Work" that increases the number of "Workers." The outflow, "Going Home," decreases the number of present "Workers." "Going Home" is the number of "Workers" divided by 4 hours, the "Average Length of Working." Finally, Howard multiplies the number of "Workers" by their "Productivity" to obtain the flow of "Making Coffee."
Without any outside disturbance, the system starts out and remains in equilibrium at 40 cups (Coffee coverage * Buying coffee) during the 48 hours of simulation. Figure shows the base run of the model.



Base run of the Coffeehouse model

Let's assume again that the demand for coffee suddenly changes. The system starts off in equilibrium, with 40 cups of coffee ready. At hour 3, we introduce a st ep increase of 5 cups in the buying of coffee. Figure shows the resulting behavior of "Coffee ready" and "Buying Coffee."



The system responding to a step increase in Buying Coffee

The additional structure added to the Lemonade stand model significantly changes the behavior of the system—the stock of coffee now exhibits "damped oscillations." After the increase in buying, "Coffee ready" decreases because "Selling" steps up together with demand. However, "Making Coffee" has not changed yet. It first takes Howard a certain time to perceive the change in buying as opposed to random noise and to find out how much coffee the workers should be making. He then determines how many more workers should be working in the Coffeehouse, and calls them to make them come to work. However, because "Desired making of coffee" is high, Howard keeps calling more workers than the equilibrium number. As they come to work, the stock of coffee starts increasing, reaches its new equilibrium value of 50 cups, 11 overshoots it, and continues to increase until the number of workers decreases again to its equilibrium value. The oscillations continue, but they become smaller and smaller, until both stocks eventually approach their equilibrium values. Choosing Parameters for Sensitivity Analysis Howard is interested in the behavior of "Coffee ready." What parameters and initial values should he use in a sensitivity analysis of the Coffeehouse model?

Performing Sensitivity Tests

Now take the parameters and initial values that you. For each of them, choose three values that seem reasonable to you and that you believe would offer insights about the behavior of the system. BEFORE running the sensitivity tests, think about the parameter as part of the structure of the model.

Compare it to the parameters from the Lemonade stand and Epidemics models, and try to guess the effect of changing it on the behavior of "Coffee ready." Why would

Howard want to know the effect? Then simulate the model and compare the graphs to your predictions.
If a behavior seems surprising at first, try to explain it through the structure of the model.
As in the first exploration, the equilibrium value can be obtained by multiplying "Coffee Coverage" (2
hours) by "Buying Coffee" (25 cups per hour).

Conclusion
Specific parameter values can change the appearance of the graphs representing the behavior of the system. But significant changes in behavior do not occur for all parameters. System dynamics models are in general insensitive to many parameter changes. It is the structure of the system, and not the parameter values, that has most influence on the behavior of the system.
Sensitivity analysis is an important tool in the model building process. By showing that the system does not react greatly to a change in a parameter value, it reduces the modeler's uncertainty in the behavior. In addition, it gives an opportunity for a better understanding of the dynamic behavior of the system.
We encourage you to experiment with the three models from this paper (as well as any other models that you have built) on your own. For example, try to change several parameters at the same time, observe the behavior produced, and compare it to the conclusions in this paper. Can you suggest any parameter values that would produce the "optimal," or most desirable behavior? The use of sensitivity analysis in such policy analysis will be explored in a later paper in this series.

Reference No #

Range of possible outcomes:

Introduction:
Economists use the term risk to describe situations where the range of possible outcomes and their probabilities can be described. Therefore, Risk in general refers to our inability to make certain predictions about future events. For example, if I flip a coin, I don't know which side will come up on a particular toss, but I do know that there are only two, equally likely possibilities. In contrast, uncertainty is reserved to refer to situations where our lack of knowledge is so great that we can't even describe the range of possible outcomes.

Reality of Risk:
In everyday speech, risk is generally seen as something negative. In fact though, the concept of risk includes the chance that things might turn out far better than had been expected as well as much worse. How someone feels about the relative importance of windfall gains and losses depends on that person's own attitude toward risk, a subject we'll consider more carefully later.

A. Comparing sets of outcomes
Comparing sets of outcomes is clumsy and such an approach to assessing and comparing alternatives can be ineffective. One approach to simplifying the analysis is to collapse the range of possible outcomes into a single number by calculating the expected value (EV) of the alternative. The expected value is simply the weighted average of the possible outcomes, where the weight assigned to each outcome is the probability of its occurring expressed as a decimal. Thus, consider the two alternatives investments below:

Investment A				Investment B			
Return	Probability			Return	Probability		
1500 *	.25	=	375	900 *	.50	=	450
1000 *	.25	=	250	600 *	.50	=	300
500 *	.25	=	125				
0 *	.25	=	0				
		EV =	750			EV =	750

B. Please note that if one were to select either A or B, the actual return would never be equal to the EV. Rather than the return on a single investment, the EV might be thought of as the long run average return one would receive on a very large number of similar investments. This suggests that i's usefulness as a performance measure may be limited for someone who will not in fact make a large number of similar investments.

C. Look again at the two alternative investments describe above. Both have an EV of $750.

It suggests that if expected returns were all that people cared about, they would be indifferent in choosing between A and B. Hardly anyone is in fact indifferent, and most, but not all individuals will favor alternative B. Whichever alternative they prefer however, the fact that people have a preference suggests that we need information in addition to the EV to describe the payoffs on risky investments in a manner adequate to guide investor's choices.

Looking at A and B, we can see that the range of possible outcomes for A is more variable than is true of B. The best possible outcome from A exceeds the best outcome under B, but the worst outcome for A is also worse than the worst which can happen under B.

Which of the two investments an individual prefers is a matter of personal preference, but most people are risk averse, which means in this case, that they would prefer B to A. Basically, risk averse people favor less variable, more predictable outcomes while risk seekers welcome a broader range of possible returns. Risk aversion is what we would expect if the marginal utility of income were declining for the decision maker over the relevant range. Essentially a risk averse person would be willing to forgo a chance at an usually favorable outcome if doing so also brought protection against an equally likely, very unfavorable outcome.

In general, people who are anything but completely indifferent to risk will care about how disperse the possible returns on an investment are, as well as about their average.
A common measure of dispersion is the standard deviation (sd) which can be defined as:

$$sd = \sum (X_i - X) * P_i$$

where:
X_i = possible outcome
X = EV of the outcomes
P_i = probability of each of the outcomes occurring

Intuitively, the sd tells us the average distance between the actual returns on a particular investment and their mean. The greater the standard deviation, the more disperse returns are and the riskier the investment would be seem to be.

It is often the case that the possible returns on an investment are normally distributed about their EV. The normal distribution - the "bell shaped curve" has some nice properties, For example, if this pattern applies, we can be confident that two thirds of the possible returns lie within one sd of the EV and the 90% of the possible returns will lie within 2 sd. Assuming a normal distribution thus provides additional information about the dispersion of returns. While many variables, like the weight of a species of livestock, or maximum temperatures on the 4th of July, appear to be normally distributed, it is a mistake to assume that this is always the case. Buying insurance, for example, brings with it a high probability that the premium will be lost, and a small probability that the hazard will occur and the policy pay off. The point is

that one should be clear on the validity of assuming a normal distribution before making inferences.

D. If most people seem to dislike risk, they will have to be compensated for bearing it. As a
result, we'd expect the EV to be higher for an investment with a larger sd than for one with less disperse returns. Unfortunately however, it's not so simple. We need to distinguish between specific and systematic risk before we can determine exactly what type of risk bearing the market will reward. In general, risk is a measure of the volatility of returns as we have seen. That variability however may be seen as the sum of two components: a) specific risk: reflecting the influence of factors peculiar to the individual firm and b) systematic risk: reflecting common factors which influence the returns on all securities of a particular type. For example, the death of a key executive could have a source of specific risk effecting a single firm, while the movements of the business cycle would effect many firms in a similar manner, giving rise to systematic risk.

E. In general, investors should be able to avoid, or at least to minimize specific risks by holding a diversified portfolio. If specific risk can be thought of as the impact of positive and negative random influences, in a portfolio containing a number of assets, the good luck and the bad luck should approximately cancel out. Since individuals can avoid specific risk at reasonable cost if they choose to, the market will not reward then for accepting it. Systematic risk, however, cannot be avoided by diversification; hence individuals will be able to earn a "risk premium" - a higher EV- by accepting more systematic risk.

F. Since specific risk can be dissipated through diversification, what asset holders are concerned with is not the riskiness of a particular asset, but the overall volatility of the owner's portfolio. Consider the equally risky assets X and Y blow. If someone holds either of these assets alone, returns will fluctuate between 20% and 0%, although in the long run the average will equal the EV of 10%.

ASSET A or B	**ASSETS: 1/2 A and 1/2 B**
Payoff **Probability**	**Payoff** **Probability**
	A **B**
20% * .5	
0% * .5	20% 20% * .25
	20% 0% * .25
EV = 10%	0% 20% * .25
sd = 10%	0% 0% * .25
	EV = 10%

	sd = 5%

On the other hand, if the returns on A and B move independently of one another, a portfolio divided equally between the two provides four possible outcomes, as shown at the right. Note that while the expected value of this diversified portfolio is the same as either of the single security portfolios, volatility, as measured by the sd has been cut in half. Moreover, with the diversified portfolio, the actual return will equal the EV about half the time. In short diversification has allowed us to reduce the risk which must be accepted to achieve a given return.

This magic is accomplished by the fact that the payoffs on A and B move independently of one another. As a result, there is some tendency for unusually favorable circumstance affecting the returns on one security to be offset by unusually unfavorable returns affecting another. The volatility or risk of a portfolio will therefore be somewhat less than a weighted average of the risk of the component securities.

Finally, the above reasoning suggests that the appropriate way to assess the riskiness of an asset is not in terms of the volatility of its own returns but relative to what it adds to the volatility of the entire portfolio. For example, a security might be inherently risky, but would reduce the over all risk of the portfolio if its returns tended to move in the direction opposite to the other returns on assets in the portfolio. Such an asset would appeal strongly to risk averse investors, who could be expected to price it so that its expected return was relatively low in spite of its volatility.

Reference No #

Example 1

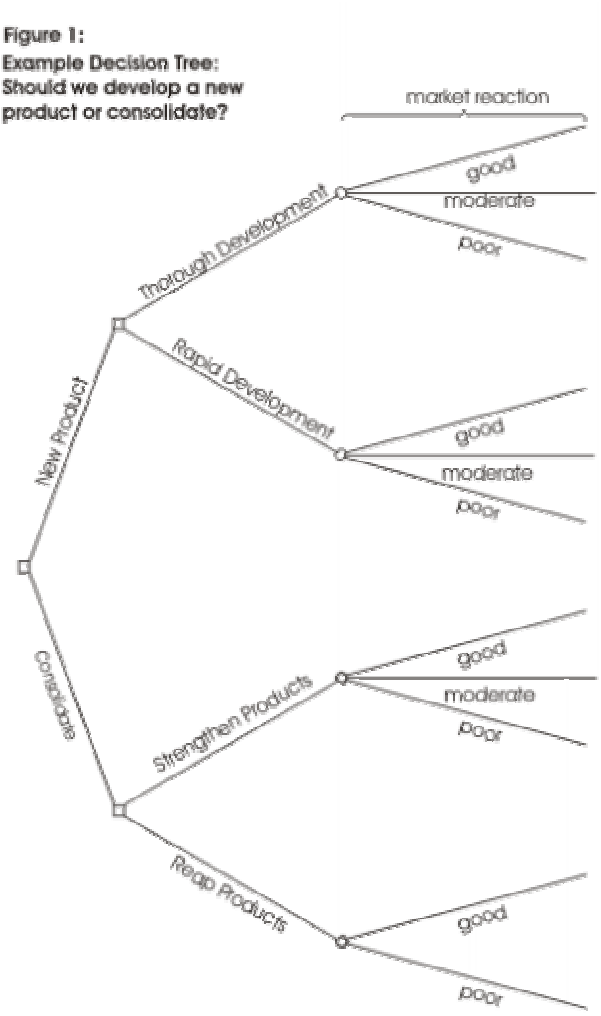
A certain company is in the process of launching a new car. The marketing director assigns a subjective probability of 0.9 to the event "the car is superior to its immediate competitor". However, he is not sure if his assessment is correct because of his total commitment to, and enthusiasm for, the new car. He calls up a reputable market research company and asks them for a quick survey to confirm or reject his initial prior assessment. The market research executive reminds his client that his survey will only be 80% reliable because of the potential extent of measurement and sampling errors. In operational terms 80% reliability means the following: the superiority or inferiority of the new car; if the car is really superior the survey will indicate superiority with probability of 0.8 and similarly if the car is really inferior the survey will indicate inferiority with probability 0.8.
The marketing director wants the market research firm to tell him what his revised probability assessment for the event "the car is superior to its immediate competitor" should be after the completion of the survey.
Bayes' theorem seems to be the logical mechanism for obtaining revised probabilities in this situation.
Let the event E1 denote "new car is superior to its immediate competitor" and also let the event E2 denote "new car is inferior to its immediate competitor".
Hence P(E1) = 0.9 & P(E2) = 0.1 ie decision makers prior assessments.
Let Z1 denote the event "market research survey indicates that the new car is superior to its immediate competitor" & Z2 denote the event "market research survey indicate that the new car is inferior to its immediate competitor".
The conditional probabilities hence are:
P(Z1/E1) = 0.8 P(Z1/E2) = 0.2
P(Z2/E1) = 0.2 P(Z2/E2) = 0.8
Thus, the revised or posterior probability that the new car is superior to its competitor (conditional on the indication from the survey that it is superior) is given by Bayes' theorem:
P (E1/Z1) = (0.9 C 0.8) / (0.9 C 0.8 + 0.1C 0.2)
= 0.97.
Hence if the market research findings indicate that the new car is superior, the marketing director's posterior assessment for the probability of the new car being superior should be 0.97, i.e. very close to "certainty". There are many decision situations, particularly in investment decision making, in which it is difficult to collect relevant additional evidence. In these situations we have to rely considerably upon the accuracy of the decision maker's initial or prior probability assessments.
Reference No #

Example 2

Decision Tree Analysis
(Choosing Between Options by Projecting Likely Outcomes)
How to use tool:

Decision Trees are excellent tools for helping you to choose between several courses of action. They provide a highly effective structure within which you can lay out options and investigate the possible outcomes of choosing those options. They also help you to form a balanced picture of the risks and rewards associated with each possible course of action.

An example of the sort of thing you will end up with is shown in Figure 1:



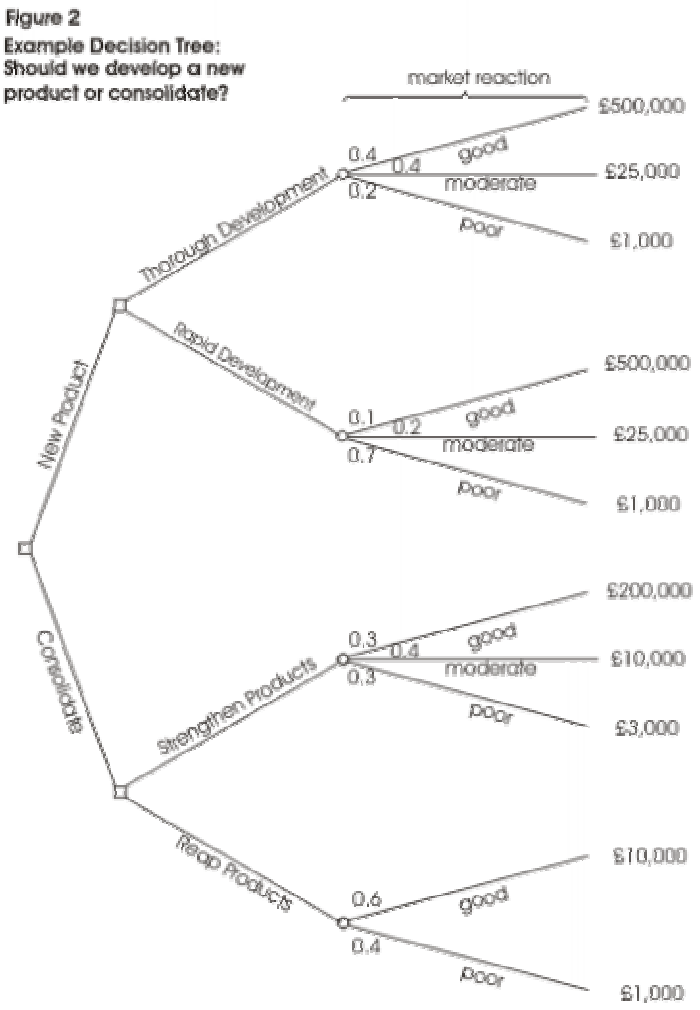
Reference No #

Evaluating the Decision Tree

Now you are ready to evaluate the decision tree. This is where you can work out which option has the greatest worth to you. Start by assigning a cash value or score to each possible outcome. Estimate how much you think it would be worth to you if that outcome came about.

Next look at each circle (representing an uncertainty point) and estimate the probability of each outcome. If you use percentages, the total must come to 100% at each circle. If you use fractions, these must add up to 1. If you have data on past events you may be able to make rigorous estimates of the probabilities. Otherwise write down your best guess.

This will give you a tree like the one shown in Figure 2:



Calculating Tree Values

Once you have worked out the value of the outcomes, and have assessed the probability of the outcomes of uncertainty, it is time to start calculating the values that will help you make your decision.

Start on the right hand side of the decision tree, and work back towards the left. As

you complete a set of calculations on a node (decision square or uncertainty circle), all you need to do is to record the result. You can ignore all the calculations that lead to that result from then on.

Calculating The Value of Uncertain Outcome Nodes
Where you are calculating the value of uncertain outcomes (circles on the diagram), do this by multiplying the value of the outcomes by their probability. The total for that node of the tree is the total of these values.

In the example in Figure 2, the value for 'new product, thorough development' is:

0.4 (probability good outcome) x £500,000 (value) =	£200,000
0.4 (probability moderate outcome) x £25,000 (value) =	£10,000
0.2 (probability poor outcome) x £1,000 (value) =	£200
+	£210,200

Reference No #

Introduction to Modeling:

Analysis technique that looks at past data and business results and applies discovered historical relationships and patterns to new business transactions. Allows for rapid

analysis of masses of data to produce action strategies. Models are easily integrated with business rules and treatment strategies and provide insight to customer-facing staff and others.

Models Include:

1- Score Cards
2- Regression Analysis
3- Segmentation Trees
4- Neural Nets
5- Probabilistic Analysis
6- Correlation Analysis
7- Regression/Multiple Regression
8- Factor Analysis
9- Cluster Analysis (also known as Market Segmentation)
10- Correspondence Analysis (also known as Brand Mapping)

Overall benefits of Models, namely:

· Providing management with a full understanding of their key business risks through quantification and modeling of uncertainty

· Delivering meaningful value by helping assure business objectives are achieved while prioritizing and optimizing resource allocation

· Reducing decision making cycles

· Development of management consensus on strategic decisions

· Ensuring that businesses are managed in relation to tolerable risks and that opportunities are exploited

Reference No #

Example 1

Regression Analysis:

Regression analysis is concerned with modelling relationships among variables. It quantifies how a dependent variable is related to a set of explanatory variables.

When would you use it?
To work out the simultaneous impact of more than one variable at a time

What are the advantages?
Allows you to work out 'what if …' scenarios

Any disadvantages?
Good predictive powers cannot be guaranteed. Interco relation of data can mean that not all variables are included in the regression model. Works best with binary variables (i.e. 'yes' / 'no' responses)

Regression analysis is used to help us predict the value of one variable from one or more other variables whose values can be predetermined.

The first stage of the process is to identify the variable we want to predict (the dependent variable) and to then carry out multiple regression analysis focusing on the variable(s) we want to use as predictors (explanatory variables). For example, the dependent variable might be overall satisfaction, the explanatory variables price, quality, value for money, delivery time and staff knowledge.

The multiple regression analysis would then identify the relationship between the dependent variable and the explanatory variables – this is presented as a model (formula) that might look like this:

Overall satisfaction =

1.37 x price rating + 0.91 x quality rating + 0.64 delivery time rating
+ 2.42 (a constant)

Invariably not all of the possible explanatory variables are included in the model due to inter-correlation between them: for example, the ratings that people give on price and value for money may be very closely correlated and are therefore not both required in the formula.

The overall predictive powers of the model can be calculated and expressed as the co-efficient of determination R^2 (= the explained variation / total variation). The co-efficient of determination will lie between 0 and 1: 1 would mean that it is able to explain 100% of the variation although a figure of less than 50% is more common.

Example 2

Probabilistic modeling for Decision-Making under Uncertainties:

In this diverse world of ours, no two things are exactly the same. A statistician is interested in both the differences and the similarities; i.e., both departures and patterns.

The actuarial tables published by insurance companies reflect their statistical analysis of the average life expectancy of men and women at any given age. From these numbers, the insurance companies then calculate the appropriate premiums for a particular individual to purchase a given amount of insurance.

Exploratory analysis of data makes use of numerical and graphical techniques to study patterns and departures from patterns. The widely used descriptive statistical techniques are: Frequency Distribution; Histograms; Boxplot; Scattergrams and Error Bar plots; and diagnostic plots.

In examining distribution of data, you should be able to detect important characteristics, such as shape, location, variability, and unusual values. From careful observations of patterns in data, you can generate conjectures about relationships among variables. The notion of how one variable may be associated with another permeates almost all of statistics, from simple comparisons of proportions through linear regression. The difference between association and causation must accompany this conceptual development.

Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. The plan must identify important variables related to the conjecture, and specify how they are to be measured. From the data collection plan, a statistical model can be formulated from which inferences can be drawn.

As an example of statistical modeling with managerial implications, such as "what-if" analysis, consider regression analysis. Regression analysis is a powerful technique for studying relationship between dependent variables (i.e., output, performance measure) and independent variables (i.e., inputs, factors, decision variables). Summarizing relationships among the variables by the most appropriate equation (i.e., modeling) allows us to predict or identify the most influential factors and study their impacts on the output for any changes in their current values.

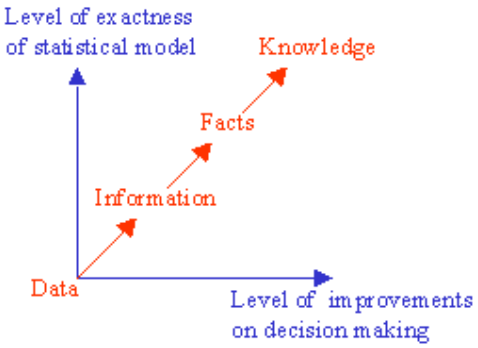
Frequently, for example the marketing managers are faced with the question, What Sample Size Do I Need? This is an important and common statistical decision, which should be given due consideration, since an inadequate sample size invariably leads to wasted resources. The sample size determination section provides a practical solution to this risky decision.

Statistical models are currently used in various fields of business and science. However, the terminology differs from field to field. For example, the fitting of models to data, called calibration, history matching, and data assimilation, are all synonymous with parameter estimation.

Your organization database contains a wealth of information, yet the decision technology group members tap a fraction of it. Employees waste time scouring multiple sources for a database. The decision-makers are frustrated because they cannot get business-critical data exactly when they need it. Therefore, too many decisions are based on guesswork, not facts. Many opportunities are also missed, if they are even noticed at all.

Knowledge is what we know well. Information is the communication of knowledge. In every knowledge exchange, there is a sender and a receiver. The sender make common what is private, does the informing, the communicating. Information can be classified as explicit and tacit forms. The explicit information can be explained in

structured form, while tacit information is inconsistent and fuzzy to explain. Know that data are only crude information and not knowledge by themselves.
Data is known to be crude information and not knowledge by itself. The sequence from data to knowledge is: from Data to Information, from Information to Facts, and finally, from Facts to Knowledge. Data becomes information, when it becomes relevant to your decision problem. Information becomes fact, when the data can support it. Facts are what the data reveals. However the decisive instrumental (i.e., applied) knowledge is expressed together with some statistical degree of confidence. Fact becomes knowledge, when it is used in the successful completion of a decision process. Once you have a massive amount of facts integrated as knowledge, then your mind will be superhuman in the same sense that mankind with writing is superhuman compared to mankind before writing. The following figure illustrates the statistical thinking process based on data in constructing statistical models for decision making under uncertainties.



The above figure depicts the fact that as the exactness of a statistical model increases, the level of improvements in decision-making increases. That's why we need Business Statistics. Statistics arose from the need to place knowledge on a systematic evidence base. This required a study of the laws of probability, the development of measures of data properties and relationships, and so on.
Statistical inference aims at determining whether any statistical significance can be attached that results after due allowance is made for any random variation as a source of error. Intelligent and critical inferences cannot be made by those who do not understand the purpose, the conditions, and applicability of the various techniques for judging significance.
Considering the uncertain environment, the chance that "good decisions" are made increases with the availability of "good information." The chance that "good information" is available increases with the level of structuring the process of Knowledge Management. The above figure also illustrates the fact that as the exactness of a statistical model increases, the level of improvements in decision-making increases.
Knowledge is more than knowing something technical. Knowledge needs wisdom. Wisdom is the power to put our time and our knowledge to the proper use. Wisdom comes with age and experience. Wisdom is the accurate application of accurate knowledge. Wisdom is about knowing how something technical can be best used to meet the needs of the decision-maker. Wisdom, for example, creates statistical software that is useful, rather than technically brilliant. For example, ever since the Web entered the popular consciousness, observers have noted that it puts information at your fingertips but tends to keep wisdom out of reach.

Business professionals need a statistical toolkit. Statistical skills enable you to intelligently collect, analyze and interpret data relevant to their decision-making. Statistical concepts enable us to solve problems in a diversity of contexts. Statistical thinking enables you to add substance to your decisions.
That's why we need statistical data analysis in probabilistic modeling. Statistics arose from the need to place knowledge management on a systematic evidence base. This required a study of the laws of probability, the development of measures of data properties, relationships, and so on.

Reference No #

Conclusion:

The purpose of the report is to show down concepts and ideas on business decision-making that you can apply to persuade organizations to support adaptability.

- Described the concept of influences of external environment on organization, how it might compete and how it might become successful.
- Identify the decision-making environment and recommend appropriate strategies to influence the decision-making process.

Recommendations:

Applying business models and actually selecting between them could be cumbersome and time taking. We must either find a solution by analogy or by finding some similar scenario and then using the business models to help us in forecasting decisions.

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