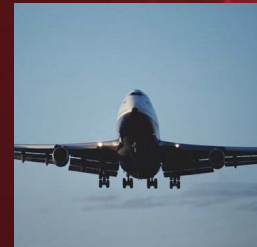# ACE THE CASE ©

'A comprehensive consulting case interview guide full of expert advice and pages of example case style interview questions, taken from real life management consulting job interviews around the world.'

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# ■ Table of Contents

# ■ Introduction

This 2007 edition of our 'Ace The Case' ©  interview guide was created to help you the aspiring consultant, to understand and prepare for the challenging rounds of case interviews that lie ahead as you attempt to begin your career in the competitive but rewarding field of management consulting.  This guide brings together our interview experiences, with case questions that have actually been given to individuals like yourself in real life case interviews at some of the top consulting firms in the world including McKinsey, Booz Allen Hamilton, Bain, Boston Consulting Group, A.T. Kearny, and L.E.K to name a few.  The worked solutions in this guide combine the actual answers given by interviewees with constructed answers and recommendations made by the team at here at acethecase.com.

Unlike other case interview informational products, this guide and our website, takes on more of an international perspective making it useful to individuals of all nations, not just the United States.  Some of the questions have been sourced from Australia, the United Kingdom and even India.  Other case questions have been re-worded to give this guide its uniquely global perspective.

The case questions you will be asked in management consulting interviews are generally drawn from the country in which the interview is taking place, however, our combined experiences show that questions based on global markets and businesses operating in foreign countries are not uncommon.  Having a reasonable understanding of different countries, demographics and economies will therefore be an advantage to you.  Remember, case questions are often just a taste of the international business scene you may experience once you score the consulting job of your dreams!

Before reading further, it is important to mention that by purchasing and reading this guide you are not guaranteed interview success or a place at a prestigious consulting firm.  By learning the skills required to answer case based interview questions and through practise, you can however, hope to improve your chances of interview success.  All of us here hope you will gain something from taking the time to read this guide.  You should at minimum obtain valuable insight into the art of confidently tackling case interviews in the rounds of management consulting interviews that lie ahead.

## What is a case interview?

A case interview is a unique style of interview question or interview technique used by management consulting firms to screen interviewees when recruiting new employees. The case question is generally a business problem or an estimating exercise designed to make you think on your toes, use logic and common sense. Consulting organisations want to see that you can analyse information, structure an answer and perform basic calculations with large numbers.

The objective of the case interview is not to get it right. In fact there is often no right answer. Instead it is designed to for you to demonstrate your ability to solve complex problems and to show the interviewer how you think. The interviewer wants to see you as a colleague with whom he or she would want to work with in a team. Often case interviews can be very interactive, as you ask questions, seek clarification and bounce ideas off your interviewer.

The case interview is generally a one on one style interview and you are given a pen and paper or perhaps a whiteboard on which to, brainstorm, perform calculations and structure your answer. After some light conversation and getting to know you type questions, the interviewer will then pose the case question. Feel free to take notes because a lot of information may be coming your way. Clarify the questions details to ensure you are of a common understanding and on the right track before launching into the case. The interviewer will then watch you and is there to answer any questions, give more information when needed and guide you on the problem.

You can expect to be interviewed by 1, 2 or 3 different people on any one day with around 30 mins to an hour assigned to each interview. The case question itself can last anywhere from 20 - 40 mins depending on its difficulty and the specific round of interview.

Although you may feel tense, nervous and anxious, the important thing is to relax be confident and have fun!

# Answering case interview questions

In this introductory section we will first offer you some basic advice for answering a case question before moving into more detailed sections on case interview skills followed by the many example case questions.

When answering case questions the most important thing above all else is to demonstrate to the interviewer your intellect and your ability to solve problems. Essentially that is what a management consultant does. They solve complex business problems that their clients cannot solve themselves.

There is a chance that during the case interview you will not even generate a final answer nor will it be correct. Sometimes case interviews can end up being an exploration of issues with the interviewer guiding you down one of many possible paths allowing you to formulate a solution to a problem, give recommendations or 'ball park' an estimate.

With this in mind never go too quick because you may overlook important elements to the problem and take too narrow a focus. Work at a steady pace to ensure you can at least give a final answer if required by the interviewer.

Interact with the interviewer and ask any questions to gauge the scope of the problem or fill in missing gaps of information. Often certain details of the case will be intentionally withheld to see if you can determine yourself what extra information or data would be useful. This demonstrates that you are both inquisitive and thorough.

Don't be afraid to be creative because management consulting requires a large element of 'thinking outside the square' and innovative ideas. Be enthusiastic, confident and comfortable. Always let your personality come through. You may get way off track in a case interview and think that there is no way you will make it to the next round, however your personality, attitude and enthusiasm is what often will get you over the line.

A good point to make here is the importance of bringing structure to your case question problem solving. Using a simple problem solving method such as that below may help:

1. **Understand and summarize the case question**

2. **Determine and clarify the case question objective**

3. **Pull together existing information, ask for and gather more information**

4. **Analyse this information**

5. **Group similar issues together and layout a structure**

6. **Perform calculations or design solutions for issues**

7. **Formulate and present answer/s**

Common business frameworks and other problem solving methods such as Porters 5 forces, the BCG Matrix, SWOT Analysis, Revenue and Cost modelling, Business Life Cycle Analysis, Process Analysis, Mind Mapping, Key Issues Grouping or Problem Decomposition and Reverse Engineering are often useful and can also be great ways of bringing structure to your thoughts, providing you use the right one for the right problem. Never try to force a framework or methodology onto a problem, only use one if there is a natural fit to the case question. Structure your solution anyway you can, keeping in mind what feels appropriate given the nature of the case question. Some of these methods and frameworks are used and briefly discussed in relation to specific case questions within this guide, however feel free to research some of them further by yourself or with a friend.

A simple way of executing a case analysis which we will discuss here is a simple and common method of breaking the problem into distinct segments to create a structured roadmap. You will see this used several times throughout this guide. Be sure that your problem components are mutually exclusive, i.e. no overlaps, and that you have considered as many high level issues as possible. From here you can work top-down using a tree based structure to setup your analysis. Be confident in your analysis and be sure to stick to your roadmap once it is created, however be open to changing direction if you are guided to do so by the interviewer.

Example: *An automobile dealership is experiencing declining profits. What could be the reason for this?* The diagram below shows a simple structure which can form the starting point for which you should begin your analysis to the case question.
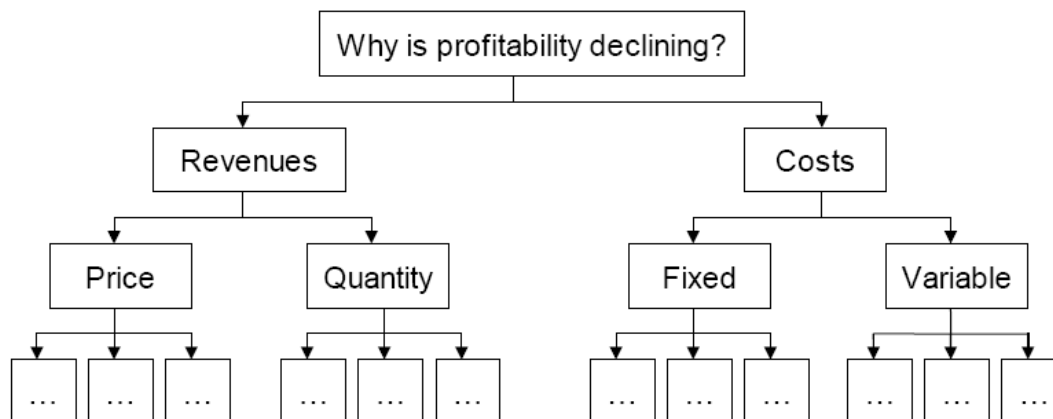


The last point that should be made is in regard to the appearance of your key strengths. Consulting firms hire from a variety of backgrounds and degrees including engineering, science, law, business, economics, management and commerce. They take anyone who shows the right attitude and intellect for the job. Management consulting firms look for the most intelligent individuals who are also 'all-rounders' with competencies and interests in a range of disciplines. It is important, therefore that if you are a business or commerce oriented individual you must be sure to demonstrate creativity, problem solving skills and a level of thinking outside of the traditional number crunching economist or accountant mind set. Conversely someone like an engineer needs to demonstrate a level of business acumen with at least some knowledge or interest in the commercial world. Play to your strengths but don't show the interviewer that you are one dimensional, only strong in solving problems from one particular approach or based on one educational style. In saying all this number and maths skills are a must so make sure you can add, subtract, multiply and roughly divide large numbers in your head or on paper without the use of a calculator.

## Structure of this guide

This guide is split up into six sections.  The first covers some specific skills and tips in relation to case interviewing.  The next four cover example case questions from real life case interviews and are categorised based on one of four question styles that you may encounter in the rounds of your management consulting interviews.  The sixth section finishes by providing a sample of narratives from real life case interviews to demonstrate how the interaction with the interviewer and the general conversation might flow during your case interview.

> **Section 1:  Case Interview Skills**
> **Section 2:  Example Market Sizing / Estimating Cases**
> **Section 3:  Example Business Problems & Strategy Cases**
> **Section 4:  Example Logic Problems**
> **Section 5:  Example Data & Charts Based Case**
> **Section 6:  Sample Candidate Case Interview Narratives**

## Using this guide

Depending on when you purchased this guide and how much time you have before your first case interview, it is suggested that for maximum benefit you first attempt some of the questions in this guide yourself before looking at the worked solutions.  Use a pen, paper and no calculator to mimic the real life interview.  Once completed  refer to the worked solutions provided to see how you went including what you did well, any ideas you missed and where you can improve. After this, attempt some of the extra questions at the end of each section.

Remember, just because your answer doesn't match the solution or recommendations we provide doesn't mean you are wrong.  Case questions can be asked in a number of ways and often there are many issues that can be considered and explored, of which we could not attempt to cover all.  Our worked solutions are only a guide and many are the actual answers that were given by interviewees in real life interviews.  Your solutions may be even better!

# ■ Section 1: Case Interview Skills

This first section of the guide gives more detailed advice and covers valuable skills and concepts which should be understood before you launch into the other sections of the guide and start working your way through the many case interview examples.

## Maintaining neat and organised notes

If possible in the interview use two separate sheets of paper. Use one for writing down all the data and information you are given as well as any analysis, issues grouping, logic trees etc. Use the other sheet for your mathematical calculations. Turn them on their side to landscape as we have found that this is much easier for working through problems on paper. Depending on the type of case question you are given, you could even present your final answer to the problem on a third sheet of paper.

Write everything down in pencil and write as neatly as possible. This may seem basic, but being able to erase mistakes as opposed to scribbling out in dark pen ink helps in producing clean and easy-to-read notes. This is important as some consulting firms will want to collect your notes, to show and discuss with their colleagues and potentially review again later. Ultimately they will be evaluated to gain further insight into how you structure your thoughts. McKinsey is a firm who has been known to do this.

Feel free to draw basic tables and graphs during the analysis stage of your case question to demonstrate structured presentation of information.

# Mathematical calculation advice

You will first need to get used to using educated estimates for values when concrete data is not provided. E.g. the population of the USA is roughly 300 million, UK 60 million, Canada 30 Million, Australia 20 million, India 1 billion, Japan 125 million etc. E.g. the average number of people per household in western countries is roughly 2.5. E.g. A large pizza costs roughly $10 -15 US so say $12.50. These are all essentially variables in your problem, so as long as they are not wildly far fetched and you justify your chosen value and explain where more accurate data could be obtained, you will be ok. Remember, when modelling data and doing calculations inputs and variables can always be changed later.

The next point is to round large numbers to make calculations much easier, because as mentioned earlier you do not get to use a calculator. This is easiest when you get to pick the number yourself. E.g. the average price for a glass of beer across all of Australia may be something like $3.87 AUD, but it makes a lot more sense just to say it is $4.00 even and go from there, because your calculations will be a lot simpler to do in the long run.

Feel free to 'ballpark' calculations if possible. E.g. during your calculations you may have to find 24.33% of 617,800, which equals 150,310.74, but it is easier to just work out 25% of 600,000 = 150,000. Remember it is not a university exam and you do not have a calculator, your mathematical responses do not have to be exact since there is usually some allowable margin of error, so take advantage of the ballpark whenever you can.

Don't try to do every calculation in your head unless you are sure you can solve them correctly. When doing calculations in your head, be sure to write your solutions down so you can refer to them later. If you remember long division and multiplication of large numbers from your high school days then use these methods, however remember they can be slow. So if you have rounded the larger numbers as we advise these methods will probably be quick enough or even unnecessary.

The rule of 10's and ½'s is an extremely useful method of calculation. Basically you break difficult numbers into either tens or halves to do quicker calculations.

E.g. If calculating 37% of 45,000

First take 45,000/10 = 4,500, this is 10% of 45,000

Then halve that to get 4,500/2 = 2,250, this is 5% of 45,000

Now halve again to get 2,250/2 = 1,125, this 2.5% of 45,000

Or you can divide the original 10% to get 4,500/10 = 450, this is 1% of 4500.

From the above calculations, you can approximate the answer to:

(3 x 4,500) + 2,250 + 1,125 = 16,875 = 37.5% of 45,000

OR more accurately calculate it exactly as:

(3 x 4,500) + 2,250 + (2 x 450) = 16,650 = 37% of 45,000

## Key Business Concepts

The following is a brief set of key business concepts we believe you may find useful when attempting case interviews. Much of this should be familiar to you already and in saying that you should research them more yourself if they are not intuitive to you.

- Generally speaking profit is all revenues minus all costs. Revenues are a function of price and quantity. Cost items can be broken down into fixed or variable. Costs can also be considered as direct or indirect.

- When discussing marketing options consider the 4 P's. Product, Price, Place (distribution alternatives) and Promotion.

- A supply chain is activity and information flow for a product. It will consist of suppliers, manufacturers, distributors, sellers and finally customers. It applies equally to physical goods as well as services.

- Economies of Scale. Generally speaking the more of something that is produced or purchased the cheaper it is to make or buy.

- Price is affected by supply and demand. High demand and low supply equals higher prices.

- Long term contracts can affect business decisions. They can be beneficial (e.g. if a lower price is achieved for raw materials) or obstructive (e.g. if a binding contract prohibits you from getting out of what has become a financially detrimental initiative).

- When discussing and analysing industry attractiveness consider the size of the market in dollars, the number of competitors, the minimum efficient scale and market conditions (growing, stagnant or shrinking)

- When discussing and analysing mergers and acquisitions consider such things as whether it will be profitable, financing and break even time, product line synergies, market reaction and cultural issues.

- When discussing and analysing product introduction consider such things as, the potential market and whether customers want or need it. Consider profitability of the product including price, revenues and costs of introduction. Think about the competitor reaction. Can they copy it or do they already have competing products. Also think about whether the new product makes sense for the company and its current product line.

- When discussing and analysing any organisational change, try not to overlook operational level issues (e.g. new processes), labour issues (e.g. salary, benefits and unions), cultural and moral issues.

# ■ Section 2:  Example Market Sizing / Estimating Cases

Case questions based on market sizing and estimation are designed to assess your ability to quickly derive rough estimates or 'ball park' figures based on a combination of assumptions, variables, existing knowledge, common sense and sound reasoning.  It also tests your confidence with numbers and mathematical capacity to perform quick calculations of large figures.  Generally no calculator is given and you must work out the problems on paper, a whiteboard, or in your head.

It is practically impossible to get the 'right answer' in this style of case question so your goal here instead should be to cover a significant amount of issues, discuss important variables and assumptions which would affect your answer.  Always justify any numbers or figures that you use.  Explain where you got a number from or where you could go to get a more accurate percentage, statistic of figure.  Don't be afraid to involve the interviewer asking for their thoughts and input on any assumptions you make.

The concept of 'triangulation' is also important.  If you can estimate an answer using more than one model/method and then compare and maybe even average the two answers then your final solution will probably be more accurate than the first that you calculated, however time will heavily dictate whether you can use this strategy.  Using more than one method will also demonstrate open mindedness because you recognise that there is more than one way to solve a problem.

Performing a reality check on your final answer is always a necessary step demonstrating your capacity for common sense.  If you end up with an answer that shows for example that in the United States each citizen must be drinking/consuming 10 bottles of coca cola per day then clearly you made some unrealistic assumption or incorrect calculation back through your modelled answer.  Voice this and then try to determine where you may have gone wrong showing a capacity for self reflection.

As mentioned earlier in this guide, it is important to structure your solutions and this cannot be stressed enough.  Management consulting firms are looking for calm collected individuals with sound reasoning and logic.  The ability to create and follow methodologies, models and frameworks is a key skill within the consulting industry.  By structuring your answer, not only will you impress the interviewer but you will also generate a plan of action to follow in answering the question.  Unlike answering business problems there are little set methods when it comes to 'guesstimating'.  Working down from

population sizes, upwards from consumption or sideways by initially gauging possible throughput are three common methods which can be used in these problems.

When asked a market sizing or estimate type question be sure to understand what type of final answer is required.  Will the answer need to be in units, customers, sales/revenue or profit.  This important piece of information can affect your approach and the length and level of detail of your analysis.

For example, if asked a simple case question in which you are to estimate the annual US market for lipstick, four different answers can be given based on what type of answer is required, each taking longer to derive.  See below:


**Question: What is the annual U.S. market for lipstick?**

**1.  In total number of consumers**

- Estimate the total U.S. population (~300 million people)
- Segment the population based on some metric (age is usually a good metric, but gender would also be useful here)
- Estimate the number of people in each population segment
- Make a guess at the percentage of each segment that uses lipstick
- Complete your calculations and arrive at a final figure

**2. In units sold**

- Start with the estimate for total lipstick consumers (as determined earlier)
- Make a guess at the amount of lipstick that an average consumer uses in a given month
- Multiply the above two numbers to estimate the tubes of lipstick sold each month in the U.S.
- [Annual volume of lipstick sold] = [Monthly estimate] * 12

**3. In revenue**

- Start with the annual number of lipsticks sold (as determined earlier)
- Make an assumption of the average price of a tube of lipstick
- [Annual revenue] = [Annual tubes of lipstick sold] * [Avg. price]

### 4. In profits

- Method #1: Use the annual revenue estimate and apply a guessed profit margin
- [Total annual profit] = [Annual revenue] * [Profit margin]
- Method #2: Use the average price, apply a guessed profit margin, and multiply by the estimate annual packs sold
- [Unit profit] = [Average price] * [Profit margin]
- [Total annual profit] = [Unit profit] * [Annual packs sold]
- The answers from these two methods could form the basis of some 'triangulation' averaging the two answers to derive your final answer.

We hope from this simple lipstick market sizing example that you now see how important it is to understand your case question and what type of answer you are trying to come up with.

As we have mentioned earlier be sure to explain the approach you will take to the interviewer. When writing use diagrams, clearly space out text and any calculations, link objects words and numbers with lines and arrows. Some consulting firms will even keep the note paper you used during the interview for later reference when making decisions on who to put through to the next round of interviews or who to hire.

A final note on time is needed before moving into the actual market sizing and estimation questions within this section. As mentioned earlier the trick is to not go too quick. You show nothing if you finish in 5 minutes with a very basic answer which considers only simple and obvious variables. Depending on the length of the interview the case question time will vary. Half hour interviews generally means 20 minutes assigned to the case question and one hour interviews 40 mins with generally a larger and more difficult problem. When you think about it you therefore have lots of time to plan, structure and calculate a good answer. If you feel the need to go fast then try the technique of triangulation as mentioned earlier. Going slower means you can discuss key variables to your calculations with the interviewer for example debating over the percentage of females under the age of 25 in the UK that smoke, as opposed to just making a wild guess. Remember using your time well also demonstrates good time management skills, another key skill of a management consultant!

## Question:
## Estimate the market for light bulbs in Australia



This is a very general question so you would first need to seek some clarification from the interviewer. Questions you should ask may be – Are you to look at all market segments? (E.g. Business/Commercial, Domestic and Public Lighting) Are you looking at all types of globes or just a few styles? (E.g. Fluorescent and Conventional Incandescent bulbs) Are you calculating the market in terms of units or dollars? Are you looking at the market for one year of sales? After asking some questions you narrow the problem down to only being concerned with:

- Household (Domestic) lighting only
- Incandescent bulbs i.e. Simple Edison screw and Bayonet styles
- Market is expressed in terms of revenue for a year



## Possible Solution:

Knowing the specifics of the problem domain we can now work out how to answer it. First you would want to brainstorm what variables and factors we need to be considered. Involve the interviewer, bounce ideas off them if possible and note that this initial list is by no means exhaustive and can be added to later. This process alone may take several minutes.

**Types of demand for light bulbs:**

- Replacement Demand (i.e. to replace globes that have blown/died)

- New Demand (i.e. new housing)

**Some initial size related variables:**

- Homes in Australia

- Rooms per home

- Globes per room

- Average lifespan of globe

- Average price of globe

You would want to start off with replacement demand because it is probably larger that new demand. Looking at the variables we now need to work out how to estimate each one.

If you don't already know Australia has roughly 20 million people. Your interviewer would probably give you this to start with unless of course you live in Australia because then you should know the population of your own country. It is a westernised country and so probably has some similarities in terms of culture, housing and economics to countries like the US and UK, Canada etc. Using this and considering the mix of large families, small families, singles, elderly, split families, second homes etc. you can take an educated guess and say there is probably on average 3 people per household. This is a nice simple figure and you should point out to the interviewer that it is also probably the most important assumption so far.

This then makes 20 million / 3 = 6.7 million households. From here you should then think about how many rooms a typical house has. Consider large homes, small homes, apartments etc. Think about houses you've been in, your own, friends etc. Don't get too caught up on this however as you may not be from a 'typical' or average household. You may be very wealthy and live in a large home or live in a small dorm room, or studio apartment.

Again using the concept that Australia is a western culture with a large Anglo-Saxon population, 2-3 bedrooms, a kitchen, lounge room, 2 bathrooms, 1.5 car spaces, another room, a hallway, maybe a staircase can probably be considered to be pretty normal. This makes roughly 11 rooms. You can round it down to 10 for simplicity.

Thinking about the number of lights in a room it is usually about 1 or 2. Take 1.5 as the average and multiply it by the rooms and you have 15 globes per household.

If you also want to consider any outside lighting and lamps you should probably throw in another 5 globes. Making on average 20 globes per household. This is a nice simple figure to work with.

Now you must think about the average lifespan of a globe. Anywhere from 6 months to 2 years is the norm depending on usage. You can base this on life experience. Take 1.5 years and you have each household going through about 20 / 1.5 = 13.3 globes per year.

Time now for a quick reality check. This number means about one globe in each household dies per month, or conversely one globe is purchased per household per month. This seems pretty reasonable. On instinct it may be a little high but we'll go with it.

Multiplying the 13.3 globes per year by the 6.7 millions households, means about 90 million globes are purchased per year in Australia. Since the question asked for market demand as a dollar figure, you now must work out the average cost of a light bulb. Try to think of the price they cost in a supermarket. Explain to the interviewer that if you were to research this in real life you would get a sample of prices from a range of different stores in different locations around Australia of different strength and size globes. Consider that buying a 4 pack generally makes each unit cheaper than buying them individually. Note: If the answer is to be expressed in Australian dollars and you live in the UK for example than you may need to ask for an exchange rate to help estimate the price. It may of course be acceptable to answer in your local currency.

They are generally between 50c – $1 in Australia so take 75c as the average. You can state such a price based again on life experience and you may want to consult with the interviewer if this is accurate. Multiplying this through and you have $0.75 x 90 million = $67.5 million Australian dollars ($AUD).

Now at this stage you may want to throw another variable in which was not brought up initially, but has been on your mind since you moved into the calculations. It is an obvious fact that not all households would be using standard globes under consideration. Some may have converted to the now common energy saving globes such as compact fluorescents, some would be using fluorescent tubes, others may have fancy down lights or even chandeliers - the list is endless. Households using these different style globes may make up as much as 10% of all homes, and so this fact should be considered. Taking 10% off 67.5 million dollars results in a revised $60.75 million Australian dollar figure for replacement demand, let's round that down to $60 million.

By now you may be running low on time and haven't even touched on new demand market as a result of new homes being built. It's good that at least something has been worked out above and this can form the basis for determining a dollar figure for new demand. Just remember that for calculating new demand, a globes useful life is irrelevant because a new home requires every globe to be installed at the same time.

Without knowing the specific economic climate in Australia in relation to construction in particular new housing development, you can explain to the interviewer that researching Australian government websites, Australian statistics bureau's and Australian reserve bank data on new housing development or development approvals would give you a more accurate picture of the numbers. For now however find a reasonable percentage figure like 3%. (I.e. you are assuming that of the total number of homes in Australia, 6.7 million, around 3% of that figure, which is about 200,000 is the number of new homes being built within a year).

So 200,000 new homes x 20 globes x $0.75 per globe x (1-10%) globe type variable = $2.7 million

Adding these two figures together gives say $62.7 million Australian dollars as the market for light bulbs within Australia.

Below is a diagrammatic view of the method and calculations used to come up with this final market size estimate:

Lifespan of globe about 1.5 years

1.5 globes per room.
Plus 5 extra globes to cover outside, as well as lamps etc.

2-3 bedrooms, a kitchen, lounge room, 2 bathrooms, 1.5 car spaces, another room, a hallway, maybe a staircase. This makes roughly 10

Population of Australia = 20 Million

On average about 3 people per household

13.3 Globes per year per household

20 Globes per house

10 Rooms per house

6.7 Million Homes

6.7 million x 13.3 = 90 Million Globes

**Average cost of light bulb = $0.75 AUD**

90 million x 0.75 = $67.5 million AUD

**10% of light fittings not using the standard bulb globes**

$67.5 million x 90% = $60 million AUD (rounded down)

Ignoring the useful life of a globe since this is new demand.

200,000 new homes x 20 globes x $0.75 x (1-10%) globe type variable = $2.7 Million

New housing development is 3% of existing homes per year.

3% of 6.7 million homes = 200,000 new homes

**$60 M + $2.7 M = $62.7 Million AUD**

Replacement Demand - resulting from existing homes

New Demand - resulting from new homes

Australian Light Bulb Market

To understand this question you would again need to seek some clarification from the interviewer. Through questioning you are given more information and it is explained that only the domestic household market is to be considered. Such motors on average have a 10 year life and therefore need replacing after this period of time. The population of California is roughly 36 million and the answer should simply be expressed in units.

**Possible Solution:**

Things that need to be considered in this question are:

- New demand will result from 2 sources both new homes and old homes because some older homes get automatic garage door motors installed on their existing doors. In addition more new homes will have automatic garage doors compared to old homes since automatic garage doors are a newish technology and sales/installations would increase each year as they become more affordable and popular.

- An item such as an automatic garage door can be considered a luxury and therefore wealthier homes are more likely to have them than lower income households.

- Apartments and units can be eliminated from the question because they generally have an underground parking and if it has an automatic door at the entrance it would probably be a more industrial sized motor and is therefore out of scope for this question.

- In terms of households then, some have two doors for two car spaces, some one big door for two spaces, some one door for one space, some simply a car port and therefore no door whilst other large homes

can have up to 4 separate garage doors 1 garage door per home therefore seems like a good average and number to use.

▪ Automatic garage doors have been around for at least 15 years now. This fact will largely determine replacement demand.

Using these initial ideas an answer to the case question can then be worked out. A possible answer is presented on the next page with the aid of a diagram.

365,000 units

Therefore 365,000 + 120,000 = 485,000 units per year

Using the average 1 garage door per home you get 65,000

Using the average 1 garage door per home you get 300,000

Housing in California may be increasing at at a rate of say 2-3% per year inline with economic inflation and growth. This means 12 million x 2.5% = 300,000 new developments per year. Of this only 85% even have garages = 255,000. Of this only 25% would even get an automatic garage door = 65,000 eligible homes approximately

At a guess about 3% of existing homes probably upgrade to an automatic garage door each year. So 10 million eligible homes x 3% = 300,000 homes having the installations each year.

Installations in new Homes

Installations in existing Homes

New

California has a 36 million population

A wealthy western culture made up of families, couples, singles, elderly, second homes etc. means probably about 3 people per household

Therefore there would be approximately 12 million households.

Not all homes have garages (e.g. apartments do not) some have only car ports etc. Without knowing California this is guessed at about 15%.

Therefore only 85% of homes even have a garage = approximately 10 million homes.

Automatic Garage door motors sold in California each year

Motor had 10 year life span

Automated garage doors have been in existence for 15 years, however growth would have occurred. Maybe 10% growth each year

Replacements

Units

365,000

215,000

120,000

75,000

Time

Present

-5 years

-10 years

-15 years

These will all need replacing

With the rise in premixed alcoholic beverages beer companies are worried that the amount of beer consumed in the UK will steadily decline compared to the 70's, 80's and 90's. This question at first glance appears reasonably straight forward if you live in the UK and are a beer drinker because you could probably just think logically about how much you and your friends drink. If you do not fit this description then the question becomes a lot harder. In addition your analytical skill comes into play when thinking about the term 'per capita' and deducing facts about the UK population. The answer is to be expressed in terms of volume and specifically litres (L). You are given no more information other than the question statement above.

**Possible Solution:**

The current population of the UK is approximately 60 million people. If you don't know this figure then you may be able to ask the interviewer, otherwise they may instruct you to think about it based on the size and population of the US or even other European nations like France. Parts of the UK are quite multicultural and it has an ageing population.

The first thing to do is work out what percentage of the population drinks. Variables to consider here are religion, age and gender. The legal drinking age in the UK is 18 so anyone below this age should be eliminated. Many females do not drink beer at all preferring drinks such as wine and champagne. In addition those females that do drink beer consume less than males. Drinking beer is generally a very social activity and a younger person's leisure; as such people over the age of say 65 can probably be eliminated from consideration. Certain religions also disapprove of alcohol meaning more people can be eliminated.

Logically thinking about these variables and their associated percentages is what will impress your interviewer rather than pulling them out of thin air. Even if you are wrong at least you have thought about it logically. Below is a possible diagram of the UK population you may draw up in the interview.
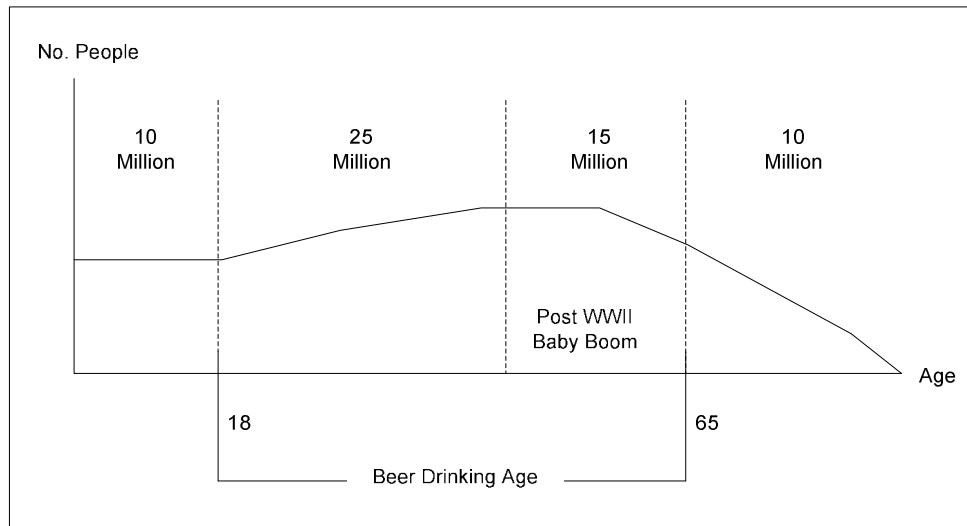
From this hypothetical population diagram we have approximately 40 million people within the beer drinking age. Now in most populations the male to female ratio is roughly 50/50. There is no reason why the UK would be any different so we shall use this. That makes 20 million males and 20 million females in the beer drinking age. It is fair to assume that more men drink that women however not all men drink beer. Personal lifestyle choice, substitute forms of alcohol, as well as religion being the largest probable factors. These males may account for as much as 15% of the 20 million. Likewise not all females drink, and as mentioned many of those who do drink substitute for wine, champagne and other mixed drinks such as vodka and orange. It is therefore fair to assume that only 20% of all females in the UK drink beer.

We then have 20 million x 85% = 20 Million x 20% = 21 million beer drinkers in the UK.

Now you must try to determine how much each drinks in a year. If you drink beer yourself or you know someone who does, it will become an easier estimate. What is suggested regardless is to create three categories of beer consumption: small, average and heavy beer drinker. Based on your knowledge of drinking you can assume that a small beer drinker would on average drink less than 5 beers per week an average beer drinker say between 5 and 15 a week and a heavy beer drinker 15 - 30 a week. Assuming the population of beer drinkers (21 million) is normally distributed (i.e. a bell shaped curve for consumption) between the two extremes, and then the average across males and females is probably about 10 beers per week.

Now the volume of a standard drink of beer in the UK is the Pint, which is roughly 0.5L or 16 US Fluid Ounces. Bottles and cans of beer are a little smaller however we shall stick with the 0.5L measurement for simplicity of calculation.

Here then are the final calculations:

0.5 X 10 x 52 weeks = approximately 250L of beer per year for an average beer drinking individual.

250 x 21 million = 5250 Million litres of beer consumed in the UK each year

5250 million / 60 Million population = approximately 90L of beer per capita.

Now depending on your personal consumption this may seem a little out, high or lower and will depend on your love of the drink but the actual figure is 97.1L for the UK believe it or not!

Now if you have time and want to further impress you interviewer you can attempt to 'reality check' this 90L answer or triangulate it by taking the 90L figure and working across to find how much beer is therefore produced per day by breweries. It comes out to approximately 15 Million litres a day – that's a lot of beer!

The 'Commonwealth Bank' is one of Australia's largest and most popular banks with branches all over the country. With the rise in internet banking, ATM's and cost cutting in the retail banking sector many banks have closed branches around the country. You will therefore need to think logically in estimating how many physical branches actually exist.

**Possible Solution:**

This looks like a difficult and complicated question. It can however be made simpler and easier to roughly estimate by using a concept known as 'critical mass' (traditionally a physics term for any scientists out there). Usually if you want to purchase and setup something like a gym franchise the company requires that the city, town or area where you want to put the complex has a certain population within a certain area. For example the United States Gold's Gym franchise requires a minimum of 50,000 people within something like a 25km radius. This general concept can loosely be applied to many businesses including bank branches. Of course you would expect a bank branch's critical mass to be a lot less than a gym since almost everyone needs to bank including businesses. To further prove this there are even statistical comparison reports of nations and how many bank branches they have per million citizens. Note: if you did not know the population of Australia it is about 20 million people.

If you look at a reasonably large yet familiar area such as your own city, town, municipality, shire, county, zipcode/postcode or district for which you have a good idea of the resident population and the number of a certain bank's branches. This can take 5-10 minutes alone as you try to work out the population, think carefully about where banks are located etc. If you have taken your time to be accurate you can then simply extrapolate this to the entire country's population. After doing this you then may want to tweak your answer based on where people work and do business as well as small remote townships. You can even triangulate or simply reality check the answer by back calculating and seeing how often and how many people go into a bank each day, and logically deducing if your estimate seems accurate. For example if it turns out that only 10 people are going to the

bank each day then you have probably over estimated. Conversely 10,000 people going into the bank each day would mean you under estimated.

Now the area in mind that will be used for this question is an actual shire with a population of approximately 215,000. There is about 30 suburbs, and after thinking about the bank branches of one particular bank there appears to be about 9 that I can think of and so we'll make it 10 for good measure. This means that each bank has a critical mass of on average 21,500 people. (Note this doesn't mean that this is how many people use the bank, simply that this is the population it can potentially draw customers from, its customers may only be 1/6 of that based on how many competitor banks there are in the area and age demographics).

Using this critical mass figure of 21,500 and extrapolating to the Australian population. You get a calculation of:

20,000,0000 / 21,500 = 930 commonwealth bank branches in Australia

This is a good method and final estimate, since the actual answer is approximately 1000. Remember though it's not how close you come to the answer but the reasoning, logic and method you use to get there.

## Question:
## How many bowling balls could you fit into a jumbo jet?



This is a classic management consulting interview question. It tests purely your logic, maths through trying to estimate something completely non realistic even absurd. The question requires you to think about the dimensions and available volume of a jumbo jet as well as the size of a bowling ball and how they might sit or stack with other bowling balls in a large space. For those not strong at maths and calculating volume, the use of π (pi) is needed and without a calculator calculations can become tricky if you don't be smart and round to more simple whole numbers. You are told that a jumbo jet is a Boeing 747 aeroplane, and that the bowling balls are to go only in the fuselage where passengers sit. (I.e. do not consider things like the fuel tank, wings and cargo hold)



## Possible Solution:

Aside from working out the size of a Boeing 747 and the volume of a bowling ball the key to impressing the interviewer is coming up with variables which take up volume within the fuselage of the aeroplane e.g. seats, the galley and overhead lockers. The other trick is working out how bowling balls stack together.

To start with let's think about a Boeing 747 or jumbo jet. It is longer than an Olympic swimming pool (50m or 163.5 ft) but less that a football field (usually around 100m or 100 yards). Let's say it is 70m, which seems about right. Inside the seating configuration is 3 - 4 - 3 with two aisles. Each seat is about 0.5m wide and the aisles about the same. This makes the aeroplane 12 x 0.5 = 6m wide. We'll make it 7m for good measure. Since the fuselage is basically a tube shape you get a cylinder as shown below.
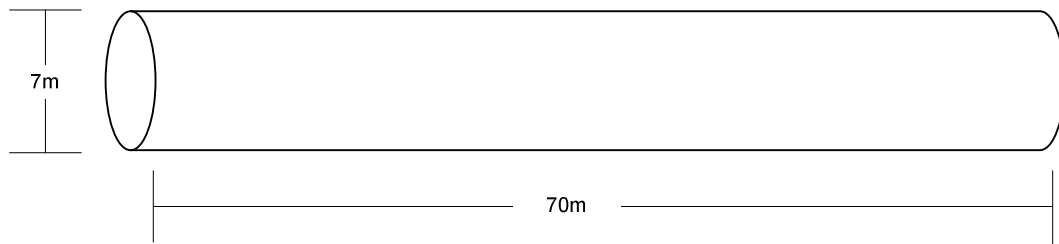
The volume of this cylinder in cubic metres is therefore:

$(7/2)^2$ x π x 70 = 12.25 x 3.14 x 70 = 2700m$^3$ approximately

The technical diagram below confirms these dimension assumptions. Note that the shape of a jumbo jet includes a second level for first class passengers at the nose and like most aeroplanes tapers at the tail. Looking at the aeroplane side on in the diagram below, the second level practically fills the tail taper and hence the basic cylinder volume above, can be assumed and used for this question.
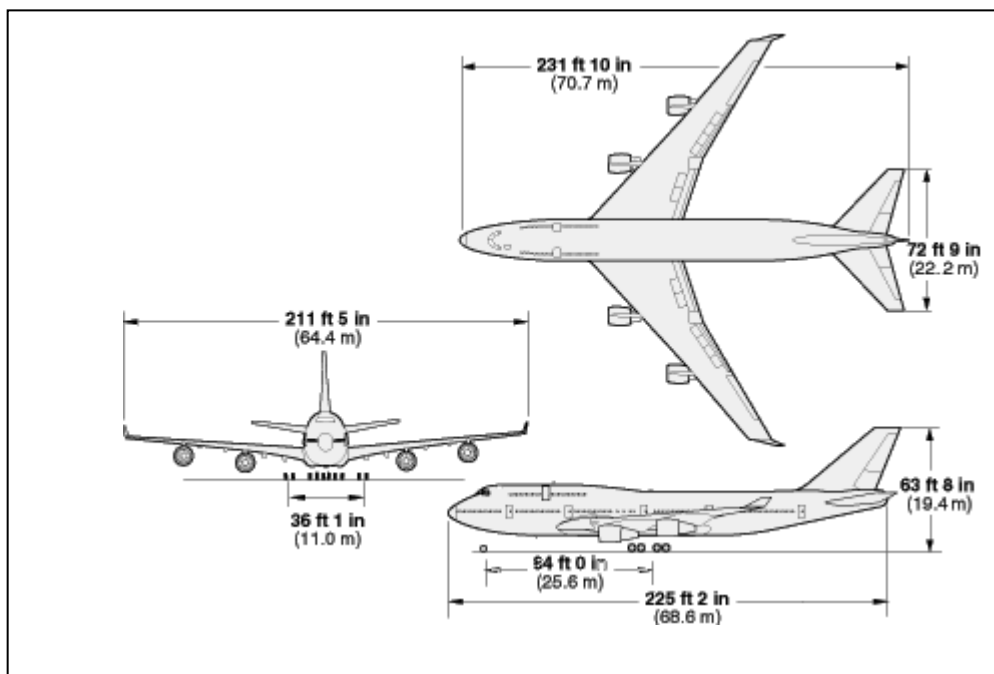
Now things like seating, galleys, toilets, structural components, flooring, roofing, the cargo hold cockpit etc. probably take up about 15-20% of the cylinder volume. Taking say 20% off this volume figure is therefore probably reasonable from an overall picture. So 80% of 2700m$^3$ is equal to 2160m$^3$ and this is the volume we will work with.

Now we must look at the bowling ball side of the question. A bowling ball is a sphere. If you picture one in your head or hold up your hands you should be able to estimate it's diameter to be roughly 20cm. In fact they are actually 22cm in diameter so 20cm was a good guess but we'll use the real measurement in the following calculations.

Before we calculate volume it is important to note something about spheres or balls and the way they sit on top of each other. You would know from experience that when balls are stacked together they take up less space that you would first assume. Look at the diagram below:
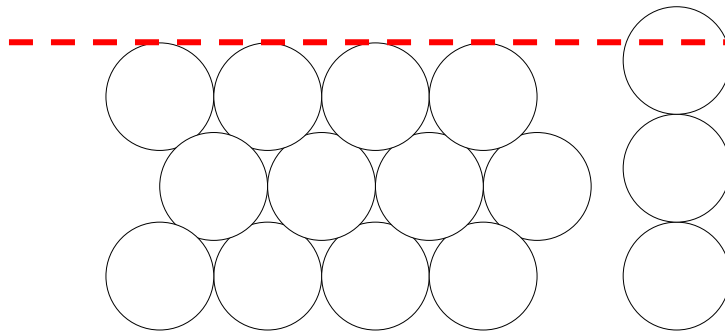
The height of the stacked balls on the left is about 85% of the height of the 3 balls on the right. It is not the same for the dimensions of length and depth however, as these remain unchanged. This height reduction factor therefore needs to be taken into consideration in this problem. It is probably easiest to now first work out how many bowling balls fit into 1 cubic metre.

5 x 22 = 1.1m

5 x 22 x 85% = 0.935m

5 x 22 = 1.1m
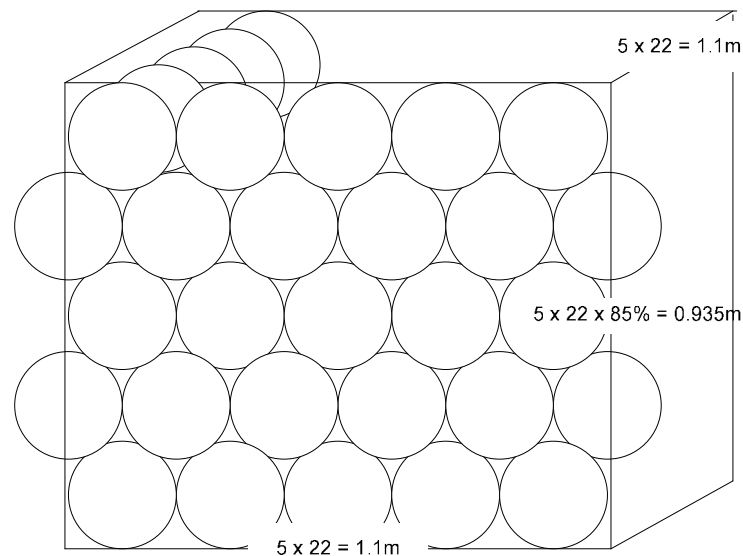
Drawing a simple diagram and doing a simple count reveals 125 bowling balls in the box which is 1.1 x 1.1 x 0.935 = 1.13 m$^3$

Working with simple ratios now, we can therefore say that in a 1m$^3$ volume you can fit (1/1.13) x 125 = 110 bowling balls

Taking this figure to the available volume in the fuselage of 2160m$^3$ means the aeroplane can hold approximately 2160 x 110 = 237600 bowling balls.

Now because the seats on the plane take up space awkwardly it means the balls would not stack as well.  Also staking balls in cramped overhead luggage compartments means the same thing.  The volume of seats was already taken off the total available volume however this point just made should mean we take at least another 5% off the estimated number of balls to account for this uneven stacking.  This gives 237600 x 95% = 225000 bowling balls fitting in the passenger area of a jumbo jet and this approximation would be your final answer.

Now to actually demonstrate the concept of triangulation we will try and estimate an answer to same question through another method:

A jumbo jet holds just over 400 passengers.  Ignoring the cargo hold each passenger has roughly one item of hand luggage on board and combined, that usually fills the overhead compartments completely.  Now when you sit on an aeroplane seat and look directly above and down your actual body probably takes up only about 10% of the available space taking into account the aisles.  That means you could probably cram and squash 10 people or bodies onto you seat to fill the vertical space, any space in front and some space in the aisle.  10 x 400 = 4000 people squashed into the passenger

hold of a jumbo jet. Now you have 4000 bodies and 400 items of hand luggage. Assuming that each item of hand luggage can hold about 5 bowling balls on average and the volume of your body about 15 – 20 bowling balls depending on your size, taking the high side, that makes 20 x 4000 + 5 x 400 = 82,000 bowling balls. You will see that this is far less than the earlier estimate.

Depending on your preference you may wish to use this figure instead, keep the previous estimate or average the two estimates to get a final answer of about 150,000 bowling balls.

Obviously a 747 jumbo jet has never been filled with bowling balls, so we have no way of ever verifying our estimates. But remember it's all about how you come up with an answer and not the value of the actual answer. As long as it is within reasonable limits (e.g. 500 would be far too small and 5 million far too large) then you can be happy you have done a good job.

As done in this possible solution demonstrating two or more ways to solve a problem is viewed very highly by management consulting firms because it shows your ability to think outside the square and approach a problem from multiple viewpoints.

**Question:**
**Estimate the number of vehicles that cross the Sydney Harbour Bridge (Australia) in one day**



This question is both challenging and interesting. It can be applied to other famous bridges around the world such as the Golden Gate in San Francisco, Brooklyn Bridge in New York or Tower Bridge in London depending on your location for the interview. Different possibilities present themselves in answering the question however the method of working out 'throughput' is used here in the possible solution.



**Possible Solution:**

If you don't know the Sydney Harbour Bridge (located in Sydney Australia) is probably the most famous bridge in the southern hemisphere spanning across one of the worlds most beautiful harbours. The first thing you need to do is clarify and further define the question. After some basic discussion with the interviewer you come to an understanding that in this question vehicles means anything travelling on the road such as, cars, buses, trucks, bikes, motorbikes, vans etc and that you are considering a standard week day.

In answering the problem the next thing we need to do is workout the length, width and usage patterns of the bridge.

Here you may try and interact with the interviewer to get some hints on how long it is. You would probably not be given a picture such as above however from it we can see that the bridge is somewhere between 300m and 500m. We'll therefore take the middle ground and take 400m. The length is not as important however as the width. Now if you lived in Sydney you should know that the bridge has 8 traffic lanes. It also has a pedestrian footpath and two train lines; however these can be ignored since the question only asks about road vehicles. In addition to this you may estimate

that the bridge has 4 distinct periods during the day which dictate traffic flow. You may draw a rough looking chart that looks something like this:
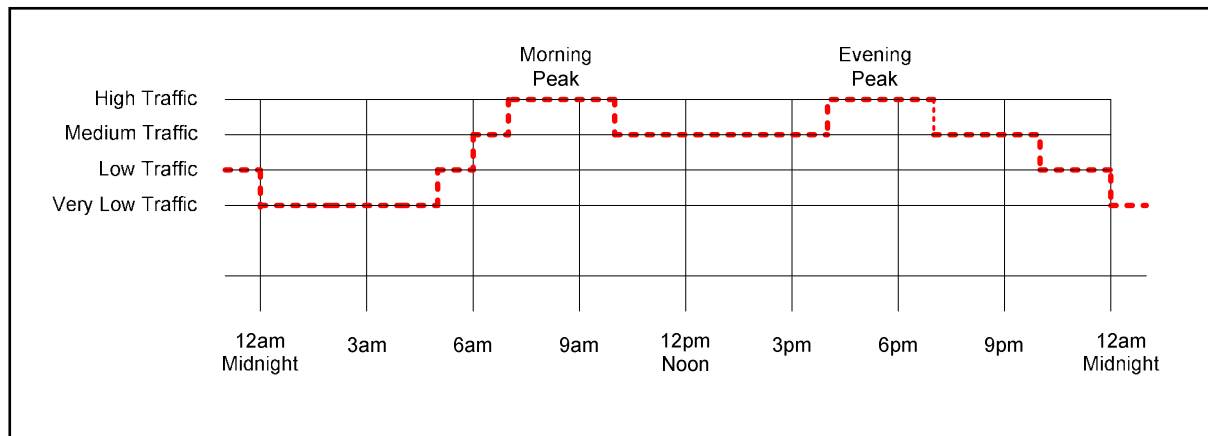


From this chart we can see the assumption that more traffic flows across the bridge during the peak periods (7-10am & 4-7pm), less flows in the middle of the day, even less in the early morning and evening and less still during the night hours 12-5am.  You would base such assumptions on personal experience and a general knowledge of how traffic works in cities.  Such a chart can be further modified based on any comments made by the interviewer.

Now you must attempt to quantify the 4 categories of traffic flow above (High, Medium, Low, and Very Low).  The city of Sydney is Australia's largest city with just over 4 million residents and the harbour bridge despite a toll and new harbour tunnel is still a primary route for motorists crossing and entering the CBD (Central Business District).  Therefore it is fair to assume that traffic is reasonably heavy.

From personal experience of driving a car in peak hour you may estimate that cars are spaced roughly 3 car lengths apart during such time and this is considered heavy traffic.  Heavy traffic on the Sydney harbour bridge may look something like in the diagram below:
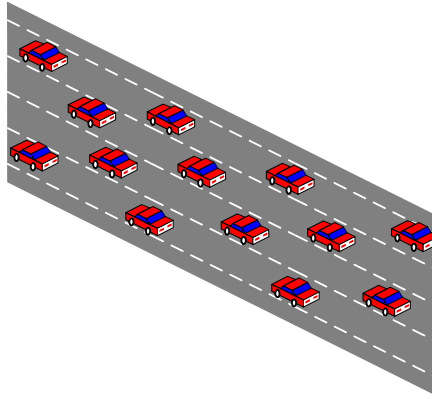
Taking into account all car shapes, trucks, busses, motor bikes etc. the average length of a vehicle is probably about 6m. This means in one lane of 400m has (400/ 6 x 4) = 400 / 24 = 17 vehicles at any one second during peak hours. The Sydney Harbour Bridge has a speed limit of 60km/h so this means that in one hour one lane of traffic during peak hour sees:

60km / 0.4km x 17 = 150 x 17 = 2550 vehicles pass through it.

And therefore 4 lanes roughly 10,000 vehicles in one hour during peak periods.

Since the bridge is used to access the CBD yet also cross the city flow in both directions can be considered even, although in reality there is probably some difference. Hence we now have 20,000 vehicles travelling across the bridge in one hour during peak periods.

If you are short on time you may want to estimate the other traffic categories e.g. medium traffic to be 25% of this, low traffic 10% and very low 5%. Now all you must do is calculate it all through for every hour of the day and add it all together. See the table below.

| Hour | Traffic Level and % of peak | Calculation |
|---|---|---|
| 12am | Very Low 5% | 5% x 20,000 = 1,000 |
| 1am | Very Low 5% | 5% x 20,000 = 1,000 |
| 2am | Very Low 5% | 5% x 20,000 = 1,000 |
| 3am | Very Low 5% | 5% x 20,000 = 1,000 |
| 4am | Very Low 5% | 5% x 20,000 = 1,000 |
| 5am | Low 10% | 10% x 20,000 = 2,000 |
| 6am | Medium 25% | 25% x 20,000 = 5,000 |
| 7am | High 100% | 100% x 20,000 = 20,000 |
| 8am | High 100% | 100% x 20,000 = 20,000 |
| 9am | High 100% | 100% x 20,000 = 20,000 |
| 10am | High 100% | 100% x 20,000 = 20,000 |
| 11am | Medium 25% | 25% x 20,000 = 5,000 |
| 12pm | Medium 25% | 25% x 20,000 = 5,000 |
| 1pm | Medium 25% | 25% x 20,000 = 5,000 |
| 2pm | Medium 25% | 25% x 20,000 = 5,000 |
| 3pm | Medium 25% | 25% x 20,000 = 5,000 |
| 4pm | Medium 25% | 25% x 20,000 = 5,000 |
| 5pm | High 100% | 100% x 20,000 = 20,000 |
| 6pm | High 100% | 100% x 20,000 = 20,000 |
| 7pm | High 100% | 100% x 20,000 = 20,000 |
| 8pm | Medium 25% | 25% x 20,000 = 5,000 |
| 9pm | Medium 25% | 25% x 20,000 = 5,000 |
| 10pm | Low 10% | 10% x 20,000 = 2,000 |
| 11pm | Low 10% | 10% x 20,000 = 2,000 |
| **Total:** | | **196,000** |

By using the method of calculating throughput per hour the final answer comes out at 196,000 vehicles crossing the Sydney harbour bridge each day. You'll be interested to know that after working this problem through, the actual answer was looked up on an Australian government website and was found to be just over 160,000 vehicles per day. Remember though, that the interviewers are looking at your method, skills, and calculations not the accuracy of your final answer.

## Question:
## Estimate the number of rubber tyres in the world

This question appears near impossible to get anywhere near an accurate answer as the world is so large and diverse. The key to impressing the interviewer is therefore thinking out loud about possible variables, usage patterns etc. You may not even come out with a final number. After some discussion you find out a bit more regarding the question in that you are to consider motorised vehicle tyres only (i.e. not bicycles or toys) and further only whole tyres, i.e. broken tyres are out of scope.

## Possible Solution:

The first step in such a question may be to brainstorm some variables or things that need to at least be considered. This may take about 5 or so minutes and might involve some interaction with the interviewer. Below is such a list.

- Motorised vehicles and rubber tyres have been around since at least the 1930's
- Many used tyres go into landfill, others are dumped, abandoned or burned whilst some are recycled
- The worlds population is over 6 billion people however only a fraction have the wealth to even own cars
- New tyres are being produced every year
- New tyres exist in organisations inventory
- Cars actually have 5 tyres because generally speaking they should all carry at least one spare tyre.
- Lifespan of a tyre ranges from 1 year to 3 years
- Motorised vehicles with tyres include private cars, motor bikes, trucks, buses, taxis, courier vans, race cars, aeroplanes, military vehicles, construction vehicles, trailers etc.

Now you could spend hours trying to accurately quantify everything above, however in limited time you are best off just creating percentages and whole numbers based on gut feel and intuition to at least finish the question. Below is a table assigning some values to the ideas and variables outlined above:

| Variable | Symbol | Estimate | Explanation |
|---|---|---|---|
| World Population | W | 6 Billion | |
| Percentage with wealth to afford vehicles | A | 20% | Poor regions in places such as Africa, India, Asia and south America have huge populations but little vehicle ownership by private individuals or organisations |
| Percentage of these individuals who own vehicles | O | 25% | Think of places like the US, Canada, UK, Europe where about 1 in 4 people own a vehicle. (this may be a little high) |
| Comparative Percentage of Business/Organisational/Government vehicles to private ownership | B | 50% | I.e. for every two private vehicles there is one vehicle owned by industry/government. This includes trucks, taxis, aeroplanes, buses etc.) |
| | | | |
| Average number of tyres per vehicle | T | 6 | this takes into account the diversity and range between motor bikes, cars, trucks etc. |
| Average life of a tyre | L | 3 years | Based on personal experience of car ownership. Larger vehicles such as trucks may be different. |
| | | | |
| Tyre Production each Year | TP | | Will be 1/3 of what is currently in use |
| Percentage kept in inventories | I | 5% | |
| | | | |
| Tyre Disposal each year | TD | | Will be almost identical to production minus growth factor |
| Percentage of tyres into landfill | LF | 50% | |
| Percentage of tyres recycled | R | 25% | Realistically these percentages would have changed over time since the early days of tyres. |
| Percentage of tyres abandoned | TA | 10% | |
| Percentage of tyres destroyed | D | 15% | |
| | | | |
| World straight-line growth in vehicles since 1930's | G | 2.5% pa. | realistically probably an exponential growth with peaks and troughs along the way |

From this data we can formulate an equation; however it will be impossible to calculate without the use of a calculator.  A rough set of preliminary calculations will therefore look something like below:

<u>Tyres currently in use</u>
= [(W x A x O) + (W x A x O) x B] x 6
= [(6 billion x 20% x 25%) + (6 billion x 20% x 25%) x 50%] x 6
= [300 million + 150 million] x 6
= 450 million x 6 = 2.7 billion tyres

<u>Tyres produced this year</u>
= Tyres in use x 1/ lifespan
= 2.7 billion x 1/3
= 900 million

<u>Tyres currently kept in inventories</u>
= Tyres produced each year x 5%
= 900 million x 5%
= 45 Million

<u>Tyres disposed this year</u>
= tyres produced – growth factor
= 900 million – 2.5%
= 877.5 million

<u>Tyres in landfill and abandoned this year</u>
= tyres disposed x (landfill % + abandon %)
= 877.5 million x (50% + 10%)
= 877.5 million x 60%
= 530 million (rounded up)

Using some of these figures and the 2.5% growth rate we can estimate how many tyres exist out there in the world considering they have existed since the 1930's.  The interviewer may tell you not to bother since by now you have already performed enough calculations and made many assumptions. However if asked, it would look something like this:

2.7 billion + 45 Million + $\sum 530 + 530 * 0.975 + 516 * 0.975.........$

= 21 billion tyres

The popularity of tobacco in westernized nations has marginally declined in recent years due to research results and extensive health warnings. With population growth however, the sale of cigarettes still slightly increases each year in many of these countries. Canada however has seen a downward trend in cigarette consumption. This question therefore simply asks for a single estimate of unit consumption of cigarettes in one day for the entire nation of Canada.

**Possible Solution:**

For those who don't know, the population of Canada is just over 30 million. Now cigarettes are classified as a fast moving consumer good and therefore huge numbers of them are consumed each day. Regular smokers may go through a pack per day, however not everyone who smokes goes through this many cigarettes. This question is therefore all about estimating reasonable percentages.

See the diagram on the next page for the possible solution:

Population of Canada = 30 Million

80% of the population are over 15, which is generally the age people start smoking →

Potential Smoking Population i.e. over 15 = 24 million

20%

Think logically about a representative sample of your friends, relatives, workmates, room mates, educational peers etc. to derive such a percentage split

Smokers = 4.8 Million

80%

Non Smokers

75%

Daily smokers = 3.6 Million

Again think about people you know and how often they smoke

25%

Non-daily/ Recreational smokers = 1.2 Million

Cigarettes per day = 12.5

Normal pack has 20 cigarettes. Some people smoke more than a pack a day whilst others less. The average is probably therefore between 10-15 per day. Say 12.5

= 12.5 x 3.6 million
= 45 million

Cigarettes per day = 0.3

This is harder to estimate since occasional smokers consume anywhere from 1 per month to 1 per week to 5 per week. Generally these type of smokers only smoke when socializing i.e. at a bar or something. So lets make this average 2 per week = 0.3 per day

= 0.3 x 1.2 million
= 3.6 million

48.6 Million cigarettes smoked in Canada per day

**Question:**
**Estimate How many taxis there are in New York City**



This is a classic management consulting interview question used the world over. The site of yellow taxi cabs in New York City and particularly Manhattan is a famous image world wide. Estimating just how many there actually are in the city is of course a challenge, especially if you don't live there or have never been there. This question will therefore test your logic and reasoning. It asks for a single unit estimate.



**Possible Solution:**

After some initial discussion and questioning you find out that you are to only consider the area of Manhattan. Now to impress the interviewer it is best to really break this question down and consider a range of variables. Two methods present themselves as possible ways of answering the problem:

1. Capacity - Think about the physical layout of the city streets and surrounding areas. Work out how many taxis fit onto the streets, then considering that roughly every second vehicle in NYC is a yellow taxi, make a judgement based on capacity.

2. Demand - Start with the population of Manhattan, categorise and divide the population and then determine how often citizens get a taxi and how many trips a taxi would do in a standard shift.

We will perform an analysis using both methods so that we can the compare the two answers in order to 'triangulate' a more accurate final answer. See the diagrams on the next two pages for both possible solutions:

## Method 1:  Capacity

By making some assumptions we can determine a maximum capacity figure through understanding how many taxis can actually fit onto the streets.

Now A single taxi takes up an area of about 15 ft by 25 ft to be conservative = 375 square feet.

There are 27,878,400 square feet in a square mile

$= (0.15 \times 27\ 878\ 400) / 375$
$=$ approximately 11,000 taxis

To consider taxis being repaired, garaged, out of town etc. add 10%

$= 11,000 + 10\%$
$= 12,000$ approximatley

| | |
|---|---|
| Taxis = 0.15 square miles | |
| Non taxis | |

50%

50%

Vehicles = 0.312 square miles

Empty Space

10%

80%

Traveled Streets = 3.12 square miles

Intersections, street parking, small streets and alleys

60%

40%

Streets = 5.2 square miles

Blocks, Buildings, Parks, Sidewalks etc.

20%

80%

Manhattan is roughly rectangular in shape. 13 miles long and 2 miles wide.

Area of Manhattan = 26 square miles

## Method 2: Demand

By working top-down, starting from the population of Manhattan, we can estimate the demand for taxis if we make enough assumptions.

= 7 x 250,000 + 3 x 250,000 + 1 x 500,000 + ¼ x 500,00
= 3,125,000 taxi rides per week

Now an average taxi ride = say 20 mins

And over two shifts a single Taxi can take maybe 40 rides per day = 280 rides per week

= 3,125,000 taxi rides per week / 280
= approximately 11,000

7 times per week

3 times per week

Once per week

Once every 4 weeks

Daily get taxis
250,000

Always get taxis
250,000

Often get taxis
500,000

Sometimes get Taxis
500,000

Never Get Taxis
500,000

Add 500,000 people. Because of those who commute into Manhattan to work, plus business travelers, tourists etc.

2 million people

Population of Manhattan = 1.5 Million

Triangulating an answer:
As discussed earlier in this guide, approaching an ambiguous problem from multiple directions allows you to sensibly check two or more answers against each other to hopefully find a more accurate middle ground. The concept of triangulation helps to achieve this and can assist in verifying one or more answers to the problem by having an additional basis for comparison.

The concept of triangulation comes from the world of geometry, in particular trigonometry, in which the distance to an object can be determined by knowing distances and angles of two other reference points, thus forming a triangle.  The term is often borrowed by the business world and management consultants when solving ambiguous business problems which often require a degree of estimation. If more than one technique is used and the estimates align then a greater level of confidence in methodology can be assumed.  This also works in reverse however.

For example this is often done by investment banks and consulting firms during financial valuations, whereby a time consuming and detailed discounted cash flow (DCF) valuation model is constructed and compared against a more simplified calculation of the value using a price to earnings multiple approach or some other valuation methodology for the purpose of sense checking

In this problem, looking at both methods used above, the answers are very close to one another.  You can therefore have a greater degree of confidence that you are on the right track in estimating a final answer. You can be confident in presenting a final answer to the interviewer knowing that the two calculation methodologies resulted in similar answers. Taking a simple average of the two answers results in a final estimate of 11,500 yellow taxis in Manhattan, this seems reasonable and agrees with the two values calculated above.  You should now explain to the interviewer in relative confidence your final estimate to the problem – "I estimate there to be approximately 11,500 yellow taxi cabs in Manhattan on any one day".

**Question:**
**Estimate the number of pizzas consumed in the USA in one year.**

With so many 'fast food' and 'take-out' options available in the United States it is no wonder that the humble pizza is consumed on such a large scale. The USA is arguably the world's largest consumer of pizza and it is your job to estimate just how much pizza's the nation consumes in one year.

**Possible Solution:**

This question can be answered much like the earlier question on cigarettes. Again it is probably easiest to work down from the population and make some assumptions. The diagram on the next page therefore proposes a possible solution using this method.

Population of the USA = 300 Million

95% → Those who eat pizza = 285 Million

5% → Those who never eat pizza because they are either extremely health conscious, elderly, Infant, or for dieting or religious reasons.

Those who eat pizza = 285 Million:
- 20% → Heavy Eaters = 57 Million → Eat pizza every week
- 60% → Regular eaters = 171 Million → Eat pizza every Month
- 20% → Occasional eaters = 57 Million → Eat pizza every 3 months

I.e. rarely eat pizza, maybe on special occasions, such as when they go out to dinner, birthday's parties etc. etc.

Since pizza comes in different sizes you can assume that on average the act of eating a pizza involves eating 4 slices, or roughly half a pizza

= 57 million x ½ x 52 = 600 million

= 171 million x ½ x 12 = 1020 Million

= 57 million x ½ x 4 = 114 Million

1.7 Billion pizza's consumed in the USA each year
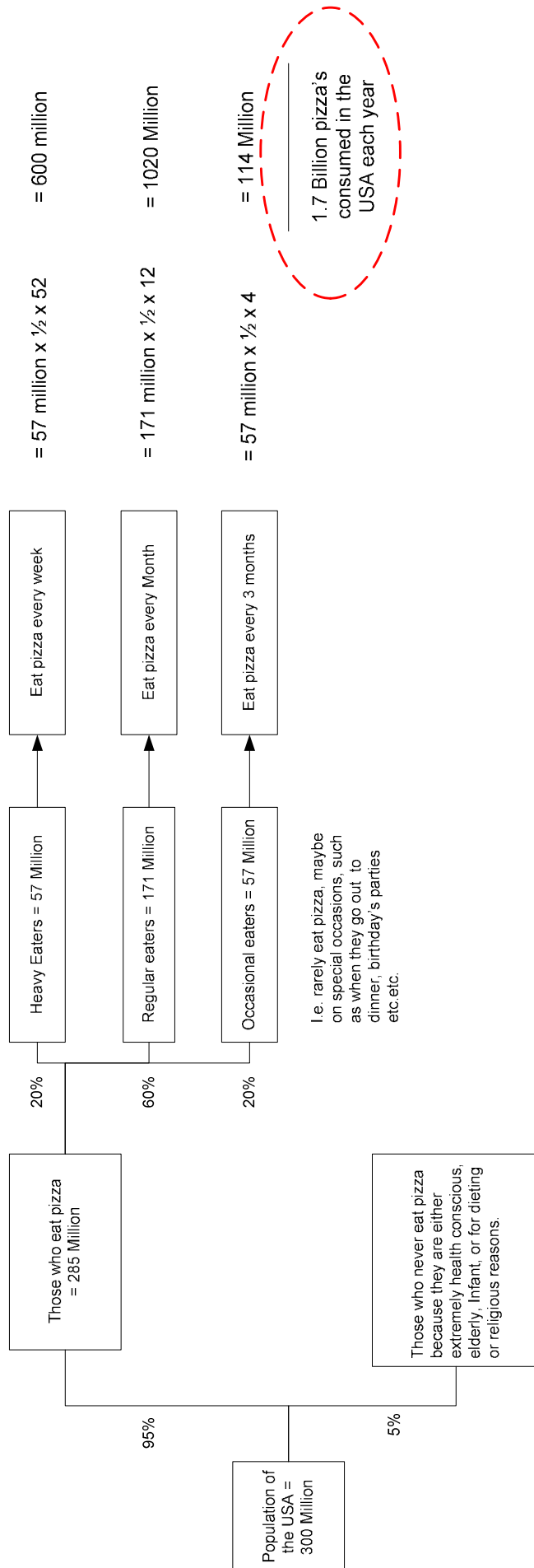
That concludes the worked solutions for estimation and market sizing case questions.  Here are more examples of this style of interview case question for you to try yourself.  Good luck!

# ■ Other market sizing and estimation questions

- Estimate how many fridges are made in the USA each year

- Estimate the total number of ears pierced in the UK

- Estimate the number of beverage cans produced in the USA in one year

- Estimate the market for 'high end' handbags in Japan

- Estimate the number of cows used in McDonald's burgers in one year in the USA?

- Estimate the market for used cars in Germany

- Estimate the market for boats in Australia

- Estimate the market for helicopters in New Zealand

- Estimate the number of shoes in the world

- Estimate how many products are sold on ebay.com every day

- Estimate how many people world wide will watch the 2008 Beijing Olympics Opening Ceremony live on television.

- Estimate how many business cards exist in London

- How many gas stations are there in Chicago?

- How many cigarettes are smoked per day in Australia?

- How many high rise buildings are there in the Northern Hemisphere?

- Estimate how many people live exactly on the equator

- Estimate how many people have a tooth removed each day worldwide

# ■ Section 3: Example Business Problem & Strategy Cases

Case questions based on business problems and strategy decisions are designed to assess your ability to truly act like a management consultant thinking logically and creatively at the same time to develop a business solution.  In doing this you can also demonstrate your strong business acumen.  Unlike the previous style of estimation questions which are often largely hypothetical in nature this style of case question is often firmly based on real life problems the consulting organisation has faced with clients or that your interviewer has personally encountered whilst working as a management consultant.

Again there is no one right answer to these interview questions however your ability to propose realistic, useable and often inventive solutions will get you across the line with the interviewer.  Often one final solution will not even result, rather an in depth discussion of the issues being all that is expected of you as your final answer to the case question.

What the interviewer ultimately wants from you here is to be able to view you as a peer, either a consultant or analyst as part of their team solving real life business problems doing real management consulting work for clients.  Gauging personal and organisational fit is therefore of key concern to them.

Because this style of case question often comes in 2$^{nd}$ round interviews or after estimation based case, the focus on numbers and calculations is often not as intense.  Occasionally however, calculations will be required and generally the numbers or percentages are given and you are to calculate things like marginal costs, profitability, and required revenue per unit to break even.

It is obvious that knowledge from courses such as management accounting, managerial economics, engineering and project economics or any business and strategy courses for that matter will be of some advantage; however like all consulting interviews they are looking for anyone with an outstanding mind, a strong intellect, great attitude and a healthy, balanced personality.

Certain models and frameworks mentioned in the introduction to this guide can be applied to this style of case question.  Porters 5 forces, the BCG Matrix, SWOT Analysis, Revenue and Cost modelling, business life cycle analysis, Mind Mapping and key issues grouping are just some that are used and explained throughout the worked solutions that follow.

Again the same recommendations regarding the need to structure your solution/discussion and demonstrate good time management should be taken on board.

Before getting into the actual real life case question examples for this section, we should look at the several different types of business problems and strategy cases you may encounter, and the possible steps you could take to try and answer such problems as well as the areas you should think about and focus on.  From our combined experiences and discussions with consultants, we believe there are around 10 of these generic types of business problem and strategy case questions.  You can find more information on such business problems in any organisational strategy textbook.  It should be noted, that this guide does not have specific examples for each and every one of the types of questions below.  We simply include this summary information here to help you be even more prepared for anything that comes your way in your rounds of case interviews ahead.


## Type 1: Entering a new market

Step 1: Investigate the new market to decide whether entering the market would represent a good business decision.
- Essentially assess the markets attractiveness

Step 2: If you are going to enter the market, you need to determine the best way to become a player in the market.
The options are:
- Start operations in the new market from scratch
- Acquire an existing player in the market
- Form a joint venture or strategic alliance with another player


## Type 2: Developing a new product

Step 1: Think about the actual product and if there is a need for it
Step 2: Think about your potential marketing strategy
Step 3: Think about who your customers will be
Step 4: Think about the market position of the product.  Will it be at the low end of the market and be low cost or will it focus on quality and be priced high at the luxury end.
Step 5: Think about how to distribute the product
Step 6: Think about how to finance the project

## Type 3: Pricing strategies

Step 1: Investigate the product and its components in detail
Step 2: Choose a pricing strategy
- Consider Cost-based pricing or Price-based costing
  - Cost-based pricing means determining the cost of a product, choosing a desired profit margin, and calculating a sales price.
  - Price-based costing means choosing a desired sales price and costing out production to meet that sales price with a desired profit margin
- Consider any supply and demand forces as this will impact on price.


## Type 4: Growth strategies

Step 1: Ask probing questions
- Determine the nature of growth that your interviewer is looking for. Is it a focus on product, division, or the entire company?
Step 2: Choose the growth strategy
- Some options are: increasing sales, increasing distribution channels, increasing product line, investing in a major marketing campaign, diversification of products/services, or acquisition of another organisation.


## Type 5: Starting a new business

Step 1: Investigate the market to make sure that entering the market is a good business decision.
Step 2: Look at the project from a Venture Capitalist's view point
- The management team
- Business Plan (including market and strategic plans)
- Distribution channels
- Product/s and or Services
- Customer base
- Financing
- Financial analysis of the proposition such as, Return on Investment, Break Even Point and Net Present Value.

## Type 6: Responding to a competitors actions

Step 1: Ask probing questions
- What is the competitor's new product or service offering and how does it differ from this organisation?
- What has this competitor done differently?
- Has this or any other competitor increased their market share?

Step 2: Create a re-response plan
- Examples include: Acquiring the competitor or another player in the market, merging with another competitor, copying the competitor, hiring the competitor's top level management away, and utilising marketing to increase your profile.

## Type 7: Increasing sales

Step 1: Ask probing questions to gather information about the market and the product line

Step 2: Determine a strategy to increase sales
- Increase volume or increase prices
- Increase revenue from each sale (make buyers buy more)
- Create seasonal balance
- Increase demand for the product through marketing

## Type 8: Reducing costs

Step 1: Ask for or create a breakdown of the organizations costs.

Step 2: If any costs seem too high, determine why

Step 3: Benchmark costs to industries or competitors

Step 4: Look at areas where quality can be improved or to initiate process improvement which may reduce idle time, waste, errors and re-work.

## Type 9: Increasing profits

Step 1: Look at sales volume, price and revenues

Step 2: Look at costs – fixed and variable

Step 3: Determine whether you want to increase volume and how to do so
- Example actions include expanding into new areas, increasing the sales force, increasing marketing, reducing prices, and improving customer service

**Type 10: Organisational Turnarounds**

Step 1: Gather important information about the company and its situation
Step 2: Choose an appropriate action
- Be creative, but base your action upon a structured and well thought-out plan

So now you have seen 10 different types of generic business problem and strategy based cases including some simple steps to structuring a solution. We now present several real life examples of business problem and strategy based case interview questions which have been asked to actual candidates in management consulting case interviews. See if you can recognise any of the types of cases from above.

**Business Problem:**
**An IT consulting company operating in London is your client. It is experiencing some strong growth. In the coming months it is therefore planning to expand the size of its workforce to meet this increased demand in business. How would you go about formulating a recruitment strategy for this company? What else would you need to consider?**

This is a relatively short case question involving business strategy. The problem attempts to put you in the shoes of a consultant working with a client on a business problem. Being strategy related it is useful to first brainstorm and discuss the issues around employee recruitment. Thinking out loud about where to source skilled IT labour, how much it will cost to attract the required talent, training costs and time frames is what's needed in this case question. During this initial thinking and discussion stage the interviewer stops you and gives you some more information; explaining that the client has come back to you and said that they are willing to assign a $50,000 (US) budget to the recruitment campaign and that they are looking for roughly 20 new employees of varying skill level and experience.

As mentioned this question is all about discussing issues before proposing any strategy. Grouping issues into what McKinsey call 'Buckets' is the easiest way to start off. In formulating an overall recruitment strategy you may therefore start to brainstorm and think about dimensions such as:

- Location – Where will you get people from? International, domestic, local or interstate?

- Skill and Experience – Can they get new graduates and train them up or do they need experienced hires. Maybe a mix of these would be best?

- Cost – The budget is currently at $50,000. Recruitment agencies, contractor fees, head hunter fees, training, finders fees, incentive payouts to switch to the client organisation, travel and advertising are costs that will be incurred.

- Time – When are employees needed by, how long will they need training, what about long term needs eg. further growth

- Sources - Recruitment Agencies, Graduate Programs at universities, specialist executive head hunters and online advertising though employment websites are all options

- Specific skills – What kinds of skills are actually needed for business growth? Sales, Consulting, Customer Relations, Administration or Technical e.g. Business Analysts, Programmers, Systems Analysts, Database Developers etc.

- Numbers – how many new employees do they actually need?

You may even draw these issues up into some form of diagram such as a mind-map on the next page:
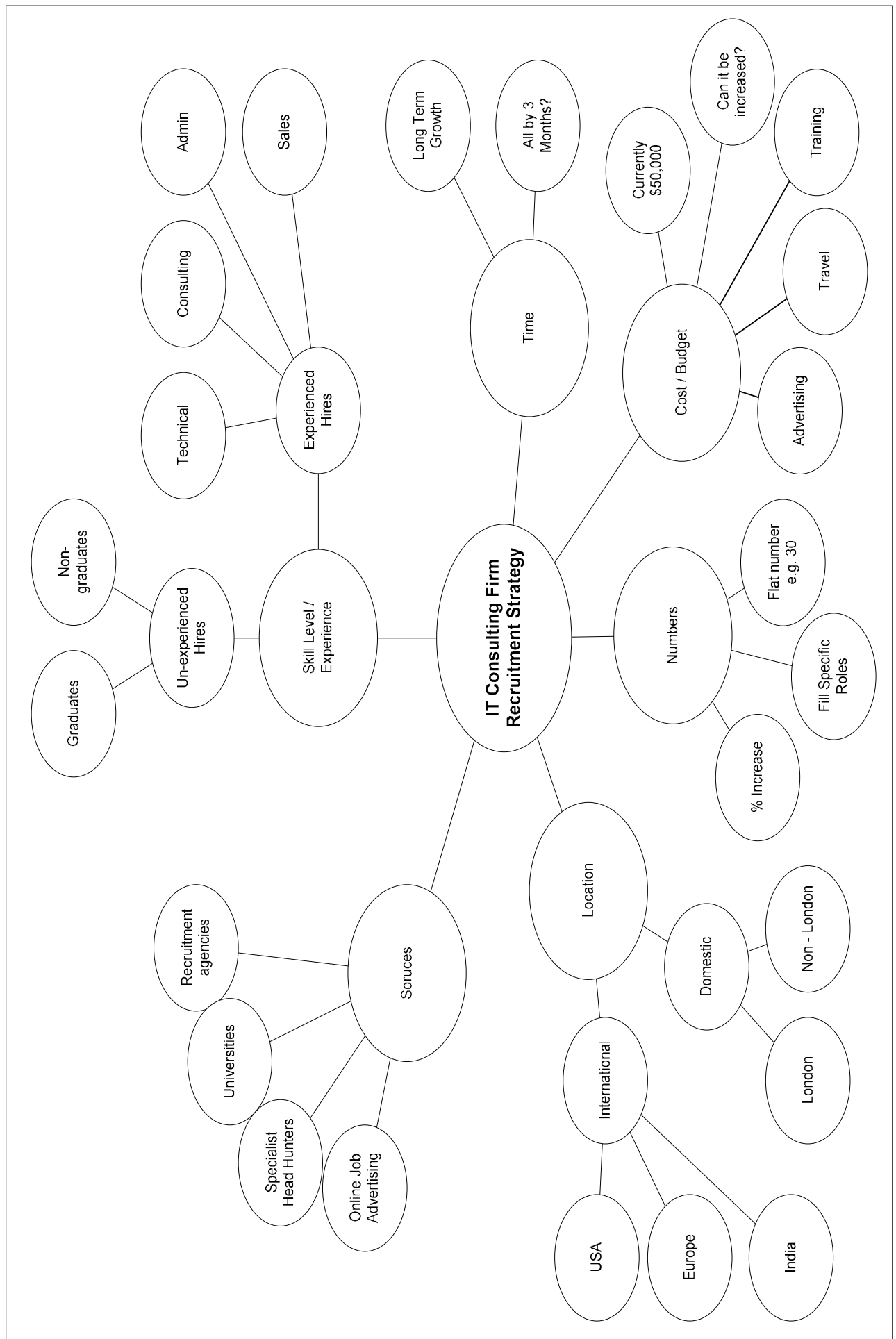
From this initial identification of issues the interviewer tells you that the client has responded specifying the following criteria.

- 20 new staff are needed
- Only half of these need have strong technical skills
- A quarter need sales and or consulting experience
- A quarter are simply needed for administration.
- The budget has now increased to $60,000 for the recruitment effort with $10,000 assigned specifically to training.
- There is to be a mix of experience and skill
- All possible sources and locations are to be exploited. They want the best they can get for their money.
- All hires need to be made within the next 3 months, and all new hires to start work within 6 months

The task now is to break up the budget as accurately and logically as possible therefore partially formulating the strategy to meet the client's criteria. See the diagram on the next page for a possible budget solution:
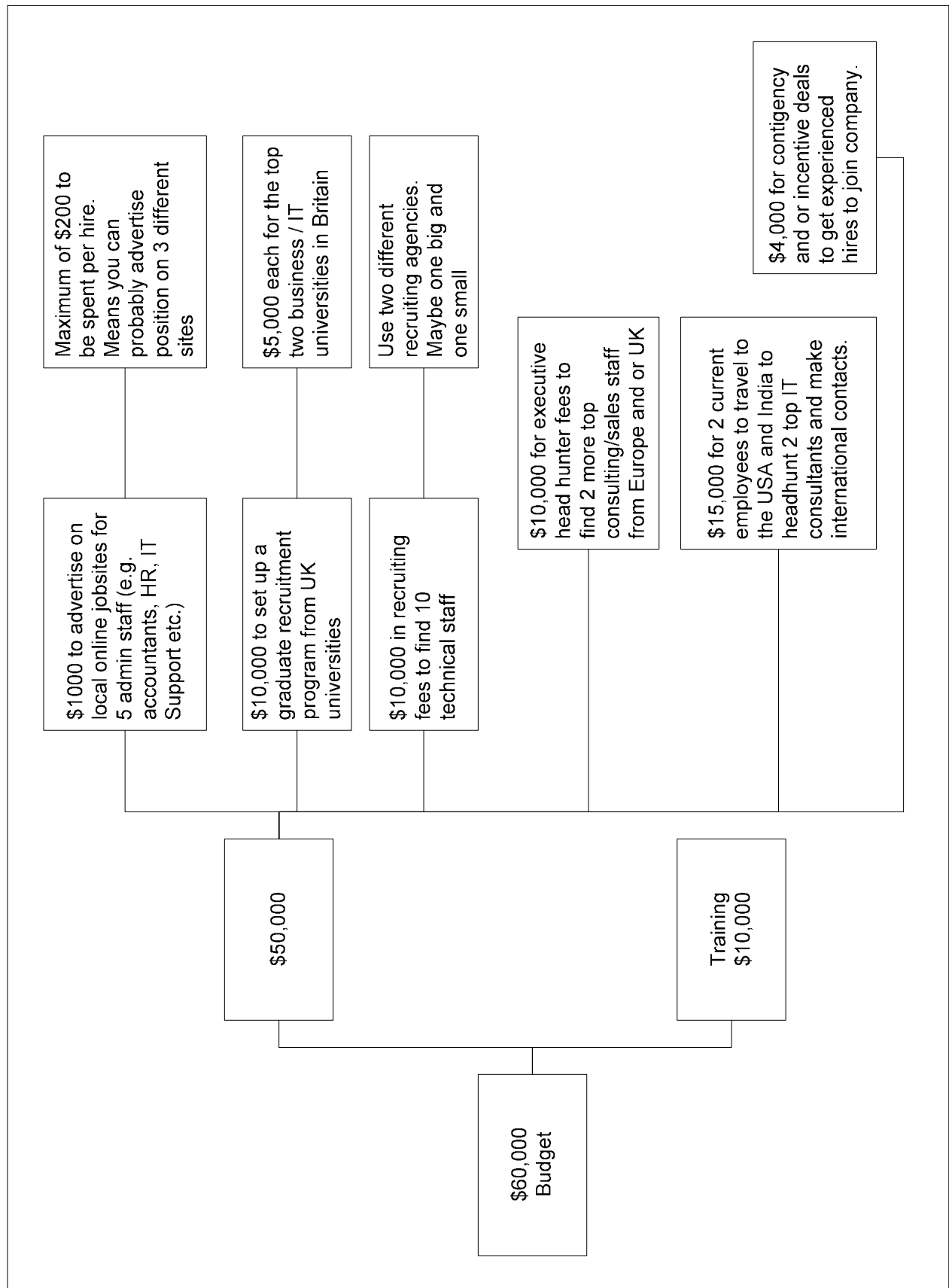
A budget breakdown diagram (issue/logic tree):

**$60,000 Budget**

Branches into:

**$50,000**

- **$1000 to advertise on local online jobsites for 5 admin staff (e.g. accountants, HR, IT Support etc.)**
  - Maximum of $200 to be spent per hire. Means you can probably advertise position on 3 different sites

- **$10,000 to set up a graduate recruitment program from UK universities**
  - $5,000 each for the top two business / IT universities in Britain

- **$10,000 in recruiting fees to find 10 technical staff**
  - Use two different recruiting agencies. Maybe one big and one small

- **$10,000 for executive head hunter fees to find 2 more top consulting/sales staff from Europe and or UK**

- **$15,000 for 2 current employees to travel to the USA and India to headhunt 2 top IT consultants and make international contacts.**
  - $4,000 for contigency and or incentive deals to get experienced hires to join company.

**Training $10,000**

This problem is more challenging and will require an extensive exploration of the reasons why an airline may experience falling profits. One useful method for analysing this problem could be to use 'Porter's 5 forces' model to analyse the forces at play on and industry and a company. With profit equal to revenue minus costs another suitable method would be to break down and model the revenues and costs of the airline to see where revenues are falling or where costs are rising.

## Discussion and Possible Solution:

Initial thoughts on why an airline may be experiencing falling profits may centre on such things as price, demand, and costs. Using concepts from the famous 'Porter's 5 forces' industry analysis however, may expand the picture and enlighten the problem at hand, helping us to find the real root cause. On the next page is a brief summary of 'Porter's 5 forces' industry analysis model.

## POWER OF BUYERS

Bargaining leverage
Buyer volume
Buyer information
Brand Identity
Price sensitivity
Threat of backward integration
Product differentiation
Buyer concentration vs. industry
Substitutes available
Buyers' incentives

## BARRIERS TO ENTRY

Absolute cost advantages
Proprietary learning curve
Access to inputs
Government Policy
Economies of scale
Capital requirements
Brand Identity
Switching costs
Access to distribution
Expected retaliation
Proprietary products

## DEGREE OF RIVALRY

Exit barriers
Industry concentration
Fixed costs/Value added
Industry Growth
Intermittent overcapacity
Product differences
Switching costs
Brand Identity
Diversity of rivals
Corporate stakes

## THREAT OF SUBSTITUTES

Switching costs
Buyer inclination to substitute
Price-performance trade-off of substitutes

## POWER OF SUPPLIERS

Supplier concentration
Importance of volume to supplier
Differentiation of inputs
Impact of inputs on cost or differentiation
Switching costs of firms in the industry
Presence of substitute inputs
Threat of forward integration
Cost relative to total purchases in industry

Starting from the top you may think out aloud or discuss with the interviewer each of 'Porters 5 forces' in an attempt to uncover part of the problem or at least narrow it's scope.

1. <u>Power of Suppliers</u>
   The predominant suppliers in the airline industry are those that provide the aircraft e.g. Boeing, Airbus, fuel suppliers, food and beverage suppliers and other services. Questions to be asked here should centre on 'are the costs of inputs increasing?', 'are suppliers driving up costs?' You are told this is not the issue.

2. <u>Barriers to Entry</u>
   There are naturally huge barriers to entry for start-up airline companies due to initial capital costs, however the client in this case question is already established. One point to note is that fixed costs are huge for airlines with variable costs relatively low and this may be an issue worth exploring later. Other than that you are told that entry barriers are not really the problem.

3. <u>Power of Buyers</u>
   People fly more and more these days, however in the last 5 years the airline industry world wide has seen a range of new low price competitors especially in Europe. Companies like EasyJet stand out as an example. Combined with the internet and therefore availability of information this gives a lot of power to buyers as they can pick and choose airlines based on the lowest price. Frequent flyer schemes also play a part working as incentives. Buyers, i.e. passengers therefore have a lot of choice when it comes to airlines. Questions that should be asked here may centre on demand levels and how full is each flight (a term called loading). You are told that loading levels have been lower that normal.

4. <u>Threat of Substitutes</u>
   Substitutes to air travel are things like bus travel, cruise boat travel and car travel. Each of these has never really been able to compete with air travel however you state that 9/11 and terrorism threats may have played a part in a reduction in demand for air travel. You are told this is not really an issue and figures show that demand for air travel is actually on a steady increase.

5. <u>Competitive Rivalries</u>
   This industry force ties into the points made above with competitor airlines now in the market. With low switching costs to fly other airlines passengers are doing this in droves changing from one airline to another based on the cheapest price. Customer loyalty and the airlines is almost a thing of the past. You are told that competitor rivalry in Eastern Europe has increased in the last 3 years.

You have therefore narrowed the problem down to issues with demand and seat loading as a result of increased competition.  The point made regarding high fixed costs and low variable costs is an important one.  You are told that the airline requires each flight to run at 75% capacity to break even (i.e. revenues  = costs) and that on average each flight over that last 12 months has only been at 76.5% capacity leaving them well short of their profit goal which requires a minimum capacity of 82% on each flight.

The simple fix is to somehow increase revenues and decrease costs.

With fixed costs by nature unchangeable (e.g. aircraft purchase/lease, fuel, some aircraft staff and maintenance) and variable costs based heavily on the number of passengers.  The options to return profitability to its previous levels therefore are:

- somehow increase demand/passenger numbers
- reduce the number of flights to consolidate costs
- reduce the number of managerial and administrative staff to reduce costs
- increase the price of a ticket, however risk further lowering demand
- reduce the price of a ticket to increase demand and cut costs elsewhere

The only real solution from the above list is the first one.  To increase demand to fly on the airline.  This is generally done through marketing and promotion which again costs money.  As you begin to see it is a difficult problem

At this point of the case question the interviewer is happy with your discussion and the way you've narrowed the problem.  They may then get you to perform some simple calculations based on revenues, fixed and variable costs in relation to seat loading to demonstrate your mathematical ability

After all this you are told that the CEO has been approached to enter into a new airline alliance with other carriers in Europe.  This could be a perfect vehicle and opportunity to boost sales/demand in the long term through established partnerships and shared deals.  You are asked by the interviewer what the CEO should want to know about the alliance?

After some thought you may provide questions such as:

- Number of airlines in the alliance?
- Which specific airlines are in the alliance?  You would not want any direct competitors who fly the same routes as you.
- Any costs to join the alliance.  Initial and ongoing
- Expected benefits of the alliance.  Tangible and Intangible
- Detailed rules and policies for member airlines
- Are new entrants allowed into the alliance?
- Can you exit the alliance at any time?
- Are competitors blocked from entering the alliance after establishment?
- Who manages/controls the alliance?

And with that as the final discussion, the case question is over.

**Business Problem:**
**Your client is a company who makes expensive specialist batteries for mobile homes (motor homes) in the USA. The battery is very powerful, long lasting and of high quality. New industry conditions are occurring and motor home dealers are starting to use a cheaper battery as the 'factory standard' in an attempt to lower the overall price of motor homes. Your client's product is now only offered as an added feature for which the customer must pay an extra $500 for. In this case question you are to discuss how your client should go about maintaining profits given these new market conditions?**



This question is again somewhat strategy related and will involve a brainstorming session and or discussion with the interviewer to work out possible avenues for the client to explore in an attempt to maintain profits given the changing market conditions.



**Discussion and Possible Solution:**

First you would want to write down some ideas and then discuss them with the interviewer. More may develop in this process and you may want to create a diagram such as a mind map or simple table to ensure you have covered all the issues. Some of the ideas which may be a possibility could include:

Differentiation:  With the battery obviously being quite large, powerful and long lasting the client company could attempt to differentiate their existing product designed for motor homes into other product markets and therefore attempt to sell the existing battery to work in large motor boats/yachts, trucks and buses/coaches. This would be an initially costly exercise setting up contacts, finding sellers, marketing etc. however it has the ability to also grow profits in the future.

<u>International Markets</u>:  Similarly the client could export the existing battery to overseas markets such as Europe and Asia for use in mobile homes/motor homes within those countries.  Again this has high costs up front as trade partners need to be established but with long term growth prospects.

<u>Enhance / Improve Service</u>:  Another somewhat simpler option is to stick with the current situation yet offer a great product warranty on the battery to entice customers to upgrade to the better battery for the extra $500.  For example doubling or tripling the length of the warranty of the 'factory standard' battery could be an option.  The only costs to this plan would be in added service and or replacement.

<u>Dealer Incentives</u>:  The client company could offer the dealerships selling the motor homes a 5-10% commission on any of their batteries sold.  Therefore the dealer's salesmen would act as direct marketers or promoters of the battery, strongly recommending it to every customer helping to increase sales.  The only cost being the commissions that must now be paid out.

<u>Joint Venture / Alliance</u>:  The client company could attempt to bundle their battery with other companies who provide added features or accessories that also do not come as 'factory standard' with the motor home.  For example bundling the higher quality battery with leather seats, a better refrigerator unit, a high quality bed, larger hot water tank etc. could mean that all additional/higher quality items could be bundled into a discount upgrade pack available together for an extra $5000 where if purchased separately would cost $7,000 for example.  The cost here is in administration of the alliance and the discount factor given for bundling.

<u>Produce cheaper lower quality battery</u>:  The final option may be to compete directly with the battery manufacturer who has now become the default supplier.  Either supply the existing battery at their price (however this may not be possible) or design and produce a new lower quality cheaper battery to compete.  This last option may be costly and not very effective depending on who the competitor is and what their price is etc.

With all these options raised and discussed the interviewer should by now be quite happy with your answer to the case question so far.  Now the interviewer may ask you to do some simple mathematical calculations in relation to the questions.

For example:   The CEO wants to know what the fall in profit will be given this new competitive situation if they do nothing.  You are given the following information:

The battery sells for $5000
Fixed costs equal $50 Million
Variable costs equal $3000 per unit/battery
Sales volume equals 50,000 units per year
They expect a 50% drop in sales if mobile home customers are expected to pay an extra $500 for their better quality battery

Currently:
Battery = $5,000
Fixed cost per unit = 50 million/50,000 = $1,000 per unit
Variable costs = $3000 per unit
Therefore profit per unit = $5000 – ($1000 + $3000) = $1000
Total Profit = $1000 x 50,000 units = $50million

Future:
Battery = $5,000
Fixed costs per unit = 50 million/25,000 = $2000 per unit
Variable costs = $3,000 per unit
Therefore profit per unit = $5000 – ($2,000 + $3,000) = 0
Total Profit = 0 x 25,000 units = $0

Therefore it is clear that the client must act given the new market conditions or they will only break even making no profit!

The CEO had an initial idea of reducing the price by 5% to better compete with the lower quality battery (meaning the customer only has to pay an extra $250 for their battery and the management team believe this may result in a drop in sales of only 25%, what would be their profit under this plan.

Battery = $5,000 x 95% = $4,750
Fixed costs per unit = $50 million/(50,000 x 75%) = $1333 per unit
Variable costs = $3000 per unit
Therefore profit per unit = $4,750 – ($1333 + $3000) = $417
Total Profit = $417 x 37,500 units = approximately $15.6 Million

This initial idea may therefore be an option to enable the client to stay in business for the short term; however it doesn't come close to the goal of maintaining profits.  Therefore the options proposed earlier should be considered.

**Business Problem:**
**Your client is a company who manufactures small detonators for use in mining and rock blasting based explosives. They have factories in Latin American, Scandinavia and North America (East Coast). They want to grow profits, however see no real opportunity for increasing revenues through increased price or volume; therefore you are to find how and where they can reduce costs.**
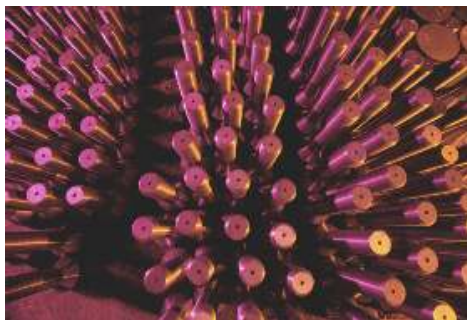


This business problem has many issues and is in fact very complex. As a case question and in limited time, the best way to first approach the problem may be to start modelling the costs involved in research, production, transportation, administration, marketing etc. for the company. In fact as you mention this cost modelling technique as the way you will tackle the problem the interviewer explains that the client company has no real understanding of their costs for each factory, but has key cost figures to give you to help work it out.



## Discussion and Possible Solution:

| North America | | Latin America | | Scandinavia | |
|---|---|---|---|---|---|
| R&D | $0.25 million | | | R&D | $0.25 million |
| Inputs | $15 million | Inputs | $20 million | Inputs | $20 million |
| Production | $20 million | Production | $15 million | Production | $22 million |
| Distribution | $20 million | Distribution | $18 million | Distribution | $25 million |
| Administration | $10 million | Administration | $10 million | Administration | $15 million |
| Wages | $10 million | Wages | $6 million | Wages | $14 million |
| | $75.25 Million | | $69 million | | $96.25 Million |

On first impression you can see that the Scandinavian factory has the highest costs and you express the idea of perhaps consolidating the Scandinavian operations into the North American factory to make one big factory.

The interviewer explains that this could be a good idea considering the location of the products markets in Australia, The USA, Korea and Asia. You draw a map of the world and explain that it would dramatically reduce the transportation costs across the Atlantic. The interviewer sketches the current transport route made to distribute the product. It is clear that the transport costs across the Atlantic Ocean would be eliminated and since R & D is performed at the North American factory this element of business would not be lost.
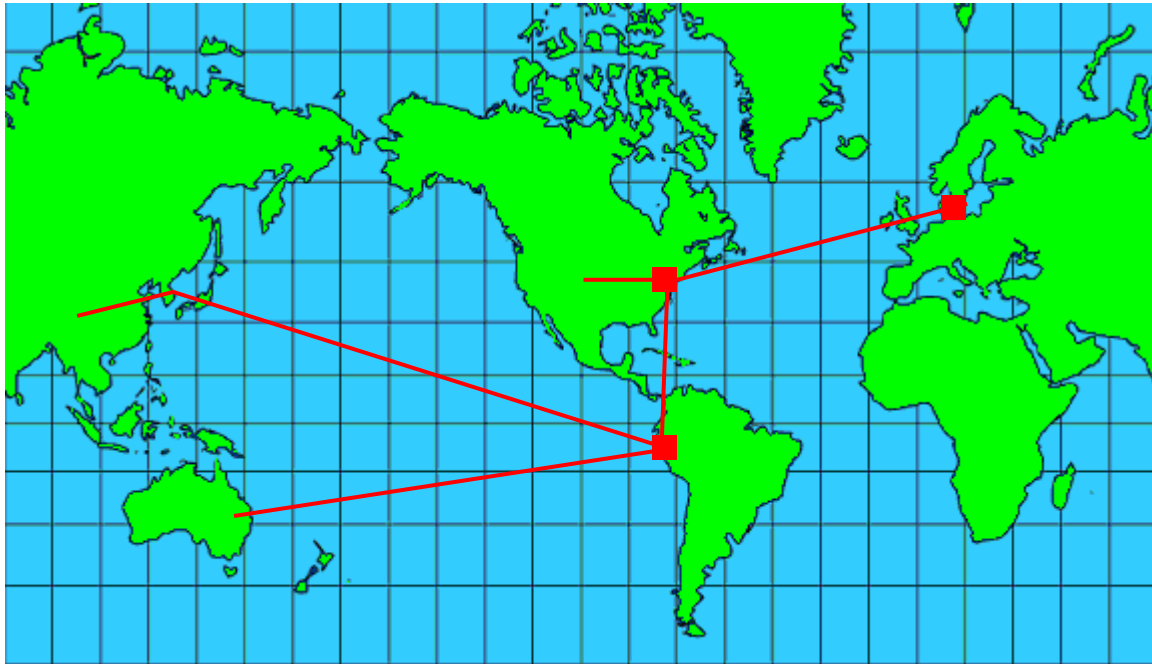


After this initial discussion the interviewer explains that you will now be flown to each factory to see first hand the operations there and collect more data. First stop is the Latin American factory. It is medium in size, quite old and they appear to work hard and use cheaper labour. As evident by the costs no R & D takes place there. The North American Factory is large, very new, modern and clean, however they appear to be running way under capacity considering the employee numbers, amount of equipment etc. You quiz the management and they explain that they could probably run production at twice the current level, with minimal increase in costs, and that would go mainly to inputs. The Scandinavian factory is much more efficient that the US factory, running at nearly full capacity but labour costs means it is not as efficient as the Latin American factory. After visiting each factory you now have some more information (see the text below the table in red):

| North America | | Latin America | | Scandinavia | |
|---|---|---|---|---|---|
| R&D | $0.25 million | | | R&D | 0.25 million |
| Inputs | $15 million | Inputs | $20 million | Inputs | $20 million |
| Production | $20 million | Production | $15 million | Production | $22 million |
| Distribution | $20 million | Distribution | $18 million | Distribution | $25 million |
| Administration | $10 million | Administration | $10 million | Administration | $15 million |
| Wages | $10 million | Wages | $6 million | Wages | $14 million |
| | $75.25 Million | | $69 million | | $96.25 Million |

| | | | | | |
|---|---|---|---|---|---|
| No. Employees | 100 | No. Employees | 100 | No. Employees | 150 |
| Output | 500,000 units | Output | 750,000 units | Output | 800,000 units |
| Cost per unit | $150.50 | Cost per unit | $92.00 | Cost per unit | $120.30 |

Having the employee numbers and output volumes completes the picture. It is clear that the North American factory is very inefficient and the Latin American factory very efficient primarily due to much cheaper labour. The Scandinavian factory being somewhere in the middle.

With this new information some additional options present themselves:

▪ Move 500,000 units of production from the Scandinavian factory to the North American factory. The North American factory expressed that they could easily absorb this capacity with minimal cost increases. Most costs at the Scandinavian factory would reduce significantly.

▪ Expand the North American Factory to absorb all of the Scandinavian production and reduce transportation costs.

▪ Increase the size of the Latin American factory and consolidate all operations there to take advantage of the low cost of labour. And resulting transportation cost savings.

After discussing some of these options the interviewer explains that you now have 1 min to formulate a final solution and present it to the CEO, justifying why you have made such a decision.

You quickly consider everything discussed so far and in the heat of the moment decide on a new option to build a brand new, efficient factory on the West coat of America and consolidate all operations there, bringing equipment and key employees from the North American and Scandinavian

Factories. It is envisaged that this plan will dramatically lower transportation costs as the new factory is now central to key product markets.

This answer is neat and acceptable and you are congratulated by the interviewer on a job well done!

He expresses that the case question was based on personal experience and a client engagement he actually worked on. It was a very complex problem with many additional issues such as:

- Where are input resources sourced, e.g. chemicals, metal components etc.
- Competitors locations
- Cost of expanding and or building new factories

What actually happened was that the client company bought out a larger competitor in Mexico and consolidated all 3 different operations to that single factory taking advantage of both cheaper labour and the economical location for transportation.
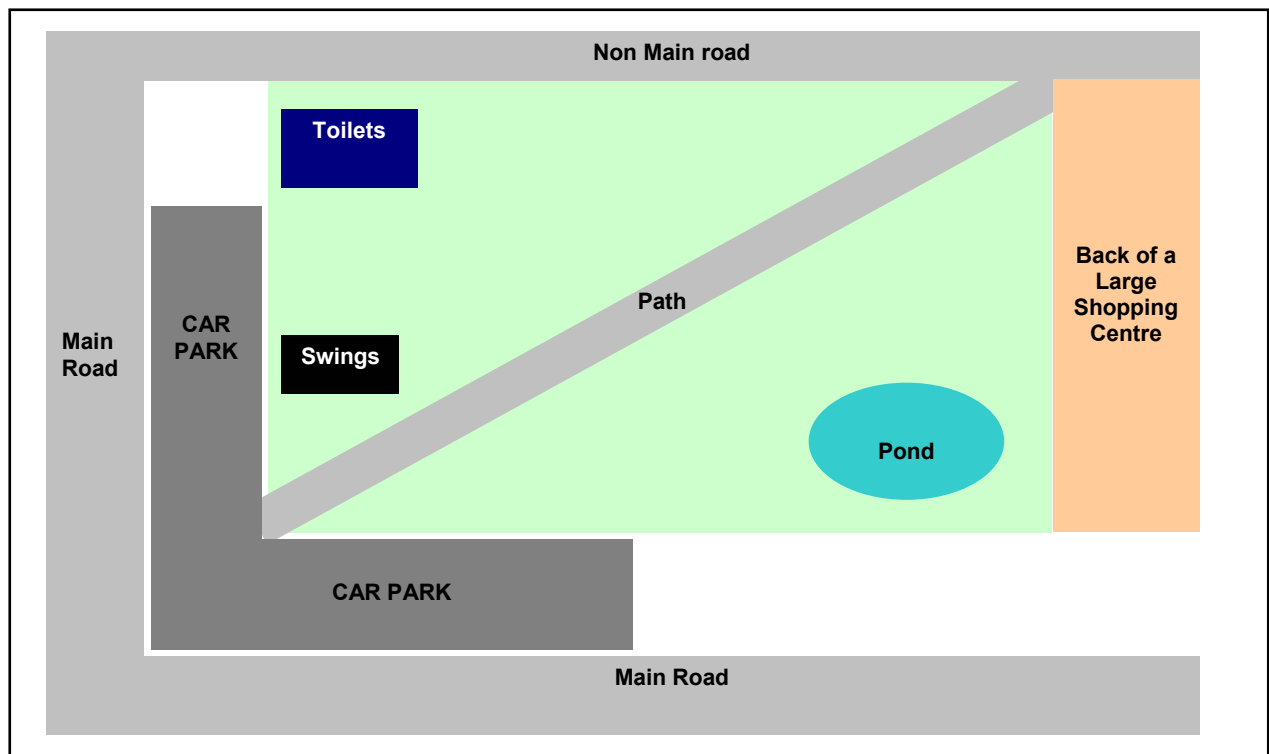
**Business Problem:**
**You have a license to operate an ice cream vending business in a large urban park. You are given the layout of the park (See below). As the new owner discuss where would be the best place to put the ice cream business to maximise sales revenue and explain why?**

This problem involves a careful analysis of the variables that will affect potential revenue. With prices fixed, things to be considered would include customer traffic, competition and location. Feel free to think out aloud and interact with the interviewer to explain and justify any decisions.

Non Main road

Toilets

Back of a
Large
Shopping
Centre

CAR
PARK

Path

Main
Road

Swings

Pond

CAR PARK

Main Road

## Competition

The first thing you should ask the interviewer is regarding any direct competition in the park. Are there any other food or beverage stores in the park or near the park? You are told that no-one currently operates in the park however the shopping centre does back onto the park as stated in the diagram. Therefore you will have a monopoly in the park in terms of ice cream and more generally food and beverage. Hence placement of the business will become critical

## Customer Traffic

Customer traffic will play a huge role in deciding where to place the business. You may explain to the interviewer that if you were the business owner you may want to attend the park on a few week days and weekends to see when the busy times are and where people predominately congregate. Things to think about here may include:

- Roads and passers-by: If potential customers can see the store from the road whether they are in a car, bike or on foot then they may want to stop and purchase an ice cream

- Shopping centre users: Shoppers may take their children to the park before or after shopping in which case they become potential customers. You would want to know however, if they would move their cars from the shopping centre car park to the park's own car park.

- People using the park: This is the most obvious and probably largest source of customers for such a business. Those who come specifically to enjoy the park are most likely to purchase ice cream especially on a warm summer's day. Thinking about their movements between features of the park i.e. car park, swings, toilets and pond becomes critical.

- People walking through the park: The final thing to consider when it comes to potential customers are the people who may use the pathway that runs through the park as shortcut or means to get where they are going on foot.

## Location

Location here refers to placement of the business relative to the other attractions or features of the park as already mentioned above. Intuitively you may want to be equidistant or central to all to maximise exposure and potential sales. Having maybe spent a few days at the park would give you a better idea but for now let's assume that on average there are as many people at the swings as there are at the pond etc.

Based on this discussion you may want to draw up some kind of table and assign some form of score and weighting system to each variable and sub-variable to help quantify the decision. But for now let's just say that we have decided to place the ice cream vending business between the swings and the pond, but close to the path and close to the car park (see red rectangle below). This also leaves it close enough to the main roads.
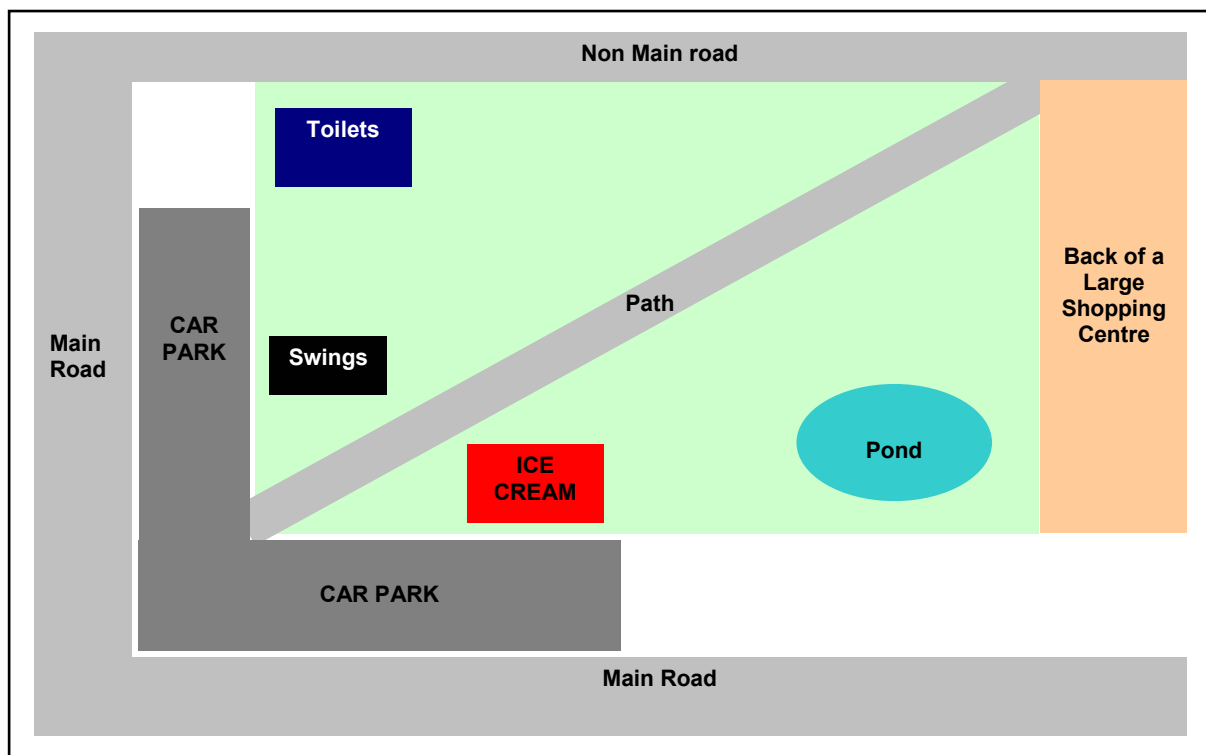


Your interviewer says that this is a reasonable and well thought out decision, and a good overall location. He goes on to explains that that your business runs smoothly for a full year turning a steady profit, however now a hotdog vendor has just opened up in the park between the swings and the toilets (see below). He asks 'what would you do?'
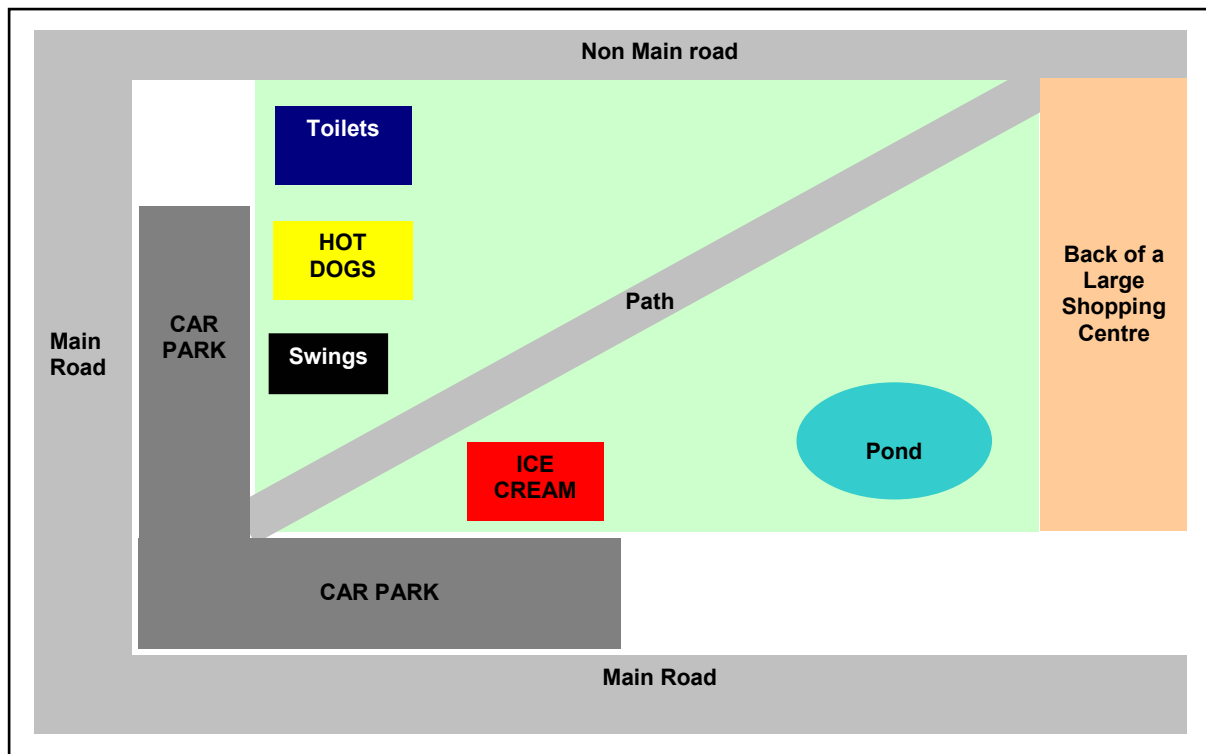
Obviously the hot dog vendor means a new competitive market situation in the park. Whilst hod dogs are not a direct substitute for ice creams the business does represent a clear threat to sales for the ice cream business since consumers now have more choice when it comes to food and beverage in general. Several options present themselves and should be discussed at length with the interviewer. Below some options are briefly explained:

1. **Do nothing:** This is the obvious first option. The two businesses however will cut into each others revenues meaning less profit for both which is not favourable for you the ice cream vendor since you were enjoying healthy profits before the hot dog vendor came along. By doing nothing there is also a real threat that the two stores may end up in a price war where nobody can win and in fact both will suffer terrible losses until one business crumbles due to lack of finance. Doing nothing is therefore not the best option

2. **Joint Venture:** The two vendors could go into partnership forming a joint venture operating from the one location under the same name and share in profits. In doing this they could still maintain prices and a monopoly in the park.

3. **Strategic Alliance:** A softer version of the above based more on a shared understanding. The two locations would still remain but they agree not to tread on each other toes' so to speak by not selling any of

each others non-core products i.e. drinks, chips etc. You may even go as far as to let the hot dog vendor operate solely in winter you solely in summer? But of course then you are only making money for half the year.

4. **Differentiation:** Since you are the established business in the park you can always expand your operations and start selling other products such as hot dogs, popcorn, burgers etc. to fiercely compete and drive the hot dog vendor out or at minimum capture some of his market. There is of course nothing stopping him from doing the same.

A quarry extracts rock and stone from the earth often in 'open-cut' style excavations. Although quarry's can extract anything from, simple rock to marble they often supply much of the raw material for concrete production and are therefore the first link in the supply chain of the concrete industry. A cement business uses raw materials such as lime, sand, clay, calcium and other minerals to mix and produce the substance of cement. This cement product is then distributed still moist to construction sites. In this case question you have been given the choice of deciding which business you would prefer to own. This question will test your analytical skills and is a clever way of revealing to the interviewer what type of business person you are. E.g. high risk, low risk, future oriented, micro or macro focus etc. You may at first want to base your decision on long term profit opportunities, however a sound and complete analysis based on a model such as Porters 5 industry forces, or even a SWOT analysis is what will impress your interviewer.

**Discussion and Possible Solution:**

Porters 5 forces industry analysis model would be ideal for answering this question, however since it was already demonstrated in an earlier question, a framework known as a SWOT analysis will be used here instead. If you don't already know, a SWOT analysis provides a careful evaluation of an organisations internal **strengths** and **weaknesses** as well as its environmental **opportunities** and **threats**. It provides a holistic view of the organisation considering both internal capabilities and external forces. It is therefore more than suitable in answering this case question of comparing two businesses at different stages in the supply chain. Each business will be looked at and analysed using the SWOT analysis and then a judgement call will need to be made based on which business has the strengths and opportunities that can really be capitalised on and the weaknesses and threats which are more easily avoided or mitigated. You may want to

interact with the interviewer asking for more information about each business if possible. The swot analysis may end up looking something like this:

## A Concrete Business

| **STRENGTHS** | **WEAKNESSES** |
|---|---|
| ▪ Opportunity for product innovation. I.e. Different mixes<br><br>▪ Higher priced end product | ▪ Once product is made it must be delivered immediately<br><br>▪ Liability if concrete quality is poor<br><br>▪ High cost of plant/factory, including maintenance<br><br>▪ Process intensive and Logistically challenging |
| **OPPORTUNITIES** | **THREATS** |
| ▪ Increased chance for growth through expansion and take overs etc. | ▪ Price can be dictated by suppliers and input mineral resource prices<br><br>▪ Output dictated by construction market<br><br>▪ Substitutes available<br><br>▪ High Competition |

# A Quarry Business

| STRENGTHS | WEAKNESSES |
|---|---|
| ▪ Little input costs and resources.<br><br>▪ Large number of buyers<br><br>▪ Product already exists in the ground<br><br>▪ Generally a larger company with higher profits<br><br>▪ Start of the supply chain | ▪ Little opportunity for change or innovation<br><br>▪ Low priced product<br><br>▪ Growth opportunities more limited |

| OPPORTUNITIES | THREATS |
|---|---|
| ▪ Low Competition and high barriers to entry<br><br>▪ Can operate more globally<br><br>▪ Can forward vertically integrate and buyout cement plants | ▪ Natural resources can always run out<br><br>▪ Government legislation & environmental protest<br><br>▪ Market price fluctuations |

From the SWOT analysis you may like to state that a quarry business is the preferred option if you were a business owner.  Minimal competition, global opportunities, being at the start of the supply chain, having a large number of buyers and no input resources other than machinery and labour is definitely favourable, however low growth opportunities is a downside. Essentially you could really argue for either business.   The strength of your SWOT analysis and later argument are the things that will impress the interviewer.

**Business Problem:**
**A retail bank is expanding and wants to know where the optimum locations are to put its bank branches. How would you go about creating a model or framework for solving this? Consider a macro perspective i.e. not what specific street or block to put it on rather what suburbs, towns, districts or areas.**




The location of a physical business shop front is always important when considering customers who must visit the premises. For an expanding bank this importance should be no different. This case question is challenging but can be made simple by introducing the concept of a population critical mass. You may remember this from an earlier question in the guide from the estimation and market sizing section.



**Possible Solution and Discussion:**

The first point to mention to the interviewer is that generally speaking similar shops and businesses which have customers who must come to them are found close together. Consider the location of clothing stores in shopping malls, car dealerships & car yards along a stretch of road and restaurants along a river side promenade. Bank branches are somewhat similar to this general rule so this should be the first aim and is in fact a micro perspective aim.

Now in terms of developing a macro model for the optimum location of bank branches you will need to discuss some more ideas with the interviewer:

- Explain your understanding of a population critical mass by saying the bank probably requires a minimum population figure (i.e. potential customers) before it will open a bank branch in any location. If it has a 10% share of the local market and requires 5,000 bank accounts/customers to make the branch feasible. Then a population critical mass of 50,000 is required in the area. Say a 5 mile radius.

- Now you may want to extend this idea and explain that since bank branches operate in the day, service business customers and individuals the population critical mass should probably be more of a day time figure, therefore taking into account where people work, live, the location of businesses etc.

- Since you must also be of a certain age to open a bank account those under the age of maybe 6 can be eliminated from the model.

- Bank branches differ in size between large and small so perhaps two critical mass figures can be used for two different sized branches (Large and Small) which ensure that those living in smaller townships which do not even reach the initial critical mass are not overlooked. Or perhaps the critical mass area radius can be widened for less populated areas such as country towns.

With these initial ideas out in the open you can begin to formulate a model using diagrams, equations and graphs.

So far you may have some variable such as:

Number of Residents:  R

Number of Workers: W

Number of Business: B

Critical mass of larger than X for large branch

Critical mass of between Y & X for small branch

Area radius of Z miles for heavily populated areas

Area radius of 10Z miles for less populated areas.

Using these variables you may draw a diagram such as that below to explain the conditions which must be satisfied for a large branch to be put in a heavily populated area:

**Conditions for Bank Branch in Heavily Populated Area**
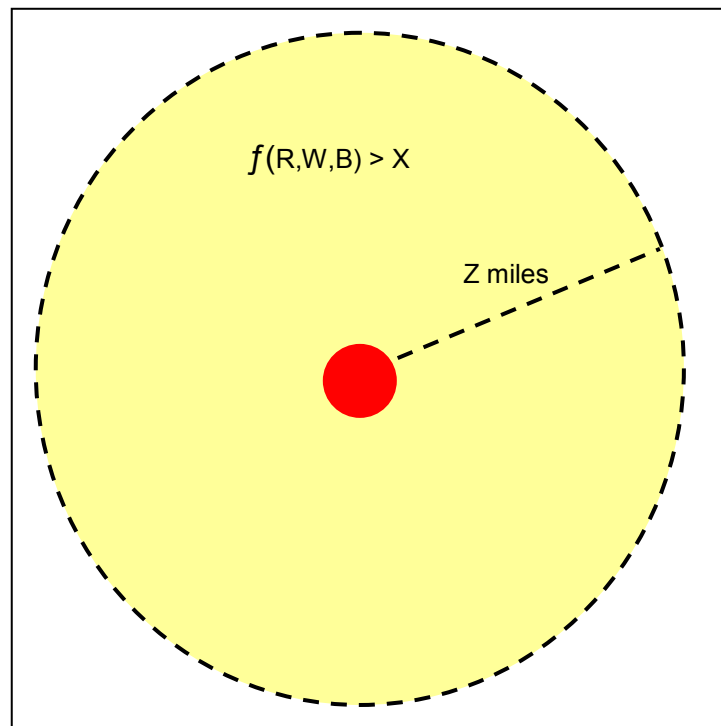


As can be seen some function of the number of residents, number of workers and number of businesses must be larger than the critical mass figure within an area of radius Z miles.

The function may be something as simple as:

R/4 – (number individuals under 12) + W/4 + B/2

So if there were 60,000 residents in the area, 6,000 residents under 6 20,000 employees during the day and 2,000 businesses. You would get a critical mass figure of:

60,000/2 - 6,000 + 20,000/2 + 2,000 = 36,000

If the critical mass figure for a large branch is 30,000 then the area under question would get a large bank branch as close to the centre as possible not forgetting to take into consideration the earlier micro goal of placing bank branches close to one another or at the very least near a shopping mall, or other commercial area.

If the bank required a critical mass of more than 40,000 for a large branch and between 20,000 and 40,000 for a small branch then in the above example the area would get a small bank branch.

Similar logic is applied to less populated areas by increasing the radius of the critical mass area.

You now have a simple working model to show the Bank. They must determine the required critical mass number and area based on their existing bank branches, expansion strategy, expected market share etc. You could then obtain vital population, demographic and business data from local and national statistics bureaus for target states and cities and the model is complete.

**Business Problem:**
**A CIO / IT Manager wants to analyse his IT application portfolio. How would you go about segmenting this?**



This is a short case question and will predominantly involve a discussion with the interviewer around some key ideas. It is a different style of question since it appears on the surface to be very much IT specific, however once you start thinking about the problem it is simply a question designed to see how you solve problems, think about a business and categorise things. Having an IT background may be an advantage, but having strong business instinct and problem solving skills is probably more important in brainstorming possible solutions.



**Possible Solution and Discussion:**

The first thing that should be discussed is the motive or goal of the CIO in analysing the IT application portfolio. Does he/she want to ultimately minimise the number of applications in use within the organisation, cut costs by reducing technical support staff, design/purchase and introduce new software applications, enhance security, formation of new outsource relationships, or simply neaten the current application situation by consolidating redundant and old systems. Is the exercise part of a larger risk management initiative or something required by external auditors? Points such as these should be raised initially to show the interviewer that you recognise the importance of first truly understanding a problem before attempting to solve it.

The interviewer may then select one of the motives above to help you narrow the scope of the problem, and formulate the best method of segmentation. Below are some simple options for segmenting an IT application portfolio.

**Organisational Value:** The first option for segmentation may be based on some estimates around value to the organisation. Looking at all the applications, data and estimates could be combined to determine how much revenue would be lost per day, or costs incurred if the application disappeared or was down. Both tangible and intangible impacts would need to be considered however and this may become hard to quantify, leaving a bias towards transaction processing based software.

**Total Cost of Ownership (TCO)**: Similarly the IT applications can be categorised based on the total costs it brings to the organisation. TCO is a common term in IT management as it is something that should always be minimised. TCO includes such things as the initial build/purchase costs as well as ongoing support and maintenance costs, any associated hardware costs licensing fees etc. This method of categorisation however may leave a bias in favour of small, low cost applications.

**Business Process:** Another way of categorising IT applications may be to look at what business process they support. Business processes may include such things as sales, marketing, manufacturing, purchasing, distribution, payroll, accounting etc. For instance 4 different applications to process purchases from suppliers could be considered somewhat inefficient and perhaps the differing functionality could be consolidated into one application.

**Users or Organisational Spread:** A simple method of categorisation may be to look at how many people within the organisation actually use the application, or how many instances of installation are there? For instance a piece of software may have been purchased along with licensing for 100 users. If only 20 people are found to actually use it then perhaps the licensing arrangements can be scaled back or future software purchases and license agreements looked at more carefully. Also imagine applications for processing sales orders which are different in the organisations 6 offices around the country. These 6 applications could probably be consolidated into one application reducing costs dramatically.

**Technology Platform:** The last option we'll mention is in relation to the underlying technology involved with the application. Categorising the application portfolio based on such things as which organisational Data Base it uses, what type of data base, language it is written in, whether it is web based, server based or locally installed, Windows based, UNIX, Mac or Linux? May all help in categorisation. For example the CIO may want to remove /replace all systems which use Oracle databases in preference of

SQL data bases. Determining which applications use a data base and of these which ones use an oracle database is therefore of importance.

You may have other great ideas in addition to these possible methods of categorisation as the above is just a sample of a multitude of possible solutions. You may want to conclude the discussion by reaffirming the need to first understand the CIO's motivations and goals in respect to the IT application portfolio and that if quantifications are to be made regarding organisational value and costs a balanced approach should be taken i.e. a variety of approaches could be used and combined to ensure intangible benefits and costs are not missed and that the inherent bias of some of the above methods does not directly show through in any final evaluation and hence decision. As a simple example, there is no point removing the organisations largest application which may be a huge ERP system because it has the largest cost of ownership and uses an oracle database.

**Business Problem:**
**What would be the major costs associated with a 'seeing eye dog' or 'guide dog' association?**

As you would be aware, many blind and visually impaired people use specially trained dogs to help them get around safely. Individuals who have suffered from strokes and those with other disabilities also benefit. These dogs, as pictured left, are trained from a very young age and are generally provided to those in need by governments, charities and other associations. The task in this case question is to describe the major cost categories that such an association would incur. Essentially it examines your ability to understand the costs of a government or even non-profit type of organisation, yet also apply logic to the specific context of the problem.

**Possible Solution and Discussion:**

You may begin answering the question by clarifying what exactly you are expected to do. After questioning the interviewer you discover that you are to imagine you are performing some pro-bono work for a guide dog association and they have no real idea where all their money is going. Your task is to simply draft potential areas or categories where the largest costs may be going for later discussion with the management. No specific estimation of costs is required.

You decide that it may be best to draw up some kind of diagram to help clarify your thought processes. See the next page for examples.

Thinking first about the 'value chain' for organisations and cost categories you may draw up something like this:

General Cost Categories in a 'For Profit' organisation

| Product / Service Design | Procurement of Inputs | Operations, Manufacture or Assembly | Distribution of product or service | Sales / Marketing |
|---|---|---|---|---|

| Administration (Finance, Legal, IT, HR, etc.) |
|---|
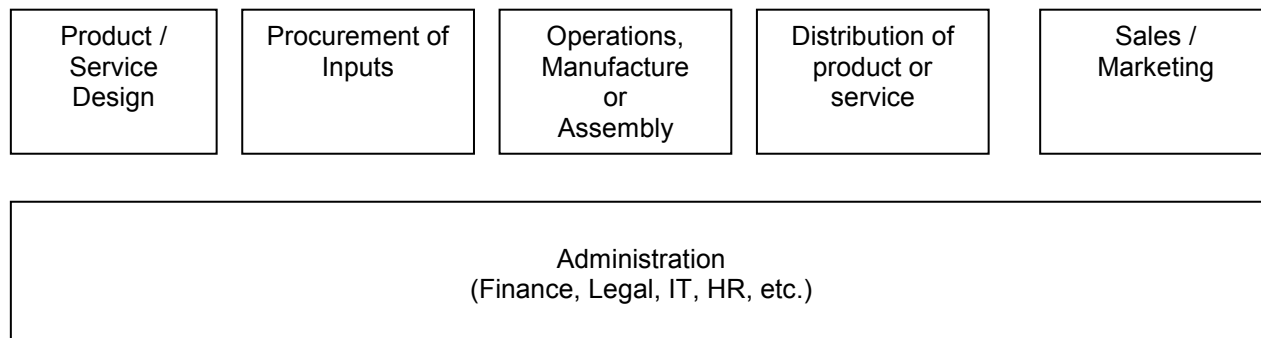
Now thinking about a 'non-profit' association the value chain and cost categories may look something more like this:

General Cost Categories in a 'Non-Profit' organisation

| Fund Raising | Procurement of Inputs | Operations | Distribution of product or service | Promotion & Awareness |
|---|---|---|---|---|
| | Administration (Finance, Legal, IT, HR, etc.) | | | |
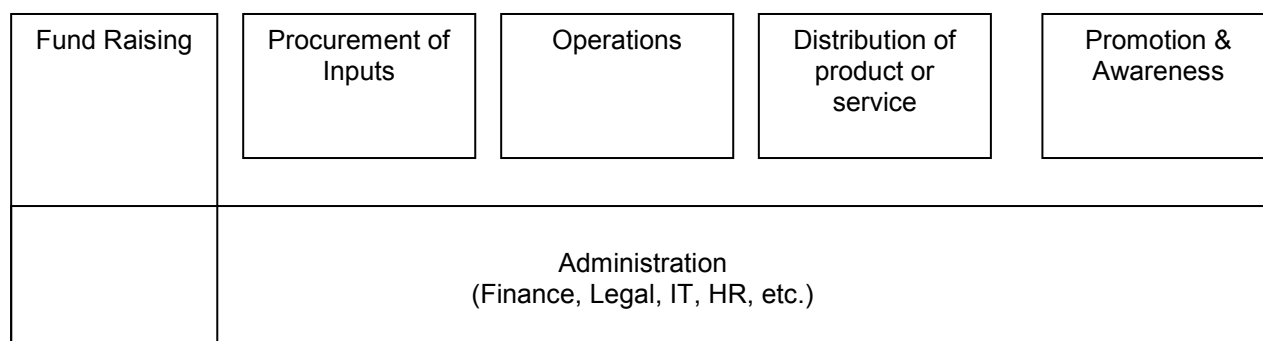
Now applying this same logic to a guide dog association you can start to build up a picture of where costs may be going. An initial diagram may look something like this:

General Cost Categories for a Guide Dog Association

| Fund Raising | Breeding and selection of Dogs | Training & Care of Dogs | Distribution of dogs and services | Promotion & Awareness of association |
|---|---|---|---|---|
| | Administration (Finance, Legal, IT, HR, etc.) | | | |
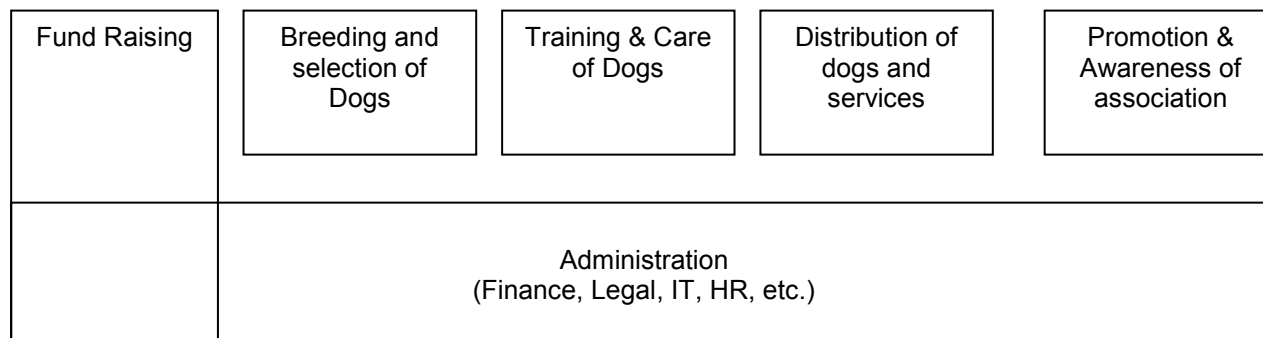
Now you have the basic categories you may want to go into more detail within each one to better answer the question.

**Fund Raising**
Some fund raising activities would be performed by volunteers; however some would also be performed by regular employees of the association. Costs may therefore fall into these areas:

- Wages to employees
- Telephone Bills
- Merchandise Costs
- General Admin expenses

**Breeding and Selection of Dogs**
A guide dog association would need to first obtain puppies before actually training them. Puppies can be purchased from breeders or created through an in house breeding program. Costs may therefore fall into these areas:

- Purchase costs of puppies from breeders
- Purchase cost of suitable adult dogs for breeding.
- Property, facilities and kennel costs (Rented or Owned)
- Veterinary expenses
- Food, Water, Equipment and additional care

**Training and Care of Dogs**
Guide dogs are trained from a very early age until they are suitable for release into the community as someone's aid. Costs here may fall into these areas:

- Trainer Costs or Wages
- Property, facilities and Kennel costs
- Veterinary expenses
- Food, Water, Equipment and additional care.

**Distribution of Dogs and Services**
Generally Guide dogs are provided to individuals in need free of charge. Therefore costs would be incurred in regard to delivery and ongoing care/maintenance of the dog. Costs may therefore include

- Transport & Delivery charges
- Costs in relation to owner initiation (e.g. employee wages)
- Ongoing veterinary costs, food and care.
- Admin expenses

## Promotion and Awareness

All non-profit organisations such as charities and associations must promote themselves to increase funding. Some are given subsidised rates for television commercials and the like. Costs here may therefore include

- Awareness Advertising (TV, Radio, Print)
- Merchandise Design
- Events and Functions

## Administration

All organisations big and small, non profit included incur administrative expenses. Therefore some costs here would go towards:

- Accounting and Finance (including wages, auditors, bank fees etc.)
- Investments (raised funds would be invested until needed)
- Legal work both in house and external
- Wages for general office staff
- Data entry
- Information Technology (equipment, systems, and people)
- General office expenses such as power, rent, paper, desks etc.

We finish with a fairly simple yet well thought out explanation of some of the major costs a guide dog association may incur. The early steps of diagramming the value chain demonstrate how important it is to structure you response in some way to provide a sound platform from which to then expand on to best answer the case question.

Since much of a management consultants work involves either maximizing a clients revenues or minimising their costs it is important for an interviewer to examine a potential employees general understanding of business costs and this question does just that, by asking for a comparison of the organisational costs of two fictitious companies producing the same product selling in the same market. In answering the problem an interactive discussion with the interviewer around some key ideas will no doubt develop. Depending on the time available the interviewer may also want to introduce some figures and numbers to allow you to demonstrate a basic mathematic ability. In providing a possible solution to this problem we will focus only on the discussion side, centring on some key reasons for possible differences in costs.

## Possible Solution and Discussion:

The first thing you may want to do in answering this case question is to draw a rough map of the USA noting the positions of Boston, Houston and New York. This can provide the basic geography of the question and form the starting point of your cost investigation. Such a map is provided below:

Looking at this map of continental USA you would assume that the Boston Company has somewhat lower transportation costs that the Houston Company due to the large discrepancy in distance between manufacture and market for the two companies. Houston however has the overall lower costs so such transportation costs can probably be eliminated already.

The ensuing investigation of costs may then look something like this:

**Labour:** Wages are one of the largest costs to any organisation. Perhaps Houston is paying lower wages to its employees. You are told this is not the case and that both companies appear on average to be paying their employees the same wage rate.

**Economies of Scale:** If Houston produces a greater amount of widgets that Boston they may be spreading their fixed costs over a greater output and hence achieving economies of scale over Boston through mass production. You are told this is not the case and that both companies produce roughly the same volume of product.

**Climate:** Since Boston is a rather cold climate in winter perhaps the company operating up there is incurring more costs in relation to heating bills or factory downtime due to snow storms, and or dramatic cold snaps. You are told this is not the case and that the company in Houston incurs similar costs in regard to cooling due to its much warmer climate.

**Efficiency:** Perhaps the Houston Company has better equipment and machinery, management and processes compared to Boston and therefore

manages to keep costs down due to its efficiency.  You are told that this is not the case and that the organisational structure, processes, factories are very similar.  Houston however does seem to spend less on raw materials and components.  You decide to then investigate this comment.

**Cheaper Inputs:**  It has been confirmed then, that Houston spends less on inputs that Boston.  Why would this be so?  You quiz the interviewer on what a widget is made up of and begin discussing manufacturing of widgets.  You are told that to make a widget requires some raw materials such as metal and glue but also some pre made components.  You quiz the interviewer further asking questions regarding who supplies such components, where are raw materials sourced?  You are told that Houston sources metals from South America, glue locally within the city, and components from Dallas.  Boston sources metals from Africa, glue locally, and pre made components from California.

Using this information you may guess that the raw material metals from south America cost less since they don't have to travel as far, and therefore transportation costs are lower however you are told this is not the case and that both companies pay a very similar price for sheet metal even though it is sourced from two different world locations.  Staying with this issue you discuss the supply of pre made components and the fact that Dallas is very close to Houston and California very far from Boston.  Again you are told this geographic fact has no impact on input costs.

Knowing that the root cause of the cost differential is related to the cost of inputs such as raw materials and components you are determined to find the underlying reason.  You explore and discuss other ideas and discover that the Houston Company has a long standing relationship with its component supplier in Dallas and signs 24 month contractual agreements locking in a low, fixed price for the input components.  The price Houston pays is in fact 40% lower than what Boston is paying for its component supplies from California.

This single fact is what is contributing to the cost differential between the two companies operating in both Houston and Boston, yet selling in New York.  As evident the first assumptions related to geographical differences was not an issue, with the cost differential coming down to supplier relationships and long term contracts.

That concludes the section on business problems and strategy based case questions.  Here are some more examples that you can try yourself.  Good luck!


# ■ Other Business Problems & Strategy Cases

- What are the major costs associated with a large retail bank?

- How would you go about verifying the accuracy of sales forecasts for the next 10 years in the cable TV market in Manila?

- I am a CEO of a large hotel chain. I am having profitability problems. Why?

- I am a company that sells a number of goods across Europe. Should I enter the high end retail women's clothing and accessories market in the USA?

- What are some reasons why a major retail bank would want to form an alliance with another major retail bank?  If your acquisition strategy included closing down branches, what method would you take to choose which branches to close?

- An airline company is seeing its aeroplanes miss a great deal of their 'leave times'.  How costly is this to the company.  Consider both operational costs and sales/reputation costs

- Your client is deciding whether or not to purchase a struggling consumer Rental Company.  What do you need to consider and what information do you need to know?  Can the rental company be turned around from its current financial state?

- Determine if the 2004 Athens Olympics Games were profitable?  Consider all possible costs and revenues.  (Note:  It is estimated that it actually had a 12 billion dollar loss)

- The government has just announced that they are cutting tariffs on cement imports.  You have 10 mins to figure out whether this is a large issue, and how this will affect your business if you are a cement manufacturer.  (Note: consider competitors, transport of cement, demand now and in future, prices, your plans and strategies e.g. expansion)

- Your client is a hotel attempting to make the decision on whether or not to setup a website that sells stressed rooms (rooms that aren't going to be used for the night) at a short timeframe i.e. less than 5 days and at a cheaper price. What information will they need to help them make a decision?

- How would you go about forecasting the production of jet engines in the world?

- Your client sells automobiles and is seeing falling profits. Investigate all possible revenues and costs and try to determine why?

- Using revenue and cost modelling try and workout the annual profit of a major shoe company such as Adidas.

- Your client manufactures average cost, average quality plasma televisions. Sales have recently been falling what should be their strategy going forward and which markets should they sell in?

- Your client is a new internet start up. What information do they need to know in order to increase their chances of being successful?

- Your client manufactures furniture. They are considering moving some of the manufacturing process into India. What do they need to consider before doing so?

- Your client makes portable music players such as mp3 devices. What should their strategy be given the huge wave of popularity surrounding apple ipod's?

# ■ Section 4:  Example Data & Charts Based Cases

Case questions involving the analysis of graphs and charts, the analysis of larger sets of data and finally the creation of charts based on this data are becoming more popular in management consulting interviews.

These exercises stray from the bounds of the more traditional styles of case questions discussed so far.  Data and Charts based exercises are generally more involved than estimation based case questions and business problem cases, and can take longer to complete.  Others however, may be somewhat shorter and actually turn into a business problem style case interview as you are made to discuss and explore the underlying issue behind a graph. Some data and charts based exercises should be labelled as more of an aptitude test or entry examination than an actual interview as you may be left in a room to complete the exercise by yourself and hence there is no interaction with the interviewer till the end when you may have to present your answers and findings.

Data and Charts based exercises are designed to assess your ability to understand data and see patterns and trends behind the data.  They also give the organisation some insight into your abilities as an analyst, which is a key role for a junior consultant.  Having to construct basic charts using pen and paper or more commonly with the assistance of software applications such as Microsoft Excel and Microsoft PowerPoint brings to light your ability to highlight key business themes within data and allows the organisation to see what type of focus you take, whether it be macro or micro, operational or financial.

After creating some graphs and charts you may even be asked to stand up and present an overview of your findings to a group which will allow you to demonstrate your presentation and persuasion skills.

Data and Charts bases exercises can also be a useful tool to assess a candidates basic computer skills, especially in Microsoft Excel and to a lesser extent Microsoft PowerPoint (if asked to put a few slides together for an overview presentation).

As a final word, remember that graphs and charts are powerful decision making tools.  So when creating charts, use neutral colours, label each axis, maintain a legend, keep the chart uncluttered, keep the chart relatively simple and feel free to use more than one chart but remember to keep the scale and units consistent.

In this section we first present one real life example of a Data & Charts based exercise which was actually given in a management consulting interview. Due to the amount of data tables we only have room for one of these examples in this guide, however we believe this single example is comprehensive enough to adequately demonstrate this type of interview exercise. It's size should also help to prepare you for similar interview exercises involving data and charts as there are obviously many possible answers which can be drawn from the exercise, so see if you can find others.

The other case questions in this section focus on the interpretation of graphs and charts and applying business logic to explore and understand what the chart represents, note that they flow naturally into business problem style case questions.

**Data & Charts Writing and Analysis Exercise:**

**The Process**
This test was called a 'remote analysis exercise' in which the candidate was placed in a room and given a laptop computer. They were told to read all the instructions included below before commencing. They had 60 minutes to return their work back to the assessor.

If they had any questions about the test, the software or anything else, they could contact them using the details provided in the covering email.

They were instructed to save their results using their name as a filename before emailing them back to the assessor (eg JohnSmith.doc).

**Documents Provided**
The exercise required the use of the following documents included with the original email. These were:
   - Writing & analysis test.doc (Microsoft Word)
   - Writing & analysis test.ppt (Microsoft Power Point)
   - Tables.xls (the data in Microsoft Excel)

The candidate had to check that they could open and read them all before they were required to start the test.

**The Exercise**
The spreadsheet containing tables had data used to support a mock client organisations out-of-date reports. The spreadsheet could be used to tell a number of different stories. The assessor wanted the candidate to pick out one story from the data and to write up a 2 page briefing that might be used in preparation for a meeting with an interested industry expert. The candidate was instructed to include a chart in their briefing using either Microsoft PowerPoint or Microsoft Excel.

**What they were looking for**
The consulting firm was looking for:
   – logical analysis,
   – clear structure,
   – correct spelling and grammar,
   – concise expression and,
   – an interesting story.

Therefore, if the candidate felt that the numbers were too dry and wanted to embellish them, they could feel free to invent additional facts that supported their case.

It was noted that this exercise was not a test of their knowledge of the metals industry, and that there are essentially no correct answers.


**Background & Notes**

The spreadsheet extract that is shown below (the candidate could view it in Microsoft Excel) includes 15 different data tables. The data refers to "copper and copper alloy semis". These are semi-finished products made from unwrought copper or copper alloys, either rolled or extruded. They are used in a variety of applications, mainly in electrical equipment and in construction.

"ACR" refers to air conditioning and refrigeration. "e" refers to an extrapolated full year estimate, since the last year of data is incomplete and sometimes only goes from January to October (months 1-10).

# Table 1:  Production and consumption of copper semis in selected countries and country groups, by product, 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Regional Total** | | | | | | |
| Production | 2,969,441 | 2,841,098 | 3,145,036 | 3,503,609 | 3,863,554 | 4,280,488 |
| Consumption | 3,234,245 | 3,135,482 | 3,499,268 | 3,947,290 | 4,446,194 | 5,029,523 |
| Net imports | 264,804 | 294,383 | 354,232 | 443,681 | 582,640 | 749,035 |
| **Wirerod** | | | | | | |
| Production | 1,948,100 | 1,882,435 | 2,105,985 | 2,377,325 | 2,656,325 | 3,004,415 |
| Imports | 89,611 | 105,971 | 129,158 | 183,114 | 264,407 | 392,954 |
| Exports | 43,848 | 54,042 | 37,952 | 32,353 | 37,389 | 36,368 |
| Consumption | 1,993,863 | 1,934,364 | 2,197,191 | 2,528,086 | 2,883,343 | 3,361,001 |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 202,220 | 189,548 | 214,275 | 210,694 | 229,506 | 248,450 |
| Imports | 97,530 | 115,103 | 109,324 | 154,867 | 179,984 | 178,135 |
| Exports | 4,893 | 4,523 | 7,291 | 7,875 | 7,505 | 11,651 |
| Consumption | 294,857 | 300,128 | 316,308 | 357,685 | 401,985 | 414,934 |
| **Copper Tube** | | | | | | |
| Production | 386,482 | 387,428 | 406,833 | 447,593 | 477,161 | 499,970 |
| Imports | 53,153 | 54,296 | 53,360 | 64,889 | 77,595 | 80,618 |
| Exports | 19,056 | 28,576 | 29,054 | 43,527 | 48,029 | 57,137 |
| Consumption | 420,579 | 413,148 | 431,138 | 468,955 | 506,727 | 523,451 |
| **Copper Alloy Strip** | | | | | | |
| Production | 306,399 | 258,947 | 291,348 | 330,023 | 351,896 | 367,929 |
| Imports | 102,985 | 109,086 | 143,081 | 162,050 | 168,485 | 232,627 |
| Exports | 28,693 | 20,141 | 29,208 | 40,739 | 24,387 | 33,398 |
| Consumption | 380,691 | 347,892 | 405,221 | 451,334 | 495,994 | 567,158 |
| **Copper Alloy Tube** | | | | | | |
| Production | 126,240 | 122,741 | 126,595 | 137,974 | 148,666 | 159,724 |
| Imports | 23,797 | 23,838 | 34,212 | 23,003 | 29,062 | 26,815 |
| Exports | 5,782 | 6,630 | 11,397 | 19,748 | 19,583 | 23,559 |
| Consumption | 144,255 | 139,950 | 149,410 | 141,229 | 158,145 | 162,980 |

## Table 2: Production and consumption of copper semis in selected countries and country groups, geographically, 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Regional Total** | | | | | | |
| Production | 2,969,441 | 2,841,098 | 3,145,036 | 3,503,609 | 3,863,554 | 4,280,488 |
| Consumption | 3,234,245 | 3,135,482 | 3,499,268 | 3,947,290 | 4,446,194 | 5,029,523 |
| Net imports | 264,804 | 294,383 | 354,232 | 443,681 | 582,640 | 749,035 |
| **China** | | | | | | |
| Production | 1,593,734 | 1,557,367 | 1,739,433 | 1,946,800 | 2,211,733 | 2,480,957 |
| Consumption | 1,716,169 | 1,711,906 | 1,930,415 | 2,201,793 | 2,555,469 | 2,958,810 |
| Net imports | 122,435 | 154,539 | 190,982 | 254,993 | 343,736 | 477,853 |
| **Egypt** | | | | | | |
| Production | 12,900 | 12,900 | 13,900 | 29,900 | 82,800 | 94,800 |
| Consumption | 15,950 | 16,714 | 16,979 | 33,050 | 85,950 | 97,950 |
| Net imports | 3,050 | 3,814 | 3,079 | 3,150 | 3,150 | 3,150 |
| **India** | | | | | | |
| Production | 339,600 | 369,700 | 410,600 | 448,200 | 493,900 | 531,600 |
| Consumption | 346,800 | 376,900 | 418,703 | 459,765 | 509,384 | 548,650 |
| Net imports | 7,200 | 7,200 | 8,103 | 11,565 | 15,484 | 17,050 |
| **Pakistan** | | | | | | |
| Production | 16,000 | 11,445 | 10,225 | 14,025 | 14,025 | 14,025 |
| Consumption | 17,564 | 12,545 | 11,126 | 14,897 | 15,843 | 15,105 |
| Net imports | 1,564 | 1,100 | 901 | 872 | 1,818 | 1,080 |
| **Saudi Arabia** | | | | | | |
| Production | 153,900 | 179,600 | 164,300 | 179,000 | 172,000 | 167,500 |
| Consumption | 200,200 | 222,488 | 198,507 | 235,258 | 225,300 | 220,800 |
| Net imports | 46,300 | 42,888 | 34,207 | 56,258 | 53,300 | 53,300 |
| **Turkey** | | | | | | |
| Production | 209,650 | 233,650 | 234,650 | 276,650 | 255,720 | 295,650 |
| Consumption | 198,250 | 223,712 | 226,532 | 269,494 | 240,697 | 281,950 |
| Net imports | -11,400 | -9,938 | -8,118 | -7,156 | -15,023 | -13,700 |
| **South East Asia** | | | | | | |
| Production | 532,200 | 375,000 | 436,719 | 471,813 | 498,683 | 555,968 |
| Consumption | 604,097 | 440,781 | 533,732 | 560,447 | 619,253 | 707,066 |
| Net imports | 71,897 | 65,781 | 97,013 | 88,634 | 120,570 | 151,098 |
| **Gulf States** | | | | | | |
| Production | 28,000 | 31,990 | 37,810 | 40,000 | 40,000 | 41,000 |
| Consumption | 54,000 | 63,290 | 72,410 | 81,000 | 96,200 | 96,300 |
| Net imports | 26,000 | 31,300 | 34,600 | 41,000 | 56,200 | 55,300 |
| **Iran** | | | | | | |
| Production | 83,457 | 69,446 | 97,399 | 97,221 | 94,693 | 98,988 |
| Consumption | 81,215 | 67,145 | 90,864 | 91,586 | 98,098 | 102,892 |
| Net imports | -2,242 | -2,301 | -6,535 | -5,635 | 3,405 | 3,904 |

**Table 3: Chinese production and consumption of copper semis, 1997-2002 (tonnes)**

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Total** | | | | | | |
| Production | 1,593,734 | 1,557,367 | 1,739,433 | 1,946,800 | 2,211,733 | 2,480,957 |
| Consumption | 1,716,169 | 1,711,906 | 1,930,415 | 2,201,793 | 2,555,469 | 2,958,810 |
| Net imports | 122,435 | 154,539 | 190,982 | 254,993 | 343,736 | 477,853 |
| **Wirerod** | | | | | | |
| Production | 893,900 | 911,000 | 1,044,400 | 1,186,000 | 1,375,900 | 1,590,290 |
| Imports | 38,908 | 49,955 | 63,471 | 101,226 | 171,768 | 275,983 |
| Exports | 8,292 | 5,846 | 464 | 75 | 120 | 484 |
| Consumption | 924,516 | 955,109 | 1,107,407 | 1,287,151 | 1,547,548 | 1,865,789 |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 74,100 | 62,400 | 70,100 | 67,400 | 84,000 | 96,000 |
| Imports | 38,192 | 39,701 | 46,091 | 64,103 | 59,503 | 69,692 |
| Exports | 3,394 | 2,000 | 1,097 | 1,450 | 1,596 | 5,320 |
| Consumption | 108,898 | 100,101 | 115,094 | 130,053 | 141,907 | 160,372 |
| **Water Tube** | | | | | | |
| Production | 276,795 | 276,386 | 272,213 | 274,208 | 281,808 | 283,333 |
| Imports | 3,089 | 4,112 | 2,761 | 1,533 | 998 | 785 |
| Exports | 3,180 | 5,832 | 3,696 | 5,653 | 9,899 | 14,896 |
| Consumption | 276,704 | 274,666 | 271,278 | 270,088 | 272,907 | 269,222 |
| **ACR Tube** | | | | | | |
| Production | 33,206 | 43,614 | 57,787 | 85,792 | 103,192 | 121,667 |
| Imports | 15,495 | 17,700 | 17,121 | 23,808 | 36,826 | 32,353 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Consumption | 48,701 | 61,314 | 74,908 | 109,600 | 140,018 | 154,020 |
| **Copper Alloy Strip** | | | | | | |
| Production | 247,400 | 197,300 | 226,600 | 263,400 | 286,000 | 298,000 |
| Imports | 65,822 | 71,891 | 91,600 | 106,400 | 108,481 | 152,180 |
| Exports | 25,147 | 16,127 | 22,431 | 30,242 | 18,078 | 24,881 |
| Consumption | 288,075 | 253,064 | 295,769 | 339,558 | 376,403 | 425,299 |
| **Copper Alloy Tube** | | | | | | |
| Production | 68,333 | 66,667 | 68,333 | 70,000 | 80,833 | 91,667 |
| Imports | 4,055 | 3,964 | 3,452 | 4,188 | 4,363 | 6,500 |
| Exports | 3,113 | 2,979 | 5,826 | 8,845 | 8,510 | 14,059 |
| Consumption | 69,275 | 67,652 | 65,959 | 65,343 | 76,686 | 84,108 |

## Table 4: Chinese imports of wirerod by origin, 1995-2002 (tonnes)

|  | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 (1-10) |
|---|---|---|---|---|---|---|---|---|
| Taiwan | 16,848 | 17,988 | 19,028 | 15,827 | 26,423 | 49,830 | 61,568 | 59,959 |
| South Korea | 455 | 3,364 | 7,551 | 19,881 | 25,536 | 39,837 | 47,865 | 53,822 |
| Kazakhstan | 11 | 0 | 0 | 0 | 34 | 1,950 | 34,676 | 52,941 |
| Russia | 0 | 55 | 0 | 0 | 0 | 0 | 15,662 | 16,588 |
| Australia | 1,936 | 2,930 | 2,658 | 3,755 | 3,429 | 5,141 | 6,637 | 11,645 |
| Others | 7,710 | 6,064 | 9,671 | 10,493 | 8,049 | 4,468 | 5,359 | 12,032 |
| Total | 26,961 | 30,403 | 38,908 | 49,955 | 63,471 | 101,226 | 171,768 | 206,987 |

## Table 5: Chinese imports of copper and copper alloy sheet, strip and plate by origin, 1995-2002 (tonnes)

|  | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 (1-10) |
|---|---|---|---|---|---|---|---|---|
| **Copper** | | | | | | | | |
| Taiwan | 12,013 | 7,681 | 8,534 | 10,174 | 12,554 | 17,212 | 14,216 | 17,052 |
| Germany | 1,673 | 1,234 | 889 | 803 | 1,607 | 4,235 | 8,860 | 9,686 |
| Japan | 16,272 | 14,811 | 17,065 | 16,992 | 17,992 | 13,592 | 15,316 | 6,121 |
| South Korea | 2,125 | 3,333 | 2,554 | 3,042 | 4,537 | 9,669 | 7,668 | 5,300 |
| Singapore | 879 | 1,239 | 84 | 86 | 96 | 1,724 | 1,719 | 2,549 |
| Others | 14,068 | 9,815 | 9,064 | 8,604 | 9,304 | 17,668 | 11,726 | 11,561 |
| Total | 47,024 | 38,110 | 38,192 | 39,701 | 46,091 | 64,103 | 59,503 | 52,269 |
| **Copper alloy** | | | | | | | | |
| Taiwan | 10,122 | 10,135 | 10,952 | 14,918 | 20,038 | 27,531 | 40,218 | 44,879 |
| South Korea | 6,231 | 4,831 | 9,395 | 13,989 | 15,335 | 23,253 | 22,053 | 16,614 |
| Germany | 391 | 1,643 | 4,951 | 6,066 | 11,922 | 13,762 | 9,895 | 12,851 |
| Japan | 10,148 | 16,008 | 23,027 | 21,198 | 26,675 | 15,338 | 11,973 | 11,617 |
| Poland | 6 | 579 | 68 | 679 | 2,211 | 2,944 | 1,307 | 2,069 |
| Others | 8,309 | 12,475 | 17,428 | 15,045 | 15,420 | 23,575 | 23,034 | 26,105 |
| Total | 35,207 | 45,671 | 65,821 | 71,895 | 91,601 | 106,403 | 108,480 | 114,135 |

**Table 6: Chinese exports of copper and copper alloy sheet, strip and plate, 1995-2002 (tonnes)**

|  | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| Copper | 3,394 | 2,000 | 1,097 | 1,450 | 1,596 | 5,320 |
| Copper alloy | 25,147 | 16,127 | 22,431 | 30,242 | 18,078 | 24,881 |

**Table 7: Estimated imports of ACR tube into China by origin, 1995-2002 (tonnes)**

|  | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 (1-10) |
|---|---|---|---|---|---|---|---|---|
| Japan | 13,127 | 15,054 | 14,299 | 17,042 | 25,184 | 23,273 | 23,857 | 15,069 |
| Malaysia | 1,302 | 1,235 | 1,349 | 3,242 | 6,902 | 3,277 | 4,293 | 2,978 |
| South Korea | 770 | 1,326 | 1,357 | 3,103 | 4,264 | 4,239 | 4,134 | 2,703 |
| Thailand | 296 | 85 | 116 | 421 | 476 | 1,564 | 4,268 | 2,445 |
| Estimated total | 15,495 | 17,700 | 17,121 | 23,808 | 36,826 | 32,353 | 36,552 | 23,195 |

## Table 8: Egyptian production and consumption of copper semis,

## 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Total** | | | | | | |
| Production | 12,900 | 12,900 | 13,900 | 29,900 | 82,800 | 94,800 |
| Consumption | 15,950 | 16,714 | 16,979 | 33,050 | 85,950 | 97,950 |
| Net imports | 3,050 | 3,814 | 3,079 | 3,150 | 3,150 | 3,150 |
| **Wirerod** | | | | | | |
| Production | 4,000 | 4,000 | 5,000 | 21,000 | 74,000 | 86,000 |
| Imports | 100 | 138 | 409 | 500 | 500 | 500 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Consumption | 4,100 | 4,138 | 5,409 | 21,500 | 74,500 | 86,500 |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 2,100 | 2,100 | 2,100 | 2,100 | 2,000 | 2,000 |
| Imports | 700 | 1,106 | 670 | 700 | 700 | 700 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Consumption | 2,800 | 3,206 | 2,770 | 2,800 | 2,700 | 2,700 |
| **Copper Water and ACR Tube** | | | | | | |
| Production | 0 | 0 | 0 | 0 | 0 | 0 |
| Imports | 700 | 657 | 720 | 400 | 400 | 400 |
| Exports | 0 | 3 | 0 | 0 | 0 | 0 |
| Consumption | 700 | 654 | 720 | 400 | 400 | 400 |
| **Copper Alloy Strip** | | | | | | |
| Production | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 |
| Imports | 900 | 1,187 | 665 | 900 | 900 | 900 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Consumption | 6,900 | 7,187 | 6,665 | 6,900 | 6,900 | 6,900 |
| **Copper Alloy Tube** | | | | | | |
| Production | 800 | 800 | 800 | 800 | 800 | 800 |
| Imports | 650 | 730 | 616 | 650 | 650 | 650 |
| Exports | 0 | 1 | 0 | 0 | 0 | 0 |
| Consumption | 1,450 | 1,529 | 1,416 | 1,450 | 1,450 | 1,450 |

## Table 9: Indian production and consumption of copper semis,

## 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Total** | | | | | | |
| Production | 339,600 | 369,700 | 410,600 | 448,200 | 493,900 | 531,600 |
| Consumption | 346,800 | 376,900 | 418,703 | 459,765 | 509,384 | 548,650 |
| Net imports | 7,200 | 7,200 | 8,103 | 11,565 | 15,484 | 17,050 |
| | | | | | | |
| **Wirerod** | | | | | | |
| Production | 156,000 | 180,400 | 215,600 | 247,500 | 287,500 | 319,500 |
| Imports | 4,000 | 4,000 | 5,108 | 7,930 | 13,407 | 15,000 |
| Exports | 500 | 500 | 594 | 821 | 1,134 | 1,100 |
| Consumption | 159,500 | 183,900 | 220,114 | 254,608 | 299,773 | 333,400 |
| | | | | | | |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 90,000 | 94,000 | 98,000 | 102,000 | 106,000 | 110,000 |
| Imports | 1,400 | 1,400 | 1,349 | 1,306 | 973 | 1,000 |
| Exports | 200 | 200 | 251 | 643 | 1,311 | 1,300 |
| Consumption | 91,200 | 95,200 | 99,098 | 102,663 | 105,661 | 109,700 |
| | | | | | | |
| **Copper Water and ACR Tube** | | | | | | |
| Production | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| Imports | 1,300 | 1,300 | 1,459 | 1,748 | 1,749 | 1,750 |
| Exports | 0 | 0 | 66 | 332 | 552 | 600 |
| Consumption | 6,300 | 6,300 | 6,392 | 6,416 | 6,197 | 6,150 |
| | | | | | | |
| **Copper Alloy Strip** | | | | | | |
| Production | 38,600 | 40,300 | 42,000 | 43,700 | 45,400 | 47,100 |
| Imports | 1,800 | 1,800 | 1,769 | 2,912 | 2,827 | 2,900 |
| Exports | 300 | 300 | 303 | 279 | 387 | 500 |
| Consumption | 40,100 | 41,800 | 43,466 | 46,333 | 47,840 | 49,500 |
| | | | | | | |
| **Copper Alloy Tube** | | | | | | |
| Production | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| Imports | 1,000 | 1,000 | 905 | 1,400 | 1,181 | 1,200 |
| Exports | 1,300 | 1,300 | 1,272 | 1,656 | 1,268 | 1,300 |
| Consumption | 49,700 | 49,700 | 49,633 | 49,744 | 49,913 | 49,900 |

## Table 10: Pakistani production and consumption of copper semis, 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| | | **Total** | | | | |
| Production | 16,000 | 11,445 | 10,225 | 14,025 | 14,025 | 14,025 |
| Consumption | 17,564 | 12,545 | 11,126 | 14,897 | 15,843 | 15,105 |
| Net imports | 1,564 | 1,100 | 901 | 872 | 1,818 | 1,080 |
| | | | | | | |
| | | **Wirerod** | | | | |
| Production | 16,000 | 11,445 | 10,225 | 14,025 | 14,025 | 14,025 |
| Imports | 507 | 210 | 42 | 79 | 1,460 | 600 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Consumption | 16,507 | 11,655 | 10,267 | 14,104 | 15,485 | 14,625 |
| | | | | | | |
| | | **Net imports of other semis** | | | | |
| Cu sheet & strip | 45 | 34 | 29 | 32 | 18 | 30 |
| Alloy sheet & strip | 144 | 113 | 268 | 216 | 82 | 100 |
| Cu tube | 373 | 426 | 379 | 366 | 177 | 200 |
| Alloy tube | 495 | 318 | 183 | 178 | 81 | 150 |

## Table 11: Saudi Arabian production and consumption of copper semis, 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| | | **Total** | | | | |
| Production | 153,900 | 179,600 | 164,300 | 179,000 | 172,000 | 167,500 |
| Consumption | 200,200 | 222,488 | 198,507 | 235,258 | 225,300 | 220,800 |
| Net imports | 46,300 | 42,888 | 34,207 | 56,258 | 53,300 | 53,300 |
| | | | | | | |
| | | **Wirerod** | | | | |
| Production | 153,900 | 179,600 | 164,300 | 179,000 | 172,000 | 167,500 |
| Imports | 1,000 | 1,085 | 1,239 | 1,704 | 2,000 | 2,000 |
| Exports | 300 | 3,919 | 1,372 | 445 | 300 | 300 |
| Consumption | 154,600 | 176,766 | 164,167 | 180,259 | 173,700 | 169,200 |
| | | | | | | |
| | | **Net imports of other semis** | | | | |
| Cu sheet & strip | 39,000 | 38,406 | 28,903 | 48,438 | 45,000 | 45,000 |
| Alloy sheet & strip | 1,000 | 1,042 | 806 | 1,152 | 1,000 | 1,000 |
| Cu tube | 4,000 | 3,872 | 3,378 | 3,554 | 4,000 | 4,000 |
| Alloy tube | 1,600 | 2,402 | 1,252 | 1,855 | 1,600 | 1,600 |

## Table 12: Turkish production and consumption of copper semis, 1997-2002 (tonnes)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Total** | | | | | | |
| Production | 209,650 | 233,650 | 234,650 | 276,650 | 255,720 | 295,650 |
| Consumption | 198,250 | 223,712 | 226,532 | 269,494 | 240,697 | 281,950 |
| Net imports | -11,400 | -9,938 | -8,118 | -7,156 | -15,023 | -13,700 |
| **Wirerod** | | | | | | |
| Production | 175,000 | 199,000 | 200,000 | 242,000 | 221,000 | 261,000 |
| Imports | 15,000 | 15,856 | 9,999 | 10,260 | 9,943 | 10,000 |
| Exports | 34,000 | 34,023 | 25,624 | 24,554 | 28,565 | 27,000 |
| Consumption | 156,000 | 180,833 | 184,376 | 227,706 | 202,378 | 244,000 |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| Imports | 1,700 | 1,721 | 1,966 | 2,816 | 3,162 | 3,000 |
| Exports | 100 | 100 | 293 | 884 | 1,509 | 1,800 |
| Consumption | 21,600 | 21,621 | 21,673 | 21,932 | 21,653 | 21,200 |
| **Copper Water and ACR Tube** | | | | | | |
| Production | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Imports | 4,000 | 4,427 | 4,337 | 5,109 | 3,724 | 4,500 |
| Exports | 200 | 259 | 149 | 374 | 535 | 600 |
| Consumption | 13,800 | 14,168 | 14,188 | 14,735 | 13,189 | 13,900 |
| **Copper Alloy Strip** | | | | | | |
| Production | 3,000 | 3,000 | 3,000 | 3,000 | 3,000 | 3,000 |
| Imports | 2,000 | 2,230 | 1,544 | 1,252 | 1,560 | 1,500 |
| Exports | 300 | 282 | 367 | 1,444 | 2,872 | 3,500 |
| Consumption | 4,700 | 4,948 | 4,177 | 2,808 | 1,688 | 1,000 |
| **Copper Alloy Tube** | | | | | | |
| Production | 1,650 | 1,650 | 1,650 | 1,650 | 1,720 | 1,650 |
| Imports | 600 | 608 | 540 | 777 | 257 | 400 |
| Exports | 100 | 116 | 71 | 113 | 188 | 200 |
| Consumption | 2,150 | 2,142 | 2,119 | 2,314 | 1,789 | 1,850 |

## Table 13:  South East Asian production and consumption of copper semis, 1997-2002  (tonnes)

|  | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Total** | | | | | | |
| Production | 532,200 | 375,000 | 436,719 | 471,813 | 498,683 | 555,968 |
| Consumption | 604,097 | 440,781 | 533,732 | 560,447 | 619,253 | 707,066 |
| Net imports | 71,897 | 65,781 | 97,013 | 88,634 | 120,570 | 151,098 |
| **Wirerod** | | | | | | |
| Production | 445,200 | 304,000 | 346,650 | 365,000 | 386,100 | 439,300 |
| Imports | 10,088 | 13,119 | 23,589 | 31,722 | 27,984 | 49,065 |
| Exports | 356 | 9,315 | 9,415 | 5,079 | 6,952 | 7,000 |
| Consumption | 454,932 | 307,804 | 360,824 | 391,643 | 407,132 | 481,365 |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 15,000 | 10,000 | 20,000 | 16,000 | 17,000 | 18,500 |
| Imports | 15,023 | 30,865 | 28,140 | 34,030 | 65,559 | 52,252 |
| Exports | 199 | 1,208 | 2,557 | 2,726 | 2,583 | 2,500 |
| Consumption | 29,824 | 39,657 | 45,583 | 47,304 | 79,976 | 68,252 |
| **Copper Water and ACR Tube** | | | | | | |
| Production | 59,000 | 50,000 | 59,069 | 69,613 | 74,383 | 76,668 |
| Imports | 21,096 | 17,633 | 19,002 | 22,487 | 21,617 | 27,332 |
| Exports | 15,626 | 22,430 | 25,071 | 37,100 | 37,000 | 41,000 |
| Consumption | 64,470 | 45,203 | 53,000 | 55,000 | 59,000 | 63,000 |
| **Copper Alloy Strip** | | | | | | |
| Production | 8,000 | 8,000 | 6,000 | 6,200 | 6,200 | 6,500 |
| Imports | 30,369 | 29,848 | 45,300 | 48,094 | 51,538 | 71,850 |
| Exports | 346 | 607 | 1,438 | 4,091 | 1,064 | 1,900 |
| Consumption | 38,023 | 37,241 | 49,862 | 50,203 | 56,674 | 76,450 |
| **Copper Alloy Tube** | | | | | | |
| Production | 5,000 | 3,000 | 5,000 | 15,000 | 15,000 | 15,000 |
| Imports | 13,097 | 10,088 | 23,599 | 10,350 | 11,065 | 11,000 |
| Exports | 1,249 | 2,212 | 4,136 | 9,053 | 9,594 | 8,000 |
| Consumption | 16,848 | 10,876 | 24,463 | 16,297 | 16,471 | 18,000 |

**Table 14: Gulf States production and consumption of copper semis, 1997-2002 (tonnes)**

|  | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| | | **Total** | | | | |
| Production | 28,000 | 31,990 | 37,810 | 40,000 | 40,000 | 41,000 |
| Consumption | 54,000 | 63,290 | 72,410 | 81,000 | 96,200 | 96,300 |
| Net imports | 26,000 | 31,300 | 34,600 | 41,000 | 56,200 | 55,300 |
| | | **Wirerod** | | | | |
| Production | 28,000 | 31,990 | 37,810 | 40,000 | 40,000 | 41,000 |
| Imports | 20,000 | 21,600 | 25,300 | 29,300 | 36,400 | 39,000 |
| Exports | 0 | 0 | 0 | 0 | 0 | 0 |
| Consumption | 48,000 | 53,590 | 63,110 | 69,300 | 76,400 | 80,000 |
| | | **Net imports of other semis** | | | | |
| Cu sheet & strip | 1,000 | 1,500 | 2,000 | 3,300 | 4,000 | 4,500 |
| Alloy sheet & strip | 900 | 900 | 1,100 | 700 | 1,300 | 1,300 |
| Cu tube | 2,400 | 3,200 | 3,200 | 4,700 | 5,800 | 6,500 |
| Alloy tube | 1,700 | 4,100 | 3,000 | 3,000 | 8,700 | 4,000 |

**Table 15: Iranian production and consumption of copper semis, 1997-2002 (tonnes)**

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002e |
|---|---|---|---|---|---|---|
| **Total** | | | | | | |
| Production | 83,457 | 69,446 | 97,399 | 97,221 | 94,693 | 98,988 |
| Consumption | 81,215 | 67,145 | 90,864 | 91,586 | 98,098 | 102,892 |
| Net imports | -2,242 | -2,301 | -6,535 | -5,635 | 3,405 | 3,904 |
| | | | | | | |
| **Wirerod** | | | | | | |
| Production | 76,100 | 61,000 | 82,000 | 82,800 | 85,800 | 85,800 |
| Imports | 8 | 8 | 1 | 394 | 945 | 806 |
| Exports | 400 | 439 | 484 | 1,379 | 318 | 484 |
| Consumption | 75,708 | 60,568 | 81,517 | 81,815 | 86,427 | 86,122 |
| | | | | | | |
| **Copper Sheet, Strip and Plate** | | | | | | |
| Production | 1,020 | 1,048 | 4,075 | 3,194 | 506 | 1,950 |
| Imports | 470 | 370 | 177 | 142 | 1,070 | 1,961 |
| Exports | 1,000 | 1,015 | 3,093 | 2,173 | 506 | 731 |
| Consumption | 490 | 403 | 1,159 | 1,163 | 1,070 | 3,180 |
| | | | | | | |
| **Copper Tube** | | | | | | |
| Production | 2,481 | 2,428 | 2,764 | 2,980 | 2,778 | 3,302 |
| Imports | 700 | 968 | 1,003 | 1,184 | 2,304 | 2,798 |
| Exports | 50 | 52 | 72 | 69 | 43 | 41 |
| Consumption | 3,131 | 3,344 | 3,695 | 4,095 | 5,039 | 6,059 |
| | | | | | | |
| **Copper Alloy Strip** | | | | | | |
| Production | 3,399 | 4,347 | 7,748 | 7,723 | 5,296 | 7,329 |
| Imports | 50 | 76 | 29 | 424 | 796 | 897 |
| Exports | 2,600 | 2,825 | 4,669 | 4,683 | 1,985 | 2,617 |
| Consumption | 849 | 1,598 | 3,108 | 3,464 | 4,107 | 5,609 |
| | | | | | | |
| **Copper Alloy Tube** | | | | | | |
| Production | 457 | 624 | 812 | 524 | 313 | 607 |
| Imports | 600 | 630 | 664 | 606 | 1,165 | 1,315 |
| Exports | 20 | 22 | 91 | 81 | 23 | 0 |
| Consumption | 1,037 | 1,232 | 1,385 | 1,049 | 1,455 | 1,922 |

**Possible Solution and Discussion:**

Rather than simply present a two page summary solution, we have decided to provide you with more detail and show some of the rough workings, notes and initial analysis that you would want to perform in order to construct a 2 page summary analysis. Remember, you only have 1 hour, so be sure to keep things simple and make sure you can draw out a story from the data. We have decided to focus on China and create a story around its growing demand for wirerod.

The data in Table 2 and the charts below show that China is by far the largest producer of copper semi's in the region. It produced just over half of the regional total in 1997 alone. Its share of the total production has only increased over time whereby in 2002 it was producing close to two thirds of the regional total. As a side note, South East Asia's production levels decreased over this time.
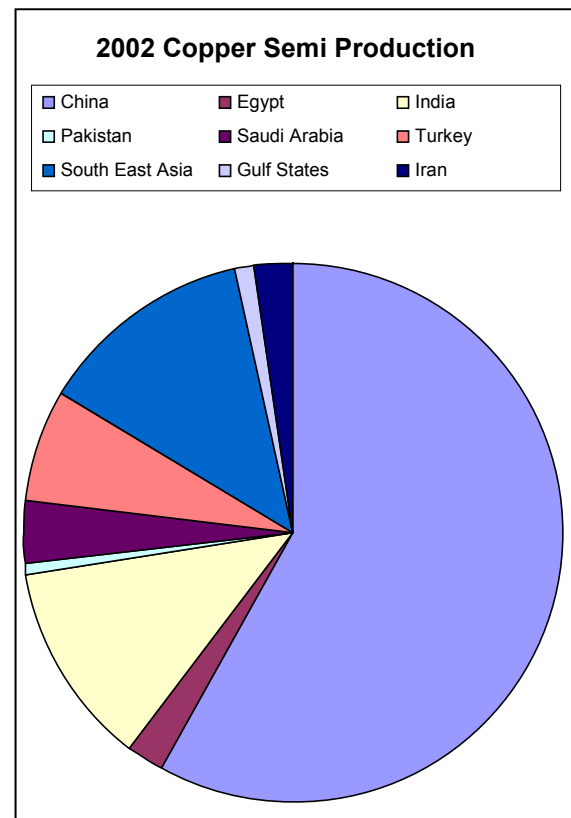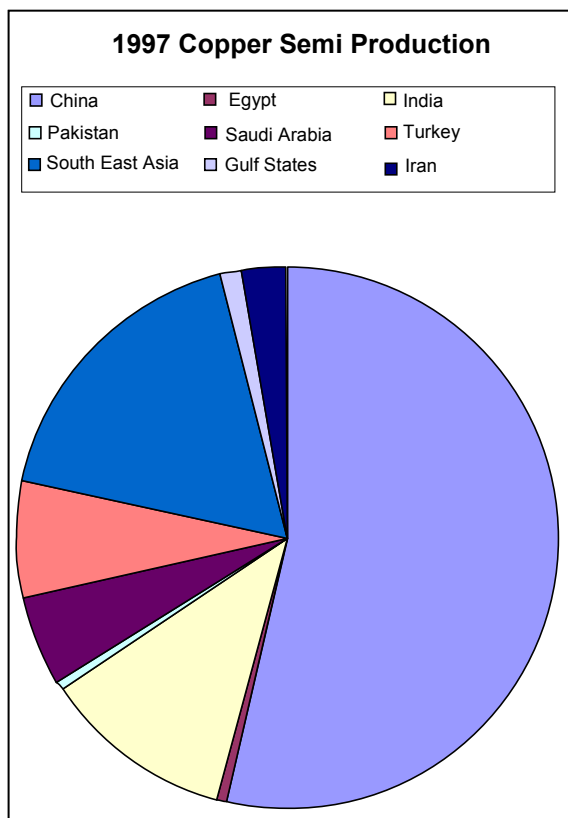
Staying in Table 2 and looking at the chart below it can be seen that China's overall demand for Copper semis has historically been greater than production, meaning they have to import many tonnes to meet demand. This supply-demand differential gap has been rising in recent years.
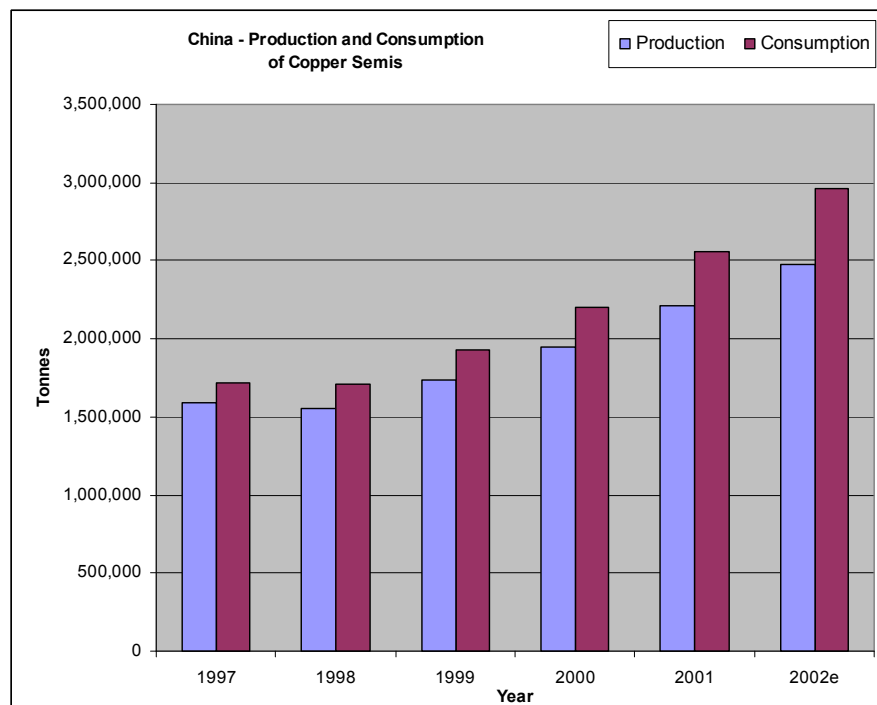


In Table 3. we see that wirerod is the most prevalent copper semi being produced and consumed in China. From the graph below we can see that imports of wirerod have increased 6 fold in order to meet demand within the country, whilst consumption has doubled. Exports within the graph are negligible and this is reflected in the data.

What must be happening is that China's economy is growing so fast (evident by the growth in consumption) that business's are having to import more and more tonnes of wirerod to meed their needs.

On a similar note ACR Tube (Air Conditioning and Refrigeration) consumption has tripled and ACR tube inputs have doubled. China also does not export any of this copper semi.

**China - Wirerod** — Production, Imports, Exports, Consumption
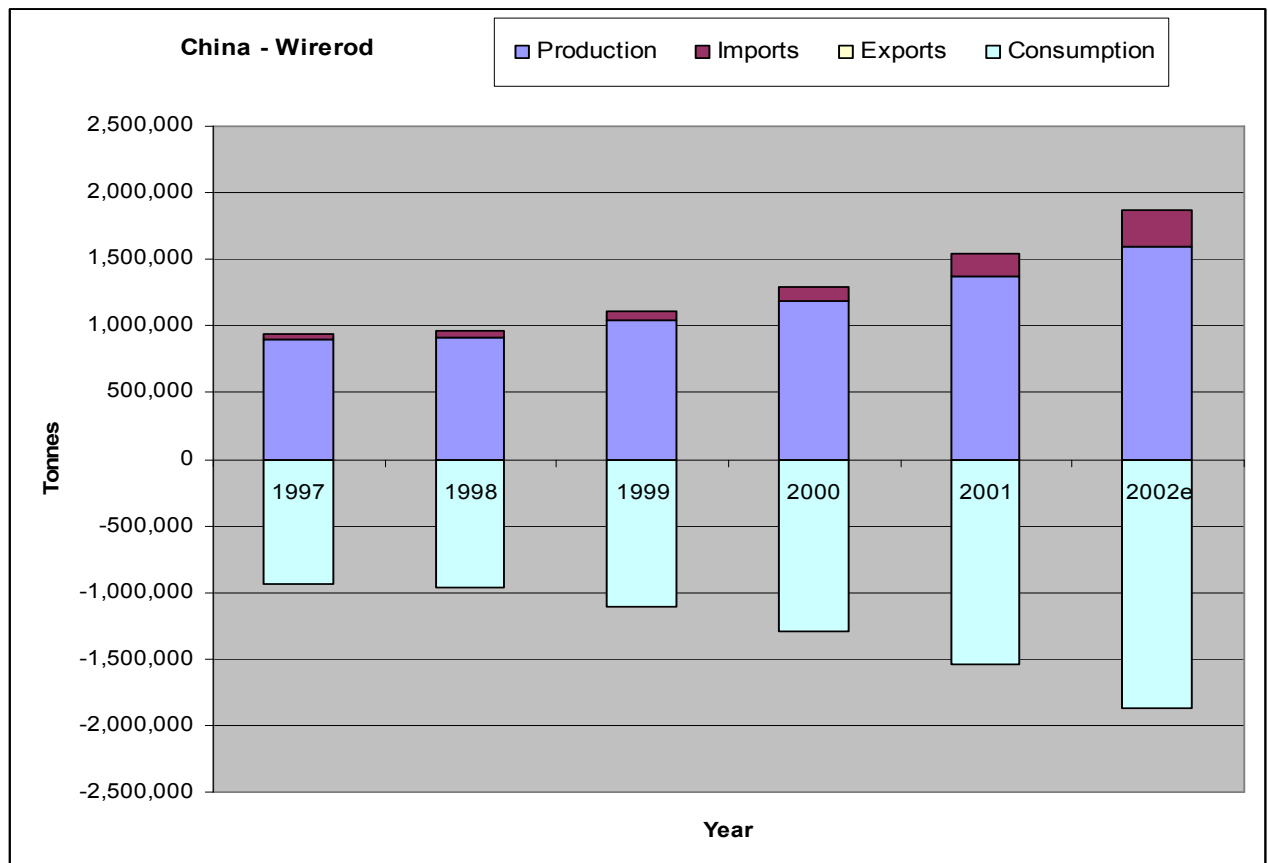
With dramatic increases in both of these copper semis, we could be led to believe that there may have been an increase in the level of construction and development in China, with buildings demanding wirerod for concrete reinforcement and ACR tube for air conditioning.

Table 4 and the chart below illustrates that China originally sourced the majority of its wirerod from Taiwan, however recently South Korea, Russia and Kazakhstan have become major players in the exporting of wirerod to China. This graph also highlights the massive growth in wirerod now crossing into China.

In terms of the ACR Tube, China sources almost all of its import requirements from Japan. This is evident in Table 7.

**Chinese Imports of Wirerod by Origin**
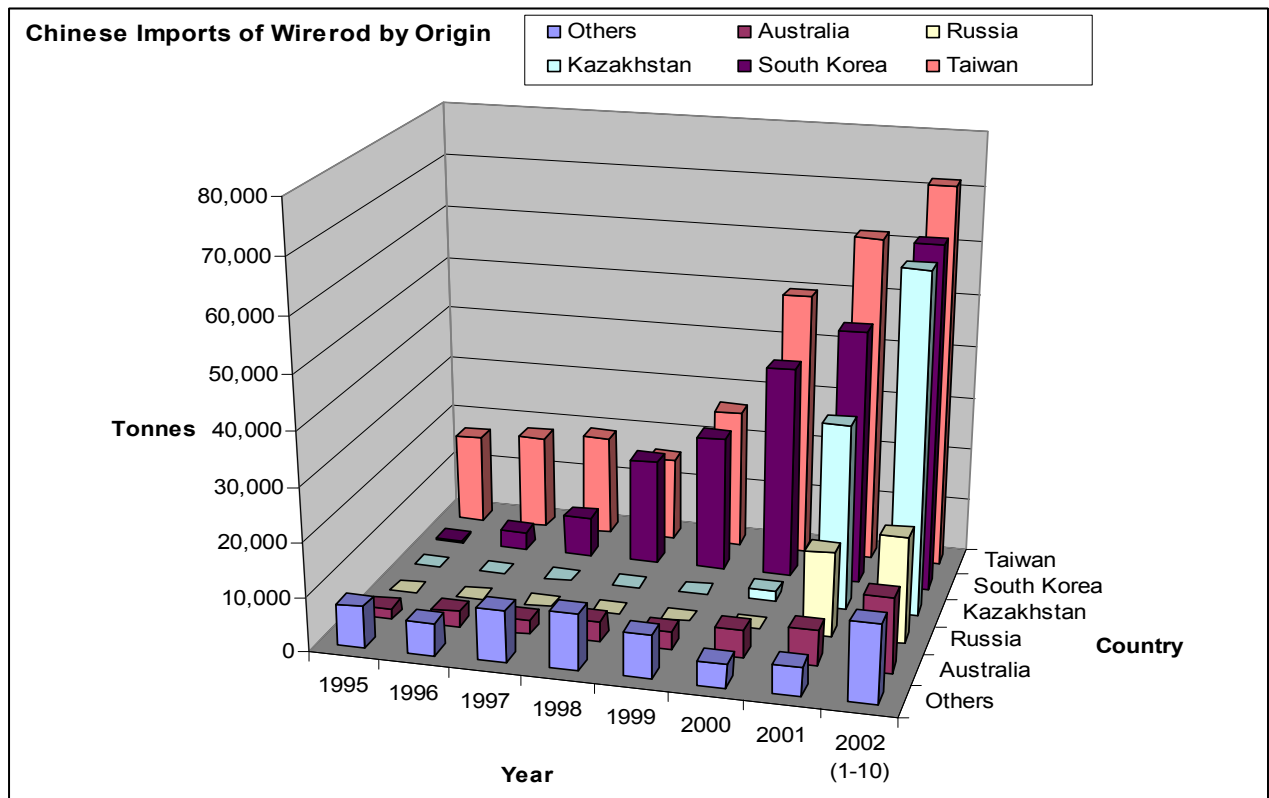
From this graph we could speculate that countries such as Kazakhstan and Russia have only just realised the growth potential in China for wirerod and started exporting to China on a dramatically increased scale, or perhaps certain trade barriers between these nations have finally been lifted.

Finally, looking at many of the other wirerod producing nations in the region (Tables 8-15) we can see that wirerod is in high demand but not heavily exported. This leaves the door wide open for resource rich nations in the region such as India, Australia and some of the African nations to take advantage of the Chinese wirerod demand boom and the general wirerod production shortage in the region.

In conclusion these nations just mentioned should perform further research on this topic and consider extracting the required metal ore from the earth and either shipping it over as ore, metal or finished wirerod, because with the growth boom in China, other nations in the region will be soon to follow.

In this style of case question, you are presented only with the chart below and no further information. You must be able to explain to the interviewer what may be happening within the business that this chart possibly reflects. Essentially, this type of charts based case is designed to assess your graphical analytical skills and to see how you deal with ambiguity. Feel free to make any necessary assumptions, but ensure these assumptions are consistent with each other.
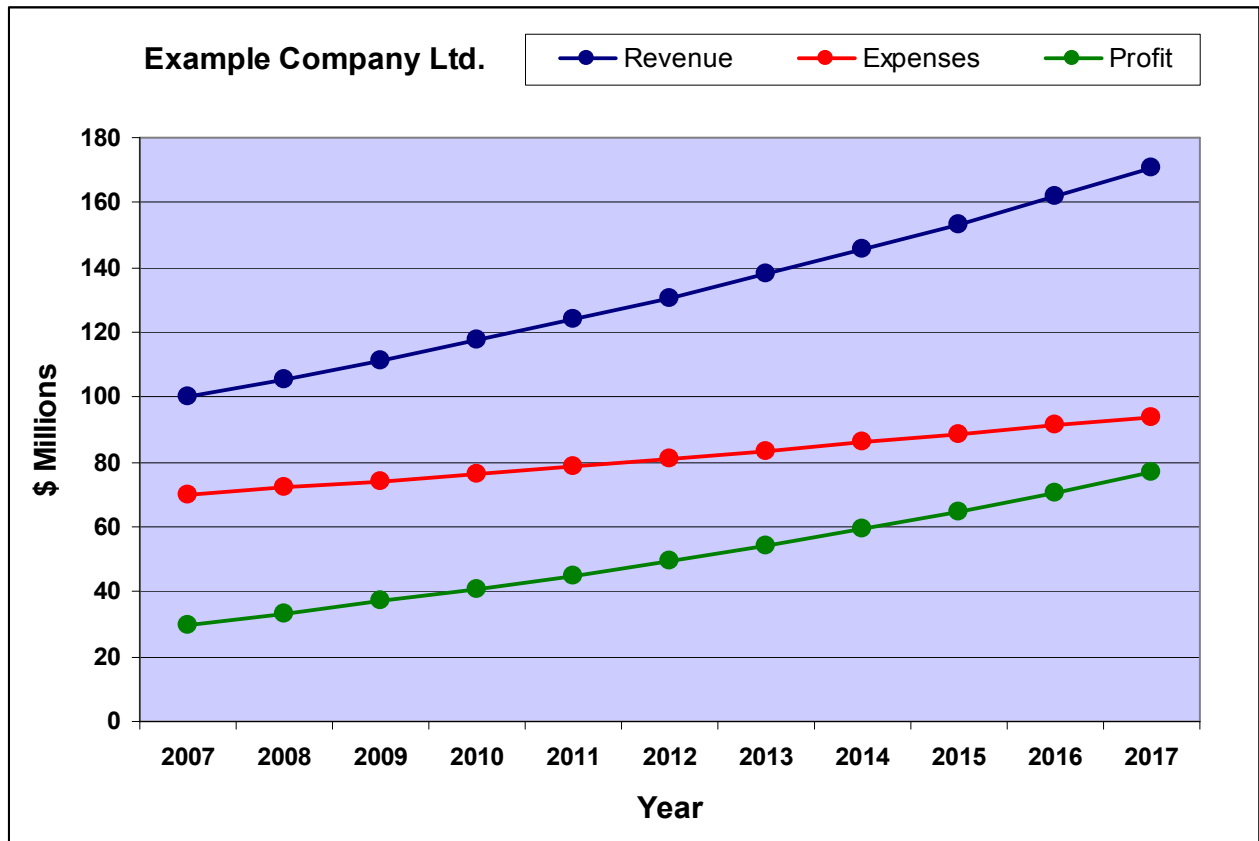
It is first best to describe the obvious things within the chart by listing the facts. This will help to narrow your focus.

The Facts

- This chart appears to be a forecast of an organisations revenue, expenses and profits over 10 years, reported in millions of dollars.
- Revenue in blue appears to be increasing each year at an exponential rate.
- Expenses in red are also increasing but in more of a linear fashion and at a slower rate than revenue.
- Profit in green, simply follows revenue and expenses, as expected since Profit = Revenue - Expenses. Because the profit trend line is a derived value on the chart, based off the revenue and expense values, we can ignore it from our analysis.

Next you should begin analysing why values on the chart are moving in a certain way by asking yourself some key questions which you can write down.

Questions

- Why is revenue forecast to increase at a greater rate than expenses?
- Why is revenue increasing exponentially when expenses appear to be increasing linearly?

Now you can begin answering your questions through discussion, making assumptions and proposing some generic solutions. A summary of such a discussion in relation to this chart may look something like this:

Discussion & Analysis

- Margins are obviously increasing each year, because the percentage gap between revenue and expenses grows each year. Now because Revenue = Price x Volume, two things could be happening. Perhaps volume with no associated variable costs or overheads is predicted to increase, meaning the business assumes economies of scale will be reached in the near future. We already know that sales volumes are forecast to increase each year because expenses are increasing. Because this is a complex scenario to analyse we will assume that it is

unlikely. Exponential revenue increases, however, does infer year on year percentage price increases. This better explains the curve as the price increase effect compounds upon itself.

- Due to yearly inflation which effects the price of inputs such as labour and materials, expenses should also be increasing exponentially each year, however with inflation of say 2-3% this chart due to it's scale, probably does not reflect this exponential growth trend in expenses.
- Concluding, price must be forecast to increase at a faster rate than inflation.

Finally you can discuss the business impact of any findings and conclusions which result from the discussion and analysis.

Business Impact

- This chart is the summary of an organisational forecast and we have just concluded that the business is predicting their prices to increase at a higher rate than inflation. A risk therefore exists that the market will not absorb or tolerate the planned price increases and sales volumes could fall as a result.

As a consulting firm helping this organisation, greater research and analysis into competitors pricing strategies, historical industry and market research on pricing increases in order to better predict future price increases could be conducted and presented with recommendations in a report to the organisations management.

---

**Question:**
**Interpret and explain the following chart.**

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This question is identical to the style seen above. We present this as another example and the possible solution will be structured in the same way.

**Monthly Sales Volume for the last 3 years**



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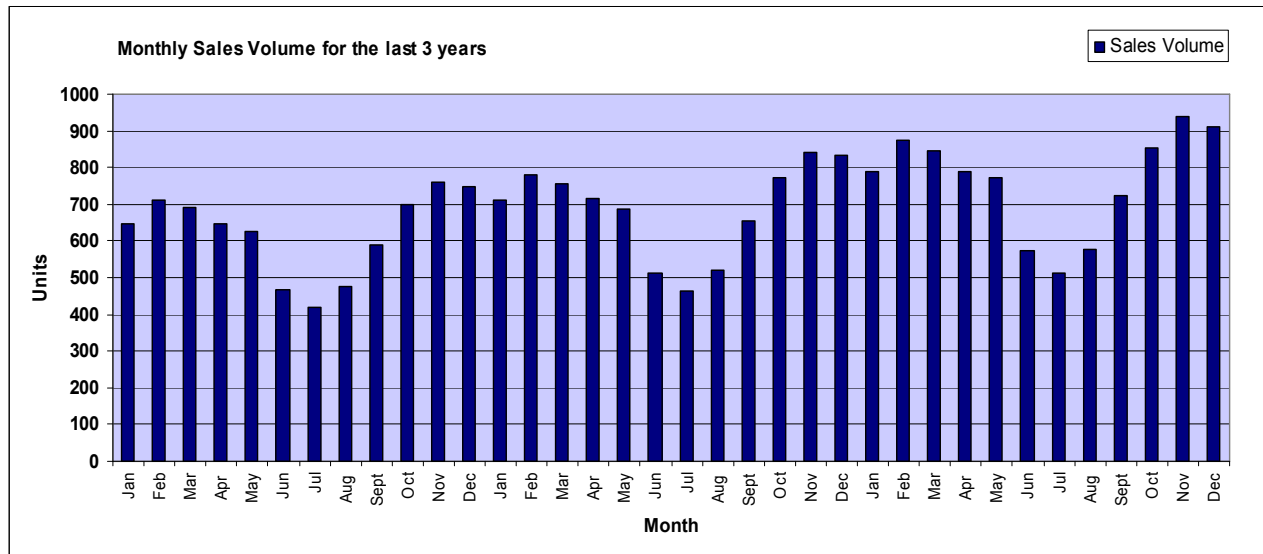
**Possible Solution:**

---

## The Facts

- This is a historical view of an organisations monthly sales volume from the last 3 years.
- Looking at equivalent months (e.g. start with January) it can be seen that sales have been increasing each year.
- A heavy seasonality pattern exists with sales dropping by around 30% in June, July and August

## Questions

- Why does this business suffer from large seasonal swings in sales volume?
- What kind of business is this and what hemisphere is this business in? This will help to understand the seasonal sales volumes and to determine if it is a drop due to summer weather or a drop due to winter or neither.

## Discussion & Analysis

- This organisation may be heavily affected by the weather or similar seasonality affects such as sporting seasons or school terms.
- If we were to assume that this business is a growing travel company operating in the southern hemisphere specialising in sunny island holidays in the Pacific Ocean. Then we could explain the sales drop as the result of the weather getting cooler.
- If we were to assume that this business is a sporting goods supplier for which the specific sport for which it supplies equipment and apparel has its off season between June and August, then we could explain the sales drop as a result of this.
- Whatever the cause of the seasonal sales volumes, cash flow management must be a key issue for this business.
- If cash flow management is an issue for this organisation then a strategy of 'seasonal diversification' to offset the seasonal impact may be appropriate. E.g. the sporting goods company begins selling sporting goods for a sport which is played in the off season of its primary sports market. E.g. the southern hemisphere travel company moves into selling ski holidays to boost cash flow in the winter months.

## Business Impact

- Seasonal sales volumes no matter what the cause places stress on cash within an organisation. During the low season, financing is often required to meet short term obligations to suppliers and employees, which is usually comfortably repaid with cash during the boom time. The constant challenge however, still persists and unnecessary interest payments and negotiations with lenders can place a drain on management.

As a consulting firm assisting this organisation, a strategy to smooth this seasonality effect, tailored towards the operating environment of the client could be designed after thorough analysis of the business and its opportunities.

Again this question is identical to the style seen above. We present this as the final example, again with the possible solution structured as before.
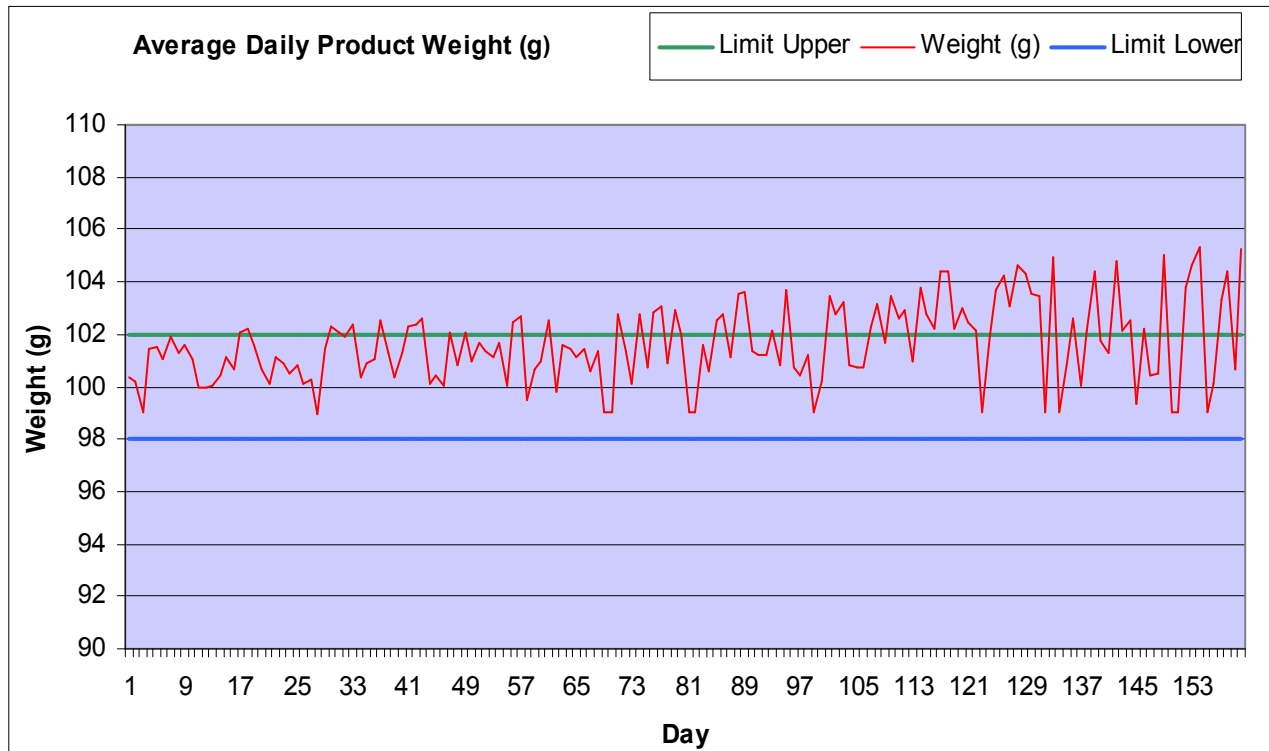


**Possible Solution:**

The Facts

- This chart shows the average daily weight of what could be a manufactured product, probably one coming off a production line.
- There appears to be defined limits, probably for quality control purposes.
- The average weight has started to breach the upper limit more and more frequently in the last 90 days and has become somewhat erratic.

## Questions

- Why has the manufacturing process started fluctuating so badly such that the average weight fluctuates so much daily?
- Why has the average daily weight started to regularly exceed the acceptable high side limit of 102 grams?
- Why was corrective action not taken at the first sign of a breach in the quality control limits?

## Discussion & Analysis

- A process can start to fluctuate for many reasons. Machinery could be wearing down and need replacing, staff may be tired and overworked, new staff may not have been adequately trained, input materials may not be consistent, or there could be general problems with the process itself for example the sequence and timing assigned to each sub process or event.
- There appears to be a trend in the data, i.e. the average weight is regularly breaching the upper acceptable limit, which would lead us to believe that it may be something simple like a faulty piece of equipment which is over allocating the inputs to the end product. E.g. too much of some type of component or ingredient is being added.
- The erratic behaviour of the trend line however, indicates that it is more than just old machinery and could in fact be a combination of things.

## Business Impact

- In terms of the business impact, this is a quality issue which by nature has multiple ramifications. First, it is wasteful and costly because the consumer is in effect, getting more than they have paid for when the weight is higher than the specifications, and hence margins are eroded. Secondly large inconsistencies in weight make the product and organisation look incapable as their output is not standardized, this impacts reputation. Finally since this is a process control issue the business needs to ensure this does not happen again both with this product and others they may manufacture. This can be achieved through creating new processes and procedures and ensuring they are followed by employees in charge of monitoring and quality control.

As a consulting firm working with this organisation, the first thing to do would be to address the current situation and determine the root cause/s of the product weight inconsistencies.  Secondly a full analysis of and changes to internal processes would be required to ensure that product quality is maintained across the organisation.

That concludes this section on data and charts based cases.  We hope we have provided you with some insight into answering this style of question should you come across it during the management consulting interview process.  On the next page you'll find additional data and charts based questions to try yourself. Good luck!

# Other Data & Charts Based Cases

- Analyse and explain what the following chart could represent.
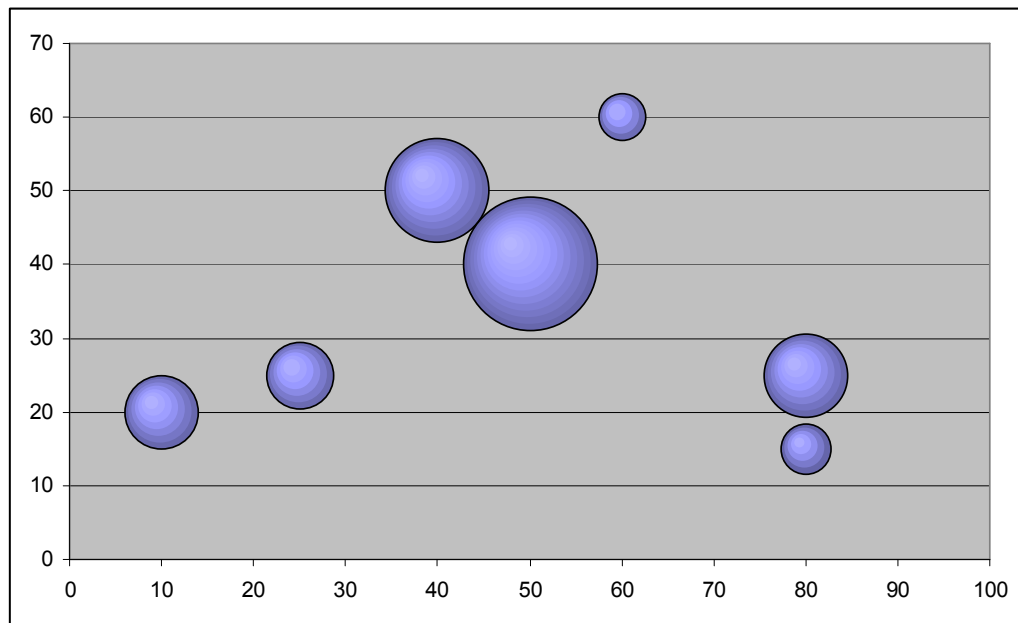


- Analyse and explain what the following chart could represent.
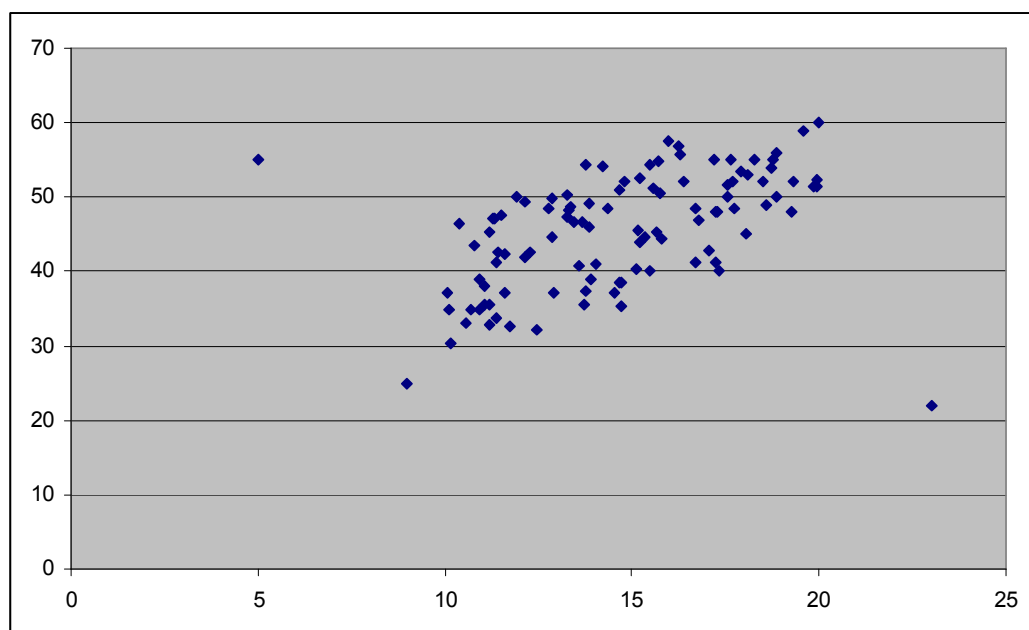
# ■ Section 5:  Example Logic Problem Cases

Logic problems can be considered rare when it comes to management consulting interviews.  They are not a case question as such but have been known to be asked.  Since most management consulting firms put you through 2 - 3 rounds of case based interviews there is a chance you will encounter a logic problems maybe in the final round interview just to test you once more in a slightly different way through your ability to solve abstract puzzles through logic or come up with creative, unique and interesting answers to strange and unrealistic problems.  They have been included in this guide to ensure you know what to expect if you happen to be asked one of these questions in an interview.  Remember, management consulting firms are looking for the best people.  Intelligence with a sound mathematical ability, logical and analytical yet creative with an open mind are the prized traits of a new recruit.  All of these traits are required to first analyse data and then devise new strategies for client organisations.  Logic problems like those in this section help test all of this.

As mentioned it is rare that you will be asked a logic problem and from our experience this style of question will generally only appear in the final round interview, if it appears at all.  Often difficult at first glance, they are generally easily solved if you think 'outside the box' Take comfort in the fact that this style of question should be more familiar to you as such logic problems are often popular brain teasers or puzzles that you may have heard throughout your education and life in general.  You may have even seen some of these in text books or newspaper puzzle sections.  Other logic problems are different and simply require creative and interesting answers to impress the interviewer.

**Question:**
**You have a 100L barrel of white wine and an equal sized barrel of red wine. You take a ladle of red wine and put it into the white wine and they mix perfectly. You then take a ladle of the mixture and put it into the red wine. Assume no spillage occurs. After completing the exercise you are asked: is there more red wine in the white wine than there is white wine in the red wine?**

First we must understand the question. Forget that no one in their right mind would go mixing red and white wine together, but let's remember it's an abstract logic problem. Basically it is asking, is there more red wine polluting the white wine barrel compared to the amount of white wine polluting the red wine barrel.

## Solution:

Answering this problem can be done in two ways.

First you could say okay let the ladle be 10L, and perform some basic calculations.

- 10L of red wine goes into the white wine.
- There is now 110L of wine in the white barrel in a ratio of 10:100
- Taking a 10L ladle of the mixture in the same ratio results in 9.09L of white and 0.91L of red sitting in the ladle.
- This means that there is now 10 - 0.91 = 9.09L of red wine left in the white wine barrel.
- Pouring this ladle into the red wine results in 9.09L of white wine ending up in the red wine barrel which is the same as the amount of red wine left in the white wine barrel.

Therefore the answer is "no, it's the same"

This is a good enough answer but you interviewer may ask, "well what if the ladle was a different size?" you could go on performing the same calculations using different sized ladles and get the same answer so to better demonstrate your logic ability, or you can assign the ladle be some variable, e.g. 'z'. Now you can perform similar calculations

- z litres of red wine goes into the white wine.
- There is now 100 + z litres of wine in the white wine barrel in a ratio of z :100 (Red : White)

- Taking a ladle of size z litres from the mixture in this same ratio results in the ladle containing:

$$\frac{z^2}{100 + z}$$ Litres of red wine and $z - \frac{z^2}{100 + z}$ of white wine.

- This also means that there is now $z - \frac{z^2}{100 + z}$ of red wine left in the white wine barrel.

- Pouring this ladle of the mixture into the red wine results in

$z - \frac{z^2}{100 + z}$ of white wine being in the red wine barrel

and therefore there is the same amount of red wine in the white wine as there is white wine in the red wine.

This method of using a variable is a bit more involved but clearly demonstrates your ability to use mathematical reasoning!

This question involves more of an exploration of the issues as well as using logic and creativity. Here there is no right or wrong answer, rather the interviewer wants to see your potential for creative thought as well as business decision making.

**Solution:**

Among the possible industries or business models here are a few:

Holiday/Travel Industry
Civilian travel into space has a huge potential with many people dreaming of going into space, feeling weightless and viewing the earth from afar. Such an industry would probably grow much like the terrestrial transport based advances we have already seen throughout history. With the advent of airborne flight speeding up travel and opening up new destinations space travel should do the same. Like aeroplane jet travel once was, space holidays would start off only for the very rich as costs would be huge for the operating companies. You may be able to only be in space for a few hours before returning to earth or perhaps extended stays may be possible by visiting special tourist space stations, setup like luxurious hotels.

Construction
In line with this idea another early industry which may operate in space will be construction. Large construction or specialist aeronautical companies may soon be offered contracts to build such things as hotels in space. Much of the construction can take place on earth with simple assembly teams required to get the modularised sections of building into space and connected together.

Advertising
Large brand focused multinational companies such as Nike, Coca Cola, McDonalds, Amazon, Sony and Toyota may soon create giant advertising, billboard like objects which can orbit the earth displaying their brand name. We already see sky writers create advertising messages in the air so this

would be taking it to the next level.  Costs would be huge and hence why only extremely large companies could justify such an expense

Such a billboard would obviously need to be huge, in the order of 100's of football fields in area, but if it could be built in such a way that it was made out of light weight materials and collapsible or compacted enough that it could go up in conventional space craft then a possibility may exist to get the thing constructed and orbiting with only 2 or 3 manned space flights.

A lower cost option may be to design some special kind of solar powered projector device that can be triggered to shine a mirrored image onto clouds so that we could read it on earth the other way round.

Mining
Minerals on other planets may be useful for medicines, construction purposes, forging existing and new alloys or to substitute our dwindling supply. Such an industry would take a long time to establish since initial costs would be huge in terms of machinery, transportation and processing. If mining and processing were robotic and conducted on foreign planets then all that would need to be transported back would be the finished product rather than the basic unprocessed ore.

Real Estate
Potentially already in existence today is the buying and selling of planetary real estate.  Depending on laws and restrictions we should be able to purchase or claim land on planets and moons within our solar system.  In fact you can already purchase land on the moon, but how legitimate these deeds are at this time is an interesting question.  United Nations restrictions and Government regulations may hold back this industry at this time, however this line of business would be relatively low cost, and demand potentially high.

Telecommunications
Already in existence in the form of satellites, telecommunications is built for space since data can travel with ease via radio and microwaves.  Special repeater and amplifier receiver/transmitter stations may be built in space as satellites or fixed to planets and moons to allow for more efficient and longer distance communication in space without the need for an initial powerful transmission signal.

Funeral Services
This is an interesting idea where the family or the deceased may directly request to have their ashes released in space, or alternatively sent out on a

continual journey through space. This business would be relatively low cost as the funeral service and cremation could be held on earth and then hundreds of urns could be taken to space in one single voyage and each is released as the space vehicle orbits the earth before returning to earth.

Private Investigators
Using current or new satellites and special cameras with powerful zooms and or thermo detection, private investigators could utilise this technology to track a persons whereabouts and daily movements for a client, all from the comfort of his/her computer.  Privacy and Spying laws may be an issue here and would need to be researched.

This question is short and sweet, getting you to think on your toes, use some common sense and logic to think about product design. An Engineer would probably answer this better than a business student but something along these lines should suffice.

**Solution:**

Smoothly curved surfaces are actually stronger than a flat surface of identical diameter. This strength in design prevents the pressurized, carbonated beer or soda from forcing the can out of shape.

As an aside, this concept also describes why European castles went from being built with straight linear walls and rectangular prism shaped buildings and towers to rounded, cylindrical structures to better withstand the force of enemy cannons or catapult fire.

Additional reasons could be to hide volume and give the appearance of more liquid. Also maybe it makes them stack easier, however that's probably what the grooved lid and ridged circumference is for on the bottom.

**Question:**
**Does the sun always rise in the east?**

**Solution:**

This is another short brain teaser to test your knowledge. The answer is no, because at the exact point of the North Pole there is no such thing as east or west because everything is south. The same can be said for the South Pole in which all directions are north.

In addition you want to say that in the far northern winter and southern summer the sun doesn't rise at all.

To be even more clever you could explain that the magnetic polarity of earth changes every million or so years so that north actually becomes south and therefore east would become west. Meaning the sun would rise in the new magnetic west.

**Question:**

**You have a 3 litre bucket and a 5 litre bucket. How will you measure out exactly 4 litres of water? Assume you have an endless supply of water and no markings on the buckets.**

This is a question you may have seen before and in fact it appeared in one of the 'Die Hard' movies. It requires a bit of thinking but the answer is relatively straight forward. There are actually two ways of measuring out the 4L exactly so see if you can solve it the other way.

**Solution:**

First fill the 3L bucket and pour all of its contents into the 5L bucket. You now have 3L of water in a 5L bucket and therefore 2L of empty space. Now fill the 3L bucket and pour as much as you can into the 5L bucket (i.e. 2L). This leaves 1L in the 3L bucket. Empty the 5L bucket and pour in the 1L of water you have sitting in the 3L bucket. Now fill the 3L bucket to the top and pour it into the 5L bucket and you are done. 1L + 3L = 4L measured out exactly in the 5L bucket.

**Question:**
**Why are manhole covers round?**

**Solution:**

You may be given some time to think about this question but like most logic puzzles the answer is simple.

Round lids or covers cannot fall into the hole they are covering. A square or rectangle cover would fall in if angled correctly, i.e. on the hypotenuse or diagonal of the square whole. A round lid cannot fall through a round hole no matter what angle you put it on. Therefore to avoid losing the lid down the hole, manhole covers have been designed to be circular.

**Question:**

**In a 24 hour day how many times do the hands of a clock overlap?**

**Solution:**

The answer will vary depending if you count 12:00am once or twice. I.e. at the start and then at the end for midnight.

Most people will assume 24 times, however if you take the time to think about it and work it out in your head or on paper the answer is actually 22 or 23 if you make the assumption above.

The reason is that yes the hands overlap once every hour and then in the 10th and 22nd hour you see the hands overlap right at the end of the hour at roughly 10:54, but they don't overlap again until 12:00 noon. Therefore the hands never overlap in the 11th or 23rd hour. Hence the answer is 24 – 2 = 22.

**Question:**
**How many degrees are there between the hour hand and the minute hand on a clock face when the time is ten past two?**

**Solution:**

Another annoying clock question is what you are thinking. And yes it is. Most people jump out and say zero as their answer, believing that the two hands are overlapping at this time. This assumption is obviously wrong. At 2:10, the minute hand is exactly on the 2 indicating 10 minutes out of the hour. The hour hand, however, is just past the 2 but sitting just before the first notch and is exactly 1/6 of the way between the 2 and the 3. Between each numbered hour there is 360/12 = 30 degrees. 1/6 x 30 degrees = 5 degrees. Hence the answer is 5 degrees.
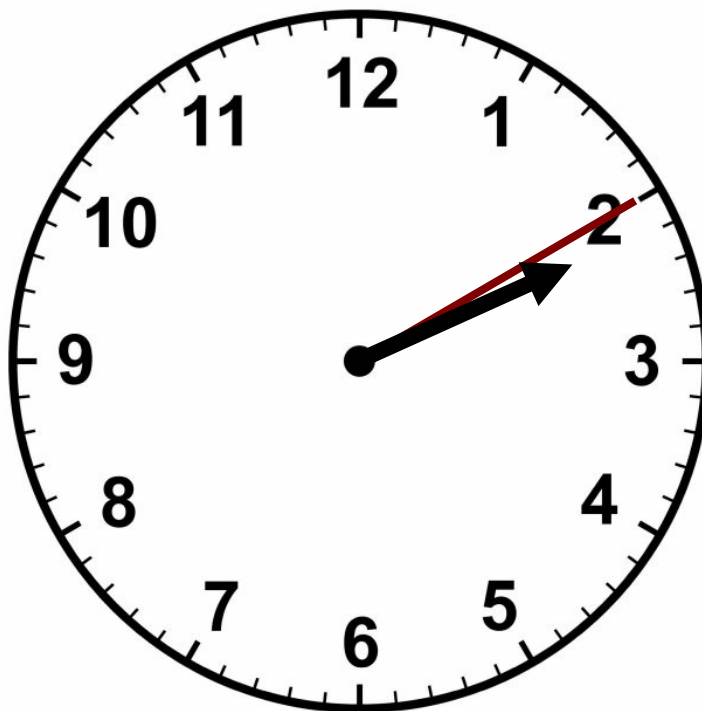
**Question:**

**You have eight Billiard balls. One is defective, meaning that it weighs more than the others. How would you find it, using a balance, if you were allowed to use the balance only twice?**

This is quite a difficult logic puzzle and requires some thinking. Sure enough it is easily solved using the balance three times, i.e. if you compare 4 against each other, find the heavy side, then split them and compare two against each other, and then find the heavy side and compare one against another, but this is not the question.

**Solution:**

To solve it using the balance only twice you must, pick any three balls and weigh them against another three balls. If the scales balance then one of the remaining two balls is defective so put one in either side of the balance and the heavier one is the defective ball. If the starting three balls don't balance then take the three balls from the heavy side and pick two of them to compare against each other on the balance. If they balance the third is defective and if they don't then the heavy ball is defective. A simple enough answer but difficult to deduce in an interview situation.

**Question:**
**How do you weigh a jumbo jet without any scales?**

This is yet another rather abstract question which could be solved in a number of ways; however the interviewer just wants to see what creative yet practical solutions you may come up with.  Below are some suggestions.

**Solution:**

Put it on a big boat. (E.g. a container ship or aircraft carrier) and mark the water line on the hull.  Now take it off the boat and add known weights onto the deck until the boat sinks to that water line again.  Add the weights up and there is your weight of the jumbo jet.

Use a big electro magnet placed above it and some magnetic attraction formula from the world of physics which includes mass and magnetic force.  When the jumbo jet lifts off the ground determine the magnetic force being exerted and thus calculate the mass of the plane.  Note this may not work because the fuselage is probably not designed to take the weight of the plane when lifted directly from above by a giant electro magnet.  You may also have trouble finding an electro magnet of adequate strength and size.

Other more practical suggestions would be better.

Note: For you information a 747-400 weighs roughly 180 tonnes empty and up to 370 tonnes when loaded with people, fuel and cargo.

**Question:**
**You have a large bucket full of pieces of candy in only three distinct colours (ren ones, blue ones and green ones). You are blindfolded. How many pieces do you have to take, to be sure of getting a matching pair?**

This is a simple exercise in probability and getting it wrong means you learnt nothing back in high school. This type of question should be answered quickly and should not require you to think for more that about 20 seconds. It may be thrown at you in addition to a case question or another logic problem.
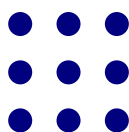
**Solution:**

The correct answer is 4. After taking out three pieces you may have a matching colour pair already, but you may also have only one of each colour. Taking a fourth guarantees you that one will match up with the coloured candy piece just selected.

That concludes the section on logic problems. Below are some more examples for you to try yourself. Good Luck!

### ■ Other Logic Problem Cases

- You have 120 seconds to come up with 10 uses for a paper clip

- How would you invest 1 million dollars?

- Three people check into a hotel. They pay $30 to the manager and go to their room. The manager finds out that the room rate is $25 and gives $5 to the bellboy to return to them. On the way to the room the bellboy reasons that $5 would be difficult to share among three people so he pockets $2 and gives $1 to each person. Now each person paid $10 and got back $1. So they paid $9 each, totalling $27. The bellboy has $2, totalling $29. Where is the remaining dollar?

- A man lives in a small house with a farm and his back garden and has a river beside his house. On the other side of the river is a shop. One day he visited the shop. He bought a chicken and fox for his farm and bought a bag of corn to feed the chicken on. The man can only take one thing and himself across in the boat at any one time. Without killing any animals or letting another animal eat an item or animal, how will the man get across?

- You are in a room with three light switches. Each switch controls one of three light bulbs in the next room. You have no way of seeing into the next room unless you walk out and around via a corridor. You must determine which switch controls which light bulb. All lights are off. You may flick only two switches and enter the room with the light bulbs only once. How would you determine which switch controls which light bulb?

- How would you design a spice rack for a blind person?

- Join all of these 9 dots together with only 4 straight lines

# ■ Section 6: Sample Candidate Case Interview Narratives

So far we have presented many real life case questions and given you a possible solution in a very structured way using text and diagrams. In this last section of the guide, we wish to tie everything together and present a sample of case interview transcripts, or narratives as we prefer to call them. Each narrative below is based on the actual transcripts of real life case interviews.

We hope that these consulting case interview narratives give you a better indication of how a real case interview may unfold and to demonstrate how the analysis could flow.

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### Narrative 1 – A brain teaser

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After some brief 'getting to know you' style questions such as, "what was your favourite course at university?", the interviewer launched into a brain teaser style case question.

**Interviewer:** So… let's see if you like puzzles.

**Participant:** Sure.

**Interviewer:** Suppose there is a round chocolate cake, out of which somebody has taken a slice. The remaining cake has to be divided equally amongst two boys by a blind man. He has nothing except a cutting device. How would you do it?

**Participant:** Ok. Give me a moment to think over this.

**Interviewer:** Yeah, sure.

**Participant:** Ok, tell me one thing, is the cake flexible enough to be folded?

**Interviewer:** Yes, you can assume that.

**Participant:** So, in that case the blind man can fold the cake right from the inside edge of the slice taken out, into two parts, in such a way that the outside corners of that cake fold into a semi-circle.

**Interviewer:** Let's assume that the slice is not symmetric in shape. The person, who has taken it, has cut it in a haphazard manner. Then what do you do.

**Participant:** Then we can try one other thing. Can I assume that the cutting device is knife?

**Interviewer:** Yes

**Participant**: And the knife is longer than the diameter of the cake?

**Interviewer:** Yes. What do you have in mind?

**Participant:** Well…the blind man can sense the shape of the slice taken out, and place the knife horizontally on the cake with one end touching the mid point of the empty slot of the slice taken, in such a way, that it covers the maximum of the cake. There will be high chances of that chord being the diameter of the cake. He can cut the cake into half on that line.

**Interviewer:** But that is just an approximation.

**Participant:** True, but it will be very near to the exact half.

**Interviewer:** Yes, You are true. But can you think of any other way of cutting it?

**Participant:** (after thinking a while) No.

**Interviewer:** Let me give you my solution to this. The blind man can cut the cake vertically instead of cutting it horizontally. In that way, each of the boys will get half of the sliced away portion.

**Participant:** But that is also an approximation I guess. How can a blind man know where is exactly half the height of the cake is?

**Interviewer:** See… there can be number of answers to this case. This is just an example of lateral thinking to the problems.

**Participant:** Yes, but…ok, that is nice.

(The participant did not argue further with the interviewer, although she was not satisfied by his answer.)

**Participant:** I have just thought of a more accurate way to divide the cake.

**Interviewer:** Ok, I'm listening

**Participant:** Well… since the blind man has a knife which is larger than the actual cake, he could balance the cake on top of the knife blade, until it balances perfectly. He will need good judgement to do this and it can be done by touch alone. He may however, need the two boys help to do this task. At this point of balance he knows that on each side the blade the cake has equal weight and hence is an equal portion. He can then push the cake down over the blade to get two equal halves for the boys.

**Interviewer:** Now that's another good idea, well done!

## Narrative 2 – A Business Case

After some behavioural style interview questions such as, 'tell me about a time when you influenced someone', the interviewer launched into a business case style question. Note: This question is from India and was asked in 2006.

**Interviewer:** Let me now ask you one case study.

**Participant:** Ok

**Interviewer:** There is an electric tower manufacturer in India, who manufactures steel towers via which electricity is transferred from one place to other. For example, the electricity which you are consuming in Mumbai might have come from Himachal Pradesh. The annual sales of the manufacturer are INR 1,000 million, and they want to increase sales up to INR 3,000 million in a span of 3 years. How can they do this?

**Participant:** Let me make sure that I understand the whole problem. There is a steel tower manufacturer whose annual sales are INR1,000 million, which he wants to increase up to a level of INR 3,000 million in three years. We have to suggest to him a game plan to achieve this. Are there any other objectives?

**Interviewer:** You are right. No, there are no other objectives.

**Participant:** Just give me a few seconds to jot down my thoughts.

**Interviewer:** Sure

**Participant:** Ok. I would go with the following framework:
- Get the overview of the steel tower industry, its growth rates, existing competition, and barriers to entry, etc.
- Get an overview of the prevailing pricing environment and any expected changes therein, if any.
- Identify potential industry verticals or geographies where the market for steel towers is under penetrated/ un-organized.

- Capabilities of the company in terms of manufacturing, marketing and sales expertise, both domestically and internationally. Also check the financial position of the company if additional funds are available.

**Interviewer:** Ok. So go ahead with your strategy.

**Participant:** Fine. So first of all, can you tell me how big the steel tower industry is in India and what is the market share of the company?

*(From here we have condensed the exact transcript of the conversation, and simply consolidated the data provided by the interviewer in fewer responses, which was actually revealed after asking about each aspect individually)*

**Interviewer:**

*Industry Overview*

Company is the most dominant player in the industry with 20% market share. There are eight other players in the market. Our client has a dominant position in the market because it is the oldest player (operating since last 20 years). There is no technology involved in building a steel tower, but heavy initial investment required has limited the no. of players to a handful. The industry is pretty mature and growing at a nominal annual CAGR of 10%

*Pricing Overview*

The pricing of all the players in the industry are same. Nothing can be done regarding the price change. All players operate on the same margin level.

*Potential Expansion*

The company has its revenue break-up as – 60% from India, 40% from North Africa. (Here comes some crucial information). The industry in North Africa is growing at a moderate rate of 10-12% CAGR. Company enjoys a 25% market share in that industry.

*Capabilities*

Company is already running at its fullest capacity at three of its manufacturing locations in India, which are widely dispersed over the country. If any additional demand comes, company gets that manufactured from other suppliers (which have excess capacity) on an outsourcing basis.

It has all the manufacturing expertise needed. It also has access to debt and capital markets from where it can raise additional funds, if needed. And since company is already doing business internationally, it has management team capable of handling domestic and international operations.

**Participant:** OK. All this is interesting. So first of all, let me make an estimate what will be the sales of this company after three years, assuming the growth rates mentioned for the North African and Indian industry, and assuming that its market share will remain intact, if not increase.

*India:*

Total market now is (1000*60%/20%) around INR 3000 million. At a CAGR of 10%, it will reach around INR 4000 million in 2009. So company's share out of it = 4000*20% = INR 800 million

*North Africa:*

Total market now is (1000*40%/25%) around INR 1600 million. At a CAGR of 12%, it will reach around INR 2200 million in 2009. So company's share out of it = 2200*25% = INR 550 million

That makes a total of INR 1350 million in 2009 (3 years time).  Now tell me is company willing to expand to other geographies?

**Interviewer:** It is you who have to advise the company.

**Participant:** OK. Tell me how is the market for steel towers in the Americas, Europe, and APAC?

**Interviewer:** Americas have no potential. It's Already a saturated market. APAC has a big market but the customers (electricity suppliers) prefer Malaysian distributors there. So you have no chance of expansion there. Europe also is an emerging market, with current sales in line with those in North Africa (i.e. 1600 million). Actually there have been recent bombings there and many of the towers have been damaged or destroyed, and are being rebuilt. There are no local players in the steel tower industry operating there.

**Participant:** That's great news. So company can make a big entry into Europe, with already having expertise in manufacturing and international operations management. Though it is short of manufacturing capacity, it can get the towers manufactured by other suppliers. Does the company have any contacts with the suppliers outside India?

**Interviewer:** Yes. Company has been outsourcing its manufacturing to Indian as well as international suppliers.

**Participant:** Oh great. By getting it manufactured somewhere near to Europe, the company can save on transportation costs from India to Europe allowing them to keep margins from getting too small. Are their any government regulations or any other inhibitors to the entry such as pricing?

**Interviewer:** There are no government regulations. Pricing is almost same globally, with the same margins.

**Participant:** ok. So I can assume that the company will be able to get 50% market share of the industry in Europe in 3 years, as there are no local players operating and the industry is under penetrated?

**Interviewer:** That is too high (given it has gained just 20% in India in 20 years).

**Participant:** Ok, then I would revise that to 15%. Should that be fine?

**Interviewer:** That's more realistic, yes.

**Participant:** And how is the growth rate in Europe?

**Interviewer:** It will be around 20% annually.

**Participant:** So companies share from Europe - Total market now is 1600 million. At a CAGR of 20%, it will reach around INR 2800 million in 2009. So company's share out of it = 2800*15% = around INR 400 million.

That makes the total revenues of company in 2009 to be 1750 million (India + Africa + Europe).  This is still well short of the 3000 million target, so we need additional options rather than just international expansion.  Perhaps some kind of diversification strategy?

Now a thought has just struck my mind. I am going to want to research on the business of leasing/ selling steel towers to the communication service operators. Since telecommunications is one of the largest growing industries in India, APAC, and Africa, I think that it will have huge potential. This model comes to my mind by looking at this business growing in North America, where companies are doing billions of dollars business by just leasing sites and towers to cellular telecommunications operators.

Can you help me out in doing a bit research on this?

**Interviewer:** Sure

**Participant:** How big is the market in India for this business?

**Interviewer:** Around INR 3000 million, growing at a CAGR of whopping 60%.

**Participant:** So in 3 years, this market is going to touch around 10000 million. If we take a conservative estimate, I think our client company can gain at least 10% share in the market.

**Interviewer**: Sounds realistic.

**Participant:** So that's a jackpot. We have INR 1000 million coming from there. So we have a total of INR 2750 million. And I believe the rest INR 250 million, we can get it by entering into international markets like North Africa, where we already have a strong presence.

**Interviewer:** Yes

**Participant:** *Summary*: So I would advise the company, first to make an entry into the European markets where it can rapidly gain market share,

taking INR 400 million into its annual revenues in 2009. It should also consider expanding horizontally into the manufacturing/ leasing of towers for mobile service operators, and monetize the growing telecommunications market in India and North Africa. Leveraging its strong brand name and positioning in these two markets, our client can easily gain somewhere around INR 1200 -1500 million of annual revenues in 2009. Adding to this the normal revenue contribution coming from electricity towers in India and North Africa; our client can easily ramp up its sales to INR 3000 million in 2009. Actually it can also go ahead of the target by following aggressive marketing and sales tactics in its core segment.

**Interviewer:** A comprehensive strategy.  Well done, and thank you.

This is an example of how a case interview can be rushed, if you do not take the time to explore the issues before making assumptions about the problem. Think about how you could have answered this question better.

**Interviewer:** There is a wheat packing machine with a big hole at the top of it, wherein donkeys pour wheat into it. There are a number of donkeys who are carrying wheat in the baskets on their back. The man controlling these donkeys can make them walk, trot, run or gallop. The wheat is packed into poly-bags and is sent to the market for sale. Now the objective of the problem is to suggest to the person controlling the donkeys, whether he should make the donkeys walk, trot, run or gallop.

**Participant:** What is the packing speed of the machine?

**Interviewer:** There is no constraint on the speed of the machine. It can pack wheat into wheat bags infinitely fast.

**Participant:** Is there any constraint in terms of number of poly-bags available?

**Interviewer:** No

**Participant:** What is the maximum speed at which a donkey can move?

**Interviewer:** We have infinite number of donkeys who can run at an infinitely fast speed.

**Participant:** What is the demand of our wheat in the market?

**Interviewer:** How is that relevant?

**Participant:** To reduce our inventory costs, we should not just stack up wheat bags. Meaning thereby, we should not produce more than what we can sell. By doing that, we can minimize on storage costs.

**Interviewer:** But I never said if that was our objective. We can pack the wheat and stock it in our storehouse.

**Participant:** But there is no logic in that. What is the need of producing in excess of demand?

**Interviewer:** Ok. For a moment let us say that our objective is to minimize our inventory cost. Then what is your final answer?

**Participant:** In that case, we should scour through our sales data and customer records to identify the potential demand for wheat in the market, and should rationalize our packing of wheat in such a way that there is no killing of demand, and at the same time there is no excess stock of wheat bags. This approach will help us to minimize our inventory storage costs.

**Interviewer:** That is good. Thank you

**Interviewer:** There is a refrigerator manufacturing company. As a management consultant, you have to analyse the current sales incentive policy of the company, and suggest any changes therein which make most sense for the company.

The current sales incentive policy is as follows:
- The minimum guaranteed salary for a salesperson is Rs. 6000.
- The average salary of a salesperson is Rs. 10,000. This is the salary which one gets if he meets his annual sales target. Meeting the annual sales target means the achievement of 80% to 100% of target.
- If the actual sales fall below 80% of the annual target, the salary drawn by the sales person is Rs. 8000.
- If the salesperson beats the target by more than 10%, he earns Rs. 12,000.

**Participant:** Ok, so this means their sales incentive is based on the value of sales, rather than on any other factor, right?

**Interviewer:** Yes.

**Participant:** OK. So first of all, let me ask one question. Does the client company manufacture only one type of refrigerators or a variety of them?

**Interviewer:** That is a good question. The company manufactures four types of refrigerators. Their respective sales price and profit margin (post S,G & A expenses) is as follows:

| Product | Sales Price (Rs.) | Profit margin |
|---------|-------------------|---------------|
| A | Rs. 8,000 | 15% |
| B | Rs. 10,000 | 14% |
| C | Rs. 15,000 | 10% |
| D | Rs. 5,000 | 20% |

**Participant:** After analysing the above data, I would observe that there is a flaw in the current sales incentive policy of the company. The company is currently giving uniform incentives on all of its products, although they entail different selling prices and profit margins. Company should rationalize its incentive policy to suit its interests.

**Interviewer:** That is an interesting observation. How would you go about that?

**Participant:** Can you tell me the sales break-up of the company according to its different products?

**Interviewer:** That is an irrelevant question.

**Participant:** Ok. So now I would like to frame the final answer.

**Interviewer:** OK, go ahead.

**Participant:** The company should focus on the sales of product D, because it enjoys the highest operating margin. Currently what the company is doing is rewarding more to its sales representatives for selling refrigerator C (since it has highest sale price), but which has lowest operating margin. Focussing on the sales of product D will result in higher Return on Investment (ROI) and will enhance shareholder value.

**Interviewer:** But the company is making highest profit on product C in terms of absolute Rupee amount. Shouldn't the company focus on higher absolute profits instead of higher profit margin?

**Participant:** No. The company should always focus on higher operating margin instead of higher absolute profits. In the current case, higher profits by selling product C will come on the base higher invested capital (as it has higher cost of production), which will more than offset the incremental absolute profits. So, if the company wants to increase its shareholder value, it should push for the sales of product D instead of product C.

So, my final recommendation for the company would be that it should re-design its incentive policy in such way that sale of product D is maximum. This can be done by offering differential sales incentive for different products in descending order of the operating margins offered by them.


**Interviewer:** That is a good conclusion. Thank you.

# ■ Conclusion

We have come to the end of our 'Ace The Case' management consulting case interview guide. Inside you have found detailed information on the consulting case interview and many examples of how to answer different types of case questions common amongst consulting firms around the world. Hundreds of thousands of individuals apply to management consulting firms every year hoping to land their dream job, so you are privileged to have witnessed second hand, dozens of case interview questions which have actually been asked to real life job seekers and university graduates like yourself.

By reading this guide you have gained an advantaged in the competitive interview process as you now have a better idea of what to expect when you walk in the door. Our proposed solutions were provided to demonstrate how to go about intelligently answering case interview questions. We also provided several hints, tips and tricks for simplifying complex problems and bringing structure to your answers. This should all help put you ahead of your fellow candidates who may not even know what a case interview is, let alone the different types and styles or how best to answer one.

At the end of each section you would have seen additional case questions for you to try yourself in your own time. This is essential if you truly want an edge against the competition, as they will allow you to practice answering management consulting case based interview questions, ensuring you improve. Try using a friend to help you and be conscious of sticking to a set length of time

We hope you have enjoyed reading the guide and have gained an insight as well as some experience when it comes to answering case questions in management consulting interviews. We wish you the best of luck in applying for consulting jobs and in every round of your consulting interviews. Remember to always be yourself, structure your answers, be aware of time and most of all have fun with the case questions because this ensures that your all important personality shines through, in addition to your natural abilities in business, mathematics, logic, analytics and creativity.

Good luck in scoring your dream consulting job and launching yourself into the rewarding world of management consulting!

Sincerely,

The 'AceTheCase.com' team.

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Titan
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