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| **ASSIGNMENT** | |
| **Course Code** | HSC301A |
| **Course Name** | Economics for engineers |
| **Programme** | B Tech |
| **Department** | Computer Science and engineering |
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| **Declaration Sheet** | | | | | | | | |
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| Course Code | HSC301A | | | | | | | |
| Course Title | Economics for engineers | | | | | | | |
| Course Date |  | | to | |  | | | |
| Course Leader | **Sunita Chakraborty** | | | | | | | |
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| Signature of the Course Leader and date | | | | Signature of the Reviewer and date | | | | |
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| --- | --- | --- |
| **Symbol** | **Description** | **Units** |
| A | Current | Amp |
| g | Acceleration due to gravity - 9.81 | m/s2 |
| V | Voltage | Volts |
| w | Width | mm |
|  |  |  |

< Arrange in alphabetical order>

# **Question No. A1**

**Solution to Question No. A1:**

**“The service sectors of our country bring about economic development for our country”.**

## Introduction to all the service sectors that exists in our country:

The services sector is a vital component of the Indian economy. The sector, which accounts for around 60 per cent of the country’s gross domestic product (GDP), has emerged as one of the largest and fastest-growing sectors not just in the country but in the global landscape; subsequently, its contribution towards global output and employment has been substantial.

The share of services in India’s GDP at factor cost (at current prices) rose from 33.3 per cent (1950–1951) to 56.5 per cent in 2012–13, as per advance estimates. During FY 2014–15, the sector is projected to grow at a healthy 5.6 per cent, according to National Council of Applied Economic Research (NCAER).

This sector in India comprises a wide range of activities, including trading, transportation, communication, financial, real estate and business services, and community, social and personal services.

**Service Sector in India # 1. Trade**:

Trade is an important segment in India’s GDP. The GDP from trade (inclusive of whole­sale and retail in the organized and unorganized sectors) at constant prices increased from Rs.4,33,967 crore in 2004-05 to Rs.6,71,396 crore in 2009-10, at a CAGR of 9.1 per cent. The share of trade in the GDP, however, remained fairly stable at around 15 per cent in the last four years.

**Service Sector in India # 2. Tourism, Including Hotels and Restaurants:**

Tourism is one of the major engines of economic growth in most parts of the world including India. Since tourism does not fall under a single heading in the National Accounts Statistics, its contribution has to be estimated. In 2007-08, the contribution of tourism to the country’s GDP, and to total jobs (direct and indirect) in the country was estimated at 5.92 per cent, and 9.24 per cent respectively.

**Service Sector in India # 3. Shipping**:

Shipping plays an important role in the economic development of the country, especially in India’s international trade. The Indian shipping industry also plays an important role in the energy security of the country, as energy resources, such as coal, crude oil, and natural gas are mainly transported by ship

**Service Sector in India # 4. Real Estate Services**:

The real estate sector includes development of commercial and residential real estates, with participation and involvement of both Government agencies and private develop­ers.

**Service Sector in India # 5. IT Services:**

India has gained a brand identity as a knowledge economy due to its IT sector. The IT industry has four major components: IT services, business process outsourcing (BPO), engineering services and R&D, and software products

## Advantages of these service sectors:

* Increased affluence—As consumers have raised their standard of living, they have increasingly chosen to purchase services such as lawn maintenance and carpet cleaning that they previously took care of themselves.
* Increased leisure time—Some segments of the population have been able to garner larger chunks of free time; this trend, coupled with increased wealth, has spurred a higher demand for certain service businesses such as travel agencies and resorts, adult education courses, guide services, golf courses, health clubs, etc.
* Changing work force demographics—Over the past few decades, increasing numbers of women have entered the work force. This has spurred greater demand for services in such realms as child care, housekeeping, dry cleaning, etc.
* Greater life expectancy—Another development that has had a particular impact on certain service sectors, particularly in the health care industries.
* Increased complexity of products/technological advancement—High-tech products have created a corresponding increase in demand for specialists who can fix and maintain those products (computers, cars, electronic equipment, etc.).
* Increased complexity of life—Many service sectors have enjoyed tremendous growth because of their orientation toward helping individuals and businesses stay on top of the many facets of today's fast-paced society. Tax preparers, psychiatrists and counselors, and legal advisors are good examples.
* Increased environmental awareness—General trends toward increased ecological sensitivity and enlightened natural resource management practices have spurred growth in environmental service sectors (waste management, recycling, environmental advocacy).
* Increased number of available products—Technological advances have spurred development of service industries in such areas as programming.
  1. **Explain about the service sectors which brings the growth for our country:**

Agriculture Sector of Indian Economy is the most important sectors of the Indian economy remains Agriculture and one of the most significant part of India. Agriculture is the only means of living for almost two-thirds of the employed class in India. As being stated by the economic data of financial year 2006-07, agriculture has acquired 18 percent of India's GDP.

The agriculture sector of India has occupied almost 43 percent of India's geographical area. Agriculture is still the only largest contributor to India's GDP even after a decline in the same in the agriculture share of India. Agriculture also plays a significant role in the growth of socio-economic sector in India.

In the earlier times, India was largely dependent upon food imports but the successive stories of the agriculture sector of Indian economy has made it self-sufficing in grain production. The country also has substantial reserves for the same. India depends heavily on the agriculture sector, especially on the food production unit after the 1960 crisis in food sector. Since then, India has put a lot of effort to be self-sufficient in the food production and this endeavor of India has led to the Green Revolution. The Green Revolution came into existence with the aim to improve the agriculture in India.

The services enhanced by the Green Revolution in the agriculture sector of Indian economy are as follows:

* Acquiring more area for cultivation purposes
* Expanding irrigation facilities
* Use of improved and advanced high-yielding variety of seeds
* Implementing better techniques that emerged from agriculture research
* Water management
* Plan protection activities through prudent use of fertilizers, pesticides, and cropping applications

All these measures taken by the Green Revolution led to an alarming rise in the wheat and rice production of India's agriculture. Considering the quantum leap witnessed by the wheat and rice production unit of India's agriculture, a National Pulse Development Programme that covered almost 13 states, was set up in 1986 with the aim to introduce the improved technologies to the farmers. A Technology Mission was introduced in 1986 right after the success of National Pulse Development Programme to boost the oilseeds sector in Indian economy. Pulses too came under this programme. A new seed policy was planned to provide entree to superior quality seeds and plant material for fruits, vegetables, oilseeds, pulses, and flowers.

# **Question No. B1**

**Solution to Question No. B1:**

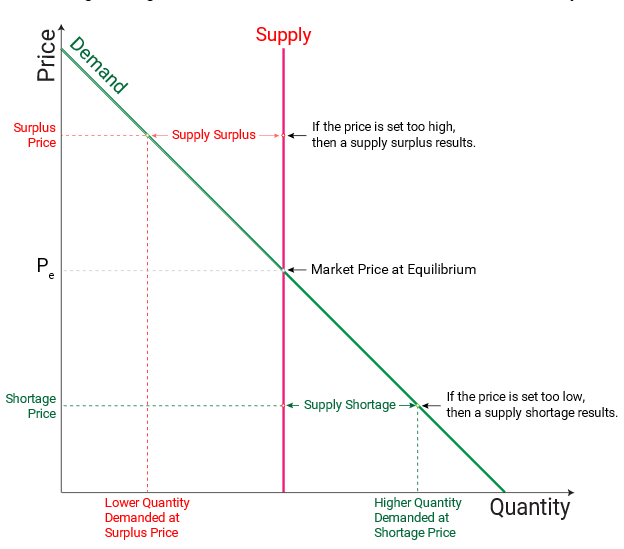
**“Market Equilibrium point where the quantity demand is equal to quantity supply”.**

## B1.1 Graphical presentation – The determinants of market equilibrium:

Let understand market by daily life, consider a farmer’s market, where the farmers are selling Beans. On the first day, they offer their Beans for $5 apiece, but few people buy them, so as the end of the day draws near, the farmers find that they have a surplus of Beans. Consequently, the farmers drop the price of their Beans to $1, quickly selling their surplus. For most products, as their price increases, the supply increases but the demand decreases. If the sellers raise their price too high, where the demand is less than what they have to offer, then they will have a surplus that will force them to lower their price until they can sell their entire supply.

On the other hand, if the sellers set their price too low, then they will sell their entire supply before they can satisfy the demands of the market, thereby causing a shortage for the buyers and lesser profits or greater losses for the sellers. Some people who wanted to buy the product will be unable to obtain it. Surpluses and shortages reduce the allocative efficiency of the economy, because the distribution of goods and services is less than optimal.

Supply increases with prices because the suppliers earn greater profits and can easily cover their costs; higher prices increase the producer surplus for the sellers. Demand increases with lower prices because the products become more affordable and the buyers get more value for their money, i.e. consumer surplus. Because people only buy a product if the benefit at least equals its cost, and because people's preferences vary widely, a lower product price will have a benefit worth the cost for more people, thus increasing demand. This is why when demand and supply quantities are plotted according to price, the supply curve moves upward with price, while the demand curve moves downward with price. When the amount demanded equals the amount supplied, then market equilibrium (aka supply-demand equilibrium) is achieved, where the quantity equals the equilibrium quantity and the price equals the equilibrium price. Furthermore, if prices are different from the equilibrium price, then the law of supply and demand states that the price of any product will adjust until the supply equals the demand.



In the short term, supply is insensitive to change in price or income. For example, if farmers bring their product to market, then they have a specific quantity to sell, and they cannot change that quantity while they are at the market, so allocation efficiency is maximized only if the right price is set. If sellers’ price their product too low, then they may not be able to provide the quantity demanded by the buyers, since buyers demand more at lower prices, resulting in a supply shortage. If the price of product too high, then sellers will not be able to sell all that they have, since buyers demand less at higher prices, resulting in a supply surplus. In either case, sellers will have to adjust their price toward the market equilibrium price to maximize profits. The market equilibrium price is the highest price that sellers can charge and still be able to sell all that they have, with no surplus or shortage.

## B1.2 Graphical presentation – The shift in the demand and supply curve:

Let understand shift in demand and supply by real life example, we often hear news about how prices of gold change every single moment. They never seem to be static and are always fluctuating. Thus, a graphical representation of market equilibrium for gold would always keep changing. This can happen due to many factors that come under the umbrella of either shift or increase in demand, supply or both.

The Shift in Demand and Supply

Definitely, if there is any change in supply, demand or both the market equilibrium would change. Let’s recollect the factors that induce changes in demand and supply:

Shift in Demand

The demand for a product changes due to an alteration in any of the following factors:

* Price of complementary goods
* Price of substitute goods
* Income
* Tastes and preferences
* An expectation of change in the price in future
* Population

Shift in Supply

The supply of product changes due to an alteration in any of the following factors:

* Prices of factors of production
* Prices of other goods
* State of technology
* Taxation policy
* An expectation of change in price in future
* Goals of the firm
* Number of firms

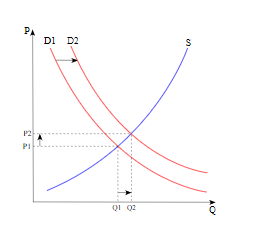
**When only Demand Changes**

A change in demand can be recorded as either an increase or a decrease. Note that in this case there is a shift in the demand curve.

**Increase in Demand**

When there is an increase in demand, with no change in supply, the demand curve tends to shift rightwards. As the demand increases, a condition of excess demand occurs at the old equilibrium price. This leads to an increase in competition among the buyers, which in turn pushes up the price.

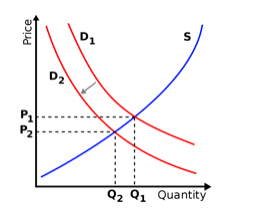
Of course, as price increases, it serves as an incentive for suppliers to increase supply and also leads to a fall in demand. It is important to realize that these processes continue to operate until a new equilibrium is established. Effectively, there is an increase in both the equilibrium price and quantity.



**Decrease in Demand**

Under conditions of a decrease in demand, with no change in supply, the demand curve shifts towards left. When demand decreases, a condition of excess supply is built at the old equilibrium level. This leads to an increase in competition among the sellers to sell their produce, which obviously decreases the price.

Now as for price decreases, more consumers start demanding the good or service. Observably, this decrease in price leads to a fall in supply and a rise in demand. This counter mechanism continues until the conditions of excess supply are wiped out at the old equilibrium level and a new equilibrium is established. Effectively, there is a decrease in both the equilibrium price and quantity.



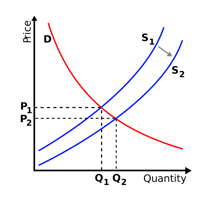
**When only Supply Changes**

A change in supply can be noted as either an increase or a decrease. Note that in this case there is a shift in the supply curve.

**Increase in Supply**

When supply increases, accompanied by no change in demand, the supply curve shift towards the right. When supply increases, a condition of excess supply arises at the old equilibrium level. This induces competition among the sellers to sell their supply, which in turn decreases the price.

This decrease in price, in turn, leads to a fall in supply and a rise in demand. These processes operate until a new equilibrium level is attained. Lastly, such conditions are marked by a decrease in price and an increase in quantity.



**Decrease in Supply**

When the supply decreases, accompanied by no change in demand, there is a leftward shift of the supply curve. As supply decreases, a condition of excess demand is created at the old equilibrium level. Effectively there is increased competition among the buyers, which obviously leads to a rise in the price.

An increase in price is accompanied by a decrease in demand and an increase in supply. This continues until a new equilibrium level is attained. Further, there is a rise in equilibrium price but a fall in equilibrium quantity.

**When both Demand and Supply Change**

Generally, the market situation is more complex than the above-mentioned cases. That means, generally, supply and demand do not change in an individual manner. There is a simultaneous change in both entities. This gives birth to four cases:

* Both demand and supply decrease
* Both demand and supply increase
* Demand decreases but supply increases
* Demand increases but supply decreases

# **Question No. B2**

**Solution to Question No. B2:**

## B2.1 Differentiate between Total Utility and Marginal Utility:

The Total Utility refers to the sum of utility that an individual derives from the consumption of all the units of a given commodity at a point or over a period of time.

In other words, the total satisfaction derived from the consumption of various units of goods and services is called total utility. Every unit of a commodity has its marginal utility (a utility derived from the consumption of an additional unit), and the total utility is the summation of all these individual marginal utilities

The Marginal Utility refers to the additional benefit (utility) a consumer derives from the consumption of one additional unit of good or service.

In other words, marginal utility is the addition to the total utility resulting from the consumption of one additional unit of the commodity.

|  |  |
| --- | --- |
| **Marginal Utility** | **Total Utility** |
| The utility derived from consuming extra unit of a commodity is known as marginal utility.      The marginal utility shows a tendency to decrease with every additional intake    At the point of satiety marginal utility is zero      Once the point of satiety is reached, thereafter marginal utility becomes negative      Marginal utility could be stated as the difference between the total utilities of the two successive units. For instance, marginal utility of fourth unit would be the total utility of fourth unit less the total utility of the third unit      The tendency of marginal utility is diminishing and this forms the basis for the law of diminishing marginal utility | Total utility is the aggregate utility that a person derives from consuming a particular product.    In the beginning the total utility increases but at a decreasing rate    At the point of satiety total utility is maximum    The total utility starts falling after the point of maximum satisfaction      Total utility could also be sated as summation of the marginal utilities. It simply means total utility for a particular unit is the summation of the marginal utilities up to that unit    In case of total utility, initially the consumer gets more and more satisfaction from consumption of a particular product but beyond a certain level this satisfaction reaches at the point where it does not rise but remains constant and thereafter starts falling. |

## B2.2 Graphical presentation – Diminishing Marginal Utility:

The marginal utility of a commodity diminishes at the consumer gets larger quantities of it. Marginal utility is the change in the total utility resulting from one-unit change in the consumption of a commodity per unit of time.

The law of diminishing marginal utility.

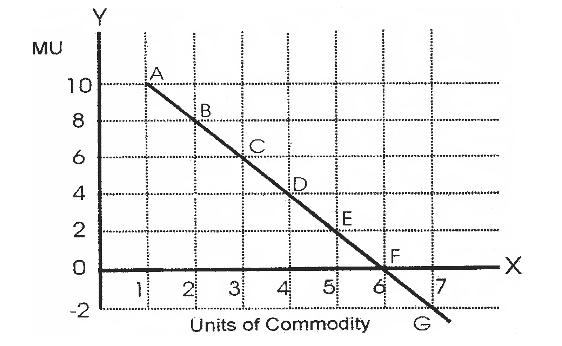
* The utility is measurable and a person can express the utility derived from a commodity in qualitative terms such as 2 units, 4 units and 7 units etc.
* A rational consumer aims at the maximization of his utility.
* It is necessary that a standard unit of measurement is constant
* A commodity is being taken continuously. Any gap between the consumption of a commodity should be suitable.
* There should be proper units of a good consumed by the consumer.
* It is assumed that various units of commodity homogeneous in characteristics.
* The taste of the consumer remains same during the consumption o the successive units of commodity.
* Income of the consumer remains constant during the operation of the law of diminishing marginal utility.
* It is assumed that the commodity is divisible.
* There should be no change in fashion. For example, if there is a fashion of lifted shirts, then the consumer may have no utility in open shirts.
* It is assumed that the prices of the substitutes do not change. For example, the demand for CNG increases due to rise in the prices of petroleum and these price changes effect the utility of CNG.

Let’s assume it with one example, we assume that a man is very thirsty. He takes the glasses of water successively. The marginal utility of the successive glasses of water decreases, ultimately, he reaches the point of satiety. After this point the marginal utility becomes negative, if he is forced further to take a glass of water. The behaviour of the consumer is indicated in the following schedule:

|  |  |  |
| --- | --- | --- |
| Units of commodity | Marginal utility | Total utility |
| 1st glass | 10 | 10 |
| 2nd glass | 8 | 18 |
| 3rd glass | 6 | 24 |
| 4th glass | 4 | 28 |
| 5th glass | 2 | 30 |
| 6th glass | 0 | 30 |
| 7th glass | -2 | 28 |

On taking the 1st glass of water, the consumer gets 10 units of utility, because he is very thirsty. When he takes 2nd glass of water, his marginal utility goes down to 8 units because his thirst has been partly satisfied. This process continues until the marginal utility drops down to zero which is the saturation point. By taking the seventh glass of water, the marginal utility becomes negative because the thirst of the consumer has already been fully satisfied.

The law of diminishing marginal utility can be explained by the following diagram drawn with the help of above schedule:



In the above figure, the marginal utility of different glasses of water is measured on the y-axis and the units (glasses of water) on X-axis. With the help of the schedule, the points A, B, C, D, E, F and G are derived by the different combinations of units of the commodity (glasses of water) and the marginal utility gained by different units of commodity. By joining these points, we get the marginal utility curve. The marginal utility curve has the downward negative slope. It intersects the X-axis at the point of 6th unit of the commodity. At this point "F" the marginal utility becomes zero. When the MU curve goes beyond this point, the MU becomes negative. So, there is an inverse functional relationship between the units of a commodity and the marginal utility of that commodity.

# **Question No. B3**

**Solution to Question No. B3:**

## B3.1 Explain measures required for growth of the company:

**Lay out company objectives so that you can determine progress**. If you have goals to meet, not only do you have something to strive for, but you have something to measure against. When setting your objectives for your company, don't set yourself up to fail. Be realistic about what you can achieve so that you can be successful at achieving it. In the same way, don't lower your expectations so that you can easily accomplish your objectives. Set objectives that are both realistic and challenging.

Goals may include objectives like increasing market share or retaining more clients.

Consider splitting your goals into short term and long-term goals, which refer to goals achievable in under a year and those achievable in over one year, respectively.

A good way to check your goals is to make them conform to the acronym SMART (Specific, Measurable, Achievable, Realistic, Time-Bound).

[**Put together a business plan**](https://www.wikihow.com/Write-a-Business-Plan) **so that you stay on track.** Your business plan should reflect the objectives that you have for your company, as well as the methods you plan to apply in trying to achieve them. When measuring company growth, you will consult your business plan to not only see if you have managed to achieve objectives, but also confirm that you have successfully followed the plan that you set out for your business.

**Hire an outside source to assist you in measuring company growth.** This external service will come in and evaluate your current business. Having an outside consultant look at your organization can provide you with a fresh perspective that can identify problems you might have missed. Consultants are particularly useful for using accounting or statistical analysis to measure growth of specific business metrics.[[3]](https://www.wikihow.com/Measure-Company-Growth#_note-3)

**Benchmark your company against competitors.** Growth is important within your company, but measuring growth in comparison to competing businesses determines your success in the industry. If you improve your reputation in the marketplace, you will ultimately attract more clients and increase growth within the company

**Assess your customer base and determine whether that has increased.** Not only are you looking for more customers, but you should be seeing better quality customers. Your customer base should be bringing in more profit. This means you are seeking to gain repeat customers and build customer loyalty.

**Compute revenue growth.** Revenue growth is one of the simplest ways to measure company growth over a period of time. Typically, growth is measured using the compounded annual growth rate (CAGR). This calculation is particularly useful for summarizing growth over longer time frames, like 5, 10, or 20 years.

**Calculate the price/earnings (PE) ratio.** For a publicly-traded company, the PE ratio represents the premium paid for the company's stock. That is, it is the current stock price divided by the average earnings per share over the last twelve months. A high result from this calculation means that investors expect that the company will increase in value in the future. Conversely, a low value may represent lower or negative growth expectations

**Measure market capitalization.** For publicly traded companies (companies who sell stock to the public), market capitalization (market cap) is a measurement of the total value of the company's outstanding stock. It is calculated by multiplying the current stock price by the total number of outstanding shares. Market cap is often used to measure a company's growth over time and is the most common indicator of a company's size used by financial professionals

**Find cash flow growth.** Cash flows show how much actual money a company is earning. They are often used by financial professionals to determine the value of a company. This is done through the process of discounted cash flow analysis, in which future cash flows are extrapolated to determine a value for the company. Measure current cash flows against past cash flows to determine whether or not the business remains solvent

**Calculate gross margin growth.** The gross margin is simply the difference between the company's revenue and its cost of goods sold (or cost of services provided). This represents how effectively the company is converting raw materials into finished products.

**Find profit growth.** Net profit, also called net income or simply profit, is the "bottom line" of the company. It measures the company's earnings after all expenses and taxes have been subtracted from revenue. Profits are then used to either pay dividends or are reinvested in the company. Profits, like revenues, are often measured using the compounded annual growth rate (CAGR). This allows companies to show their averaged profit growth over time, rather than focusing on individual years

**Analyse changes in your customer acquisition cost.** The customer acquisition cost measures how much you have to spend on marketing and sales to earn the business of a new customer. This is found by dividing these costs (sales and marketing) by the number of new customers over a set period of time.

* A reduction in this cost is evidence that you are building a recognized brand. It also can show you if you are overspending on sales and marketing (if additional spending in these areas fails to bring a similar increase in new customers)

## B3.2 Challenges faced by companies:

We live in rapidly changing times, especially for companies and businesses. Consider that, in a single generation, companies have had to adapt to entirely new marketing channels (web and social), decide how to invest in and utilize new technologies, and compete on a global stage — things that were barely imaginable to our parents’ and grandparents’ generations.

One side effect of these rapid changes and growth is that no single CEO — or any employee, for that matter — can be an expert in everything. This was, perhaps, always true, but it has never been more apparent.

This is why, in my opinion, some of the biggest challenges businesses face today

Just a few of the challenges I see facing that are best addressed with the help of a consultant include:

## Uncertainty about the future

Being able to predict customer trends, market trends, etc. is vital to a changing economic climate, but not every CEO has Warren Buffett-like predictive powers. Bringing in a consultant trained in reading and predicting those all-important trends could be the difference between a bright future and a murky one.

## Financial management

Many CEOs I know are ideas people; that means they’re great at the big picture and disruptive thinking, but less good with things like cash flow, profit margins, reducing costs, financing, etc. Small and medium businesses may not require a full-time CFO, but would do better to employ a financial consultant who can step into the role as needed.

## Monitoring performance

Using a meaningful set of rounded [performance indicators](https://www.hiscox.co.uk/business-blog/4-business-metrics-every-consultant-needs-to-understand-the-bernard-marr-column/) that provide the business with insights about how well it is performing is key. Most business people I know are not experts in how to develop KPIs, how to avoid the key pitfalls and how to best communicate metrics so that they inform decision-making. In most cases companies rely on overly simple finance indicators that just clog up the corporate reporting channels.

## Regulation and compliance

As markets and technologies shift, so do rules and regulations. Depending on your industry, it can make much more sense to bring in a consultant to help with these areas rather than trying to understand the complexities yourself — and risk fines or worse for non-compliance.

## Competencies and recruiting the right talent

Again, a small or medium-sized business might not need full-time human resources or recruiting staff, but during peak growth periods, finding the right people and developing the right skills and competencies is the key to a sustainable future. Bringing in a consultant with the expertise to find exactly the workers you need would be a wise investment.

## Technology

As technologies change practically at the speed of light, it’s vital for companies to innovate or be left behind — but many CEOs started their careers and businesses before many of these technologies even existed! Consultants can be vital for integrating new technologies, in particular mobile, app development, and cloud computing.

## Exploding data

Grandpa’s generation certainly didn’t have to deal with terabytes of data or worry about what to do with it. 90% of the world’s data was created in the past two years and managing, keeping safe and extracting insights from the ever-increasing amounts of data your company produces needs to be in the hands of a qualified professional who can help you get the most return from that data.

## Customer service

In a world of instant gratification, customers expect instant customer service — and can take to the web to share their displeasure at less than satisfactory service just as quickly. Consultants can find ways to improve customer service and bring it into the 21st century.

## Maintaining reputation

In a similar vein, because customers can voice any displeasure so much more publicly and loudly than ever before, businesses have to monitor and maintain their online reputations. And while it’s an important task, it’s one best suited to a third party who can monitor and mediate with a certain amount of distance.

## Knowing when to embrace change

Early adopter or late to the game? Consultants can help CEOs determine when to embrace change and when to stay the course. Not everything new is better, yet eschewing every change runs the risk of becoming obsolete. A professional outside opinion can make all the difference in these decisions.

# **Question No. B4**

**Solution to Question No. B4:**

## B4.1 Conclusion of study:

Overview to the question (students are expected to give a brief introduction on the context on which the question is set, applications, limitations, new developments happening and students own views on the question and the paragraph should not exceed more than 200 words and references should be cited and it should be authored by the students means to say students should not be borrowing sentences as they are from any referred literature)

## B4.2 Suggestions of the study:

Students are expected to provide the solution to the question considering the points mentioned in the marking scheme of the assignment question

**Bibliography**

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