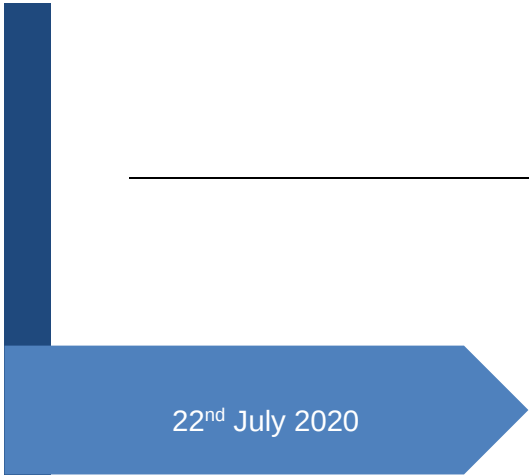




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Knowledge and Information Management Assignment

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Introduction

The purpose of this assignment is to understand the importance of data, information and knowledge and how this impacts organisations. The report will be done in a Q and A format and will be split in to 2 sections, each comprised of 5 questions.

Few different scenarios regarding data, information, knowledge and information systems will be discussed in part 1. Part 2 will focus on a case study of American airlines and analyse the SABRE system, as well as information systems impact on business.

Part 1 – Data, Information and Knowledge

1. Give an example of how human decision making in business suffers from limited time, data and information?

Decision making has a few necessary steps which help facilitate the reasons why people make certain choices about things in daily life. It was discovered there are 7 steps required for good decision making.

The 7 steps of decision making (UMass Dartmouth, 2020)

1. Identify the problem

Identify the decision that needs to be made. This is simple but can be most crucial one, managers need to understand what needs to be done before other steps are planned out.

2. Gather Data

Gather the crucial information needed to implement the plan. Rushing this step would not allow proper planning and can miss important information,

3. Identify Alternatives

Identify any potential alternatives decisions or paths to take.

4. Weigh Evidence

Check the evidence collected is useful and identify any other issues.

5. Choose Among Alternatives

Choose the best decision on list of options.

6. Implement Action

Take action to implement the chosen decisions.

7. Review the decision

Finally review the decision that has been made. Checking up on it to ensure best outcome has been achieved.

Managers not having enough time, data and information will resort to rushed and not quality decision making. Using the steps outlined above can help create good decision making. Managers skipping the necessary steps can cause very big problems due to rushing the decision-making process. Decisions that are made without proper understanding of information can cost organisations a lot of money. An example of costly decision-making is Kmart in the mid to late 1990s trying to compete with the giant Walmart on pricing. Walmart had a “Just in Time” inventory system which allowed efficient management of its supply chain. Kmart management failing to implement a similar system resulted in the chain filing for bankruptcy in 2002 and shutting down hundreds of stores (Shields & Kures, 2007).

2. Consider five decisions you have made today (they could be simple such as taking a turn while driving or even choosing a soda at a convenience store). In each case determine the data, information, or knowledge that were involved in the decision.

What is Data, Information and Knowledge?

Data is raw information which at its first stage is unable to be interpreted without any proper context. For example, it can be a random number or document.

Information is the second stage where data is collected and processed and is able to be interpreted. Information will allow understanding the context which provides the background for data and makes it understandable. For example, a number 10 has no meaning at all to us. But number 10 at a McDonald's fast food restaurant can make more sense to the appropriate recipient.

Knowledge is processed information with more background information given that can help individuals make decisions based on having proper understanding of an area. Best example could be following a cooking recipe. Having the proper method and recipes being explained allows a decision to be made by individuals. Cooking a new dish following a recipe is a good example of concept of knowledge in action (Tang, et al., 2016).

Decision 1. I have decided I would like a cup of tea today.

The decision is broken down into data, information and knowledge steps.

Data: teabag, cup, kettle, water. Sugar, milk, teaspoon.

Not much context is available at this stage and it's just raw data. The various items are just items without any background info and has not much meaning to it on its own.

Information: The data collected is processed into the information stage and more context is given.

Put water in the kettle then turn it on and wait 2 minutes for water to boil. After water has boiled pour the hot water into tea cup along with a Tetley teabag. After pouring the water stir the tea for a couple of minutes to get the tea flavour to infuse with the water. Pour a dash semi-skimmed milk in the tea to help neutralise the flavour to make sure it isn't too strong or bitter.

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Finally add 2 teaspoons of sugar to the tea and stir for a few minutes. Once satisfied take the teabag out.

Knowledge:

I decide to make my favourite brand of tea Tetley and putting in two sugars and milk as is my preference.

Decision 2. Choosing what to order for lunch at a fast food restaurant

Data: No. 7, chicken wings, fries, drink, Chilli sauce, £2

The data here is the components of a meal at local chip shop. At this stage it's just data so it has no meaning without any further info. For example, no.7 has no meaning in this scenario without context.

Information

Once more background data is collected it shows that it is the order for chicken wings and fries meal at Gold Fried chicken fast food shop in Small Heath. The order number of the dish is number 7. The meal costs £2.

Knowledge

All details of the order is now known so it is possible to make a decision. The meal costs only £2 and comes with a drink it's very cheap and tasty I believe its good value for money compared to local rivals.

All of this aids my decision to order the number 7 at the Gold Fried chicken fast food restaurant for lunch.

Decision 3. Washing my white clothes

Data

White clothes, 40-degree wash, washing powder, washing liquid

This is the data of this decision, not very much info without the rest of the context

Information

My white clothes needed to be washed because they were dirty. The steps required to do so was turn on the washing machine. Put all my white clothes inside. Insert washing liquid and washing powder in the machine compartments. Select 40-degree wash which take 1-hour length to finish washing.

Knowledge

From previous knowledge I know that if you don't wash all the white clothes separately the other colours will stain your clothing, this is the decision why I will wash all my white clothes separately. I follow all the steps and start the washing machine, which will make my dirty clothes clean and fresh in 1 hour.

Decision 4. Right turn while driving through town

Data

All the data in this decision are Right turn, boots pharmacy, baker street, medicine.

Information

Need to get to the Boots pharmacy on baker street to pick up medicine. From current location there is multiple ways to get to the pharmacy. Taking a right turn that's coming up 200 meter is the quickest way to the destination. Going another way will result in going into a busy main road with a lot of traffic.

Knowledge

I decide to take the upcoming right turn as it is the quickest way to the pharmacy and it will save me a lot of time not being stuck in traffic as well as wasting car fuel. I will arrive there in a few minutes and I will be able to get my medicine quickly and return home without taking too much time. The result of this decision will be most efficient in terms of time and money.

Decision 5 – Picking a drink at a convenience store

Data

monster energy, costs £1.20, Convenience store

Information

I would like an energy drink at a convenience store. There are over 50 type of choices of drinks available. I narrow it down to a 500ml can of Monster energy drink which is a popular drink and it costs £1.20 in the shop.

Knowledge

After having all the information available I decide to pick a can of Monster energy because it is one of my favourite drinks, and I believe it is a fair price for a large can of 500ml. It will give me a caffeine boost during the times I am tired during the day.

3. Does a player in a card game use tacit or explicit knowledge? Explain why. Define and explain the difference between the two with example.

Explicit Knowledge –

Explicit knowledge is data that has been written down or stored and is easy to pass along. When data has been processed, organised and can be interpreted it is explicit knowledge in action.

In the workplace this is the information which can be easily shared and provide information to employees. This could be perhaps company rules or instructions of how to use certain equipment. Without properly documented and stored explicit knowledge, organisations would struggle to pass on a large amount of data to its workforce. (Elizabeth, 2001)

An example of explicit knowledge is reading the instructions of how to install flat pack furniture.

Tacit knowledge

Tacit knowledge is information which individuals possess that is based on personal insight, emotions, observations and experiences. (BusinessDictionary, 2020) Tacit knowledge is data which is hard to write down and exactly articulate the information. Such knowledge is acquired from personal experiences and is hard to codify in order to make knowledge transferable. When organisations lose good employees, they lose the tacit knowledge that comes unique to that individual, so it is important to try and convert and store some tacit knowledge in the form of explicit knowledge. An example of tacit knowledge is how a comedian can tell jokes and turn a personal experience into a humorous topic, with use of good timing. This is very difficult to transfer to another person and teach someone to be funny as it is human intuition, characteristics and experience.

Player in a card game: Tacit or Explicit?

A player participating in a card game will be using his gut feeling and intuition to read the situation as the game carries on. This is a clear example of tacit knowledge in play. A card game will go through many good hands and bad hands and the player will use his experience or feelings to make decisions, whether to raise while having a strong “hand” or fold when having a weak “hand”. Usually in a card game player attempt to fool each other with bluffing tactics in order to fool players in to a sense of security, this is where experience and tacit knowledge come in and will help the individual make decisions.



Figure 1 Card game Source: Gaming Today

4.Explain the categories of computer-based information systems, providing relevant business examples for each category identified

Not all businesses goals and functions are the same, which is why there are many different types of computer information systems used in organisations. There is no one size fits all approach and there are many different systems have their own special advantages. Computer based information systems provide support to employees, managers in order to keep operations running smoothly and functional. These computer systems are designed to store crucial information, make it easy to access, perform some functions which helps aid human decision making in the workplace. (Leifer, 1988)

Transaction Processing Systems (TPS)

A TPS is mandatory in nearly all businesses as it is the information system responsible for business transactions. It involves the collection of all stored, modified and retrieved transaction data. A transaction processing system records data such as customer orders, bills, invoices, and stock inventory. Information gathered will need to be readily available and consistent to provide accuracy and reliability. The data will need to be stored and backed up in order to provide backup in case systems fail (Techopedia, 2018)

The data collected from TPS allows managers to generate database of information which will be useful to create other information systems for decision making. An example is retail store can understand how much units of an item has sold and how much stock there is available in the warehouse. If stock levels are low, then orders will be made to suppliers.

Management Information Systems (MIS)

A management information system is a number of systems which will gather data, which will be compiled into an easily readable format. Managers produce reports of this data so it can be easily interpreted and understood. Managers are then able to gain an overview of the decisions which need to be made, from operations level to the top strategic levels. Management Information Systems (MIS) allows the current performance of the organisation can be properly understood from many different angles and will allow management to do their jobs more efficiently. The information will be used to monitor and control the organisations and can be used to predict future trends and patterns. Management can take the data gathered from a TPS and will make adjustments to budget, production and sales targets. An example

would be, a manager of a restaurant chain can view the sales of each restaurant branch in the local area and find out which ones are performing well, as well as which one is having issues and losing business. This information would then aid decision making and give insight to areas that needs attention. (Ingram, 2019)

Decision Support Systems (DSS)

Decision Support Systems (DSS) gather the information from a TPS and are tools used to assist managers with decision making. DSS uses the internal information from TPS and Management information systems, however external information is brought into the equation to affect decision of outcomes, like current market prices, stock prices, competitors pricing strategy. This system is effective for business analysts and those who need more in-depth analysis models to interpret data. Data can be interpreted from graphs, charts and tables to make it easier to read.

Examples can be interests rates, stock market pricing history, house prices history, quarterly sales figures.

Executive Support Systems (ESS)

Executive Support Systems (ESS) are designed to help those at the top strategic level of management. The ESS gathers internal information from TPS and MIS, but also relies on external information outside sources. The gathered data allows the manager perspective from multiple angles of the organisation. The systems assist with daily operations and help with new strategic decisions which must be made. ESS has certain benefits such as faster responses to unpredictable situations, improve communications, better control, saving costs by reducing paper flow and reducing employees and middle management. (Watson & Rainer, 1991)

Examples of Executive Support Systems in use are: top level managers introducing new products or schemes, as well implementing long term changes in the company such as restructuring company or merging with another company.

5.Explain why organisations have a structure composed of different levels and specialities. How computer-based information systems can support managers at each level of an organisation.

Organisations are structured with many different layers and specialties. A common structure is the functional structure which groups employees together by function, e.g. marketing, finance and HR. Grouping by function provides clear understanding of what an employee job role is and what needs to be done.

At the operational level employees are more interested in doing their regular jobs for their financial income. The higher up the chain of command more responsibility is given as well as long term planning for organisations progression is more relevant at the top strategic level. Figure 1 explains a management structure in a four-tier pyramid, also explaining the appropriate computer-based information systems for each level.

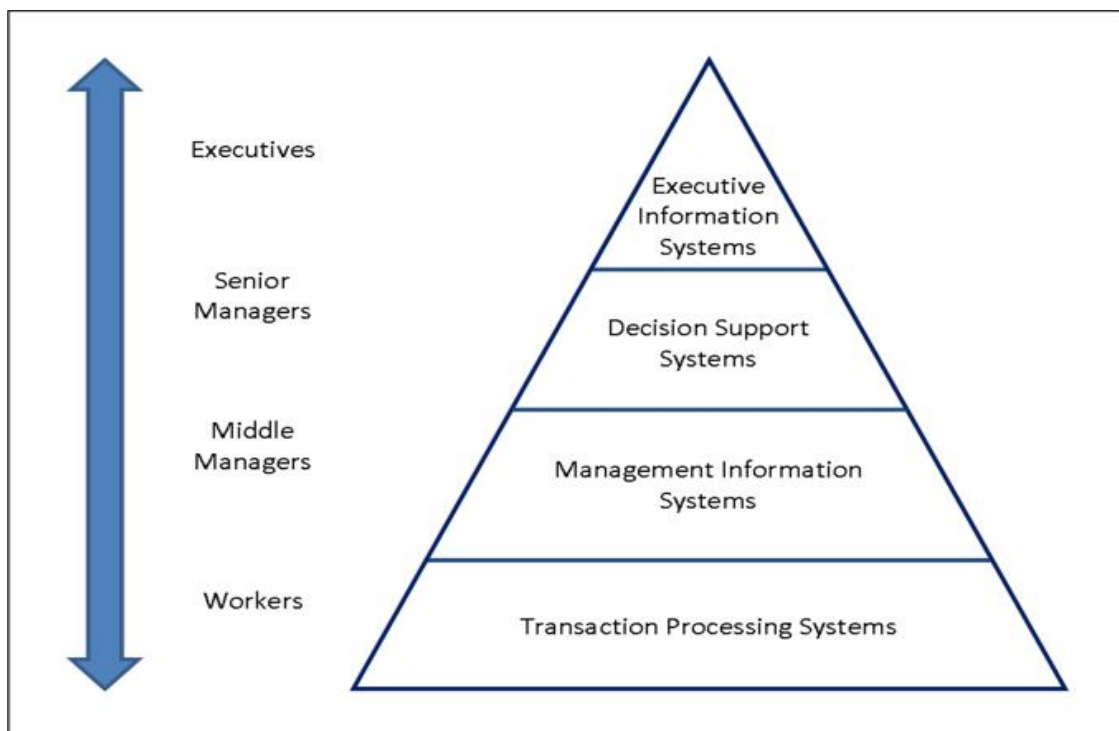


Figure 2 Four tier pyramid, Workers, Middle Managers, Senior-Managers, Executives
Management Hierarchy in a IT department (LumenCandela, 2020)

Operational

At the operational level employees would be best suited using a Transaction Processing System to record all business transactions and record stock information. Employees often just focus on getting the job done, as instructed by management. Sometimes they are kept in the dark about why procedures are done a certain way, as the information is usually shared at a managerial level. An employee at a warehouse will be responsible for tracking stock inventories, invoices and reporting to management. (Konana & Ram, 1999)

Mid-level management -

Mid-level management are higher in rank than standard employees but below the senior management. Use of Management Information Systems (MIS) will be useful here to gather collected data and make it easy to decipher. Reports will be used to help interpret the information. These managers usually have a lot more knowledge regarding operational side of the business, as well as the goals and objectives that come from higher management or executives. Managers often need to have excellent communication as they are responsible for passing information down to employees, as well as reporting back to their superiors. (Laudon & Laudon, 1998)

Senior managers

Senior management will use data from MIS in conjunction with a Decision Support System to help administer the changes required. Senior managers will need to pass down information to mid-level management, as well as transfer information upwards to the executives. Using a DSS will aid decision making by giving more detailed info gained from the MIS. The detailed information will be in the form of reports, graphs and charts to allow easy visualisation models. An example could be regional managers in a factory looking at sales of products, production numbers, staff numbers etc. (Asemi, et al., 2011)

Executives

The top-level management will focus on the future planning of company with the assistance of all the data in Executive Support Systems. A whole range of data both internal and external will be analysed to help make business decisions. Executives will need to look at whether organisation health is going the right direction, are target profits being met. Executives can introduce new products, rules, targets for the company to grow and become more successful. ESS makes all of this information more organised, accessible, structured and enables understanding of large amount of data, to help make the big decisions. (Laudon & Laudon, 1998)

Task 2 – American Airlines case study

1. Describe how the overall approach adopted by American Airlines incorporated Porter's basic competitive strategies of 'cost leadership' and 'product differentiation'.



Figure 3 Porter's Generic Strategies Source: MindTools

Michael Porter created the three "generic strategies" for competitive advantages. It was called "generic" because they could be applied to all businesses and industries. Porter's strategies are there to provide ideas to identify the cutting edge required to overtake rivals. (Porter, 1996)

The Cost Leadership Strategy

The Cost Leadership strategy is the process of increasing profits by cutting costs and still being able to charge average market rate. Another alternative way is by reducing the price of the product, it will help increase market share. Due to reducing production costs, a decent profit per sale is still gained.

American Airlines' decision to adopt the Semi-Automatic Business Research Environment (SABRE) designed by IBM allowed the organisation to cut a lot of its costs of booking airline tickets. The airline was able to save 30% on its investment by allowing it to expand and be accessible to travel agents, which enabled cheaper online booking of tickets for customers.

This decision allowed increase in market share due to them undercutting their rivals and gaining customers.

The Differentiation Strategy

The differentiation strategy is simply providing a unique product or service to what's being offered by rival competitors. This enables differentiation in the market and be able to stand out. Good in-depth market research, innovation and delivering high quality products and services are factors to consider to implement this strategy (Tanwar, 2013).

The SABRE system allowed American Airlines to differentiate itself in the market, by offering functions which allowed cheaper fares to travel agents. Realtime accurate information was available regarding seats availability and was able to process tickets within seconds, compared to the old manual card system which took approximately 90 minutes. Previously there were errors recorded due to human errors, either tickets were oversold or undersold on flights and records didn't match (Plugge, 1972).

The system expanded to include hotels bookings and rental cars, all of which gained a competitive advantage against its rivals because of its service differentiation. Further services were offered by American Airlines and IBM in 1988, such as yield management, number of decision support tools and crew scheduling.

2. In what ways did SABRE provide American Airlines with a competitive advantage? Your analysis should refer to Porter's five forces, for example, 'entry barriers'.

Michael Porter created the Five Forces of competitive analysis in 1979. The framework is very popular and a highly regarded business tool, to understand how the challenges an organisation or industry may face which will affect profitability. By utilising the Five forces greater understanding is gained of key areas which can lead to potentially disrupting the business or industry. The five forces are: bargaining power of suppliers, bargaining power of buyers, threat of substitutes, threat of new entrants, rivalry among existing competitors. (Porter, 2008)

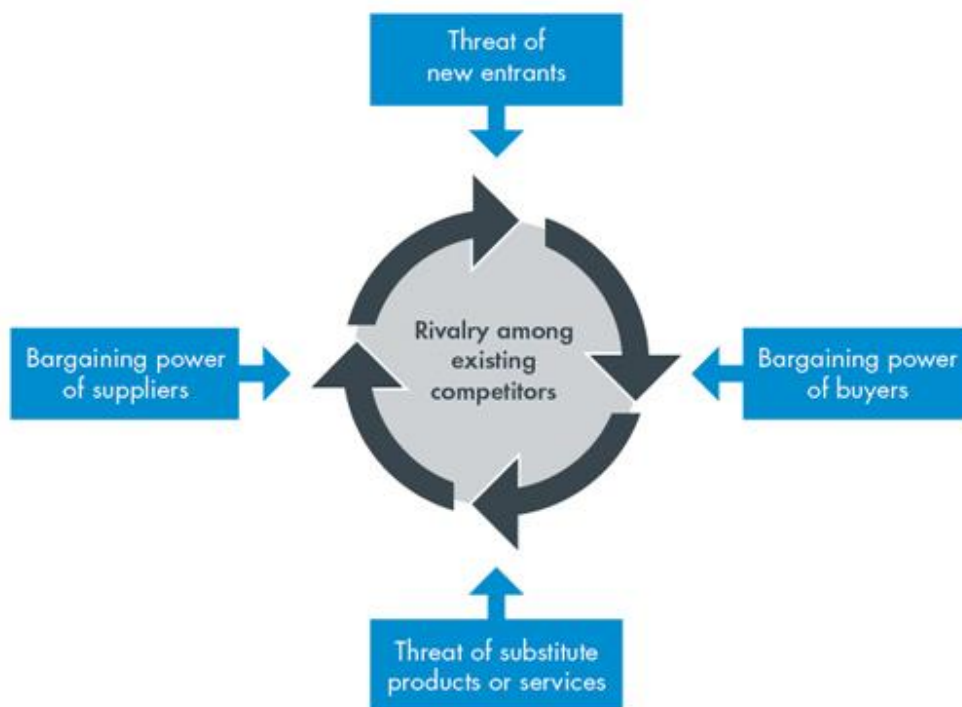


Figure 4 Porters' Five Forces (CGMA, 2013)

In 1960 the SABRE system was built with knowledge gained from IBM's mid 90s SAGE (Semi-Automatic Ground Environment) air defense system. SABRE first operated with two IBM computers in New York. By 1964 the system was able to handle 7500 reservations per hour. The old hand written manual cards took approximately 90 minutes to complete, SABRE had given American the edge by doing it in seconds (IBM, 2020).

Porters Forces - How competitive advantage was gained

American Airline using the SABRE system at the time revolutionised the way business was done. SABRE allowed real time flight information, booking tickets for customers when it suited them, as well as storage of information. It was a huge competitive advantage for American Airlines, it forced other rival competitors to come up with their own reservation system. Clearly this was an example of one of Porter's forces "threat of entry" in effect as other airline rivals would need access to similar level of technology in order to compete. The innovative system replaced the outdated and time consuming hand written card method, and were also able to provide cheaper fare by giving the technologies to travel agents in 1976, by which the system could store one million air fares. The forces "threat of substitute" and "rivalry amongst competitors" also applies here as this made rivals rethink their strategy because they would lose their customers to American Airline who were providing tickets at a cheaper rate as well as a quicker advanced booking system. This also captured the force "buyer power" as it made customers turn to American over rivals because of their advantages.

3. Although SABRE was undoubtedly successful, American Airlines was not able to maintain its competitive advantage beyond the late 1980s. What factors played a part in the erosion of the company's lead over its competitors and how did the company react? Discuss.

SABRE was American Airlines' unique advantage at the time; however, IBM was free to work with other airlines. This led IBM to the development of other reservation software: Deltamatic for Delta Airlines and Panamatic with Pan-American Airlines in 1963. The main differences were in size, as the code had to be hardware specific. Using knowledge of the three systems, IBM was able to create its own PARS (Programmed Airline Reservation system), which was a standardised software widely available for other airlines regardless of size to use, on its own IBM S360 line of computers. Eventually, this would lead to evolving into Airline Control Programs (ACP) and Transaction Processing Facility (TPF) (Copeland & McKenney, 1988).

Many rivals of American Airlines had access to their own reservation software now, so the competitive edge was lost beyond the late 1980s. The reservation software being widely available in the airline industry as well as transaction processing in banking, and booking systems made rivals being able to compete more closely. SABRE was split from American Airlines into its own entity in 1996 by parent company AMR Corp. In the 90s, technological advances with the internet allowed new capabilities to be explored. SABRE created the first Global Distribution System (GDS) called Travelocity in 1996. The online booking system, which started generating 15 million hits in a month, was accessible to everyone with a computer and an internet connection. (SABRE, 2020)

Innovative loyalty schemes

American Airlines had to come up with another way to attract customers since airline rivals had their own systems in place, so they launched its frequent flyer AAdvantage reward program in 1981. The scheme was a huge success and is still in place today. Frequent fliers were rewarded "miles" for booking airline tickets, hotels and car rentals with American Airlines or its partners. This reward scheme is now adopted by almost all airline rivals to incentivise brand loyalty to customers. (Toh & Y. Hu, 1988)

4.How are information systems transforming business, and why are they so essential for running and managing a business today?

What are Information systems?

Information systems comprise of multitude of tools, including software, hardware, computer system connections and end user. These allow data collection, processing, organising and storing information. Information systems are able to customise this data for easier interpretation. For example, a factory manager is able to view real-time production numbers in the form of charts and graphs which allow detailed understanding if targets are being met. The four main types of information systems are transaction processing software, management information systems, decision support systems and executive support systems. (Lamar University, 2016)

Social Media

Information systems have transformed the business landscape and our social lives. Smartphones have changed the business practices, now it is usual to contact organisations, suppliers, colleagues, via text, emailing and social media tools. The rapid rise of social media with the use of Facebook, Twitter, WhatsApp, many organisations have taken note and have their own social media page, as it is free advertising and easy to connect to new customers. Social media can be utilised to increase sales figures. Some examples of social media for marketing purposes are BMW advertising their 1-series Road Trip on Facebook. Dunkin Donuts found social media useful and set up a Twitter account to promote their products. (Neti, 2011)

Operate Efficiently

Information systems have allowed organisations to be able to provide rapid response to customer demand and enquiries. Stock chain management systems have allowed real-time information. Due to this supply chains are being controlled efficiently and while also saving costs by reducing overhead costs of personnel. An example is the Just In Time (JIT) first introduced by Taiichi Ohno to improve Toyota's competitiveness in the automobile industry. This system was very beneficial in the China automotive industry in 2002-2006. Systems allowed in real-time information of parts and supplies and warehouses were no longer needed which decreased costs significantly. (Madadipouya, 2015) Remote working is also a real possibility with the use of the internet and communication software.

Better Decision Making

Information systems have provided managers with excellent tools which will help make informed decisions, because software has allowed data to be viewed easily. Data can be organised and acquired from software which wasn't possible before. Systems will allow identifying areas for improvement as well as recognising patterns and trends. Using Information systems such as TPS a supermarket manager can track the sales of seasonal items such as Easter eggs during Easter period or orange pumpkins during Halloween period, per branch for example. Using this data, the correct level of stock can be ordered to maximise sales. (Hemmatfar, et al., 2010)

E-commerce

E-commerce is a big deal for organisations and it is expected of many organisations to sell their products online and be able to deliver goods locally as well as sometimes internationally. Amazon for example has no physical brick and mortar presence but is the leading online shopping website. Special algorithms and cookies are cleverly used to provide tailored recommendations to customers, which leads to increase in sales and revenue for e-commerce websites like Amazon, eBay, Asda etc. (Khurana, 2019)

Information systems transforming business

Information systems are crucial in the 21st century for businesses as it has made tremendous progress and revolutionised how organisations do business. The few examples outlined above give some ideas to how this has impacted business. Many service industries like financial, insurance and real-estate would cease to exist without developments of information systems. Other personal services such as medicine, education and travel would also look very different without the accessibility's technology has provided. If a business wants to be successful then proper implementations of information systems will help aid organisations in the right direction. In the future the advancements of information systems will provide even better advantages for businesses to utilise in their daily operations. (LBTC, 2020)

5. Identify three major new information system trends. Justify your answer with relevant pros and cons of each of the trends.

1. Artificial Intelligence

Artificial Intelligence uses smart machines to learn and algorithms to predict useful trends and patterns. Smart machines can learn and adapt to replace human decision making on simple and uncomplicated decisions. Companies would benefit from A.I as it would lessen burden of employees on some routine tasks, allowing them more time to focus on more demanding areas.

Advantages

Success in medical

A.I has found some success in the medical field. Data given about patients and including their risk levels, A.I has been able to predict an outcome of treatment and the length of hospital stay. A.I has been applied deep learning to acquire knowledge about patients' medical records, which is then able to give a prediction of patient's chances of recovery as well as even mortality rate. (Rajkomar, et al., 2018)

Home systems

Home A.I Systems such as Amazon's Alexa, Google Assistant are continuing to increase in popularity. Popular functions are to check news, weather or play a song. The A.I software is continuing to learn and will be useful in the workplace for future problem solving. Amazon launched Alexa for business and it will be able to such as organise meetings and help with routine tasks. (BBC NEWS, 2017)

Work Non-stop

A.I is not human so it's not required to have breaks to re-energise. A.I machines can continue to work non-stop, and be able to complete tedious tasks without complaining.

Disadvantages

Not realistic

People have been wary of A.I systems as they are machines there is no human element being taken into account. The rational decisions being made are sometimes not realistic to human world and not applicable.

Can't think outside the box

A.I can only learn what it interacts with, unlike humans who are able to think outside the box and learn in day to day situations. The artificial intelligence does have limitations in what it can possibly do.

Very Costly Technology

A.I is a very costly feature to use and it's continually being improved upon, there is worry of people losing their jobs once A.I is increasingly capable of automating increasingly human like behaviour

2. Blockchain Data

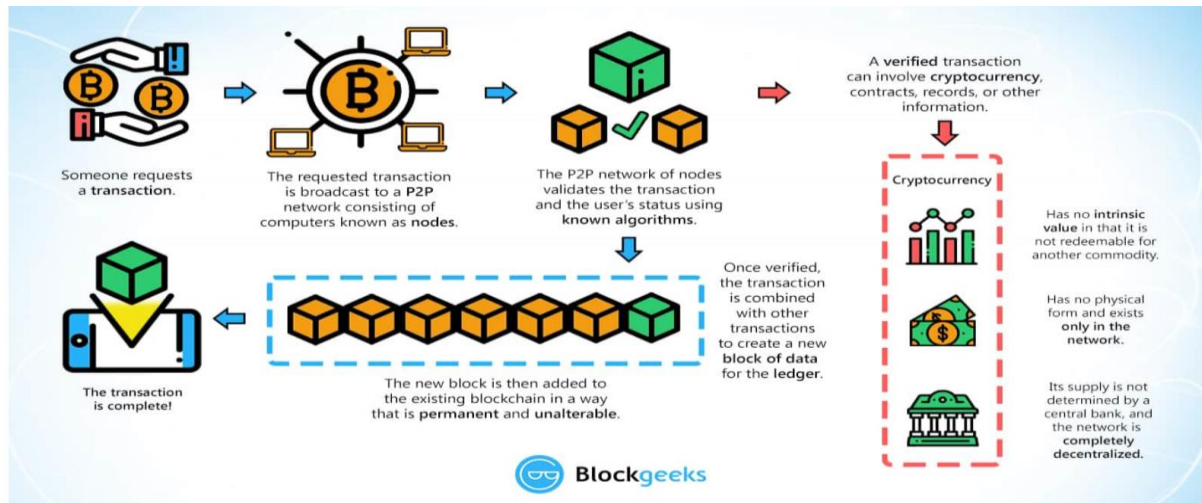


Figure 5 Blockchain. Source: Blockgeeks

Blockchain data like the cryptocurrency Bitcoin is an emerging trend. The Blockchain system allows entering of data without deleting or altering any data. With the large number of shared networks and cloud computing, being able to protect original data without loss is extremely valuable. (Binance Academy, 2020)

Advantages

Stability

Once a blockchain has been entered, it is very unlikely to be reversed. This makes it very useful to track financial records. Using a blockchain can prevent fraud from happening as information will leave an audit trail and changes are logged permanently.

Distribution

Blockchains are stored on thousands of nodes on a network it, means it won't be easily attacked. A node going offline doesn't prevent availability or security of the network. (Binance Academy, 2020)

Saves money

Blockchains can cut out the intermediary in transactions, like banks and credit card companies. A transaction goes through various nodes and is verified through the mining process. It negates risk of trusting organisations, while cutting out transaction charges by eliminating the middle man.

Dis-advantages of Blockchain

Data modification

While stability is a strong point, once a mistake is made on the Blockchain it is permanent and not able to easily be altered. So once a crucial mistake is made, a chain is often abandoned and a new one is replaced.

Storage

Blockchain ledgers can grow very large in size. The Bitcoin ledger is 200Gb in size alone. There are risks of nodes disappearing as the size is growing too big for hard drives for individuals to store.

Personal keys

Users are given their own private keys to their own blockchain address. Using cryptography, it is very secure however, if it is lost the user will lose access to all their money in the account and it is not recoverable.

High cost

The use of blockchain is very expensive and requires powerful software, and large networks to be very effective.

3. Augmented Reality



Figure 6 Augmented Reality

Augmented reality provides interactive scenarios which changes the real world with real images and sounds to create a new altered environment. Similar to Virtual reality but it doesn't try to engage individuals in a fully immersive virtual environment., but adjust our normal reality with the technology. (Carmigniani, et al., 2011)

The recent Pokémon Go craze was popular mobile game which had the concept of augmented reality of using the real environment but enhancing it with digital model images to provide entertainment.

Advantages

Benefits Businesses

Augmented reality can help support businesses. Retailers can use AR to showcase new products and gauge customer interest. Pepsi used AR in a bus stations wall to show advertisements to people. The ad contained a tiger, UFO and robots running loose in the AR vista while people were waiting for the bus, this allowed Pepsi to create discussions and strengthen the brand. (SmartInsights, 2020)

Immersive communication

Businesses may benefit from more AR software making communications more immersive. Instructions can be shown instead of just spoken about, and will give more detailed insight to observers.

Smart devices

Benefits can be applied to smart phones and devices. AR software has been used in camera software to apply filters. There a multitude of apps using AR, for instance using interactive street maps with detailed info and navigation software.

Disadvantages

Expensive

Augmented Reality software is very expensive to implement and is something that is still being developed. Perhaps in future once costs are brought down it will see large scale implementation.

Privacy Concerns

AR software records real time information and this can cause concerns for personal privacy. Legal implications of capturing photos of random individuals and their property is real drawback. Large amount of data is need to be collected in order for AR to be applied.

Dangerous behaviours

The Pokémon Go game was a huge success, however it promoted people to get too immersed in the game and the software can obscure real life dangers on the software. Being aware of ones surrounding is paramount to using it safely. (TheWashingtonPost, 2016)

Conclusion

In the 21st century having information systems is crucial for the success of organisations, many key areas such as decision making, sales, efficiency, production, costs were all improved.

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