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Emerging Technologies:
Emerging Technologies Essay*

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Article I. Introduction

This essay will focus on determining 'how emerging technologies affects businesses?And how businesses can strategically manage the issues that can arise from implementing such technologies?'

The essay will provide a critical analysis of the role and impact of emerging technologies and innovative attempts on businesses which will be backed up by,up to date relevant sources and examples.

There will also be an in-depth analysis on the issues that may arise, which includes issues around the resources and skills, the governance and politics, the social and ethical concerns and the loss of integrity, amongst others.

The essay will then focus on the discussion of strategic solutions in response to the adoption of innovative approaches and emerging technologies by businesses, reflecting a clear insight of relevant literature.

To finish, an insightful conclusion will outline the main points throughout the essay in order to fulfil the learning outcome and unearth the answer to the above question.

Article II. Emerging technologies' effects on businesses

Technology is constantly evolving and can have a great impact on businesses, from generating more revenue to creating a competitive advantage. With the use of technology, the prevention of accessing a product or service due to geographic location has now become a thing of the past.

Web conferencing and teleconferencing now plays a vital role in businesses not only to communicate with current clients and employees but also to communicate with potential ones, which results in a vast amount of time and money being saved.

The GPS is another example of an emerging technology that was a success, although this safety measure was first used by the Navy, the first mobile phone to integrate GPS was in 1999 and now almost every phone has a built in GPS tracker. (Sullivan, 2012)

A recent study shows that GPS technology can now be used in next generation robotics to allow robots to be used in precision agriculture. There are experiments being conducted with robots in multiple scenarios to test the relationship between humans and machinery, in Japan robots are taking over the role of nurses to assist patients out of bed and aid stroke patients in regaining control of their limbs. (Columbus, 2015)

Finances have now become easier to manage due to the allowance of internet banking and the use of ATM's, and sophisticated medical equipment is now available which results in a number of lives being saved, an example of this is the micro cameras which allows intricate surgery to be conducted due to the live feed being outputted on a large monitor for clearer vision. (Business Knowledge Source, 2010)

IKEA have recently released plans to build a high-tech table which will have multiple sensors and processors in order to weigh ingredients and offer cooking tutorials and recipes. If the plans go ahead, IKEA will override many furniture brands with this innovative product and will probably cause a drop in the sales of cookery books and small appliances such as scales. (Glenday, 2015)

Businesses which do not offer 3D printing may lose out on custom and revenue due to competitors who do offer this service, because 3D printing allows products to be produced faster and because of the mass production, it makes items much more affordable, along with the fact that the products can be tailored to suit customer's needs and requirements whether it be for medical prosthetics or simply an item of clothing. (Columbus, 2015)

Future plans for 3D printing include the printing of integrated electronic components, but it is also important to analyse the risks with advanced 3D printing, because the

printers could be used to produce illegal items which pose a threat such as weapons and firearms.

A recent case study shows that researchers have discovered a new way to make chips that could pack terabytes into smartphones with the use of resistive random access memory; this would allow users to store data that is greater than ten times their usual allowance. (Bullis, 2014)

Article III. Issues

Section 3.01 Resources and skills

Developing and implementing emerging technology can often be problematic due to a lack of certain required skills such as a technical understanding, an awareness of security issues, analytical skills, risk analysis and management skills and some knowledge of industry standards. (GOV, 2013b)

Cost is also an important factor to consider due to the resources which will be required, as they can be pricey and the cost to train employees to learn how to use the new technology and resources will need to be accounted for.

Section 3.02 Governance and politics

Governance and politics issues are one of the most important risk factors for emerging technologies. Although new technology may progress independently with strong political support, good governance should still remain. (Al-Rodhan, 2015)

The government often gets behind emerging technologies due to the fact that they can be developed and transferred into military applications, an example of this would be the use of predictive analytics which the military could use to forecast security and military related issues. (Al-Rodhan, 2014)

Bitcoin is an example of a failing technology due to the fact that the computer protocol operates without human governance, although this prevents bankers and politicians from having the ability to tamper with the online currency, it will never achieve the same status as paper currency due to the technologies security risks. (Kenneth, 2015)

Section 3.03 Social and ethical issues

Adopting emerging technologies can uncover a number of social and ethical issues and unless they are addressed and public acceptance is secured, it is likely that the innovation will not fulfil its full potential, and may result in an innovation fail.

Biomechatronic devices such as the pacemaker gained public acceptance due to the device having the ability to control abnormal heart rhythms which resulted in a number of lives been saved.

However an ethical issue of the pacemaker is, if a patient required a pacemaker to be fitted in order to survive, but they were unable to give consent, should medical staff be authorised to perform the operation?

Another issue arose when it became apparent that unethical hacking could be performed on a pacemaker, meaning the implanted device would be vulnerable to attacks which could result in fatalities.

Section 3.04 Losing integrity

Due to cyber attacks becoming more and more sophisticated it is important to maintain data and information integrity in order to ensure succession amongst the general public.

With Cloud computing becoming very popular, the Cloud Data Storages are also constantly emerging to prevent security breaches. A problem solving technique used in artificial intelligence areas is the use of Multi Agent Systems, which are also used to develop architecture to secure and maintain the data in Cloud Data Storages. (Rawat et al, 2013)

Along with Multi Agent Systems, data encoding is also used which is one of the most basic but reliable ways to provide stronger data and information integrity. (Rawat et al, 2013)

Section 3.05 Other

There are a number of other issues linked to emerging technologies which need to be considered, for example the issues that may arise with the analysis and methodology of the system.

When analysing technological systems it is important to determine the level of analysis needed and which system approach should be applied. It is then essential to define the system boundaries, identify the actors within a system, find a way to capture the key relationships and discover a method to measure the performance of the system without producing misleading results. (Carlsson et al, 2002)

Article IV. Role of business strategy and operation on tackling the issues

Once issues and concerns have been outlined it is important for businesses to produce effective solutions to tackling them, in order to move forward with the innovation or emerging technology.

In order to tackle the issue of cost it is a good idea to produce a cost-benefit analysis in order to decide if the benefit to cost ratio is greater. Although innovations and emerging technologies, if done correctly, can reduce cost in the long run, the upgrading and ongoing maintenance costs will need to be accounted for. (O'Brian, 2012)

Although a lack of technical skills can prove to be problematic when implementing new technology and the cost of training can be pricey, once the basic skills are in place it can make tasks that was once time consuming much simpler allowing for substitutions of grades and roles, as well as the ability to reduce staff and team sizes all together.

When the government chooses to back an innovation or emerging technology there are a number of factors they consider, for example they start by analysing a range of sectors to decide which sector could make a greater contribution to employment and future growth within the UK. (GOV, 2012)

The government will then provide businesses with a strategy to boost confidence and growth by developing strategic partnerships with industries, supporting emerging technologies, improve access to finance, develop skills and publish government contracts. (GOV, 2013a)

A recent example of government backing is the additional £32 million that has been allocation to 38 universities and companies for the development of biomedical treatments that could transform people's lives. (GOV, 2015)

Tackling social acceptance can be a challenge, although the government and word of mouth can always help, by producing a new strategy, concept and idea that has a purpose that meets the social needs and can create new social relationships is always a good way to start. (Wikipedia, 2015)

Although the pacemaker can be hacked into, up to now there have been no reports of death because of this reason, and due to the risk factor being low and the benefits been high, this technology still has a great social acceptance.

British health companies are aware of the issues which can arise from wireless hacking into the medical implants and have taken a number of actions to boost the security of the devices. (Knapton, 2014)

The devices are continuously monitored for new vulnerabilities and forensic medicine and security specialists are in the making of developing software that will detect if the pacemakers have been interfered with before death. (Knapton, 2014)

In order to protect data from sophisticated hacking a number of steps can be taken for example keeping up-to-date with patches to fix bugs and any other security vulnerabilities, ensuring only necessary machines are switched on and are fully protected, encrypting the saved data and removing passwords as a means to enter a network, and the careful oversight of vendors, because anyone who has access to the computer is at risk from hackers. (Yadron, 2015)

Article V. Conclusions

Although emerging technologies can affect businesses in a number of positive and negative ways, with coherent planning and strategies in place the issues that can arise from implementing such technologies can be overcome.

The benefits that emerging technology can provide people with are endless, technology will constantly be improving to ensure a better future for all, and as more problems arise, stronger solutions will be built and it will be an ongoing cycle.

Article VI. Bibliography

Al-Rodhan, N (2014) **Security, ethics and emerging technologies**. [Internet] Available from: <<https://agenda.weforum.org/2014/03/security-ethics-emerging-technologies/>> [Accessed 21st April 2015].

Al-Rodhan, N (2015) **The Many Ethical Implications of Emerging Technologies**. [Internet] Available from: <<http://www.scientificamerican.com/article/the-many-ethical-implications-of-emerging-technologies/>> [Accessed 21st April 2015].

Bullis, K (2014) **Super-Dense Computer Memory**. [Internet] Available from: <https://my.leedsbeckett.ac.uk/bbcswebdav/pid-871176-dt-content-rid-2395924_1/courses/16806-1415/Week%2010%28N%29%20Case%20Study%201.pdf> [Accessed 24th April 2015].

Business Knowledge Source (2010) **Impact on business and society of emerging technology**. [Internet] Available from: <http://www.businessknowledgesource.com/technology/impact_on_business_and_society_of_emerging_technology_024012.html> [Accessed 21st April 2015].

Carlsson, B. And Jacobsson, S. And Holmén, M. And Rickne, A (2002) **Innovation systems: analytical and methodological issues**. [Internet] Available from: <<http://www.sciencedirect.com/science/article/pii/S004873330100138X>> [Accessed 21st April 2015].

Columbus, L (2015) **Top Ten Emerging Technologies For 2015 Include 3D Printing, Distributed Manufacturing**. [Internet] Available from: <<http://www.forbes.com/sites/louiscolombus/2015/03/09/top-ten-emerging-technologies-for-2015-include-3d-printing-distributed-manufacturing/>> [Accessed 21st April 2015].

Glenday, J (2015) **Ikea turns the tables on professional chefs with latest innovation**. [Internet] Available from: <<http://www.thedrum.com/news/2015/04/21/ikea-turns-tables-professional-chefs-latest-innovation>> [Accessed 21st April 2015].

GOV (2012) **Industrial strategy: UK sector analysis**. [Internet] Available from: <<https://www.gov.uk/government/publications/industrial-strategy-uk-sector-analysis>> [Accessed 1st May 2015].

GOV (2013a) **Industrial strategy**. [Internet] Available from: <<https://www.gov.uk/government/policies/using-industrial-strategy-to-help-the-uk-economy-and-business-compete-and-grow>> [Accessed 1st May 2015].

GOV (2013b) **Technology and skills in the Digital Industries**. [Internet] Available from:
<https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/305377/evidence-report-73-executive-summary.pdf> [Accessed 21st April 2015].

GOV (2015) **£32 million boost for UK biomedical projects**. [Internet] Available from: <<https://www.gov.uk/government/news/32-million-boost-for-uk-biomedical-projects>> [Accessed 1st May 2015].

Kenneth, A.Posner (2015) **Without Stronger Governance, Bitcoin's Not Worth the Bet**. [Internet] Available from:
<<http://eds.a.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/detail/detail?sid=508fd0ef-8970-4843-864b-d86bac34d5e2%40sessionmgr4005&vid=0&hid=4105&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#db=buh&AN=101112048>> [Accessed 21st April 2015].

Knapton (2014) **Terrorists could hack pacemakers like in Homeland, say security experts**. [Internet] Available from:
<<http://www.telegraph.co.uk/news/science/science-news/11212777/Terrorists-could-hack-pacemakers-like-in-Homeland-say-security-experts.html>> [Accessed 1st May 2015].

O'Brian, John (2012) **Top Ten Mistakes to Avoid When Adopting Emerging Technologies in BI**. [Internet] Available from:
<http://radiantadvisors.com/2012/12/17/top10mistakes_emergingtechnology/> [Accessed 24th April 2015].

Rawat, S. And Chowdhary, R. And Bansal, A. (2013) **International Journal of Advanced Research in Computer Science and Software Engineering: Data Integrity of Cloud Data Storages (CDSs) in Cloud**. [Internet] Available from:
<http://www.ijarcsse.com/docs/papers/Volume_3/3_March2013/V3I2-0160.pdf> [Accessed 21st April 2015].

Sullivan, M (2012) **A brief history of GPS**. [Internet] Available from:
<<http://www.techhive.com/article/2000276/a-brief-history-of-gps.html>> [Accessed 21st April 2015].

Wikipedia (2015) **Social innovation**. [Internet] Available from:
<http://en.wikipedia.org/wiki/Social_innovation> [Accessed 1st May 2015].

Yadron (2015) **Five Simple Steps to Protect Corporate Data**. [Internet] Available from: <<http://www.wsj.com/articles/five-simple-steps-to-protect-corporate-data-1429499477>> [Accessed 1st May 2015].