INFORMATION SYSTEMS

FORMATION 2 EXAMINATION - AUGUST 2019

NOTES:
Section A - You are required to answer Questions 1 and 2.
Section B - You are required to answer any **three** out of Questions 3 to 6.
Should you provide answers to all of Questions 3 to 6, you must draw a clearly distinguishable line through the answer not to be marked. Otherwise, only the first three answers to hand for these four questions will be marked.

TIME ALLOWED:
3 hours, plus 10 minutes to read the paper.

INSTRUCTIONS:
During the reading time you may write notes on the examination paper but you may not commence writing in your answer book. **Please read each Question carefully.**

Marks for each question are shown. The pass mark required is 50% in total over the whole paper.

Start your answer to each question on a new page.

You are reminded to pay particular attention to your communication skills and care must be taken regarding the format and literacy of your solutions. The marking system will take into account the content of your answers and the extent to which answers are supported with relevant legislation, case law or examples where appropriate.

List on the cover of each answer booklet, in the space provided, the number of each question attempted.

THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS IN IRELAND

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Time Allowed: 3 hours, plus 10 minutes to read the paper.

SECTION A
Answer **BOTH** Question 1 and Question 2 in this Section.
(Both Compulsory)

1. Luxury Cars Ltd. runs a network of four showrooms across the island of Ireland. Specialising in luxury saloons and SUVs, the company sells both new cars and premium used cars. It also offers servicing, repair, paint and valet services from garages attached to each showroom.

The company was set up 20 years ago by Jack McKeown, who was previously a used car dealer at Fast Cars Ltd. Jack's business philosophy has been built around people:

'Our customers come back to us because we have the best people. Not car people, not technical people, people people. Make the relationship, you make the sale. And I have no problem in paying to keep the best people, and keep them making money for Luxury Cars.'

The sales team at Luxury Cars are well remunerated and can earn substantial bonuses based on achieving sales targets. Perhaps because of this, they work hard to follow up leads, contact past customers and generate new and repeat business. Each of the sales team has their own way of keeping details on past and potential customers. Some keep spreadsheets, some have notebooks, and others have different ways of maintaining records. An issue in the business (and in the industry more broadly) is that when staff move on from Luxury Cars, they take that information with them and Luxury Cars often loses the customer. A paper file is kept by Luxury Cars on each customer who buys a car, but this consists primarily of any copies of contracts, invoices and other such documents.

Jack is broadly pleased with the performance of the sales team. Sales are good and he feels that there is a good level of new and return business. However, he doesn't have any substantial evidence to support this feeling because Luxury Cars doesn't track metrics such as repeat business, spend per customer, or other indicators of sales performance.

On the other hand, he is less impressed with performance by the service department. Most of the revenue from the service department arises from routine servicing of cars that have been sold by Luxury Cars. Jack sees an opportunity to sell more services to these customers – such as winter services, wheel and scratch repair, and valet services. He also feels that Luxury Cars should be advertising these services more widely as another means of bringing new customers to its business.

Jack has recently brought in a new operations manager from a rival dealer network, Budget Cars. She has been arguing strongly that Luxury Cars should implement a new 'customer relationship management' (CRM) system across the organisation.

REQUIREMENT:

(a) Explain the term 'customer relationship management' (CRM) systems. In your answer, you should describe the potentially different elements and functions of CRM systems that Luxury Cars might use in its different departments.

(6 marks)

(b) Discuss the potential benefits and challenges of implementing CRM systems, specific to Luxury Cars, making any further assumptions you consider necessary.

(10 marks)

(c) How might Social CRM offer further benefits to Luxury Cars? (4 marks)

(d) Outline the potential ethical issues of Luxury Cars engaging with its customers through social media. (5 marks)

[Total: 25 Marks]

2. Write briefing notes on any THREE of the following topics. In each case, your note should include a summary of the main points relating to the topic.

(a) Conversion strategies for enterprise-wide applications.

(b) Service Level Agreements (SLAs) when using cloud computing to store operational data (Infrastructure as a Service).

(c) eXtensible Business Reporting Language (XBRL) for internal use in large, complex organisational structures.

(d) Executive Support Systems (ESS) in deciding to diversify product offering.

(e) Group Decision Support Systems (GDSS) for product design.

[Total: 15 Marks]

SECTION B
Answer **ANY THREE** of the four questions in this Section.

3.
(a) Discuss four contemporary hardware trends that may affect geographically dispersed businesses. (8 marks)

(b) Discuss the possible business benefits of collaboration within geographically dispersed firms, and the tools and technologies that might be used to facilitate this.

(8 marks)

(c) Explain the role of end users in developing and implementing new technologies in geographically dispersed organisations.

(4 marks)

[Total: 20 Marks]

4.
(a) Explain what is meant by the term Enterprise Resource Planning (ERP) systems, and outline options available to an organisation deciding to acquire ERP software.

(5 marks)

(b) Outline the organisational, management and technological factors that will need to be considered in implementing an ERP system, giving relevant examples.

(9 marks)

(c) Outline the steps involved in business process management and the usefulness of such an approach.

(6 marks)

[Total: 20 Marks]

5.

(a) Porter's model of competitive forces suggests five competitive forces that shape the success of the firm. Assess the extent to which Information Systems can support the generic strategies used to address such competitive forces.

(6 marks)

(b) Using the example of an online retailer to illustrate your answer, discuss the impact of Information Systems on the value chain of a business.

(8 marks)

(c) Outline three business models unique to internet-based providers. (6 marks)

[Total: 20 Marks]

6.

(a) Assess the usefulness of data warehousing and business intelligence tools in improving decision making in manufacturing organisations.

(8 marks)

(b) Outline three business intelligence and business analytics tools that could be used in manufacturing organisations.

(6 marks)

(c) Outline the competitive forces model for IT infrastructure investment and assess its usefulness in evaluating an investment in business intelligence and analytics.

(6 marks)

[Total: 20 Marks]

END OF PAPER

THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS IN IRELAND

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FORMATION 2 EXAMINATION - AUGUST 2019

SOLUTION 1

Tutorial Notes: -

Purpose: To examine candidates' understanding of: CRM systems including benefits and challenges; social CRM; and ethical considerations.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.

Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose) and ability to apply this to the given context

(a) CRM systems capture and integrate customer data from all parts of the organisation. They consolidate the data, analyse it and distribute the results to the various systems and customer touch points across the enterprise. Well-designed CRM systems provide a single enterprise view of customers that is useful for improving sales and customer services.

There are three elements of CRM: sales, marketing and service. CRM include aspects linked to sales (including sales force automation – helping staff increase their productivity by focussing sales efforts on the most profitable customers), service (providing information and tools to increase the efficiency of call centres, help desks and support), and marketing (supporting direct marketing by providing capabilities for capturing prospect and customer data, scheduling and tracking direct marketing etc.).

The functions of CRM include operational or analytical functions. Operational CRM includes all customer-facing applications, such as sales force automation, call centres, and marketing automation. The analytical CRM uses data from the operational CRM, customer touch points and other sources, this is organised into data warehouses and used for data analysis including data mining and OLAP. This analysis provides managers with information to identify buying patterns, create segments for targeted marketing and pinpoint profitable and unprofitable customers.

2 marks for CRM, 4 marks for elements/functions

(b) Benefits of CRM systems include:
- data on all client interaction (e.g. window-shopping, purchase, service, warranty service, recalls) is consolidated in one place, for access by relevant staff (e.g. in service or sales department), even across different functions (e.g. in credit control or marketing)
- more effective marketing based on analysis of client data
- improved response time to client queries with easy access to information
- increased client satisfaction from more informed interactions
- reduced client churn/ improved loyalty
- greater efficiency in client service, reducing time taken on administration/responding to queries, increasing profitability
- ability to identify profitable and high lifetime value clients (e.g. those changing car regularly, using specific types of financing)
- ability to respond to opportunities to deliver additional services to clients, including by different business units (e.g. offering services, valet, or sending information on new vehicles)

Challenges include:
- CRM software is often linked not only to technological changes, but also to fundamental changes in the way that businesses operate. Employees must accept new job functions and responsibilities – for example, the requirement for each employee to record each interaction on the CRM system so that other staff see a comprehensive record of interactions with the client
- these changes can lead to resistance (and ultimately to the failure of the CRM system) if not handled appropriately
- these are complex pieces of software that are expensive to purchase and implement, and often involve a lengthy implementation time

- while specific software packages for many types of organisation are available, many will require some level of customisation (requiring in-house expertise or consultancy)
- the organisation becomes dependent on the provider to upgrade and maintain the software provided – risk if not updated and maintained, or if support is not available
- CRM systems may introduce 'switching costs' – once applications are installed it becomes very costly to switch providers
- CRM systems require a very clear understanding of exactly how data is used in the organisation and how it would be used in the CRM system. Some data cleansing work may be required

                    5 marks each for benefits and challenges – which must be relevant to the case

(c) Social CRM tools enable a business to connect to customer conversations and relationships from social networking sites to CRM processes, for example SAP, Salesforce and Oracle CRM products feature technology to monitor, track and analyse social media activity in Facebook, LinkedIn, YouTube Twitter and other sites. Employees who interact with customers via social networking sites are often able to provide customer service functions much faster and at lower cost than via phone or email. Social CRM can be combined with social media analytics to test and optimise marketing campaigns, or to aim social media campaigns directly to existing or known potential customers.

Customers increasingly expect organisations to use these channels to respond – however there is a possible reputational effect of customer complaints being so publicly visible – particularly if these are not responded to in an appropriate or timely way.

(d) Possible answers include:

- Right to privacy of those engaging with the organisation
- Targeting of specific demographics
- Reputational risks (organisation and those engaging with it)
- Exclusion of those not engaging with social media
- Use of data from social media (e.g. Facebook profiles)
- Need for social media use policy, and for this to be fairly applied

                    Up to 5 marks for relevant points, explained

SOLUTION 2

Tutorial Notes: -

Purpose: Responses for each question are expected to include a summary of the main facts relating to the topic, and relevant to a given context.

Links: No major links to other topics or papers.

Options: Candidates should answer three of the five parts/sub-questions

Essential components: Each sub-question has an aspect that allows the candidate to show what they know about a broad topic. Each also provides an opportunity for candidates to show they understand the relevance of the broad topic in a specific context. In general, 5 key points are expected on each sub-question for the 5 marks. 4 of these could be general points but must be relevant.

(a)   **Conversion strategies for enterprise-wide applications**

Conversion is the process of changing from the old systems to new systems. For enterprise-wide applications, a direct cutover strategy would normally be too risky. A pilot study strategy - testing the system in a single department/location before rolling it out - may not be appropriate for an enterprise-wide application, where the success or failure of the system relates to its enterprise-wide use.

Appropriate strategies might include a parallel strategy – running the old and new systems in parallel for a period – a strategy which is low risk, and allows for ongoing testing and amendments. However, this strategy is also relatively high cost and time-consuming (for example, transactions needing to be processed twice on the different systems – this also confusing and frustrating for staff).

A phased approach strategy involves introducing the system in stages – for example department by department, or introducing specific modules first before integrating these with others. Again this approach is higher cost and lower risk than the direct cutover strategy, allowing for ongoing testing and amendments. It may be more suitable than pilot study for an ERP implementation.

(b)   **Service Level Agreements (SLAs) when using cloud computing to store operational data (Infrastructure as a Service)**

Service level agreements (SLAs) help protect both the organisation (the customer) and the service provider. These might include:

- Responsibilities of the service provider and level of service expected by the customer, including the nature and level of services provided
- Provisions for security, confidentiality and disaster recovery – e.g. how is the organisation's data segregated from others?
- Stipulation of jurisdictions in which data will be stored, and that data is stored in accordance with the privacy rules of those jurisdictions
- Billing and conditions for termination
- Criteria for performance measurement – e.g. connection speeds, outages, responsiveness of support
- Customer support options

(c)   **eXtensible Business Reporting Language (XBRL) for internal use in large, complex organisational structures**

eXtensible Business Reporting Language (XBRL) is an XML-based markup language used to communicate financial and business data electronically. Software is used to 'tag' the data contained in financial statements with contextual information such as scale (€m, €000) date (as at 31.12.18) and nature (for example, non-current assets – freehold property). When such tagged data is read by XBRL-enabled software, it can be quickly and accurately sorted, classified and analysed.

XBRL can be useful internally in large complex organisational structures, particularly where different parts of the business operate different systems (perhaps legacy systems following acquisitions), operate under different accounting and tax regulations, or even use different languages. Companies within the organisation can produce their statements in XBRL-enabled format saving time and cost by preventing re-keying at Head Office. Where this has been done correctly and consistently across the organisation, the process of consolidation is made significantly easier and faster. Preparing tax returns may also become easier and faster. Financial results can be more quickly and easily compared across the organisation. This also leads to improved accuracy and reliability of data and the analysis. Regardless of the native language, or systems used to produce the financial data, that data can be more easily and reliably analysed. As such, it allows greater focus on analysis (rather than data entry) potentially improving and speeding decision making by Head Office.

(d) **Executive Support Systems (ESS) in deciding to diversify product offering**
Executive Support Systems are information systems at the organisation's strategic level, designed to address unstructured decision making through advanced graphics and communications. Their purpose is to provide executives with information to help them to make their decisions (not to provide executives with ready made decisions), because such decisions normally require judgement, evaluation and insight. Such an evaluation could be made of the decision to diversify product offerings, which will require executives to combine the information provided with their own experience, expertise, risk preferences and understanding of the organisation and its business environment in making their decision.

Such systems are designed to be flexible, to cope with unstructured data from a range of sources, including internal and particularly external to the organisation. In this context, they may draw on information from internal management information systems and decision support systems to provide information on the past performance of these existing products, or the performance of other products the organisation already sells in these new territories. The ESS may also store and present external information, such as information on new territories (demographics, key competitors etc.) or new products. A key aspect of the provision of information through ESS is ensuring information is clearly presented - this could be provided at a summary level rather than risk information overload, yet also provide the capacity to drill down (possibly using business analytics tools) to more specific information. Another approach is to provide a digital dashboard, which provides, at a glance, a real-time view of key performance indicators for the business. Executives using this type of information, provided the information provided is accurate, reliable and provided in real-time (or in a timely fashion), may be able to make more informed and better decisions on whether and how to diversify existing product offering.

(e) **Group Decision Support Systems (GDSS) for product design**
GDSS are interactive computer-based systems for facilitating the solution of unstructured problems by a set of decision makers working together as a group in the same location or in different locations. Rather than provide information and modelling that enables an individual to make a particular decision, GDSS use hardware and software to facilitate group meetings. Hardware includes computer and networking equipment, display screens and may also include dedicated desktops under each participant's control so that their input can be shared as and when they decide to do so over the meeting network and/or on display screens. Software includes electronic meeting software that collects, documents, ranks and edits the ideas offered. Contributions are made anonymously and simultaneously by participants. Subsequently, information is stored on the ideas submitted, evaluation of these ideas and results, and can be made available to non-participants.

These systems are distinguished from others by their focus on decision-specific information, and that these are tools for engagement across a range of staff levels dependent on the problem to be solved.

SOLUTION 3

Tutorial Notes: -

Purpose: To examine candidates' understanding of: contemporary hardware trends; collaboration tools and systems development.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.

Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose) and ability to apply this to the given context.

(a) Mobile digital platforms: These have emerged as alternatives to PCs and larger computers. Smartphones and tablets have taken on many functions previously done by larger devices, including the transmission of data, accessing the Web, displaying digital content and exchanging data with corporate systems. These devices are increasingly used for business computing as well as for consumer applications. Advantages in terms of staff having access to job-related information wherever they are – but also security concerns.

Consumerisation of IT and BYOD (bring your own device): flow of consumer trends into business IT – hardware specifically including the use of formerly personal mobile devices (but as a more general trend this includes consumer-based software and apps also, including social media). For hardware, it means the company has to consider not just providing and controlling its own devices as in the past, but also the accessibility and security of company data being available on devices it does not own/control. Advantages in terms of staff having access to job-related information wherever they are – but also security concerns.

Massive increases in storage potential and processing power: significant increases in both over time, and continuing to evolve rapidly, facilitating the use of 'big data' by increasing numbers of firms, particularly in customer-facing industries. A possible further development of this is quantum computing: emerging technology with the potential to dramatically boost processing power – developments in analytics software then allow for analysis of these large quantities of structured and unstructured data.

Virtualization: presenting a set of computing resources (including computing power or data storage) in such a way that all can be accessed in ways that are not restricted by physical configuration or geographic location. It involves running multiple operating systems and application programs on one machine and increasing the overall utilization rates of the device. It may mean having fewer servers that are more effectively utilised, saving space, energy and cost, and can lead to easier combinations of new and legacy systems.

Cloud computing: a model of computing in which computer processing, storage, software and other services are provided as a pool of virtualised resources over a network, primarily the internet. 'Clouds' of computing can then be accessed on an as-needed basis from any connected device and location. There are three main categories of cloud computing: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Benefits and risks depend on the form of cloud computing employed, benefits often include cost savings, risks relate to control of data and accessibility. From a hardware perspective, IaaS can lead to cost savings, reduced investment in hardware (paying for usage rather than owning servers), and keeping data offsite is a disaster contingency measure however concerns over access and security of data remain.

Green computing: practices and policies for designing, manufacturing, using and disposing of computing services and devices and systems to minimise impact on the environment. This allows businesses to reduce their total cost of ownership of hardware through more efficient use of servers, printers, storage devices and networking equipment. In turn, that reduces the impact on the environment. Could be linked to virtualisation and cloud computing above. Possible benefits include cost savings and alignment with corporate social responsibility or sustainability goals.

Efficient power saving processors: As businesses require more and more computing capacity, hardware and chip manufacturers are answering the need with multicore processors. These reduce the overall number of servers or processors, and operate more efficiently, thus reducing the total cost of ownership, including electricity costs. The motivation to reduce power consumption is migrating to netbooks, smartphones, and mobile computing devices.

4x2 marks for a relevant hardware trend, explained

(b)   Possible business benefits include:

Productivity: people interacting and working together can capture expert knowledge and solve problems more rapidly than the same number of people working in isolation. There may be fewer errors. This can lead to a reduction in buffers and time delays among production units.

Quality: People working collaboratively can communicate errors and corrective actions faster than people working in isolation. There are likely to be fewer errors as a result, and reduced time delays.

Innovation: people working collaboratively in groups can come up with more innovative ideas for products, services and administration than the same number of people working in isolation. There are advantages of diversity and the 'wisdom of crowds'.

Customer service: People working together in collaboration can solve customer issues and complaints faster and more effectively than if they are working in isolation from each other.

Financial performance: As a result of improvements in productivity, quality etc., organisations that support collaboration can achieve higher sales and better overall financial performance.

Possible tools and technologies include:
Email and instant messaging
Wikis
Virtual worlds – online 3D environments where employees have graphical representations of themselves (avatars) which meet, interact and exchange ideas at these virtual locations.

Collaboration and social business platforms including:
Virtual meeting systems: videoconferencing and web conferencing, or telepresence (an integrated audio and visual environment that allows a person to give the appearance of being present).

Cloud collaboration services: online tools and services that allow file storage and synchronisation including cloud storage, file sharing and collaborative editing (examples include Google Drive) or cyberlockers – online file-sharing that allows users to upload files to a secure location for access by others (for example, Dropbox, Microsoft OneDrive). Some services such as Google+ offer 'social' aspects where users create a profile and can organise into 'circles' for specific sharing and collaboration, or 'hangouts' where users engage in group video chat.

Microsoft SharePoint – browser based collaboration and document management platform combined with a powerful search engine and installed on corporate servers. It has a web-based interface and is closely integrated with Office desktop

IBM Notes – collaborative software system with capabilities for sharing calendars email, messaging, collaborative writing and editing, shared database access and electronic meetings.

Enterprise social networking tools – specialised tools for supporting social business e.g., Yammer, Jive and IBM Connections – employees are connected to each other through profiles, updates and notifications similar to Facebook features.

<p align="right">4 marks for business benefits, 4 marks for possible tools and technologies</p>

(c)   The role of end users could be described as it relates to the systems development life cycle, for example:
- Systems analysis – defining the problem the new system is trying to solve through discussions with end users. Identifying the needs of end users, e.g. the data that is required and not required, what works well/less well in the existing system? Feeding in information to the feasibility study on organisational feasibility of the proposed new system.
- System design – need for oversight to ensure that the system reflects end users' business priorities and information needs, not biases or misunderstandings of technical staff.
- Testing – testing with end users to identify what works and does not
- Conversion/implementation – need for appropriate training and preparation of manuals to allow staff who have not used or been trained in such a system to engage with the system quickly. Use of champions of change, support of senior management and other incentives to educe buy-in from staff and ensure that end users engage with the system, rather than working around it. Resource and technical support for end users over conversion/implementation period, for example, allowing paid overtime or expecting a lower utilisation rate while staff get used to the new system

- Maintenance – Review of the project with end users, possibly including formal post-implementation audit. Contribution to correcting errors, issues and otherwise fine tuning the system after implementation, for example, increasing available storage. Highlighting of lessons to be learned for future projects

Up to 4 marks for relevant points (using the SDLC as a framework is not required)

SOLUTION 4

Tutorial Notes: -

Purpose: To examine candidates' understanding of: ERP; organisational/management/technological factors affecting IS; business process management.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.

Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose) and ability to apply this to the given context.

(a) Enterprise Resource Planning (ERP) systems are systems which integrate business processes in manufacturing and production, finance and accounting, sales and marketing, human resources and others as necessary into a single software system and comprehensive data repository. This can be contrasted to the traditional approach of unintegrated systems. While each business process has its own module within the software, data is stored in a centralised database and can be used by multiple business processes. When data is entered by one process (such as the accounting function) it is immediately available to other business processes.

ERP software is usually purchased from a software vendor, and examples include SAP, Oracle, IBM and Microsoft. Companies would choose which business processes they wished to include in the ERP and map their business processes to the software. The software is usually customised, often with support from external consultants, however this is difficult given the complexity of these systems, and can create risks that the performance of the new systems and the information and process integration intended might be compromised.

ERP software is increasingly available as cloud-based software, particularly for small and medium sized organisations (e.g. SAP's Business One on Demand). It is also increasingly available as open source products at no or lower cost, but with less functionality and support.

ERP is not usually developed in-house except for very large complex organisations (and in which case it is usually developed with consultants), reflecting the complexity of such systems, the importance of the integrations and the risks of such integrations not working effectively.

2 marks for explanation, 3 marks for options to acquire

(b) Enterprise Resource Planning (ERP) systems integrate business processes in manufacturing and production, finance and accounting, sales and marketing, human resources and others as necessary into a single software system and comprehensive data repository. This can be contrasted to the traditional approach where these functions each have their own, unintegrated systems. While each business process has its own module within the software, data is stored in a centralised database and can be used by multiple business processes. When data is entered by one process (such as the accounting function) it is immediately available to other business processes.

Organisation: The key elements of an organisation are its people; structure; business processes; culture and politics. Information Systems provide information to different staff levels to allow them to carry out their function and to monitor others as appropriate. Authority and responsibility is organised as a hierarchy. Each organisation has a unique culture, a fundamental set of assumptions, values and ways of doing things that has been accepted by most of its members. Organisational politics may be a part of this, and is often based in conflicts as to how the company should be run and resources and rewards distributed. Organisations need to consider how each of these factors could inhibit or support the success of the new ERP system: for example, is there a culture of positively embracing change? Are there clear reporting lines in each organisational divisions, as well as from the divisions to senior management/head office? In addition, new ERP systems can affect these organisational factors, for example, flattening hierarchies through greater information sharing.

Management: management's job is to make sense out of the many situations faced by organisations, make decisions and formulate action plans to solve organisational problems. They assess business challenges in the environment, set the organisational strategy for responding to these challenges, and allocate human and financial resources to coordinate the work and achieve success. A primary objective of a new ERP system will be to ensure that this provides the information needed by management to complete these tasks, and that information ideally should be timely, reliable, accurate and objective. Examples include having more accurate, more regular (possibly real-time) information on the product mix being sold in each store/by agents provided to divisional management (for forecasting and placement), Head Office (for forecasting and procurement) and the manufacturing/procurement divisions (for production/procurement planning).

Technology: Technology includes computer hardware, software, data management technology and networking and communications technology (consisting of both physical devices and software, linking various pieces of hardware and transferring data from one physical location to the other). Networks including the internet, intranets

(internal corporate networks) and extranets (private intranets extended to authorised users outside the organisation) may be used. These, together with the people required to run and manage them, make up the firm's information technology infrastructure. The success of information systems depends on their availability and ease of use, as facilitated by these technological components. Organisations need to consider what technology is optimal, taking into account the objectives of the new system, integration between different parts of the system, performance, ease of use and cost. For example, with faster network connections more expensive, there may be aspects where the business is happy to have a daily update of some types of information rather than real time information, and spend the money saved in other ways.

3x3 marks for organisational, management and technological, plus relevant examples

(c) Business process management is a continuous cycle of process redesign and process monitoring.

1. Identify processes for change: decide which business processes are to be improved
2. Analyse existing processes: processes are modelled and documented, noting particular issues such as bottlenecks, labour intensive tasks and other time delays
3. Design the new process: produce a detailed specification of the new process
4. Implement the new process: implement the new process and accompanying technologies and systems, making necessary changes and revisions
5. Continuous measurement: once implemented, continue to measure the process: is it working effectively, is it still appropriate or is further change needed?

It may be appropriate where the existing process is weak and needs to be replaced in its entirety – it leads to a much more significant organisational change than automation or rationalisation of procedures. It can lead to dramatic gains in productivity and efficiency. However, need for change is at a process, rather than an organisational level (that is, it is not requiring a paradigm shift). The advantages of business process management over business process redesign include the recognition of a constantly changing environment and the building in of behaviours that continually check the continuing appropriateness of the process/need for change. Possible challenges in implementing BPM include the resistance of employees to change, the costs of process redesign and risks in the design and implementation of new processes.

3 marks for explaining the steps in business process management and 3 marks for explaining its usefulness

SOLUTION 5
Tutorial Notes: -
Purpose: To examine the candidate's understanding of: IS in responding to global competitive forces; the effect of internet technologies on the value chain; e-commerce models.
Links: No major links to other topics or papers.
Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below. Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a)   The four generic strategies include:

Low-cost leadership: securing competitive advantage by keeping costs low. IS can assist in a range of ways, including: providing real-time, accurate information that facilitates cost monitoring and control; reducing processing times with increasing automation; minimising stock-holding by enabling better forecasting and replenishment. Other relevant suggestions and examples are acceptable.

Product differentiation: securing competitive advantage by differentiating products from the offerings of competitors. IS can assist by, for example: using stored information to develop a more personalised, or faster, shopping experience for customers; using proprietary technology to enhance the product/buying experience. Other relevant suggestions and examples are acceptable.

Focus on market niche: securing competitive advantage by serving a target market better than competitors. IS can assist by using (perhaps data mining) stored information on the target market to: develop a more personalised, or faster, shopping experience for customers; facilitate targeted marketing; utilise Customer Relationship Management software; engage in customer profitability (or risk) analysis. Other relevant suggestions and examples are acceptable.

Strengthening customer and supplier intimacy: securing competitive advantage by developing loyalty with customers and suppliers. IS can assist by: using stored information as suggested above; facilitating Electronic Data Interchange between the organisation and its customers and suppliers (for example, allowing suppliers access to production schedules and stock levels); utilising Customer Relationship Management or Supply Chain Management software (affecting switching costs). Other relevant suggestions and examples are acceptable.

2 marks for detailing the four strategies, 4 marks for a clear explanation of how IS can be used in implementing the strategy.

(b)   The value chain model illustrates the series or chain of basic activities that add a margin of value to a firm's products or services. It allows organisations to highlight the specific activities where competitive strategies can be applied, and in the context of information systems, the specific, critical leverage points where a firm can use information technology most effectively to enhance its competitive position. For an online retailer, it may be particularly important to evaluate business activities and how these may be impacted upon by internet technologies.

The value chain highlights primary activities (those most directly related to the production and distribution of the firm's products and services, which create value for the customer) and support activities (those that make the delivery of the primary operations possible.

Primary activities include:
Inbound logistics: receiving and storing materials for distribution to production. Possible IS usage: automated warehousing systems are crucial for an online retailer for efficient stock management and good customer service through accurate inventory levels.

Operations: transforming inputs into outputs. Possible IS usage: computer-controlled machining systems; manufacturing planning applications; each focussed on producing products in the most time and resource efficient way due to competition on price from other online retailers.

Sales and marketing: promoting and selling the firm's products. Possible IS usage: computerised ordering systems are essential for an online retailer and can be a source of competitive advantage (Amazon's patented 'one-click' technology). Customer relationship management applications; data mining on existing customer information for targeted marketing also extensively used.

Service: maintenance and repair of goods and services. IS usage very dependent on the goods and services involved, may include equipment maintenance systems.

Outbound logistics: storing and distributing finished products. Possible IS usage: automated shipment scheduling systems are essential in large online retailers and a possible source of competitive advantage (facilitating same day or one-day delivery); parcel tracking increasingly an expectation of customers.

Support Activities include:
Administration and Management: organisational infrastructure associated with managing the organisation as a whole. Possible IS usage: electronic scheduling and messaging systems; range of decision-support systems providing timely and reliable information to management.

Human resources: employee recruiting, training and hiring across all primary and support activities. Possible IS usage: workforce planning systems; HR-specific applications to facilitate confidential storage of employee data.

Technology: improving products and the production process. Possible IS usage: computer-aided design systems; decision support systems to monitor the efficiency of various processes and activities.

Procurement: purchasing inputs. Possible IS usage: computerised ordering systems; supply chain management applications; electronic data interchange. Particularly relevant to an online retailer as procurement over the internet tends to raise bargaining power over suppliers; substitute products may emerge from new suppliers; widening of geographic market may impact on price and supply availability.

2 marks for identifying the supply chain activities, 4 marks for highlighting relevant IS usages, 2 marks for specific examples relating to an online retailer.

(c) Any three from:

Transaction broker: saves users money and time by processing online sale transactions and generates a fee each time. Examples include Expedia.

Market creator: provides a digital environment where buyers and sellers meet, search for and display products, and establish prices for those products. Can serve consumers or B2B e-commerce, generating revenue from transaction fees. Examples include eBay, Priceline.com, Etsy.

Content provider: creates revenue by providing digital content, such as digital news, music, photos, or video over the Web. The customer may pay to access the content, or revenue may be generated by selling advertising space. Examples include iTunes, gettyimages.com, timesonline.com.

Community provider: provides an online meeting place where people with similar interests can communicate and find useful information. Examples include Facebook, Google+, Twitter.

Portal: provides an initial point of entry to the Web along with specialised content and other services. Examples include Google and Bing.

Service provider: provides web 2.0 applications such as photo sharing and user-generated content as services. Other services may include online data storage and back-up. Examples include Dropbox, Google Apps.

3x2 marks, must name and show understanding of models (suggesting websites alone not sufficient)

SOLUTION 6
Tutorial Notes: -
Purpose: To examine the candidate's understanding of: data warehousing, business intelligence and business analytics, valuing IS investment.
Links: No major links to other topics or papers.
Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.
Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a) **Data warehousing**

A data warehouse is a database that stores current and historical data of potential interest to decision makers throughout a company. The data originate in many core operational transaction systems inside the organisation such as systems for sales, customer accounts and manufacturing, and may include data from website transactions. The data warehouse then extracts current and historical information from these systems, and combines this with data from external sources. This is transformed by correcting inaccurate or incomplete data and restructuring the data for management reporting and analysis before being loaded into the data warehouse. A data warehouse can therefore provide concise, reliable information about current operations, trends and changes across an enterprise.

Business intelligence

Once data has been captured and organised in a data warehouse they are available for further analysis using business intelligence tools and techniques for analysing and understanding data, including online analytical processing (OLAP), statistics, models and data mining. Business intelligence is therefore dependent on data warehousing. Taken together, business intelligence integrates all the information streams produced by a firm into a single, coherent, enterprise-wide set of data, and then using modelling, statistical analysis tools and data mining tools to make sense out of all these data so managers can make better decisions and better plans, or at least know quickly when their firms are failing to meet planned targets.

Data warehousing and business intelligence can be beneficial to the firm in gathering, storing and analysing the organisation's own data (possibly in combination with externally-sourced data) to better understand factors that are important to their business, including customer behaviour. It can provide a basis for more informed, and hopefully better business decision making on a range of issues. These might include customer profiling, redesign of existing products, and decisions on new business lines informed by analysis of data on existing lines, and evaluated on the basis of scenario modelling.

However, organisations should also consider that business intelligence infrastructure and business analytics tools normally require a considerable investment and ongoing cost for the business. The infrastructure and systems bought will only lead to benefits being achieved if the data being fed into these systems is clean, reliable and relevant. Similarly, benefits will only be seen if the management team is involved, and capable of asking intelligent questions and analysing the data they receive. Management and broader users need to receive information from these tools in an appropriate way, for example through an integrated delivery platform that integrates a range of information and brings it to the manager's desktop or mobile platform in a reliable, timely and easy to use way.

2 marks for explanation of data warehouse; 2 for BI/tools explanation; 4 marks for evaluation of benefits and challenges

(b) Any three from:

Production reports: These are pre-defined reports which are specific to the industry and to a functional area of the business, for example, for a manufacturing organisation these might include reports on production scheduling, stoppages, quality measures etc.

Parameterized Reports: users enter several parameters as in a pivot table to filter data and isolate impacts of parameters. An example might be identifying changes in productivity or quality measures by facility and date/season, which might lead to remedial action being taken.

Dashboards/Scorecards: visual tools for presenting performance data defined by users. Such dashboards/scorecards could be used to give users, particularly senior managers, an overview of the most important metrics for the business.

Ad hoc query/search/report creation: functions that allow users to create their own reports based on queries and searches, i.e. not just to run the reports predefined by the vendor or at the time of installation. These would normally

be run by managers or business analysts in response to their specific queries such as, for example, investigating production times of specific components to inform make or buy decisions.

<u>Drill down</u>: the ability to move from a high-level summary to a more detailed view. For example, to be able to see production by facility, then to drill down into production in different departments, of different products etc. to see more detail such production quantities v budget, quality measures and wastage.

<u>F</u>orecasts, scenarios, models: these include the ability to perform linear forecasting, what-if scenario analysis, and analyse data using standard statistical tools. Predictive analytics use statistical analysis, data mining techniques, historical data and assumptions about future conditions to predict future trends and behaviour patterns. Variables that can be measured to predict future behaviour are identified, and a collection of such predictors is combined into a predictive model for forecasting future probabilities with an acceptable level of reliability. One possible use might be to model production of a new product based on information from existing products, or for production scheduling.

<div align="center">2 marks per suggestion, well explained and with a clear example</div>

(c) The competitive forces model for IT infrastructure investment suggests six factors that can be used to address the question of how much an organisation should spend on its IT infrastructure. These include:

1. Market demand for your firm's services: identify the services provided to customers, suppliers and employees and identify whether these services currently meet their needs and expectations. For example; do customers complain of slow responses to queries?

2. Your firm's business strategy: what is the firm's medium to long-term business strategy, and what services and capabilities will be needed to achieve the objectives set?

3. Your firm's IT strategy, infrastructure and cost: examine existing IT plans and their alignment with business strategy; evaluate total infrastructure costs (possible using a total cost of ownership approach).

4. Information technology assessment: where is the company's IT in relation to current trends? While highly experimental technologies can be problematic it may also be short sighted not to invest in new technologies that can build the organisation's capabilities and lead to competitive advantage.

5. Competitor firm services: what technology services are competitors offering their customers, suppliers and employees, and compare these to your firm. If falling short your firm may be at a competitive disadvantage

6. Competitor firm IT infrastructure investments: benchmark IT expenditures against competitor firms

Completing such an assessment may be time consuming and costly, and it may not be possible to adequately answer all of the questions posed: for example, it may be particularly difficult to identify how much your competitors spend on IT, or to get a picture of what competitor firms offer their employees. However, the merit in the model, as compared to other models of IT infrastructure valuation (such as total cost of ownership) is that it acknowledges that firms do not exist in a vacuum, and that the appropriate level of IT infrastructure investment is a function not only of internal matters but also environmental factors. It provides a framework to explore whether present or suggested levels of IT infrastructure are placing the organisation at a competitive advantage or disadvantage by comparison to competitor firms.

<div align="center">4 marks for discussion of model, 2 marks for evaluation of usefulness</div>