CPA IRELAND | CERTIFIED PUBLIC ACCOUNTANTS

INFORMATION SYSTEMS

FORMATION 2 EXAMINATION - AUGUST 2016

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. Fowlim is a for-profit training provider with over 10,000 students in various centres across Europe. It offers courses in a range of employment-related areas including literacy and numeracy, book-keeping, ICT, management, as well as vocational training. Nearly 3,000 of Fowlim's students participate in English as a Foreign Language and Teaching English as a Foreign Language courses. This followed on from the announcement three years ago that Fowlim was to be the 'preferred provider' for a major EU programme to promote language skills. The company's management team believes that this is a major growth area for the business, and is projecting that the number of participants on these programmes could increase to as many as 6,000 students per year over the next five years.

By contrast, other types of courses have experienced falling student numbers. In particular, the number of students taking Fowlim's short courses (eight weeks or less) in areas such as book-keeping and ICT has fallen by 50% over the past two years. These falling numbers are putting pressure on the company's financial results.

Classes are delivered in Fowlim's own facilities by casual staff who are not employees but are contracted to deliver specific courses. Given differences in teaching delivery and cost profiles between courses, the optimal number of students in a class may differ from one course to another. The company has a rule that courses will not run with less than ten students, and the breakeven number of students in any class is probably closer to 15 students per class.

Given the changes seen in Fowlim and in its sector in recent years, the senior management team has decided to undertake a strategic review of the business, to include a root and branch review of its Information Systems. The recently appointed Head of IT and Corporate Services, Declan Kieran, has expressed significant concern about the lack of investment in the company's Information Systems in recent years. In particular, he feels that the student interface 'Myfowlim' is not user-friendly and dated compared to the student interfaces of rival organisations. Moreover, it exists solely to provide online learning resources – students cannot see information relating to their registration, progress or even information about their fee payments. Aside from this, Fowlim's finance function uses unintegrated accounting software that requires significant manual input, standalone payroll software, and the organisation has not implemented any enterprise applications.

REQUIREMENT:

Based on a critical evaluation of the case study above, you are asked to address the following:

(a) Discuss the impact of the internet on the competitive forces facing Fowlim. (7 marks)

(b) Assess the extent to which engaging with cloud computing would assist Fowlim in gaining competitive advantage over its rivals.

(10 marks)

(c) What aspects of Fowlim's system, as described, would be relevant in choosing between a private and public cloud?

(8 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) XBRL for internal use in large, complex organisational structures.

(b) The phases of the traditional system development process as related to the implementation of new accounting software.

(c) The Total Cost of Ownership approach in evaluating an investment in a knowledge management system.

(d) Mobile digital platforms with CRM.

(e) Expert Systems in product pricing. (Each part carries 5 marks)

[Total: 15 Marks]

SECTION B

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

3. **(a)** Discuss three unique features of internet technology and the business significance of these. (6 marks)

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

(8 marks)

(c) Discuss the challenges and opportunities facing retailers operating in digital markets as compared with traditional markets. In particular, what effects might be seen on product pricing?

(6 marks)

[Total: 20 Marks]

4. **(a)** Explain what is meant by the following four terms and give examples of each:

(i) Data
(ii) Information
(iii) Knowledge
(iv) Wisdom (6 marks)

(b) Identify three potential ways knowledge management may add value to large firms. (6 marks)

(c) Assess the possible usefulness of data warehousing and Business Intelligence tools in improving decision making in large firms.

(8 marks)

[Total: 20 Marks]

5. **(a)** Explain the term 'supply chain management' (SCM) software, distinguishing between planning systems and execution systems.

(4 marks)

(b) Assess the potential for SCM software to add value in a manufacturing environment, and the challenges that need to be overcome in obtaining that value.

(10 marks)

(c) Discuss three possible strategies that managers can employ to increase user involvement and overcome user resistance to systems change.

(6 marks)

[Total: 20 Marks]

6. **(a)** Businesses should invest in information systems that can assist them in achieving a range of strategic business objectives. Identify and explain four of these, giving an example of each.

(8 marks)

(b) Explain, giving examples, why Information Systems may be vulnerable to destruction, error and abuse.

(6 marks)

(c) Using two relevant examples, discuss how contemporary Information Systems technology may pose challenges to the protection of intellectual property.

(6 marks)

[Total: 20 Marks]

END OF PAPER

SUGGESTED SOLUTIONS

THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS IN IRELAND

INFORMATION SYSTEMS

FORMATION 2 EXAMINATION - AUGUST 2016

SOLUTION 1

Purpose: To examine the candidates' understanding of: the impact of the internet on competitive forces, business benefits of cloud computing and private vs. public clouds, and the factors organisations need to consider in selecting between these.

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).

REQUIREMENT:

Based on a critical evaluation of the case study above, you are asked to address the following:

(a) Discuss the impact of the internet on the competitive forces facing Fowlim. (7 marks)

Candidates can discuss a range of possible impacts of the internet on the competitive forces affecting Fowlim, perhaps drawing on the following table from Laudon & Laudon, which summarises the impact the Internet is having on many industries.

TABLE 3-5 IMPACT OF THE INTERNET ON COMPETITIVE FORCES AND INDUSTRY STRUCTURE

COMPETITIVE FORCE	IMPACT OF THE INTERNET
Substitute products or services	Enables new substitutes to emerge with new approaches to meeting needs and performing functions
Customers' bargaining power	Availability of global price and product information shifts bargaining power to customers
Suppliers' bargaining power	Procurement over the Internet tends to raise bargaining power over suppliers; suppliers can also benefit from reduced barriers to entry and from the elimination of distributors and other intermediaries standing between them and their users
Threat of new entrants	The Internet reduces barriers to entry, such as the need for a sales force, access to channels, and physical assets; it provides a technology for driving business processes that makes other things easier to do
Positioning and rivalry among existing competitors	Widens the geographic market, increasing the number of competitors, and reducing differences among competitors; makes it more difficult to sustain operational advantages; puts pressure to compete on price

The Internet allows traditional/new competitors to introduce new products and services and lure customers away. There is significant potential for this to happen in this case, as many of the courses presently offered by Fowlim could be offered online: either as some form of MOOC (massive online open access courses) or through a simpler distance-based arrangement. Students may prefer such offerings due to their time flexibility and because these could potentially be offered at lower cost. Consumers can easily and quickly find substitute products and services through the Internet.

Alternatively, potential students can easily use the information available online to switch to lower-cost providers. They can compare product prices across hundreds of providers, and with moves towards greater provision of online training, these providers could be anywhere in the world.

Procurement of consumables is likely to be a small element of cost for a training provider (in the model described costs will be primarily staff, infrastructure and back office costs), but availability of information on prices may assist.

The internet and the potential for online courses provide a low cost avenue for new market entrants. For example, once an online course is recorded, the marginal cost of further students viewing that content is nil. This may create competition and fundamentally change the market.

The geographic market is widened as global competitors become a threat – Fowlim could find itself facing competition from household name providers.

2 marks for overview. 1 mark each for identifying impact relating to each of the 5 forces, or equivalent.

(b) Assess the extent to which engaging with cloud computing would assist Fowlim in gaining competitive advantage over its rivals. (10 marks)

The case indicates that Fowlim has underinvested in its systems in the past and flags a number of areas of concern, including its accounting software, lack of enterprise applications (e.g. CRM or ERP) and it's student interface 'myFowlim'. In seeking to strategically assess the existing system and how it should be improved, a major area for consideration is what can be offered through cloud computing, and the appropriateness of cloud computing as a means of developing new applications or as a source of sector-customised software.

Generally speaking, the main advantages of cloud computing are:

- On-demand self-service: they can obtain computing capabilities such as server or network storage on demand.
- Ubiquitous network access: They can use standard network and Internet devices, such as mobile platforms, to access cloud-based services.
- Location independent resource pooling: Computing resources are pooled to serve multiple users, with different virtual resources dynamically assigned according to user demand. The user generally doesn't know where the resources are located.
- Rapid elasticity: computing resources can be rapidly provisioned, increased or decreased to meet changing user demand.
- Measured service: charges for computing resources are based on the amount actually used.

Candidates may also discuss the specific benefits of particular types of cloud computing, such as:

Benefits of IAAS include: saving a large initial investment in servers (moving costs from fixed to variable) and an overall potential cost reduction. This may be important in this context – if previous underinvestment is an indication that Fowlim may not have the available capital to invest in improvements that require large upfront costs. Greater flexibility in capacity where data storing/processing peaks at certain times of the year (for example, at the start of the year, or academic year) or due to other events (if you were buying infrastructure it would have to cope with your maximum even if not required for 11 months of the year, where payment for cloud might more closely reflect usage).

Benefits of PAAS include the ability to develop own applications at a lower cost than without the infrastructure and programming tools supported by the cloud service provider. Benefits would vary depending on the application created, but at a general level developing own applications can lead to acquisition of more relevant data, production of more useful information, more efficient data gathering, communication etc. PAAS might be useful here in developing the student interface.

SaaS benefits include minimising a range of costs including the costs of multiple licenses, installation and maintenance. The organisation may benefit from regular upgrades, patches and fixes by the software provider without the disruption of upgrading individual machines – this is also potentially a considerable cost saving, reducing internal IT requirements. Taking data and software offsite may be safer in event of a disaster – important student information would still be easily accessible.

Candidates are expected to discuss these benefits in the context of competitive advantage, and could do so by linking these benefits to strategic objectives including operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival.

Candidates could also discuss the possible use of the value chain model to identify areas where changes to information systems (in this case cloud computing) will improve business processes. They can also benchmark their business processes against their competitors or others in related industries, and identify and implement industry best practices. Taking the suggested benefits of cloud computing, value chain analysis can be used to identify where such benefits might be particularly important: for example, to increase the availability of information, to utilise information, to speed processes, to reduce costs, or to mitigate identified risks or areas of poor performance relative to competitors.

6 marks for discussing possible benefits of cloud computing, 4 marks for discussing competitive advantage.

(c) What aspects of Fowlim's system, as described, would be relevant in choosing between a private and public cloud?

(8 marks)

A public cloud is owned and maintained by a cloud service provider, such as Amazon Web Services and is made available to the general public or industry group. A private cloud is operated solely for an organisation. It may be managed by the organisation or a third party and may exist on-premise or off-premise. Like public clouds, private clouds are able to allocate storage, computing power, or other resources seamlessly to provide computing resources on an as-needed basis. In terms of costs, while the usage of public clouds is on a per-use basis (usually involving monthly billing or subscription), private clouds are owned by the organisation and they bear all relevant costs, including the costs of building and maintaining this facility, in particular the possibly significant upfront costs of hardware and software.

Factors to consider include:

- True cost of each option – for example, the full cost of pay per use at an expected level of usage, plus some sensitivity analysis should be carefully compared against the cost of implementing a private cloud (for example, on a total cost of ownership basis). Fowlim would need to consider this particularly carefully in light of their current operating difficulties
- Expected levels of usage, and stability of these – pay per use options become much more expensive if usage suddenly increases as it has in recent years following the EU programme
- Scale of expected fluctuations in usage (for example, suggestions that language course could double in numbers)
- 'Locked-in' costs may be a factor in both cases if the business is growing or changing but may differ substantially in their nature
- Availability of money to invest in building a private cloud – not clear in the case, but Fowlim had underinvested in the past
- Nature of data, in particular it's sensitivity and whether it is subject to regulatory requirements – essential that data on student attainment is reliable and accurate, concerns around the security of students' personal and payment data
- Organisational importance of 'guaranteed' access/risks of downtime – this is of crucial importance to students
- Existence of organisation-specific IT infrastructure, e.g. Fowlim's 'myFowlim' student learning environment, which can be difficult to integrate with existing public clouds.

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 student 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.

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) 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 31.12.14) 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.

(b) The phases of the traditional system development process as related to the implementation of new accounting software

The standard system development process (as documented in Laudon & Laudon) includes:

Analysis: A team is formed to examine existing business processes and systems, as well as problems. Business processes are observed, key users are consulted. For accounting software, this will include an in-depth analysis of the current system, surrounding processes, including the efficiency and effectiveness of the current software and supporting processes. The team examine what is feasible and achievable from a financial, technical and organisational point of view. The team then presents several alternative solutions which management should choose between.

Design: This looks at how the system will meet its objectives. It consists of specifications that outline the functions identified during analysis; these should address all the managerial, organisational and technical components of the proposed solution. It may need to look at redesigning business processes, and IT infrastructure requirements based on the selected system and vendor are determined.

Programming: Customisation of selected software may be required, in respect of processing or at a minimum in developing reports as required by management. This is likely to be done by the vendor or an external consultant. Modifications may also be needed to existing systems if they are to be integrated, for example to existing standalone payroll software.

Testing: Exhaustive and thorough testing must be done to ascertain whether the system produces the right results (i.e. does what it is expected to do). It involves three types of testing: unit testing, system testing and acceptance testing. Specific examples include whether integrations between modules happen as they should, whether logical access is enforced, whether audit trail is visible. A test plan should be prepared to cover this.

Conversion: This is process of changing from the old to the new system. There are four possible strategies: parallel strategy (run old and new in parallel for a period), direct cutover strategy (replace old with new on an appointed day), pilot study strategy (akin to testing the system in a single department before rolling it out to other departments) or phased approach strategy (introduce the system in stages – for example department by department).

Production and Maintenance: When the new system is installed it is reviewed to determine how well it has met its original objectives. A post-implementation audit may be conducted.

(c) The Total Cost of Ownership approach in evaluating an investment in a knowledge management system

The total cost of ownership (TCO) model focusses on the direct and indirect costs of owning technology. It includes the cost of acquiring and installing hardware and software, as well as ongoing administration and maintenance costs, upgrades, technical support, and costs of housing and powering the technology, as well as costs relating to maintaining network connections. It should also include such items such as employee training, ongoing technical support and lost productivity if hardware or software failures cause the system to be unavailable for processing end user tasks. Crucially, this model seeks to identify the true, total cost of ownership of an IS investment so that this can be compared to the expected (or actual, if applied retrospectively) benefits of the investment, such as increases in productivity and efficiency. These may be more difficult to predict than costs.

In the context of a knowledge management system, it might be particularly important to consider that these are general purpose firm-wide efforts to collect, store, distribute and apply digital content and knowledge. They include capabilities for: searching for information; storing both structured knowledge (explicit knowledge that exists in formal documents, as well as formal rules that organisations derive by observing experts) and semi-structured/unstructured knowledge (information in folders, messages, emails, graphics, videos, etc.). As such focus might be on the costs of IT infrastructure for significant data storage, the need for 24/7 access to data, technical support etc.

(d) Mobile digital platforms with CRM

Mobile digital platforms include the use of smartphones and tablets, rather than PCs and desktop machines. These devices are able to download hundreds of thousands of applications to support collaboration, location based services, communication with colleagues, and to provide information for decision making. In this context, the application may relate to the organisation's CRM. Increasingly, business processes are moving to these platforms, being enabled by: grid computing (connecting geographically distant computers into a single network to create a computational grid that combines the computing power of all computers on the network); virtualisation (organises computing resources so that use is not restricted by physical configuration or geographic location) and cloud based services, which provide computing power and software as services over a network, rather than installing the hardware and software on their own computers.

Advantages of such platforms include: increasing the availability and flexibility of relevant business information – for example to sales representatives, managers regardless of their location; allowing faster and more accurate decision making based on the availability of better information; the increased computing power that can be made available to each device which may speed the process; possibly lower hardware and software costs (vs. provision of desktop); greater work flexibility to facilitate teleworking (may be essential in a retail/ other multi-site environment); development of business processes to include collaboration capabilities. However, in considering their usefulness, concerns around security of mobile platforms also need to be considered.

(e) Expert Systems in product pricing

Expert systems are an intelligent technique for capturing tacit knowledge in a very specific and limited domain of human expertise. Expert systems model human knowledge as a set of rules that are collectively known as the knowledge base, potentially consisting of a few hundred to many thousands of these rules, depending on the complexity of the problem. These rules are interconnected and nested, and a strategy known as an inference engine is used to search through the knowledge base using either forward or backward chaining to move through the rules and frames.

Expert systems are used in discrete, highly-structured decision-making situations, decisions that could be taken by a professional in a few minutes or hours, such as deciding whether to grant credit for a loan.

Similarly, such systems may be appropriate for product pricing decisions, where decision-making is based primarily on highly structured information (such as selection of options, delivery time, availability of products, time to produce) - giving a customer a price for a new Mini might be an example. However, these systems would not be appropriate where the product pricing decision required large amounts of unstructured data (on the market, competitors actions etc.) and expertise – for example, in setting the basic price points for a new car model.

Benefits of expert systems include improved decisions, reduced errors, reduced costs, reduced training time and higher levels of quality and services. However if these benefits are to be achieved organisations need to be mindful of the limitations of such systems. These include that only certain classes of problems can be solved in this way, and that these systems are less useful for dealing with the unstructured problems often encountered by managers. Developing and maintaining expert systems can be costly – such systems must work correctly and be based on regularly updated, relevant information, otherwise they could result in incorrect decisions based on outdated or incorrect information.

Each part carries 5 marks

[Total: 15 marks]

SOLUTION 3

Tutorial Notes: -
Purpose: To examine the candidates' understanding of: the unique features of internet technology; benefits of collaboration and the tools and technologies to facilitate this; and the challenges and opportunities presented by digital markets.
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) Discuss three unique features of internet technology and the business significance of these. (6 marks)

Candidates can discuss any 3 of the following:

Ubiquity: internet/web technology is available everywhere via desktop and mobile devices – mobile devices extend services to local areas and merchants.

Significance: marketplace extended beyond traditional boundaries, including temporal and geographic boundaries. 'Market space' created, shopping can take place anytime, anywhere. Enhanced customer convenience and reduced shopping costs.

Global reach: technology reaches across national boundaries.

Significance: commerce enabled across cultural and national boundaries seamlessly and without modifications – market space includes, potentially, billions of consumers and millions of businesses.

Universal standards: one set of technology standards (Internet Standards).

Significance: disparate computer systems can easily communicate with each other, extending reach of the market space.

Richness: video, audio and text messages are possible.
Significance: video audio and text marketing are messages are integrated into a single market message and consumer experience – experience is more immersive and more emotive.

Interactivity: technology works through interaction with the user.
Significance: consumers engage in a dialogue that adjusts the experience to the individual, makes the consumer a co-participant – again experience is potentially richer, more immersive.

Information density: technology reduces information costs and raises quality.
Significance: information processing, storage and communication costs drop dramatically, whereas accuracy and timeliness improve. Information becomes more plentiful, and consumers can self-select their level of engagement with this.

Personalisation/customisation: technology allows personalised messages to be delivered to individuals as well as groups.

Significance: marketing messages and products can be customised, potentially leading to greater consumer satisfaction, brand affinity and repeat custom.

Social technology: technology supports content generation and social networking.
Significance: new internet social and business models enable user content creation and distribution, social networks as a forum to engage with consumers and potential consumers.

3x2 marks

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

(8 marks)

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.

4 marks for business benefits, 4 marks for possible tools and technologies
(note detailed discussion of these tools and technologies is not expected)

(c) Discuss the challenges and opportunities facing retailers operating in digital markets as compared with traditional markets. In particular, what effects might be seen on product pricing? (6 marks)

Candidates may discuss the following factors:

In digital markets, information asymmetry is reduced; consumers and suppliers can see prices being charged for the goods and have stronger bargaining power. This may have a downward pressure on prices due to the need to price match with competitors.

In digital markets menu costs (or the costs associated with changing prices) are much lower, meaning that businesses in digital markets can respond more swiftly to competitor's pricing or other competitive forces.

Similarly, some firms in digital markets may be able to use dynamic pricing – where the price can be varied depending on demand characteristics of the consumer (for example, different prices in different territories, or based on behavioural parameters) or supply characteristics of the supplier (for example, a surplus or scarcity). This may include the use of price discrimination and market segmentation.

Firms in digital markets may experience higher or lower switching costs depending on the service offered.

Candidates may also discuss digital goods: any goods that are stored, delivered and used in its electronic format. Digital goods are supplied electronically to the consumer through email or download from the Internet and include e-books, music files, software, digital images, Web site templates, manuals in electronic format, and any item which can be electronically stored in a file or multiple files. Candidates could also refer to how digital goods differ from traditional goods in the following: marginal cost/unit, cost of production, copying cost, distributed delivery cost, inventory cost, marketing cost, pricing.

Up to 2 marks for each relevant point, satisfactorily explained, up to a maximum of 6

SOLUTION 4

Tutorial Notes: -
Purpose: To examine the candidates' understanding of: the differences between data, information, knowledge and wisdom; the potential for knowledge management to add value for large firms; and data warehousing and Business Intelligence tools in decision making.
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) Explain what is meant by the following four terms and give examples of each: data, information, knowledge and wisdom.

(6 marks)

Data is collection of symbols or facts. It can be a flow of events or transactions which, by itself is only useful for transacting, for example: temperature readings, list of sales orders.

Information is data that has been given meaning by processing, organising, structuring and presenting the data into categories of understanding, for example: monthly sales reports / regional sales reports.

Knowledge is the appropriate collection of information such that its intent can be useful. It may be an individual attribute, or a collective attribute of the firm. To create knowledge resources must be expended to discover patterns, rules and contexts where the knowledge works. Examples include tacit knowledge – residing in the minds of employees, and explicit knowledge – that which is documented.

Wisdom is the collective and individual experience of applying knowledge to the solution of problems. Wisdom involves knowing where, when and how to apply knowledge, for example, applying knowledge of how to perform a review of suppliers by identifying when such a review is required, what information is sought etc.

4 x 1.5 marks

(b) Identify three potential ways knowledge management may add value to large firms. (6 marks)

Knowledge management refers to the set of business processes developed in an organisation to create, store, transfer and apply knowledge. Effective knowledge management increases the ability of the organisation to learn from its environment and incorporate knowledge into its business processes.

Effective knowledge management can assist in:

Reducing costs by leveraging what is known in the organisation (not reinventing the wheel) – leads to increased profitability.

Promoting organisational learning so that mistakes are not repeated – leads to improved products and/or services (competitive advantage).

Improving speed of response (for example in a call centre) as a result of better knowledge access and application.

Better relationship management through knowing customer/supplier/employee needs.

Driving innovation including through collaboration in physical and virtual teams, with knowledge workers driving the process of new knowledge creation.

Up to 2 marks for each relevant point, satisfactorily explained, up to a maximum of 6

(c) Assess the possible usefulness of data warehousing and Business Intelligence tools in improving decision making in large firms.

(8 marks)

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.

3 marks for explanation of data warehouse; 3 for BI/tools explanation; 2 marks for clear statement of relationship and combined value

SOLUTION 5

Tutorial Notes: -
Purpose: To examine the candidates' understanding of: supply chain management software; the potential for SCM software to add value and the challenges that need to be overcome in obtaining that value; strategies to increase user involvement and overcome user resistance to systems change.
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) Explain the term 'supply chain management' (SCM) software, distinguishing between planning systems and execution systems.

(4 marks)

Supply chain management software is classified as either software to help businesses plan their supply chains (supply chain planning) or software to help them execute their supply chain steps (supply chain execution).

Supply chain planning systems enable the business to model its existing supply chain, generate demand forecasts for products, and develop optimal sourcing and manufacturing plans. Such systems can help companies make better decisions such as determining how much of a specific product to manufacture in a given period; establishing inventory levels for raw materials, intermediate products and finished goods; determining where to store finished goods; and identifying the transportation mode to use for product delivery.

Supply chain execution systems manage the flow of products through distribution centres and warehouses to ensure that products are delivered to the right locations in the most efficient manner. They track the physical status of goods, the management of materials, warehouse and transportation operations and financial information involving all parties.

2 x 2 marks

(b) Assess the potential for SCM software to add value in a manufacturing environment, and the challenges that need to be overcome in obtaining that value. (10 marks)

SCM can add value by reducing supply chain costs, including: minimising stock-holding by enabling better forecasting and replenishment; more reliable systems to avoid stock-outs; providing real-time, accurate information that facilitates monitoring and control of replenishment processes; and reducing procurement transaction processing times with increasing automation.

SCM can assist in securing competitive advantage through developing relationships and loyalty with suppliers, by: facilitating information sharing between the organisation and its customers and suppliers (for example, allowing suppliers access to production schedules and stock levels); reducing transaction processing times for both the organisations and its suppliers through increasing automation; developing relationships based on repeat business that can lead to volume and other discounts.

Other relevant suggestions and examples are acceptable. Candidates may make reference to the particular benefits of SCM in managing global supply chains.

Challenges that will need to be overcome in order to obtain value include:

These are complex pieces of software that are expensive to purchase and implement, and often involve a lengthy implementation time.

SCM 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, and learn how to perform a new set of work activities, which may lead to resistance to the change if not handled appropriately.

SCM systems require multiple organisations to share information and business processes – each organisation may have to change some of the processes and the way it uses information to create a system that best serves the supply chain as a whole.

SCM systems may introduce 'switching costs' – once applications are installed it becomes very costly to switch providers, and the organisation becomes dependent on the provider to upgrade and maintain the software provided.

SCM systems require a very clear understanding of exactly how data is used in the organisation and how it would be used in the SCM system. Some data cleansing work may be required.

Other relevant suggestions and examples are acceptable. 4 marks for discussing the potential to add value, and 6 marks for discussing possible challenges

(c) Discuss three possible strategies that managers can employ to increase user involvement and overcome user resistance to systems change.

(6 marks)

Engage users on the project team – as active members, in leadership roles, or in installation and training.

Demonstrate responsiveness to user concerns – promptly answering questions, incorporating user feedback and ensuring that the end-user interface is user-friendly.

Identify and address reasons for user resistance - for example, dispute of system benefits, demotivation through exclusion, feelings of imposition.

Identify required education, training and ongoing support - for example, user manuals/quick reference guides, software embedded help feature, support structures, repositories of information, dedicated telephone support, support through regular communication.

Use clear management edicts and policies, with incentives for cooperation.

Address existing/developing organisational issues before implementation.

3 x 2 marks, other relevant suggestions and examples are acceptable

SOLUTION 6

Tutorial Notes: -

Purpose: To examine the candidates' understanding of: the use of information systems in achieving strategic business objectives; information system vulnerabilities; and how Information Systems technology may pose challenges to the protection of intellectual property.

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) Businesses should invest in information systems that can assist them in achieving a range of strategic business objectives. Identify and explain four of these, giving an example of each.

(8 marks)

Operational Excellence

Organisations continuously seek to improve the efficiency and productivity of their operations in order to achieve higher profitability. Information systems can assist in this by providing tools that allow organisations to operate more efficiently, examples might include the use of business to business e-commerce in procuring consumables; real-time inventory stock monitoring. In terms of service quality, information systems can assist in promoting better quality in service and productivity by making relevant, real-time information available at the operational level. Laudon & Laudon cite the example of Walmart and its RetailLink system, which digitally links its suppliers to every store. As soon as a customer purchases an item, a replacement is shipped by the supplier.

New Products, Services, and Business Models

Information systems and technologies are a major enabling tool for firms to create new products and services, as well as entirely new business models. A business model describes how a company produces, delivers, and sells a product or service to create wealth. Examples include Apple's creation of new (to Apple-arguably mainstreaming existing products) products such as the iPod and iPad, and a new business model through iTunes.

Customer and Supplier Intimacy

When a business really knows its customers, and serves them well (the way they want to be served), the customers generally respond by returning and purchasing more. The result is increased revenues and profits. Information systems can assist in meeting these customers' needs by ensuring streamlined invoicing and payment procedures (and related queries) and useful tools might include good quality customer relationship management software. With suppliers, the more a business engages its suppliers, the better suppliers can provide vital inputs and this can lead to lower costs. This might include engaging with suppliers through the use of web-enabled electronic data interchange or net marketplaces or supply chain management software.

Improved Decision Making:

Information systems and technologies have made it possible for managers to use real-time internal and external data when making decisions. Without these, ill-informed decisions result in increased costs, misallocation of resources and lost customers. Information systems are important both at an operational level and at a management level. It may be particularly important for managers to have a dashboard of information on a range of metrics, including financial and performance information. Information can also be used in a range of business decisions ranging from changing suppliers, customer profitability analysis, to broader growth or process change decisions.

Competitive Advantage

Doing things better than competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that competitors cannot match. Apple, Wal-Mart and UPS are prime examples of how companies use information systems and technologies to separate themselves from their competition.

Survival

Firms also invest in information systems and technologies because they are necessities of doing business. Information systems are not a luxury. In most businesses, information systems and technology are the core to survival. Laudon and Laudon cite the example of Citibank, the first banking firm to introduce ATMs. In doing so, they had a major competitive advantage over their competitors. In order to remain and survive in

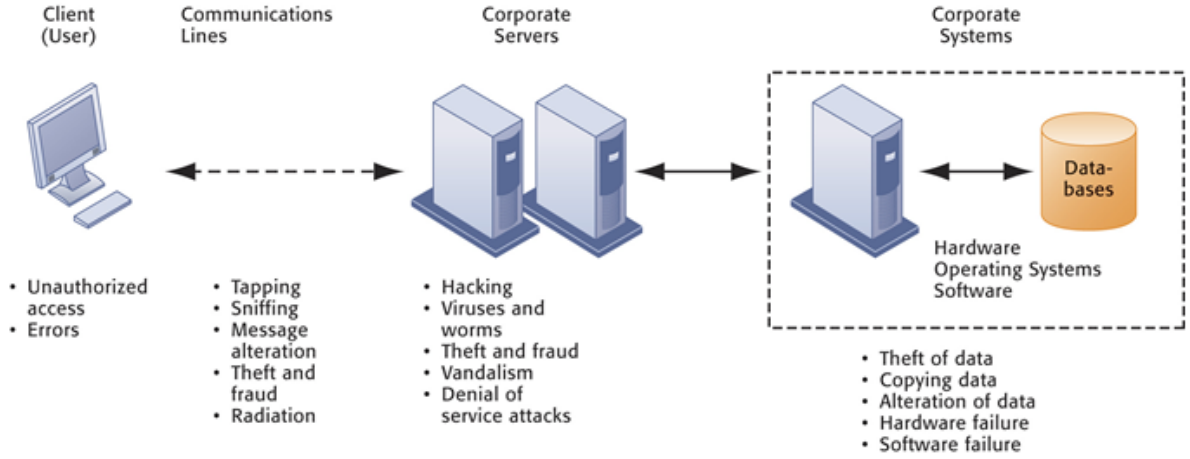
the retail banking industry, other banks had no choice but to provide ATM services to banking customers. Additionally, from a business perspective, it is essential for the organisation to have strong transaction processing systems relating to the finances of the organisation in order to report externally and to provide accurate information on financial position internally.

4 x 2 marks

(b) Explain, giving examples, why Information Systems may be vulnerable to destruction, error and abuse. (6 marks)

When large amounts of data are stored in electronic form, they are vulnerable to many more kinds of threats than when they existed in manual form. Through communications networks, information systems in different locations are interconnected – and the potential for unauthorised access, abuse or fraud can occur at any access point in the network.

Information systems are vulnerable to technical, organisational, and environmental threats from internal and external sources. The weakest link in the chain is poor system management. If managers at all levels don't make security and reliability their number one priority, then the threats to an information system can easily become real. Laudon & Laudon summarise the threats to each component of a typical network in the figure below:



Key areas where systems are most vulnerable include: hardware or software failure and errors; personnel actions; terminal access penetration; fire or electrical hazards; user errors; theft of services, data, and equipment; program changes; and telecommunications problems. Examples of specific vulnerabilities include: internet vulnerabilities (every point of entry into the Internet network is a point of vulnerability); vulnerabilities related to the use of wireless networks (radio frequency bands are easy to scan); Malicious Software: Viruses, Worms, Trojan Horses, and Spyware; Hackers and Computer Crime; Spoofing and Sniffing; and Denial of Service Attacks. Purposeful and accidental problems, such as programming and data errors, can occur. Hardware and software can fail. The effects of an event such as a hardware malfunction, power outage, or fire can be more extensive. An organisation's entire record keeping system could be destroyed.

Candidates may make a number of points for 1 mark, or discuss some points in more detail for a maximum of 2 marks per point, to a maximum of 6 marks.

(c) Using two relevant examples, discuss how contemporary Information Systems technology may pose challenges to the protection of intellectual property. (6 marks)

Intellectual property is intangible property created by individuals or corporations and is subject to a variety of protections under three different legal traditions: copyright, patents and trade secrets. Copyright is a legal term which describes the rights given to authors/creators of certain categories of work. It applies to all sorts of written and recorded materials from software and the internet to drawings, photography, films and music. A patent confers upon its holder, for a limited period and in a specific jurisdiction, the right to exclude others from exploiting (making, using, selling, importing) the patented invention, except with the consent of the owner of the patent. A trade secret is a specific set of information (data, design, process, formula) which is not generally known and by which its owner or licensee can derive economic advantage over its

competitors. It is important to make reasonable efforts to maintain its secrecy, as a trade secret derives most of its value from this.

The Internet poses severe challenges to intellectual property rights and the protection of those rights. Prior to the broad usage of the Internet it was much more difficult to steal another's works. Digital media differs greatly from books and other media in terms of ease of replication, ease of copying and re-distribution, and ease of alteration. It is often difficult to establish uniqueness – this is particularly so with software programs. The Internet enables the copying and distribution of any digitised content to large numbers of people around the world, even if they are using different types of computer systems. The proliferation of technologies that enable widespread digital copying, combined with file-sharing software and peer-to-peer networks that are easily accessible via high-speed Internet connections, have led to increased concerns about distribution of unauthorised copies of copyrighted media, particularly for film and music industries.

The vulnerabilities discussed in response to part b) of this question may expose firms to potential loss of intellectual property including through unauthorised access to: knowledge management systems; sensitive performance information; customer databases (particularly where these include detailed customer payment and preference information).

2 marks for explaining intellectual property and 2 x 2 marks for relevant examples