

ALL EXTRA WEB CASE STUDIES

Cisco

Cisco systems was founded in 1984 at Stanford University by husband and wife team Leonard Bosack (who developed early router technology) and Sandra Lerner and three colleagues. Cisco is generally regarded as the leader in the market for inter-networking equipment. It is generally seen as the company which commercialised the router – a device which determines the optimal path along which packets of data should flow on a computer network. The growth of Cisco is also attributed to its setting of standards for networking equipment through its proprietary Internet Operating System (IOS). Both routers and IOS are key technologies supporting the Internet and enables customers of the company to build large-scale, integrated computer networks. Growth of the company has been driven by the surge in data traffic on the Internet. The company initially targeted universities, aerospace and government facilities relying on word-of-mouth and contacts for sales. The market for routers opened up in late 1980s and Cisco became the first company to offer reasonably-priced, high-performance routers. It went public in 1990 and soon after initiated an acquisitions strategy to broaden the range of products offered. Originally focusing on corporate data networking it began to target both Internet Service Providers and the home networking market.

The primary value-stream for Cisco is products, particularly routers. It has attempted to broaden the range of this value by offering a wider range of products. It also provides traditional added-value services such as its after-sale service. However, Cisco also

provides value by managing its wider value-network with a range of partners. These include resellers that sell and support Cisco products, service specialists providing network integration and operations and component manufacturers that provide most of the company's actual manufacturing capability.

Cisco's main transformation is the assembly of inter-networking equipment such as routers. The key inputs for Cisco consist of parts from a vast range of suppliers as well as a vast range of data associated with this supply. The key outputs from Cisco are completed products. The competitive environment for Cisco consists of companies producing comparable products in support of the infrastructure of the Internet. Control in the case of Cisco means ensuring that it has sufficient information about its internal operations to ensure the efficient and effective delivery of goods to its customers (regulation). It also needs to ensure effective monitoring of its competitive environment to ensure that it develops new products for its marketplace (adaptation).

Cisco engages in B2C and B2B eCommerce. In terms of B2B eCommerce it has integrated its ERP systems with key suppliers through an extranet. In terms of B2C eCommerce it has built a Web portal which enables its customers to order and configure products on-line.

It is possible to describe briefly some of the gains that CISCO experiences from its engagement with eBusiness. In terms of efficacy, Cisco is able to relate to a large range

of suppliers and assemble a vast range of parts to produce its technical products. In terms of efficiency, Cisco uses B2C and B2B eCommerce as well as intra-business eBusiness to lower its costs. In terms of effectiveness, Cisco maintains that eBusiness has allowed it to grow quickly and allows it to more quickly adapt to environmental changes. It is therefore better able to compete in its key markets.

Cisco has implemented an e-Business strategy to enable fast integration of its supply-chain with key business processes. The supply chain is critical to the business as Cisco's manufacturing operation globally consists of 34 plants, only two of which are owned by the company. Suppliers make up to 90% of the subassembly of Cisco products and 55% of the final assembly. This means that suppliers regularly ship finished goods directly to Cisco customers.

A key component of Cisco's B2B eCommerce strategy is integration of its ERP systems with the information systems of its key suppliers. Suppliers use their ERP systems to run their Cisco production lines, allowing them to respond to demand from Cisco in real-time. This is enhanced by the introduction of Cisco Manufacturing Online, an extranet portal that allows partners to access real-time manufacturing information including data on demand forecasts, inventory and purchase orders.

Such a technical infrastructure means that changes in parts of the supply chain are communicated almost instantaneously to the company. For instance, if one supplier is low on a component then Cisco can analyse its supply chain for excess supplies elsewhere. Changes in forecasted demand are also communicated in real-time, enabling suppliers to respond immediately to requests for products or materials.

Payments to suppliers are triggered by a shop-floor transaction in the ERP system indicating that production is complete. The transaction initiates an analysis of inventory to determine the value of components sold by suppliers and triggers an electronic payment to suppliers. Annual benefits from the use of this ERP system integration are estimated to be in the realm of millions of dollars of savings per year.

Cisco has also engaged in B2C eCommerce innovation. It has introduced a Web portal known as Cisco Connection Online which consists of a dynamic online catalogue, a facility for ordering and configuring products online, a status agent which allows customers and retailers to track orders, a customer service section, a technical assistance section and a software library. The company currently estimates to earn 75% of its \$20 billion sales through its portal. The portal is also indicated as contributing to a 20% reduction in overall operating costs.

Cisco created an internal online community within its emerging technologies group, called the Idea Zone or I-Zone. Within this space anyone can propose ideas for new products, processes or markets. Ideas are critiqued by others and filtered for further development.

In 2011 Cisco is reported as having revenues of \$43 billion and employing over 71,000 people. This revenue was driven largely by its core business: sales of hardware devices such as routers and switches, software such as its network operating system and the provision of associated services such as network management. More recently however, Cisco has diversified into a large range of associated businesses such as optical networks, wireless equipment and internet telephony. It is also developing technologies associated with supporting the increase in video traffic via the Internet. As part of this strategy, Cisco has produced a technology known as telepresence

which provides a high-quality videoconferencing facility.

Cisco has organised its structure around key functions rather than customer segments. To manage innovation in new markets it has introduced an elaborate system of

committees made up of managers from different functions. Such committees are supported by fluid working groups. This form of matrix organisation is supported by collaborative working using online tools provided by the company itself, such as Telepresence.

Points for reflection

- Cisco does have a general internet web-site. Could this be regarded as a form of B2C eCommerce? Who are the typical customers of Cisco?
- How much of Cisco business is P2P eBusiness? Does this company maintain partnership networks and what role does ICT play?
- Cisco uses an extranet to ensure integration of external relationships with suppliers. Consider the benefits as well as costs of extranets in managing the supply chain.
- Cisco is a heavy user of technology for collaborative working. How important are such online tools within companies worldwide?

Dell

The US-based technology company Dell Inc. has its headquarters in Round Rock, Texas. It develops, manufactures, markets, sells, and supports personal computers, servers, data storage devices, network switches, software, televisions, computer peripherals, and other technology-related products. The company employs over 100,000 people world-wide.

Michael Dell the founder of Dell Computer Corporation is often credited with creating a revolution in the personal computer industry. Dell's business model built around direct selling to the customer and managing its inventory and distribution processes effectively is credited with a rapid growth in the business.

The idea for the company originated in a business run from Michael Dell's parents' home when he was a teenager. From here he originally sold memory chips and disk drives

for IBM PCs. Michael Dell was able to sell his products through newspapers/magazines at 10-15% below retail prices. He dropped out of college in 1984 and started assembling his own IBM clones selling direct to customers at 40% below retail price. In 1988 his company went public. Having experienced some problems in 1990 the company re-established its position through selling its PCs via mail order through soft warehouse/compUSA superstores. In 1994 the company abandoned superstores to return to its mail-order/direct retail roots. Dell is now a worldwide business based around integrated manufacturing and supply of hardware.

The primary value-stream for Dell is tangible products such as computers and peripheral equipment. A certain degree of other intangible items such as software are also provided to customers. It attempts to provide

added-value services such as customisable configuration and on-line help and support. Dell originally started its Internet initiative in the late 1980s to attempt to increase its level of customer support. The company traditionally provided such customer support using a call-centre. At the call-centre Dell customer care representatives normally advised customers to obtain software updates either sent on disks or as software downloads from a site run by CompuServe. By 1989 Dell began on-line distribution of software updates.

Dell's main transformation is the assembly of computing equipment. The key inputs for Dell consist of parts from a vast range of suppliers as well as a vast range of data associated with this supply. The key outputs from Dell are completed products. The competitive environment for Dell consists of hardware companies producing comparable products. Control in the case of Dell means ensuring that it has sufficient information about its internal operations to ensure the efficient and effective delivery of goods to its customers (regulation). It also needs to ensure effective monitoring of its competitive environment to ensure that it develops new products for its marketplace (adaptation).

Dell engages in both B2C and B2B eCommerce. It also has integrated its internal information systems to become an effective intra-business eBusiness, through strategies such as just in time inventory management. In terms of efficacy, Dell has been able to diversify into a vast range of hardware products for retail. In terms of efficiency, Dell has been successful at lowering its internal costs and is able to pass on lower costs to its customers. In terms of effectiveness, Dell is able to sell its products across the world and is able to relate to a large range of suppliers.

In 1996 the company launched www.dell.com to provide technical support on-line. Initially, the Web-side was used to provide technical information to customers. Later, customers were able to order through a Web-site that provided an on-line catalogue of products. Customers can now also enter details of specific configurations of hardware they require and hence configure systems on-line. Dell routes technical support queries according to component-type and to the level of support purchased. For instance, there are five levels of support offered for business customers. For individual consumers the company offers 24 x 7 telephone and online troubleshooting.

Dell engages in supply-chain innovation including customisation of hardware and direct retailing to customers. Customers may order a personal computer through a web-site that provides an on-line catalogue of products. Customers can also enter details of specific configurations of hardware they require through this web-site. Such build-to-order retail requires assembly plants around the world (Austin, Texas; Limerick, Eire; Penang Malaysia) close to suppliers such as Intel (Chips), Maxtor (Hard drives) and Selectron (Motherboards). Order forms follow each PC across the factory floor. As well as on-line customer support the Dell site provides order and courier-tracking and pages of technical support related to the tagging of machines. Dell associates a Service Tag, a unique alpha-numeric identifier, with most of its products.

Traditionally, Dell has sold all its products whether to individual consumers or to business customers using a direct-sales model via on-line and telephone channels. The company receives payments for products before it has to pay for the materials and practices just-in-time (JIT) inventory-management. This means that Dell builds

computers only after customers place orders and by requesting materials from suppliers as needed. Dell advertisements have used several channels including television, the Web, magazines, catalogues and newspapers. Marketing strategies include lowering prices at all times of the year, offering free bonus products (such as Dell printers), and offering free shipping. Dell also runs its own on-line community site in which members can access

and contribute to fora and blogs on the use of latest technology. Dell introduced a customer community known as IDEASTorm. The aim was to allow users of Dell products to help each other with problems such as software installation. One aim of IdeaStorm was to take pressure off the company's helpdesk. IdeaStorm also enabled the company to gather information about use of their products and what their customers thought.

Points for reflection

- Would you describe Dell as engaging in customer relationship management through its Web-site?
- Dell uses Just-in-time inventory management and manufacturing. How important is ICT to this business philosophy?
- How important is tracking of products to the Dell business; not only in terms of the supply chain but also in terms of its customer chain?
- IdeaStorm could be considered a type of adjunct electronic community. Is it appropriate to describe it as such?

DotCym

Domain names are a significant part of the pragmatics of the world-wide-web in particular and the Internet more widely. They form an important element of internet governance and act as supporting infrastructure for critical aspects of the global information society such as electronic business and electronic government. In this case study, first, we provide a description of the context for domain names on the Internet and the World Wide Web (Web) and particularly focus upon so-called top-level domain names or TLDs. The Internet Corporation for Assigned Names and Numbers (ICANN) control the assignment of domain names internationally. Second, we help ground issues relating to the promotion, assignment, administration and use of TLDs by

describing an interesting case in progress from a distinctive geographical region of the UK: Wales. The dotCYM campaign is a not-for-profit pressure group which for a number of years has attempted to promote a distinct Internet domain for the Welsh linguistic and cultural community. The campaign believes that the Welsh language and culture connotes a community that should be identified and enhanced by having its own Top Level Domain on the Internet.

International control of domain names

Domain names arose as an attempt to provide meaningful conventions enabling connections to be made between computer systems across the Internet. Any domain name is typically made up of three or more parts

referred to as domain levels. Levels therefore provide structure to the domain name. In a particular URL, domain levels read from right to left: sub-domain, 2nd level domain, top-level domain. Top-level domains (TLDs), consist of either so-called generic top-level domain names (such as .com) referred to as gTLDs, or country codes (such as .uk), referred to as ccTLDs. gTLDs are also referred to as 1st level domain names. 2nd level domains serve to further refine the top-level domain name by typically suggesting the type of provider. For instance, .ac indicates an academic institution based in the UK. Sub-domains refer to those domains below the 2nd level and are typically used to refer to a specific content provider. In our example, cardiff signifies the Web-site of Cardiff University.

Internet Protocol addresses are mapped to domain names by domain name servers. These are computer systems in the inter-network that perform such transformation. For such domain servers to work effectively standardisation is needed in domain names. ICANN have responsibility for a number of naming conventions including gTLDs such as .com and .org and ccTLDs such as .uk and .fr. They also have responsibility for sponsored top-level domain names (sTLDs) such as .coop and .museum and un-sponsored TLDs such as .biz.

IANA, the precursor organisation to ICANN, originally created seven Generic Top Level Domains (gTLDs), consisting of strings of three letters taken from the following list: .com. (signifying some form of commercial organisation), .org (signifying any type of organisation but typically used to signify public sector or voluntary sector organisations), .gov (initially used to signify government establishments generally but now restricted to refer to US government establishments), .edu (used generally to signify an educational institution

internationally), .mil (initially used to signify military establishments generally but now restricted to refer to US Armed Forces establishments), .int. (initially conceived for international entities), .net (initially used to signify 'networks' and therefore a generic free usage domain).

However, in 'an uncharacteristic lapse of consistency on the part of early internet designers' IANA established a parallel list of ccTLDs. Part of the reason ccTLDs were introduced and began to be used was because gTLDs gradually began to be perceived internationally as US TLDs. For instance, the original intention was that any educational institution in the World could register itself under the .edu gTLD. In practice, it turned out that, with a few exceptions, only US-based institutions registered under .edu.

Country Code Top Level Domains (ccTLDs) consist of strings of two letters, for example .uk, .fr, .es. ICANN clearly states that it does not decide on the status of a country. The verification of countries is therefore delegated to the International Standards Organisation (ISO) and more specifically to inclusion in its ISO-3166 list of country codes. However, there are considerable anomalies in the ccTLD naming conventions arising both from inconsistencies in the ISO list and from the presence of early naming agreements established before the creation of ICANN. The ISO list is derived primarily from a list of country names published by the United Nations, which also assigns unique codes to a number of inhabited overseas territories. Thus, in 2002 there were 189 countries which had seats in the UN General Assembly but 239 'countries on the ISO 3166-1 list. Some countries have also established country codes that conflict with the ISO 3166-1 list. The .uk country code is a notable example in that the specified country code for Britain in the ISO 3166-1 list is .gb. Some 'regions' within this

country also have codes established in ISO 3166-1 list. Examples here are .gg (Guernsey), .im (Isle of Man) and .je (Jersey). The current ICANN namespace contains 255 registered ccTLDs.

Therefore, over time the domain system has been gradually extended, sometimes in an apparent piecemeal manner. For instance, the current ICANN namespace contains 21 registered gTLDs all of which are open for use as supporting infrastructure for the Internet. Adding to its complexity, since 2000 a number of sponsored top-level domain names (sTLDs) have been created, typically backed by some defined community. The named sponsor of an sTLD is delegated the responsibility of administering the domain in the sense that it decides if a person or legal entity can register for use of the domain. Such sponsored domain names include, .aero (signifying the aeronautical industry), .coop signifying cooperative organisations, .museum (signifying museums), and .cat (signifying the Catalan language and cultural community, discussed below).

Also since 2000 a number of un-sponsored domain names have been created. These are generic top-level domain names, not backed by a community but which operate under the policies established by the global Internet community, directly through ICANN. Such un-sponsored domain names include: .biz. (signifying businesses), .info (signifying information resources - an extension of .net), .pro (signifying independent professionals - lawyers, doctors, etc.), .name (signifying individuals or legal entities that wish to register their names as domains).

Applications for the approval of a new TLD are made to ICANN using a defined process. Decision-making on applications within ICANN is conducted via a series of meetings held by ICANN's board of governors, and within a

variety of committees such as the GNSO (Generic Names Supporting Organisation), the ALAC (At-Large Advisory Committee), the GAC (Governmental Advisory Committee) and other so-called constituencies. Representation from various interest groups is included at committee level. After approving a new TLD domain, ICANN delegates the administration of issuing it to IANA. Domain names frequently launch with a defined 'sunrise period' – this refers to the period of time at the launch of a new Top Level Domain during which owners of trademarks may register a domain name containing the owned mark.

DotCYM campaign

The dotCYM campaign is a not-for-profit organisation which has been seeking for a number of years to establish a TLD for the Welsh linguistic and cultural community. It believes that the Welsh language and culture is a community that should be identified and would be enhanced by having its own TLD on the Internet.

However, in terms of the international process described in the previous section, the options available to establish a Welsh Identity on the Internet through a TLD are limited. In terms of assigning a two-letter country code for Wales, ISO maintains that it cannot include Wales in the ISO 3166-1 list as Wales does not meet the criteria established by the UN for assuming the status of an independent country. However, given that regions such as Guernsey (.gg) are included in the list as well as territorial possessions such as the Faroe Islands (.fo) and the Falkland Islands (.fk) it was suggested that a campaign sponsored by the Welsh Assembly Government might increase the chances of a further exception to the rule being made in favour of Wales. However, in the case of this becoming a possibility the two-letter string .cy has already

been taken by Cyprus. Available alternatives include .wa, .wl and .cw.

In terms of assigning a three-letter sponsored TLD for Wales, the dotCYM campaign were initially promoting the potential use of .cym because it is the official ISO 639-2 alpha-3 code and the latest ISO 639-3 code for the Welsh language. The campaign was hence promoting the use of the .cym TLD as signifying a community (Welsh language, culture and interests) rather than a country. They believed that this sidestepped the problem ICANN has with including Wales as a country and draws on precedence established by the .cat TLD. In 2010 however, ICANN ruled that the TLD .cym was to be reserved for use by the Cayman Islands, even though they already have use of .ky. The DOTCYM campaign is therefore currently canvassing for opinion on a number of other TLDs such as .cymru (cymru being the Welsh for Wales), .cwl (Cymru Wales) or .Wales (dotCYM, 2010).

The campaign maintains that there would be a number of consequent benefits from having a TLD for the Welsh community. The prime focus is particularly one of promoting and supporting the Welsh language and it is claimed that the presence of an sTLD will serve to unite Welsh-speaking communities within Wales. It is also seen as a means of uniting other historic Welsh communities in other parts of the British Isles, as well as in North and South America, and Australia. The presence of having a domain name is seen as playing a pivotal role in promoting further the use of the Welsh language on the World Wide Web as a modern method of communication. However, in their campaign literature dotCYM also promote a larger vision for the domain name. They see it as enabling the creation of an online community of people, organisations and other stakeholders of all languages, ethnicity and diversity that have an interest in Wales and all things Welsh.

The dotCYM campaign took its initial inspiration from a successful campaign which has already established .cat as a sponsored top-level domain name through ICANN. The .cat domain was approved in September 2005 to serve the needs of the Catalan Linguistic and Cultural Community on the Internet. Catalan is an official language in Spain, and is widely spoken by an estimated 10 million first and second language speakers worldwide in many autonomous Spanish regions. The Charter for use of the .cat TLD states that ‘the .cat TLD will be established to serve the needs of the Catalan Linguistic and Cultural Community on the Internet (the “Community”). The definition of the Catalan Linguistic and Cultural Community refers ‘to those individuals, groups, businesses, organisations, entities or initiatives, however constituted, eligible to register in the .cat TLD according to this Agreement and the .cat Charter. The Community includes those who use the Catalan language for their online communications, and/or promote the different aspects of Catalan culture online, and/or want to specifically address their online communications to this Community’.

PuntCAT comprised a private Catalonia foundation consisting of a coalition of around 98 organisations supporting the Catalonian language and culture. The registry operator selected the CORE (Internet Council of Registrars), to provide registry services. The establishment of the .cat TLD is seen as novel for ICANN, as the majority of countries and geographical territories all have domain names consisting of two letters and not three. As we have seen above, domain names consisting of three letters have previously been reserved for non-territorial domains which are largely under professional or national organisations like .com or .biz.

The Catalan government soon after assignment expressed its pleasure with the



decision and expected that as a result of this decision many applications will be made to switch existing Websites from .es (Spain) to .cat (Catalonia). The Catalan Government itself announced that it would register its site under this new domain. During the sunrise period, there were around 11,400 .cat domain name applications, 9,300 of which were granted. Within 10 months, 19,000 domain names were registered under the sTLD, referencing 3.5 million Web pages.

As a sTLD, the .cym domain name must clearly signify a community. If successful, the sponsor is delegated the responsibility by ICANN of administering the domain in the sense that it decides if a person or legal entity can register for use of the domain. Most of the held benefits for the .cym domain relate to issues of signification. This is because a domain name is only useful in terms of what it signifies. To help unpack this it is useful to consider domain names in terms of the meaning triangle. Designation defines the symbol being used. In the case considered here this is the proposed string .cym. Intension refers to the concept for which the symbol is being taken to stand for. In this case, the campaign is proposing .cym to stand for some form of 'community'. Extension refers to instances of the concept (intension) in question. In this case, the domain name will be used to stand for a 'community' which in practice will consist of a body of organisations providing Web-based content addressed using the .cym domain.

In 2011 ICANN decided to end most restrictions on the names of generic top-level domains. This means that organisations are now able to bid for essentially any arbitrary top level Internet domain name and pay an annual fee for its registration. As a result of this the DOTCYM campaign has changed tack and is now bidding for two new TLDs - .cymru and .wales. Dotcymru is intended for use by

web-sites based in Wales which have primarily Welsh language content while DotWales is intended for use by web-sites based in Wales, with primarily English language content and designed for use by international users.

Points for reflection

- How important are domain names to the competitive performance of particular nations and regions?
- How important to an organisation's strategy is choosing and registering a domain name?
- What communities does the .cym or .cymru domain seek to signify, as compared to the .wales domain?
- How important is the registration of domain names to modern-day companies and other organisations?
- How important are domain names to nation states?

YouTube

YouTube is a popular free video sharing Web site which lets users upload, view, and share video clips (Tapscott and Williams, 2006). Founded in February 2005 the wide variety of site content includes movie and TV clips and music videos as well as amateur content such as videoblogging.

YouTube.com was founded by Chad Hurley, Steve Chen, and Jawed Karim, who were all early employees of PayPal. The domain name YouTube.com was activated on February 15, 2005 and the website was developed over the following months. In August of 2005, Macromedia released FlashPlayer 8, which provided a large increase in video quality compared to FlashPlayer 7 and has a very small download size, decreasing download time. For the first time ever, users did not have to use a separate video player such as Windows Media Player or Realplayer. Claims have been made that without the capabilities of Flashplayer 8 it is unlikely that YouTube would have grown as fast as it did in such a short time.

At present, YouTube is one of the fastest-growing websites on the Web. According to a July 2006 survey, 100 million clips are viewed

daily on YouTube, with an additional 65,000 new videos uploaded per 24 hours.

On October 9, 2006, it was announced that the company would be purchased by Google for US\$1.65 billion in stock. YouTube will continue to operate independently, and the company's 67 employees and its co-founders will continue working within the company.

Before being bought by Google, YouTube stated that its business model is advertising-based. Industry commentators have speculated that YouTube's running costs may be as high as US\$1 million per-month. This fuelled criticism that the company, like many internet start-ups, did not have a viable business model. Advertisements were launched on the site beginning in March 2006. Given its traffic levels, video streams and pageviews, some have calculated that YouTube's potential revenues could be millions of dollars per month

In March 2009 Youtube took the decision to block music videos to UK users of the site. This followed failure to reach agreement with the Performing Rights Society over a licensing arrangement. The Performing Rights Society collects royalties on behalf of a large number

of music producers, many of which are small-scale. Google, which owns Youtube, apparently wanted to pay lower royalties to performers of such music. The Performing Rights Society was fighting this decision.

The presence of YouTube has stimulated a number of controversies. For instance, YouTube policy does not allow content to be uploaded by anyone not permitted by United States copyright law to do so. The company frequently removes uploaded content infringing such legislation. However, a large amount of copyrighted content continues to be uploaded. Generally, unless the copyright holder reports them, YouTube only discovers

these videos via indications within the YouTube community through self-policing.

In June 2006, British media reported that YouTube and sites like it were encouraging violence and bullying amongst teenagers. Teenagers were filming so-called 'happy-slapping' fights on their mobile phones and then uploading them to YouTube. While the site provides a function for reporting excessively violent videos, news reports stated that communication of such content with the company was difficult.

Points for reflection

- YouTube is considered a pre-eminent example of a social networking site. It uses income from advertisements as its main revenue stream. How viable is this revenue model longer-term?
- What place does YouTube play in the eMarketing strategies of the major companies?
- How can sites like YouTube ensure that its content is ethical?

HM Revenue and Customs

Large central government agencies such as the Inland Revenue have been subject to considerable computerisation, many such projects being financed by a mix of public and private sector investment over the last twenty years. In the UK, some 4 million people work in local government, central government and public administrations such as the National Health Service. It is therefore not surprising to find much of the rhetoric surrounding the expected benefits of eGovernment within the UK to be focused around efficiency and effectiveness improvements associated with the re-organisation and re-deployment of staff supported by integrated ICT systems.

In April 2000 the UK e-Government Strategic Framework was published requiring all central government departments to produce eBusiness strategies. These were intended to show how each department planned to implement eGovernment and to achieve electronic service delivery targets. The first draft was required in October 2000. From July 2001 departments were required to report progress against eBusiness strategies to the Office of the e-Envoy every six months. The Inland Revenue was until 2005 the UK government department responsible for collecting and administering taxation. This government department has attempted to be

at the forefront of eGovernment in the UK by transforming its performance using ICT. This is evident in much of the strategic thinking emanating from the leadership within the organisation.

For instance, at this time the organisation indicated four indicators that it would use to determine how well it has transformed itself. First, the receipt of clean data from customers would allow the Inland Revenue to remove work that added little value to the organisation and consequently release people to work at the front line of customer care. Second, increasing the organisation's capability to deliver services electronically and increasing the take-up of such services by customers. Third, it intended to increase use of knowledge management so that its staff had better guidance which in turn enhanced its customer service capabilities. Finally, information and data management would enable it to progress towards the 'joined up government' vision of developing seamless, quality services and making best use of the data it receives.

The department set out its first eBusiness strategy in 2000. The key feature of the strategy at this time was the development of a number of access channels for different customer groups with clear incentives to encourage use of such channels. As part of this strategy the organisation intended to offer improved e-services to the UK taxpayer, thus reducing the burden of compliance on individuals and organisations. The revenue also planned use of intermediaries such as the National Association of Citizens Advice Bureau (see case), the Post Office and software suppliers to provide bespoke services to the customers of the organisation. This transformation was predicated upon greater integration of its services with that of other departments and the provision of its services through commercial and government portals.

It also required transformation of staff roles to focus around support for the customer through the use of electronic tools.

In 2001 the Inland Revenue revised its strategy, keeping the fundamental principles above but making two additions: first, a transformation of the organisation around a focus on the customer; and second a philosophy based in customer relationship management, creating a technical framework that would deliver e-services in a modular but integrated fashion. Within this strategy, the Inland Revenue established three targets. First, that 50% of services would be available electronically by 31st December 2002. By this time the organisation aimed to offer basic secure e-services and have developed plans for organisational change based on such services. Second, it intended to have 50% take-up of its services by 2005. Third, all of its services would be available electronically by 31st December 2005. By this date the Inland Revenue aimed to have achieved significant business transformation with most customer transactions being conducted electronically.

However, subsequent to publication of the strategy, the Inland Revenue merged with Customs and Excise in 2006 to form Her Majesty's Revenue and Customs (HMRC). This was part of a wider attempt at improving the efficiency of UK government departments stimulated by a review of activity.

The newly formed HMRC, however, soon came into the spotlight in 2007 for its failings in data management.

In October of 2007 a junior official from Her Majesty's Revenue and Customs (HMRC) based in Washington, Tyne and Wear sent two compact disks (CDs) containing government records to the National Audit Office (NAO) based in London. The data was requested by the NAO in order to enable

them to run their own independent survey of child benefit payments. The disks were password-protected but the data was unencrypted. The package was sent unrecorded and un-registered using a courier company. The records on the disks contained the names, addresses, birth dates and national insurance numbers of all 25 million individuals dealt with by the HMRC in relation to child benefits. The records also contained details of partners, the names, sex and ages of couple's children as well as bank/savings account details for each claimant. This meant that details of 7.25 million bank accounts associated with families were stored on the disks.

The disks failed to arrive at the offices of the NAO and following notification of this a second package was sent by registered post and arrived safely. In November of 2007 senior managers at the HMRC were told that the first package had been lost. A week later the Prime Minister and other government ministers, most notably the Chancellor of the Exchequer were informed of the loss. Initially, government ministers were told that the CDs would probably be found but when HMRC searches for the lost disks failed the Metropolitan Police were called in to investigate.

This data loss led the Chancellor to consult with the Information Commissioner, the person responsible for overseeing the implementation of data protection in the UK, and they agreed that consultation with UK financial institutions was required. At the request of these financial institutions the public was not informed of the data loss for some days in order to allow these institutions

to monitor potential suspicious activity. Banks and other financial institutions tracked transactions back to the date at which the data was lost in an attempt to identify suspicious activity.

As a consequence of this data incident the HRMC Chairman resigned and the Chancellor made an announcement to the House of Commons. It was claimed that a junior civil servant at the HMRC had broken data security procedures in downloading the data to disks and sending these via unrecorded postal delivery. The Chancellor reassured the public that the police had no reason to suspect the data had got into the 'wrong hands'. However, the public was urged to keep a close eye on their bank accounts for any unusual activity.

The possibility of criminals gaining access to the data and hence engaging in mass identity theft and identity fraud was raised in numerous quarters. This included not only criminals using data to gain access to existing bank accounts but also the possibility of such deviant groups using personal identity data to open new bank accounts or other financial products such as credit cards in the name of individuals. The issue of paedophile rings gaining access to the data on children and using such data for 'grooming' activities was also raised as a possibility.

A report into this incident was published in June 2008. The report concluded that the HMRC was woefully inadequate in its handling and managing of corporate data. It made a series of recommendations for tightening of data security and improving data management practices across UK government.

Points for reflection

- Managing channels of access is a significant issue for eGovernment. How is this issue relevant to the current case?

- In what ways do you think strategy in this area for private sector organisations differs from that for public sector organisations?
- The case highlights the importance of good data security and data management for organisations. With increasing concern over identity theft and data privacy the reputation of organisations is increasingly reliant on good practices in this area. Investigate what the private sector is doing to ensure this.

Offshoring in Bangalore

Offshoring stands for the relocation by some organisation of one or more of its business processes or activity systems from one country to another. Offshoring might involve an operational process, such as manufacturing, or a supporting process, such as some aspect of informatics infrastructure. In recent years much of informatics outsourcing has occurred through offshoring to geographical areas such as Bangalore on the Indian sub-continent.

Bangalore is the capital of the Indian state of Karnataka. In 1951 it had a population of only 800,000. This had grown to 5.6 million in 2001 and is estimated to be around seven million now, making it India's third most populous city. Nowadays, Bangalore is well known as a hub for India's ICT sector; many local companies are involved in research and development and the production of electronics and software. Because of this, Bangalore is sometimes referred to as the silicon valley of India – since it is the base for the country's three largest ICT companies: Tata consultancy services, Wipro and Infosys. These three firms are now amongst the top ten companies in the world in terms of stock market capitalisation. Not surprisingly, some of the most well-recognised colleges and research institutions in India are located in this growing city. Bangalore alone accounts for approximately one third of India's software exports and some quarter of a

million people are employed in ICT within the city boundaries.

One of the most significant companies working from Bangalore is Infosys Ltd, formerly Infosys technologies. Infosys is a global company which provides business consulting, technology, engineering and outsourcing services. Infosys was founded in 1981 by seven young Indian entrepreneurs. It moved to Bangalore in 1983 and got its first foreign client, the US-based Data Basics Corporation, in 1987. The first Indian company to be listed on the US stock exchange, it now has offices in dozens of countries worldwide and development centres based in India, the US, China, Australia, the UK, Canada and Japan, amongst others.

ICT is key to enabling the offshoring of many business processes such as finance, sales, marketing and human resources to India. This process is the result of the increased availability of reliable and affordable worldwide communications during the late 1990s. This development has made possible the movement of service provision to low cost countries in a manner which is invisible (at least in principle) to the user of the service. For instance, many UK companies offshore their telephone marketing and after-sales service functions to Indian companies.

India benefited from the offshoring trend for a number of reasons. The country has a large pool of young people who speak English to a high standard and are technically proficient. Infosys, for instance, receives 1.4 million job applications per year. India's offshoring industry was originally rooted in low-end ICT functions in the early 1990s. Since that time Indian companies have moved to provide back-office functions such as call centres and transaction processing. In the late 1990s, India's abundant pool of software engineers enabled companies to cope with increased demand caused by the millennium bug problem. This enabled companies such as Infosys to attract large-scale software

development projects from Western companies, particularly those based in the US. Currently, India is the offshoring destination for global firms like HP, IBM, Accenture, Intel, AMD, Microsoft, Oracle Corporation, Cisco and SAP.

In recent times robust economic growth and rising inflation have caused growth in wage costs for Indian firms. Indian firms are starting to worry that they may become too expensive in comparison with other destinations. They have therefore attempted to diversify into other high-end sectors beyond software and hardware engineering – for example, aerospace.

Points for reflection

- Many large Western banks have moved a considerable proportion of their back-office processes to India in general and Bangalore in particular. What management challenges arise from this form of remote operation through ICT?
- There have been a small number of instances of lapses in data security such as loss of personal data from customer databases held by Indian companies and some instances of Indian employees engaging in identity fraud. How might such instances affect strategic decisions to offshore for Western companies?

Open Source Software

Open source software is computer software for which the source code is made available under a copyright license (or arrangement such as the public domain) that meets the Open Source Definition – a formal specification of what it means to be open source.

The aim of the open source movement is to make software easier to understand, modify and duplicate. Hence, an open source license permits users to use and change software, and to redistribute it in modified or unmodified form.

Open source software can be developed in traditional ways. However, such software has become associated with a particular model of software development which sees itself as substantially different from traditional approaches.

Open source software is the most prominent example of open source development. Traditional software development is that promoted by people like Frederick P. Brooks in his book *The Mythical Man-Month*. In contrast, the open source guru Eric Raymond distinguishes between two different models of software development: the cathedral

model and the bazaar model'. In the cathedral model, development takes place in a centralised way. Roles are clearly defined and include people dedicated to designing (the architects), people responsible for managing the project, and people responsible for implementation.

Raymond suggests that all software should be developed using the bazaar model. This he describes as 'a great babbling bazaar of differing agendas and approaches'. Such a bazaar model tends to have features such as:

- Users as co-developers. The users of open source software potentially become co-developers. Users are encouraged to contribute to the software with additions, code fixes for the software, bug reports, documentation etc. The general principle is that having more co-developers increases the rate at which the software evolves. One key claim is that the rate at which bugs are identified and fixed increases with open source production. Torvald Linus the originator of Linux states this as a law that 'Given enough eyeballs all bugs are shallow'.
- Early Releases. Versions of software are released as early as possible so as to increase the chance of finding co-developers.
- Frequent Integration. New code is integrated as often as possible so as to avoid the overhead of fixing a large number of bugs at the end of the project life cycle. Some open source projects have nightly builds where integration is done automatically on a daily basis.
- Several Versions. Open source software tends to have at least two versions. A development version is for users who want immediate use of the latest features, and are willing agree to accept the risk of using code that is not yet

thoroughly tested. The users can then act as co-developers, reporting bugs and providing bug fixes, in fact acting as co-developers. The stable version offers the users fewer bugs but usually fewer features.

- High Modularisation. Open source software tends to be highly modular - this allows for parallel development by a larger network of programmers.
- Dynamic decision making structure. A decision making structure, whether formal or informal, is needed - this structure makes strategic decisions as to the on-going design of the software.

The Open Source Initiative is an organisation dedicated to promoting open-source software. The organisation was founded in February 1998 by Bruce Perens and Eric S. Raymond when Netscape Communications Corporation, published the source code for its flagship Netscape Communicator product (a Web Browser) as free software. This was due to the lowering profit margins and competition with Microsoft's Internet Explorer software.

A US federal court has ruled that anyone using the code distributed under an open source software licence must attribute the author of the software and acknowledge the source of the files as well as explaining how the code has been modified in any way. This means that a commercial company cannot take some open source software, modify it and then sell it on as a commercial product.

The bazaar model of software development might be seen as an alternative to conventional approaches to information systems development. However, some maintain that the approaches promoted by the open source movement are not suitable for bespoke information systems development for a number of reasons.

Perhaps the most important difficulty is that the requirements for such systems rely on a great deal of business domain knowledge whereas open source production relies on a wide distribution of commonly accepted requirements for software. Hence, successful open source software products tend to be packaged or commoditised software products that can be used across a range of different industries; for example IS development tools. Two examples of such products are considered in the next section – MySQL and Linux.

MySQL and Linux

The data management layer of the typical ICT system normally relies upon a database management system or DBMS. First released in 1995, MySQL is a multi-user relational DBMS which has more than 11 million installations world-wide. The applications software is considered one of the most prominent examples of open source software. MySQL is popular for web applications and acts as the DBMS component of the so-called LAMP stack for application development. The DBMS has been used as part of the ICT infrastructure of organisations such as Wikipedia.

Linux is a computer operating system, which is based on a popular operating system created in the 1960s known as UNIX. An operating system is a piece of software that manages resources on some computing device and provides an interface used to access such resources. An operating system performs basic tasks such as controlling and allocating memory, prioritizing system requests,

controlling input and output devices, facilitating computer networking and managing files.

The name Linux is attributed to the creator of this operating system's kernel or core facilities. Work on the kernel started in 1991 by Linus Torvalds while he was a student at the University of Helsinki. Torvalds continues to direct the development of this kernel.

Although Linux is generally available free of charge, several large corporations have established business models that involve selling, supporting, and contributing to Linux and free software. These include Dell, IBM, HP, Sun Microsystems, Novell, and Red Hat. The free software licenses on which Linux is based explicitly accommodate and encourage such commercialisation. One common business model of commercial suppliers is charging for support, especially for business users. A number of companies also offer a specialised business version of their distribution, which adds proprietary support packages and tools to administer higher numbers of installations or to simplify administrative tasks. Another business model is to give away the software as a bundle in order to sell hardware. Many netbooks are sold in this manner with Linux pre-installed.

Many free software titles that are popular on Windows, such as Pidgin, Mozilla Firefox, Openoffice.org, and GIMP, are available for Linux. A growing amount of proprietary desktop software is also supported under Linux, examples being Adobe Flash Player, Acrobat Reader, Matlab, Nero Burning ROM, Opera, RealPlayer, and Skype.

Points for reflection

- Investigate the range of software produced using the open source model. For instance, is office software available as open source? Can you run an entire desktop computer using open source software?

- Investigate the similarities between open source software production and the collaborative production of web content.
- The open source software movement has now been in existence for over a decade. Hence, one might argue that earlier critics of the movement who argued that it lacks a sufficiently robust revenue model have been silenced. But what of the software development industry. Does it undermine the business model of companies like Microsoft?
- Why do companies need to have DBMS such as MySQL in their ICT infrastructure? Why is MySQL preferred for use by companies such as Wikipedia?
- What advantages do organisations that adopt linux achieve as compared to those that utilise Microsoft Windows as their dominant operating system?

Tesco

History

Tesco PLC is an international grocery and general merchandising retail chain. Founded in the UK it is the largest British retailer and globally it is the third-largest retailer after Wal-Mart and Carrefour. In 2007, the supermarket chain announced over £2.55bn in profits, approximately the same amount as it declared in 2012. Tesco now controls just over 30% of the grocery market in the UK. Its declared mission is to 'create value for customers to earn their lifetime loyalty' and it's declared strategy is based on offering a range of different types of stores, understanding its customers and treating its employees well.

The company originally specialised in food retail. It has now diversified into other retail areas such as discount clothes, consumer electronics, consumer financial services, selling and renting DVDs, compact discs and music downloads, Internet service provision, consumer telecoms, consumer health insurance, consumer dental plans and budget software.

The name Tesco was introduced in 1924, when the founder of the company Jack Cohen

bought a shipment of tea from T. E. Stockwell. The product was branded Tesco Tea, merging the first three letters of the supplier's name (TES), and the first two letters of Cohen's surname (CO). In 1929 Cohen opened the first Tesco store in Burnt Oak, Edgware, Middlesex; the first self-service store opened in St Albans less than twenty years later, in 1947, and the first supermarket store in 1956, in Maldon. Meanwhile, the company was floated on the London Stock Exchange in 1947, as Tesco Stores (Holdings) Limited.

The 1950s and the 1960s were years of growth for Tesco: by the end of this period, there were more than 800 Tesco stores. In 1973 Jack Cohen resigned and was replaced as Chairman by his son-in-law Leslie Porter. Porter and managing director Ian MacLaurin changed the strategy of the company from a 'pile it high sell it cheap' philosophy which had left the company stagnating and with a bad brand image. In 1977 Tesco abandoned offering the discount savings scheme, Green Shield stamps, to its customers and implemented price reductions and centralised buying for all its stores.

During the 1970s and 1980s the company continued its strategy of acquiring new stores

through takeover of existing food retail chains. During the 1990s the company began diversifying in terms of its product range, its operating area and its delivery channels. Acquisition of Associated British Foods gave the company a major presence in Northern Ireland and the Republic of Ireland. A business alliance with the Esso Petroleum Company allowed the leasing of petrol stations under the Tesco Express format. Key developments in this period were the introduction of a loyalty card and an Internet shopping service. Tesco was one of the first UK retailers to be able to make a profit out of online shopping.

This process of diversification and expansion continued during the early 2000s as Tesco started to become a major international food retailer. In October 2003 it launched a UK telecoms division, comprising mobile and home phone services, to complement its existing Internet Service Provider business.

In the UK, there are four major formats for Tesco stores, depending on size and the range of products sold. The largest stores are called Tesco Extra – they are usually located out-of-town and offer the complete range of tangible products. A smaller range of non-food goods is available in Tesco superstores, that can be described as standard large supermarkets, stocking mainly groceries. Tesco Express stores cater to the “convenience” segment of the market (that is, small neighbourhood stores), while Tesco Metro stores are sized between Tesco superstores and Tesco Express stores and are mainly located in city or town centres.

Informatics infrastructure

Tesco uses ICT and information systems more generally in a number of ways within its business. The company chairman, Terry Leahy claimed in 2007 that if the firm’s ICT failed the firm would fail.

In terms of its customer chain, Tesco introduced its loyalty card for customers, ‘clubcard’ over twenty years ago. To get such a loyalty card must supply a range of personal details to the company. The customer can then use the clubcard in all interactions with the company. Swiping the clubcard through the EFTPOS terminals at checkouts associates purchase of items against details held about the customer. For the customer regular use of the card accrues points which can be redeemed via a voucher scheme in discounting of goods. 11 million loyalty card customers were reported in the UK in 2007. Capture of this data has become critical to company operation. Aggregation of this data in data warehouses allows the company to identify purchasing patterns and plan product and store operations accordingly.

In common with most other large retailers, Tesco draws goods from suppliers into regional distribution centres, for preparation and onward delivery to stores. RFID technology is taking an increasing role in the distribution process.

Within the stores themselves the company’s ‘one in front’ initiative’, introduced in 1994 has been heavily reliant on ICT. The company uses thermal imaging technology to measure and predict customer’s arrivals at checkouts. This enables store managers to ensure that the right number of checkouts is open for every customer to receive a one in front service.

In 2008 Tesco announced its intention to overhaul its ICT infrastructure, planning to replace a number of separate voice and data networks with a single communication network, which was eventually outsourced to Cable and Wireless. This network was used to standardise its key ICT systems in areas such as finance, human resources, payroll, in-store management, distribution and sales.

The intention was to manage these ICT systems centrally across the entire network from its ICT services centre in Bangalore, India (see case study). Informatics professionals based in particular countries of operation supply only front-line support. This standardisation is built upon an earlier effort by the company initiated in 2005, known as 'Tesco in a box'. This was a programme of standardisation based upon an Oracle ERP system which was implemented in all countries of operation.

The rollout of these standard ICT systems is seen as a key enabler for standard business processes and standard management information across the Tesco group. This allows new stores opened countries such as Malaysia or Japan to operate and be managed in exactly the same way as a store in the UK.

B2C eCommerce

Tesco made its major push into B2C eCommerce with a strategic move into on-line grocery retail. The tesco.com domain name and associated Web-site was formally launched in 2000. Soon afterwards, in July 2001, the company attempted to become involved in internet grocery retailing in the USA, when it obtained a 35% stake in GroceryWorks, a joint venture with the American Safeway Inc., operating in the United States and Canada. However, GroceryWorks did not expand as fast as initially expected and Tesco sold its stake to Safeway Inc. in 2006.

Having said this Tesco now claims to be the world's largest online grocery retailer. Tesco is reported as having 45.1 per cent of the sales of online grocery sales followed by Sainsbury's (14.1%) and Asda (13.7%). Estimates of the percentage of on-line groceries within the British Grocery market has placed this as much as 5%, with a doubling of growth over

the next five years. In 2010 as much as 13% of grocery shoppers are reported as shopping online for their groceries regularly.

In 2006 Tesco was reported as having picked up two thirds of all online grocery orders in the UK and had over 750,00 regular users of its on-line grocery service, generating over 22,000 orders per week. This rose to 1 million active users in 2008 and a growth of 50% in on-line sales over the previous year. Internet sales were reported as contributing 4.2% of profits and 3.1% of overall sales. Tesco claimed in its 2005 annual report to be able to serve 98% of the UK population from its 300 participating stores. In the financial year ended 24 February 2007 it recorded online sales up 29.2% to £1.2 billion and profit up 48.5% to £83 million, with over 250,000 orders per week.

Not surprisingly other on-line retailers have begun to look seriously at on-line grocery retail as a profitable market to explore. Amazon, for instance, announced in July of 2010 that it intended to compete with the major British supermarkets in offering online groceries. Of the available 22,000 products available to customers, 2,000 will be stocked in its normal warehouses such as in Swansea. The additional products will be delivered direct from other suppliers. However, established on-line grocery retailers such as Tesco have a two hour delivery window for their groceries. This might prove difficult for Amazon to compete with given its current business model.

Grocery sales made online through the web-site are available to customers for delivery within a defined range of selected stores. Goods for each customer are hand-picked from goods held within each store. This is in contrast to other business models which pick items from the warehouse. The pick from store model allows rapid expansion with

limited investment, but has led to a high level of substitutions when stock becomes unavailable.

Through its Web-site, Tesco now offers a wide range of other products, including electronic goods, books, broadband and financial services. The company uses a content management system to maintain the content on its Web-site, restricting content production itself to a limited range of users. More recently, Tesco have introduced the option within a limited range of stores of customers picking up their crate of groceries from the store and thus deferring the delivery charge. Tesco launched its first home shopping catalogue in autumn 2006, as another channel for sales of its non-food ranges. This is integrated with the internet operation, with both channels being branded as Tesco Direct. Tesco has also launched an advertising campaign for its VOIP product, marketing the service to customers by offering free calls to all other Tesco internet phone customers.

In 2012 Tesco began trialling a mobile commerce application in the UK. For two weeks they trialled what they called an interactive virtual grocery store in the departure lounge at Gatwick Airport, UK. The fridge-sized machine displayed four interactive screens that the customer can slide by hand to reveal shelves with an assortment of 80 products. If the customer wants to buy a product, they scan the barcode with their smartphone. The idea is that the customer will be able to use devices such as this to order a basket of essentials and have them delivered the day they get home from holiday.

Organisation

From an institutional perspective Tesco would be considered in terms of a large multi-national company, producing goods and

services and competing within a number of markets. We would also be interested in the strategy of the organisation and ways of designing its activities in areas such as its supermarket operations to improve its performance. This would lead us to examine the place of information in support of activities such as decision-making about what products to stock where.

Considered from an action perspective we would be interested in how employees of Tesco PLC perform their work. Hence, for instance we would be interested in the experience of working as a checkout person for the company. We would be interested in the established procedures for doing things such as operating checkouts, stocking shelves and receiving goods into the supermarket store. Some of the knowledge about how to do things will be formalised in the sense of being written down. Many other aspects of the everyday work of employees of the company will rely on tacit knowledge. We would also be interested in how such knowledge is communicated and how it is acquired.

System and environment

Tesco PLC can be considered in systems terms. As a food retailer the inputs to the organisation are the foodstuffs it receives from its suppliers. Outputs consist of foodstuffs sold on to customers. Its key transformation consists of those activity systems involved in supporting the sale of foodstuffs. These activity systems can be considered in a hierarchical fashion. Hence, the company will have systems of supply, supermarket operation and financial management that all contribute to the overall purpose of the organisation, which is making a profit for its shareholders.

The environment of the organisation consists of the retail industry generally and specifically supermarket retail. Within food retail in the UK the dominance of big supermarkets means that they have enormous power in determining pricing levels for key foodstuffs from their suppliers. However, the food retail industry is subject to quite heavy degrees of regulation in such areas as environmental health legislation. The food retail sector is still growing in the UK. In recent years the major supermarkets have increased their levels of technological deployment quite dramatically and have utilised their information systems in new areas such as financial services. The basis of competition has traditionally been on matters of pricing although other bases such as the quality of foodstuffs (particularly in relation to organic foodstuffs) have recently come into play.

Value-chain and value-network

The value produced by Tesco is primarily the sale of foodstuffs to customers. Its declared mission is to 'create value for customers to earn their lifetime loyalty'. Tesco introduced its loyalty card for customers a number of years ago. Value might therefore include the additional value services available to loyalty card customers such as discounting of goods.

It is possible to consider the performance of Tesco in terms of the three Es of performance. Tesco efficacy measures are likely to include sales for product groups across different supermarkets. Efficiency measures are likely to include profit margins against product lines or measures of stock fulfilment against orders in warehouses. In terms of effectiveness measures might include the degree to which new customers are attracted to stores; old customers continue to come to their stores and the levels of satisfaction expressed by customers with the level of service they receive.

Consider a supermarket chain in terms of the concept of the value-chain. It is possible to map some of the key processes from the internal value-chain onto this type of business. Inbound logistics involves the management of the purchasing of foodstuffs and the distribution of foodstuffs to warehouses. The process of operations involves the unpacking of bulk deliveries and the presentation of foodstuffs on supermarket shelves. Outbound Logistics involves the distribution of bulk foodstuffs from warehouses to supermarket stores. Marketing and sales involves the advertisement of product lines and the purchasing of foodstuffs from stores. After-Sales service involves the handling of customer enquiries and complaints.

Tesco operate a number of information systems which contribute both to operational control through single-loop feedback and to strategic control through double-loop feedback. For instance, sales of products within their stores are recorded at checkouts and update information about stock levels in the service area of the store. This information triggers replenishment of products from stock held in the inventory area of the store. This is an example of operational control. Sales to loyalty card holders provide valuable information to the company which is used for determining which products to sell at which stores at which times of the year. This is an example of strategic control.

eBusiness and eCommerce

Tesco is what we would refer to as a clicks and mortar company. It is primarily a physical operation but it has an on-line service as well. Tesco have made eCommerce work successfully and integrated it with its core business.

Tesco as a food retailer has relationships with its customers and suppliers. Revenue flows into its value-chain from its customers and on to its suppliers. Customers are mainly attracted to supermarkets by a combination of low prices and a large variety of goods on offer. Supermarket chains typically sell large volumes of their products and hence their business strategy is typically one of low-cost/high-volume operations with typically low margins on each product. Costs are minimised in a number of ways such as buying in bulk from suppliers and letting customers bear the costs of selecting products from shelves, packing products and transporting such goods to their homes. The critical success factor for a supermarket chain is therefore attracting sufficient customers to its store. This means that location of stores is critical. Stores need to be placed within easy reach of a sufficient catchment area of willing customers.

The provision of an eCommerce site such as Tesco.com changes the business model of a supermarket chain. Relationships with customers and suppliers change, as do costs and revenue. For example, if a supermarket fulfils on-line orders by having a member of staff walk around the store and picking and

packing goods followed by transportation to customer's homes using delivery vans then the costs of the operation can substantially increase. Hence, many supermarkets pass on this cost directly to the customer through a charge for delivery as does Tesco.

An alternative business model is to do away with stores entirely. Goods may then be stored in and delivered from low-cost warehouses. Hence, additional order fulfilment costs (picking, packing and transporting) can be balanced by lower operational costs (larger range, reduced inventory, larger volume, lower margins).

Technology clearly has had and continues to have impact on organisational practices. The introduction of bar-code scanners and electronic point of sale terminals at checkouts has rapidly improved throughput of customers. Tesco like many other large retail companies have also introduced automated self-service checkouts with the longer-term aim of reducing staffing cost. It is experimenting with the use of RFID tagging in its supply chain to automatically track its inventory and intelligent trolleys in its stores which will automatically read the products purchased as they are dropped into the trolley.

Points for reflection

- Supermarket chains such as Tesco have been criticised for the control they exercise over both their customer chain and their supply chain. Within food retail in the UK the dominance of big supermarkets means that they have enormous power in determining pricing levels for key foodstuffs from their suppliers. Criticism has also been voiced over the way in which companies such as Tesco have led to the decline in traditional smaller retail outlets on the high street. Examine this issue in greater detail.
- The food retail industry is subject to quite heavy degrees of regulation in such areas as environmental health legislation. This raises significant barriers of entry to the industry. How does Tesco's adoption of eBusiness act as a barrier to entry in such terms?
- The food retail sector is still growing in the UK. In recent years the major supermarkets have increased their levels of technological deployment quite dramatically and have utilised their

information systems in new areas such as financial services. How successful has this strategy been and how reliant is it upon technology?

- The basis of competition has traditionally been on matters of pricing although other bases such as the quality of foodstuffs (particularly in relation to organic foodstuffs) have recently come into play. The value network in food retail shows signs of changing subtly. For instance, within the UK there has been significant growth in organic suppliers selling direct to customers through the Web – a form of dis-intermediation. Is this a challenge to a major online grocery retailer such as Tesco?
- Tesco have used information systems in a number of ways to help build customer loyalty and retention. Through use of its loyalty card scheme the company captures a lot of information about the consumer behaviour of its customers. Concerns have been raised over the potential dangers of using such transactional data and the questions it raises in areas of personal privacy. Examine the data stored on such cards and the uses to which it is put.

Victorian Railway Clearing House

The British railway network first began to be developed during the 1830s. By 1840 some 1,500 miles of railway track had been laid and many problems, such as that associated with standardisation of railway gauge, had been resolved. It therefore became possible for railway passengers to embark upon long journeys such as that between London and Newcastle. However, such journeys required passengers to use the railway lines of several different railway companies. Such companies not only managed and operated their own trains, carriages and freight wagons; they also managed and operated their own sub-network of railway lines.

Hence, for long passenger, parcels or goods journeys that crossed the networks of two or more railway companies, the revenue from a journey had to be divided appropriately amongst the railway companies involved. Initially, private arrangements between companies for such through traffic enabled the division of a composite fare. However, as the number of railway operators grew, this 'accounting' challenge proved monumental

for individual companies. Also, companies were frequently unable to agree on the terms of a composite fare. This led to passengers being turned out of their railway compartments at the junctions between the networks of railway operators. Passengers then had to purchase tickets for the next leg of their journey. The same happened in the case of goods traffic. Philip Bagwell cites the case of a wealthy horse owner who had to send a servant to a particular station simply to lead his horse from one train to another.

The idea for a Railway Clearing House is generally attributed to George Carr Glyn and Kenneth Morrison. Glyn was the partner of a banking firm and chairman of the London and Birmingham railway. Morrison was chief accountant of the same railway and was to become the first executive secretary of the Railway Clearing House. The idea for this organisation appears to have been modelled on the Bankers' Clearing House on whose executive committee Glyn sat.

In 1841, Glyn persuaded his own railway and that of eight others to jointly subscribe to a railway clearing system. The initial focus of the endeavour was upon establishing an intermediary organisation that would handle information associated with through-passenger traffic. Under this system, passengers would be able to book a journey from any station to any other station amongst the network of participants. The Clearing House would then be responsible for distributing revenue from fares to its participants. In time, the Clearing House would also assume responsibility for clearing the transport of parcels and goods on the railway network. Parcels were carried in the goods van of passenger trains; the transport of goods demanded special freight wagons.

The Railway Clearing House began operation on 2nd January 1842. Initially, its staffing consisted of George Carr Glyn as chairman, Kenneth Morrison as a part-time secretary and six full-time clerks. By 1845, 16 companies had joined the system and details of over a half a million passenger/journeys were being processed in that year. By 1848, 43 companies had joined, raising the scale of the network to some 887 stations. This demanded an increase in staffing to 45 clerks and a change of accommodation to offices in Seymour Street, near Euston station in London. These offices were eventually substantially remodelled and extended to create the famous 'long office', which was the largest single office in Britain at the time of its completion in 1855.

As the railway network of the country continued to expand the Clearing House grew to meet the increased demand for its service. By 1861, 500 clerks worked in the Clearing House and were organised into a number of working divisions. In 1864, the Railway Clearing House had a total of 873 clerks and processed a total of 1.6 million settlements

between participating railway companies. By 1874, the number of settlements totalled 4.9 million. However, staff numbers had not increased in proportion and comprised only 1,325 clerks. This was presumably because of increasing productivity amongst the workforce.

In 1876, the Railway Clearing House was at peak capacity and became an organisation that was respected worldwide. At this time, its staff comprised over 1,000 clerks and 500 so-called 'number-takers' which we describe below. Staff were organised into three large divisions: the Coaching department with 352 clerks; the Mileage and Demurrage department with 276 clerks and 500 number-takers; and the Merchandise department with 720 clerks. In addition, there was a small Lost Luggage department with a complement of 16 clerks.

The Coaching department had responsibility for dividing up receipts from passenger and parcel traffic between member companies. The department was headed by an assistant secretary and divided into seven sections. Three Passenger sections with 55 clerks each dealt with receipts from passenger traffic. Similarly, three Parcel sections, again with 55 clerks each, dealt with receipts from parcels traffic. The final section was a Ticket section with 25 clerks that processed passenger tickets. Each section was headed by a senior clerk and subordinates were graded and paid in a scale usually based upon experience. It took approximately three months for a clerk to achieve 'novitiate' status and they were only considered experienced after five or more years of service.

The largest division in the Railway Clearing House was the Merchandise department, which was responsible for dividing revenues from goods traffic. It was divided into 16 sections each with 44 clerks.

The Mileage and Demurrage department was the smallest department but handled the most complex activities. By the 1870s it was possible for any railway company to transport a wagon-load of merchandise on any of the lines of the railway network using any suitable vehicle, whether or not the company actually owned the vehicle. The mileage function of this department divided the revenue between many different actors who participated in this process: the company that organised the train, the company that owned the wagon, the companies that owned the railway lines and the companies that provided terminal facilities. A system of fines, known as demurrage, was enforced to ensure that unused rolling stock was returned to its owner promptly.

Clearly the 'systems' of the three departments of the Railway Clearing House worked differently. For our purposes, we shall focus on describing the systems underlying the work of the Coaching department, since they were the simplest of those used by the Clearing House.

The principle underlying the work of this department was straightforward. Any fare paid for a through-journey needed to be divided amongst the companies involved and a levy raised to help fund the operation of the Clearing House. The complexities lay in dividing up a given journey into its constituent parts and handling the vagaries of different fare structures. This took the monthly returns from booking offices and the tickets collected from passengers at the end of their journey and transformed them into payments made to railway companies.

The Railway Clearing House supplied all through-passenger tickets to member companies. These tickets were printed on 6 cm by 3 cm green card. Tickets were issued to each booking office on the railway network

and were pre-printed with all the common destinations available on the network. Tickets were issued in batches of one hundred and within each batch an individual ticket was printed with a serial number by machine. Serial numbers continued between batches.

Tickets were sold in strict ascending serial number order from within a batch. At the end of each day, the booking office clerk would record the serial number of the lowest-numbered unsold ticket in each batch and send these numbers with the cash collected to the head office of the railway company. At head office these numbers were used to check the cash received against tickets sold. They were used to compile a monthly summary of tickets sales and receipts for the Railway Clearing House.

Tickets were collected at the end of each passenger's journey, usually at railway stations. These were sent on in batches to the head office of the railway where staff would sort them by destination. The batches of sorted tickets, along with a summary of ticket sales, constituted a monthly return from a railway company to the Ticket section of the Coaching department.

In the Ticket department 25 boy clerks would arrange the incoming tickets into serial order sequence and reconcile them with the monthly summaries of sales. Frequently, such reconciliation identified anomalies. For instance, there might be a missing half-fare ticket for a child within a batch. In such cases, a senior clerk was called in and a standard form was completed inviting explanation from the offending railway company. Ticket clerks were also responsible for determining the actual route taken by a passenger from a number of possible routes taken. This was determined by inspection of the punches made in a given train ticket by train conductors. Each railway company used a

distinctive set of 'snippers' to make this possible. In 1876, there were approximately 3.3 million tickets processed in this manner.

After all the tickets from relevant batches had been verified the results would be tabulated on another standard form and passed on to the appropriate passenger section. In the passenger section the proceeds from an individual ticket needed to be divided between participating companies. To do this, clerks had to inspect a complex set of fare structures. The simplest fare structure was the 'ordinary fare' which consisted of the sum of local fares applicable for the individual legs of a passenger journey. In contrast, for certain discounted fares a division had to be made on the basis of the total mileage between all the junctions in the railway network covered by a passenger journey. Hence, maps of the railway network detailing such junctions and

the mileage associated with branches of the network had to be inspected.

In terms of each passenger ticket sold in the railway network, the company that sold the ticket was classed as the 'debtor' of the transaction. All other companies involved in the passenger journey became 'creditors' in the transaction. A months-worth of tickets generated thousands of debits and credits against each of the 80 companies in the railway network. Processing this volume normally took a couple of weeks work by clerks. At the end of this activity, the total debits and credits were summed for each company and on this basis a single transfer of funds was made between the Railway Clearing House and the railway company. The aggregate result of these financial transfers had to balance. Hence, clerks normally worked in pairs, each checking the work of the other.

Points for reflection

- How would you describe the primary activity system supported by the clearing house?
- In what way does the clearing house constitute an information system?
- What data was used within the clearing house and for what purpose?
- What do you think comprises information technology in the case of the clearing house?
- In 1993 British Railways - a public sector agency - was broken up and the operation of the UK railway network parcelled up amongst 25 railway franchises. This has meant that depending on where you travel the finance derived from ticketing has to be parcelled up amongst a number of railway operators. Is this similar to the situation in Victorian times or different?