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Accounting for information: information and knowledge in the annual reports of FTSE 100 companies

Joanna Cummins and David Bawden¹

Department of Information Science, City University, London, UK

Abstract

The purpose of this study was to assess the ways in which a sample group of companies discuss information and knowledge.

Quantitative and qualitative content analyses were used to survey the way that companies present and value information and knowledge, based on the annual reports of the FTSE 100, the United Kingdom's largest publicly-listed companies. A novel content analysis approach is used, based on a set of categories proposed by Oppenheim, Stenson and Wilson.

Many of the companies analysed made explicit the importance of information and knowledge, through either discussion in the text of the annual report or through an attempt to assign a monetary value to information assets. Where the importance of information and knowledge was not made explicit, the study revealed links between successful performance and effective use of information assets. Different categories of information assets were identified within the annual reports.

Conclusions drawn from the analysis include that information and knowledge are demonstrably important to FTSE 100 companies, although the specific term “knowledge” does not appear to have a special significance in the companies’ lexicon; and that certain sectors, such as General Financial, General Retail, Travel & Leisure, Mining, Aerospace & Defence and Software & Computer Services, mention information and knowledge more than others.

Keywords: valuation of information; information assets; organizational information

¹ Correspondence to: Prof D Bawden, Department of Information Science, City University London, Northampton Square, London, EC1V 0HB, United Kingdom, db@soi.city.ac.uk.

1. Introduction

‘Information exploitation is a critical driver for world-class business performance’ [1].

‘Knowledge is a critical factor in business competitiveness’ [2].

‘There is an increasing recognition of the value of knowledge and information to individuals, organizations, and communities’ [3].

Statements like the above can be found in numerous articles, in both the information science and the business literatures. Oppenheim, Stenson and Wilson note that: ‘the role of information in organizations and information value has long been discussed’ [4].

However, although there is much discussion on how companies *should* value information and knowledge, there is a paucity of empirical research into the way that companies *do* value these assets, that is, how they are presented and valued in reality. Sakalaki and Kazi, for example, note that: ‘there are only a few experimental studies on the valuation of information’ [5]. This study aimed to address this lack by analysing the annual reports of the UK’s largest publicly-listed companies, those comprising the FTSE 100.

The annual report and accounts are ‘the principal way in which shareholders and others keep themselves informed on the activities, progress and future plans of a company’ [6].

For this reason, if information and knowledge is valued by a company in any significant way, it should be clear from the annual report. Furthermore, all annual reports share a similar format that aids comparison. Holmes, Sugden and Gee note that:

the annual report and accounts must by law contain four basic components: 1. a directors' report; 2. a profit and loss account; 3. a balance sheet; and 4. an auditors' report [6].

The directors’ report and auditors’ reports are textual, a discussion of the company’s activities during the period covered by the annual report. The profit and loss account and balance sheet are numeric. The former represents ‘a monetary record of the activities of a business during an accounting period’ whereas the latter ‘is drawn up on the last day of the company’s accounting period’ [6] in order to present a snapshot of the state of the company at that date.

The FTSE 100 is an: ‘index representing the performance of the 100 largest UK-domiciled blue chip companies’ [7]. All of these were included in the analyses, using the composition of the FTSE 100 as at August 1st 2008.

2. Accounting for information and knowledge

There are numerous, and often contradictory, definitions of information and knowledge, and hence of the ways in which these entities may be valued in business settings [4, 8-12].

It is not the intention of this study to add to the ongoing attempts to, once and for all, define concepts such as information, knowledge, and data. However, it is necessary to explain our understanding of the terms.

Davenport and Prusak define information as ‘a message, usually in the form of a document or an audible or visible communication’[9]. Oppenheim et al. add to this the caveat that:

information that is communicated has both the intention of the sender and the expectations of the receiver to take into account. As such, it cannot be viewed as an independent entity” [4].

Knowledge can be described as ‘larger structures of related information’ [10]. The relationship between information and knowledge has long been debated. The ‘cognitive’ model of knowledge:

regards knowledge as something intrinsic to, and only existing within, the human mind and cognition. Knowledge, being subjective, cannot be directly transferred or communicated from one person to another, but must be converted into information first. Information is then regarded as the objective – and therefore communicable and recordable – form of knowledge [11].

This model of knowledge is able to incorporate the concept of ‘tacit knowledge’, that is, ‘knowledge which we all possess but which cannot be expressed in explicit, objective terms’ [11].

Opposed to the cognitive model is the ‘scalar’ model of knowledge, in which ‘information and knowledge are seen as readily identifiable and communicable’ [4]. The two concepts ‘can be transformed into one another, outside the human mind’ [11]. Information is distilled into knowledge through “‘value added’ activities: summarizing, evaluating, comparing, classifying, etc.”[11]

The relevance to this study of arguments regarding the definition of and relationship between information and knowledge is that the viewpoint that is accepted: ‘will determine how information and knowledge are understood, and hence what approach to their management and valuation is followed’ within an organisation [11].

Information management in an organisation that accepts the cognitive model will involve the management of communicable information (documents etc.) with systems, whereas knowledge management, ‘eschewing any attempt to ‘make tacit knowledge explicit’...will use cultural means to allow the transfer and spread of such knowledge’ [11].

Cultural means include ‘observation, shared practice, and apprenticeship, and...the building of ‘cultural’ aspects; relationships, trust, etc.’ [11].

Yates-Mercer and Bawden go on to note that: ‘the value of knowledge in such organizations will be assessed by methods which closely relate the knowledge assets of an organization to its overall value and performance’ [11].

An organisation that accepts the scalar model (in which information and knowledge are closely related) will think of knowledge management in terms of a particular kind of information management. It will develop 'know-how' databases, and 'knowledge stores', and will try to 'capture' the organization's knowledge in software. There 'may well be a reliance on metrics' to assess the value of both information and knowledge [11].

These different approaches to information and knowledge, their management and valuation, are very likely to affect the way that information and knowledge are presented and valued within annual reports. It will be particularly interesting to note what kind of knowledge management tools (if any) are in use by the FTSE 100 companies. Do they discuss knowledge in systems, or in people? What is the prevailing approach to knowledge management?

A company that accepts the scalar model is perhaps more likely to wish to assign a monetary value to their information and knowledge, given that under this model information and knowledge are readily identifiable and, by implication, measurable. A company that accepts the cognitive model may be more likely to discuss knowledge sharing as a key strategy as opposed to an asset.

From an accounting perspective, information and knowledge fall under the category of intangible assets: 'nonmonetary asset[s] without physical substance' [13].

Deloitte Touche Tohmatsu define an asset as:

a resource that is controlled by the enterprise as a result of past events (for example, purchase or self-creation) and from which future economic benefits (inflows of cash or other assets) are expected. Thus, the three critical attributes of an intangible asset are:

identifiability

control (power to obtain benefits from the asset)

future economic benefits (such as revenues or reduced future costs)' [13].

As Oppenheim, Stenson and Wilson note, information does give access to future economic benefits [4]. But it is not identifiable in an accounting sense ('capable of being separated and sold, transferred, licensed, rented, or exchanged, either individually or as part of a package' [13]).

The reason for this is that:

information is embedded in diverse systems and business processes which underpin various organizational activities, and so it is very difficult to separate it from the business. To sell such information assets, a company would have to sell the entire business. Therefore, the usefulness of defining information as asset in strict accounting terms is limited to those companies that sell information [4].

The International Accounting Standards Board (IASB) has looked closely at the accounting standard governing intangible assets, noting the increased significance of intangible assets [14].

The IASB's interest in the area suggest that companies are keen to account for their intangible assets more fully than they are allowed at present, and a close reading of the annual report and accounts could show that they are finding ways around the restrictive accounting standard.

Goodwill is a particular type of intangible asset that appears in the annual report and accounts of a company when it has acquired another company. It represents the portion of the price paid for the company that is over and above the acquired company's identifiable assets; that is, what the company has paid for advantages such as reputation, brands, customer relationships, and, perhaps, the information assets of the acquired company.

Attempts to categorically define the value of information and knowledge to organisations from within the information science community stumble on philosophical reservations regarding the nature of information.

Yates-Mercer and Bawden describe the multitude of

attempts to devise methodologies for rationally valuing information and knowledge, ranging from simple qualitative value judgements, through assessments of added value and 'scorecards', 'monitors', 'benchmarks'...to complex mathematical methods [11].

They conclude, however, that

a tension exists between the desire to evaluate activities and initiatives relating to knowledge and the apparent near impossibility of doing so in ways which can be shown to be meaningful, and which do not do violence to the nature of the things being evaluated [11].

Orna echoes this point, noting that organisations have been reluctant to assign a value to information

because they could not see how to do it. The difficulty arises partly from mistrust of qualitative measures and partly from the intellectual demands of methods for converting qualitative to quantitative. It is compounded by imperfect understanding of the unique qualities of information [15].

These unique qualities centre on the fact that information's value is dependent on 'context and use' [8]. This would suggest that we should not expect to see the value of information and knowledge made explicit in anything but qualitative terms in the accounts we analyse.

Orna summarises recent research by authors such as Marchand and M'Pherson to find qualitative measures of information value. Marchand's metric 'depends on the relation between senior managers' judgment of their own company's business performance, and the extent to which the company combines effective management of information and IT with appropriate information and knowledge behaviour (its 'information orientation')'. M'Pherson's 'Inclusive Value Accounting Framework', also depends on the judgment of managers, furthermore: 'he acknowledges that the intellectual effort they need to make in coming to terms with the concepts involved is a major barrier; it can probably be overcome only in large corporations' [15].

A recent paper by Wilson and Stenson reviews further attempts to find a monetary value for information. Griffiths and King's method

saw the main factor in valuing information not as the value of the resource itself but as the value of the time and effort spent by users in obtaining information elsewhere...however, if we consider that any one user's time may be worth more or less than that of other users and that many users in practice would not be interested in obtaining information from elsewhere, then the measure appears less than objective [16].

The authors also review Glazer's method, in which the value 'generated from potential uses of transaction-based information' was calculated, but argue that the approach was flawed since it is 'by no means certain' that 'all the information held by the organization was valuable'. They conclude that so-called 'objective measures' of arriving at a quantitative value for information 'are often far less reliable than they at first appear' [16].

Of recent work into the value of information to organisations, the research of Oppenheim, Stenson and Wilson [4, 12] is of most relevance, in developing a definition of information as an asset that combines the accounting perspective and the information science perspective: 'information assets comprise resources that are, or should be, documented and which promise future economic benefit'. These authors argue that 'information assets form an umbrella category' that includes knowledge as well as information, because, as discussed above, 'if tacit knowledge cannot be communicated and explicit knowledge is, in fact, information, then knowledge assets cannot exist, and should instead be included as information assets'.

They identify nine categories of information assets, based on categories first introduced in the Hawley Report (a pioneering report into information as an organisational resource) but adapted following consultation with senior executives, as follows:

- organisational information
- legal and regulatory
- customer information
- competitor information
- product information
- business processes
- management information
- people management
- supplier information

In the study reported here, these categories are used as a framework for qualitative analysis of which categories of information assets appear most often in the annual report and accounts.

Turner and Holmes, in a recent white paper on discourse analysis, have noted that:

the language a business uses reveals the deep character of that organisation. Every business, like every person, has a distinct language, which signals their inner psychology. The talk a person or

company chooses to employ, about their goals, what drives them, or their leadership style, generates insights well beyond those words...Businesses also have 'tell' words. These are words or phrases that a company expresses well beyond any obvious reason and say a great deal about how the business thinks and feels [17].

This study analysed the language used by FTSE 100 companies in order to unearth unwitting evidence on the value of information and knowledge.

3. Methodology

The analyses were carried out on the annual reports of the FTSE 100 companies, as of 1 August 2008, downloaded from the company websites. A list of companies and their reports details is given in Appendix A. The study was carried out between August 2008 and December 2008. Fuller details are given in Cummins [18].

The central research method is content analysis, a research technique based on the counting of the occurrences of 'recording units' (typically words or phrases) in a sample of texts, usually with consideration of the context of the occurrences [19]. This was carried out here in two stages: an 'incidence analysis' and a 'textual analysis'. This combined analysis is a novel approach to content analysis of this type of subject matter.

The initial intention was use a variety of synonyms and associated concepts for information and knowledge, such as know-how, knowing, expert, expertise, experience, learn, learning, intellectual capital, skills, culture; and also to examine words linked to Oppenheim, Stenson and Wilson's framework of information assets, for example "people" and "staff" linked to "people management" and "processes" and "procedures" linked to "business processes", "competitor", and so on. However sample concordances and textual analysis revealed a great deal of relevant material using the terms 'information' and 'knowledge' alone. Practical constraints dictated a focus on these two terms.

For the incidence analysis, Concordance software (<http://www.concordancesoftware.co.uk>) was used on text files created from the PDF versions of annual reports from company websites. The list of units present in each set of accounts were copied from the Concordance software into Excel and ranked by the number of occurrences. Numbers, numerals, single letters (apart from those that double as words, e.g. "a" and "i") and symbols were removed, to leave only units of text.

Although this process cannot be 100% accurate given the element of manual removal of certain units from lists of thousands of words, a high level of accuracy was indicated by checking the top-ranked units in the lists against an independent ranking of the most frequently used words in the English language.

To assess the significance of the terminology used in the reports, word frequencies were compared with the Wordcount database (<http://www.wordcount.org>). This is defined as: 'an...experiment in the way we use language. It presents the 86,800 most frequently used English words, ranked in order of commonness. Each word is scaled to reflect its frequency relative to the words that precede and follow it, giving a visual barometer of relevance' [20].

WordCount's data is suitable for the purpose of a study of UK company accounts since it is based on the British National Corpus (BNC) as opposed to a corpus of American English. The BNC is described as: 'a 100

million word collection of samples of written and spoken language from a wide range of sources, designed to represent an accurate cross-section of current English usage. WordCount includes all words that occur at least twice in the BNC' [20].

Initial testing showed that the top-ranked units of text in our concordances generally matched the top-ranked units of text in the English language. These are:

1. The
2. Of
3. And

Eighty-eight of the ninety-five companies (83.6%) for which a concordance was made had the same top-ranked units. For the remaining seven companies had the top-ranked units were:

1. The
2. And
3. Of

Given this degree of accuracy, using WordCount we can compare the rankings of information and knowledge in our word lists with their rankings in the English language generally.

If either term were more highly ranked in an annual report than in UK English, it might suggest that that company was particularly information- or knowledge-oriented, as per Turner and Holmes [17].

The initial concordances made verified the argument noted earlier, that the words an organisation uses reveals something of the character of that organisation. For example, in the annual report of Vodafone Group, the word "mobile" is the 28th most frequently-used word as opposed to the 4875th most frequently used as it is in UK English, thus demonstrating the focus of Vodafone's activities.

Although mobile phones are unambiguous products, and information/knowledge philosophical concepts, the same argument could be made for 'information' and 'knowledge', which are respectively the 219th and 675th most frequently-used words in the English language [20].

For each of these two terms in turn, its position in the list of words for each company was taken and added to a spreadsheet. The companies were then sorted by the position in which the term appeared, with the company in whose annual report information ranked highest at the top of the list. An incremental value was assigned to each company according to their position in this sorted list with the highest score going to the company in whose annual report the term ranked highest, and so on.

The values for the various sectors were added together and then divided to arrive at a mean score for each industry sector, as used by the London Stock Exchange for the classification of companies [21].

The process was carried out on the number of mentions of information and knowledge as well as their relative rankings, although this is arguably less relevant given that the number of mentions can be related to the relative length of the reports.

The next stage of the analysis was the textual analysis, the first step being to search the .pdf versions of the annual report for the terms 'information' and 'knowledge'.

Where the terms appeared they were copied in their context into a separate document. Their location (page number and section of document) in the annual report was noted.

The terms were of most interest if the 'information' or 'knowledge' in question could, following Oppenheim, Stenson and Wilson's definition of information assets [4], be described as a resource promising future economic benefit. Where this was the case the terms were classified into one of these authors' nine categories noted above.

The decision on the category into which the term would fall was dependent on the context in which it appeared,

A new spreadsheet was created where appearances of categories of information assets in an annual report could be noted, with the aim of ascertaining

- whether certain sectors focus on a particular type of information asset
- which types of information assets appear in the annual reports most often

Many points arose from the textual analysis that could not be analysed purely quantitatively, as is discussed below.

All 100 FTSE companies were entered into the analysis. In five cases, the available report format could not generate a file suitable for use by the concordance software, so that the incidence analysis was carried out on 95 companies. In one case, the report was not in a format amenable to searching, so that the textual analysis was carried out on 99 companies. In two cases, no full accounts were available for a newly merged company, and therefore the accounts of the predecessor were used. These limitations of the study should not significantly affect the results.

A comparison of the most recent accounts with accounts from previous years to see whether or not the situation with regard to the value of information is changing would have been desirable, but time constraints did not allow for this. This would undoubtedly be a interesting future study, but a very different one to what is reported here.

4. Findings

The results of the analyses are presented in two sections, corresponding to the incidence and textual analyses respectively.

4.1. Incidence analysis

Of the 95 company reports in this analysis, all included the word 'information' and 94 included the word 'knowledge'. For 93 reports, the word 'information' occurred more frequently than in the UK English corpus. However, of the 94 reports mentioning 'knowledge', in only 3 was the word used more frequently than in the corpus.

If we accept the contention that the language a business uses reveals the character of that organisation, this would be a strong indication that information is particularly important to FTSE 100 companies, but that knowledge is not.

This is somewhat unexpected given the amount of literature discussing the importance of knowledge management to companies. It is possible that knowledge used to be a more popular term but is now 'going out of fashion'. It is also possible that knowledge is discussed in such reports in terms of people's learning and skills rather than as an entity in its own right. This possibility is examined in the textual analysis.

Considering sector rankings, in Table 1, the term 'information' was on average ranked highest in the sector Equity Investment Instruments and lowest in the Chemicals sector.

Table 1

Mention of 'information' ranked by sector

	Sector	No. of companies in sector	Mean ranking score
1	Equity Investment Instruments	1	60
2	Beverages	2	53
3	Health Care Equipment & Services	1	53
4	Pharmaceuticals & Biotechnology	3	52.33
5	General Financial	5	50.2
6	Food Producers	3	50
7	Gas, Water & Multiutilities	4	47.5
8	Media	6	46.17
9	General Retailers	4	41.5

10	Travel & Leisure	9	40.33
11	Mining	6	39.5
12	Aerospace & Defense	3	39.33
13	Household Goods	1	39
14	Industrial Metals	2	38.5
15	Software & Computer Services	2	37.5
16	Support Services	5	35
17	Fixed Line Telecommunications	2	34
18	Oil & Gas Producers	4	30.75
19	Tobacco	2	30
20	Real Estate	4	28.5
21	General Industrials	2	28
22	Food & Drug Retailers	3	27.6
23	Nonlife Insurance	2	27.5
24	Banks	5	25.4
25	Life Insurance	6	22.17
26	Mobile Telecommunications	1	22
27	Oil Equipment, Services & Distribution	2	21
28	Electricity	4	20.25
29	Chemicals	1	11

However given that there was only one company in each of these sectors these results may not be representative of the wider sector. Other sectors with only one representative in the FTSE 100 include Mobile Telecommunications, Health Care Equipment & Services, and Household Goods. If we discount these sectors we see that the highest-ranked sectors are Beverages, Pharmaceuticals, and General Financial.

The position of the Beverages and Pharmaceuticals sector is unsurprising. The former deals in the area of fast-moving consumer goods (FMCG) where information about customers and markets is crucial in order to retain

market share, while the pharmaceutical industry is generally regarded as the epitome of the 'information intensive' industry [22].

The General Financial sector covers investment companies such as ICAP and the London Stock Exchange, both of which 'sell' information itself, and companies such as 3i and Schroders who depend on information and knowledge to make the best investments for their clients. Man Group, also from the General Financial sector, note in their accounts that

the timeliness and the accuracy of performance information is essential to maintain investor confidence in their investment decision... This is particularly important in turbulent markets when regular and timely performance reporting is essential for our institutional investors and distributors to ensure that investors have the most up to date information [23].

Those sectors at the bottom of the list are not likely to be 'anti-information': rather their position reflects a difference in the degree of interest in and, consequently, reference to information. However it is possible that Electricity is the lowest-ranked of the sectors with more than one representative because the element of competition has been introduced to this sector relatively recently and, as noted above, the element of competition stimulates interest in information about customers, markets, competitors, etc.

Knowledge on average was ranked highest in the General Industrial sector and lowest in Household Goods, as shown in Table 2.

Table 2
Mention of 'knowledge' ranked by sector

	Sector	No. of companies in sector	Mean ranking score
1	General Industrial	2	74.5
2	Chemicals	1	70
3	Oil Equipment, Services & Distribution	2	69.5
4	General Financial	5	66.8
5	Software & Computer Services	2	62.5
6	General Retailers	4	60.25
7	Electricity	4	59.75
8	Real Estate	4	55

9	Tobacco	2	54
10	Support Services	5	53.6
11	Travel & Leisure	8	50.125
12	Aerospace & Defense	3	49
13	Oil & Gas Producers	4	48.25
14	Mining	6	46.67
15	Nonlife Insurance	2	44
16	Health Care Equipment & Services	1	44
17	Banks	5	43.4
18	Food & Drug Retailers	3	43.33
19	Media	6	42.33
20	Food Producers	3	42
21	Industrial Metals	2	41
22	Mobile Telecommunications	1	38
23	Pharmaceuticals & Biotechnology	3	33
24	Life Insurance	6	29.5
25	Beverages	2	29.5
26	Gas, Water & Multiutilities	4	26.5
27	Equity Investment Instruments	1	26
28	Fixed Line Telecommunications	2	15.5
29	Household Goods	1	13

[illegible]

Ignoring companies with only one representative in the FTSE 100, the top three are General Industrial, Oil Equipment & Services, and General Financial.

Reasons why General Financial might rank so highly have already been noted.

3i note that General Industrial is one of the sectors they are most interested in investing in, and state that:

in this broad sector, sustainable advantage is typically held by manufacturers who have innovative technologies and compelling brands, and can achieve a strong cross-border presence through organic and acquisitive growth [24].

Knowledge is clearly important to developing innovative technologies.

In an analyst report on Petrofac, one of the companies in the Oil Equipment & Services sector, Shuaa Capital note that:

among the major trends affecting the [Oil Equipment & Services] industry, and the most constraining factor on growth, is limited resources, primarily that of skilled labor. It takes time to develop a skilled workforce that requires years of experience and in many cases several certifications and designations [25].

It could be argued that this is why knowledge is so important to this sector: the years of experience, certifications and designations that are required represents the knowledge of the workforce, a lack of which would limit growth.

It might be expected for information and knowledge to be closely tied, and the rankings of these terms to correlate, but this is not the case.

Discounting those sectors with only one representative, 63% of sectors ranked highly (in the top half of the table) in one table ranked low (in the bottom half of the table) in the other table. This may show that within FTSE 100 companies information and knowledge, or information and knowledge management, are not considered to be strongly linked because of the tendency for knowledge management practitioners to distance their discipline from ‘traditional’ information management [26].

Six sectors were in the top half of the table of both the tables. These sectors were:

- General Financial
- General Retail
- Travel & Leisure
- Mining
- Aerospace & Defense
- Software & Computer Services

Five sectors achieved a low ranking in both tables. These sectors were:

- Fixed Line Telecommunications
- Food & Drug Retailers
- Nonlife Insurance
- Banks
- Life Insurance

Financial services' (Banks, Insurance) low ranking is interesting given the current financial crisis, which could be argued to stem from a lack of information, or perhaps a lack of focus of the information that was to hand: investments in sub-prime mortgages were repackaged to look like safe investments, so those banks and insurers investing did not have the correct information about what they were investing in; banks stopped lending to each other because they did not have enough information about how much bad debt their competitors were hiding, and so on. For several qualitative examples of the ways in which banks discussed their information assets, see the textual analysis.

Why does General Financial fare so much better? Perhaps for the reasons suggested above (ICAP and the London Stock Exchange 'sell' information, 3i and Schroders operate in the information- and knowledge-intensive area of investing for clients).

Mining, Aerospace & Defense, and Software & Computer Services all depend on a high level of technical knowledge. It is perhaps less obvious why Travel & Leisure would be so highly ranked. One possible explanation is the growth of competition in this industry through low-cost airlines, travel websites, and so on. A greater level of knowledge regarding customers and markets is arguably now required in order to maintain market share.

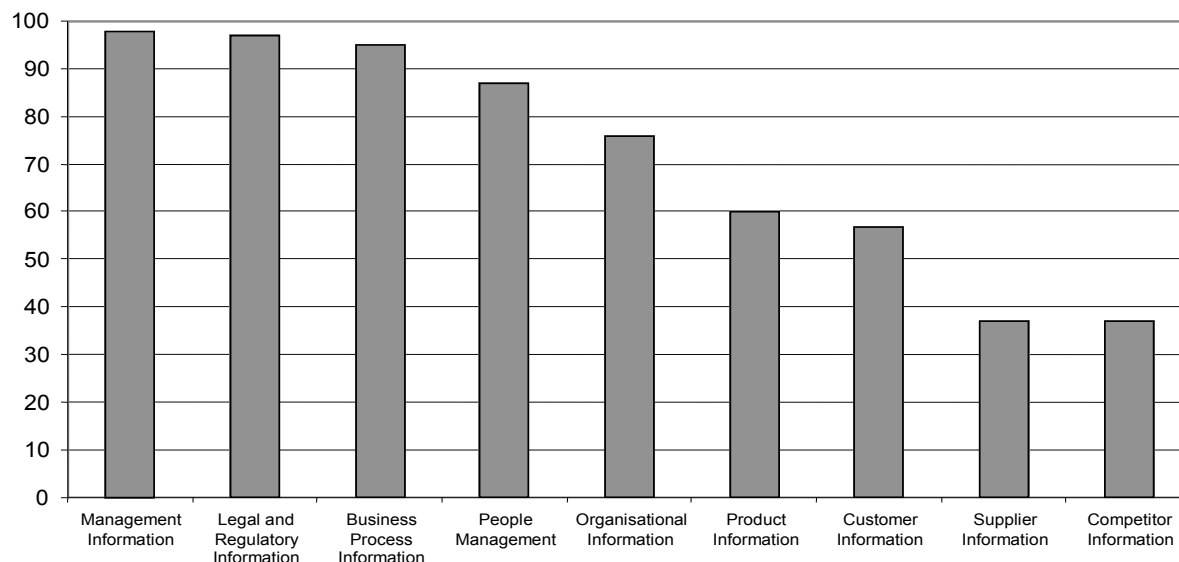
4.2. Textual analysis

The analysis of 99 reports yielded a large amount of detailed qualitative information, often in the form of illuminating quotations. Only a representative selection can be presented here; see Cummins for fuller details [18].

An analysis of the information assets, categorised as above, for the 99 reports subjected to textual analysis is shown in Figure 1.

Figure 1

Categorisation of information assets



Management information, Business Processes, and Legal and Regulatory are clearly the most-discussed information assets, perhaps implying a high level of inward focus as opposed to outward when producing the annual report. That is, the annual report is more concerned with the day-to-day processes, strategic direction, and compliance with regulation of the business itself than with customers, competitors and suppliers.

Nevertheless it is interesting to note the similarity in the number of times that product and customer information was discussed by companies, emphasising the possibility of a link between these two categories of assets. Furthermore, supplier and competitor information assets are discussed the same number of times, suggesting a link in the 'mind' of the company (as per Turner and Holmes[17]) between business it deals with and businesses it competes with, i.e. the other companies in its 'sphere'. These are, of course, suggestions, unfortunately not provable within the scope of this study.

Organisational information in the reports includes discussion of how the company approaches knowledge management in particular, by either by using software systems, such 'know-how databases', 'knowledge stores', intranets and groupware, designed to capture knowledge, or by using 'cultural means' such as policies designed to encourage staff to share knowledge face-to-face [11].

Twenty-three of 99 companies discussed knowledge management, despite the fact that the term 'knowledge' is comparatively uncommon in annual reports, as noted above. The majority of these relate to systems, rather than policies. To give some examples (numerous others are described in Cummins [18]):

3i noted that 'environmental, ethical and social policies and are available to all employees through 3i's portal, a web-based knowledge system'.

Anglo American's 'internal enterprise information portal', known as 'theSource', is described as a platform 'for sharing core management tools and techniques across the business'.

Invensys describe their 'InFusion system', which 'provides a common engineering, automation and applications environment that connects, collects and leverages all the knowledge and data available from disparate systems and technologies'.

Companies such as: **Capita Group**, **Intercontinental**, **International Power**, **National Grid** and **Rexam** all mention their intranets as a tool for sharing policy and knowledge, however **Capita** do also note that they reinforce an 'ideas-sharing culture' by encouraging 'transfers and secondments across the Group'. **WPP**, although they: 'introduced ChangeROOM, our knowledge management database' [presumably software-based], note that the aim of ChangeROOM is 'to encourage learning and collaboration' between employees.

There was evidence that companies were using innovative new ways to share knowledge, beyond the traditional means of intranet and groupware.

British Airways, are looking at 'ways that we can harness the knowledge and experience of our customers and staff' using 'social networking and blogging'. **SAGE** describe the 'introduction of podcasts and other media to enable greater connection and knowledge sharing', and **Vodafone** claim that: 'the use of mobile technologies such as SMS, video clips and mobile intranet sites is commonplace, all assisting in sharing knowledge amongst employees'.

BHP Billiton go further in describing this kind of approach:

The real benefit for us is in sharing projects across the Group so they can be replicated. This is achieved through our knowledge sharing Networks and Communities of Practice (CoPs). Currently, there are 300 CoPs with over 6,000 technical experts sharing innovative ideas and experience and Group-developed best practices electronically, by phone and face-to-face in workshops. This work is supported by business leaders and resourced by a dedicated team. By effectively harnessing technical expertise in mine operations, mine planning, maintenance, processing and our outbound supply chain, Business Excellence helps people find solutions quickly and builds teamwork across our globally diverse organisation

They specifically mention 'cultural means' [11] such as Communities of Practice, experts, face-to-face interaction, and so on.

Forty-four of 99 companies indicated that information or knowledge was important at a strategic level, or said specifically that information or knowledge was considered a resource. Some of these statements suggest a more "cognitive" approach to knowledge. **3i**, for example, note that: '3i is a people business with an entrepreneurial culture that depends on our employees' depth of knowledge and their networks of strong internal and external relationships'. **Aviva** note that one of their '2008 Priorities' is to: 'foster improved performance, through global sharing of knowledge and information'. **BG Group** 'encourages its people to share knowledge and develop cross-cultural experiences'. **Drax** 'provides a wide range of development opportunities to help employees develop the necessary skills, knowledge and experience to realise their performance potential'. **International Power** note that: 'teamwork requires complete sharing of necessary information, inclusion rather than exclusion and a 'lend a hand' philosophy at all levels of the organisation'. **Kazakhmys** note that: 'although there are various information channels the primary one is face-to-face communication between managers and their staff'.

The link between financial benefit and information and knowledge is made explicit in several cases:

British Land note that: ‘development is a lever of value creation. It combines our skills in the development process, from planning and design to construction management, with our customer and market-focused real estate knowledge, to create distinctive added value’. **Schroders** ‘focus on growing and preserving wealth, utilising the knowledge of our economics and investment strategy teams’. **Rolls Royce** note that they: ‘add value through the application of our skills and knowledge of the product’.

Further examples of companies stating the strategic importance of information and knowledge include **Admiral**, whose strategy is: ‘to exploit the knowledge, skills and resources attaching to our core business’; **Anglo American**, who note that ‘knowledge and expertise’ are among ‘the resources Anglo American considers critical to achieving its strategic aims’; **Antofagasta**, who recognise ‘the importance of timely and accurate information flows, both within the Group’s companies and with external stakeholders’; **HBOS**, who note: ‘our expanding distribution, our knowledge of our customer base and the efficiency of our credit process remain at the heart of our proposition’; **National Grid**, who state that ‘the Board considers that it is imperative to have accurate and reliable information within the Company’; and **Old Mutual** who note that: ‘the world in which we operate is characterised by rapid change, both in economic terms and in terms of our customers’ needs. We are responding to this by sharing knowledge, technologies and best practice across the Group’.

In every set of annual reports in which the importance of information and knowledge was not specifically mentioned, it was at least implied by the contexts in which information and knowledge were discussed. Companies demonstrated a ‘pro-information attitude’ in various ways.

Johnson Matthey, for example, note that: ‘Information and comment is exchanged with employees through the company’s in house magazine’, implying that the exchange of information within the company is desirable. Similarly **Liberty International** notes the importance of ‘keeping its employees informed of the company’s activities and financial performance by such means as employee briefings and publication to all staff of relevant information and corporate announcements’. However, it is important to note the difference between what could be considered ‘stock phrases’ on the importance of information, such as the above, and the descriptions of practical information- and knowledge-sharing initiatives such as those described by BHP Billiton.

In the *legal and regulatory* category, 15 of 99 companies noted that they had been required to provide information to an authority that had requested it, in relation to legal proceedings. This would seem to be a fitting example of this type of information asset. Companies in the pharmaceutical and banking sectors were particularly likely to be approached for this kind of information. For example, **AstraZeneca** note that:

the US Attorney’s Office in Philadelphia is directing four active investigations involving AstraZeneca. The first two involve requests for documents and information relating to contracting and disease management programmes with two of the leading national Pharmacy Benefits Managers.

Lloyds TSB was required to provide ‘information relating to its review of such historic payments to a number of authorities including OFAC, the US Department of Justice and the New York County District Attorney’s office’.

Failure to provide adequate legal and regulatory information can have an adverse financial impact. **BHP Billiton**, for example received a fine in April 2007: ‘regarding the condition of the hazardous waste warehouse roof and lack of information in the Hazardous Waste Container Register’. **Lloyds TSB** note: ‘the risk of financial

failure, reputational loss, loss of earnings and/or value arising from...the inappropriate recording, reporting and disclosure of financial, taxation and regulatory information’.

Most companies had not reached the stage of having to provide legal information to an authority but were concerned with the effective distribution of health and safety information. **Barclays**, for example, ‘regularly reviews its Statement of Health and Safety Commitment...in this statement Barclays commits to ensure that appropriate information, instruction, training and supervision are provided’.

Some companies had introduced information management systems to manage their legal information, for example **Invensys** who ‘have used our internal EHS&S [Environmental, Health & Safety, and Sustainability] website as a global tool to deliver information to all our business operations’, and **Thomas Cook** who aim to ‘converge legacy reporting systems to enable consistent health and safety reporting, and bring together property portfolio and safety information on a single central system’.

Every company was, by law, required to include a statement from their auditors in their annual report. These statements are all very similar in format and form the extent of the legal and regulatory information in most of the annual reports, since the statements include repeated reference to the information required by the auditors in order to carry out an audit. For example, **3i**’s auditors state:

We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that the financial statements and the part of the Directors’ remuneration report to be audited are free from material misstatement.

The *customer information* category comprises information on customers and the market in which the company operates. This information was used in several different ways by the companies surveyed.

A number of companies used the information for what might be considered ‘traditional’ purposes, i.e. using information about customers to better tailor products and services to them. For example, **Man Group** note that a ‘close association with our distributors allows us to understand the major trends and changes in appetite in their investor base for our products. This information is fed back into the product structuring groups and core investment managers’.

However where customer information was specifically discussed it was more commonly information on the customer’s creditworthiness that was of interest. For example, **Barclays** state that:

We have also extended our data-sharing collaboration with the UK credit reference agencies: pooling information about cash advances and minimum payments is proving to be an effective way of flagging up those customers who are in danger of incurring serious debt problems.

The security of customer information is also an issue. **Alliance Trust** note:

specific areas of risk management which have been enhanced in the course of the year have included a re-emphasis of the importance of client data security with additional guidance being given on security measures to be taken in the case of any transfer of such information

while **Intercontinental Hotels** note the damage that unprotected or misused customer information can do to the business: ‘in addition, non-compliance with privacy regulations may result in fines, damage to reputation or restrictions on the use or transfer of information’.

The use of information management systems to manage customer information were strongly in evidence. **FirstGroup** state that they are ‘upgrading Customer Information Systems at stations across the network’, while **National Grid** note that they ‘recently completed a customer service system conversion that consolidated the upstate New York and New England customer systems into a single information and billing system’.

In the *competitor information* category, the most common manifestation was the use of data on the salaries paid by competitors, typically in the ‘Governance’ section of the accounts: 26 of 99 companies reported this type of information asset. **BAE**, for example, note that: ‘information on the market for comparable management positions was provided by PwC so that the Committee could form a view as to where to position the various elements of the package relative to comparable companies’.

Other mentions of competitor information include **Astrazeneca’s** assertion that ‘we can also gain useful information by examining the number of breaches relative to other companies’ performance where such data are made public by the authorities’; **Compass** noting that ‘our UK business our units receive a regular ‘Price Watch’ update providing information, based on ‘high-street’ benchmarking research’; **Diageo’s** use of the volume information of its competitors; and **Unilever’s** statement that: ‘We also monitor the development of our brands through market information that gives us insights into our leading positions versus our direct competitors’.

With respect to *product information*, a number of companies said how important it was to protect their intellectual property rights: often when discussing risks to the business. **BHP Billiton**, for example, note that: ‘protecting our intellectual property rights, such as patents, copyrights, trade secrets and confidential information, is a critical component in the successful development and exploitation of our new technical innovations’. **Diageo** uses ‘security measures and agreements to protect its confidential information’, including patents that ‘cover some of its process technology, including some aspects of its bottle marking technology’. **Rolls Royce** specifically attribute growth to their ownership of intellectual property: ‘growth has been achieved partly as a result of the introduction of new products, but also because our ownership of intellectual property enables us to turn data into information that adds value to our customer’.

Mining companies rely heavily on their depth of knowledge regarding their industry’s particular technologies: for example, **Eurasian** note that: ‘the location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge’.

Product information systems were in evidence. **Morrisons**, for example, claim that: ‘the successful implementation of a new data system has increased the efficiency and detail of product information that can be accessed easily’.

Business process information is the hardest type of information asset to identify since it is so embedded in the business itself [12]. Examples can, however, be identified: **BG Group** ‘also discloses certain information, as indicated, at constant US\$/UK£ exchange rates and upstream prices. The presentation of results in this manner is intended to provide additional information to explain further the underlying trends in the business’: **Cobham’s** ‘Chief Executive and Chief Financial Officer held regular meetings with fund managers and other investors to discuss information made public by the Group’, and similarly **Drax** held meetings ‘with our major institutional

shareholders to assist them in understanding the information announced to the market': **Legal and General** note that they use 'embedded value (EV) financial information to manage and monitor performance, and hence the financial risks, as it is believed to provide information about the value which is being created on the Group's long term insurance contracts'.

In the *management information* category, 92 of 99 companies make reference to the flow of information to the board in time for meetings, and the information that management receive upon joining the company in order to familiarise themselves with the business, suggesting that this type of information is crucial to decision-making within the business.

For example, **Admiral** note that 'on appointment, Directors take part in a comprehensive induction programme where they receive financial and operational information about the Group'. **FirstGroup** state that 'the Chief Executive and Company Secretary' must ensure 'the provision of accurate, timely and clear information to the Board'. Next note that: 'there is a regular flow of written and verbal information between all directors irrespective of the timing of meetings'.

Some companies noted the specific decisions that management information is used to make. **3i's** management information helps the company to decide where to invest. They note that: 'an effective review process to identify risks and opportunities in potential new investments is crucial to our sustained success. This can be a particular challenge in emerging markets, where publicly available information is sometimes thin'. **Admiral** was one of a number of companies explicitly using management information to inform certain estimates or assumptions contained in the accounts:

whilst the Directors consider that the gross provisions for claims and the related reinsurance recoveries are fairly stated on the basis of the information currently available to them, the ultimate liability will vary as a result of subsequent information and events and may result in significant adjustments to the amounts provided.

Two companies, **Friends Provident** and **International Power**, used diagrams of information flows and knowledge sharing in their reports which illustrated the importance of management information [18].

Management information systems are also in evidence: **Kazakhmys** 'invested in automated information systems to streamline reporting processes between the corporate centre and operating subsidiaries'. **Old Mutual** note: 'the maintenance and use of sophisticated management information systems, which provide current data on the risks to which the business is exposed', and **SAGE** that 'management information systems provide the directors with relevant and timely information required to monitor financial performance'.

Strategic decisions are difficult without the relevant information. **Alliance Trust** note that abstentions from votes affecting the future direction of the company 'have, in the main, been where insufficient information has been available to allow an informed decision to be taken'.

In the *people management* category, several reports described information systems, including **Anglo American**, who note that: 'the year also marked the launch of Project Fusion, a payroll, benefit and employee life cycle information-management system that will enhance online people-management capability at the transactional level and provide a more sophisticated platform for Group-wide HR initiatives', and **AstraZeneca** are 'in the process of implementing a global Human Resources information system that will drive consistent people management practices and information standards worldwide'.

Several companies made explicit the risk to the company of losing the knowledge and skills accumulated in their people. **Intercontinental Hotels** state that ‘unless skills are supported by a sufficient infrastructure to enable knowledge and skills to be passed on, the Group risks losing accumulated knowledge if key employees leave the Group’, and **Man Group** note that: ‘there is a risk that key individuals leave the business resulting in a loss of knowledge or expertise’.

For the *supplier information* category, the most common expression in the reports was where the supplier’s knowledge of the surveyed company from providing a particular service led the surveyed company to use them for another type of service. **Compass Group**, for example, note that their ‘external auditors undertake some due diligence reviews and provide assistance on tax matters given their in-depth knowledge of the Group’s business’.

Companies had specific strategies with regard to supplier information. **AstraZeneca** note ‘the development and implementation of an information strategy that best enables the delivery of supply chain excellence’, while **Tesco** ‘take a partnership approach to working with suppliers – sharing our knowledge and listening to suppliers’ feedback’.

Capita take this characterisation of supplier details a step further: ‘we maintain a comprehensive database of all suppliers, segregated by supplier type and product/service category ensuring that client requirements for supplier information can be readily provided’.

5. A financial value for information

Given that accounting rules, as noted above, make it very difficult for companies to put monetary value on their information assets, with the exception of those companies that sell information, it was not expected that any companies would put information or knowledge on the balance sheet, despite the fact that nearly half of the companies surveyed specifically said that information or knowledge was important to them.

Nevertheless, some reports did give some indication of the financial value of information assets, though often in an oblique manner. It is also likely that the figures are somewhat subjective, as Wilson and Stenson argue [16].

3i, a private equity company, discuss the return on investment from the companies they have invested in the financial year. In two instances, they note that their ‘knowledge’ was a key factor in the investment:

Several companies noted the cost of obtaining information and knowledge, through research, and through direct purchase of information resources. **Associated British Foods**, noted that ‘expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised as an expense in the income statement as incurred’. The mining company **Kazakhmys** reported that:

\$35.4 million (2006: \$8.6 million) was capitalised by the Group in respect of contractual reimbursements to the Government for geological information and social commitments. These latter amounts are non-cash items and are recorded within provisions for payments of licences.

Goodwill is perhaps the most interesting of the attempts to put a monetary value on information and knowledge, representing the portion of the price paid for the company that is over and above the acquired company's identifiable assets.

AstraZeneca acquired another company during the course of the year and attribute part of the goodwill to knowledge:

In most business acquisitions, there is a part of the cost that is not capable of being attributed in accounting terms to identifiable assets and liabilities acquired and is therefore recognised as goodwill. In the case of the acquisition of MedImmune, this goodwill is underpinned by a number of elements [including] the core technological capabilities and knowledge base of the company.

First Choice Holidays (now TUI) note that:

a consistent process is undertaken at each acquisition to identify the fair value of separable assets and liabilities acquired, including the fair value of intangible assets, being brands, order books and customer databases. The residual goodwill on acquisition represents the value of assets and earnings that do not form separable assets under IFRS3 but nevertheless are expected to contribute to the future results of the Group.

At 31 October 2006, the residual goodwill represents mainly:

Market knowledge of particular geographic areas such as the Americas and the Far East.

Knowledge of particular market segments, for example escorted tours.

Involvement of existing management and employees and transfer of their knowledge of the operation of the business model.

Integration synergies, particularly cost optimisation in our yacht holidays businesses.

The ability to sell acquired product through existing channels and existing product through acquired channels.

Knowledge here clearly forms a large part of residual goodwill, the amount of which is £641.7m.

It is tempting to use the figures identified above to state what, on average, a FTSE 100 company spends on information and knowledge/has information assets worth/makes from their information assets. But these figures would be guesstimates at best, and it could be argued the figures involved speak for themselves. It is clear that information and knowledge is worth millions of pounds to FTSE 100 companies.

It is, of course, a very different matter when a company makes a substantial amount, perhaps all, of its income from selling information products. The study identified six such companies in the FTSE 100 [18]. However, this leads to factors specific to the information industry, which is not the focus of this study.

6. Conclusions

This study shows that information and knowledge are discussed in various contexts in the annual reports of FTSE 100 companies. The companies analysed either make explicit or strongly imply the importance of

information and knowledge to their business. This is usually achieved through discussion of the role of information or knowledge in the text of the annual report, although there was evidence from some companies of a desire to put a monetary value on information assets, despite the difficulties of doing so using traditional accounting methods. A particularly popular way of assigning a value to information assets was through goodwill and this area would merit further research.

Even where the importance of information and knowledge was not made explicit, a close reading of the accounts revealed the links between successful performance and effective use of information assets. Furthermore, the textual analysis techniques revealed that information, especially, is prominent in the language of the sample companies. It was suggested that this reflected information's prominence in the 'psychology' of these companies.

The analyses revealed some surprising findings: firstly, that knowledge was not nearly so prominent as information in the language that companies use; and secondly, that information and knowledge did not seem to be 'linked' in the psychology of these companies.

Given the number of companies that mentioned knowledge management initiatives identified by the qualitative analysis, the first point is unlikely to represent a lack of interest in knowledge. It is more likely that knowledge is discussed in different terms, such as 'know-how', 'learning', 'skills' and so on.

Arguably, the second point could represent the distance that has grown (and been promoted, from some quarters), between information management and knowledge management.

Research into those sectors in which the terms 'information' and 'knowledge' ranked highest in the concordances revealed some interesting trends. The high rankings of sectors such as Pharmaceuticals & Biotechnology, Software & Computer Services and Mining were unsurprising, but a low ranking for financial services companies across both information and knowledge rankings was unexpected.

The main findings from textual analysis of the different categories of information assets was that each category was strongly in evidence in the annual reports, and the use of each category of asset was linked by the company to improved performance.

This study's quantitative analysis confirmed links between certain types of information assets that were proposed by Oppenheim, Stenson and Wilson [4, 12]. Management Information, Business Processes, and Legal and Regulatory Information were the most-discussed types of information assets due to the nature of the annual reports themselves. Further consideration of annual reports as an information product could merit future research, complementing other approaches to the estimation of the value of information, such as those of Sakalaki and Kazi [27].

The definition and categorisation of information assets provided by Oppenheim, Stenson and Wilson proved a useful framework for searches through annual reports and was effective in comparing a wide range of companies. It would seem to be a valid description of the various attributes of information as an asset, and valuable for use in further research.

Whether information and knowledge are the 'most important' assets that companies possess it is impossible to say. The popularity of such claims perhaps stems from the fact that they can be neither proved nor refuted. It is hoped, however, that this study's empirical analysis of the FTSE 100's annual reports has gone some way towards showing the importance these companies place on information and knowledge when communicating to their shareholders.

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8. APPENDIX A

Annual reports analysed

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