AN ANALYSIS OF THE ANTICIPATED CULTURAL IMPACTS OF THE IMPLEMEMENTATION OF DATA WAREHOUSES

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Potential Usefulness of Paper: The results of this study provide many illuminating insights into the relationship between information, information technology and organisational culture, which have important implications for the management of IT projects. More specifically, it has been demonstrated that realising the benefits of an IT project, especially in areas such as customer service, empowerment and flexibility, might require changes to working practices and employee behaviour, which can in turn have significant cultural implications.

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Key Words: Organisational culture; information flows; data warehouses; interpretative study.

Abstract: *The implementation of information systems is increasingly resulting in significant impacts upon the host organisation's culture. This study seeks to explore how major changes to the flow and quality of information, engendered through the implementation of data warehouses, are likely to impact upon organisational culture, amongst a sample of large UK-based enterprises. An analysis of these cases suggest that improvements to the flow of information may have the potential to modify organisational culture, particularly in the areas of customer service, flexibility, integration and empowerment. Moreover, a modified version of the 'competing values' framework [Quinn & Rohrbaugh, 1983] is then used as a mechanism for exploring and discussing the implications of such IT-induced cultural changes. The paper concludes with a word of warning that information technology rarely delivers a quick fix, and that the realisation of benefits and the management of cultural change are a long-term and potentially difficult undertaking.*

1. INTRODUCTION

One arena, in which the dictum *'there is nothing constant but change*' is particularly pertinent, is within the organisational environment. A key driver of this unrelenting change is the application of information technologies and systems. Information technology is now a ubiquitous and increasingly critical part of the fabric of the modern organisation, supporting its day to day operations and all aspects of the decision-making process, as well as its strategic positioning. It is therefore not perhaps surprising that technology and information systems have already had a marked impact on the ways in which work is organised, allocated and ultimately accomplished, and in so doing the behaviour of individual members of staff. Moreover, it has been recognised that, in certain circumstances, the introduction of information technology might modify an organisation's culture [Butterfield & Pendegraft, 1996; Pliskin *et al,* 1993; Walton, 1989; Doherty & Perry, 2001].

Previous research in this area has generally focussed upon the dangers of IT-induced cultural change and warned that organisations should avoid IT projects where there is an identifiable mismatch between a proposed system and the organisational culture [Pliskin *et*

al, 1993; Cooper, 1994]. However, many companies are having to respond to the demands of their markets by contemplating and ultimately implementing systems that will induce cultural change [Doherty & Perry, 2001]. One increasingly popular technology that is likely to induce significant cultural impact is the data-warehouse. The aim, therefore, of the research reported in this paper is to investigate the extent to which it is anticipated that changes in the flow of information, facilitated by the introduction of data warehouses, will engender cultural change. The following section reviews the relevant literature, before the research method is discussed in section three. The research results are presented in the fourth section and their importance and implications are assessed in the final sections.

2. LITERATURE REVIEW

The aim of this section is to present a critical discussion of some of the key themes in the organisational culture literature, before reviewing the published contributions addressing the role of information technology in cultural change.

2.1 The nature of Organisational Culture

Academics typically define organisational culture in terms of the way people think, which has a direct influence on the ways in which they behave. For example, Sathe [1985] describes culture in terms of shared and relatively stable assumptions, beliefs and values that exist within an organisation. Similarly, whilst Schein [1992: xv] recognises that culture '*manifests itself in terms of behaviour and espoused values*', he suggests that the essence of culture lies in the set of '*underlying assumptions*'. Indeed, he [1992: 17] suggests that organisational culture can be conceptualised as a complex, three level phenomenon: at the shallowest, and most easily observable, level are '*artifacts*' [*organisational processes*' and '*visible behaviour*']; the middle layer is composed of '*espoused values*'; whilst the deepest level represents '*basic assumptions*'. Finally, in terms of definitions, Hofstede [1997: 183] notes that in the organisational context, '*shared perceptions of daily practices'* [symbols, heroes and rituals] are also at the core of an organisation's culture.

In addition to recognising that culture is composed of shared valued and practices within an organisation, many researchers believe that there are important consistencies across cultures [Cooper, 1994]. They have, therefore, found that it is helpful to their studies to sub-divide organisational culture into a number of distinct '*dimensions*' [Schein, 1992: 49] that measure the ways that culture is typically manifested in the organisational environment. Indeed, Ashkanasy et al [2000; 131-132] have identified 18 distinct studies which utilise '*multidimensional, descriptive measures of organisational culture*', whilst Wilderom et al [2000] have identified a further ten studies which attempt to link key dimensions of culture with organisational performance. The following discussion identifies and reviews four important dimensions of culture, that are frequently mentioned in the literature, and that are of particular importance to this research study[1]:

[1] Further discussion of why these particular dimensions were selected, and formal definitions of each, are presented in section 3.1.

- **Customer service:** Morgan [1998; 142] notes that one of the areas in which many organisations have sought to '*create a cultural change*' is with respect to '*customer service*'. Hofstede [1997; 191] also recognises that the degree to which organisations adopt a *'customer orientation*' is a key dimension of corporate culture; *pragmatic* organisations focus externally upon '*meeting the customers' needs*', whereas *normative* companies are more concerned with '*correctly following organisational procedures*'.

- **Flexibility:** Major [2000; 356] notes, that in the '*high performance culture*' there will be an expectation that employees will '*respond with flexibility*' to changing circumstances. Indeed, one of the most important dimensions of culture, as used in studies of the link between culture and performance, is the degree to which the organisation's culture is flexible or adaptable [Wilderom et al, 2000].

- **Empowerment:** Morgan [1998; 144] suggest that another area where organisations may be seeking to '*create a cultural change*' is with regard to the '*empowerment of staff*'. Similarly, Pliskin et al [1993] suggest that a culture can be characterised in terms of shared '*beliefs and values concerning the importance of delegating responsibility for decisions*'.

- **Integration:** The degree to which the organisation favours co-operation between well-integrated sub-units, as opposed to competition between well bounded functional units is another important dimension of culture [Pliskin et al, 1993]. As such, integration is closely linked to other dimensions of culture, such as '*team-working*' and '*information sharing*' [Major, 2000: 356].

Many academics have been interested in the ways that dimensions might interact. For example, the '*competing values*' framework [Quinn & Rohrbaugh, 1983], which is a two dimensional model of organisational effectiveness based upon an organisation's tendency towards flexibility or order, and internal or external focus, has been used by Cooper [1994] to interpret the likely impact of IT-induced cultural changes. A modified version of this framework is used later to contextualise the results of this research (see figure 1).

Much of the interest in the dimensions of culture, whether practitioner focused or research-oriented, has come from interest in the potential link between culture, and in particular strong cultures, and organisational performance.

2.2 The relationship between cultural strength and organisational performance

The interest in organisational culture was greatly stimulated at the beginning of the 1980s by management writers, such as Peters and Waterman [1982] and Ouchi [1981] who vigorously promoted the idea of developing a '*strong'* corporate culture, as a mechanism for improving organisational effectiveness and ultimately financial performance. Indeed, Barley & Kunda [1993] noted the common currency of this idea, in their analysis of the '*management discourse*' on organisational culture, over the past twenty years. More specifically, they found that the '*rhetoric*' on organisational culture: emphasised the importance of '*strong*' cultures, which are characterised by a high degree of '*unity*' and '*loyalty*', with its advocates making '*vague promises*' that such cultures would result in '*some form of economic advantage*'.

However, there are many that argue that there are serious weaknesses in the '*rhetoric*' of '*strong culture*'. For example, Saffold [1988] notes that the '*single unitary organisational culture*', emphasised in the strong culture studies, is the exception in practice where '*multiple subcultures appear to be the rule*'. This view is supported by Morgan [1998; 129] who notes that the '*influence of a host culture is rarely uniform*'. Moreover, the link to improved performance was also refuted. For example, Schein [1992] argues forcefully that a '*strong*' culture is not better, and further that there is no preferred type of culture. Saffold [1988] suggests that many studies are based upon '*overly simplistic concepts of the relationship between culture and performance*', whilst Wilderom et al [2000] also question the validity of much of the existing '*culture as a predictor of performance research*'. However, the interest in culture and performance has stimulated a significant level of interest in the potential for managing cultural change.

2.3 The Potential for Managing Cultural Change

Barley & Kunda [1993; 383] have noted that a further important tenet of the '*rhetoric*' of organisational culture is the notion that *'cultures can be consciously designed and manipulated*'. However, there is a very keen debate about the potential for effectively managing cultural change [Hofstede, 1997; 180]. On the one side of the debate we have authors who, whilst recognising that culture is difficult to change, have proposed strategies to facilitate the process [e.g. Sathe & Davidson, 2000; Williams et al; 1990]. By contrast, there is also a strong body of opinion that believes organisational culture to be persistent and relatively unchanging, even over relatively long periods [e.g. Pettigrew, 1979; Willmott, 1993]. As Morgan [1998; 150] warns, whilst managers may be able to '*foster desired values, they can never control culture in the sense that many management writers advocate*'. In a similar vein, Willmott [1993;521] warns of the dangers inherent in the common management perception '*of culture as a manipulable variable for gaining competitive advantage'*, and Coombs et al [1992:59] view culture as the *'root metaphor for organisational analysis*', rather than an object which can be '*isolated, measured and manipulated*'.

Whilst there is a growing debate as to whether culture can be consciously and objectively managed, there is a growing body of literature that acknowledges that the introduction of new technologies might have a significant impact upon organisational culture.

2.4 The Cultural Impact of Information Technologies

Because information technology plays an evermore significant role in the operations and strategic direction of an organisation, there is growing evidence that it is exerting an increasingly strong impact on the organisational design [Doherty & King, 2001]. In particular, there is currently much interest in the impact that information technologies might have on organisational culture. On one side of the debate we have researchers who believe that IT has a role to play in facilitating planned changes to organisational culture. For example, Walton [1989] suggests that IT has '*dual potentialities*'; it can either *'reinforce a control / compliance orientation'* or it can *'facilitate a move towards a commitment-oriented organisation'*. Moreover, Doherty and Perry [2001] present evidence that suggests that the

introduction of workflow management systems might have a positive role to play in facilitating culture change, with respect to dimensions of culture, such as the degree of '*flexibility*' or '*customer service*'.

By contrast, there are researchers who suggest that as culture is persistent, problems may occur when implementing systems where the assumptions about organisational culture built into an information system are at odds with the actual culture of the host organisation [Pliskin, *et al,* 1993]. This view is supported by Martinsons and Chong [1999: 124] who note that '*even good technology can be sabotaged if it is perceived to interfere with the established social network*'. These findings are also supported by Cooper [1994] who suggests that when IT conflicts with an organisation's culture, the implementation will be resisted in one of two ways; either the system will be rejected or it will be modified so that it matches the existing culture. This puts the systems developer in something of a '*catch 22*' situation in that IT is increasingly likely to precipitate cultural change, but this may in turn increase the chances of a problematic implementation or even outright rejection of the system.

Despite the growing recognition of the cultural impact of information technology, very few empirical studies have been conducted that systematically explore the role of information technology, and in particular, the role of information [Coombs et al, 1992], in cultural change.

3 RESEARCH APROACH

Having identified the need for further empirical studies of the relationship between organisational culture and the implementation of information technology we initiated a study with the broad objective of exploring the anticipated cultural impacts of changes in the flow of information, following the implementation of data warehouses. Consequently, we needed to gain in-depth knowledge, based upon the views of the stakeholders, of the broad drivers, as well as the specific requirements, for data warehouse projects, within large UK-based organisations. Moreover, we needed to relate these findings to the existing theory on organisational culture so that we could determine the areas of organisational culture that were most likely to be impacted by the changes to the flow of information. For example, it was envisaged that modifications to the flow and quality of information with regard to customer behaviour might impact on the levels of customer service. Similarly, it was anticipated that changes to the flow of information between and within functions might have implications for the degree of integration and / or the level of empowerment. Finally, we needed to explore whether the host organisations were initiating any complementary strategies, in addition to the introduction of technology that might facilitate cultural change. In terms of its philosophical perspective, this empirical study can be broadly categorised as 'interpretive' as our aim was to gain '*knowledge of reality*' through the study of social constructions, in particular, language and documents [Klein & Myers, 1999]. The principle aims of the research were therefore to '*generate relevant theoretical insights that might be useful in understanding similar and related organisational situations*' [Prasad, 1993; 1405], rather than providing '*universalistic predictions and explanations about organisations*'. The

aim of the remainder of this section is to review the overall research design, describe the targeting and execution of the case studies and then review data analysis strategy.

3.1 Research Design

A multiple case study approach was adopted [Walsham, 1995], to gain the necessary in-depth interpretations of the anticipated impacts of data warehouses. This has been defined as '*an empirical enquiry that investigates a contemporary phenomenon within its real life context*', which '*relies on multiple sources of evidence*' [Yin, 1994: 13]. Such an approach was considered ideal for studying whether changes in the flow of information were likely to engender cultural changes, *in situ*, within a variety of large and highly sophisticated commercial organisations.

The detailed design of the research strategy was very strongly influenced by the fact that one member of the research team was employed in the role of '*Principal Business Analyst*', for a large information technology firm. More specifically, he was heavily involved in the development and implementation of data warehouse systems, for a wide variety of commercial clients. In this position he had unrestricted access to a wide variety of relevant information and key personnel, within a variety of systems development projects, each of which would make a highly appropriate case study. Consequently, he was able to gain unique insights into this increasingly important phenomenon. The research approach adopted was, however, more akin to '*participant observation*', than '*action research*', as the aim of the study was to objectively assess, rather than proactively influence, the cultural impacts resulting from the implementation of data warehouses..

3.2 Case Study Targeting and Execution

The '*principal business analyst*' was heavily involved in eight major data warehousing projects, over a five-year period. In each case, the aim of the project was to significantly improve the quality, flow and availability of information, within the host organisation. The analyst was assigned to each project for a minimum of three months, in which time he worked at the client's site, interacted with key personnel and had access to project documents; this gave him ample opportunity to collect relevant evidence. Consequently, each of the case studies was chosen on the basis of convenience, rather than more objective criteria. However, as each of the case study organisations was a large, highly sophisticated, UK-based public limited company, they constituted a sufficiently homogeneous group to allow meaningful comparisons and contrasts to be made. More specifically the case study organisations were a clearing bank, a commercial bank, a retailer, a car manufacturer and four insurance companies that are labelled 'A' - 'D' in the remainder of the paper. Klein & Myers [1999] argue that it is important that when conducting interpretive field studies, the subject matter be set in its social and historical context. To this end profiles of each of the eight case study organisations have been presented in table 1.

Table 1: Case Study Organisation Profiles

Case	Size / areas of business	Strategies and Challenges	Interviews: nos. / types
Clearing Bank	**Size:** Large, National **Business:** retail banking; credit cards; mortgages; Insurance	An established clearing bank that was undertaking a number of major changes to compete in a rapidly changing market place. A fuller discussion of its strategies can be found in section 4.6.	**4:** system architect; strategic analysis manager; finance manager; strategy consultant
Retailer	**Size:** Large, International **Business:** clothing; food; financial services	A well established national retailer that had an international presence but could not be considered to be a truly multi-national organisation. See also section 4.6.	**5:** system architect; business manager; 3 information analysts
Insurance Company 'A'	**Size:** medium, national **Business:** motor / household insurance	This firm was a UK subsidiary of a large European insurer but it operated autonomously. See also section 4.6.	**4**: IT director; underwriting manager; underwriting director; business manager
Insurance Company 'B'	**Size:** large, national **Business:** life assurance; general insurance; financial services	This firm had recently been acquired by a large global insurer but still operated as an independent business unit in the UK. See also section 4.6.	**5:** strategy director; corporate performance manager; training manager; HR manager; marketing manager
Commer-cial Bank	**Size:** medium, national **Business:** personal loans; insurance; mortgages	This firm was a subsidiary of a UK clearing bank but it operated as an independent business unit. It was a very successful organisation that was in a leading position in a number of the markets it operated in. It operated a very successful tele-sales operation on behalf of its many business partners.	**5:** system architect; marketing analyst; database administrator; information analyst; marketing manager
Insurance Company 'C'	**Size:** large; international **Business:** life assurance; general insurance; financial service	This large insurance company had an international presence that was rapidly being developed into a global brand. This brought many challenges. Traditionally the firm had allowed its subsidiaries to operate with a great deal of independence. This was changing, and it was creating a significant challenge for the management of the organisation.	**5:** IT strategy manager; underwriting manager; group executive; information manager; HR manager
Car maker	**Size:** large, international **Business:** Car / truck manufacturing; financial services	A significant global car manufacturer. This firm was continually seeking to identify ways of gaining competitive advantage. A number of strategies were being implemented, with a particular emphasis on reducing the time to deliver a car.	**4:** project director; marketing analyst; system architect; optimisation consultant
Insurance Company 'D'	**Size:** large, national **Business:** life assurance; general insurance; financial service	This firm was the UK subsidiary of a large global insurer but it operated with a great deal of independence. It had a leading position in a number of markets and its main strategy was to consolidate its position. These included the launch of a direct insurance business and the adoption of a more customer-centric focus.	**5:** IS director; business analyst; system architect; information architect; IT strategy consultant

When conducting a case study, Darke et al [1998] suggests that data should be collected in a variety of ways, including '*formal interviews, questionnaires, observation, and document*

analysis', so that the findings can be triangulated. As with other '*interpretive*' case studies [e.g. Prassad, 1993; Walsham & Sahsay, 1999] this study sought to use a variety of data collection methods, but avoided the use of formal surveys. More specifically, when working on each case study site, the following data collection techniques were employed:

- **Interviews:** A variety of stakeholders were interviewed in each case study organisation, including system developers, business managers and very senior executives. Depending on the circumstances, these interviews ranged from highly structured and formal interviews through to less formal discussions.
- **Document reviews:** The principal researcher had access to a wide variety of documents, including IT, marketing and corporate strategy reports, staff communication documents and detailed design documents.
- **Observation:** Being an active participant in each project, the principal researcher was able to observe their day to day execution at very close quarters, including participation in the vast majority of important project meetings.

A series of note-books were compiled to ensure that a complete, coherent and contemporaneous set of evidence was captured. Furthermore, the advise of Nandhakumar & Jones [1997: 118] was followed and time was set aside to periodically '*step back from the research context*', to write-up key findings and objectively review them with the other researchers.

3.3 Data Analysis Strategy

The '*QSR NUD*IST Vivo*' [Nvivo] software was chosen to manage and analyse the qualitative data, as it provides a range of tools for handling rich data records, for browsing and enriching text, coding it visually, and for grouping the data records by many categories. The source data to be analysed, for each case study, comprised a selection of notebooks, formal business documents and the verbatim transcripts from interviews. All this data was entered into the (Nvivo) software, which was then used to code of all the source documents and the retrieve data from them. Codes were created and applied for all potential areas of cultural impact, so that it was simple to collate evidence about a specific aspect of cultural change. For example, codes were used to highlight and then collate signs of cultural change in a wide variety of areas, including all those dimensions used in studies by Pliskin et al [1993] and Doherty & Perry [2001]. However, this paper focuses on just those four cultural dimensions, as presented and defined in table 2, where the potential impact was anticipated to be the most significant.

Table 2: Dimensions of Organisational Culture

Dimension	Definition	Key References
Customer service	The degree to which an organisation collectively adopts an **external customer orientation**, as opposed to an **internal process orientation**.	[Cooper, 1994]; [Hofstede, 1997: 191]
Flexibility	The extent to which an organisation is predisposed to **adaptation** in the response to changing circumstances in preference to favouring **stability** and settled order, whenever possible.	[Cooper, 1994]; Major [2002]
Empowerment	The degree to which decision-making is **delegated** to individual employees, in preference to **centralising** it within a group of key managers.	[Pliskin *et al,* 1993]; [Morgan; 1998: 144]
Integration	The extent that an organisation favours **co-operation** between well-integrated sub-units, rather than **competition** between well bounded functional units.	[Pliskin *et al,* 1993];

Having coded the data, the next stage of the qualitative data analysis was to create '*within-case*' displays, using the '*ladder of analytical abstraction*' approach [Miles and Huberman, 1994; p 92]. More specifically, '*check-list matrices*' and a '*thematic conceptual matrix*' were created for each case study organisation. Having organised and summarised the data, at the case level, it was then possible to embark upon the '*cross case*' analysis, the key component of which was the creation of '*thematic conceptual matrices'* [Miles and Huberman, 1994; p 131]. The literature suggests two generic approaches to cross-case analysis; firstly the variable-oriented approach [Runkel, 1990], and secondly the case-orientated approach [e.g. Ragin, 1987]. The analysis presented in this paper firstly uses a variable-oriented approach to present each of the four critical dimensions of culture, before using the case-oriented approach to compare and contrast the experiences of different case study organisations.

4 RESEARCH FINDINGS

The aim of this section is to provide an overview of the findings, before reviewing, in greater detail, the evidence of anticipated cultural changes. The section concludes with a cross case analysis that compares and contrasts the situation in organisations where substantial and limited cultural change is anticipated.

4.1 Overview of findings

For each case study organisation, it was possible to use the collected evidence, with respect to each of the four cultural dimensions, to evaluate the extent of the cultural impact, using a four point scale: highly significant, significant, moderate and none [see table 3]. The assessment of the level of impact was based upon:

1. **Current experiences:** the degree to which the case study organisation has been experiencing problems with the flow of information which had inhibited their ability to make cultural changes;

2. **Desired outcomes:** The extent to which the data warehousing projects have explicitly been used to modify information flows in areas that are likely to engender cultural change.

The analytical exercise considered current experiences and desired outcomes in tandem, as organisations who were experiencing very significant informational problems, in one particular area, typically used the data warehouse implementation to explicitly attempt to remedy the situation. For example, the **clearing bank** had evolved a very internally focussed, process-oriented culture and had not typically concerned itself with collecting high quality customer-related information. It had recognised that, in an increasingly competitive environment, this was impeding its ability to deliver appropriate levels of customer service. It was explicitly using the data-warehousing project to deliver a more detailed picture of its customers, which was a highly important part of its wider plan to deliver higher levels of customer service. Therefore, in the case of the **clearing bank,** it was anticipated that there would be a significant cultural change, with respect to customer service.

Table 3: The Anticipated Significance of Cultural Change within Case Study Organisations

Case	Customer Service	Flexibility	Empowerment	Integration
Clearing Bank	***	***	***	*
Retailer	*			***
Insurance Co. 'A'	*	*		
Insurance Co. 'B'	**	***	***	***
Commercial Bank	***		*	
Insurance Co. 'C'	***	**	*	***
Car Manufacturer	*	***		**
Insurance Co. 'D'	***		**	

Key : * highly significant impact**; ** ** significant impact**; * ** moderate impact

Whilst the assessment of the significance of the impacts was somewhat subjective, it is based upon a rich variety of qualitative evidence, which is summarised, for each of the four cultural dimensions, in the following sections.

4.2 Customer Service

It can be seen from table 3 that the most widespread cultural change, being facilitated through the wider availability and quality of information, relates to the enhancement of '*customer service*'. Most of the organisations had explicitly recognised that their ambitions to provide higher levels of customer service were greatly hampered by the absence of high quality, customer-focussed information. For example, at the **commercial bank** it was observed that: '*there was a serious lack of consolidated information on the customers and it was recognised that this was an area where significant improvement was required*' [Notebook

(NBk)]. A similar trend was noted at the **clearing bank**; *'the lack of consistent customer information is a classic example of a problem that has affected this Bank just as it has affected most financial services organisations* [NBk]*.* All eight of the organisations studied had, to a greater or lesser extent, experienced problems in this area.

Consequently, one of the major drivers for the majority of data warehousing projects had been the expectation that its implementation would facilitate a more customer centric organisation. The underlying logic for this was articulated in a **commercial bank** document, which can be summarised as the provision of the right information would improve the understanding of customer behaviour, which would facilitate the tailoring of products and the provision of a more effective and focussed service. Ultimately, this '*would result in better long-term customer relationships, which would help to increase the profitability of the bank's long-term strategy*' [NBk]. Similarly, at **insurance company 'D',** it was anticipated that the availability of high quality information would leverage *'lasting relationships that are managed proactively',* with customer contact and service being delivered *'in the manner most suited to the customer's individual needs'* [document: information strategy]. The ambitions of **insurance company 'B'** were perhaps even wider. Not only did they explicitly seek to '*manage and satisfy each customer's needs as an integrated whole*', but they also wanted to discover how positive relationships with existing clients were being '*translated into referrals to family and friends*' [document: feasibility report].

The view that the creation of the customer-centric organisation was predicated upon changes in employee behaviour and ultimately organisational culture, in addition to enhanced information provision, was most explicitly articulated at the **clearing bank**. The following quotes, which come from internal communications addressed to the staff of the bank, indicate the importance they attached to making high quality customer service being the responsibility of all members of staff:

> '*We are developing a co-ordinated programme for customer retention. This involves more than just new products and incentives. It includes measurement of customer and product profitability, and identification of the profitable and non-profitable types of customer. Together with excellent service quality – which is where you have such an important part to play – we will retain and sell more to our profitable customers*' [staff newsletter].

> '*The importance of Customer Focus has been emphasised, and we have looked at how we will have to change to meet the present and future needs of our customers. But none of this can happen without your full support. We can provide the necessary training but you have to want to learn and develop. All of us need to work together and in the same direction'* [staff newsletter].

4.3 Flexibility

A second dimension of organisational culture where a number of the organisations were planning to engender change was the 'focus on flexibility'. Four of the organisations envisaged that the introduction of data warehousing technology would have a significant or a

highly significant impact on their flexibility. Many organisations recognised that their flexibility was greatly inhibited by the lack of appropriate information. At the **retailer**, the systems architect noted that '*being able to obtain the right information and providing the right infrastructure takes time.* The situation at **insurance company 'A'** was summed up by the underwriting manager as being '*managers cannot really understand the business ... currently there is a complete lack of flexibility*'. It was believed that information had a critical role to play in the facilitation of the flexible organisation.

The systems architect, at the **clearing bank,** noted that '*with the right information the bank should be able to spot opportunities and act proactively*'. Similarly, at the **car manufacturer** it was stated that '*good quality information was required to improve the performance of key processes and to achieve nimbleness*' [tender document]. Whilst in **insurance company 'B'** it was recognised that *'making consistent information widely available to support quality business decision making would be key to achieving flexibility*. [feasibility report]. In terms of the rationale for achieving flexibility, **insurance company 'B'** it was articulated that *'more flexibility was required, as the insurer and its products needed to be flexible enough to respond to changing customer needs*'. [corporate strategy]. The **car manufacturer's** drive towards flexibility was motivated by a desire to significantly reduce the time between a customer ordering a vehicle and the vehicle being delivered. It was noted that '*nimbleness is about having processes that improve our understanding of the consumer, support fast decision-making, reduced time to market, reduce costs and improved quality*'. [internal report]. Once more it was recognised that the objective of becoming more flexible would not be attained through the provision of information alone, but would also require a cultural change. As feedback to the staff at the **clearing bank** noted: '*it requires everyone to co-operate and learn new flexible ways of working*'. [staff newsletter].

4.4 Empowerment

A further cultural change being facilitated through the wider availability and higher quality of data was staff empowerment. Two of the eight case study companies, namely the **clearing bank** and **insurance company 'B'**, were explicitly using the introduction of data warehouses to empower their staff. For example, at the **clearing bank** it had been recognised that to achieve its vision '*every opportunity must be taken to fulfil personal potential*'. [corporate vision]. The primary way that this would be achieved was through the wider availability of information; '*the people who require the information and who understand the information will be able to access it without any intermediaries*'. [system specification]. The increased accessibility of information would facilitate the '*delegation of decision-making to all levels in the organisation*' [system specification].

Similarly, the key principle, at **insurance company 'B',** was that '*information should be regarded as a critical shared asset of the business and it should be made available for use across the whole organisation*' [internal report]. Moreover, it was recognised that:

> *'providing the right information at the right levels within the organisation would be vital to empower staff in operational process roles such that cycle times*

and the need for management and supervisory intervention could be minimised' [feasibility report].

It was envisaged that empowerment would be of particular importance for staff who dealt directly with the customers and the aim was to redesign processes *'to bring all activities closer to the customer and empower customer facing personnel'* [internal report]. Whilst high levels of empowerment was less of an explicit concern in other case study companies, a key philosophy of **insurance company 'D'** was to *'think globally, yet act locally'* [internal report].

Once more, it was recognised that empowerment would only be achieved if there were a wider cultural change to accompany changes in the flow of information. In the case of **insurance company 'B'** it was envisaged that this might best be achieved through communication, where '*internal communications vehicles, such as the in-house newspaper, videos and project focussed newsletters have been used extensively to communicate the change programme to staff*' [internal report].

4.5 Integration

The final dimension of organisational culture, to be considered, in detail, is 'integration'. In four of the case study organisations, significant problems were being experienced with information being '*locked within*' departmental systems. This limited the flow of information between functional areas, and made internal integration and inter-departmental co-operation difficult to achieve. For example, at the **retailer,** it was noted that '*data is available on a departmental basis, but a corporate view is unavailable*' [NBk], with the consequence that '*cross-functional co-operation is difficult to achieve*' [Interview: IT architect]. Similarly, the **car manufacturer's** attempts to stream-line its production processes had been greatly hindered as a result of critical information being trapped in '*twenty different sources*', between which there was little '*compatibility or co-operation*' [NBk].

In the case of **insurance companies 'B'**, it was envisaged that the introduction of the data warehouse would improve the flow of information between business functions. Consequently, it would act as a catalyst to break down internal barriers and in so doing increase the level of integration and inter-departmental co-operation. More specifically, it was attempting to implement end-to-end business processes to ensure that the organisation, people and information systems are all well aligned, so that '*the company would operate as a single business system*' [corporate strategy]. The data warehouse was, therefore, designed to ensure that information is *'made available for use across the whole organisation and not exclusively to any one business unit*' [information principles]. It was envisaged that this would facilitate the '*unlocking of corporate information, by providing new and company-wide perspectives*', which would '*improve the quality of decision-making*' [feasibility report].

I**nsurance company 'C'** also anticipated that the introduction of a well designed data warehouse would improve the degree of inter-departmental co-operation by removing '*the barriers between underwriters, actuaries, claims handlers, and loss adjusters*' [corporate

strategy]. In so-doing, it was recognised that this would facilitate '*sharing information across the different company territories, and in particular, sharing information related to underwriting practices and experiences, and for sharing risk on a world-wide basis'* [NBk]. The **retailer** was perhaps attempting to move further than either of the two insurance companies by removing external, as well as internal, barriers to improve the performance of its entire supply chain, from supplier through to customer.

Whilst in all these cases, the data warehousing project was undoubtedly viewed as an important catalyst for improving inter-departmental co-operation, the development teams were not deluding themselves that technology, alone, could provide a complete solution to their integration problems. For example, the **car manufacturer** and **insurance company 'B'** had both initiated significant organisational re-structuring and business process re-engineering initiatives to complement their IT investments.

4.6 Results of Cross Case Analysis

This section uses a case-oriented approach to qualitative analysis [Ragin, 1987] to compare and contrast the experiences of the two organisations where the introduction of data-warehouses is likely to engender the most significant cultural change, with the two organisations where the culture is least likely to be affected. The following analysis suggests that the **clearing bank** and **insurance company 'B'** were likely to experience the most significant cultural change once their data warehouses became operational:

> **Clearing Bank:** The clearing bank was a well established conservative bank that was extremely stable and staid. Control was centralised and processes were established and adhered to. Change had always been gradual and evolutionary, keeping in step with market practices. However, the bank was attempting to respond to the rapidly changing marketplace and external forces in general. The data-warehousing project was being used to make the bank much more customer focused and it was attempting to develop and target products based on customer needs. It recognised that the goal of delivering higher quality customer service *'requires everyone to co-operate and learn new and flexible ways of working*' [staff newsletter] and to '*delegate decision-making to all levels within the organisation*' [system specification]. Training programmes were being developed to assist with this transition, communication to staff on the progress of change was regular, and feedback was encouraged. It was attempting to embrace new working practices, new sales channels, and new technology. Consequently, in the case of the bank, an external orientation, in terms of customer focus and customer service, empowerment and flexibility were seen as going hand in hand.

> **Insurance Company 'B':** This was a very conservative and secure organisation that was renowned for its stability. Control was centralised even although it had an extensive branch network. It had a very paternalistic culture where staff considered their employment with the firm to be for life; it had a very low staff turnover rate. The insurer had seen its market share gradually decline over many years but it had still managed to maintain its profitability. The bulk of its revenues and profit came from its investments

rather than its premium income. New products were rare as was entry into new markets. Having recently been taken over, the major objective of the firm was to grow market share. It set about achieving this by a change programme that addressed organisational and cultural issues. A better understanding of the external environment and in particular a stronger customer-focus was needed. Much more flexibility was required as was the need to develop staff potential; '*a key objective was to deliver in a flexible and convenient fashion high quality business information to all the insurers staff, agents and managers who need it, regardless of their level of computer literacy*' [feasibility report]. For insurance company 'B', the data-warehousing implementation was therefore an integral part of a wider change programme designed to facilitate higher levels of customer service, flexibility and empowerment.

By contrast, it can be seen from the following discussion that it was envisaged that the cultures of the **retailer** and **insurance company 'A'** would remain largely unaffected by the implementation of their data warehouses:

Retailer: The retailer was a market leader and had a world-class reputation built on quality and value for money. It had gone through a period of substantial growth many years before and since then its focus had been on productiveness and profit generation. The management style was directive and there was a focus on competing and achievement. There was a certain amount of conservatism about the firm and control was clearly exercised from the top. The data-warehousing project was seen as a way of enhancing the flow of information and in so doing improving the efficiency of its supply chain and facilitating closer integration with suppliers. Whilst there was a recognition that more consideration had to be given to competition and to the external environment, organisational order was still considered to be important. Moreover, the desire to control the organisation from the top remained as did the conservative approach to business, for example, the '*head office would remain the buying centre for all merchandise*'. [corporate strategy]. It was therefore envisaged that the introduction of the data warehouse would not engender any significant changes in the organisation's culture.

Insurance Company 'A': This company, which had been seen as a secure, stable, paternalistic and reasonably conservative employer, was now struggling to survive. Historically, the firm had always prospered in the motor insurance market where it had been able to ensure that premiums generated a profitable revenue stream. However, a new breed of '*direct writer*' had entered the market, offering substantially reduced premiums because of their low cost operations. This had forced the company to reduce premiums to a level where profits were no longer being made and consequently significant change was required if it was to survive. It realised that it had to develop a much better understanding of the marketplace, its competitors, and competitive products. It needed to develop the ability to identify profitable niches in the marketplace and to rapidly develop products to fill these niches by taking more risks, and being more creative. Whilst a data-warehouse, which could enhance the flows of information within the organisation, was seen as being a key component of the survival strategy, it was

envisaged that the culture of the organisation would be little affected by the introduction of the data-warehouse.

5. DISCUSSION: IMPLICATIONS AND LESSONS LEARNED.

The aims of this section are to contextualise the results of this study in the literature, review the implications of this studies for IT managers and researchers, and to highlight its potential limitations.

Quinn & Rohrbaugh's [1983] '*competing values*' framework, as used to evaluate the cultural impacts of IT [Cooper, 1994], can be used to position the four companies before and after the implementation of the data warehouse. It can be concluded that historically all four companies could, to a greater or lesser extent, be characterised as traditional companies, with fairly ordered and internally focussed cultures. Consequently, it is possible to suggest that all four case study companies were positioned in the bottom left-hand corner of Quinn & Rohrbaugh's [1983] framework before the introduction of the data warehouses. Following the introduction of the data-warehouses it is likely that the cultures of the **retailer** and i**nsurance company 'A'** will be left relatively unchanged. By contrast, it is envisaged that the organisational cultures of the **clearing bank** and **insurance company 'B'** will be significantly modified; moving to the top, right-hand quadrant of Quinn & Rohrbaugh's [1983] framework.

As noted in section 2.4, Walton [1989] suggests that the introduction of information technology can have '*dual potentialities*'; it can either reinforce control or facilitate empowerment. It is, therefore, also possible to evaluate the position of the four case study companies in terms of Walton's [1989] control versus empowerment dichotomy. More specifically, it has been found that whilst all four companies had a control-oriented culture, prior to the introduction of data-warehouses it is likely that the cultures of the **clearing bank** and **insurance company 'B'** will be characterised as 'empowering' cultures, once these systems were operational. Whilst at first glance, Walton's [1989] and Cooper's [1994] contributions to the debate about IT and cultural change might appear very different, the findings of this research suggest that they may complement each other. It has been shown that for two of the companies an empowering culture is associated with flexibility and an external, customer focus. Indeed, it is understandable that these three dimensions are changing simultaneously, as improvements to customer service are unlikely to be realised unless organisations empower employees, and have sufficient flexibility, to respond to their customers' needs. By contrast, at the other two case companies the control culture is associated with an internal focus and an order-orientation. If Walton's [1989] '*dual potentialities*' is viewed as a continuum of organisational effects, ranging from highly controlled at one end, through to completely empowered at the other, it is possible to superimpose it on Quinn & Rohrbaugh's [1983] framework (see figure 1). Moreover, this diagram can be used to locate the cultural characteristics of the four case study companies, before and after the implementation of data-warehouses. It is important, when reviewing this diagram, to remember that it is based upon a subjective interpretation of the situation, rather than the result of a quantitative assessment.

Organisational culture is persistent [Pettigrew, 1979], so as Cooper [1994] warns '*people tend to embrace information systems that are in accordance with their culture and resist those that conflict with their culture*'. Based upon this interpretation of the relationship between IT and culture, it is possible to make some assumptions about the level of risk associated with each of the four case companies' data warehousing project. It might, for example, be concluded that the **retailer** and **insurance company 'A'** were adopting a low risk strategy by applying their data warehouse in a way that was congruent with their existing organisational culture. However, they might ultimately find that their systems are not making a very significant contribution, because managers have been too cautious when specifying their requirements. By contrast, the **clearing bank** and **insurance company 'B'** were risking user resistance by changing the information flows in a way that might induce cultural change. However, an alternative interpretation might be that they were being prudent as they actively sought changes that they believed were necessary to successfully compete in increasingly volatile markets. It is therefore suggested that the modified *'competing values*' framework should be used to evaluate the balance between risks associated with resistance to change as opposed to risks associated with not responding to competitive pressures.

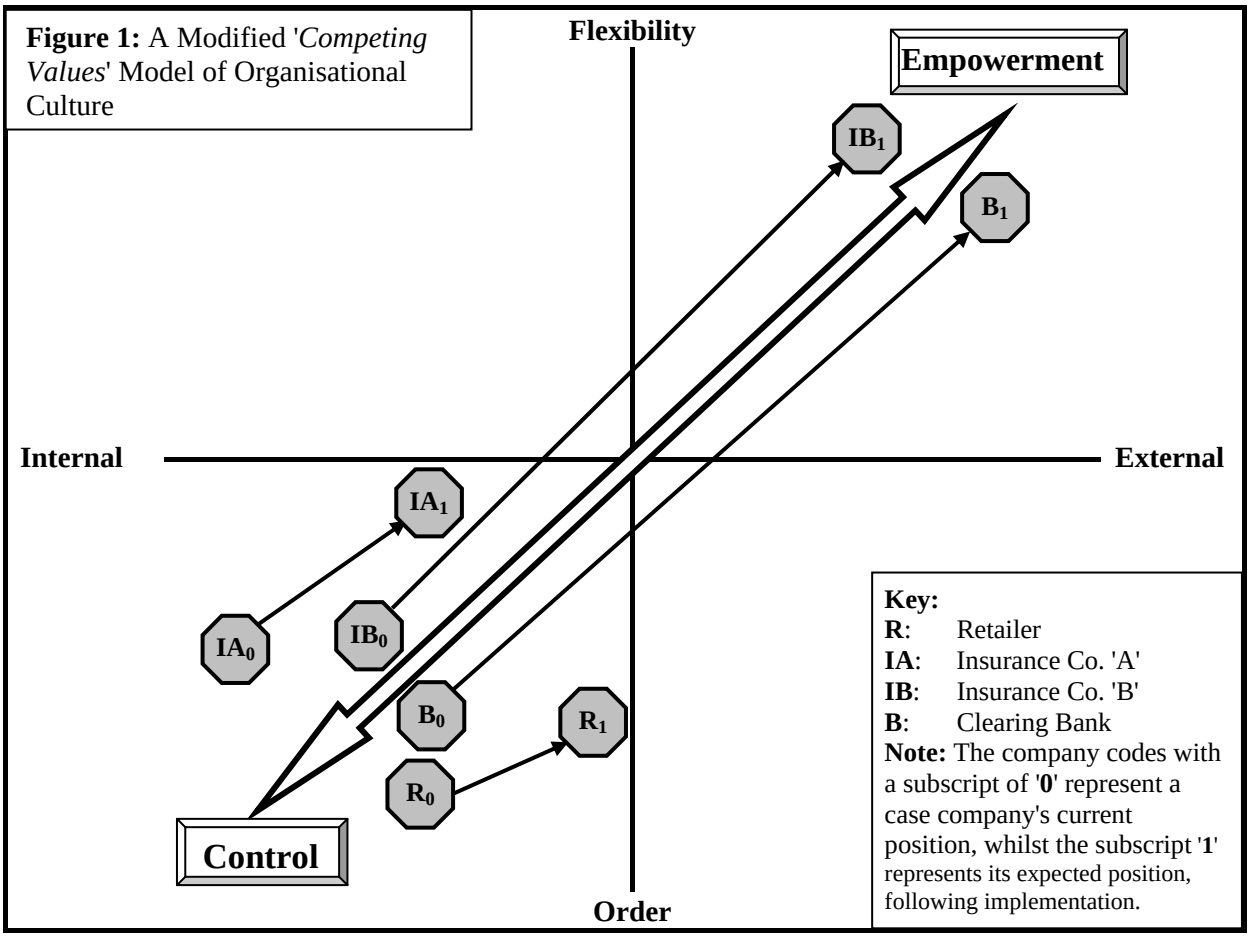

Figure 1: A Modified '*Competing Values*' Model of Organisational Culture

There is an implicit recognition in previous studies [Pliskin et al, 1993; Cooper, 1994] that it is not the technology, *per se*, that impacts upon culture, but the accompanying changes to working practices, and in particular expectations about employees' future behaviour. For example, it is highly unlikely that putting a PC on every employee's desk and providing them with information will automatically empower them. Employees will only be truly empowered if they have the motivation, authority, confidence and the competence to use that information in

the decision-making context. At the **clearing bank** and **insurance company 'B'** it was recognised that the broad objectives of the data-warehousing project, in terms of increasing the levels of customer service, flexibility or empowerment, were unlikely to be realised solely through increasing the availability, or modifying the flow, of information. Consequently, both organisations were accompanying their data-warehousing projects with wide-ranging change programmes, focussing upon working practices, communications and training. However, it should be recognised that even the realisation of such organisational changes, may still leave the workforce's *'basic assumptions'*, at the deepest levels of culture [Schein, 1992], unchanged, at least in the short-term.

These findings offer a number of important insights for IT managers, when evaluating, developing and implementing data-warehouses. Firstly, it is important for them to recognise that the identified benefits of an IT project might only be realised if its implementation is accompanied by significant organisational change, which in turn may have cultural implications. Such impacts cannot simply be ignored; a more considered response might be to:

- **Be aware:** use the dimensions of culture or the modified framework to evaluate the degree to which an IT implementation might ultimately impact upon culture;
- **Be prepared:** In circumstances where the realisation of benefits is predicated upon the successful modification of organisational culture then it is important to investigate how amenable, or otherwise, the workforce might be to such changes. If there is a strong likelihood of user resistance then it might be better to rethink or even abandon the project [Pliskin et al, 1993]
- **Be proactive:** If IT projects are being undertaken, despite the identification of significant cultural implications, then the cultural change must be proactively managed. Many authors, including Williams et al [1990: 91] and Hofstede [1979: 202] provide clear guidelines for the effective management of cultural change;
- **Be realistic:** As noted previously, culture is fairly persistent and slow to change. Therefore, it is important to be realistic about how quickly or easily the planned outcomes of an IT implementation can be achieved. For example, if the objective of a data-warehousing project is ultimately to improve levels of customer service, it may be relatively easy to make customer-focussed information more readily available. However, it may take months, if not years, before the availability of information is accompanied by the required changes to employee behaviour and attitudes that really improve the level of customer service.

This research should also be of interest to the researcher, as it provides some interesting insights into the dimensions of culture, the application of the 'competing forces' model and the nature of the relationship between IT implementation and cultural change.

Research into the role of information, within the organisational context, is an ambitious undertaking, and therefore contains a number of inherent limitations. In particular, the adoption of the case study format reduced the number of organisations that could realistically participate and there is also potential bias with respect to the way in which the principal

researcher interpreted the situations to which he was exposed. A second limitation relates to the fact that the research was conducted at the outset of the data warehousing projects, and therefore the identified cultural changes were anticipated, rather than actual. A final limitation relates to the conduct of the interpretive research study. Whilst the principles of interpretive field research [Walsham, 1995; Klein & Myers, 1999] were adhered to as far as possible, it should be noted that the opportunities to gain '*multiple interpretations*' [Klein & Mywers [1999; 77] were limited as it was not always possible to gain access to non-managerial stakeholders. Consequently, whilst the study provides many interesting and novel insights, these limitations do highlight the need for follow-up studies to be conducted that adopt different methods, and target different populations and respondents, to investigate the wider currency of the results. Moreover, longitudinal studies, such as the ones by Pettigrew [1979] & Prasad [1993], that monitor organisational behaviour over a protracted period, are also highly desirable.

6 CONCLUDING REMARKS

In providing many illuminating insights into the relationship between information, information technology and organisational culture, the results of this study provide some important pointers as to how information technology projects should be managed. More specifically, it has been demonstrated that realising the benefits of an IT project, especially in areas such as customer service, empowerment and flexibility, might require changes to working practices and employee behaviour, which can in turn have cultural implications. Consequently, it is important that the cultural impacts of IT implements are explicitly evaluated, and effectively managed. Moreover, information technology rarely delivers a quick fix, so there must be a recognition that the realisation of benefits and the management of cultural change is a long-term and potentially difficult undertaking. Finally, whilst these findings will be of most significance to those organisations contemplating the implementation of data-warehousing technologies, in particular, they may also provide important insights into the management of many other IT projects.

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