

RISK CULTURE: FROM SAFETY TO FINANCE

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by

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Abstract

Purpose

Examination of financial loss events (e.g. Barings Bank) and planned regulatory changes within the financial sector reveals that culture, i.e. the beliefs and attitudes of an organisation and its employees, plays a key role in operational loss events. In this study the risk culture of financial organisations was measured using a questionnaire developed through discussions and interviews with personnel from both financial organisations and their regulatory bodies, and the utilisation of existing knowledge into the concept of safety culture within industrial organisations. The structure of the risk culture of financial organisations was compared to the safety culture of industrial organisations, and the predictive and discriminant validity of the risk culture questionnaire was assessed.

Methodology / approach

Discussions with financial sector personnel (n=37) aided the development of the risk culture questionnaire and helped to ensure the questions included were appropriate to the financial sector. Comments on the first draft of the risk culture questionnaire from eleven of these individuals helped to ensure the terminology and phrasing of the questionnaire was appropriate.

Thematic template analysis of qualitative data obtained during semi-structured interviews with personnel (n=11) working in two of the financial institutions involved in quantitative data collection provided insight into employee's attitudes and beliefs towards risk issues within their workplace, and enabled the investigation of the face

and content validity of the questionnaire. Following this the final version of the risk culture questionnaire was developed and distributed within three financial organisations (n=769).

Findings

The results indicate that the risk culture of a financial institution can be measured in a similar way to which safety culture is measured in industrial organisations. Twelve risk culture factors were derived from the questionnaire, providing information on separate elements of an organisation's risk environment. Evidence is presented which suggests that some elements of risk culture (Employee Risky Acts, Management Risky Acts, Time Constraints and Employee Satisfaction with Decision Making) are related to the experience of financial loss events (i.e. errors and near misses), a premise that is discussed in other texts, but one that has not previously been shown empirically. The results also demonstrate that the different organisations involved in the research reported significantly different attitudes towards risk.

Research Implications / Limitations

The research indicates that risk culture assessments and interventions within the financial sector may prove useful in the drive to reduce errors and operational losses, in a similar way to which safety culture assessments and interventions have proven useful with regard to the reduction of accidents in industrial organisations. The importance of management attitudes and behaviour suggests that particular attention should be paid to ensuring positive management attitudes towards risk are successfully communicated to employees.

Further research involving additional financial organisations will provide information into the general applicability and usefulness of the questionnaire within the financial sector. Longitudinal research with risk culture data gathered before and after interventions designed to improve the risk culture of an organisation will establish the success of such interventions with regard to both improving risk culture and reducing errors. The use of actual loss data (which organisations are currently being encouraged to collate) rather than self-report error rates would further benefit and strengthen the findings of risk culture research.

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1. Introduction

1.1 *Background to Research*

Examination of events that occurred prior to the uncovering of losses within financial institutions reveals that cultural issues are important causal factors. Examples of loss events that were, at least partially, caused or aided by cultural failures in the workplace include Barings Bank (Bank of England 1996), Allied Irish Bank (Wachtell, Lipton, Rosen and Katz, 2002), Johnson Matthey Bank and BCCI (Stead and Smallman, 1999), Daiwa Bank (Dowell, 1997) and Sumitomo Corp. (Riskinstitute, 2002a). Each of these events resulted in very large monetary losses to the organisation. Moreover, in addition to those named above, there are many more loss events that are likely to be partly the result of cultural breakdowns in the organisation. However, smaller (although still sizeable) financial losses are often not of interest to the media and are therefore not discussed and reported as extensively as the events listed above, thus making it more difficult, without access to internal reports, to accurately identify the role of culture. Nevertheless, there is a strong indication that culture is relevant to the experience of financial loss.

This thesis describes research conducted during completion of an EPSRC funded project into the measurement and modelling of risk in the workplace. The focus of the thesis is on discussion and investigation of the concept of risk culture in financial organisations (e.g. banks and building societies) as a contributory factor in financial loss events, and the development of a risk culture measurement tool suitable for use in financial organisations is detailed. The impetus behind the research is the increased

recognition (from financial organisations, the regulators of the financial industry and the academic community) that cultural issues are important to the experience of errors and financial losses. This introductory chapter presents a brief overview of the research and provides explanations for some of the terms used throughout the thesis. The research hypotheses are stated and the structure of the thesis outlined.

Financial organisations traditionally monitor and measure their risk exposure through analysis of market and credit risk, neither of which takes into account the influence of organisational culture. Regulators of the financial sector are, however, beginning to encourage financial organisations to look at operational risk, which incorporates cultural risk (Bank for International Settlements, BIS, 2003) and there is increasing recognition of the relevance of cultural issues to financial loss events from within the financial sector (e.g. Kingsley, Rolland, Tinney and Holmes, 1998; Chen, 2003). The scale of financial losses being experienced by financial organisations, both in terms of the number of incidents and the monetary losses incurred, provides strong impetus for the investigation and understanding of organisational culture as a contributory factor in loss events. Financial organisations report experiencing between one hundred and two hundred operational risk incidents of significance per month (Finlay and Kaye, 2002), and 90% of financial service firms lost more than \$10 million a year through poor operational risk management (SAS, 2003).

Bozeman and Kingsley (1998) define risk as the 'exposure to the chance of loss from one's actions or decisions' (p.110). This definition is useful in that it relates losses to a person's actions, although, since the nature of financial organisations is such that risk is a necessary part of their operations, it is more useful to describe unnecessary

risk, or risk beyond that deemed acceptable by the organisation. For the purposes of this research, risk is therefore best described as ‘unnecessary or unacceptable exposure to the chance of loss from one’s actions or decisions’.

Risk culture relates to the degree of risk present in a workplace as a result of the attitudes, beliefs and behaviour of people within the organisation, i.e. although the likelihood of a loss occurring will depend upon an interaction between inherent risks in the workplace and the prevailing risk culture, it is anticipated that working in a positive risk environment will mean that a financial loss is less likely to occur than if working in a negative risk environment,. A definition of risk culture is proposed as;

The extent to which organisational members are motivated towards and involved in identifying and reducing unnecessary or unacceptable risk.

The term culture is used throughout the course of this research. It is, however, recognised that there has been much debate in recent years over the ways in which culture can be measured. The terms culture and climate are often used interchangeably, with some theorists using the term ‘climate’ when describing research of the type detailed in this thesis, i.e. attitudes questionnaire measurement (Guldenmund, 2000). Glisson and James (2002) describe how the culture of an organisation affects the climate of an organisation, which in turn impacts upon people’s attitudes and behaviour at work. Therefore the measurement of people’s attitudes towards issues at work (e.g. attitudes towards safety or risk) indicates the nature of the climate of a workplace and helps to build a picture of the culture of an organisation (Cheyne, Oliver, Tomás and Cox, 2002). Furthermore, attitudes are a

strong predictor of risk behaviour (Rundmo and Hale, 2002) and are described as 'the most comprehensive and useful indicators of a safety culture' (Harvey, Bolam, Gregory and Erdos, 2001, p. 616). The relevance of safety culture to the present study is discussed throughout the thesis and outlined below.

Safety culture and the factors underpinning safety culture have been identified by a number of researchers in a variety of settings (e.g. Donald and Young, 1996; Lee, 1998; Mearns, Flin, Gordon and Fleming, 1998) and safety culture questionnaires developed which measure employee attitudes towards safety issues within the workplace. It is considered likely that similar psychological processes will be at play in both the industrial and financial sector and therefore the risk culture of financial organisations can be measured in a similar way to which safety culture is measured in industrial organisations.

The attitudinal approach to monitoring safety in the workplace (Donald and Canter, 1993) proposes that whilst people may not deliberately aim to cause an accident, they are nevertheless aware of their actions, and their behaviour is intentional and based upon their understanding of their organisation. People's attitudes are influenced by social context (Eagly and Chaiken, 1993) and 'salient others' (Fishbein and Ajzen, 1975; Ajzen, 1991), for example colleagues and management, which provides people with information on what is considered right or wrong, and acceptable or unacceptable behaviour at work. Measuring people's attitudes towards safety at work informs on the climate and culture of the organisation (e.g. Cox and Cox, 1991; Zohar, 1980) and safety attitudes are predictive of safety performance and accidents in the workplace (e.g. Donald and Canter, 1993; Lee, 1998; Lee and Harrison, 2000).

Similarities between industrial accidents and financial loss events are apparent with regard to the cultural breakdown evident in the organisation in the run up to adverse events (e.g. Sheaffer, Richardson and Rosenblatt, 1998; Stead and Smallman, 1999; Soane, Fenton-O’Creevy, Nicolson and Willman, 1998; Toft and Reynolds, 1997). Issues such as inadequate communication and supervision, unclear reporting lines and a lack of positive emphasis from management with regard to managing risks at work, have been shown to play a part in both financial loss events (e.g. Barings Bank, Bank of England, 1996; and Allied Irish Bank, Wachtell et al. 2002) and industrial accidents (e.g. Piper Alpha oil rig fire, Cullen 1990; Ladbroke Grove rail crash, Cullen, 2001). It is anticipated that just as employee’s safety attitudes influence their behaviour, safety performance, and the likelihood of them being involved in an accident, so too will the risk attitudes of employees working in the financial sector influence their behaviour at work and subsequent likelihood of their being involved in a financial loss. Measuring the risk attitudes of employees will inform on the climate and culture of their organisation and will enable exploration of a relationship between risk attitudes and financial losses in order to assess whether or not the risk culture of an organisation influences loss events in the same way as safety culture has been shown to influence accidents.

An existing questionnaire used to measure safety culture (Safety Attitude Questionnaire, SAQ, Donald and Canter, 1993) will be used as a foundation that can be built on to make the questionnaire applicable to the financial sector. Discussions about the research with personnel working within the financial sector, i.e. senior management and compliance personnel (n=37) will aid the development of the questionnaire and help to ensure the questions included are appropriate to the

financial sector and the risks they believe they are facing. Eleven of these individuals will be sent copies of the first draft of the risk culture questionnaire. Their input will help to ensure the terminology and phrasing of the questionnaire are applicable to financial service personnel.

Prior to questionnaire distribution one-hour semi-structured interviews (n=11) will be conducted with individuals working in two of the organisations involved in quantitative data collection. Thematic template analysis (Cassell and Symon, 2004) of these interviews will provide insight into the working environment of these individuals, the risks they believe they face at work and the influence they believe culture has on these risks. These interviews will also enable an investigation of the content and face validity of the risk culture questionnaire.

Four main research aims are addressed in this thesis:

- To investigate if it is possible to measure the risk culture of a financial organisation quantitatively, i.e. through the use of a risk attitude questionnaire.
- To establish if the risk culture of financial organisations is structured in a similar manner to safety culture in industrial organisations.
- To determine the predictive validity of the risk culture measure, i.e. to assess whether or not an organisation's risk culture is related to their experience of errors (and near misses) leading to financial loss.
- To determine the discriminant validity of the risk culture measure, i.e. to establish whether or not separate organisations possess identifiably different risk cultures.

1.2 Outline of Thesis

Chapter 2, Organisational Culture and Safety Culture; provides an overview of organisational culture and climate research, details research into safety culture and outlines the rationale for transferring knowledge of safety culture into the financial sector.

Chapter 3, Regulation of Financial Loss; details financial loss events and discusses cultural breakdown in two high profile losses (Barings and Allied Irish Bank).

Parallels between these events and industrial disasters / accidents are drawn and the regulatory changes being instigated in financial organisations as a result of growing cultural awareness are detailed.

Chapter 4, Method - Development of the Risk Culture Questionnaire; provides information on the safety attitude questionnaire (SAQ) on which the risk culture questionnaire is partly based, and outlines the process taken in the development of the risk culture questionnaire.

Chapter 5, Method - Qualitative Data Collection; presents the qualitative work (i.e. interviews) completed with an individual involved in a financial loss event and employees working in two of the organisations involved in the research. The similarities between risk culture in finance and safety culture in industry are discussed.

Chapter 6, Analysis Methods; details the selection of appropriate statistical methods with which to interpret the risk culture questionnaire data.

Chapters 7, 8 and 9, The Factor Structure of the Risk Culture Questionnaire – Org1, Org2 and Org3; detail the three financial organisations involved in the research, describe the principal components analyses (PCA) conducted on the questionnaire data and presents the accepted factor structure for each dataset.

Chapter 10, Combined Dataset – Rationale and Analysis; explains the rationale for combining the three separate datasets, describes the PCA conducted on the combined data and discusses the final factor solution accepted as representative of each organisation.

Chapter 11, Discriminative Ability of the Risk Culture Questionnaire; presents the analyses conducted to look at (a) the ability of the risk culture factors to discriminate between employees involved or not involved in an error / near miss, and (b) whether or not the organisations possess identifiably different risk cultures.

Chapter 12, Discussion; discusses the findings of the research, for example in relation to existing knowledge and in terms of the implications of the results for financial organisations.

2. Organisational Culture and Safety Culture

2.1 Introduction

This thesis investigates the concept of risk culture in financial organisations as an important contributory factor to financial loss events, and details the development of a risk attitude questionnaire designed to provide insight into an organisation's risk culture. However, prior to examining risk culture in any detail, discussion of existing knowledge into organisational culture is required. This chapter therefore introduces the concepts of organisational culture and climate before moving on to consider in detail the more specific concept of safety culture.

The importance of employee attitudes with regard to employee behaviour at work, and the attitudinal approach to measuring safety culture is described. The information contained in this chapter serves to provide support for the theoretical rationale of applying existing knowledge of safety culture and its impact on the occurrence of accidents in the workplace to other organisational settings, namely the finance industry. It is proposed that risk attitudes can be measured and are likely to be linked to involvement in a financial loss in the same way as safety attitudes have been measured and revealed to be related to involvement in accidents.

2.2 Organisational Culture

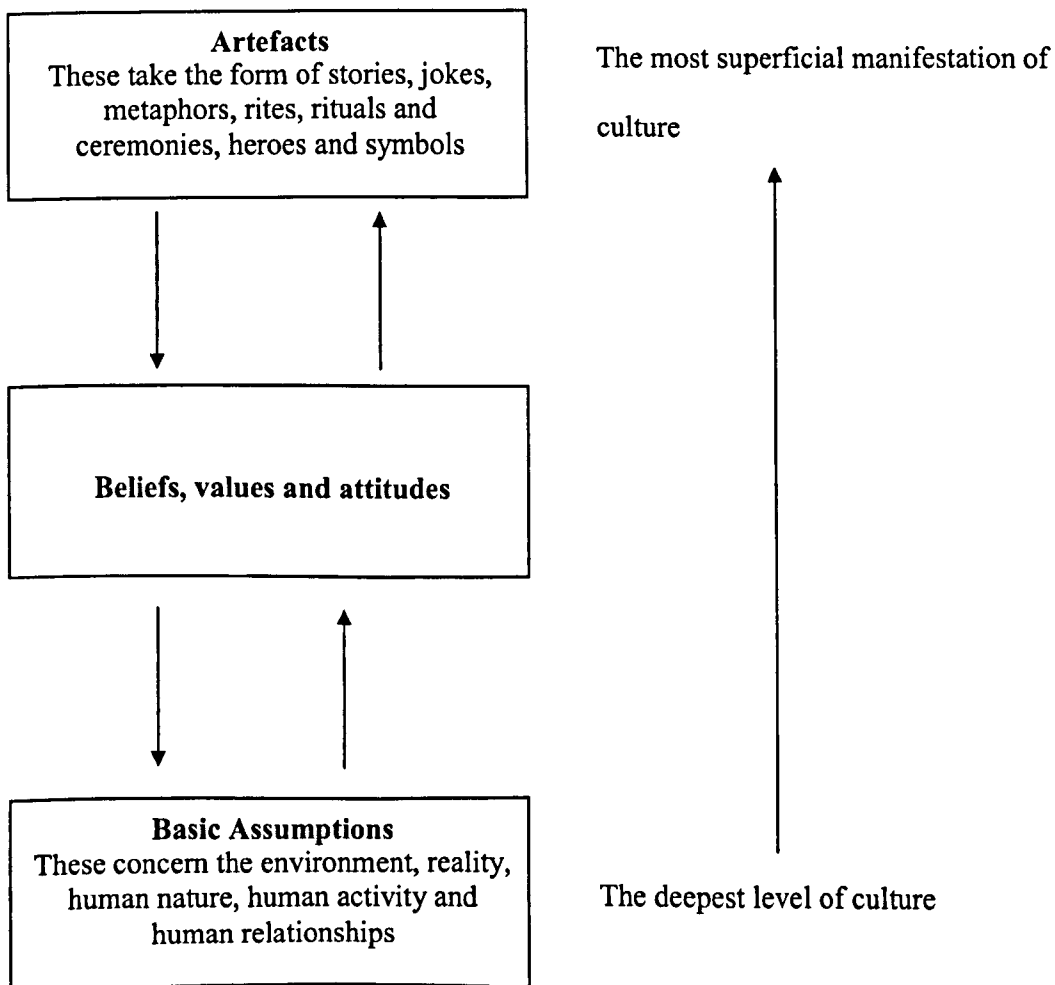
A number of theorists have described culture. One of the most influential being Schein (1992) who defined culture as;

a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems.

Schein, 1992 p.12

Schein described culture as existing across three main levels; artefacts; beliefs, values and attitudes; basic assumptions, see Figure 2.1.

Figure 2.1 Levels of Culture and Their Interaction (adapted from Schein, 1985, cited in Brown, 1998, p.12)



The first level (artefacts) is conceptualised as the most superficial, and the third (basic assumptions) the deepest. Many theorists later drew upon and adapted Schein's model in their own work (e.g., Brown, 1998). Rousseau (1990) described how the middle layer (beliefs, values and attitudes) is the one upon which the majority of organisational conceptualisations and research into culture are based. Langan-Fox and Tann's (1997) review of culture literature concluded that Schein's definition provides a comprehensive framework for describing the different levels of cultural manifestation (p.274). They discussed how culture is complex but nevertheless has four common themes running through the different theoretical and methodological approaches. Culture; 1) is stable and resistant to change, 2) is taken for granted and less consciously held, 3) derives its meaning from the organisation's members, 4) incorporates sets of shared understandings.

The concept of culture has been discussed and researched for many years, with intellectual influences from both anthropology and sociology (Ouchi and Wilkins, 1985), although it was not until the 1970's that the concept began to be studied and applied within an organisational context (Brown, 1998). A similar concept to culture, primarily based within social and organisational contexts, is evident in 'climate' literature and research. There is some dispute amongst researchers as to the precise meanings of culture and climate although the broad consensus is that culture is a deeper, more stable phenomenon than climate, which is temporal and less resistant to change. The culture / climate debate is discussed in more detail in Section 2.4.

Although the concept of culture suffers from a lack of consensual definition, with Sackmann (1991) arguing that there are 'almost as many definitions and

understandings of culture as there are people writing about it' (p.2) it is widely promoted as a tool or concept for gaining insight into the workings of an organisation. Researchers have discussed culture as the key to understanding what makes some organisations more successful than others (e.g. Martin, 1992). Others have looked at the impact culture has on the well-being and performance of organisations (e.g. Denison, 1984; Wilkins and Ouchi, 1983). Additionally, specific elements of culture, for example safety culture, have been examined (see Section 2.8).

2.3 Organisational Climate

The study of organisational climate preceded that of organisational culture (Ashkanasey, Wilderom and Peterson, 2000), with the term climate being introduced in 1939 by Lewin, Lippitt and White during their study of leadership. Climate has been conceptualised as a 'snapshot' of organisational culture (Mearns et al. 1998) and is typically viewed as a component of culture, where information about the climate of an organisation can provide insight into its culture. Rousseau's (1988) description of climate demonstrates the close relationship the concepts of climate and culture have in practice. She, along with others, considered climate as consisting of shared perceptions and beliefs, making it similar to Schein's middle level of culture. Cox and Cheyne (2000) used the analogy of personality to the culture / climate distinction likening culture to personality traits which are believed to be stable, and climate to personality states which are believed to be more temporal and able to change.

2.4 Culture and / or Climate

Opinions differ as to whether measures of organisational culture and climate are indeed looking at different concepts or are essentially measuring the same thing. Two reviews of the culture and climate literature compared the differences and similarities between the two concepts and concluded that they are essentially different but related concepts (Denison, 1996; Glisson and James, 2002). However, the terms culture and climate are often used interchangeably making it hard to determine the precise meanings of the two concepts (Glisson and James, 2002; Guldenmund, 2000). Denison described how much of the culture / climate research actually measures similar issues, highlighting areas of cross-over between the two concepts, and concluded that the two 'should be viewed as differences in interpretation rather than differences in the phenomenon' (p.15) arguing that this will provide a stronger foundation for integration between the two areas than the assumption that culture and climate are fundamentally different and discrete phenomena.

Despite the confusion which exists around the definition of culture / climate there is general agreement that climate is a more specific term, which when measured is believed to provide insight into the culture of an organisation. That is, culture expresses itself through organisational climate (Guldenmund, 2000) and climate is conceived as culture in the making and a 'reflection and manifestation of cultural assumptions' (Schein, 1992, p.230). There has been much debate in recent years as to whether or not culture can be measured. Many theorists prefer to use the term climate, consisting of beliefs and attitudes, to describe the element of culture that it is possible to measure. Glisson and James (2002) described how the culture of an organisation

affects the climate of an organisation, which in turn impacts upon people's attitudes and behaviour at work.

2.5 Culture, Climate and Employee Behaviour

Organisational culture has been defined in terms of the beliefs and values of the members of an organisation, which act as prescriptions for the way in which organisational members should work (Harrison, 1972). Similarly, Smircich (1983) stated 'culture serves as a sense making device that can guide and shape behaviour' (p.346) and both culture and climate are seen as a frame of reference for the members of an organisation that directs behaviour (Guldenmund, 2000). The study of organisational culture and climate is therefore about understanding people's perceptions of the organisations in which they work and how these perceptions influence their work. As Buchanan and Huczynski (1985) stated, people do not behave in and respond to the world 'as it really is' but as they perceive it. More detailed discussion of the influence of culture and climate on employee behaviour specifically in relation to safety in the workplace is made in Section 2.8.4.

2.6 Measuring Culture and Climate

Both qualitative and quantitative techniques have been employed to research culture, each possessing advantages and disadvantages. For example, interviews enable detailed discussions and are more likely to uncover new issues than questionnaires, but have been criticised for their lack of objectivity, reliability and validity and for not being conducive to comparisons within an organisation (Martin, 1992). Questionnaire

studies, often used within climate research and which typically measure Schein's middle level of organisational culture (Glendon and Stanton, 2000), are able to include all members of an organisation, are more reliable and valid than interviews, and enable statistical comparisons (Martin, 1992). When discussing the measurement of culture, Rousseau (1990) stated that it is best to use multiple methods, as the 'failure to apply a variety of methods to assessing culture limits our understanding of it' (p.186).

Measuring employee attitudes to inform on the climate and culture of an organisation is a commonly used technique (Guldenmund, 2000) which will be utilised during the present study. Attitudes and the relationship between attitudes, climate and culture are therefore discussed in the section below.

2.7 Attitudes, Culture and Climate

2.7.1 Attitudes

For well over half a century attitude surveys have been a standard tool for managers to check on what employees think about their work and their workplace (Arnold et al., 2005). Attitudes have been described as summary evaluations of objects (e.g. to oneself, other people, issues etc.) which range along a dimension from positive to negative (Petty, Wegener and Fabrigar, 1997) and were defined by Eagly and Chaiken (1993) as;

A psychological tendency that is expressed by a particular entity with some degree of favour or disfavour

Attitudes essentially consist of three aspects, i.e. cognitive (what people know) affective (what they feel) and instrumental (what they do) although in practice the term 'attitude' usually refers to the cognitive and / or affective components, with behaviour more often conceptualised as an outcome of attitudes (Arnold et al., 2005).

The question of whether attitudes predict behaviour is a fundamental issue in attitudinal research. It was originally believed that there was a direct link between attitudes and behaviour, although this view was later challenged (Abelson, 1972; Wicker, 1969). It is now recognised that other factors mediate the relationship between attitude and behaviour. An indirect, as opposed to direct, link between attitudes and behaviour was presented in the Theory of Reasoned Action (Fishbein and Ajzen, 1975; Fishbein, 1967) and its successor the Theory of Planned Behaviour (Ajzen, 1991) which included an interaction between attitudes and subjective norms which served to influence intention to act. Intention to act is then believed to have a direct influence on behaviour.

Although the belief that there is a direct link between attitudes and behaviour has been discredited, people are motivated to maintain consistency in their attitudinal responses. Attitude models predict that individuals will try to exhibit behaviours that are in keeping with their attitudes (Hanisch, Hulin and Roznowski, 1998). The measurement of attitudes, and in particular attitudes specific to particular referents (e.g. safety attitudes, risk attitudes), is therefore still likely to prove useful in the prediction of behaviour.

2.7.2 Attitudes and Culture / Climate

The belief that attitudes are influenced by social context underlies most attitudinal research (Eagly and Chaiken, 1993) and 'salient others' are believed to exert the greatest influence on an individual's attitudinal behaviour (Fishbein and Ajzen, 1975; Ajzen, 1991). Salient others (e.g. workmates) can influence attitudes by providing information on what is wrong, right, acceptable or expected by the group (e.g. the organisation in which an individual works) and individuals will use their perceptions of other peoples beliefs, attitudes and behaviours as references to guide their own behaviour. Membership of a group demands 'conformity' to the group's behavioural and attitudinal norms, and groups can promote or negate certain attitudes. An individual's peers and the group to which they belong can therefore determine the beliefs, attitudes and actions which people need to hold and exhibit in order to maintain the group's acceptance (Saks and Krupat, 1988). Ashkanasay et al. (2000) describe how;

Multiple individuals are reacting to some of the same experiences and situations.

People talk with one another about their groups, leaders, and jobs. The perceptions of one person shape the interpretations of others. A climate evolves.

p.15

Although the above suggests that there is a relationship between attitudes and organisational culture, generally, when culture is defined, attitudes are not mentioned explicitly, although they are inferred in some definitions. For example Schein (1992, p.12) described culture as a 'pattern of shared basic assumptions' (Nananidou, 2000).

Attitude measurement is usually achieved through the use of self-administered questionnaires which are a reliable way of assessing attitudes (Likert, 1932; Oppenheim, 1992). Organisational climate, which can provide insight into an organisation's culture (Mearns et al., 1998), can be defined or given through the aggregated attitudes of its members (Guldenmund, 2000).

2.8 Safety Culture

Culture and climate have been described as multifaceted constructs which need a referent to accompany them (Rousseau, 1988; Schneider, 1975) and it has been proposed that it is more realistic to view organisational culture as an umbrella under which multiple subcultures exist (Martin, Sitkin and Boehm, 1985; Harvey et al. 2002). Subcultures have been described as existing within an organisation on a number of different levels, i.e. corporate, departmental, divisional, geographical location, issue-related and professional (Jansen, 1994). Since organisations create a number of different cultures, an investigation of organisational culture benefits from a focus upon specific aspects of culture, e.g. service culture (Schneider, Parkington and Buxton, 1980) and safety culture (Zohar, 1980).

Safety culture, described as a subset of organisational culture that is specifically related to cultural issues within an organisation pertaining to safety and safe working behaviour (Clarke, 1999), is integral to the present investigation of risk culture, as it is anticipated there will be similarities between safety culture and risk culture and existing knowledge of safety culture will serve to inform the development of a risk culture questionnaire.

The following sections therefore define safety culture, provide an overview of the concept, detail the factors commonly found in studies of safety culture and discuss the links shown to exist between safety culture and industrial accidents.

2.8.1 Definition and Overview of Safety Culture

Safety Culture has been defined in many ways, for example, the ACSNI (the Advisory Committee on the Safety of Nuclear Installations, 1993) stated that;

The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to and the style and proficiency of an organization's health and safety management.

ACSNI, p.23

In a similar manner Cox and Cox (1991) defined safety cultures as reflecting;

The attitudes, beliefs, perceptions, and values that employees share in relation to safety.

Cox and Cox, p.93

In addition to the above, numerous other definitions of safety culture have been proposed (see Guldenmund, 2000, for a comprehensive list of definitions proposed by different researchers). However despite the multitude of safety culture definitions in existence they generally include some or all of the following factors:

- *Psychological factors* that include employees' attitudes, perceptions, beliefs, norms, values and behaviours.
- *Organisational factors* such as rules, regulations, equipment, structures and policies in relation to safety.

(Clarke, 1999; Reason, 1990).

It is the combination of these elements that determines how safety is evaluated within an organisation, what steps are felt to be appropriate to reduce or eliminate the likelihood of an accident occurring and whether or not people feel able to take these steps.

Inquiries following major incidents repeatedly reveal the significance of cultural aspects of an organisation in the run up to a disaster. For example Cullen (1990) highlighted the relevance of culture in his report following the inquiry into the Piper Alpha oil rig disaster. Studies that have looked at the relationship between safety culture and involvement in incidences and accidents have revealed that a weak safety culture increases the risk of an adverse incident and is a good predictor of accident rates (e.g. Donald and Canter, 1993; Zohar, 2000; Seo, 2005, see Section 2.8.4). Measuring safety culture has been described as a useful management tool which is as important as traditional hazard analysis to ensuring safety in the workplace (Coyle, Sleeman and Adams 1995).

2.8.2 Attitudes and Safety Culture

Attitudes and their link to behaviour is central to workplace health and safety (Glendon and McKenna, 1995) and the link between culture and attitudes has been

explicitly described in relation to safety culture, with safety attitudes conceived as one of the components of safety culture and safety climate (e.g. Donald and Canter, 1993; Lee, 1998; Cox and Cox, 1991; Mearns et al. 1998; Zohar, 1980). Cox and Cox (1991) state:

Safety cultures reflect the attitudes, beliefs, perceptions and values that employees share in relation to safety

p.93

Lee (1994) and Williamson, Feyer, Cairns and Biancotti (1997) argued that attitudes, defined as stable predispositions, are the most comprehensive and useful indicators of safety culture. Assessment of employee attitudes towards safety issues at work can therefore indicate the nature of the climate of a workplace and help to build a picture of the culture of an organisation (Cheyne et al. 2002).

As detailed in Section 2.7 attitude questionnaires are commonly used to measure organisational culture. Safety attitude questionnaires typically comprise a series of questions that measure people's beliefs, values, attitudes and perceptions towards various aspects of safety in their workplace. Questionnaires are used to survey individuals working in an organisation and scores tend to be aggregated at either the group or organisation level thereby providing indices of the organisation's current safety climate (Cooper, 2000).

Of particular relevance to the current study is the Safety Attitude Questionnaire (SAQ) developed by the Safety Research Unit at the University of Liverpool (see

Chapter 4 for further information on the SAQ). Donald and Young (1996) outline the 16 scales that comprise the SAQ and describe how 14 of the scales have been shown to correlate with accident rates at statistically significant levels (see also Donald and Canter, 1993).

Care should be taken in the interpretation of the results of safety attitude surveys. For example Cooper (2000), in his comprehensive review of safety culture, discussed the positive skew found in some safety attitude questionnaire responses, a finding that has been commented on by other researchers (e.g. Williamson et al., 1997). The presence of non-normal data and the impact this could have on data analysis and results should therefore be assessed and incorporated into any analysis of safety attitude questionnaires.

2.8.3 Factor Structure of Safety Culture

Zohar's (1980) seminal work in this field, using a 40-item safety climate measure, identified two primary dimensions pertaining to safety: 'perceived relevance of safety to job behaviour', which comprised safety training and effects of work pace; and 'perceived management attitude towards safety', which included the status of both safety committees and safety officers. Initially Zohar derived seven dimensions from industrial safety literature, and his factor analysis of a pilot data set (n=120) revealed eight safety culture factors. However Brown and Holmes (1986), in their assessment of the validity of Zohar's model, reported that his eight factors were not replicable and that the data could be better explained through three factors; employee perception of how concerned management was with their well-being; employee perception of

how active management was in responding to this concern; and employee physical risk perception. One explanation they offered for the discrepancies between their and Zohar's findings was that Zohar's work was developed on an Israeli sample which may have served to hinder the generalisability of his findings. Furthermore, Zohar's study did not use organisational safety data or self-reported accidents, as many later safety culture studies did, but relied instead upon the rank ordering of the organisations by experienced safety inspectors.

Following Zohar's original study the factor structure of safety culture and the predictive validity of safety culture factors in relation to accidents in the workplace has subsequently been investigated in more detail by a number of research teams working in different industries and locations across the world. Similar (although not identical) factor structures have been identified, for example see Cooper and Phillips (1994), Cox and Cox (1991), Lee (1998), Lee and Harrison (2000) and Mearns et al. (1998). General findings of safety culture studies are outlined below, thorough reviews of safety culture literature can also be seen in Flin, Mearns, O'Connor and Bryden (2000), Guldenmund (2000), and Glendon and Litherland, (2001).

Characteristics stemming from inherent hazards and risks are often shared among organisations, particularly in high reliability organisations (Cheyne et al. 2002) where much of the research into safety culture has been conducted, and where safety is seen as of paramount concern due to the high risk of disaster if an accident occurs.

Common features of safety climate studies were assessed in Flin et al's (2000) review, which concluded that as safety climate studies increase, a basic set of important features is emerging. For example the importance of management attitudes appeared

in 72% of studies, and employee satisfaction with the safety system in 67%. In this respect they described safety climate factors as akin to the 'Big Five' personality factors. Cheyne et al's (2002) study, conducted in the manufacturing sector, also found that there was evidence of a sector wide safety culture, although some differences in the relationships between safety culture factors were identified between the two organisations involved in the research. They concluded that a common, shared cultural structure could be identified and the differences between the organisations reflected the prevailing safety climate within each organisation. Safety culture was therefore argued to be generic across organisations (e.g. Flin et al. 2000; Cheyne et al. 2002) and the identification of similar safety culture / climate factor structures across organisations interpreted as an indication that it may be possible to identify a generic factor structure (Flin et al. 2000). The reason one has not been identified to date is felt to be more a reflection of different research groupings working on similar, as opposed to identical, questionnaires and research programmes.

Whilst organisations undoubtedly have some aspects of safety behaviour specific to their operations, general attitudes and behaviours towards the safety of employees, their colleagues and their management are reflected in safety culture studies.

However, the view that safety attitudes and behaviours, and in turn safety climate factors, can be generalised across organisations has been challenged. Coyle et al. (1995) argued that since safety climate factors are not stable across organisations the universal stability of safety climate factors is doubtful. They further proposed that relying on supposedly general questionnaire items would result in the failure to identify factors that are idiosyncratic to a particular organisation, and proposed that

interviews should be conducted within an organisation prior to questionnaire distribution, to enable additional questions to be included where appropriate.

2.8.4 Safety Culture and Involvement in Accidents and Near Misses

Granot (1998) stated that human error is a causal factor in at least half of industrial disasters and described how a revolution in thinking about the causes of disasters initially came about in the 1970's, when it was recognised during investigations of disasters that human error was increasingly being identified as a causal factor. It has subsequently been estimated that of the factors that contribute to an accident 20-30% are technical in nature whilst 70-80% are social, administrative or managerial failings (Turner, 1994).

A simple example of how human error can override safety processes; the guards on machinery (provided to protect workers from injury) are only effective if used correctly. If guards are not in place, either due to simple human error e.g. an operator forgets to use them, or due to cultural issues e.g. the guards slow work down and so it is generally accepted by workers that it is not worth using the guards for quick tasks, then an injury is as likely to occur whilst the machinery is being used with no guard as it would be if the guards designed to protect workers did not exist. Employees will make a decision on whether or not to use the guards with reference to their own attitudes towards safety and also the attitudes of those around them, i.e. the 'salient others' (Fishbein and Ajzen, 1975) in the workplace (e.g. colleagues and managers).

2.8.4.1 *Limitations of Safety Regulations*

Research into safety culture and the influence it may have on accidents stemmed from the realisation that even once technical and procedural changes were implemented in order to decrease accidents, there were still a number of accidents occurring below which companies could not dip through further technological improvements (Donald and Young, 1996). Indeed, the proliferation of safety regulations has been described as resulting in regulations becoming incomprehensible and unworkable, leading to them being disregarded in practice. Therefore instead of improving safety they assume the role of mere 'back protectors' (Lee, 1998, p.218; see also Sorenson, 2002). It was proposed that these remaining accidents were the result, at least in part, of the safety culture of the workplace. Lee states;

Despite the adoption of the full range of engineering and technical safeguards, complex systems broke down calamitously because the people running them failed to do what they were supposed to do.

p.217

2.8.4.2 *Importance of a Positive Safety Culture*

The importance of a company's safety culture can be seen in many, if not all, investigations and reports into high profile safety incidents. For example the enquiries into the King's Cross Underground disaster, the Piper Alpha oil rig fire and the sinking of the Herald of Free Enterprise all revealed cultural factors in the disasters which significantly contributed to the chain of events. Often the human error involved in such incidents resulted in disasters occurring in spite of the technical

and engineering processes in place to prevent such incidences. It has been noted that an organisation is unlikely to have safe working without a good organisational safety climate (Canter and Olearnik, 1989) and the notion that a company's safety culture can impact upon the likelihood of adverse events such as an accident and/or a near miss occurring has been researched for many years. The results of this research support the contention that there is a relationship between safety culture (usually measured through employee attitude questionnaires) and behaviour (i.e. accidents and near misses) and it is now generally accepted that the safety culture of an organisation does have a part to play in the occurrence of accidents, and safety attitudes predict occupational accidents and injuries (e.g. Donald and Young 1996; Mearns et al. 1998; Lee, 1998; Siu, Phillips and Leung, 2004; Seo, 2005).

2.8.4.3 *Attitudinal Approach to Monitoring Safety*

The contention that people generally act intentionally and a large number of accidents are under the control of those involved in them was the basic premise of the attitudinal approach to monitoring safety in the workplace (Donald and Canter, 1993). That is, people involved in accidents may not deliberately aim to cause an accident but are nevertheless aware of their actions and the behaviour that leads them to the accident is intentional. Employee expectations of what is required of them at work is based upon their interpretation and understanding of their organisation. For example, interpretation of a safety policy will depend on what people think the organisation really means, and their behaviour will be based on this interpretation rather than the original safety policy (Donald and Canter, 1993);

The formal and informal organisational context in which people work is critical in guiding people's actions

p.5

Donald (1994) further highlighted the importance of measuring people's attitudes towards safety at work since these were not incorporated into existing safety audit techniques. Measuring the safety culture of a company and where necessary taking active steps to improve an organisation's safety culture has proved a successful way to reduce accident rates below those achieved through more traditional methods such as technological improvements.

2.8.4.4 *Safety Attitudes Predictive of Safety Performance*

Donald and Canter (1993) outlined how people's safety attitudes were predictive of safety performance and argued that since it is possible to predict accident rates following a safety attitude study, it is also possible to take corrective action to improve employee safety attitudes and thereby improve safety performance. Other researchers have reported similar findings regarding the link between safety attitudes and safety performance, for example Lee (1998) found that 16 out of 19 factors discriminated between accident-involved and accident-free respondents, and Lee and Harrison (2000) described how all but 4 of their 28 factors correlated with one or more of the nine criteria of accident history included in their study. The prediction of accident rates through safety attitudes was also reported by Siu et al. (2004) who concluded that high role overload can lead to accidents and a tendency to engage in unsafe acts. In summary, there is very strong evidence to suggest a relationship between safety culture and safety performance.

2.8.4.5 *Rule Violation*

The importance of employee attitudes (including management) towards rule violation within the workplace has been discussed as an important component of safety culture. Unsafe attitudes almost always precede accidents (Coyle et al. 1995) and Rundmo and Hale (2002) described the acceptance of rule violation as the strongest predictor of risky behaviour. Violations from organisational rules may help employees to get their work done, and if they are not penalised they can subsequently be viewed by employees as normal and acceptable behaviour. If violations are not penalised then they have immediate benefits and no (apparent) negative consequences to employees and therefore such practices are reinforced and violations are likely to continue to occur. Attitudes towards rule violation are explored in many safety culture surveys, for example the Safety Attitude Questionnaire (SAQ, described in more detail in Chapter 4, Section 4.2, Donald and Canter, 1993) contains questions relating to the attitudes of employees, co-workers and management towards the taking of shortcuts in the workplace.

2.8.4.6 *Self-Reported Accidents and Near Misses*

Due to the nature of most safety attitude surveys, i.e. they are typically anonymous and confidential in an attempt to ensure employees are honest in their responses, the majority of studies included self-reported accident rates. Some criticism has been made of this as a reliable measure of accident involvement, primarily due to the potential influence of social desirability (Gadd and Collins, 2002). However, studies which incorporated 'real' measures of accident rates found that safety culture factors were still predictive and also that there were high correlations between these and self-

reported accident rates (e.g. Hurst, Young, Donald, Gibson and Muyselaar, 1996) thus providing support for the continued use and validity of self-reports.

In addition to self-reported accidents, studies into safety and safety culture often make use of self-reported 'near misses', that is events which may have resulted in an accident but did not (see for example Mearns et al. 1998). There is a conceptual relationship between accidents and near misses, i.e. similar psychological processes are believed to be at play in the run up to both near misses and accidents, therefore investigation and identification of the predictors of near misses is useful for the identification of ways in which positive safety cultures can be promoted in an aim to reduce occupational accidents and injury. Data on near misses is routinely collated within many high-risk industries and it is a term that employees are familiar with. Near misses are generally more common than accidents (Barling, Kelloway and Zacharatos, 2002) therefore including near misses in studies usually enables more data to be captured and analysed than the reporting of accidents alone, and results in a greater number of incidents which can serve to enhance any statistical analysis of the predictors of incidents. Gathering data on both accidents and near misses can therefore result in the identification of more detailed information on the predictors of negative safety events within an organisation.

2.8.5 Importance of Management Attitudes Towards Safety

It has been argued that many safety problems have their origins in the poor attitude of management towards occupational health and safety (Coyle et al. 1995) and the importance of management attitudes towards safety and their influence on the safety

culture of a workplace has been investigated, with many researchers stating that managers are a key element in promoting a positive safety culture (e.g. Heinrich, 1959; Schein, 1992; Hofmann, Morgeson and Gerras, 2003; Harshbarger and Rose, 1991; Zohar, 1980). A review of the safety climate literature revealed employee perceptions of management's attitudes and behaviours to be the most useful measurement of safety climate (Gadd and Collins, 2002). The research detailed below illustrates the importance of management attitudes and behaviour as a way of shaping employee attitudes.

Hofmann et al. (2003) discussed the relevance of management and supervisor attitudes towards safety and concluded that 'front line leaders and the climates they help create within their work groups, can have a significant impact on the safety performance of the subordinates' (p.176). Managers' attitudes and behaviours towards safety features within an organisation are therefore believed to directly influence the safety behaviour of workers and the safety performance of the company. High management commitment, high safety priority and high risk awareness are described as particularly important attitudes for managers (Rundmo and Hale, 2002).

Schein (1992) described how senior managers are particularly important in shaping organisational culture, and O'Toole (2002) proposed a connection between management's approach to safety and employee perception of how important safety is, and reported that:

Reductions in injuries related to positive employee perceptions and especially to managements commitment to safety

2.8.5.1 *Productivity over Safety*

Placing productivity above safety results in accidents being more likely to occur (Lee and Harrison, 2000). If managers specify safety as a key concern but nevertheless turn a blind eye to violations, and reward behaviours which keep up production rather than adherence to safety rules, then the safety behaviour of workers and the organisation's safety performance are likely to be negatively affected. Following their investigation of safe employee behaviour in the steel industry Brown, Willis and Prussia (2000) described how;

Virtually every plant we visited was plagued by spikes in accident rates during times of increased production. In all cases... employees expressed the feeling that safety programs had been suspended.

p.459

2.8.5.2 *Management Commitment to Safety*

Clarke (1999), in her study of British Rail employees, detailed how a key feature of a company's safety culture is the shared perceptions amongst staff and managers concerning the importance of safety, and described how people were less likely to report incidents if they believed their managers were not committed to safety (Clarke, 1996). Clarke further concluded that although there is a need for positive safety attitudes at a senior management level, it cannot be assumed that these attitudes will automatically cascade down the organisational hierarchy. One reason she proposed for communication failure between management and employees is that staff and supervisors may be prone to negatively stereotype senior manager's attitudes and

actions. The implication is that organisations need to actively and continuously promote positive attitudes towards safety from senior management down.

Cox, Tomás and Oliver's (1998) study of commitment to safety looked at employee attitudes in three main areas; management actions for safety; quality of safety training; and personal actions for safety. They reported that attitudes relating to management actions towards safety had the strongest relationship to commitment to safety, and discussed how the importance of management actions in influencing personal actions and commitment is important for safety policy and / or interventions designed to reduce accidents at work.

2.8.5.3 *Importance of Good Communication*

Good levels of communication and a constant flow of information between people are characteristics of high reliability organisations where good communication is seen as an essential aspect of ensuring safe working practices are in place in the organisation (Bierly and Spender, 1995). There is a need to continually work at and review communication to ensure its importance regarding safety is not being neglected (Smallman and Weir, 1999). Ensuring regular safety meetings are held is proposed as one way to encourage two-way communication between management and workforce (Gadd and Collins, 2002).

2.8.5.4 *Blame Culture*

The importance of ensuring that the presence of a 'blame culture' does not result in people covering up accidents and near misses has been discussed in relation to high

reliability organisations where promoting a 'no blame culture' includes encouraging people to report incidents, ensuring they do not need fear disciplinary action if they do so, and treating accidents and near misses as learning opportunities rather than as something to cover up and be ashamed of (Bierly and Spender, 1995; Pool, 1997).

Most theorists agree that management play an important role in establishing positive attitudes to safety. Additionally, it has also been suggested that different levels of management may influence health and safety in different ways. For example Gadd and Collins (2002) proposed that managers have more influence on safety through the quality of communication within an organisation (organisations with a positive safety culture have been characterised by effective communication, e.g. Glendon and McKenna, 1995), whereas the supervisors of employees have more of an impact with how fairly they interact with workers.

In summary, the importance of management attitudes towards safety is critical, not least because senior managers and managers have been identified as the people in the organisation most likely to exert pressure to put production before safety (Lee and Harrison, 2000). Given the importance of management in promoting a safe culture the role of management will be assessed in relation to risk culture in the present study.

2.9 Characteristics of Low Accident Organisations

The characteristics of low accident organisations, which include some of the issues discussed above in relation to safety culture, were outlined by Lee (1998) in his assessment of safety at a nuclear reprocessing plant:

- High levels of communication between and within levels of the organisation
- Good organizational learning
- A strong focus on safety by the organization and all its members
- A senior management that is strongly committed to safety
- A management leadership style that is democratic, cooperative, participative and humanistic, as distinct from autocratic and adversarial
- More and better quality training
- Clean and comfortable working conditions
- High job satisfaction, with favourable perceptions of the fairness of promotion etc.
- A workforce composition that includes employees who are recruited or retained because they work safely and have lower turnover and absenteeism, as distinct from yielding higher productivity

p.219

2.10 Summary

This chapter introduced the concepts of organisational culture and climate and outlined how safety culture and the factors underpinning safety culture have been identified by a number of researchers in a variety of settings (e.g. Donald & Young, 1996; Lee, 1998; Mearns et al. 1998). Also discussed is how in order to investigate safety culture, many research groups have developed questionnaires which measure employee attitudes towards safety issues within the workplace.

The Safety Attitude Questionnaire (SAQ) developed by the Safety Research Unit at the University of Liverpool was introduced in this chapter (see Chapter 4 for additional information on the SAQ). Donald and Young (1996) outline the 16 scales that comprise the SAQ and describe how 14 of the scales have been shown to correlate with accident rates at statistically significant levels (see also Donald and Canter, 1993). Furthermore, research has demonstrated that improvements to accident rates can be made as a result of interventions put in place following safety attitude surveys (Canter & Donald, 1990). Knowledge and content of the SAQ will be used during the current research as a guide and basis to aid development of a questionnaire designed to gather information on employee attitudes towards risk.

Similar constructs have been identified by individuals researching safety culture (see for example, Lee, 1998; Mearns et al. 1998) indicating that it is likely that there are generic safety culture factors, although there has as yet been no consensus reached between research groups as to the exact nature of these factors. Nevertheless, it is generally accepted that safety attitudes and culture have an important part to play in the accidents and near misses experienced within organisations, indeed the British Safety Council (2002) describe the monitoring of safety culture as 'best practice'.

The current research aims to analyse risk culture within financial institutions through use of a risk attitude questionnaire, and will investigate whether or not organisational risk culture impacts upon financial loss incidents in the same way as safety culture impacts upon the experience of accidents and near misses. If risk attitudes and risk culture are shown to be important to an organisation's experience of errors resulting in financial loss, then it is anticipated that knowledge and understanding of risk

culture within an organisation can be used to reduce the risk of financial loss in the same way as knowledge and understanding of safety culture is used in the industrial sector to reduce the risk of accidents.

In order to exemplify the role that culture has played in loss events within the financial sector the following chapter discusses the regulation of financial losses and presents a case study discussion of both the Barings Bank crisis in 1995 and the more recent Allied Irish Bank losses in 2002. Similarities between these and safety related events in industry are discussed, thereby providing support for the contention that risk culture and safety culture are similar constructs.

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3. Regulation of Financial Loss

3.1 Introduction

The present chapter focuses on the scale and type of events that are being experienced by financial organisations and provides an overview of two loss events (Barings Bank and Allied Irish Bank) to illustrate the nature and importance of cultural issues. These two events were selected primarily due to their high-profile nature and the availability of detailed information relating to the losses that occurred. Also detailed in this chapter are the regulatory changes being instigated as a result of growing awareness of the importance of culture; the scale of loss events being experienced by the financial industry; and the similarities between risk culture and safety culture.

It is acknowledged that the events discussed in this chapter are extreme cases of financial losses but inspection of financial reports and legal proceedings that are publicly available (for example through the Securities and Futures Association) revealed that these events are not unique apart from the scale of losses, which served to make them especially newsworthy.

The Barings and Allied Irish Bank (AIB) events are outlined below and cultural issues identified and discussed (see Appendices 1 and 2 for more detailed information pertaining to these events). The importance of these cases and the warning signals they sent to the financial sector cannot be overstated, i.e. it is apparent that the losses (especially those of Barings Bank) served to change the perception of risk within the financial sector and raised the awareness of cultural issues as relevant to financial loss

events (see for example Stead and Smallman, 1999; Soane et al. 1998). The Barings losses are still discussed today; even more so in the wake of the AIB loss, to which similarities to Barings have been pointed out (e.g. BBC News Online, 2002). The impact of these events on the financial sector and the regulatory changes that are planned as a result of the recognition that culture is important are outlined.

Similarities between Barings and AIB are identified and the parallels evident between financial loss events and safety related events in industry discussed. As described in Chapter 2 it is generally accepted that attention to cultural issues is important in order to reduce the risk of accidents in an industrial context, and the measurement and monitoring of safety culture has been described as best practice (British Safety Council, 2002). The research detailed in this thesis investigates whether or not the same psychological processes are involved in both financial loss and safety related events. This chapter, and its description of the role cultural issues played in two high profile loss events provides support for the view that similar processes are involved.

3.2 *Financial Loss Events*

There have been many instances of loss events within the financial sector, the two obvious and most topical being Barings Bank and Allied Irish Bank. Due to the prominence of these cases they are introduced in this chapter as case study illustrations of the likely importance of risk culture (also see Appendices 1 and 2). However, these events were not isolated cases and there are numerous other occurrences of cultural influences on loss events. For example, Llewellyn (2000) wrote about banking crises and discussed how there is currently 'a greater failure rate among banks than at any time since the great depression of the 1930's' (p.71) and

cited weaknesses such as inefficient management and control systems as a root cause. The article stressed that there should be less attention paid to detailed rules and regulations and more on ensuring there are effective management and control systems and a strong management culture in place.

The importance and prevalence of 'people risks' was highlighted by Rachlin (1998) who stated that although many operational risk events are attributed to the failure or inadequacy of internal controls it is often the failings of the people within the system that are to blame. For example the bank clerk who mistakenly transferred £3.1 million instead of £1,800. Also detailed is the increased risk of losses occurring during times of change within an organisation. For example, when a new back office system was introduced in a Treasury environment, staff 'gave up' performing reconciliation (double checking payments in and out). This meant that when a further error resulted in half a million pounds being sent to the wrong place it was only detected five months later.

There are many loss events that have occurred over recent years that have made it into the papers or financial reports. For example the copper market fraud at Sumitomo (Riskinstitute, 2002a), disciplinary action taken against Sussex Futures as a result of their failure to monitor staff (S. F. A., 2001), losses of more than \$1 billion dollars at Daiwa bank (Dowell, 1997) and the Kidder Peabody and Joseph Jett scandal, where \$339 million of phoney profits were reported (Hansell, 1997). Descriptions of these cases all reveal cultural elements which played a role in the run up to the losses occurring. For example, Iguchi, the perpetrator of the losses at Daiwa bank, described how he didn't see his actions as criminal since they were only a violation of internal

rules. He also believed that several of his managers knew what was happening in the run up to the losses being uncovered, but chose to turn a blind eye (Dowell, 1997).

In addition to the loss events available for public scrutiny, there are many more cases not openly reported by financial organisations in an effort to prevent the loss of their reputation. This is clearly reflected in the number of loss events reported in the operational risk data collection exercise detailed in Section 3.6 below.

An important point of consideration is that risk taking is an inherent part of the financial sector, since without taking economic risks, financial organisations would cease to exist. The emphasis of the current research is therefore on unacceptable risk, i.e. risk that goes beyond that accepted and allowed within an organisation rather than risk per se. As Ferguson (2002), the Vice Chairman of the Board of Governors of the U.S. Federal Reserve System stated:

Banks survive and prosper by accepting risk, which is their crucial economic role and the reason for their existence.

p.1

and went on to describe how, in order to successfully manage risk:

It is crucial then that institutions maintain a culture that values integrity and creates adequate controls. That effort must begin at the top.

p.4

A further issue of importance that needs to be highlighted is that due to the nature of financial markets, errors and mistakes may not always result in a financial loss. If for example a trader makes an error or indeed a conscious 'gamble' and puts the bank at the risk of a large financial loss, it is often the movement of the market that will determine whether or not a loss occurs. If the market moves in a favourable way then this could result in a profit being made even though risk controls were breached (Kingsley et al. 1998). Traders are well aware of the degree of risk (or to put it more bluntly, the amount of money they are 'allowed to lose') that is acceptable to their management. However, if a positive risk culture is in place, then any breach of rules, for example exposing the bank to the risk of a large loss or failing to conduct adequate checks, will be unacceptable, even if it ultimately results in profits. Risk taking beyond that which is permitted by the bank is therefore the important factor, not the resulting outcome. The importance of this cannot be overstated. If an employee circumvents the rules and subsequently is applauded for profit making then surely they are more likely to circumvent the rules a second time, since they are likely to perceive their rule breaking as being viewed by management as acceptable behaviour. If the culture of an organisation is such that management turn a blind eye to rule breaking as long as profits are being made then rule breaking will come to be seen as acceptable practice. This of course is not a problem for the organisation until such rule breaking results in losses occurring instead of profits. At which point, as illustrated by the case studies discussed in Section 3.4, the damage is already done and the losses can be catastrophic.

3.3 Impact of Loss Events on Organisations

The impact of loss events on financial organisations can be extremely negative. In some cases it has led to the total collapse of organisations (e.g. Barings), in others it has resulted in severe financial losses and at the very least a tarnished reputation (e.g. AIB). Engemann and Miller (1992) discussed how banks face two types of losses following loss events, the first being direct losses such as lost fees, funds or compensation costs, the second being indirect losses such as the loss of future business as a result of reputational damage.

The cost of reputational damage to financial organisations is of major concern and can far outweigh the actual losses incurred through a fraud or loss event. Ackroyd and Thompson (1999) described how organisations whose reputation relies upon the trust of the general public, such as banks, will tend to sack employees who misbehave rather than prosecute, as the danger of negative publicity is too high. A point that is also discussed in Punch's (1996) exploration of corporate misconduct. Practices such as these can have a negative impact, as they lead to a lack of transparency within the financial sector, and many operational losses are hidden from public (and competitors) view. The planned regulatory changes within the financial sector (see Section 3.5) are intended to tackle this issue by forcing banks to be more open about their operational losses.

3.4 Barings and AIB Bank

3.4.1 Overview of Events at Barings Bank

The collapse of Barings Bank followed the actions of one solitary trader, Nick Leeson, and has been subject to many reviews and analyses, not least due to the scale of the losses (estimated at £927 million, Stonham, 1996). The theme running through accounts of the events at Barings is that although Leeson was primarily responsible for the loss, it was the culture of Barings Bank (and its subsidiary Barings Futures Singapore (BFS) where Leeson worked) that enabled Leeson to hide the losses for so long and therefore played an important part in the scale of the financial losses ultimately experienced by the bank. An overview of the Barings events is provided here and Appendix 1 details the aspects of cultural breakdown evident within the organisation.

Barings Bank was placed in administration on the 27th February 1995 following revelations that Nick Leeson, a trader based in the Singapore office, had accumulated losses of over £800 million. Leeson was engaging in unauthorised trading over a number of years and hid the losses (and at one point the profits) from this illegal trading in a 'secret' account, the notorious five eights (88888) account. He hid his actions from Baring's management by ensuring the 88888 account was reduced to zero at the end of the month by passing trades through the system and only returning them to the 88888 account once month end had passed. This ensured that when the end of month checks were done the 88888 account was not identified as holding a position (i.e. as having any outstanding trades). A state of affairs that is against regulatory guidelines, would have led to an investigation of the 88888 account and would ultimately have resulted in the exposure of Leeson's illicit trading. The

management of Barings denied that they had any knowledge of the 88888 account prior to the collapse (Bank of England, 1996) although doubts have been cast upon this claim from a number of sources. For example the Singapore report that followed the collapse of the bank was particularly damning of managements role in the loss (Lim and Kuang, 1995).

For more detailed reviews of the Barings case, see the Bank of England Report (Bank of England 1996) and / or the Singapore report (Lim and Kuang, 1995). Additionally there are many articles and books available which describe events (e.g. Stonham, 1996, Fay, 1996, Leeson, 1996).

3.4.2 Overview of Events at AIB

The losses incurred by AIB were related to activities uncovered in February 2002 in the trading operations division of its US subsidiary, Allfirst. The losses were estimated to be £473 million. The perpetrator of the fraud was identified as John Rusnak, who pleaded guilty to the charges in October 2002 and was subsequently sentenced to serve seven and a half years in federal prison. Unless otherwise stated the events outlined here are taken from the preliminary report prepared in March 2002 (Wachtell et al. 2002). The report made criticisms of a weak control environment and inadequate monitoring, with a number of specific instances being described in more detail. An overview of events at AIB is given below and Appendix 2 details aspects of cultural breakdown evident within the organisation.

Rusnak worked for Allfirst, a subsidiary of AIB based in the United States, where he was responsible for foreign exchange trading. He hid the losses he incurred over a five-year period by circumventing controls and manipulating the weak control environment in place at Allfirst.

The first losses of Rusnak's are believed to have occurred in 1997 when he traded incorrectly on the movement of the Japanese yen. In order to hide his losses he created fictitious options (an option is an agreement which gives the right, but not the obligation to buy or sell a specified quantity and quality of a product, at a specified price within a specified time period). These fictitious options were not noticed for two main reasons. Firstly one day options were not usually tracked, a fact that Rusnak was well aware of, secondly Rusnak persuaded an individual in the back office not to follow normal procedures, i.e. not to seek confirmation of these options.

As more losses were incurred through Rusnak's trading activities, he created more and more fictitious options. In order to fund his trading he also raised money from other Banks by selling options to them and then hiding these liabilities through the creation of yet more fictitious options. In addition to his use of false options to cover his tracks Rusnak also created false figures to manipulate the Value at Risk (the measure used by Allfirst and AIB to monitor his trading) in order to prevent his extreme position being identified. The fraud has been described as 'inelegant', and many opportunities for it to be uncovered were missed, resulting in it taking five years for the losses that were being incurred and hidden by Rusnak to be identified.

3.4.3 Evidence of Cultural Breakdown at Barings Bank and AIB

The cultural inadequacies that were in place at Barings and AIB prior to the exposure of financial losses are outlined in Appendices 1 and 2 and, in order to ease comparison of the two events, are grouped thematically under a number of broad headings; regulatory failures, inadequate supervision, undue influence on other employees, unclear reporting mechanisms and inadequate communication, incorrect assumptions, employees being wary of management, inadequate auditing, and an inadequate control environment.

The issues described in Appendix 1 were highlighted in the Bank of England (1996) report, which followed the collapse of Barings Bank. The Singapore report described similar findings but was even more damning of Baring's management team than the Bank of England report stating that:

In our view, the Baring Group's management either knew or should have known about the existence of account 88888 and of the losses incurred from transactions booked in this account.

Lim and Kuang (1995) Section 16

This suggests that it was not solely a case of inadequate controls and rules and regulations that led to the losses being incurred. Although there were problems with some of these aspects within the bank, it was believed to be the culture of Barings and the environment in which people worked which resulted in controls and rules that were in place not being adhered to. The preliminary report into the AIB losses

(Wachtell et al. 2002) also suggests that cultural inadequacies (outlined in Appendix 2) played an important part in events.

The cultural aspects of the Barings crisis have been approached by a number of researchers. For example, Stein (2000) analysed the events running up to the crisis from a psychoanalytic point of view and, although he was not directly looking at cultural issues, concluded that much of what occurred was the result of 'group mentality' (Bion, 1961). He proposed that the conditions within Barings, which made Leeson's fraud possible, were set in place substantially prior to Leeson's arrival at the bank, indicating that the culture of the organisation was an important factor in the losses that were incurred.

3.4.4 Similarities between Barings and AIB losses

Investigation of events at Barings and AIB revealed cultural breakdown in the following areas for both organisations.

- Inadequate supervision of employees
- Perpetrators of the frauds having undue influence on other employees
- Inadequate communication within the organisation
- Unclear reporting lines
- Inadequate auditing procedures
- Employees being wary of management
- Inadequate control environment

Negative aspects of the working environment are evident in both cases and the attributes of a negative risk culture linked to similar issues. For example it is apparent that controls were in place that could have prevented the losses from occurring but employees were not adhering to them, often as a result of management actions, indicating that it was acceptable to do so. Additionally, unclear reporting lines meant that even when employees were aware of problems in the workplace they were unsure who they could / should approach to report this. Furthermore, evidence of intimidating and bullying environments in both organisations served to discourage people from reporting any concerns they may have had.

It would appear from the reports into both Barings and AIB that the culture of the organisations led employees to believe that adhering to certain risk controls was not important. People's negative attitudes and beliefs ultimately resulted in procedures not being followed, and gave the perpetrators of the fraud increased opportunity to hide their actions and losses.

The relevance of managements perceived attitudes towards risk and the influence this is likely to have on employee attitude and behaviour is evident in both cases. For example, if people believe that management are condoning risky working practices, and that reporting concerns about the risk environment will make no difference (or even that their reporting concerns will impact negatively upon themselves) then they are unlikely to react to control breaches and will instead accept working practices which they know to be against guidelines as simply the 'way in which things should be done'. In this type of scenario, although it may be an individual employee who fails to complete a necessary check or procedure, it is the perceived attitudes and

behaviour of management that have created an environment in which it is believed to be acceptable to do so.

3.5 *Regulatory Changes and Financial Risk*

3.5.1 Turnbull Guidelines

The Turnbull guidelines published in 1999 served to advise companies on best practice in adhering to the regulatory requirements of corporate governance, and were designed to ensure Boards of Directors in the commercial sector were made more accountable for the culture of their organisation than they had been previously. Pleading ignorance to actual practices (as opposed to espoused practices) within an organisation, as evident in a number of events within the commercial sector (e.g. the management in Barings claimed they were unaware of control failures), was no longer an acceptable or adequate defence for poor management (Turnbull, 1999). The Turnbull guidelines were aimed at improving internal controls and the key messages have been described as ensuring; management at all levels within the organisation are involved in risk management and control strategies; consultation throughout the organisation is taking place; and where appropriate the business culture of an organisation should be improved to ensure these measures are being taken (Jones and Sutherland, 1999).

Turnbull described how the system of internal control should 'be embedded in the operations of the company and form part of its culture' (p.7) and detailed how senior management should be asking questions such as; does the company's culture support

their business objectives, risk management and internal control system; and do senior management demonstrate, through their actions as well as policies, the necessary commitment to competence, integrity and fostering a climate of trust within the company? Hill (2001) in his discussion of the Turnbull guidelines went on to detail how 'people's attitudes and behaviours are the other key components affecting achievement of a managed risk culture' (p.30).

3.5.2 Financial Sector Regulatory Changes

The Turnbull guidelines outlined above encompass the commercial sector. In addition to this, the financial sector and its regulatory bodies have been instigating changes designed to ensure internal controls and operational risks are managed more carefully than they have been in the past (operational risk is 'the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events' BIS 2003, p.2).

In 1998 the Basle Committee on Banking Supervision (comprised of members representing both the central bank and the regulators of the financial industry from 13 countries, including the UK) produced a framework document aimed at evaluating the current internal control systems in place within the financial sector. This document detailed how both the Board and Senior Management are responsible for establishing a culture that demonstrates the importance of internal controls. They include five categories of control breakdowns; lack of management oversight and control culture; inadequate recognition and assessment of risk; absence/failure of control structures and activities; inadequate communication (especially upward) and

inadequate/ineffective audit and monitoring. This was one of the first documents from the governing bodies of financial institutions to introduce the concept of culture and to describe culture as important in the drive to reduce internal control failures. Subsequent years have seen these concepts drawn upon more widely from within the financial community.

In 2001 a consultative exercise began between the BIS and financial institutions into planned changes in bank regulation. Intervening years have seen the BIS striving to heighten awareness within financial organisations of the need to focus attention on Operational Risk, to ensure Banks have a strong control culture. Prior to this, financial institutions had primarily focused on Market risk (the risk of being over exposed to changing interest rates, exchange rates etc.) and Credit risk (the risk that a borrower will default), with no systematic evaluation of the importance of Operational Risk. The increasing recognition of the importance of operational risk and cultural aspects of organisational life are discussed in a number of BIS publications. For example, in their guidelines for the management and supervision of operational risk they describe the need for;

A strong operational risk culture and internal control culture (including, among other things, clear lines of responsibility and segregation of duties), effective internal reporting, and contingency planning are all crucial elements of an effective operational risk management framework for banks of any size and scope.

BIS (2003) p.1

The BIS have also recognised that whilst there is a need for a framework of formal, written policies and procedures, this alone is not enough to ensure appropriate behaviour occurs within financial organisations. They have stated therefore that formal policies such as these should be reinforced through strong control *cultures*, which promote sound risk management practices.

After lengthy discussion between the regulators of the financial sector (within the UK this is the Financial Services Authority, FSA) and financial organisations, and in recognition of the degree of financial loss being incurred as a result of operational risk, a new Capital Accord has been proposed which stipulates that financial organisations must look at their Operational Risk and assess their exposure to losses as a result of operational issues (BIS, 2004). Capital Accord was designed to ensure Banks have adequate funds to prevent insolvency should they experience financial loss. The implication of the new Capital Accord is that if banks can assess and ultimately reduce their operational losses they will be required to retain less funds to offset the risk of insolvency (i.e. the risk of insolvency will be deemed to be lower). A reduction in the amount of operational losses being experienced and a corresponding reduction in the amount of capital banks are required to retain are both strong financial incentives for banks to look closely at operational risk issues.

Operational risk covers a number of potential loss events and, partly as a result of the initiatives by the regulators of the financial sector described above, cultural issues are now increasingly being recognised as important factors within operational risk. Management need to be aware of the role that culture plays in their exposure to the risk of loss events occurring. It is not enough to have excellent controls in place in an

organisation if controls are simply not being adhered to by employees, something which is emphasised by the BIS (2003):

Both the board and senior management are responsible for creating an organisational culture that places a high priority on effective operational risk management and adherence to sound operating controls.

BIS, 2003, p. 6

The Board and Senior Management should promote an organisational culture which establishes through both actions and words the expectations of integrity for all employees in conducting the business of the bank.

BIS, 2003, p. 6

In the wake of these planned regulatory changes (due to come into effect from year-end 2006, BIS 2004) financial organisations are looking for ways to assess their operational risk exposure, and whilst culture is not the only important aspect of the new regulations, it is widely accepted that it plays an important part. There is therefore interest from the financial sector in new approaches that will assess risk exposure, especially in the areas of operational (and therefore cultural) risk that they have not traditionally assessed as part of their risk management strategy, i.e. financial organisations are recognising the need to assess risk culture and are looking for ways for this to be achieved.

Theodore (2002) argued that the recent interest in operational risk events are a shift in focus, from banks merely reacting to operational risk events, as they have in the past, to their attempting to quantify and manage them. He stressed that banks should not focus solely upon reducing their capital charges through merely monitoring their exposure to risk but should instead aim to improve the risk culture of their organisation by ensuring tight procedures and controls are both in place and being adhered to. He proposed that one of the fundamental questions banks should aim to answer when assessing their operational risk is ‘what is the institution’s overall risk culture (is there a stable fundament for operational risk management)?’ (p.8).

MacDougall and Marsteller (2002) further detailed how corporate boards need to take care to promote behaviour that accurately manages risk and ensures compliance to risk controls.

3.6 Operational Risk Data Collection

In recognition of the proposed changes to the regulation of the financial sector, the regulators of financial organisations have encouraged financial organisations to collect and collate information on operational loss events in order to ascertain the full scale of the losses being incurred. The data collection exercise conducted in 2002 revealed that out of 89 participating banks 47,269 individual losses were reported giving an average of 528 operational losses per bank per year (BIS, 2002). It is evident therefore, that losses are occurring at a high rate and whilst not all of these will be as a result of cultural issues, existing research into financial loss events suggests it has a crucial part to play. It is also worth noting that only losses greater

than \$10,000 were included in this loss data collection exercise, which suggests there were many more events that fell below this threshold and were therefore not reported.

A survey into operational risk in the banking industry conducted by PricewaterhouseCoopers and the British Bankers Association (Rossiter, 2002) revealed that around 25% of respondents had experienced individual losses of over \$1 million in the past three years and approximately 73% of respondents stated that they thought operational risk was as, or more, significant than either market or credit risk. An international benchmarking survey into operational risk management conducted in 2003 by SAS reported that 90% of financial services firms lost more than \$10 million a year through poor operational risk management with 35% believing they lost as much as \$120 million per annum.

Further indication of the scale of operational losses is alluded to in Finlay and Kaye's (2002) survey of operational risk in the financial services industry. They described how several players within finance have publicly stated that they average between one hundred and two hundred operational risk incidents of significance per month. The scale of these losses in terms of both the number of loss incidents and their monetary value explain to some extent the growing interest in operational risk. It is this, alongside the encouragement from the regulators, that has partly driven the interest from the financial sector in the current research.

As demonstrated by the figures cited above, the scale of losses resulting from operational failures is of extreme importance to financial organisations. Indeed, it is difficult to understand why these issues have not already been tackled within the

industry and it is not surprising that the regulators of the financial sector are pushing organisations to monitor and measure their operational risk.

3.7 *Parallels with Industry*

Cultural issues, such as those discussed in the Barings and AIB case studies, are evident in a number of industrial disasters and accidents. For example, the enquiries into the King's Cross Underground disaster (Fennell, 1988), the Piper Alpha oil rig fire (Cullen, 1990) and more recently the Ladbroke Grove rail crash (Cullen, 2001) all revealed cultural factors similar to those detailed above (e.g. relating to issues such as inadequate supervision and communication) which significantly contributed to the chain of events. Indeed, it is generally recognised that human error and cultural issues within an organisation can result in both disasters and smaller scale accidents occurring in spite of the technical and engineering processes that exist to prevent such incidences occurring (e.g. Granot, 1998; Donald and Young 1996, Mearns et al., 1998, Lee, 1998).

As discussed in Chapter 2 (Section 2.8) the importance of monitoring and controlling an organisations safety culture is increasingly recognised as a way to improve safety and reduce accidents (Health and Safety Executive, 2002). Similarly, the importance of cultural issues and the limitations of controls to work effectively without a strong culture in place is demonstrated in the above financial case studies, where it is clear that, although controls and regulations were in place, they were not sufficient to prevent the financial losses occurring. The limitations of controls is recognised by the Basle Committee on Banking Supervision (1998) who outlined five categories of control breakdown, only one of which related to the absence or failure of controls, the

other four categories being; lack of management oversight and control culture; inadequate recognition and assessment of risk; inadequate communication (especially upward within the organisation) and inadequate / ineffective audit and monitoring.

The similarities between industrial crises and financial crises have been identified in other texts. Sheaffer et al. (1998) discussed how less tangible features of an organisation, such as culture, can provide useful insight into the failure proneness of an organisation. They outlined the incubating factors of the Barings crisis and described them as similar to the incubating factors evident in industrial accidents and disasters (Turner, 1994). They also discussed how past successes can 'numb' managers into believing that their internal practices and controls are adequate.

Stead and Smallman (1999) outlined the similarities between business failures and industrial crises, a process which they argued proved in part the case for applying industrial crises management to business failure. They described organisational culture as the main contributory factor in the loss events experienced at Johnson Matthey Bank, BCCI and Barings. They outlined the crisis cycle of events, already used by researchers to describe industrial crises, which included pre-conditions, triggering event, crisis event, recovery and learning, and argued it is evident in financial crises as well as industrial. Additionally, they detailed how there is little, if any, learning evident from past crises even though similar issues are being repeated. For example they referred to the similarities evident between the Johnson Matthey events in 1984 and the Barings Bank crisis which occurred 11 years later in 1995.

Soane et al. (1998) discussed both the positive and negative effects of organisational culture within financial institutions, describing how sub cultures and divisions could potentially be a major threat. They used the example of Baring Futures Singapore as a negative sub-culture, which ultimately led to the collapse of the entire organisation, Barings Bank. Industrial accidents such as Piper Alpha and Challenger were proposed as offering lessons about risk management, including the importance of developing a safety culture. The likely importance to financial institutions of placing emphasis on cultural issues was broached when Soane et al. discussed the trading actions of Leeson and Iguchi (Daiwa Bank):

The lengths to which these individuals were prepared to go... and the lack of management controls over them, are unusual. However, it also seems reasonable to think that replicas of these behaviours on a minor scale might be quite commonplace.

Soane et al. (1998) p. 159

It is apparent that the financial sector is increasingly looking at culture as relevant to operational risk and financial loss events. The emphasis the industry is beginning to place on these issues indicates that developing a way to measure cultural influences is both relevant and important to the industry. Interestingly, the progress being made in the financial sector in relation to financial loss events mirrors to some extent the progress that has already been made in the industrial sector in relation to industrial accidents. When discussing the progress made in the safety arena, the Advisory Committee for the Safety of Nuclear Installations (ACSNI, 1993) described a three-stage process:

There are three phases in the history of attempts to regulate general industrial safety. First, there is a stage of concentration on the outcome; if a worker or a member of the public is harmed, those considered responsible are punished. Second, there is a stage of prescribing in advance the detailed action that industry must take. For example the organisation must provide guards of certain types for specific machines... This stage is an advance because it attacks points of danger before actual harm occurs... In the third stage, industry is canvassed to develop a safety culture... This stage of regulation... concentrates on the internal climate and organisation of the system [and] also emphasises the need for every individual to 'own' the actions being taken to improve safety.

ACSNI (1993) p. 47

The first two of these stages are apparent within the financial sector to date and, as demonstrated by the shift in regulatory demands described above, the emphasis is beginning to turn to the third stage, i.e. to look at the culture of the organisation as relevant to the reduction of financial losses in order to ensure all effort is made to reduce the risk of future incidents occurring. Llewellyn (2000) in his review of banks 'regulatory regime' stated that:

Externally imposed regulation in the form of prescriptive and detailed rules is becoming increasingly inappropriate and ineffective. More reliance should be placed on institutions' own risk-analysis, management, and control systems. This applies not only to quantitative techniques such as value-at-risk (VAR) Models but also to the management culture.

Llewellyn (2000) p.96

In discussing the implications of the Basle Committee's (1998) proposed operational risk guidelines for the financial sector in Japan, Geiger (2000) outlined how operational risk is not a new concept but is in fact one of the oldest risks which banks face. He drew an analogy between safety and financial loss events saying that operational risk management resembled the risk management of both the industrial and energy sectors more than it does the management of credit or market risk.

The concept of financial risk culture is analogous to current practices within industrial safety (Muermann and Oktem, 2002), and banks can aid their understanding of low frequency / high impact events (such as the Barings Bank losses) by focussing on high frequency / low impact events (such as those included in the Operational Loss data collection exercise described above). Muermann and Oktem further proposed that banks should strive to capture and learn from 'near-miss' data, i.e. they should look at events which do not result in a financial loss and use the information they gather in order to prevent future events which could lead to full-scale losses occurring.

We consider near-misses as weak signals some of which contain a genetic signature of a serious, adverse effect.

Muermann and Oktem (2002) p. 11

The BIS (2001) also discussed the possibility of using near misses as indicators of an organisation's exposure to risk, although this is not yet a regulatory requirement.

The collection and consideration of near-miss data is normal practice within high-risk industry and is commonly used as a tool to monitor risk exposure in relation to

industrial safety. Near-miss data is also often collected within safety culture research and has been shown to be related both to the components of safety culture and to the experience of actual incidents. The concept of safety culture and the links that have been found between safety culture and accidents and near misses were discussed in more detail in Chapter 2. It is apparent that some organisations within the financial sector are beginning to look at this type of data but it is not as yet common practice. Finlay and Kaye's (2002) survey into emerging trends in operational risk within the financial services industry provided an estimation of how widespread this type of data collection is. Fifty percent of respondents stated that their organisation gathered some information on the experience of near-misses, although there was no clarification as to what type of data they were collecting. It will be interesting to see whether or not the current research reveals if financial organisations are collecting data on near-miss events.

Finally, the parallels between industrial disasters and financial loss events have been discussed by a number of researchers. Toft and Reynolds (1997), in their discussion of the management of risk, were among the first to discuss the similarities of financial loss and accident events. They detailed a number of disasters including safety related disasters (e.g. the capsizing of the Zeebrugge cross-channel ferry and the crush of spectators in the Hillsborough football ground) and financial crises (Barings Bank) and described how there is often no malfunction of equipment, which can be said to have caused the events to occur, rather, that there is a mixture of 'human, organisational and social pathologies' (p. 14), which are responsible. They described how similar events can occur across organisations within the same industry due to 'organisational isomorphism' where organisations are at risk of similar failures as a

result of the similarities in their organisational structure and processes. Also detailed is the lack of information sharing between organisations. More information sharing between organisations would go some way to helping organisations learn from the failures experienced by others. Unfortunately, organisations are often unwilling to share information, as they do not wish to either give their competitors a commercial advantage or risk damaging their reputation by broadcasting their business failures. Although information sharing would be expected to help reduce the number of incidents occurring, even when information is in the public domain it is often the case that cross-organisational learning does not occur. This appears to be the case in the Barings and AIB losses where the same type of risky events were allowed to occur. Within AIB for example inadequate supervision and controls not being enforced, even though the Barings case was widely publicised, indicate that financial organisations are not learning from major loss events. The regulatory changes due to come in force in 2006 (BIS, 2004) should force organisations to pay more attention to these issues, a process which is similar to that within industry;

While it would appear that orgs other than those involved in a particular incident do register that a disaster has taken place in their industry, sadly, they often do not appear to incorporate the findings of the enquiry into their organisation unless legislation is passed to that effect.

Toft and Reynolds (1997, p.24)

3.8 Summary

This chapter discussed financial loss events and the negative impact such events can have on financial organisations, both in terms of direct (i.e. financial) and indirect (e.g. reputational) losses.

Cultural issues in relation to two case studies (Barings and AIB) have been detailed. Identified and discussed within the case studies was people's attitudes towards the risk environment in which they work, i.e. the risk culture, and how these attitudes influenced the organisations' subsequent experience of financial losses. The influence that management had on employee attitudes towards risk through their own (apparent) attitudes and actions towards risk was identified as particularly important.

Similarities between the Barings and AIB losses in terms of cultural breakdown have been outlined, for example the intimidation and bullying of employees, the existence of unclear reporting lines, and ambiguity as to who was in charge of completing tasks (particularly in relation to supervision and controls).

Finally, parallels between the cultural issues evident in financial loss events and industrial disasters / accidents have been identified thereby providing support for the contention that similar psychological processes are at play in both sectors. The rationale underpinning the present research, i.e. that risk culture will be related to financial loss events in a similar manner to which safety culture is related to safety incidents in industry, is therefore supported.

The following chapter outlines the procedure followed in the development of a questionnaire designed to measure employee attitudes towards risk.

4. Method - Development of the Risk Culture Questionnaire

4.1 Introduction

This chapter details the rationale behind, and the procedure followed in the development of a risk culture questionnaire. The questionnaire was named the 'risk culture questionnaire' since, although the questions were designed to gather information on employee attitudes towards risk, inspection of the aggregated attitudes of employees will serve to provide insight into the risk culture of an organisation (Guldenmund, 2000). Furthermore, organisations and people generally understand the term culture (Denison, 1996) and there is therefore benefit in using this term when discussing and giving feedback on the research to participating organisations and employees.

Since the risk culture questionnaire was based partly on the concepts underpinning and the content of the safety attitude questionnaire (SAQ) the chapter begins by providing information on the development and structure of the SAQ. The SAQ's predictive ability in relation to accidents and near misses is also outlined.

Section 4.3 begins with the rationale for using a questionnaire to measure risk culture and details the stages of questionnaire development. These include; the drafting of questionnaire items; the selection of items for inclusion in a draft questionnaire; the assessment of the pertinence of the questionnaire with personnel within financial institutions; the assessment of the questionnaire items in relation to the risk culture issues identified as important in the case studies detailed in Chapter 3; the inclusion of

items asking employees to self-report their involvement in errors and near misses; and the assessment of the face and content validity of the questionnaire through interviews with employees working in two organisations involved in the research (Org1 and Org2).

The chapter ends with a brief discussion of the distribution of the questionnaire within participating organisations and the feedback provided to them in the form of a risk culture report.

4.2 Safety Attitude Questionnaire (SAQ)

The SAQ was developed as a measure of employee's safety attitudes, which were argued to be indicative of the safety culture of an organisation and has subsequently been shown to predict accident rates (e.g. Donald and Canter, 1993; Donald and Young, 1996). It is envisaged that the measuring of risk attitudes and an investigation of the relationship between risk attitudes and financial loss events will prove beneficial to the financial sector in a similar manner to which the industrial sector benefits from the measurement of safety attitudes. Since the concepts behind, and the content of the SAQ guided the development of the risk culture questionnaire, detailed information about the SAQ is given in the sections below.

4.2.1 Initial Development of the SAQ

The SAQ was designed to inform on the safety culture of an organisation through the exploration of employee attitudes towards aspects of safety in their workplace. A

systematic, theoretical approach was adopted to identify the key elements of safety attitude.

The original SAQ comprised in excess of 300 questions, following adoption of the 'mapping sentence' approach whereby questions for inclusion were devised through the combination of specified facets relating to safety in the workplace. An advantage of using the mapping sentence method of question generation is that it ensured the basic components of attitude were included in each question. A disadvantage of the method is that a large number of similar (although not identical) questions were generated, resulting in a lengthy and time-consuming questionnaire to complete.

The SAQ has been through several versions following its development and subsequent use in a large number of industrial organisations and the number of questions has been reduced from over 300 to as few as 80 (Donald, 1994) whilst the construct structure and other aspects of the measure have been improved.

The majority of SAQ studies utilised Smallest Space Analysis (SSA) to identify and examine the dimensions of safety attitude. Sixteen scales were revealed as the basic structure of the SAQ (Donald 1994, Hurst et al. 1996). Correlation analysis revealed that 14 of the 16 scales were significantly associated with accident involvement while at work in the previous six months (Donald, 1994). More recent work on the complete SAQ database has utilised factor analysis techniques to identify a robust factor structure (detailed in Section 4.2.3, Donald and Johnson, 2004, see also Nananidou, 2000).

4.2.2 SAQ Questions

The current version of the SAQ comprised 64 safety attitude questions, each answered on a seven-point Likert scale ranging from Very Strongly Disagree to Very Strongly Agree. Also included in the SAQ are items requesting information on the employee's accident history, e.g. whether or not they had been involved in an accident or a near miss in the last six months.

4.2.3 SAQ Factor Structure

Analysis of the 64 question SAQ (n = 7211) using factor analysis with Maximum likelihood extraction and the rotation method Oblimin with Kaiser Normalisation revealed 12 factors with Eigen value over 1, which explained 61.04% of the total variance (Donald and Johnson, 2004, see Table 4.1).

Table 4.1 - Safety Attitude Questionnaire Scales

Scale	Scale Description	Alpha
1	Personal evaluation of the safety system	0.90
2	Safety representative's perceived (knowledge of and) involvement in the safety system	0.88
3	Personal safe working practice	0.87
4	Workforce's perceived evaluation and involvement in safety meetings	0.86
5	Management's perceived involvement (knowledge) in the safety system	0.86
6	Unsafe working practices (split into three further factors)	0.79
7	Safety representative's perceived evaluation of the safety system	0.86
8	Workforce's (perceived safety encouragement and) support	0.80
9	Co-worker's perceived involvement and evaluation of the safety system	0.78
10	Management's perceived evaluation of the safety system	0.70
11	Participative communication	0.70
12	Personal involvement in the safety system (safe working practice)	0.70

All factors were interpretable and reliable (i.e. with Cronbach Alpha values above .60). Confirmatory factor analysis on a subsection of the full dataset (n=1539) using the AMOS SEM package revealed that the proposed factor structure had adequate fit (CFI = 0.972, RMSEA = 0.057), (Donald and Johnson, 2004).

Further analysis, using the same extraction and rotation method, on Factor 6 (unsafe working practices) enabled differentiation between managers' and workforce's roles with regard to safety and revealed three distinct factors which related to unsafe working practices: Shortcuts, management's perceived involvement in unsafe working, and co-worker's perceived involvement in unsafe working. Together they explained 57.12% of the total variance.

4.2.4 Accident and Near Miss Data Collection

The factors derived from the questionnaire were analysed in relation to accident and near miss rates (Donald and Johnson, 2004; Nananidou, 2000). These analyses revealed that some of the factors were significantly related to the number of accidents / near misses reported by employees.

Unsafe practices (Factor 6) was the most predictive factor, followed by personal evaluation of the safety system (Factor 1). Safety representatives' perceived evaluation of the safety system (Factor 7) just reached the significance level. Workforce's perceived evaluation and involvement in safety meetings (Factor 4) was marginal. No other factor reached a reasonable predicting level when all 12 scales were considered together.

The 'unsafe' factors were subjected to additional analysis. Unsafe Factor 2 (management's perceived involvement in unsafe working) was the most powerful in discriminating accident-free and accident-involved respondents. Co-worker's perceived involvement in unsafe working (Unsafe 3) was also a significant predictor of accident involvement in the previous six months.

4.3 Risk Culture Questionnaire

It was predicted that the underlying factors involved in the safety culture and risk culture of an organisation would be similar. As described in preceding chapters, just as there are unsafe working practices which have been shown to influence workers involvement in accidents, so too are there risky working practices that are believed to influence financial loss events. It was considered likely then, that the same organisational, social and psychological processes would be involved in both the risk of accidents and the risk of financial loss.

Developing and using a questionnaire designed to measure employee attitudes towards risk (and thereby providing insight into the risk culture of an organisation) was an appropriate methodology since:

- The use of questionnaires has been demonstrated to be a reliable way of assessing attitudes (Oppenheim, 1992; Likert, 1932)
- Attitude questionnaires have been successfully applied to the measurement of employee attitudes towards safety (e.g. Donald and Young, 1996; Flin et al, 2000)

suggesting they may be equally useful in the measurement of employee attitudes towards risk.

- It facilitates the ability to assess whether or not a relationship exists between risk attitude scores and employee involvement in errors and near misses.
- Questionnaire studies are relatively easy to conduct and make relatively low demands on people's time therefore causing a minimum of disruption to participating organisations.
- It allows all members of participating organisations to be included in the research, and elicits a large amount of data in a relatively short time (Fife-Schaw, 1995).
- Every respondent is asked the same question in the same sequence.

The following section details the process of writing and selecting risk attitude questions for inclusion in the risk culture questionnaire.

4.3.1 Development of Risk Culture Questions

Items for inclusion in the questionnaire were drafted based upon the structure and content of the SAQ (see section 4.2). It was expected that similar psychological processes would be involved in both safety and risk culture therefore the intention was to include questions in the risk culture questionnaire that would measure similar aspects of culture as the SAQ whilst ensuring the wording was applicable to risk in the financial sector as opposed to safety in the industrial sector.

Three psychologists working in the Organisational Research Group in the University of Liverpool independently drafted questions for inclusion in the risk culture questionnaire. The SAQ (Donald and Canter, 1993) was used as a guide for questionnaire content and individuals were asked to propose a minimum of four questions, with wording applicable to the financial sector, to match the content of the factors derived from analysis of the SAQ (see section 4.2.3). The SAQ factors relating to safety representatives were excluded from this process as there was no comparable role in finance. Each question was designed to explore employee attitudes towards aspects of risk in their workplace. This process resulted in a total of 157 proposed questions.

Following the identification of items of consensus in the proposed questions and detailed discussion of the desired content of the questionnaire within the Research Group, a total of 43 questions were selected for inclusion in a first draft of the risk culture questionnaire. This first draft was used, as a way of checking face validity, during discussions about the content of the questionnaire with financial sector personnel (n=37).

The third stage of questionnaire development involved giving a copy of the draft questionnaire to a number of personnel (n=11) within financial institutions in order to assess the relevance and appropriateness of the questionnaire items. Included in this stage of questionnaire development were management and compliance personnel within five financial institutions (n=8), an insurance underwriter (and ex trader) working in the city of London, and representatives from both the Financial Services

Authority and the Institute of Internal Auditors. Drawing direct comparisons between organisations can be problematic where language differences exist (Flin et al. 2000) therefore personnel from different financial institutions were included in order to ensure the terminology used was meaningful to all individuals and not specific to any one organisation. This was important as a generic questionnaire, i.e. one that is applicable and relevant to personnel working in different organisations, will enable the comparison of risk attitudes across organisations.

Individual interviews were conducted with each person and the questionnaire discussed in detail. This process resulted in the identification of a number of issues believed to be important in relation to risk culture that were either not included in the questionnaire or were not believed to be covered in sufficient depth. Following these interviews an additional 13 questions were drafted for inclusion in the questionnaire, e.g. the questions relating to time pressures at work were included as a result of this being raised as an area of concern by a number of people. Minor alterations to the phrasing and terminology of some items were also made following these interviews.

Finally, the risk culture questionnaire and individual questionnaire items were inspected alongside the case studies detailing cultural breakdown described in Chapter 3. Each of the areas identified as important to the case studies (i.e. inadequate supervision of employees, perpetrators of the frauds having undue influence on other employees, inadequate communication within the organisation, unclear reporting lines, inadequate auditing procedures, employees being wary of management, inadequate control environment) were found to be represented in the questionnaire

thereby further indicating that the risk attitude questions proposed in relation to the content of the SAQ would gather information on issues of relevance to financial loss events.

In addition to the process described in this section, the face and content validity of the questionnaire was assessed prior to distribution with employees working in two of the three organisations involved in the study. This process is discussed in detail in Section 4.3.4.

4.3.2 Final Version of Risk Culture Questionnaire

The final version of the risk culture questionnaire included 56 randomly ordered questions, and had an approximate completion time of 15 minutes. All questions were answered using a seven-point Likert scale ranging from Very Strongly Disagree (with a score of one) to Very Strongly Agree (with a score of seven). Of these 56 questions 18 were negatively worded. The inclusion of positively and negatively worded questions helps to prevent acquiescence when questionnaires are completed. Prior to conducting statistical analyses on the risk culture data, negatively worded items will be recoded. Therefore higher scores on all questions will indicate a positive attitude towards the risk culture of the organisation.

The risk culture questionnaire will gather information on the respondent's own attitudes towards the risk culture of their organisation and on the respondent's opinions about both their colleagues and management attitudes towards the risk

culture. Example questions from the questionnaire are shown in the box below (to view the entire questionnaire see Appendices 3, 6 and 9).

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree
<i>As long as I have followed the procedures for my job I will receive the support of management if something goes wrong</i>					1	2 3 4 5 6 7
<i>My colleagues take short cuts in set procedures to get their work done</i>					1	2 3 4 5 6 7
<i>I don't always report the errors that I've made</i>					1	2 3 4 5 6 7
<i>I sometimes ignore risk control procedures if I am confident it will mean I can get my work done more effectively</i>					1	2 3 4 5 6 7
<i>My colleagues refer to procedures, guidelines and instructions when necessary</i>					1	2 3 4 5 6 7
<i>My manager sometimes implies that I should disregard a rule or guideline</i>					1	2 3 4 5 6 7
<i>Time pressures sometimes lead to me making errors</i>					1	2 3 4 5 6 7

4.3.3 Additional Information – Error, Near Miss and Demographics

In addition to the risk culture questions detailed above, items were included in the questionnaire asking respondent's to self-report their involvement in incidents. The inclusion of these questions will enable the risk culture data to be analysed in order to establish whether not a relationship exists between risk culture and financial loss incidents in a similar way to which safety culture has been shown to be related to accidents (Donald and Young, 1996; Lee, 1998; Lee and Harrison, 2000).

Information on employee involvement in an error was requested using the following item:

In the last six months have you been involved in any incidents or errors that could cost (the organisation) financially? Yes / No

As detailed in Chapter 2 many industrial organisations use the term near miss to gather information in relation to safety at work. In a similar fashion, and as described in Chapter 3 (Section 3.7), the regulators of the financial sector are beginning to encourage organisations to gather information on near misses as a way to gain more information on financial loss events (Finlay and Kaye, 2002). Discussions with collaborating organisations revealed that many senior management personnel within financial organisations are familiar with the term near miss. However, this was not true of all senior management approached and it was also considered likely that a number of employees (particularly those in non-management roles) would not be familiar with the term. Therefore the term near miss was explained within the wording of the question;

In the last six months have you been involved in any 'Near Misses' at work, that is incidences that had the potential to cost (the organisation) financially but didn't?
Yes / No

Each of the questions relating to errors and near misses was discussed in depth with all individuals who assisted with questionnaire development (detailed in preceding sections) to ensure the targeted respondents would understand and be comfortable with the request to provide such information. People reported that they believed the questions were understandable and that, as long as respondents were reassured about the confidentiality of the study and the anonymity of their responses, they would be

answered. In an effort to gather additional information other than a dichotomous yes / no split, respondents were also asked to indicate the number of errors and near misses they had been involved in, although subsequent exploration of responses revealed too few responses on these items to warrant statistical analysis.

Information was also gathered on a number of demographic variables, such as job role and place of work. Requesting this information in the questionnaire ensured that the reports written for the organisations involved in the research covered both an overview of the whole organisation and provided the organisations with more detailed information using these demographics. However, due to the anticipated low numbers of respondents for particular job roles and departments, no statistical analysis was undertaken at this level.

4.3.4 Assessing the Face and Content Validity of the Risk Culture Questionnaire

The qualitative data collection (semi-structured interviews) conducted in two organisations involved in the research enabled the investigation of the face and content validity of the questionnaire prior to its distribution. This process in relation to Org1 and Org2 is described below, see Chapter 5 for background information relating to the participating organisations and a description of the data gathered during the interview process. Interviews with employees were not permitted within the third organisation partaking in the research (Org3) therefore the content and face validity of the questionnaire was assured through email and phone discussion with a contact working in the organisation prior to questionnaire distribution.

Org1

Six employees were asked to read the risk culture questionnaire and give their opinion as to whether or not they believed it was understandable and relevant to their job role.

Employees reported they were comfortable with the content of the questionnaire and believed the questions it contained to be both relevant and understandable. Only one minor change was required to the terminology used;

q11 The instruction manual for my role is user friendly

Was changed to;

q11 The toolkit for my role is user friendly.

This change was made in order to reflect the terminology in use within Org1. Care was taken during the interviews to ensure that instances such as this were identified in order to reduce any uncertainty respondents may experience whilst completing the questionnaire. Additionally, since the questionnaire was designed to request information on risk outcomes within the workplace, i.e. employee involvement in errors / financial losses, the specific wording of this section was also verified with interviewees.

Org2

Although the face validity of the questionnaire was assessed within Org1 the process was repeated within Org2 because, although both organisations were based within the

financial sector, the job roles of the participants were very different. It was therefore important to ensure the questionnaire was appropriate both in content and language to employees working in both organisations. As in Org1, employees (n = 5) were asked to read the risk culture questionnaire and to give their opinion as to whether or not they believed the questionnaire was understandable and relevant to themselves and their job role.

Employees reported they were comfortable with the content of the questionnaire and that the questions were understandable and relevant. One minor change was suggested to ensure the terminology used was appropriate for Org2, i.e. q11 'The toolkit for my role is user friendly' was changed to 'The instruction manual for my role is user friendly'. This is, of course, a reversal to the original wording of the question prior to the changes made following the interviews in Org1 and serves to illustrate the need to ensure the wording of questionnaire items is determined within each organisation prior to questionnaire distribution. This change did not alter the meaning of the question and the structure of the questionnaire used in Org1 was maintained. The agreement (across organisations within the same (financial) sector) as to the applicability of the risk culture questionnaire provided support for its generic nature.

4.3.5 Distribution and Feedback to Organisations

Copies of the risk culture questionnaire can be seen in Appendices 3, 6 and 9.

Instructions provided to employees regarding the completion of the questionnaire were included on the first page of each questionnaire. Additionally, a covering letter provided alongside the questionnaire explained the purpose of the research and

assured confidentiality (see Appendices 4, 7 and 10). All respondents were given pre-paid envelopes, which enabled the questionnaires to be directly returned to the University of Liverpool, thus ensuring confidentiality. Further information on the questionnaire in relation to each participating organisation and the distribution methods used are detailed in Chapters 7, 8 and 9.

Each organisation was given opportunity to include their own questions in the survey, thus providing opportunity for the organisations to gather information on topics specific to their operations. There were therefore a small number of questions included in each questionnaire that were not derived from the development of the risk culture questionnaire detailed above (i.e. the 56 risk attitude questions). Each organisation was given feedback on their questions within the risk culture report provided to participating organisations but since these additional questions did not form a core part of the risk culture research, and there would be a risk of compromising the confidentiality of the organisations if the questions were published, they are not detailed further in this thesis.

4.4 Summary

This chapter describes the development of a risk culture questionnaire that explores employee attitudes towards aspects of risk in their workplace and through so doing provides insight into the risk culture of an organisation. Since the risk culture questionnaire is partly based on the SAQ (following the identification of parallels between the industrial and financial sectors, see Section 3.7) this chapter began by detailing the development, content, and factor structure of the SAQ and provided a

brief outline of the safety culture factors that have been revealed as related to accidents and near misses.

The procedure followed whilst developing the questionnaire, for example the interviews conducted with financial sector personnel, the drafting and redrafting of risk attitude questions, and the inclusion of additional questions (i.e. error, near miss and demographics) has been outlined and the chapter ended with a description of the final accepted version of the risk culture questionnaire.

The following chapter details the qualitative data gathered through interviews conducted with employees working within two of the organisations involved in the research. All interviews were conducted prior to questionnaire distribution and included the discussion of the face and content validity of the risk culture questionnaire detailed here (described in Section 4.3.4 above).

5. Method - Qualitative Data Collection

5.1 Introduction

This chapter details data gathered through interviews conducted with individuals who work, or have previously worked, in financial organisations. Section 5.2 briefly outlines an interview conducted with a perpetrator of a significant financial loss event. This interview provided insight into how a person closely involved in a loss believed cultural issues may have impacted on events thereby providing support for the rationale of the research.

Sections 5.3 and 5.4 detail the qualitative data collection using a semi-structured interview technique and involving two organisations participating in the research (Org1 and Org2). All interviews were conducted prior to the distribution of the risk culture questionnaire and the purpose of these interviews, which included a number of employees from each organisation, was twofold. First they enabled detailed discussion of employee attitudes towards their working environment and the risks employees believed they faced whilst completing their work, thereby providing insight into the organisations risk culture. Second, they enabled investigation of the content and face validity of the risk culture questionnaire (see Chapter 4, Section 4.3.4). Conducting interviews in two separate organisations was useful as it enabled the validity of the risk culture questionnaire to be assessed in relation to each organisation, which gave an indication of the generic nature of the questions included in the questionnaire, i.e. through investigation of their relevance to individuals working in differing roles within financial institutions. The interview data, alongside

the results of the quantitative data collected using the risk culture questionnaire will also be used to compare the risk culture of each organisation.

Detailed analysis of the qualitative data collected within these organisations was not undertaken, since the emphasis of the thesis is on the quantitative data gathered using the risk culture questionnaire. Nevertheless the interview findings are outlined here as they both guided the quantitative study and serve to illuminate the findings of the risk culture data analysis. Sections 5.3 and 5.4 detail Org1 and Org2 respectively.

Subsections provide a description of the organisation, an overview of the interviews and the questions asked, and discussion of the interview findings.

Finally, Section 5.5 outlines the parallels evident between the issues identified as important to risk culture following these interviews and those known to be related to safety culture in industrial organisations. Issues detailed include; the importance of management commitment; the promotion of productivity over safety / risk; blame cultures and the availability of support; the quality of communication; and management turning a blind eye to unsafe or risky working practices.

5.2 Interview Regarding Financial Loss Event

In order to directly explore the role culture played in a financial loss event, an interview was conducted with a key individual (represented as TH in order to preserve anonymity) involved in a major financial loss incident. The interview enabled information to be gathered from this individual as to how they believed cultural issues

impacted upon events. In order to protect the anonymity of the individual only limited quotes are produced below.

TH worked for and was based in an overseas subsidiary arm of a UK Bank and described the environment in which the loss occurred as;

It wasn't as controlled, it wasn't as efficient (as other financial institutions in which they had worked)... the back office was poorly run.

As an example of the poor running of the organisation, TH described how when the division in which he worked needed to hire somebody, they were unable to hire somebody experienced in finance due to financial considerations. Pressure from senior management regarding the appointment resulted in a fresh graduate being hired who 'had absolutely no experience of the business but she fitted in'. TH believed she was hired mainly due to the fact that she was a relative of one of the senior management team. The implication of these actions is that fitting into the existing culture of the bank was seen by senior management as more important than an ability to do the job.

TH outlined the beginning of the loss event (which was only uncovered at a much later date) as stemming from a mistake another individual working in the division made. This mistake resulted in a small loss that was subsequently hidden from Senior Management by TH. TH claimed he hid this loss because he believed that if the loss were revealed to senior management the individual in question would have lost their job;

She would have been sacked... Somebody had been sacked a couple of weeks ago. The current environment was very tight on losses within the bank or errors within the bank... People who tended to make errors were let go.

During the course of the interview TH detailed how errors were not always revealed to management since individuals could be fairly sure that errors would not be acted upon unless management's attention was actively drawn to them. TH described how the culture of the bank was such that it was possible to hide mistakes from management since the checks which should have been completed in order to pick up on the errors were either not being done, or were not being done correctly. When questioned further about whether or not this was common practice TH admitted that this would not have been able to occur in other financial institutions in which he had worked since the checks in these organisations were more rigorously conducted. When asked why the checks which would have uncovered TH's involvement in the loss event were not being done TH stated 'because I had control of the checking. I did the checking. So I was checking my own work'. This is obviously poor practice and against regulatory guidelines within the UK.

TH described a negative support culture in place within the organisation and stated that he believed this was one of the reasons why errors and mistakes were made:

I don't think (the bank) offered anybody any support ever. It's not like anybody was sent on management courses or how to cope with stress courses and things like that, there is an awful lack of support within the organisation.

Breakdowns in communication within the organisation were also evident. TH described how employees were generally unwilling to approach management about any concerns they had about the control environment, and furthermore that management took no action to attempt to encourage employees to talk about any concerns they may have. When asked why employees in the back office did not act upon control failures, i.e. why nobody reported to senior management that mandatory checks were not being conducted, TH stated:

A lot of people asked why didn't the people in the back office expose me... I had to put it down to naivety – I mean they didn't know how a proper organisation worked so they were doing what I told them and what I told them to do every day. They hated (next level of management) because he was a tyrant – they wouldn't go to him, he was the next line of reporting.

At another point in the interview TH again discussed communication breakdowns in the organisation in relation to this manager:

Nobody would go into his office all day. He had 60 people working for him and the only person who would go into his office was (the controller of settlements).

(he) would never sit the girls down and have a meeting with them to air their problems at the time. There was never anything like that.

The type of environment that was in place in the organisation, i.e. where people were unwilling to talk to management, was described by TH as being non typical. He described how:

In most other operations there would be more of a structure and that reporting structure would go on to the next level.

When asked whether or not there was anybody in the organisation that people did approach about any problems they had at work TH revealed that people would typically approach him about it since the atmosphere on 'the shop floor', i.e. between TH and the people he worked with, was far better than it was between the shop floor and management. However, since people were unknowingly discussing their concerns with the person who was circumventing the rules, their reports were not passed further up the management chain.

Even when questions about events relating to the loss were beginning to be raised by senior management, TH felt that they were still wary of asking probing questions for fear of upsetting things. He believed that senior management were more concerned with profits than ensuring a positive control environment was in place:

I was the star child and nobody really wanted to tread on my toes in case I left or anything and the fear of them losing money was quite great.

The net result of the issues outlined above (e.g. communication breakdown and the perceived negative attitude of senior management towards control issues) resulted in

problems not being uncovered for a number of years. It is likely that if checks had been conducted appropriately, or if people had felt able to voice their concerns to senior management, the issues that ultimately led to the loss event would have been uncovered far sooner.

The points made by TH, some of which are discussed above, illustrate how he perceived cultural elements played some part in the loss event, both as the events were triggered and also in the length of time things were able to continue without being uncovered. It is not the contention of this research that cultural elements are the only important factors within financial loss events. Nevertheless it is increasingly apparent that a degree of importance should be placed upon them.

5.3 *Qualitative Data - Organisation One (Org1)*

5.3.1 Description of Org1

The first organisation (Org1) involved in the research was a major UK clearing bank. Following discussions with senior management about the rationale of the research, their Credit Card Collections section was nominated as the most appropriate place for the risk culture research to be undertaken. The employees who worked in this section were continually in contact with the public, primarily through phone calls (both incoming and outgoing). Employee duties involved making decisions about credit card default, repayment schedules, bad debts and recovery options. For each customer employees were expected to make an appropriate decision, within stipulated guidelines, that would ensure the bank recovered as much money as possible.

Customers were only referred to this section of the organisation if pre-existing problems on their credit-card account were identified.

The risks the employees needed to consider during the completion of their work covered a number of areas, for example fraud (internal or external), appropriate decision-making, understanding and following procedures correctly, and the likelihood that their actions could pose a reputational risk for the bank. The decisions employees were making on a daily basis therefore had the potential to impact upon the bank financially in a number of ways. For example, the amount of money collected from customers could be lower than optimum as a result of poor decision making, the organisation could face penalties or fines if incorrect action was taken, and incorrect actions or decisions could also result in indirect financial losses as a result of reputational risk. As described in Chapter 3 (Section 3.3) banks view reputational risk as a high priority in the competitive marketplace in which they operate.

The research was conducted in two phases, semi structured interviews following which the questionnaire was distributed to all employees working in the areas of the organisations participating in the research. The qualitative interview data for Org1 is detailed in the section below and the quantitative data collection and analysis detailed in Chapter 7.

5.3.2 Overview of Interviews

Six one-hour semi-structured interviews were conducted with employees working in Org1. Employees were requested to volunteer for interview and a representative

sample (e.g. individuals of differing tenures and working in different teams) were selected for interview. All interviews were conducted on work premises and during work time.

Since risk culture research is relatively new to finance, semi-structured interviews were selected as the most appropriate method of qualitative data collection. Semi-structured interviews generate a large amount of data from a range of respondents, are able to be recorded (with the consent of the interviewee) and transcribed after the interview, and are unrestricted in scope and less prescriptive than structured interviews, therefore enabling the exploration of topics as they arise within the interview context. Each interview comprised two distinct parts and followed the same basic structure. Part one comprised employees answering questions based upon a number of risk and cultural issues, the information from which can be used to aid interpretation of the data gathered using the risk culture questionnaire. Part two comprised employees reading the draft questionnaire and giving their opinions on both the applicability of the questionnaire to their job role and the terminology and phraseology of each question (see Chapter 4, Section 4.3.4).

In line with BPS informed consent guidelines the aim of the interviews was explained and permission to audiotape the interviews was requested from each interviewee. Five gave their permission, whereas the sixth stated a preference for a tape recorder not to be used. Handwritten notes were therefore made during this interview. The audio taped interviews were transcribed by the author at a later date and destroyed. Ethical issues, such as confidentiality and right to withdraw from the interview at any stage,

were discussed with each interviewee prior to commencement. Participants were assured that all data used in the research from the interviews would be anonymous.

5.3.3 Interview Questions

The interview questions were designed to address issues believed to be important to financial loss events, therefore the questions were drafted with regard to the issues identified as important following the case study analysis of major financial loss events (see Chapter 3). The interview questions covered three broad areas; the risk issues employees believed to be important to their job role; the rules, controls and guidelines in place within their organisation (and whether or not these were being adhered to); and the culture of the organisation with regard to risk (for example the training, support and communication available). The interview questions, which were used as a guide during each interview, are produced in the box below under these three broad areas.

Although the questions are presented below as relating to one of these three areas, there is overlap between areas for some of the questions. For example, this is illustrated in the question, 'Can you give me an example of when the rules haven't been followed', the answers to which provided information on both the controls that were in place in Org1 and the cultural values within the organisation (i.e. those values that will in part determine whether or not the rules are adhered to). Despite the recognised overlap between the three broad areas, they are retained throughout this chapter as they are useful in the reporting of the interview findings. The discussion below is therefore divided across these areas, i.e. risks, controls and culture.

Interview Questions (Org1)

Risks

Do you feel you take any risks as part of your job?

What about the decisions you make as part of your job, for example when getting promises off customers, are there risks involved in this?

How do you balance the decisions you make? i.e. weigh up what people can pay back and when.

Controls

You obviously work within certain rules and guidelines – do these always get followed?

Can you give me an example of when the rules haven't been followed / excessive risks have been taken, either by yourself or others in the workplace? e.g. lack of knowledge or deliberate.

Do these events get picked up by controls in the workplace? If so, which ones?

Do you think the rules are adequate for the work you do?

If you make an error at work does that get picked up? If so, how?

Culture

Are you encouraged to report any errors that are made?

How is information about controls and risks communicated to employees?

What is a typical management structure – who do people report to?

If you are unsure about a decision is there support available for you?

What training do you get – is it adequate, does everybody get the same?

5.3.4 Discussion of interview findings

The interview data suggested that employees are generally aware of the risks they encounter at work and the implications these risks may have both for themselves and their organisation. Interviewees reported being reasonably happy with the controls and guidelines that were applicable to their role. Moreover, employees generally reported being satisfied with cultural aspects of their organisation suggesting a positive risk culture is in place in Org1. Each of these three sections are discussed in more detail below.

5.3.4.1 Risks

The first set of interview responses, described below, were related to the risk issues employees saw as important to their job role. Interviewees reported that they believed they were aware of the risks they faced at work. As the following quotes demonstrate, employees believed that most of their risk centred around the decisions they made whilst dealing with a customer, for example when agreeing repayment schedules on default accounts.

It can be quite risky in regards to whether you are making the right decision or not.

Too low an offer or maybe not checking up properly on a person's circumstances, just believing them ... scenarios where people could be tricking you into accepting too low an offer.

Risk I suppose in that you are accountable for what you say... if you do anything wrong.

One employee who had worked for the organisation for many years stated that they believed risk had reduced in recent years as a result of new computer systems that had been introduced.

Some of the risk has been taken off us because we used to be able to agree credit limits and stuff like that, but now there's a specific system which agrees it for you basically.

The majority of comments received from each respondent were positive, i.e. people reported being aware of the risks they faced and indeed in some cases felt that their risk exposure had reduced due to changes in the job. However, some negative points were raised. The first negative issue raised by one interviewee related to instances where employees could be tempted to take excessive risk in an effort to either make themselves look good in the workplace and / or to receive bonuses.

When you have 500 people working not everybody is going to be as professional as you would like them to be... we have found that people will take risks unnecessarily just so that stats look good...

The second negative issue related to risks the organisation could face as a result of recent changes in the contracts issued to new staff (existing staff have been encouraged to sign these contracts but could choose to remain on their current contract). The new contracts have changed the way employees received their bonuses, with the size of a bonus dependent on the number of 'pounds collected' from customers by individual employees. A number of interviewees expressed their concern that this could result in people taking excessive risks in an effort to maximise their 'pounds collected' and that this could subsequently have significant repercussions for the organisation.

There is no doubt in my mind whatsoever that the way people act will be greatly changed by this pounds collected... senior mgmt say they are more than willing to pay the highest bonuses that can be obtained... people taking pounds collected for me is a moral issue.

*I fear our reputation will be severely damaged if we continue... I hope they realise...
yes we might be performing more efficiently but at what cost?*

5.3.4.2 Controls

The second area covered during the interviews related to the controls, rules and guidelines in place in the organisation. Interviewees reported being aware of the rules and controls that were in place and described how they generally felt that these were adequate. The quotes below illustrate the types and range of controls in place in this organisation.

We have an audit trail, listening in/monitoring, printout checks, quality checks, there are a lot of ways.

The system doesn't let them do changes above their limit without authorisation – there are checks in the system.

If you do certain things on accounts it will be flagged, for instance if you are issuing cards all the time to certain areas, an indicator will come up in our internal investigations team and they'll monitor your work.

In addition to gathering information on the types of rules and controls in place, employees were also questioned as to whether or not they felt that these were adequate. Once again most comments received in response to this were positive. For example, when asked whether the rules were always followed one interviewee responded that;

There are occasions (when controls are not followed), but work is so rigorously checked that if they make an error it will be identified.

Anything that is a risk or anything that could be manipulated is checked.

Another interviewee, when asked whether or not errors and mistakes were picked up by the system or controls, stated that;

I would say that the majority of indiscretions are identified... you leave a footprint whatever you do...

Because the systems work if I did anything outside of my limit, or anything I wasn't supposed to do, then it would be identified...we have a team in (name of town) that scans everybody's work.

In addition to the computer and system controls in place, Org1 actively encouraged its employees to note and report any errors that they find on a customers account. These reports are then referred back to the employee who made the original error (usually via their team leader). When originally introduced employees were wary and untrusting of the scheme.

Staff used to call it 'the snitch', but we try to move it across as development and training...it sounds a bit strange because they aren't meant to be looking for errors but they are targeted on it and they need to be logging a certain amount a month...on

average you will find so many errors a month you need to make sure you log as many as you see.

Although the initial problems of employee reluctance to trust the scheme were mentioned, interviewees went on to describe how Org1 had gone to great trouble to try and ensure that the scheme would be viewed in a positive light and not be seen as 'telling tales'. As the above quote illustrates, one of the ways management attempted to ensure people would see the noting of these errors as a core part of their job was by the introduction of targets, with employees expected to note a certain number of errors every month. On the whole this system appears to be working and the majority of interviewees reported being comfortable with the process. The following quote illustrates how this particular employee views the reporting of errors as being more about the highlighting of potential training issues rather than as a way to 'catch out' fellow employees.

If it's a staff error then we just call it a staff referral, that person then just goes to that person and lets them know what has happened. These aren't logged as controls and checks... if there's been an oversight or if there's a training issue, you are actually raising it with the person who made the mistake, we then identify whether we need to take it forward...or whether it was just a simple mistake.

Overall, employees reported they were comfortable with the rules and controls in place. However, a small number of concerns were expressed. For example, although most people stated that errors would not be able to go unnoticed one interviewee revealed that;

So yes people could and I'm sure have (made agreements with customers) that are outside of their limits and they've never been picked up on...

Another person expressed concern that the controls in this organisation were too excessive and therefore served to limit the decisions they were able to make. This individual believed that excessive controls prevented them from solving a problem through negotiation with the customer.

5.3.4.3 Culture

The third area covered by the interviews was employee opinions on the culture of their organisation in relation to risk issues. A number of topics were discussed and the majority of comments received from employees were positive. Overall, interviewees reported being content with their working environment.

Interviewees were asked about the advice that was available to them if they had any queries about work issues. They reported that as well as being able to go to their immediate supervisors or management there was also a lot of advice available from other members of staff.

Obviously there are things come up you've never heard of and procedures change daily... there is always someone to ask.

Oh yes, I can press a button and speak to a superior... The biggest comfort is the people working alongside us.

Like any society you tend to get people who you know you can go to because you know they will give good advice.

Help wise whether it's through the toolkit or managers whatever there is help there... it's not a case of people taking any risk through lack of help.

The only negative comment received in relation to the availability of advice was concerned with employees needing advice whilst working extended hours since supervisors were not always available during these times to answer queries. However, interviewees also described how this problem had been recognised by the organisation and employees had therefore been directly advised on what they should do if placed in such a position.

The only problem really could be out of hour's work where sometimes there isn't a lot of support available... I will just say to the person I can't give you a decision today I'll ring you tomorrow.

Sometimes there may be no one available but you are trained to tell the customer you'll ring back.

Interviewees were asked about the training that was available to them and whether or not they believed that this training was adequate. The comments received in this area were not as positive as in previous areas, with many people describing that they believed the quality of training had decreased over recent years. Management in the organisation had phased out one-on-one training and were seeking to replace it with a

rolling training package that people could utilise whilst at their workstations. The length of training employees received when they joined the company had also been reduced. Since employees reported that they believed they are not receiving the training they need to enable them to do the job confidently and competently, there is the potential for further work-related problems to arise, both for the employees and the organisation. The quotes below illustrate some of the issues regarding training discussed in the interviews.

The training now is not as comprehensive as it used to be... years ago trained for four five weeks and then 'sit next to Nelly' and then go live... now with the training they don't give people enough time to adapt to it.

We get it (training) in note form now... the older people used to have training on a one to one basis.

Do you think that works?

Not for everybody... I think a lot of people like to be told.

A further theme covered in the interviews related to the quality of communication within the workplace. Interviewees were asked about the types of communication used within their organisation and whether or not they felt these communication methods were adequate to ensure they received the information they needed, when they needed it. Interviewees reported a number of communication methods in use, for example logbooks, verbal messages from supervisors and management, email and

written updates on changes in procedures. Generally people described communication within the organisation as adequate.

There are several methods of communication, we have regular updates on changes in procedures... it is fed out.

High level decisions get cascaded down through emails... big changes... there will be a presentation usually by the management team to explain it all... company wide there are papers/magazines.

In addition to the above, informal communications operating within the organisation were also identified. For example, the following quote is from a supervisor describing how he discussed potential changes with his team prior to the changes being instigated.

If I think a change is beneficial I'll ask staff views, so before changes are implemented they know my thought processes... get a feel for their reactions and work on their buy-in.

Another interviewee described how staff actively shared information between themselves;

From time to time people will find out something new, maybe because they were doing something wrong and then let all the telephones (people manning the phones)

and all their colleagues know and maybe 60 or 70% of people already knew that... but even if they are only telling a few that's a good thing.

In general, positive comments were received from employees about the type and quality of the communication methods in place. People reported that they were generally kept aware of any important changes that were occurring. However, one important issue was raised, the possible negative impact of receiving too many emails and therefore experiencing information overload.

Yes... one thing people wanted to talk about (at last weeks meeting) was to have their emails reduced...if they're on the phones all day and getting constant emails... they sometimes don't have time to take it in.

The final quote is in relation to the checking of employee's work in order to identify any errors. This employee believed that the organisation was generally supportive and that emphasis was placed by management on establishing why errors were made, as opposed to automatically punishing the individual who made the error.

(quality checking for errors) it's a good thing for you if there are not many, if there are a few its not necessarily a bad thing... you may need training... if you do it again and again I imagine it would go against you.

As the quotes reproduced throughout this section have illustrated, the interviewees generally reported being satisfied with their organisation, and the support and advice they received, which they believed enabled them to do their job without taking

unnecessary risks. Although there were a few issues raised which the organisation should be aware of, for example the over use of email, people were generally positive about most aspects of their work, management and colleagues.

5.4 Qualitative Data - Organisation Two (Org2)

5.4.1 Description of Org2

The second organisation (Org2) involved in the research was another large UK financial institution. Discussions with senior management about the rationale underpinning the research resulted in them nominating their financial advice section for inclusion in the study. All financial advisors working for Org2 were subsequently involved in the risk culture survey. Their job role involved advising the public about financial decisions (e.g. mortgages, pensions and financial investments).

The risks the advisors needed to consider included giving incorrect advice, failing to meet deadlines regarding paperwork, incorrectly completing paperwork and failing to keep adequate records. Problems in any one of these areas could result in a direct financial loss to the organisation (e.g. lost business or compensation payouts).

Furthermore, the importance of reputational risk cannot be understated, particularly in light of the negative publicity surrounding poor advice in relation to pensions that has impacted on the entire financial industry over recent years.

Financial advisors work under a large number of stringent rules and regulations and are required to complete examinations every year in order to retain their advisory license. In light of the strict regulations surrounding financial advice, this

organisation, like many others in the industry, has strict procedures in place in an attempt to ensure all stages of the advice process are adhered to. Furthermore, advisors are required to meticulously record all advice they give in an effort to improve transparency within the industry and lessen the risk of the organisations experiencing compensation claims and reputational loss.

The qualitative research in Org2 followed the same structure as that conducted in Org1 (Section 5.3). The research therefore comprised two main phases, semi structured interviews, which are discussed in this chapter, followed by distribution of the risk culture questionnaire (see Chapter 8).

5.4.2 Overview of Interviews

Semi structured interviews were conducted with five financial advisors. The interviews followed the same structure as those conducted in Org1 and comprised two main parts. Part one consisted of advisors answering questions about a number of risk and cultural issues. Part two involved the advisors reading the draft questionnaire and giving their opinion on the applicability of the questionnaire to their job role and the terminology and phraseology of the individual risk culture questions (see Chapter 4, Section 4.3.4).

The interview process provided insight into the financial advisor's job role, the risk culture of their organisation, and the type of risks and errors that were occurring (or were believed likely to occur).

Upon request each of the five interviewees gave their permission for the interviews to be audio taped. The audiotapes were transcribed by the author at a later date and destroyed. Ethical issues, such as confidentiality and right to withdraw from the interview at any stage, were discussed with each interviewee prior to commencement. Participants were assured that all data used in the research from the interviews would be treated confidentially and they would remain anonymous.

5.4.3 Interview Questions

As with the interviews conducted in Org1 the interview questions, detailed in the box overleaf, were designed to gather information on the financial advisor's job role and to explore in depth three areas relating to risk in the organisation; the risk issues employees viewed as important to their job role; the rules, controls and guidelines in place within their organisation (and whether or not they believed they were being adhered to); and the culture of their organisation with regard to these risk issues (for example the training and support available to employees).

Interview Questions

Job Description

Can you briefly describe / explain your job role.

What are the grades / different job roles?

Risks

What risks do you feel you take as part of your job?

Are time constraints ever a problem at work?

Is it clear to you exactly how much risk you are expected/permitted to take?

Controls

Can you give me an example of when the rules haven't been followed / excessive risks have been taken, either by yourself or other Financial Advisors? E.g. lack of knowledge or deliberate.

Do controls in the workplace pick up these events?

If so, which ones?

You obviously work within certain rules and guidelines (both internal and external, e.g. FSA) – do these always get followed?

Do you think the rules and controls are adequate for the work you do?

If you make an error at work does that get picked up? If so, how?

Culture

How is information about controls and risks communicated to employees?

Do you think management are generally satisfied with the level of risk taking / risk awareness?

Are employees encouraged to report any errors that are made?

Are you involved in meetings / decision making at work? Would you want to be more involved?

What training do you get (re. risk awareness) – is it adequate, does everybody get the same?

If you are unsure about a decision is there support available for you?

5.4.4 Discussion of Interview Findings

Interviewees reported being aware of the risks they may encounter during their work and believed they understood the implications that these risks could have for their organisation. Employees reported some concerns about the controls and guidelines for their role, e.g. three employees expressed concerns that these could be too restrictive. The interview data also indicated that the financial advisors were not happy with

some of the working conditions in place in their organisation, although one person described how they believed there had been an improvement over recent years. Each of these three sections is discussed in more detail below.

5.4.4.1 Risks

The first area covered during the interviews related to the risk issues employees believed to be important to their job role. Interviewees reported they were generally aware of the risks they faced. The majority of comments about the risks of the job were related to the amount of paperwork advisors were required to complete and document. This paperwork is designed to ensure there is a paper trail of all decisions the advisors have made in order to have documented evidence that the customer has been correctly advised of all relevant issues. Archiving the advisory process in this way reduces the risk of compensation payouts should the advisor face criticism / complaints about the advice customers have received. The quote reproduced below illustrates employee concern with paperwork.

The paperwork can be a risk absolutely yes. If you don't document. I think that is probably our biggest bugbear certainly on the mortgage side. Our paperwork is quite extreme. It is. It is an enormous amount of your time spent on paperwork because not only have you got your regulations to look at which is obviously what our (compliance) people are checking. You've also got all the paperwork going to the manager, so and you are taking so many details you're filling out so many forms that errors can occur between those forms because it's down to you.

Much of the concern voiced by the advisors with regard to paperwork was in relation to the amount of time pressure they believed they were under to complete paperwork, whilst simultaneously ensuring they were available to meet regularly with their clients.

The biggest risk to me personally was when I was too busy and that potentially could have caused obviously customer complaints because the service wasn't always right.

However, this advisor went on to state that they believed there had been recent improvements and that the organisation was trying to ensure support was available to advisors (this support is typically provided by advisory assistants, who, as well as offering business support, deal exclusively with some of the paperwork the advisors are required to complete).

And this was one of the first things that was brought in... (supporting team). That has really helped to eliminate a lot of that because you know they can spend all day on the phone to lenders, to customers, giving them feedback etc.

The organisation currently offers administrative support only to those advisors writing the most business.

Managers kind of made a rule that you have to be doing so many mortgages a week to warrant the help and that's what the distinction was... if you pitch a certain level of business then we will give you admin support, we will give you extra help.

It should be noted that whilst additional support is likely to be helpful, if it is not available to all employees this may lead to resentment. One advisor described how they believed the support to be unreliable.

There's been a lot of hit and miss. When I was at my busiest I was getting no support whatsoever.

A further issue of importance to financial advisors is that of miss-selling products to customers. It became clear in the interviews that some advisors believed that this occurs to some extent within Org2. For example one employee, when discussing miss-selling, stated that they 'still think this is happening'. The quote below illustrates how another advisor believed that miss-selling had decreased over recent years, through reference to the steps the organisation has taken to try and limit the risks they face.

I feel that there's not as much now and that's where things have improved following (recent training). In the past the risks were that commission hungry sales people for want of a better word would attempt to justify or fabricate true circumstances of customers even to the point of giving false information to that customer, especially the elderly and the vulnerable. Which I thought was appalling.

Interesting points were raised by the interviewees in relation to their management's perceived attitude towards risk. A number of interviewees reported that they believed management were aware that risks could be being taken by advisors, but were unable (or unwilling) to do anything to reduce them. The quote below illustrates this point

with regard to the long hours advisors have to work when they are busy and how they often end up completing essential paperwork in their own time.

Even when I was swamped out I did it all myself. I was coming in here at 7.30 and working till eight at night. Management were just, oh are you still here, well don't do too much.

The second quote, below, illustrates the perceived lack of support and understanding from management with regard to the potential risks facing advisors.

I don't think the management at (the company) are aware of any risks that we have to do. They don't care particularly. Well that's how we think, they probably are but you know it's a case of we'll get your grading right for (compliance) but we're not bothered what you do.

On the whole the advisors reported being aware of the risks they face in their work. However, they also believed that there were times when the risks were too high, for example as a result of extreme time pressures. Additionally, advisors reported not being satisfied with management attitudes towards risk. This negative management attitude is of course pertinent to the risk culture of the organisation and is therefore referred to in more detail in Section 5.4.4.3.

5.4.4.2 Controls

The second area covered by the interviews related to the controls, rules and guidelines in place in Org2. Interviewees described how they generally received information

about controls and guidelines in a number of ways, including meetings with management (both formal and informal), through email, and via their information system, which was primarily computer based.

A lot of emails, most of it's done via email. If there's something big you'll either have a meeting or they'll send you an email saying listen such a thing has changed make a note of it.

As the above quote illustrates a lot of information is cascaded down to advisors via email. A number of employees expressed concerns about what they described as excessive use of email which could result in them being unaware of important changes in the control environment.

If you're busy like you'll click on it because it's in red and its something to read and you'll read it and just kind of go yeah, yeah I'll come back to that later. But then you've got another four later... before you know it it's half way up there and it's not even on your screen any more even though it's still there and you've forgot about it.

You do get enough (information) it's just sometimes you can get a bit too much.

With regard to the monitoring of their work, employees reported being aware of numerous checks that were in place in the system. However, interviewees consistently described how they were confused as to changes in the checking of their work. Org2 recently sent all its advisors on training courses in an effort to ensure their working practices were acceptable and within regulatory guidelines. According to one

interviewee these training courses were a direct result of FSA (financial services authority) criticism into existing working practices.

The reason that (training courses) took place was apparently the FSA who are our regulators. They had a look at our working practices and said this won't do.

The quotes produced below serve to illustrate the confusion advisors experienced as a direct result of recent changes in the checking of their work.

How many passes or conditionals or reassesses etc. determines your grade and the higher the grade the less files you need to have checked... at the minute my grade I haven't got a clue what it is because we have gone under this new procedure so its all been a bit up in the air.

What was said was the first five had to go and be checked and then the, we've had mixed messages here, mortgage advisors were told the next 10 cases would be selected at random on request. We were told that following our first five it was a 100% checking, in other words send everything. Now our sales manager said don't send them following the first five till I've looked at them.

Advisors also voiced concern about the discrepancies they believed were evident in the checking process, in particular in relation to the inconsistency of the checks being conducted. Interviewees revealed that it was difficult for them to ensure they were following compliance guidelines when they were being given mixed messages as to what was or was not appropriate.

There is also a little bit of annoyance with some colleagues about a case that might be passed with one checker but there would be a problem found with another one.

So there isn't really uniformity and the answer we got which I didn't think was very satisfactory was well it can be a tedious job.

Additionally, concern was expressed about changes in guidelines not being effectively communicated to advisors. Interviewees described how this had resulted in the compliance department not passing work which they had previously been informed was acceptable. Some employees believed they were not receiving information on guideline changes, although it is possible that issue is linked to the problem of information overload described in Section 5.4.4.2.

The other problem is our internal compliance can change the rules on something so what wouldn't have been deemed as a pass four months ago is now suddenly a pass and what we do, we've got a thing called (computer based information system) where they put all the bulletins on. I don't have time to look at that, there is no point in me saying I do... I've not got time to read through that and make notes on all the changes.

I've had files that have come back conditional and then a year later when I've followed the way of a year ago they've come back conditional again because I should have gone back to the way I was doing it before.

The interviews indicated that there was a degree of uncertainty in Org2 as to the controls and guidelines currently in place. Employees reported being generally aware of the control systems the organisation used but, as a result of changes and the sheer amount of information they needed to be aware of, there were specific areas of the control environment with which they were unsatisfied.

5.4.4.3 Culture

The third area covered by the interviews was the culture of the organisation in relation to risk. The interview questions were designed to assess the degree and nature of the satisfaction employees had with the risk culture of their organisation. Employees reported a number of concerns. For example, with regard to the support they received whilst at work and the quality of communication that existed between advisors and their supervisors and management.

A positive aspect of the culture described by the advisors related to the availability of advice. Advisors reported they were aware of the systems in place for them to obtain advice about the decisions they were making and that a number of mechanisms for them to obtain advice were in place. Moreover, employees reported that they were generally happy with the advice they received.

We can speak to your senior guys, the managers. We can speak to the mortgage team down in London we can speak to advisor quality assurance who have two centres around the country. We have (computer based information system) that we can go off. And of course we can speak to other advisors.

There is a department at head office that I find quite helpful that if you are struggling you can give them a ring.

There are always occasions when you fail the first time (to get advice when requested) but they'll always get back to you.

Advisors also reported high levels of satisfaction with the amount of training they received. This was unsurprising since, as detailed above, the organisation had recently sent all of its advisors on training courses.

We have ongoing training programmes we do something like 80 hours a year of training for different bits and pieces.

The whole of the sales force has just been on a sales course... but we get ongoing training for virtually everything.

More negative comments were received from the advisors when they were asked about the level and quality of communication between themselves and their management. They reported not being given the opportunity to voice their opinions about issues they believed directly affected them. When asked about the recent changes in the organisation, and questioned as to whether or not management had involved the advisors in this change process, advisors reported that:

There's no consensus where you say we'd like this we'd like that and they come up with it. I don't know how it comes about. We just get told this is the new way and that's it.

I don't think they asked.

Additional concern was voiced about the quality of communication between departments within the organisation. The quote produced below is in reference to the checking of advisors work (as detailed above, this is an area of contention and there is a degree of ambiguity in Org2 as to what procedures should currently be followed).

It's just one of those things. I'm not having a pop at the company but I don't think sometimes certain departments in (the company) actually talk to each other.

One advisor detailed how they had specific concerns about the content of communications received from management and expressed the view that they believed the wrong message was being sent out, with management placing too much emphasis on the quantity of sales as opposed to the quality.

I think my feelings particularly are that this company still will applaud an advisor who's done, and hold them up as a shining light if you will, on a weekly acknowledgement of people who've written loads of business. There is no quantifying what it was or where it was or if it was right. It's like this is how much business, you're measured by results irrespective of how they were achieved.

Despite these concerns the advisor went on to explain that they believed things had improved over recent years. When describing how management used to act they said:

Nobody cared what you'd done as long as there was business being written. And advisors were considered fantastic if they were writing, nobody cared if it was good advice to the customers. Even I felt in my opinion middle management would turn a blind eye to the fact that the job wasn't been done properly.

There is some acknowledgement from this interviewee that whilst they had concerns they also believed that things were moving in the right direction, i.e. management were less likely to 'turn a blind eye' than they had been previously. Nevertheless, this employee still believed that management were placing too much emphasis on profit.

A further area discussed during the interviews is the support that advisors received (or believed they would receive) from their supervisors and management if they had problems or needed help at work. Mixed comments were received from the advisors on this issue. Some reported very negative opinions and did not believe that support was available to them. The quote below illustrates how, in this employee's opinion, lack of support at work can lead to advisors experiencing unnecessary stress.

And this year alone two colleagues have left, one who was off with stress. There is a lot of stress and that stress I feel could have been avoided if the right support had been given. And hasn't been.

Further concerns were raised about the level of support available to advisors. A number of interviewees expressed the belief that if advisors approached their supervisors and reported that they were not keeping up with their workload they would be penalised rather than receive the support they needed. If employees believe this to be the case it will undoubtedly make people more reluctant to request help when they need it.

Some people, if they say they've not done something right, they can go to their sales and say listen my letters are a week behind now, and they'll say right you're off the road for a week now, you're not seeing anybody else now. And you know that tarnishes their record which is wrong.

So thank god I told her every single day and she couldn't deny this that I needed some admin time, I needed a bit of space and you know 'can somebody else not help me?'. Somebody else take these appointments or whatever. Until in the end she came to me and said 'you're so far behind I'm taking you off the road' which basically means a bad mark against you. But it got to that point and I thought 'thanks' after all the times that I've been asking.

Very strong opinions were expressed around these issues, with management generally being presented in a negative light. The two quotes reproduced below exemplify the strength of feeling from advisors. Two interviewees described people as being 'scared' of telling management about problems and how they believed there was a general lack of trust in Org2.

I think in other teams that they're actually scared to actually say this, they're scared to say listen with the admin we're both down we can't get it done on time, they don't say that.

I think speaking to other advisors in different teams I think they feel they can't trust their sales managers which is not a good thing.

However, despite the negative opinions outlined above, one employee expressed a positive attitude to the support they received in the workplace.

I can go to him (manager) and say listen I'm late, I'm struggling, how am I going to do it?

I just phoned up head office and great. I did get support there yes and I do get the support from my sales manager.

One explanation for the differences of opinion is that the problems the advisors have reported are in relation to their supervisors rather than senior management. The financial advisors are spread across the UK and as such have area supervisors. A number of comments expressed suggest that it may be at the area level where the problems lie.

It was apparent from the interviews that a lot of uncertainty exists in the organisation at the moment, partly as a result of the changes recently instigated by management. Advisors reported that they had concerns about some of the working practices in place

and were generally not satisfied with the level of communication and support that was available to them.

5.5 *Parallels Between Risk Culture in Finance and Safety Culture in Industry*

Some issues raised during the interviews detailed above were similar to those known to be related to safety culture in industrial organisations and the likelihood of employee involvement in accidents at work. The interview data therefore provides some support for the contention that the risk culture of financial organisations will include similar issues to safety culture in industrial organisations. Parallels between the two research areas are outlined below.

5.5.1 Management Commitment to Safety / Risk – Error Reporting

When discussing the reporting of employee concerns about the control environment within his organisation, TH described how people were unwilling to approach management and that management made no attempts to encourage employees to report any concerns they may have. More positive attitudes towards error reporting were evident in Org1, with employees describing their management commitment as high and error reporting as being actively promoted within their organisation. Similar points in relation to safety were discussed by Clarke (1996), following her study of British Rail employees. She described how people were less likely to report incidents if they believed their managers were not committed to safety. Cox et al. (1998) also discussed how management actions influence employee actions and argued that

management commitment to safety is important in relation to employee attitudes to safety. High management commitment has been described as a particularly important attitude for managers (Rundmo and Hale, 2002). It is likely then, that a lack of management commitment to the reduction of risk and errors in financial organisations has a negative impact on employee attitudes towards risk, in the same way as a lack of management commitment has been shown to have a negative impact on employee attitudes towards safety.

5.5.2 The Promotion of Productivity over Safety

Interviewees in Org1 expressed concern that bonuses based on performance could result in excessive risk taking. Similarly employees in Org2 described how management placed too much emphasis on the quantity of sales rather than the quality. Time constraints were also described as one of the biggest risks in their job with the push from management for them to see as many customers as possible in order to maximise sales resulting in an increased likelihood of errors being made, either in the advice given to customers or in the paperwork they are required to complete. Similar issues have been discussed in safety research where the placing of productivity above safety results in accidents being more likely to occur (Lee and Harrison, 2000; Brown et al. 2000).

5.5.3 Blame Culture and Availability of Support

TH described how he originally hid a loss from management as he believed that an individual who had made a mistake would be fired if they were told about it, and

employees in Org2 talked about people being 'scared' to tell management about problems they may experience, and detailed how admitting they were experiencing problems with their workload could result in them being penalised. Conversely, an interviewee in Org1 reported that their organisation was generally supportive (i.e. they stated that they knew who they could ask if they required advice or support and that they were confident of receiving it) and that the emphasis from management was more on establishing why errors were made rather than automatically punishing the individual who made them. These issues are aligned to those discussed in relation to safety and the covering up accidents and near misses in high risk organisations (Bierly and Spender, 1995; Pool, 1997) where employees not requesting support when they might need it increases the risk of an incident occurring.

5.5.4 Quality of Communication

The quality of communication within their organisations was discussed by individuals in both Org1 and Org2. In Org1 communication was described as adequate with a number of different communication methods in use. In Org2 individuals were not satisfied with the communication in their organisation and described being confused as to changes in working practices as a result of poorly managed communication. In industry, good communication is seen as an essential aspect of safe working practices (Bierly and Spender, 1995; Smallman and Weir, 1999; Gadd and Collins, 2002). The implication is that good communication in a financial organisation will be important to ensure a positive risk culture in the same way as it is important to the promotion of a positive safety culture.

5.5.5 Management Turning a Blind Eye

Management turning a blind eye to risks that employees are taking was mentioned by an individual in Org2 who expressed the opinion that management were concerned with things being seen to be done correctly (i.e. for compliance purposes) but were not necessarily concerned with actual working practices. Once again issues such as these are apparent in the safety literature, for example Lee and Harrison (2000) discussed how, if managers specify safety as a key concern but nevertheless turn a blind eye to violations and reward behaviours which keep up production rather than adherence to safety rules, then the safety behaviour of workers and the organisation's safety performance are likely to be negatively affected.

5.6 Summary

This chapter detailed an interview conducted with a perpetrator of a significant financial loss event, and revealed that they believed cultural issues influenced the loss to some extent.

Also detailed in this chapter were the semi-structured interviews conducted within Org1 and Org2. The data gathered during this phase of the research provided information into the nature of the work conducted by the participants of the organisations involved in the research, and gave insight into the risk culture of the organisations. This data will be looked at alongside quantitative risk culture data following distribution and analysis of the risk culture questionnaire.

The interviewees in Org1 reported a reasonable degree of satisfaction with their organisation, the support and advice they received at work, and were generally positive about most aspects of their work, management and colleagues. In contrast to this the interviewees in Org2 reported high levels of change and uncertainty in their organisation, highlighted a number of concerns they had about working practices, and reported dissatisfaction with the communication and support available to them.

The chapter ended with the drawing of parallels between issues relevant to the risk culture of financial organisations (identified through the interview process) and issues relevant to the safety culture of industrial organisations. The parallels evident between these two areas provided support for the rationale that risk culture and safety culture will incorporate similar issues, which is an indication that the risk culture of financial organisations can be measured in a similar way to which safety culture is measured in industrial organisations, i.e. through use of a questionnaire designed to gather information on the risk attitudes of employees.

The following chapter (Analysis Methods) details the statistical tools used in the analysis of the risk culture questionnaire.

6. Analysis Methods

6.1 Introduction

Having discussed the development of the risk culture questionnaire and the qualitative data collection in preceding chapters, this chapter details the statistical techniques that will be used in the analysis of the quantitative data gathered using the risk culture questionnaire. Three separate organisations will be involved in risk culture surveys and Chapters 7, 8 and 9 detail the analysis of and results arising from these. Similar analytical methods will be used for the analysis of each of the individual datasets. Therefore, in order to prevent unnecessary repetition, the methods used are detailed below. The statistical procedures used to ensure that the combination of these individual datasets (see Chapter 10) is appropriate are also presented in this chapter. Throughout this chapter explanations are given as to why particular analytical procedures were selected as appropriate for use with the risk culture data.

6.2 Dataset Distribution

Establishing whether or not a dataset is normally distributed prior to undertaking statistical analysis is an important first step since some statistical techniques require a normal distribution. Moreover, for many techniques, even if a normal distribution is not required, the solution following statistical analysis is usually better (i.e. more robust) if all variables are normally distributed (Tabachnick and Fidell, 2001, p.73). Knowledge of the distribution of a dataset therefore aids the selection of appropriate statistical methods.

The distribution of responses to individual questions on the risk culture questionnaire will be inspected prior to analysis to establish if the data is normally distributed.

One technique for dealing with non-normal data is to transform it prior to analysis in order to ensure normal distribution assumptions are met. However, transformation is inappropriate for a number of reasons. First, transforming variables leads to increased difficulties when interpreting results. Second, where a dataset contains more than one group (e.g. the combined risk culture dataset which will contain data from three organisations) the same method of transformation must be applied to each group. Since different groups may possess differing levels of skewness the same transformation method may not be appropriate for each group and would therefore negatively impact on the ability to successfully interpret the findings of the survey. Third, although the original variables are on an interval scale (and so can be subjected to parametric tests) transformed scores are unlikely to conform to an interval scale thereby restricting the selection of statistical tools. Fourth, if the sample size of a dataset is small, estimates of skewness may be inaccurate resulting in an inappropriate transformation method being applied, conversely if the sample size is large transformation is considered unnecessary since any violations of normality will influence results to a negligible extent (Moss, 2004).

Not undertaking transformation of the data prior to analysis was further supported through the selection of principal components analysis (PCA) to derive factors from the data (see Section 6.5). Unlike other factor analysis procedures, PCA requires no distributional assumptions (Dunteman, 1989) therefore transforming variables in

order to ensure the data conforms to a normal distribution prior to conducting a PCA is not necessary.

6.3 Missing Data

The amount, and pattern of, missing data within the risk culture datasets will be examined in order to ensure missing data will not negatively impact the statistical analyses (and in particular the generalisability of the results, Tabachnick and Fidell, 2001, p.58). Tabachnick and Fidell (2001) discussed the importance of inspecting data for missing values prior to analysis and detailed two main methods for dealing with missing values, deletion / exclusion of cases or variables and estimation of missing values. Each of these is briefly outlined below.

6.3.1 Estimation of Missing Values

The most commonly used method of estimating missing values is insertion of the mean value for the variable (other methods include using prior knowledge and regression). Estimation of missing values is usually used in instances where missing data are non-normally distributed or the sample size after exclusion of missing data is too small for analysis. The main advantage of estimation is therefore that it does not reduce either the sample size or the number of variables. However, estimation poses other statistical problems. It results in a lower standard deviation of variables and has the potential to lead to the identification of significant results that would otherwise be non-significant (Field, 2000).

6.3.2 Exclusion of Cases / Variables

The main disadvantage to exclusion of cases containing missing variables is that it reduces the number of cases and variables in a dataset. However, if the missing data are randomly distributed throughout the dataset and the sample size after exclusion is sufficiently large it is often the better choice since exclusion has none of the statistical implications that the estimation of missing values procedure possesses (Field, 2000; Tabachnick and Fidell, 2001). Care must be taken when using this technique since, if missing values are not randomly distributed throughout the dataset, deletion of cases could result in distortion of the sample and hinder the generalisability of the results.

Although it is essential to check datasets prior to analysis to identify missing data patterns Tabachnick and Fidell (2001) assert that, if there are only a few missing data missing at random from a large dataset, almost any procedure for dealing with missing values will yield similar results.

Since it is preferable to reduce the likelihood of statistical error wherever possible, and each of the datasets discussed in this thesis are likely to be of sufficient size to cope with the loss of a small amount of data, cases will be excluded if a number of criteria are satisfied. Firstly, an examination of both individual variables and cases will establish the percentage of missing data. Secondly, Missing Values Analysis (SPSS) will be used to highlight patterns of missing values. If the percentage of missing data is small and the distribution random following examination of these procedures, cases will be excluded from further analysis on a listwise basis (Tabachnick and Fidell, 2001).

6.4 Recoding Negatively Worded Questions

Eighteen of the fifty-six risk culture questions are negatively worded. In order to simplify interpretation of the results the 18 negatively worded questions will be recoded prior to analysis to ensure all questions can be interpreted in the same manner, i.e. after recoding, higher scores on all questions will indicate a more positive response. This recoding has no impact on PCA since the direction of a variables loading onto a factor has no impact on its degree of association. However, the recoding will significantly ease interpretation of the results of subsequent analysis (e.g. logistic regression which will be used to determine whether or not the risk culture factors are associated with experience of errors / near misses).

6.5 Principal Components Analysis (PCA)

It is usual when working with a large number of questions / variables in a questionnaire to establish if coherent subsets can be identified which can provide insight into the substantive and theoretical issues underlying the questionnaire and aid the interpretation of questionnaire responses. To this end, variables that are found to be correlated with one another but largely independent of other subsets of variables are grouped together. There are three main techniques which can achieve this, multi-dimensional scaling (MDS), principal components analysis (PCA) and factor analysis (FA).

An underlying assumption of MDS is that geometric distance can represent similarity (Davidson, 1983) and MDS procedures produce geometric representations of the relationships between items (e.g. see Cox and Cox, 2000). MDS procedures were used in the original analysis of the SAQ (Donald and Canter, 1993; Donald, 1994) although more recently factor analytic techniques, which were believed to be likely to produce more robust findings than MDS, have been applied to the SAQ dataset (Nananidou, 2000; Donald and Johnson, 2004). Since one aim of this study is to compare the factor structure of the risk culture questionnaire to the factor structure of the SAQ, MDS will not be used and instead factor analytic techniques were identified as more suitable procedures. Moreover, using factor analysis results in easier comparison with other studies of safety attitude, climate and culture since this is the most common method used in this domain.

PCA and FA are both used to reduce numerous variables down to a few factors (Tabachnick and Fidell, 2001). Strictly speaking FA produces factors and PCA components although the term 'factor' is commonly used to describe the findings of both procedures, and is allowed to do so here. The primary mathematical difference between the two techniques is in the variance analysed. In PCA all variance in the observed variables is analysed, whereas in FA only shared variance is analysed (i.e. the procedure attempts to estimate and eliminate error variance). Theoretically, the difference between the procedures lies in the reasons why variables are associated with factors. FA seeks to 'find' the construct that causes the scores on individual variables, whereas PCA states that variables 'cause' the factor (Tabachnick and Fidell, 2001). Although there are therefore inherent differences between the two

techniques it has been proposed that they will produce similar results, particularly if there are a large number of variables included in the analysis (Dunteman, 1989).

Tabachnick and Fidell (2001) detail how consideration of what the results of an analysis will be used for can help guide selection of a particular procedure. For example, PCA is the most suitable procedure to use when an objective of an analysis is to simplify the description of the dataset through the identification of a number of factors which are subsequently to be used as dependent variables in further analyses.

Given that either PCA or FA can be selected for use in the current research, and it is likely that the results will be similar whichever technique is adopted, the selection of the most appropriate technique can be made as a result of practical considerations. First, PCA is likely to offer a simpler explanation of the data, which is important in relation to both interpreting that data and to relaying the findings of the research to the organisations involved. Secondly, since it is likely that the factors will be used as predictors of errors and near misses in logistic regression analyses PCA was considered an appropriate technique (Dunteman, 1989). Thirdly, PCA, unlike other factor analysis procedures (e.g. maximum likelihood factor analysis), does not require a normal distribution (Dunteman, 1989).

As a result of these considerations PCA is the most appropriate technique to use on the risk culture data.

Outlined below are a number of PCA related considerations that are detailed for each analysis in subsequent chapters (see Chapters 7 to 10). These include; sample size of the dataset; adequacy of the dataset for factor analytic procedures; method of rotation; factor loadings; the identification of factors; the number of variables which comprise a factor; the adequacy of the factor solution in relation to individual questions; the computation of factor scores; the assessment of internal scale reliability; and the sum of squared loading (SSL's).

6.5.1 Sample Size

Differences of opinion exist as to the required number of cases for factor analysis procedures. Tabachnick and Fidell (2001) proposed a rule of thumb of 300 cases whilst detailing how a lower sample size may be adequate if solutions have several high loading marker variables (i.e. loadings > 0.80). Comrey and Lee (1992) proposed guidelines for sample sizes stating that 200 cases is fair and 300 cases good for factor analysis purposes. Gorsuch (1974) stated that reliable solutions could be found with a sample size as small as 100. Using these references as guidance the range of acceptable sample size for factor analysis is therefore between 100 cases and 300 cases. In addition to sample size most researchers agree that more cases than variables are required for factor analysis, although there are differences of opinion about the acceptable case to variable ratio. For example, proposed ratios include two (Kline, 1994) four (Cattell, 1952), and five (Gorsuch, 1974) cases per variable. The larger the sample size and the greater the case-variable ratio, the more reliable the solution. The sample size and case-variable ratio of each risk culture dataset will therefore be assessed in relation to its adequacy for obtaining a reliable factor solution.

6.5.2 Suitability of the Datasets for Factor Analysis

The suitability of the risk culture datasets for factor analytic procedures will be assessed in two ways, inspection of the correlations between variables and the production and examination of both Kaiser-Meyer-Olkin's (KMO) Measure of Sampling Adequacy and Bartlett's test of sphericity.

If a dataset is suitable for factor analysis there should be a number of significant correlations between variables (such correlations provide an indication that variables are being similarly affected by underlying processes and may load onto a factor). A correlation matrix will therefore be produced for each risk culture dataset and examined for significant correlations. Tabachnick and Fidell (2001) suggested that if there are no correlations > 0.3 between variables then the use of factor analysis procedures is questionable. Establishing the existence of correlations > 0.3 between variables therefore provides support for the use of factor analytic procedures.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's test of sphericity will inform each of the PCA's. Both measures indicate whether or not a data file is suitable for factor analysis. The KMO statistic varies between 0 and 1, with a value close to 1 indicating that factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends that values between 0.8 to 0.9 are great and values > 0.9 are superb. Field (2000) describes how a highly significant Bartlett's measure provides further indication that factor analysis is appropriate.

6.5.3 Rotation

Orthogonal Varimax rotation will be employed for each PCA as it serves to minimize the complexity, and simplify the interpretation, of the factors (Tabachnick and Fidell, 2001, Dunteman, 1989). Tabachnick and Fidell (2001) further detailed how orthogonal rotation has distinct advantages if factors are subsequently to be used as IV's or DV's in other analyses, or if a goal of analysis is the comparison of factor structure in groups. Both of these types of analyses are planned for the risk culture data therefore further supporting the selection of orthogonal rotation as appropriate.

In order to ensure orthogonal rotation is appropriate, each dataset will be subjected to PCA with oblique rotation and the resulting correlations between factors examined. If oblique rotation is appropriate the correlations between the factors should be greater than 0.32. If correlations between factors are found to be lower than 0.32 this indicates that orthogonal rotation is the most suitable method. The suitability of the datasets in relation to oblique or orthogonal rotation is discussed in each chapter detailing the factor structure of the data (Chapters 7 to 10).

6.5.4 Factor Loadings

The guidelines proposed by Stevens (1992) will be followed to identify the level at which a factor loading indicates an item belongs to that factor. For example, with a sample size of 200 only those items with factor loadings greater than 0.364 will be accepted for inclusion in a factor.

6.5.5 Identification of Factors

There have been a number of techniques proposed for interpreting the results of PCA in relation to the identification of an optimum number of factors. As detailed below, a combination of methods was selected for use in the present analysis.

The cut-off level for principal components factor acceptance of Eigen > 0.7 proposed by Jolliffe (1972) was considered, but inspection of preliminary analyses revealed that proposed factors with Eigen < 1 and > 0.7 contained only single items and therefore explained no more of the variance in the dataset than the individual questions. The standard level for factor acceptability of Eigen > 1 , initially proposed by Kaiser (1960), was therefore adopted (Field, 2000). However, rather than relying solely on Eigen values, analysis of the scree plot will also be undertaken to guide the analyses. Cattell (1978) proposes the use of the scree plot to help guide the decision of how many principal components to retain, and describes how the scree graph can be examined for identification of a point where the line joining the latent roots is steep to the left of the point and not steep to the right. This point then determines the number of principal components to be retained.

Where there is a difference between the number of components to be retained as identified by Eigen values > 1 and through inspection of the scree plot, additional PCA's will be requested, specifying a number of factors (e.g. if the Eigen values proposed a 14-factor solution and the scree plot a 12-factor solution, PCA's requesting 12, 13 and 14-factor solutions will be obtained). The resulting factor structures will be compared and the most representative factor structure selected on

the basis of; its interpretability; analysis of the residual correlation matrix (the larger the number of nonredundant residuals (i.e. with absolute values greater than 0.05) reported in a solution the increased likelihood that another factor exists which has not been identified in the current solution, Tabachnick and Fidell, 2001); the number of variables loading on each factor, and the amount of variance accounted for by the solution (Tabachnick and Fidell, 2001).

6.5.6 Number of Variables Included in a Factor

The number of variables that loaded onto a factor will be assessed whilst comparing different factor structures since, as detailed below, the number of variables loading onto a factor has an impact on the stability of the factor and therefore the proposed factor structure.

Factor solutions which contain single item factors will be rejected as they account for no more variance than individual questions and indicate that the factor is poorly defined and the solution potentially unstable (Tabachnick and Fidell, 2001). At least two variables will therefore be required to load together in order to be considered as constituting a factor. However, since the stability of two item factors should be assessed prior to accepting a two-item factor as a stable factor (Tabachnick and Fidell, 2001) whenever a two-item factor is identified the degree of correlation between the two variables, via the correlation matrix (R) will be assessed. If the variables are found to be highly correlated with each other (i.e. $r > .70$) and relatively uncorrelated with other variables, the factor could be considered reliable (Tabachnick and Fidell, 2001). Wherever possible the number of two-item factors within a solution will be

kept to a minimum since, in general, factors containing higher numbers of items are preferable and considered to be more stable.

6.5.7 Adequacy of a Solution in Relation to Individual Questions

The questions included in each PCA will be investigated in three ways in order to establish if there are any variables that should be considered for exclusion from the dataset prior to further analysis. Examination will be made of the number of crossloadings in a solution, and the measure of sampling adequacy (MSA) and communality scores for each question. Chapters 7, 8 and 9 each include a section pertaining to the performance of individual variables within each PCA on these indicators. Chapter 10 (Section 10.3.4.1) provides an overview and comparison of the findings from each chapter prior to the combining of the three datasets. Following PCA on the combined dataset the overall adequacy of the solution in relation to individual questions will again be assessed (Section 10.3.8).

6.5.7.1 *Crossloadings*

Questions which crossload on more than one factor, i.e. questions that have loadings greater than 0.364 on two or more factors, may be 'complex' variables (Tabachnick and Fidell, 2001, p.587). A problem with complex variables is that they may correlate with other complex variables in a dataset due to their shared complexity rather than because they both relate to the same issues, thus creating difficulties in the interpretation of results. Pure variables (i.e. variables which only load onto one factor) are therefore preferable. However, although awareness of the possibility of complex variables is beneficial it is also not unusual to find cross loading variables in this type of dataset.

To enable direct comparison across the three individual datasets the decision was made to not delete any crossloading items following the PCA's on the individual datasets, thereby ensuring that each analysis contained the same items. For the individual analyses therefore, each variable will be retained in the factor for which it has the highest loading. For the combined analysis, instances of crossloading will be assessed on a case-by-case basis and items that have similar loadings on two factors will be retained in the factor for which they are the most salient (Gorsuch, 1974).

6.5.7.2 *Measure of sampling adequacy (MSA)*

Each question will be inspected in relation to its MSA score. Low values on this (i.e. < 0.5) can indicate that a variable does not fit with the structure of the other variables and it may be preferable to exclude this variable in future analyses.

6.5.7.3 *Communalities (h^2)*

Communalities represent the amount of variance in each variable that is accounted for by the factor solution, therefore the higher the communality score (i.e. the closer the communality score is to 1) the more variance accounted for. Communality values that equal or exceed 1 indicate that there is a problem with the factor solution extracted, e.g. too little data is available or the number of factors extracted is wrong (Tabachnick and Fidell, p.620). Small values indicate that a variable does not fit the factor solution well and could be considered for exclusion from the analysis. A cut-off value of < 0.4 is identified as representing potentially worrying low communality values (Stevens, 1992). Communality values for each dataset will be inspected and low communality values reported for each analysis.

6.5.8 Computation of Factor Scores

There are two main methods of computing factor scores, the first through summing scores on questions that load highly onto a factor, the second through use of the regression method which uses factor score coefficients as weights in an equation (Field, 2000).

Factor scores will be computed by summing the scores on the questions that load highly on each factor, a simple technique that has been shown to be highly effective (Comrey and Lee, 1992; Tabachnick and Fidell, 2001). Support for the summation of scores rather than using more complex formulas was provided by Dunteman (1989) in his discussion of PCA who stated that this is:

Equivalent to giving a weight of 1 to variables important in defining the principal components and a weight of 0 to the less important variables. Simple weighting schemes like this often produce approximate component scores that hold up better under cross-validation than the exact component scores

p.45

6.5.9 Internal Scale Reliability

The internal scale reliability (consistency) of the risk culture factors will be calculated using the Cronbach Alpha coefficient. Internal scale reliability is applied to groups of items that are believed to measure different aspects of the same concept (Litwin, 1995) and is an estimate of reliability based on the average correlation among items within a test (Nunnally, 1967). It has been proposed that 0.5 is an acceptable internal

consistency coefficient for a questionnaire under development (Nunnally, 1967) although the accepted level for the Cronbach Alpha is generally around 0.7 (Cox and Cheyne, 2000).

6.5.10 Sum of Squared Loadings (SSL)

The Sum of Squared Loadings (SSL) figure represents the importance of each factor in relation to the amount of variance in a dataset that is accounted for by a factor after rotation. The first factor in a solution usually accounts for the most variance with subsequent factors accounting for decreasing variance. The SSL's for each factor solution will be calculated and reported for each PCA conducted.

6.6 Structural Equation Modelling (SEM)

Once the three datasets are combined (Chapter 10) the AMOS Structural Equation Modelling (SEM) package (Arbuckle and Wothke, 1999) will be used to perform a confirmatory factor analysis (CFA) on the scales suggested by the exploratory factor analysis. In addition to conducting CFA on the combined dataset, which is likely to indicate good fit since the scales were derived from this dataset, individual CFA's will be conducted on the three individual datasets. Demonstrating the existence of a 'good fit' for the combined model on each of these individual datasets will provide strong support for accepting the combined factor structure as being a good representation of risk culture and will allow the identification of any dataset that is not adequately represented by the combined factor structure. If analysis of the individual datasets

produces poor fit statistics on CFA it is arguable that the combined factor structure is not robust, suggesting that the three datasets should not be combined and should instead be analysed individually.

The χ^2 statistic as a representation of goodness of fit within SEM has been increasingly criticised and deemed unreliable. For example, Byrne (2001) described how the χ^2 statistic is; dependent on sample size; based on restrictive assumptions; and an approximation rather than an exact representation of observed data. As a result of these concerns other indices of fit will be utilised in the present study, namely the comparative fit index (CFI, a value over 0.9 has been suggested as indicative of model acceptance, Bentler, 1990), the root mean squared error of approximation (RMSEA, a value of about 0.08 or less indicates a reasonable error of approximation, and a value of about 0.05 or less indicates a close to excellent fit, Browne and Cudeck, 1993; Byrne, 2001) and the normed fit index (the NFI has shown a tendency to underestimate fit in small samples and the CFI was proposed by Bentler (1990) to take sample size into account. Nevertheless, since the NFI is often reported as a practical criterion, in the interest of parsimony it will also be reported here) (Byrne, 2001; Oliver, Cheyne, Tomás & Cox, 2002).

6.7 Congruence Coefficient

The congruence coefficient is a robust and statistical measure of similarity between factors which enables the degree of similarity between factors to be expressed as between -1 and +1 in a similar manner to correlation coefficients (Cureton and D'Agostino, 1983).

Establishing an acceptable level of similarity between the separate factor structures aids the research in two ways. First, it justifies the decision to combine the individual datasets. Tabachnick and Fidell (2001) discussed how, if factor structures resulting from individual samples are dissimilar, it is inappropriate to conduct analyses on the combined data as this would potentially obscure differences between the groups rather than illuminate them. Second, providing evidence of similarity across factor structures reduces the risk that error present in a dataset is impacting on results. Cattell (1978) in his discussion of factor analysis stated 'because of the intrusiveness of unavoidable sources or error, confidence is justified in factor analysis only in results well-replicated at least once' (p. 247).

The sections below discuss the congruence coefficients in relation to the degree of similarity between factor structures and the generalisability of the results.

6.7.1 Degree of Similarity

The congruence coefficient will be used to assess the degree of similarity between the PCA's run on the individual datasets. Barrett (1986) in his outline of the four methodologies that encompass factor-comparison techniques (confirmatory maximum likelihood procedure, KHB coefficient, correlation of factor scores, and calculations made on the factor loading vectors, e.g. Tucker's (1951) congruence coefficient) detailed how, although each of the procedures possessed advantages and disadvantages, the use of the congruence coefficient was recommended.

The congruence coefficient is calculated using the factor loadings on corresponding rotated factors. The loadings of all variables are taken into account (i.e. both high and low loadings are included) The degree of similarity between factors is expressed as between -1 and $+1$ and the congruence coefficient will only equal unity if all the pairs of loadings are identical (Cureton and D'Agostino, 1983).

The lower bound of coefficient size for factor similarity has not been predefined and there are no acceptable significance tests for the congruence coefficient statistic that can determine whether or not factors are invariant (Chan, Ho, Leung, Chan and Yung, 1999). Researchers have therefore generally used lower bounds of between 0.80 and 0.95 as indicating sufficient similarity between factors (Barrett, 1986). Chan et al. (1999) discussed how, in finite samples with limited sizes, even two identical factors can fail to reproduce a perfect congruence due to sampling error. Since the sample sizes in this study are not expected to be large (although adequate) 0.80 was selected as the lower bound cut-off for factor similarity.

In some situations it can be desirable to perform Procrustes rotation on one sample prior to comparing the factor structures of two samples using the congruence coefficient. Procrustes rotates a replica dataset onto a normative dataset so the factor matrices are as similar as possible (McCrae, Bond and Paunonen, 1996). Although it is recognised that Procrustes rotation can be a useful technique in some circumstances it was not appropriate during the current analyses for three reasons. First, it was neither possible nor desirable to identify a normative dataset since the three samples discussed in this thesis are all exploratory in nature. Second, Procrustes can result in artificially high levels of congruence, Chan et al. (1999) detailed how, after Procrustes

rotation, a congruence value of 0.90 may be obtained from a sample even if the population has a congruence of 0.70. Since acceptably high levels of congruence were identified during the current analysis without the use of Procrustes rotation this provides stronger support for the similarity between two datasets since neither dataset had been deliberately rotated to match the structure of the other. Third, the cut-off of 0.80 to 0.90 for factor replicability has been questioned (and no alternative proposed) when Procrustes is used since this rule of thumb was developed in the absence of Procrustes rotation (Chan et al. 1999).

6.7.2 Generalisability of the Results

Demonstrating that similar factor structures have been derived from independent samples provides evidence for the generalisability of the results. Field (2000) discussed how the use of PCA restricts the conclusions to the sample collected unless analysis using different samples reveals the same factor structure. Similarly, factors have a wider range of applicability as generalised constructs if they are shown to be invariant across samples (Gorsuch, 1974), that is, whilst the subpopulations over which the factors occur would be expected to differ in their mean scores and variance, the pattern of relationships among the variables would be the same. If the congruence coefficient reveals that factors are similar, i.e. applicable to several populations it can be expected that they will also generalise to other similar populations.

6.8 Logistic Regression (LR) Analysis

Once the factor structure of the risk culture data has been established further analyses will be conducted to investigate whether or not the risk culture factors are related to errors and near misses (see Chapter 11). Both of these outcome measures are dichotomous therefore statistical tests suitable for use with dichotomous DV's are required.

Field (2000) argued that linear regression is unsuitable for use with a dichotomous outcome variable since linear relationship assumptions are violated. There are two main methods of analysis considered suitable for use with dichotomous DV's, discriminant function analysis (DFA) and logistic regression (LR).

Tabachnick and Fidell (2001) detailed how both procedures allow the prediction of group membership from a set of predictors. DFA was considered and not selected as suitable for the present analysis for two reasons. First, DFA has been criticised for its demonstrated ability to produce probabilities outside acceptable limits (i.e. outside the range of 0 to 1, Howell, 1997). Second, DFA depends on a number of restrictive normality assumptions (Howell, 1997). LR possesses neither of the drawbacks associated with DFA i.e. it is suitable for use with data that is not normally distributed, and has been described as the best statistical tool for use with dichotomous outcome data (Field, 2000). Howell (1997) further described how, as a result of the benefits of LR outlined above, common practice has moved away from DFA in favour of LR (p.549). LR was therefore selected as a suitable statistical tool for the planned analyses (Howell, 1997).

6.8.1 Multicollinearity

Prior to conducting the LR on the combined dataset it will be assessed for levels of multicollinearity between factors through examination of the correlation matrix. High levels of multicollinearity (i.e. correlation levels between predictors greater than 0.8) increases the probability that a significant predictor of an outcome will be found non-significant and therefore rejected, i.e. a type two error (Field, 2000 p. 130).

6.8.2 Regression Techniques

It is possible for a variable to appear unimportant in a solution when it is actually highly correlated with the DV if only multiple regression techniques are utilised (Tabachnick and Fidell, 2001, p. 131). Therefore, both the individual contribution of the IV's (i.e. the risk culture factors) and stepwise regression methods will be investigated and reported.

Stepwise methods have been criticised since they leave a researcher open to accusations of 'data mining' as opposed to established theory driving their research. However, it is defensible to use stepwise methods in situations where no previous research exists on which to base hypotheses for testing (Menard, 1995), as is the case in the risk culture research. In situations like this the selection of known predictors to be entered into a model in order of their importance in predicting the outcome is not possible therefore Stepwise methods are appropriate.

Forward: LR will be used as the Stepwise method of regression. Field (2000) detailed how this is probably the best stepwise method to use since other stepwise methods have been criticised, e.g. the Wald method has been shown to be unreliable and the Conditional method is simply a less intense version of Forward: LR. Using the stepwise method of regression enables the identification of the most important variables in terms of prediction of the DV (e.g. involvement in error) and eliminates those variables that may have been identified as significant within an individual regression through virtue of shared variance between predictors thereby providing more information on the relative importance of the risk culture factors.

6.8.3 Investigation of Model Fit

For the stepwise logistic regression analyses a number of values that give an indication of whether or not the proposed models adequately fit the data will be examined (Field, 2000). These include; Cook's distance, which measures the overall influence of a case on the model and therefore identifies cases which may impact on the model's ability to predict all cases, values > 1 are cause for concern; the dfbeta statistic, which identifies cases which are poorly fitted by the model, values > 1 are cause for concern; Hosmer and Meleshow's goodness of fit value, which tests the hypothesis that the observed data are significantly different from the model's predicted values. A non-significant value supports the validity of the model since it indicates the model does not differ significantly from the observed data, and is indicative of a model that is predicting real-world data fairly well (Field, 2000).

In addition to the model fit statistics detailed above examination of the standardised residuals will be made and the number and percentage of residuals that are greater than three (i.e. large enough to cause concern, Field, 2000) reported. However, these are only provided in the interests of transparent and comprehensive reporting since they should not be used to support (or not) the degree of model fit. The guidelines for acceptable residual levels were originally proposed for normally distributed datasets and logistic regression was employed due to the non-normality of the risk culture datasets. As Dunn and Smyth (1996) detailed;

In non-normal regression situations, such as logistic regression..., the residuals, as usually defined, may be so far from normality and from having equal variance as to be of no practical use.

p.1

6.8.4 LR Statistics

Statistics which provide information about the importance of a factor to the prediction of the outcome variable, and which indicate the amount of variance explained by the model will be produced for each logistic regression conducted.

The Wald statistic and its corresponding significance level reflect the relative importance of a factor in the prediction of the outcome variable. The odds ratio (ExpB) and its corresponding confidence interval indicate the strength and direction of the prediction. Where Exp(B) is found to be less than one, increasing values of the variable correspond to decreasing odds of the events occurrence. Conversely, when Exp(B) is found to be greater than one, increasing values of the variable correspond to

increasing odds of the events occurrence. It was therefore predicted that for variables that are shown to be significantly associated with involvement in an error or near miss the odds ratio will be less than one. That is, as the risk culture score increases (i.e. a more positive risk culture is reported) the likelihood of involvement in an error or near miss decreases.

In a similar manner to linear regression, the r^2 in logistic regression seeks to indicate the amount of variance explained by the proposed model. However, caution needs to be taken in interpretation of the r^2 value within logistic regression since the variance of a dichotomous variable is dependent on its distribution. Nevertheless, Nagelkerke's r^2 can be a useful indicator of the amount of variance explained by a particular model and was therefore considered worthy of inclusion (Garson, 2004).

6.9 Effect Size (w)

In line with American Psychological Association standards (APA, 2002) the effect size of each analysis will be reported within the logistic regression result tables. The effect size of the difference between the two groups (i.e. error / no error; near miss / no near miss) revealed through logistic regression analysis will be computed through conversion of the Wald statistic (Penny and Johnson, 1999; Penny, 2002) using the formula $\chi^2 = nw^2$, where χ^2 is the Wald chi-square statistic, n is the sample size (harmonic mean sample size was used due to unequal group sizes, Howell, 1997), and w is the effect size. Cohen (1988) used the values of .1, .3, and .5 to indicate small, medium, and large effects on w .

6.10 Summary

This chapter described the statistical techniques that will be used in the analysis of the risk culture data (gathered using the risk culture questionnaire). Justification for the selection of particular methods was given, and explanations provided as to why other procedures were rejected. The chapter prevents excessive repetition when the results of the statistical analyses conducted on the data are presented in later chapters.

The results of the analysis of the three individual datasets (Org1, Org2, and Org3) are detailed in Chapters 7, 8 and 9.

The combining of the three datasets and further analysis of the combined data is detailed in Chapter 10.

Chapter 11 details the discriminative ability of the risk culture factors in relation to reported employee involvement in errors and near misses, and between the three organisations involved in the research.

7. The Factor Structure of the Risk Culture Questionnaire – Organisation One (Org1)

7.1 Introduction

7.1.1 Organisations Participating in the Risk Culture Research (Org1, Org2 and Org3)

The risk culture questionnaire was distributed within three financial organisations. The first (Org1) was a Credit Card Collections section of a major UK clearing bank. The second (Org2) was the financial advice section of a large UK financial institution. The third (Org3) was the Processing Division of another major UK clearing bank. Two organisations (Org1 and Org2) were involved in both stages of the research, i.e. they also participated in the qualitative data collection detailed in Chapter 5 whereas the third (Org3) only participated in quantitative data collection. The distribution and analysis of the three risk culture surveys are detailed in this and the following two chapters. Chapter 10 details the combining of the three datasets and the analysis conducted on the combined data.

Conducting surveys in three separate organisations was beneficial for a number of reasons. First, if the results of the factor analysis are replicated within separate organisations the risk that error in a dataset is impacting adversely on results is reduced and confidence in the findings of the factor analysis is increased (Cattell, 1978). Second, demonstrating that similar factor structures can be derived from independent samples will provide evidence to support the generic nature of the results (Field, 2000; Gorsuch, 1974). Third, it enables the comparison of risk culture (and

reported loss events) across organisations thereby allowing an investigation of whether or not the risk culture questionnaire possesses discriminant validity.

7.1.2 Skewness and Kurtosis in the Risk Culture Datasets

The distribution of responses to individual questions included in the risk culture questionnaire was inspected for each of the datasets prior to analysis, a process that revealed high levels of skewness and / or kurtosis on a number of questions indicating non-normality of scores. This was unsurprising due to the nature of the risk culture questionnaire, i.e. it was expected that the majority of employees would hold positive attitudes towards risk in their workplace. There was also an increased likelihood that the organisations would exhibit positive risk cultures since, through their agreement to be involved in the research, they were demonstrating their awareness and acceptance that cultural issues are important. Moreover, as discussed in Chapter 2, the tendency towards a positive skew in datasets of this type has already been demonstrated in safety culture research (Cooper, 2000, Williamson et al. 1997). Although the datasets were not normally distributed, transformation of the data in order to attain normality was not conducted, as this can introduce further problems in the analysis and interpretation of results. Instead, the selection of robust statistical tests that were acceptable for use on non-normal data guided the process of data analysis (see Chapter 6).

7.1.3 Chapter Structure

This chapter details the distribution and analysis of the risk culture questionnaire within Org1. Section 7.2 describes the sample, i.e. it gives the background to Org1,

and details response rates and demographics. Section 7.3 presents the principal components analysis (PCA) and includes discussion of a number of data considerations and the identification of the most representative factor structure. Section 7.4 provides an interpretation of this factor structure, for example through outlining its characteristics, factor loadings and the adequacy of the solution. Finally, the chapter ends with a description of the process followed when naming each factor.

7.2 Sample

7.2.1 Background to Org1

Following the questionnaire validation process detailed in Chapter 6 the risk culture questionnaire was distributed to all employees working in Org1 (i.e. the Credit Card Collections section of a major UK clearing bank). Employees in Org1 were in direct contact with the public and made decisions about credit card default, repayment schedules, bad debts and recovery options to ensure the bank recovered as much money as possible from each customer. Further information on Org1 was provided in Chapter 5, Section 5.3.1.

7.2.2 Distribution

All employees were located in the same office building and worked in small teams of between six and ten people, with a team leader overseeing each team. Prior to questionnaire distribution a meeting was held with all team leaders, the purpose of the study explained and their help requested in the distribution of the questionnaires. All team leaders agreed to help and were subsequently responsible for ensuring each member of their team received a copy of the risk culture questionnaire. The cover

page of each questionnaire comprised an information sheet providing details of the questionnaire and gave completion instructions (see Appendix 3).

Accompanying each questionnaire was a covering letter, which described the research and guaranteed confidentiality and anonymity (see Appendix 4). A prepaid envelope was included that enabled respondents to return the questionnaire directly to the University of Liverpool, thus ensuring confidentiality.

In total 521 questionnaires were distributed to all employees of relevant grades within the Collections environment.

7.2.3 Response Rate

Of the 521 surveys distributed 201 responses were received, giving an acceptable response rate of 39% which is marginally higher than the average response rate of 36% for academic studies involving organisational representatives (Baruch, 1999).

7.2.4 Demographic Variables

Discussions with management identified the items that would be included in the questionnaire. These included demographic data, e.g. the section of Credit Card Collections in which respondents worked, their gender, the type of contract they held (the organisation was going through a process of change in the type of contracts they issued to new staff. Type of contract was therefore included as of potential relevance to employee's evaluation of the risk culture of their organisation), their job tenure and their age.

Of the 201 respondents 43 were male and 156 female with 2 not disclosing their gender. Ages ranged from 19 to 58 years, with a mean age of 37 years. Tenure ranged from 1 month to 37 years with a mean tenure of 9 years. Management in Org1 described the demographic breakdown of the responses received as representative of the organisation as a whole.

Tables 7.1 and 7.2 show the breakdown of responses in relation to the section in which employees worked and the type of contract they held.

Table 7.1 - Section Breakdown of Org1 Responses

Section	Number of responses	% of Responses
A	27	13
B	24	12
C	64	32
D	4	2
E	44	22
F	32	16
Not Disclosed	6	3
Total	201	100

Table 7.2 - Type of Contract Breakdown of Org1 Responses

Contract	Number of responses	% of Responses
Full-Time	118	59
Part-Time	46	23
Flexible	34	17
Not Disclosed	3	1
Total	201	100

7.2.5 Error and Near Miss Rates

In response to the questions relating to financial risk outcomes (i.e. involvement in an error or a near miss in the previous six months) 15 (7.5%) employees reported involvement in an error and 18 (9%) employees reported involvement in a near miss.

7.3 Principal Components Analysis (PCA)

As detailed in Analysis Methods (Chapter 6), Principal Components Analysis (PCA) was selected as the most appropriate statistical method to derive the factor structure of the questionnaire. The PCA is described in the sections below, for information on the individual questions (i.e. mean and standard deviation) see Appendix 5.

7.3.2 Data Considerations

7.3.2.1 Sample size

The dataset for Org1 comprised 201 responses and was therefore within adequate sample size guidelines for factor analysis procedures (e.g. Comrey and Lee (1992) proposed guidelines for sample sizes as 200 = fair). The case to variable ratio is 210:56 or 3.8:1 which is also satisfactory (Cattell, 1952).

7.3.2.2 Missing data

The amount and pattern of missing values within the dataset were inspected. Fourteen variables were found to contain missing data, seven had one (0.5%) missing case, six had two (1%) missing cases and one had three (1.5%) missing cases. Given the low percentage of missing data within the variables it was not considered necessary to consider deletion of variables prior to analysis. Twenty cases were found to contain

missing data, eighteen had one (1.8%) missing variable, and two had two (3.6%) missing variables. Missing Values Analysis indicated that the distribution of missing data was random.

Given the random distribution and low incidence of missing data, and the adequate size of the datafile (n=201), listwise deletion of cases prior to analysis was selected as the most suitable method of dealing with missing values.

7.3.2.3 *Factorability of the dataset*

Examination of the variable correlation matrix revealed a large number of significant correlations, a large proportion of which were > 0.3 which indicated the data was suitable for factor analysis.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.818 and Bartlett's test of sphericity was significant at $p < 0.001$, providing further indication that the dataset was suitable for factor analysis and should yield distinct and reliable factors.

7.3.2.4 *Selection of rotation method, oblique or orthogonal*

In order to check the suitability of the dataset for orthogonal rotation a PCA using oblique rotation was first conducted. As detailed in Chapter 6 the correlations between factors should be greater than 0.32 to justify oblique rotation, if the correlations are below this level then the use of orthogonal rotation is supported.

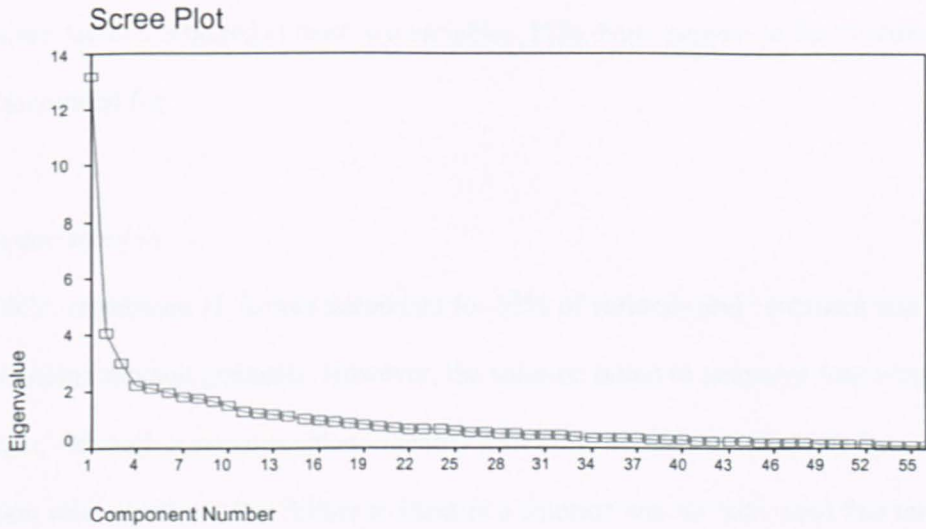
PCA with oblique (oblimin) rotation revealed a 15-factor structure. Examination of the component correlation matrix revealed no correlations greater than 0.32 therefore supporting the use of orthogonal rotation. The dataset was subsequently subjected to PCA with orthogonal rotation, as detailed below.

7.3.3 Identification of Factor Structure

The 56 risk culture questions were subjected to PCA with varimax rotation which resulted in the identification of 15 factors with Eigen values > 1 , together accounting for 70% of variance. However, inspection of the Scree plot suggested that retaining a lower number of factors may be preferable, see Figure 7.1.

Using Cattell's (1978) guidelines for identifying the number of factors to be retained following inspection of the Scree plot a break was evident in the plot after Factor 10, i.e. the line flattened out to the right of this point.

Figure 7.1 - Scree plot, Org1



The Eigen values indicated a 15-factor solution and the scree plot a 10-factor solution. Since there were differences between the number of components to be retained as identified by the Eigen values and the scree plot, further PCA's were run, each requesting a specified number of factors. An additional six principal component analyses were therefore conducted requesting 10, 11, 12, 13, 14 and 15-factor solutions.

Each of these factor structures were compared and the most representative selected on the basis of their interpretability and inspection of; the residual correlation matrices; the number of variables loading on each factor; and the amount of variance accounted for by the solution (Tabachnick and Fidell, 2001). Each factor structure is briefly outlined below.

10-factor solution

The 10-factor solution contained 449 (29.0%) nonredundant residuals and each proposed factor contained at least two variables. Fifty-Nine percent of the variance was accounted for.

11-factor solution

The PCA requesting 11 factors accounted for 62% of variance and contained 406 (26%) nonredundant residuals. However, the solution failed to converge following rotation, although it was possible to identify a fit if the number of iterations for rotation was increased. The failure to identify a solution was an indication that the fit was not as satisfactory as the other factor solutions requested. The 11-factor solution was therefore rejected.

12-factor solution

Sixty-four percent of the variance was accounted for by the 12-factor solution which contained 356 (23.0%) nonredundant residuals. Each proposed factor contained at least two variables.

13-factor solution

The PCA requesting 13 factors accounted for 66% of variance and contained 323 (20%) nonredundant residuals. All proposed factors contained at least two variables.

14-factor solution

Sixty-eight percent of the variance was accounted for by the 14-factor solution. This solution contained 296 (19%) nonredundant residuals. However Factor 11 contained

only one variable suggesting it was unstable, therefore the 14-factor solution was rejected.

15-factor solution

The 15-factor solution accounted for 70% of the variance and had 255 (16%) nonredundant residuals. However, both Factors 14 and 15 contained only one question suggesting these factors are unstable. The 15-factor solution was therefore rejected.

The 11-factor solution was rejected as it failed to converge following rotation; the 14 and 15-factor solutions were rejected as factors were identified that contained only one variable indicating those factors were unstable. The remaining factor structures (10, 12 and 13) were compared in more detail to aid selection of the best fitting solution. Table 7.3 reveals the characteristics of each of these factor structures.

Table 7.3 - Characteristics of Factor Structures for Org1

	10 factors	12 factors	13 factors
Nonredundant residuals	29%	23%	20%
Total variance	59%	64%	66%
Number of crossloading questions	15	17	16
Number of questions on factors			
1	14	13	14
2	7	5	6
3	6	6	6
4	5	5	3
5	4	4	4
6	5	4	3
7	4	4	4
8	3	3	3
9	4	4	3
10	3	3	4
11		3	2
12		2	2
13			2
Total	55	56	56

The 10-factor solution was rejected at this point as it had substantially more nonredundant residuals than either the 12 or 13-factor structures (6% and 9% respectively) and accounted for substantially less variance (5% and 7% respectively).

The choice between the 12 and 13-factor solutions was less clear since the differences between the variance accounted for and the residuals was relatively small. The number of questions loading onto each factor was therefore taken into consideration since in general it is preferable to have factors containing larger rather than smaller numbers of variables (Tabachnick and Fidell, 2001). The 13-factor solution contained three factors with only two variables loading onto each factor whereas the 12-factor solution had only one factor containing two variables. This provided support for the selection of the 12-factor solution as having the best fit for the risk culture data in Org1. Additionally, closer examination revealed that the 12-factor solution made more conceptual sense than the 13-factor solution, further suggesting this should be the preferred solution

The 12-factor solution was therefore selected as the most representative factor solution for Org 1.

7.4 Interpretation of the Factor Structure

As described in the above section PCA with varimax rotation of the risk culture dataset for Org1 resulted in the selection of a 12-factor structure, which accounted for 64% of the variance, as the best representation of the data.

7.4.1 Characteristics of the Factor Structure

Table 7.4 shows the characteristics of the factor structure, i.e. the number of questions loading onto each factor and the internal consistency (Cronbach Alpha) values, also shown is the Sum of Squared Loadings (SSL) figure for each factor.

Table 7.4 – Characteristics of the risk culture factors (Org1)

Factor	Number of items	Alpha	SSL
1	13	.89	11.90
2	5	.74	6.82
3	6	.73	5.73
4	5	.68	5.05
5	4	.71	4.89
6	4	.76	4.57
7	4	.74	4.53
8	3	.77	4.52
9	4	.74	4.47
10	3	.81	4.16
11	3	.63	3.80
12	2	.55	3.48

The SSL's revealed that Factor 1 accounted for almost 12% of the variance in the dataset. As expected the variance decreased for each subsequent factor with Factor 12 accounting for approximately 3% of variance. Each factor is discussed in more detail in Section 7.4.4.

The internal consistency (Cronbach Alpha) coefficients revealed in Table 7.4 were all within acceptable limits with the majority above 0.7. Factors 1 and 10 had particularly high coefficients (i.e. > 0.8) although even the lowest coefficients were greater than 0.5, the level considered acceptable for measures of a construct in the early stage of research (Nunnally, 1967).

7.4.2 Factor Loadings

Table 7.5 presents the variable factor loadings taken from the rotated component matrix, loadings greater than 0.364 (the cut-off for inclusion in a factor when working with a sample size of 200, Stevens, 1992) are highlighted in bold.

Table 7.5 - Factor Loadings, Org1

Question Number	Component												h ²
	1	2	3	4	5	6	7	8	9	10	11	12	
34 - The management in ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk	0.75	-0.03	0.12	-0.05	-0.02	0.09	0.03	0.03	0.21	0.09	-0.10	-0.03	.66
53 - Advice about risk and procedures is always available to me	0.74	0.26	0.08	0.03	0.06	0.14	0.09	0.10	0.14	0.07	-0.05	0.09	.70
49 - The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk	0.73	0.05	0.04	0.08	0.15	0.11	0.27	0.07	0.00	-0.06	0.21	0.00	.71
52 - I am happy with the way in which I receive information about risk issues at work	0.69	0.16	0.22	0.01	0.13	0.16	0.08	0.08	0.03	0.02	0.03	0.13	.62
55 - The management of are aware of the risks we have to take in order to do our work	0.67	-0.09	-0.06	0.27	0.02	0.03	0.02	-0.01	0.08	-0.05	0.10	0.22	.60
45 - I feel satisfied with the attention given to risk and governance awareness within this environment	0.66	0.27	0.06	0.09	0.12	-0.04	0.06	0.08	0.07	0.26	0.17	0.07	.65
35 - If I have to make a decision that I think is risky I know support is available to help me	0.61	-0.03	-0.12	0.28	0.04	0.11	0.01	0.23	0.15	0.02	-0.10	-0.14	.60
40 - My colleagues believe the internal risk control procedures are effective	0.56	0.02	0.22	0.07	0.24	-0.10	-0.03	0.15	0.00	0.16	0.04	0.26	.55
51 - The managers encourage me to report any risk control problems I might discover	0.53	0.34	0.14	0.25	0.35	0.02	0.32	-0.14	-0.04	0.01	0.08	-0.05	.73
10 - The management in know what risk control procedures people should be following	0.45	0.20	0.16	0.23	0.45	0.07	0.18	0.00	0.06	0.07	0.02	-0.08	.57
28 - As long as I have followed the procedures for this role I will receive the support of management if something goes	0.44	0.07	-0.04	0.34	0.23	0.16	0.14	0.04	0.35	-0.04	-0.02	0.32	.65

wrong														
13 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues	0.44	0.19	0.01	0.11	0.30	0.10	0.03	0.32	0.10	0.11	-0.04	-0.10	.48	
11 - The toolkit for my role is user friendly	0.40	0.03	0.00	-0.20	-0.06	0.10	0.14	0.01	0.39	0.14	-0.02	0.14	.43	
24 - I always work within the risk control rules and guidelines of my role	0.12	0.69	0.12	0.19	0.10	0.03	0.09	0.02	0.15	0.14	0.10	-0.03	.61	
47 - I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially	0.42	0.55	0.05	0.18	-0.03	0.02	0.05	0.09	-0.16	0.26	0.00	0.04	.63	
3 - I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome	0.04	0.54	-0.04	-0.13	0.10	0.09	0.14	0.22	0.28	-0.09	0.20	-0.02	.53	
25 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself	0.46	0.51	0.08	0.07	0.21	0.14	0.14	0.21	0.09	0.09	0.05	-0.14	.66	
46 - I encourage my colleagues to work within the risk control guidelines	0.34	0.47	0.02	0.17	-0.09	-0.02	0.17	0.02	-0.10	0.23	0.39	0.20	.65	
31 - Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role	0.23	0.07	0.68	-0.03	0.18	0.12	0.07	0.14	-0.07	-0.03	0.31	-0.10	.72	
54 - People here will often take a chance on a risky decision, if they think it is likely to improve their results	0.21	0.04	0.68	0.05	0.16	-0.10	0.01	0.02	0.28	0.08	0.10	-0.12	.65	
38 - My colleagues take short cuts in set procedures to get their work done	0.20	-0.06	0.67	0.10	-0.09	0.15	0.19	0.30	0.18	0.01	0.02	0.09	.70	
12 - Management are aware that risk controls, rules and guidelines are not always followed	-0.10	0.19	0.53	-0.11	0.10	0.12	-0.35	-0.08	-0.09	0.01	-0.07	0.09	.51	
50 - My colleagues know of short cuts that would get their work done more effectively	-0.01	-0.06	0.52	0.08	-0.29	0.10	0.18	0.35	0.10	0.10	0.13	0.19	.60	
22 - There are occasions in my role when I do not follow all the risk controls, rules and guidelines	-0.01	0.42	0.45	-0.11	-0.04	0.14	0.11	0.09	0.22	0.09	0.29	0.00	.57	
20 - I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially	0.24	0.06	-0.12	0.67	0.19	-0.11	0.03	-0.03	-0.05	0.09	0.09	0.04	.60	
15 - I am encouraged by my colleagues to only take acceptable risks in the decisions I make	0.04	-0.18	0.10	0.64	0.20	0.01	0.04	0.10	-0.22	0.10	-0.06	0.26	.63	
27 - My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure	0.07	0.33	-0.02	0.64	0.02	-0.02	0.00	-0.19	0.10	0.07	-0.01	-0.04	.57	
19 - In terms of limiting financial losses I am happy with my decisions	0.09	0.52	0.04	0.54	0.13	-0.09	0.03	0.10	0.04	0.05	-0.18	0.14	.66	
2 - The people I work with would support me if I had a concern about a possible breach of risk control procedure	0.29	0.16	0.22	0.45	-0.18	0.11	0.25	0.21	0.09	-0.06	-0.01	0.05	.53	
7 - The managers here are satisfied with the risk control procedures currently in place	0.14	0.02	-0.06	0.05	0.75	-0.02	0.07	0.09	0.03	0.11	0.02	0.13	.64	
14 - My co-workers refer to procedures and guidelines where necessary	0.16	0.10	0.05	0.44	0.55	-0.09	0.20	0.19	0.26	0.03	-0.05	0.05	.70	
17 - The management of issue strict guidelines for risk control	0.19	0.30	0.24	0.16	0.49	0.04	0.15	0.07	0.03	0.22	-0.17	0.06	.56	
48 - I believe my attitude towards risk is the same as my co-workers	0.37	-0.04	0.12	0.18	0.40	-0.07	0.22	-0.17	-0.05	0.05	0.26	0.11	.52	
1 - Time constraints sometimes lead to my colleagues making errors	0.07	-0.04	0.02	-0.09	0.10	0.83	0.02	-0.09	0.03	0.02	0.05	0.03	.73	
18 - Time constraints sometimes lead to me making errors	0.06	0.11	0.08	-0.03	-0.04	0.82	-0.07	0.05	-0.01	0.06	-0.04	0.23	.76	
29 - Time constraints sometimes prevent me from sufficiently evaluating risk	0.17	0.07	0.05	0.05	-0.11	0.71	-0.05	0.00	0.14	0.09	0.12	-0.05	.60	
37 - Time constraints sometimes prevent me from consulting the toolkit	0.24	-0.01	0.17	-0.04	0.05	0.47	0.22	0.13	0.31	0.04	0.03	-0.17	.51	
30 - My colleagues are encouraged to report any errors they make	0.17	0.01	0.06	0.08	0.30	-0.05	0.76	-0.05	0.04	0.20	0.15	-0.01	.78	
5 - I am encouraged to report any errors I make	0.27	0.19	0.01	0.01	0.13	0.03	0.73	0.15	0.02	0.17	0.01	-0.03	.72	
36 - I don't always report the errors that I've made	-0.04	0.34	0.36	-0.02	-0.12	-0.04	0.54	-0.03	0.16	0.15	-0.02	0.23	.66	
6 - If I am not sure about the implications of a particular decision I will always ask for	0.13	0.37	-0.01	0.21	0.14	0.05	0.47	0.33	0.10	-0.04	-0.22	0.00	.61	

advice														
43 - The people I work with attend meetings concerning business objectives	0.23	0.08	0.14	-0.02	0.05	0.02	0.02	0.82	0.01	0.05	0.13	-0.02	.78	
42 - When there are meetings at work concerning business objectives I attend them	0.10	0.14	0.14	-0.03	0.09	-0.08	0.06	0.78	-0.02	0.08	0.22	0.00	.73	
8 - The people I work with appreciate the need for an effective risk control system	0.16	0.32	0.19	0.14	0.39	0.07	0.09	0.39	0.07	0.14	-0.09	0.18	.57	
16 - Management only emphasise the importance of rules and guidelines if a problem has been identified	0.18	0.03	0.03	0.02	-0.05	0.12	-0.03	-0.02	0.72	0.02	0.07	0.10	.59	
32 - Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome	0.18	0.22	0.32	0.07	0.14	0.02	0.12	0.11	0.59	0.02	0.16	-0.27	.68	
44 - Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk	0.16	0.27	0.37	-0.03	0.18	0.01	0.17	-0.16	0.50	0.03	0.05	-0.20	.61	
21 - My manager sometimes implies that I should disregard a rule or guideline	-0.04	0.38	0.24	0.02	0.22	0.22	-0.01	0.17	0.46	0.02	0.15	0.11	.58	
33 - If asked, I could explain my company's policy towards risk	0.15	0.15	0.07	0.05	0.12	0.05	0.14	0.08	0.02	0.86	0.07	0.01	.84	
23 - If asked, I could explain my company's attitude towards risk	0.06	0.05	0.02	0.11	0.12	0.13	0.16	0.06	0.03	0.85	0.09	0.00	.82	
39 - I am aware of the risk controls, rules and guidelines which govern the work I do	0.41	0.43	0.03	0.03	0.10	0.04	0.02	0.08	0.16	0.51	-0.10	0.06	.67	
9 - I know of short cuts that would get my work done more effectively	0.07	-0.02	0.22	-0.11	-0.08	0.14	-0.01	0.15	0.04	0.03	0.74	-0.13	.67	
26 - I take short cuts in set procedures to get my work done more effectively	-0.06	0.22	0.23	0.02	0.01	0.06	0.07	0.24	0.30	0.08	0.65	0.12	.71	
56 - I do my best to follow risk control procedures even though this might reduce profitability	0.12	0.36	-0.19	0.17	0.15	-0.10	0.00	0.09	0.17	0.08	0.48	0.44	.71	
4 - My managers are satisfied with the results of audits	0.13	-0.06	-0.04	0.18	0.15	0.16	0.02	0.00	0.05	-0.04	0.04	0.69	.58	
41 - Management are happy with the training given to people in respect of risk awareness	0.49	0.18	0.18	0.00	0.02	-0.02	0.00	-0.01	-0.11	0.13	-0.09	0.60	.71	

7.4.3 Adequacy of Solution in Relation to Individual Questions

The individual items included in the PCA are discussed below in relation to their crossloadings, measure of sampling adequacy (MSA) figures, and communalities.

As detailed in Chapter 6 no items were considered for deletion following analysis of the individual datasets. An overview and comparison of any poorly performing items will instead be made prior to combining the datasets and conducting any additional analyses.

The factor-loadings, shown in Table 7.5, revealed that 17 questions had cross loadings (i.e. loadings greater than 0.364 on more than one factor). The crossloading questions were q6, q8, q10, q11, q14, q19, q21, q22, q25, q36, q39, q41, q44, q46, q47, q48, and q56.

In relation to the MSA score, two questions scored below the 0.5 level, questions 1 (0.498) and 12 (0.372). The range for all questions was from 0.372 to 0.924.

The communality values (h^2) are shown in Table 7.5. None of the communalities exceeded 1 or were less than 0.4 suggesting that the factor solution was acceptable and accounted for an adequate amount of variance in each variable.

7.4.4 Naming the Factors

Each of the 12 factors extracted from the dataset are detailed below and named. The naming of factors is a subjective exercise, however the rationale was to identify a common theme for the variables loading onto each factor and name the factor accordingly.

Factor 1 - General Satisfaction with Risk Information, Communication and Support

The first factor extracted contained 13 variables and accounted for approximately 12% of the variance. As is often the case for the first and most important factor identified through factor analysis techniques, the items comprising this factor covered a number of issues (Dunteman, 1989) suggesting it can be described as a general risk factor. Specifically the questions covered satisfaction with risk information and procedures (q34, q45, q13, q40, q11, q52), encouragement to discuss/report risk

issues (q49, q51), personal satisfaction with available support about risk issues (q35, q28, q53), and management knowledge of the risk environment (q55, q10). Two variables (q10, q11) crossloaded onto other factors. This factor was named *General Satisfaction with Risk Information, Communication and Support*.

Factor 2 - Personal Adherence to Risk Controls

Factor 2 explained approximately 7% of the variance in the dataset and contained 5 variables. The questions included in this factor related to personal awareness of risk control procedures (q47) and personal belief that risk controls are adequate (q25), however the main theme related to personal adherence to risk control procedures (q24, q3, q46). Variables 47, 46 and 25 although included in this factor each crossloaded onto other factors. This factor was named *Personal Adherence to Risk Controls*.

Factor 3 - Employee Risky Acts

Factor 3 contained six items and explained approximately 6% of the variance. All of the items (q31, q54, q38, q12, q50, q22) related to employee non-adherence to risk controls, for example not following procedures. One variable (q22) crossloaded onto another factor. This factor was named *Employee Risky Acts*.

Factor 4 - Employee Satisfaction with Decision-Making and Support

Five items loaded onto Factor 4, which accounted for 5% of the variance. The questions related to personal knowledge and satisfaction with decision-making (q20, q15, q19) and employee expectations of support regarding risk control breaches (q27,

q2). Variable 19 crossloaded onto another factor. The factor was named *Employee Satisfaction with Decision-Making and Support*.

Factor 5 - Management Satisfaction with Risk Controls

Factor 5 comprised four variables and accounted for approximately 5% of the variance in the dataset. This was the hardest factor to name as there was no clearly identifiable theme. Two of the four items crossloaded onto different factors (q14, q48) and it was considered possible that this factor had caught a number of complex variables which correlated due to their complexity rather than their content (Tabachnick and Fidell, 2001, p. 587). Two items referred to management issuing and being satisfied with risk controls (q7, q17). One item related to co-workers referring to risk guidelines (q14), and the final item related to personal risk attitudes corresponding to co-worker risk attitudes (q48). Due to concerns about this factor it was provisionally named after the highest loading variable (q7) as *Management Satisfaction with Risk Controls*. Chapter 10, Section 10.3.8 investigates poorly performing questions and factors from each PCA in more detail.

Factor 6 - Time Constraints

A total of four items loaded onto Factor 6 and 4.5% of the variance was explained. All four questions (q1, q18, q29, q37) were related to time constraints in the workplace and there were no crossloading items. This factor was named *Time Constraints*.

Factor 7 - Reporting Errors

The seventh factor contained four variables and accounted for 4.5% of the variance. Three items related to the reporting of errors (q30, q5, q36), whilst the fourth related

to asking advice (q6). Two items crossloaded onto other factors. This factor was named *Reporting Errors*.

Factor 8 - Employee Involvement in Meetings

Factor 8 contained three items and explained 4.5% of the variance. Two of the items (q43, q42) related to personal and colleague attendance at meetings, loaded very highly onto the factor and were highly correlated (0.824). The third variable (q8) had a much lower loading and also crossloaded onto another factor. The factor was therefore named after the highly loading factors, *Employee Involvement in Meetings*.

Factor 9 - Management Risky Acts

A total of four items loaded onto Factor 9 and 4.5% of the variance was explained. Each of the variables (q16, q32, q44, q21) were related to management non-adherence to risk controls therefore the factor was named *Management Risky Acts*. Two of the items (q44, q21) crossloaded onto Factor 3 (employee risky acts) suggesting there may be a relationship between employee and management risky acts.

Factor 10 - Personal Knowledge of Company Policy and Attitude Towards Risk

The tenth factor contained three variables and accounted for approximately 4% of the variance. The first two highly loading variables were related to personal knowledge of company attitude and policy toward risk (q33, q23). The third variable (q39) related to personal awareness of risk controls but had a much lower loading. The factor was therefore named after the first two highly loading items as *Personal Knowledge of Company Policy and Attitude Towards Risk*.

Factor 11 - Personal Involvement in Risky Acts

Factor 11 comprised three variables accounting for approximately 4% of the variance. Two items related to employees personally taking shortcuts to get their work done (q9, q26) whilst the third related to personal adherence to risk controls (q56). The third and lowest loading item crossloaded onto another factor. This factor was named *Personal Involvement in Risky Acts*.

Factor 12 - Management Satisfaction with the Risk Environment

The final factor comprised only two items (q4, q41) both relating to management satisfaction with the risk environment. The correlation matrix (R) revealed that the correlation between these two variables was low (0.398) suggesting this factor should be interpreted with caution. This factor accounted for 3.5% of the variance, contained one crossloading item (q41) and was named *Management Satisfaction with the Risk Environment*.

7.5 Summary

The distribution of the risk culture questionnaire within Org1 has been described and information provided on the job content of the respondents, the response rate (n=201) and the demographic breakdown of the responses. Employees within Org1 reported 15 (7.5%) errors and 18 (9%) near misses.

The principal component analysis of the risk culture questionnaire has been described and the rationale for accepting a 12-factor structure as the best representation of the data detailed.

Characteristics of this 12-factor structure were presented and each individual factor outlined and named. Table 7.6 reports the number of items contained in each factor, the factor names, and their Cronbach alpha coefficients. This information, although already produced above, is presented in this format for ease of reference, for example when factor structures are compared later in the thesis (Chapter 10).

Table 7.6 – Risk Culture Factors - Names and Properties (Org1)

Factor Number	Factor Label	Number of Items	Alpha
1	General Satisfaction with Risk Information, Communication and Support	13	.89
2	Personal Adherence to Risk Controls	5	.74
3	Employee Risky Acts	6	.73
4	Employee Satisfaction with Decision-Making and Support	5	.68
5	Management Satisfaction with Risk Controls	4	.71
6	Time Constraints.	4	.76
7	Reporting Errors.	4	.74
8	Employee Involvement in Meetings	3	.77
9	Management Risky Acts	4	.74
10	Personal Knowledge of Company Policy and Attitude Towards Risk	3	.81
11	Personal Involvement in Risky Acts	3	.63
12	Management Satisfaction with the Risk Environment	2	.55

The following chapter details the same procedures conducted on the risk culture data gathered in Org2.

8. The Factor Structure of the Risk Culture Questionnaire – Organisation Two (Org2)

8.1 Introduction

The distribution of the risk culture questionnaire in Org2 and the analysis of the resulting dataset are detailed in this chapter. The following section provides information on the sample drawn from Org2 and gives background information about the organisation. Section 8.3 details the principal components analysis (PCA) conducted on the dataset, outlines important data considerations and details the identification of a representative factor structure. Section 8.4 describes the interpretation of this factor structure including a breakdown of its characteristics e.g. internal consistency and the variance accounted for by the solution (and the individual factors). Finally, each factor is named following the examination of highly loading questions.

8.2 Sample

8.2.1 Background to Org2

Following the interviews and questionnaire validation process conducted in Org2 (see Chapter 5) the risk culture questionnaire was distributed to all financial advisors working for the organisation. The advisors main job role is to advise the public about a variety of financial decisions, e.g. mortgages, pensions and financial investments. Further information about Org2 is available in Chapter 5, Section 5.4.1.

8.2.2 Distribution

The financial advisors were located throughout the UK, within one of ten Area teams, each of which had a regional Director in charge of all advisors working in their Area. The Area Directors were briefed about the study by their senior managers and contacted by the author prior to commencement of the study at which point the research was explained and their help requested in the distribution of the questionnaires. Questionnaires were subsequently sent to each Area Director, all of whom had agreed to be responsible for ensuring a questionnaire was forwarded to each financial advisor based in their Area. The layout of the questionnaire was similar to that described in Org1, i.e. it incorporated an information sheet and covering letter that explained the research and provided completion instructions (Appendices 6 and 7 contain the questionnaire and covering letter for Org2). A prepaid envelope was included which enabled respondents to return the questionnaire directly to the University of Liverpool, thus ensuring confidentiality.

The survey included all financial advisors working for the Org2 and in total 813 questionnaires were distributed.

8.2.3 Response Rate

Out of the 813 surveys distributed 198 responses were received, giving a low and below average response rate of 24% (Baruch, 1999).

8.2.4 Demographic Variables

Demographic information requested in the questionnaire included the respondent's job role (i.e. the type of advice they are qualified to give, for example not all advisors provide mortgage advice), the Area in which they worked, their gender, their job tenure and their age.

The responses received were representative of the whole organisation with 136 respondents being male, 59 female and 3 not disclosing their gender. Ages ranged from 22 to 56, with an average age of 37. Tenure ranged from 2 months to 29 years with an average tenure of 5 years.

Tables 8.1 and 8.2 show the breakdown of responses for job role and Area. Arbitrary labels have been given to the job roles since it was not possible to provide further details about the type of job roles and Area breakdown of Org2 without compromising the confidentiality of the organisation.

Table 8.1 - Job Role Breakdown of Org2 Responses

Job Role	Number of Responses	% of Responses
JOB1	77	39
JOB2	58	29
JOB3	49	25
JOB4	14	7
Total	198	100

Table 8.2 - Area Breakdown of Org2 Responses

Area	Number of Responses	% of Responses
AREA1	9	5
AREA2	21	11
AREA3	14	7
AREA4	13	7
AREA5	13	7
AREA6	14	7
AREA7	20	10
AREA8	20	10
AREA9	52	26
AREA10	16	8
Not disclosed	6	3
Total	198	100

8.2.5 Error and Near Miss Rates

In response to the questions regarding financial risk outcomes (i.e. involvement in an error or a near miss in the previous six months) 31 (15.7%) employees reported involvement in an error and 29 (14.2%) reported involvement in a near miss. The frequency of reported errors and near misses for Org2 was unexpected in that errors outnumbered near misses which is the converse of incident reporting in industrial safety (Barling et al. 2002) and of that expected in financial loss reporting (Muermann and Oktem, 2002).

8.3 Principal Components Analysis

As detailed in Chapter 6 (Analysis Methods) Principal Components Analysis (PCA) was selected as the most appropriate method to derive the factor structure of the questionnaire. The PCA for Org2 is described in the sections below, for information on the individual questions (i.e. mean and standard deviation) see Appendix 8.

8.3.1 Data Considerations

8.3.1.1 Sample size

The dataset for Org2 comprised 198 responses and had a satisfactory case-variable ratio of 198:56 or 3.5:1.

8.3.1.2 Missing data

The amount and pattern of missing values within the dataset was inspected. Only ten variables were found to contain one (0.5%) case of missing data. Given the low percentage of missing data within the variables it was not necessary to consider deletion of variables prior to analysis. Seven cases were found to contain missing data, five had one (1.8%) missing variable, one had two (3.6%) missing variables, and one had three (5.4%). Missing Values Analysis indicated that the distribution of missing data was random.

Given the random distribution and low incidence of missing data, and the adequate size of the datafile (n=198), listwise deletion of cases prior to analysis was selected as the most suitable method of dealing with missing values.

8.3.1.3 *Factorability of the dataset*

Examination of the correlation matrix between variables revealed a number of significant correlations, a large proportion of which were > 0.3 thereby indicating that the data was suitable for factor analysis.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.845 and Bartlett's test of sphericity was significant at $p < 0.001$. Both of these inferred that the dataset was suitable for factor analysis and that the process of factor analysis should yield distinct and reliable factors.

8.3.1.4 *Selection of rotation method, oblique or orthogonal*

PCA with oblique rotation was conducted in order to confirm the selection of orthogonal rotation as the most appropriate rotation method for use with the Org2 risk culture dataset. As described in Chapter 6, if the correlations resulting from oblique rotation were found to be below 0.32 this would indicate that orthogonal rotation was a more appropriate method.

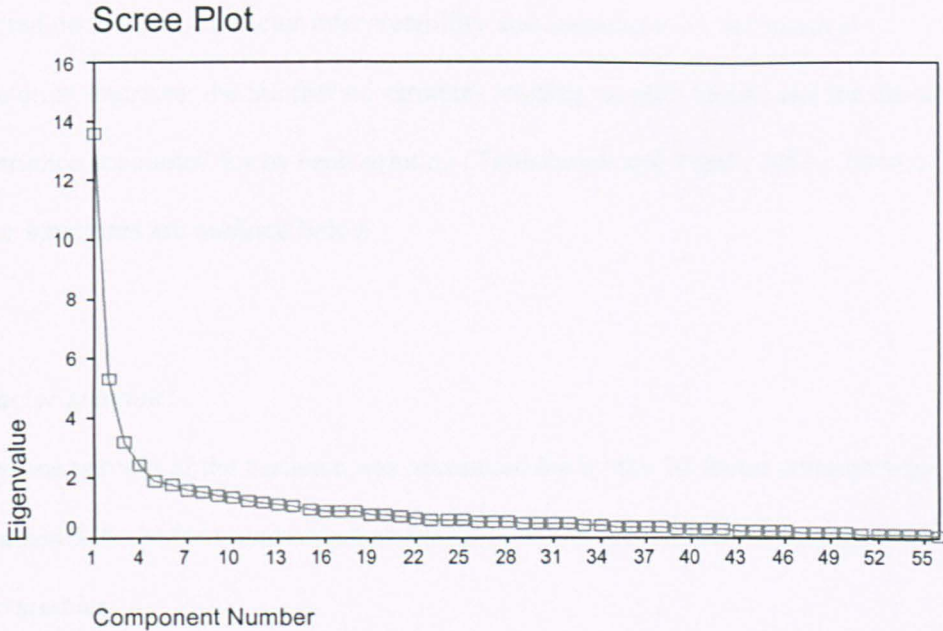
PCA with oblique (oblimin) rotation revealed a 14-factor structure. Examination of the component correlation matrix revealed no correlations greater than 0.32 indicating that orthogonal rotation would be preferable. The dataset was therefore subjected to PCA with orthogonal rotation, as detailed below.

8.3.2 Identification of Factor Structure

The 56 risk culture questions were subjected to PCA with varimax rotation. The resulting factor solution accounted for 69% of variance and included 14 factors with

Eigen values > 1 . However, the Scree plot indicated that retaining a lower number of factors may be preferable, see Figure 8.1.

Figure 8.1 - Scree plot, Org2



Using Cattell's (1978) guidelines for identifying the optimum number of factors to be retained through inspection of the Scree plot, a break was evident in the plot after Factor 14, in accordance with the Eigen values. However, a similar break was also evident after Factor 10 suggesting it may be more appropriate to retain a smaller number of factors.

Since there were differences between the number of components to be retained as identified by Eigen values > 1 and through inspection of the scree plot, additional PCA's were run, each requesting a specified number of factors. In total five additional PCA's were conducted requesting 10, 11, 12, 13 and 14-factor solutions (i.e. the

lower and upper bounds of the factors proposed through the Eigen values and the scree plot).

The resulting factor structures were compared and the most representative structure selected on the basis of factor interpretability and inspection of; the residual correlation matrices; the number of variables loading on each factor; and the amount of variance accounted for by each solution (Tabachnick and Fidell, 2001). Each of the factor structures are outlined below.

10-factor solution

Sixty-one percent of the variance was accounted for by the 10-factor solution which contained 380 (24.0%) nonredundant residuals. All proposed factors contained at least two variables.

11-factor solution

The PCA requesting 11 factors accounted for 63% of variance and contained 341 (22%) nonredundant residuals. However, the solution initially failed to converge following rotation and although a fit could be identified when the number of iterations for rotation was increased, the inability to identify a solution in the first run of the analysis was an indication that the fit was not as satisfactory as other factor solutions requested. The 11-factor solution was therefore rejected.

12-factor solution

Sixty-five percent of the variance was accounted for by the 12-factor solution which contained 289 (18.0%) nonredundant residuals. All proposed factors contained at least two variables.

13-factor solution

The PCA requesting 13 factors accounted for 67% of variance and contained 263 (17%) nonredundant residuals. All of the proposed factors contained at least two variables.

14-factor solution

Sixty-nine percent of the variance was accounted for by the 14-factor solution which contained 232 (15%) nonredundant residuals. However, since Factor 14 contained only one variable which indicated that the factor was unstable, the 14-factor solution was rejected.

The 11-factor solution was rejected as it failed to converge following rotation; the 14-factor solution was rejected as a factor was identified which contained only one variable, an indication that the factor was unstable. The remaining factor structures (10, 12 and 13) were compared in more detail to aid selection of the best fitting solution. Table 8.3 reveals the characteristics of each of these factor structures.

Table 8.3 - Characteristics of Factor Structures for Org2

	10 factors	12 factors	13 factors
Nonredundant residuals	24%	18%	17%
Total variance	61%	65%	67%
Number of crossloading questions	18	11	15
Number of questions on factors			
1	12	13	10
2	10	8	7
3	6	4	4
4	4	3	3
5	6	2	6
6	4	4	2
7	3	6	3
8	4	3	3
9	4	4	4
10	3	2	7
11		3	2
12		3	3
13			2
Total	56	55	56

The 10-factor solution was rejected at this point as it had substantially more nonredundant residuals than either the 12 or 13-factor structures (6% and 7% respectively) an indication that not all possible factors had been identified by the solution. Moreover, it also accounted for substantially less variance (4% and 6% respectively).

For the two remaining factor structures there was little difference in relation to the amount of variance they accounted for and the number of non-redundant residuals they contained. However, the 12-factor structure contained the least number of crossloading variables in the solution and additionally, had only two factors containing two variables, compared to the three two-variable factors presented by the 13-factor solution. Since it was preferable to both reduce crossloadings and retain as many variables as possible within individual factors (Tabachnick and Fidell, 2001) the

12-factor solution was accepted as representing the best fit for the Org2 risk culture data.

8.4 Interpretation of the Factor Structure

As described in the above section, PCA with varimax rotation of the Org2 dataset resulted in the selection of a 12-factor structure which accounted for 65% of the variance.

8.4.1 Characteristics of the Factor Structure

Table 8.4 shows the characteristics of this 12-factor structure, i.e. the number of questions loading onto each factor and the internal consistency (Cronbach Alpha) values. Also contained in the table is the Sum of Squared Loadings (SSL) figure for each factor.

Factor 1 accounted for 12% of the variance, with Factor 2 also accounting for a large amount of variance (10%). Subsequent factors accounted for decreasing amounts of variance ranging between 3% and 6%. Each factor is described in more detail in Section 8.4.4.

Eleven of the twelve factors had acceptable internal consistency coefficients for a questionnaire under development, i.e. greater than 0.5 (Nunnally, 1967), and seven factors possessed high coefficients (> 0.8). Two factors had an alpha level less than 0.6, one of which (Factor 11) was very low (0.37) which indicated problems with this

factor in relation to its reliability. Section 8.4.4 details this factor, the variables it contains and the possible implications of this low Alpha score in greater detail.

Table 8.4 – Characteristics of the risk culture factors (Org2)

Factor	Number of items	Alpha	SSL
1	13	.90	12.28
2	8	.88	9.81
3	4	.81	5.91
4	3	.81	5.39
5	2	.88	4.56
6	4	.81	4.51
7	6	.73	4.39
8	3	.83	4.29
9	4	.66	4.05
10	2	.62	3.50
11	3	.37	3.33
12	3	.52	3.21

8.4.2 Factor Loadings

Table 8.5 presents the variable factor loadings taken from the rotated component matrix, loadings greater than 0.364 (Stevens, 1992) are highlighted in bold.

Table 8.5 – Factor Loadings, Org2

Question Number	Component												HF
	1	2	3	4	5	6	7	8	9	10	11	12	
q35 - If I have to make a decision that I think is risky I know support is available to help me	0.78	0.06	0.14	0.11	-0.01	0.02	0.13	0.09	0.01	0.01	-0.06	0.21	.67
q53 - Advice about risk and procedures is always available to me	0.74	0.13	-0.04	0.26	0.14	0.14	0.10	0.05	0.13	-0.03	0.03	-0.02	.59
q49 - The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk	0.71	0.19	0.10	-0.03	0.13	0.04	0.07	0.08	0.13	0.17	0.06	-0.04	.71
q51 - The managers encourage me to report any risk control problems I might discover	0.70	0.18	0.09	-0.03	0.09	0.00	0.13	0.11	0.18	0.21	0.22	0.08	.60
q34 - The management in ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk	0.70	0.03	0.05	0.06	0.03	0.10	0.23	0.16	-0.08	-0.12	-0.12	0.10	.64
q52 - I am happy with the way in which I receive information about risk issues at work	0.69	0.23	-0.02	0.21	0.10	0.19	0.07	0.00	0.17	0.03	-0.03	-0.03	.52
q30 - My colleagues are encouraged to report any errors they make	0.64	0.08	0.25	-0.08	0.03	-0.05	-0.01	0.04	0.10	0.26	0.35	-0.11	.65
q28 - As long as I have followed the procedures for this role I will receive the support of management if something goes wrong	0.61	0.02	-0.04	0.19	-0.06	0.03	0.03	0.26	0.13	0.37	-0.05	0.16	.57
q11 - The instruction manual for my role is user friendly	0.60	0.13	0.00	-0.11	0.03	0.30	0.18	-0.02	0.10	-0.04	-0.20	0.07	.69
q5 - I am encouraged to report any errors I make	0.53	0.18	0.21	-0.05	-0.13	-0.02	-0.11	-0.02	0.18	0.34	0.39	-0.15	.45
q45 - I feel satisfied with the attention given to risk and governance awareness within this environment	0.51	0.30	0.16	0.27	0.09	0.14	0.26	0.01	0.07	0.03	-0.11	0.07	.55
q14 - My co-workers refer to procedures and guidelines where necessary	0.44	0.13	-0.15	0.16	0.26	-0.04	0.01	0.04	0.24	-0.16	0.16	0.12	.59
16 - Management only emphasise the importance of rules and guidelines if a problem has been identified	0.42	0.33	0.02	0.24	-0.11	0.04	0.05	0.30	-0.15	-0.09	0.27	-0.14	.73
31 - Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role	0.12	0.75	0.21	-0.05	0.06	0.04	0.24	0.06	-0.01	-0.06	-0.09	0.00	.64
9 - I know of short cuts that would get my work done more effectively	0.13	0.73	0.08	-0.02	0.11	0.04	-0.07	0.02	-0.10	-0.16	-0.12	-0.06	.76
38 - My colleagues take short cuts in set procedures to get their work done	0.27	0.72	0.15	0.08	-0.05	0.16	0.14	0.17	0.03	-0.03	-0.03	-0.09	.76
50 - My colleagues know of short cuts that would get their work done more effectively	0.09	0.71	0.04	0.00	-0.09	0.21	0.10	0.14	0.07	0.04	0.04	0.02	.71
26 - I take short cuts in set procedures to get my work done more effectively	0.05	0.62	0.49	0.18	0.00	0.09	-0.08	0.07	0.02	-0.06	0.15	0.10	.59
12 - Management are aware that risk controls, rules and guidelines are not always followed	0.08	0.58	0.05	0.14	-0.14	0.05	0.03	0.18	0.04	0.00	0.03	-0.14	.66
36 - I don't always report the errors that I've made	0.15	0.57	0.42	0.03	0.14	0.09	-0.03	-0.08	0.11	0.02	0.19	-0.05	.70
54 - People here will often take a chance on a risky decision, if they think it is likely to improve their results	0.31	0.54	0.22	0.00	-0.06	0.16	0.26	0.30	-0.02	0.07	0.16	-0.15	.78
q24 - I always work within the risk control rules and guidelines of my role	0.08	0.28	0.77	0.17	-0.04	0.06	0.09	0.05	0.15	0.07	0.03	0.11	.62
3 - I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome	0.14	0.18	0.67	-0.01	0.06	0.15	0.03	0.14	-0.06	-0.01	0.14	-0.10	.72
22 - There are occasions in my role when I do not follow all the risk controls, rules and guidelines	0.13	0.50	0.62	0.04	0.00	0.15	0.12	0.15	0.11	-0.08	0.11	0.00	.65
q56 - I do my best to follow risk control procedures even though this might reduce profitability	-0.01	0.22	0.55	0.07	0.32	-0.06	0.13	0.30	0.08	0.15	-0.12	-0.04	.67
q33 - If asked, I could explain my company's policy towards risk	0.10	0.06	0.10	0.84	0.13	-0.03	0.08	0.09	0.08	0.05	-0.07	0.02	.55
q23 - If asked, I could explain my company's attitude towards risk	0.14	0.01	0.12	0.84	0.11	0.02	0.02	0.07	0.06	0.05	-0.05	-0.04	.80
q39 - I am aware of the risk controls, rules and guidelines which govern the work I do	0.12	0.22	-0.03	0.64	0.21	0.11	0.07	-0.01	0.20	0.21	0.10	0.16	.83
q43 - The people I work with attend meetings concerning business objectives	0.15	-0.03	0.05	0.19	0.86	-0.14	0.08	-0.01	0.00	0.07	-0.03	0.03	.57

q42 - When there are meetings at work concerning business objectives I attend them	0.06	-0.06	0.09	0.17	0.84	0.00	0.00	0.07	0.14	0.16	0.02	0.08	.63
q47 - I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially	0.07	0.21	0.00	0.31	0.32	0.17	0.26	-0.17	0.20	0.19	0.28	0.32	.64
1 - Time constraints sometimes lead to my colleagues making errors	0.09	0.11	-0.01	-0.01	-0.04	0.81	-0.03	0.02	-0.03	0.07	-0.07	-0.14	.58
18 - Time constraints sometimes lead to me making errors	0.14	0.21	0.19	0.03	-0.05	0.81	0.05	0.07	0.08	-0.05	0.06	-0.06	.64
37 - Time constraints sometimes prevent me from consulting the instruction manual	0.29	0.43	0.12	0.14	-0.01	0.53	-0.04	0.18	0.04	-0.19	-0.01	0.07	.70
29 - Time constraints sometimes prevent me from sufficiently evaluating risk	0.29	0.31	0.23	0.21	-0.01	0.47	0.00	0.26	0.00	-0.21	0.09	-0.06	.64
q13 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues	0.42	0.06	0.06	-0.03	-0.08	-0.12	0.67	0.15	0.01	0.10	-0.08	-0.02	.71
q40 - My colleagues believe the internal risk control procedures are effective	0.29	0.15	0.13	0.22	0.08	0.10	0.61	0.14	0.24	-0.15	-0.07	0.08	.61
q25 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself	0.37	0.13	0.24	0.20	-0.08	-0.02	0.54	0.33	0.09	0.18	-0.01	-0.13	.61
q48 - I believe my attitude towards risk is the same as my co-workers	0.15	0.25	-0.33	0.02	0.21	0.00	0.53	-0.03	0.00	0.10	0.23	0.05	.71
q46 - I encourage my colleagues to work within the risk control guidelines	0.05	0.22	0.33	-0.01	0.19	-0.01	0.46	-0.03	0.43	0.14	0.02	0.10	.58
q41 - Management are happy with the training given to people in respect of risk awareness	0.12	-0.21	0.14	0.35	0.34	0.08	0.38	-0.06	0.06	-0.13	0.15	0.16	.63
44 - Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk	0.17	0.33	0.14	0.06	0.07	0.07	0.12	0.68	0.12	0.06	0.11	0.00	.44
32 - Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome	0.22	0.44	0.07	0.11	-0.01	0.08	0.01	0.65	0.15	0.13	0.05	0.06	.57
21 - My manager sometimes implies that I should disregard a rule or guideline	0.22	0.21	0.19	0.01	0.07	0.15	0.17	0.62	0.07	0.26	0.02	-0.03	.78
q7 - The managers here are satisfied with the risk control procedures currently in place	0.25	0.09	0.03	0.11	0.11	0.12	0.17	-0.01	0.69	-0.11	0.08	0.02	.65
q4 - My managers are satisfied with the results of audits	0.09	-0.11	0.20	0.05	-0.02	0.04	-0.08	0.17	0.69	0.08	-0.09	0.05	.74
q17 - The management of issue strict guidelines for risk control	0.29	0.04	-0.14	0.26	0.09	-0.24	0.18	0.08	0.54	0.00	-0.09	0.06	.72
q10 - The management in know what risk control procedures people should be following	0.34	0.09	-0.28	0.30	0.17	0.11	0.24	0.07	0.37	0.08	0.33	0.02	.63
q27 - My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure	0.05	-0.19	0.05	0.17	0.10	-0.15	0.02	0.17	0.06	0.67	0.04	0.07	.70
q2 - The people I work with would support me if I had a concern about a possible breach of risk control procedure	0.29	-0.10	0.01	0.08	0.26	0.09	0.10	0.11	-0.11	0.67	0.01	0.14	.73
q55 - The management of are aware of the risks we have to take in order to do our work	0.24	0.16	-0.08	0.19	0.12	0.06	0.02	-0.21	0.10	0.06	-0.64	-0.03	.61
q6 - If I am not sure about the implications of a particular decision I will always ask for advice	0.19	0.26	0.39	0.09	0.21	0.02	-0.01	-0.11	-0.07	0.05	0.52	0.02	.66
q8 - The people I work with appreciate the need for an effective risk control system	0.30	0.00	0.03	0.17	0.32	0.06	0.11	0.13	0.28	0.13	0.40	0.10	.71
q20 - I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially	0.04	-0.19	0.03	0.03	0.09	-0.06	0.02	0.00	0.02	0.10	0.07	0.76	.68
q19 - In terms of limiting financial losses I am happy with my decisions	0.12	-0.15	0.08	0.12	0.25	-0.31	-0.01	0.26	0.14	-0.16	0.05	0.63	.60
q15 - I am encouraged by my colleagues to only take acceptable risks in the decisions I make	0.22	0.10	-0.16	-0.02	-0.13	-0.03	0.05	-0.26	0.05	0.24	-0.16	0.54	.68

8.4.3 Adequacy of Solution in Relation to Individual Questions

The individual questions included in the PCA are discussed below in relation to their crossloadings, measure of sampling adequacy (MSA) figures, and communalities.

One question (q47) failed to load onto any factor at the 0.364 level.

The factor-loading table (Table 8.5) revealed that 11 questions had crossloadings (i.e. loadings greater than 0.364 on more than one factor). The crossloading questions were q5, q6, q13, q22, q25, q26, q28, q32, q36, q37, and q46.

In relation to the MSA score, no questions fell below the 0.5 level. The range of scores for all questions was from 0.523 to 0.925.

The communality values (h^2) are shown in Table 8.5. None of these values exceeded 1 or were less than 0.4 which indicated that the factor solution was acceptable and accounted for an adequate amount of variance in each variable.

8.4.4 Naming the Factors

Factor 1 - General Satisfaction with Risk Information, Communication and Support

The first factor contained 13 variables and accounted for approximately 12% of the variance. As is often the case for the first and most important factor identified through factor analysis techniques the items that comprised this factor covered a number of issues (Dunteman, 1989) suggesting it would best be described as a general risk factor. Specifically, the questions covered satisfaction with risk information and procedures (q34, q45, q11, q52, q16, q14), encouragement to discuss/report risk

issues (q49, q51, q30, q5), personal satisfaction with available support about risk issues (q35, q28, q53). Two variables (q28, q5) crossloaded onto other factors. This factor was named *General Satisfaction with Risk Information, Communication and Support*.

Factor 2 - Employee Risky Acts

Factor 2 contained eight items and explained approximately 10% of the variance. All of the items (q31, q54, q38, q12, q50, q9, q26, q36) related to employee non-adherence to risk controls, for example not following procedures. Two variables (q26, q36) crossloaded onto another factor. This factor was named *Employee Risky Acts*.

Factor 3 - Personal Adherence to Risk Controls

Factor 3 explained approximately 6% of the variance and contained four variables all of which were related to employee's personal adherence to risk control procedures (q24, q3, q22, q56). One variable (q22) crossloaded onto another factor. This factor was named *Personal Adherence to Risk Controls*.

Factor 4 - Personal Knowledge of Company Policy and Attitude Towards Risk

The fourth factor contained three variables and accounted for approximately 5% of the variance. Two of the items, related to personal knowledge of company attitude and policy toward risk (q33, q23), loaded highly on this factor. The factor loading of the third variable (q39) was lower and the variable related to personal awareness of risk controls. No variables crossloaded onto other factors. The factor was named after the two highly loading items as *Personal Knowledge of Company Policy and Attitude Towards Risk*.

Factor 5 - Employee Involvement in Meetings

Factor 5 contained two items and explained 4.5% of the variance. Although it contained only two variables the correlation between them was revealed to be high (0.782) and each variable was not significantly correlated with other variables in the dataset. This indicated that the factor, although small, should still be reliable (Tabachnick and Fidell, 2001). Furthermore, both items had high loadings and neither crossloaded onto other variables. The questions (q42, q43) both related to personal and colleague attendance at meetings therefore the factor was named *Employee Involvement in Meetings*.

Factor 6 - Time Constraints

A total of four items loaded onto Factor 6 and 4.5% of the variance was explained. All four questions (q1, q18, q29, q37) related to time constraints in the workplace. One variable (q37) loaded onto Factor two (*Employee Risky Acts*). This factor was named *Time Constraints*.

Factor 7 - Perceived Adequacy and Effectiveness of Risk Controls

Factor 7 contained six items and explained approximately 4% of the variance. The main theme included in this factor was employee beliefs that risk controls were adequate and effective, as illustrated by the three highest loading variables (q13, q40, q25). Each of the other variables covered related themes, i.e. employees holding the same attitudes towards risk as colleagues (q48), employees encouraging colleagues to work within risk guidelines (q46), and management satisfaction with training (q41). Three items crossloaded with other factors (q13, q25, q46). Factor 7 was named after

the three highest loading factors as *Perceived Adequacy and Effectiveness of Risk Controls*.

Factor 8 - Management Risky Acts

A total of three items loaded onto Factor 8 and approximately 4% of the variance was explained. Each variable (q44, q32, q21) related to management non-adherence to risk controls therefore the factor was named *Management Risky Acts*. One item (q32) crossloaded onto Factor 2 (*Employee Risky Acts*).

Factor 9 - Management Knowledge of, and Satisfaction with, the Risk Environment

The ninth factor contained four variables and accounted for 4% of the variance. The variables that loaded onto this factor covered two themes, both relating to management, i.e. management satisfaction with the risk environment (q7, q4), and management knowledge of the risk environment (q17, q10). No variable crossloaded onto other factors. This factor was named *Management Knowledge of, and Satisfaction with, the Risk Environment*.

Factor 10 - Employee Expectations of Support

Two items loaded onto Factor 10, which accounted for 3.5% of the variance. The correlation between these two variables was low (0.466) indicating this factor should be interpreted with caution. Both questions related to employee expectations of support regarding risk control breaches (q27, q2) and neither variable crossloaded onto another factor. The factor was named *Employee Expectations of Support*.

Factor 11 - General Awareness of Risks

Factor 11 contained three variables and accounted for approximately 3% of the variance. A loose theme attributed to this factor related to the general awareness of risks in the workplace. Individual variables included; management awareness of the risks employees take (q55); the asking of advice if an employee is unsure of the implications of a decision (q6); and co-workers appreciating the need for an effective risk control system (q8). One variable (q6) crossloaded onto another factor. Although a general link was identified between the variables, none of the variables were strikingly similar to each other. It was further noted that the internal consistency of this factor ($\alpha = 0.37$) was very poor which indicated that the factor should be interpreted cautiously. The factor was provisionally named *General Awareness of Risks*. Chapter 10, Section 10.3.8 investigates poorly performing questions / factors.

Factor 12 - Employee Satisfaction with Decision-Making

Three items loaded onto Factor 12, which accounted for approximately 3% of the variance. The questions all related to personal knowledge and satisfaction with decision-making (q20, q15, q19) and no variables crossloaded onto another factor. The factor was named *Employee Satisfaction with Decision-Making*.

8.5 Summary

This chapter introduced the risk culture questionnaire data gathered in Org2. A brief description of Org2 was provided alongside a breakdown of the demographics for the organisation. In total Org2 employees reported 31 (15.7%) errors and 29 (14.2%) near misses.

The main focus of this chapter was on the PCA conducted on the data (n=198), and the procedure followed in order to identify the most representative factor structure for the Org2 data has been detailed. A process of elimination resulted in the selection of a 12-factor solution. Table 8.6 reports the number of items contained in each factor, factor names, and their Cronbach alpha coefficients. This information, although already produced above, is presented in this format for ease of reference, for example when factor structures are compared later in the thesis (Chapter 10).

Table 8.6 – Risk Culture Factors - Names and Properties (Org2)

Factor Number	Factor Label	Number of Items	Alpha
1	General Satisfaction with Risk Information, Communication and Support	13	.90
2	Employee Risky Acts	8	.88
3	Personal Adherence to Risk Controls	4	.81
4	Personal Knowledge of Company Policy and Attitude Towards Risk	3	.81
5	Employee Involvement in Meetings	2	.88
6	Time Constraints	4	.81
7	Perceived Adequacy and Effectiveness of Risk Controls	6	.73
8	Management Risky Acts	3	.83
9	Management Knowledge of, and Satisfaction with, the Risk Environment	4	.66
10	Employee Expectations of Support	2	.62
11	General Awareness of Risks	3	.37
12	Employee Satisfaction with Decision-Making	3	.52

The following chapter details the distribution of the risk culture questionnaire in Org3 and details the PCA conducted on the Org3 risk culture data.

9. The Factor Structure of the Risk Culture Questionnaire – Organisation Three (Org3)

9.1 Introduction

A third financial organisation (Org3) was involved in a risk culture survey although, unlike in Org1 and Org2, no qualitative data collection was undertaken.

Chapter 9 is divided into three main sections that provide an overview of the distribution and analysis of the risk culture questionnaire within Org3. The section below provides background information for Org3 and details response rates and demographics. Section 9.3 presents the principal components analysis (PCA) conducted on the data, outlines the data considerations which guided the analysis and illustrates how the most representative factor structure was identified. The final section details the interpretation of the factor structure, e.g. through consideration of pertinent characteristics and factor loadings. The chapter concludes with the description and naming of each factor.

9.2 Sample

9.2.1 Background to Organisation Three

The third risk culture survey took place in a major UK clearing bank. Discussions with senior management resulted in the nomination of their Processing Division (comprising nine distinct Business Units situated in four UK locations) as most appropriate for inclusion in the risk culture research. One of the reasons they cited for selecting Processing was the high number of losses the bank had experienced recently

from within this division and their desire to investigate possible reasons for these losses using non-traditional (within the banking sector) methods.

Risk culture questionnaires were distributed to all employees working within the nine Business Units. Employees were non-customer facing and their role best described as working with internal clients, i.e. they provide support to all other divisions within the organisation. More specifically, they dealt with the processing of information, for example they were involved with large-scale payments being moved in and out of the organisation and the investigation of discrepancies with payments. The Business Units were viewed by the organisation as high-risk areas with regard to financial losses.

9.2.2 Distribution

Senior management within Processing nominated a contact within each Business Unit who would distribute the questionnaires to individual staff members and oversee the research. Each contact was briefed by management on the risk culture survey prior to being approached by the author. Upon contact with the author, and prior to the risk culture questionnaires being forwarded to each Centre, the research was discussed in detail and opportunity given for any questions to be raised. An information sheet and covering letter, which explained the research, guaranteed confidentiality, and gave instructions on completion, was provided with each questionnaire (see Appendices 9 and 10). A prepaid envelope was included to enable respondents to return the questionnaire directly to the University of Liverpool.

In total questionnaires were distributed to all 715 employees working within the nine Business Units of Org3.

9.2.3 Response Rate

Of the 715 questionnaires distributed a total of 370 employees completed and returned the survey, giving a good response rate of 52% (Baruch, 1999).

9.2.4 Demographic Variables

A number of questions regarding demographic information were included in the questionnaire, including the Centre in which employees worked, their gender, their age and their job tenure. Table 9.1 shows the breakdown of responses across the nine Business Units.

Table 9.1 – Business Unit Breakdown of Org3 Responses

Payment Centre	Number of Responses	% of Responses
Unit A	86	23
Unit B	91	25
Unit C	40	11
Unit D	18	5
Unit E	5	1
Unit F	61	17
Unit G	10	3
Unit H	39	11
Unit I	17	5
Not Disclosed	3	1
Total	370	100

Of the 370 respondents 154 were male and 207 female, with nine employees not disclosing their gender. Ages ranged from 18 to 59 with an average age of 33. Tenure

ranged from 1 month to 42 years with an average tenure of 11 years. Discussion with senior management within Processing revealed that these demographics were believed to be representative of the Processing Division.

9.2.5 Error and Near Miss Rates

In response to the questions regarding financial risk outcomes (i.e. involvement in an error or a near miss in the previous six months) 90 (24.3%) employees reported involvement in an error and 113 (30.5%) reported involvement in a near miss.

9.3 *Principal Components Analysis (PCA)*

As detailed in Chapter 6 (Analysis Methods) Principal Components Analysis (PCA) was selected as the most appropriate method to derive the factor structure of the questionnaire. The PCA is described in the sections below, for information on the individual questions (i.e. mean and standard deviation) see Appendix 11.

9.3.1 Data Considerations

9.3.1.1 *Sample size*

The dataset for Org3 comprised 370 responses, had a good case to variable ratio of 370:56 or 6.6:1, and was therefore well within the adequate sample size guidelines for factor analytic procedures (e.g. Tabachnick and Fidell, 2001).

9.3.1.2 *Missing data*

The amount and pattern of missing values within the dataset were inspected. Thirty-Five variables were found to contain missing data, nineteen had one (0.3%) missing

case, ten had two (0.5%) missing cases, six had three (0.8%) missing cases, and one had four (1.1%) missing cases. Given the low percentage of missing data within the variables it was not considered necessary to delete any variables prior to analysis. Forty-one cases were found to contain missing data, twenty-nine had one (1.8%) missing variable, six had two (3.6%) missing variables, five had three (5.4%) missing variables, and one had five (8.9%) missing variables. Missing Values Analysis indicated that the distribution of missing data was random.

Given the random distribution and low incidence of missing data, and the more than adequate size of the datafile ($n=370$), listwise deletion of cases prior to analysis was selected as the most suitable method of dealing with missing values.

9.3.1.3 Factorability of the dataset

Examination of the variable correlation matrix revealed a number of significant correlations, a large proportion of which were > 0.3 thereby indicating that the dataset was suitable for factor analysis.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.897 and Bartlett's test of sphericity was significant at $p < 0.001$, both of which provided additional evidence that the dataset was suitable for factor analysis and should result in distinct and reliable factors.

9.3.1.4 Selection of rotation method, oblique or orthogonal

The suitability of the dataset for orthogonal rotation was checked by firstly conducting a PCA with oblique rotation. Correlations between resulting factors should be greater than 0.32 to justify the use of oblique rotation.

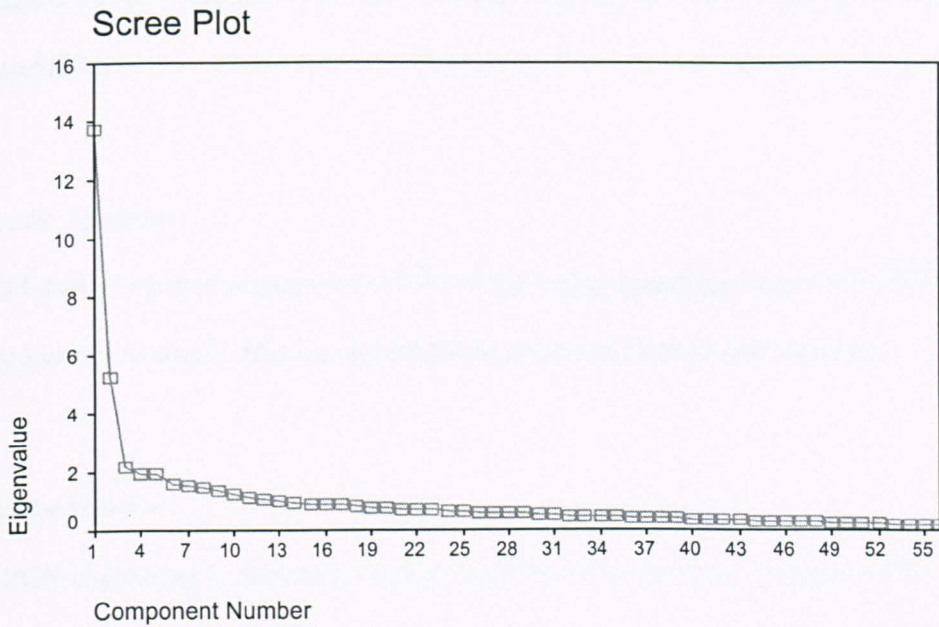
PCA with oblique (oblimin) rotation revealed a 14-factor structure. Examination of the component correlation matrix revealed that one correlation was higher than 0.32 (-0.332). However, since this was the only correlation greater than .32, and was only marginally greater, it was not considered enough to justify the use of oblique rotation. Furthermore, in order to enable comparisons of the factor structures derived from the three separate organisations it was preferable to use the same procedure for each analysis. The use of orthogonal rotation was therefore still supported and the dataset subsequently subjected to PCA with orthogonal rotation, as described below.

9.3.2 Identification of Factor Structure

The 56 risk culture questions were subjected to PCA with varimax rotation. The initial solution accounted for 61% of variance and identified 12 factors with Eigen values > 1. However, inspection of the Scree plot indicated that retaining a lower number of factors may be preferable, see Figure 9.1.

Using Cattell's (1978) guidelines for identifying the appropriate number of factors from the Scree plot a break was evident in the plot after Factor 10, i.e. the line flattened out to the right of this point.

Figure 9.1 - Scree plot, Org3



The Eigen values indicated a 12-factor solution and the scree plot indicated a 10-factor solution. Since there were differences between the number of components to be retained using these two methods further PCA's were run, each requesting a specified number of factors. An additional three PCA's were therefore conducted requesting 10, 11, and 12 factors respectively.

The resulting factor solutions were compared and the most representative factor solution selected on the basis of factor interpretability and inspection of; the residual correlation matrices; the number of variables loading on each factor; and the amount of variance accounted for by the solution (Tabachnick and Fidell, 2001). Each factor structure is outlined briefly below.

10-factor solution

Fifty-seven percent of the variance was accounted for by the 10-factor solution which contained 329 (21.0%) nonredundant residuals. All proposed factors contained at least two variables.

11-factor solution

The 11-factor solution accounted for 59% of the variance and contained 298 (19.0%) nonredundant residuals. Each proposed factor contained at least two variables.

12-factor solution

The PCA requesting 12 factors accounted for 61% of variance and contained 276 (17%) nonredundant residuals. All proposed factors contained at least two variables.

None of the factor solutions were rejected at this stage since they all met the minimum criteria, i.e. they all converged following rotation and each factor contained a minimum of two variables (it is worthy of note that the initial proposed factor solutions for Org3 are clearer than the initial proposed solutions for Org1 and Org2, possibly as a result of Org3 having a much larger sample size). The three factor structures (10, 11 and 12) were compared in more detail to aid selection of the best fitting solution. Table 9.2 shows the characteristics of each of these factor structures.

Table 9.2 - Characteristics of Factor Structures for Org3

	10 factors	11 factors	12 factors
Nonredundant residuals	21%	19%	17%
Total variance	57%	59%	61%
Number of crossloading questions	8	13	10
Number of questions on factors			
1	11	11	10
2	8	9	9
3	8	6	6
4	5	4	5
5	7	4	4
6	5	3	4
7	4	4	5
8	2	2	2
9	4	6	2
10	2	2	2
11		2	3
12			2
Total	56	53	54

The 10-factor solution was rejected as it possessed the largest number of non-redundant residuals and accounted for the least amount of variance.

There was little difference between the 11 and 12 factor solutions although the 12-factor solution was slightly better, i.e. it accounted for 2% less non-redundant residuals and 2% more variance than the 11-factor solution. The 12-factor solution also possessed the smallest number of crossloading variables. Conceptually, the solutions were very similar, although each solution contained one factor which was difficult to define.

Although both solutions were acceptable following examination of the above criteria the 12-factor solution was marginally better than the 11-factor solution and was therefore accepted as being the best representation of the Org3 risk culture data.

9.4 Interpretation of the Factor Structure

As described in the above section PCA with varimax rotation of the Org3 dataset resulted in the selection of a 12-factor structure accounting for 61% of the variance.

9.4.1 Characteristics of the Factor Structure

Table 9.3 shows the characteristics of the 12-factor structure, i.e. the number of questions that loaded onto each factor, the internal consistency (Cronbach Alpha) values, and the Sum of Squared Loadings (SSL).

Table 9.3 – Characteristics of the risk culture factors (Org3)

Factor	Number of items	Alpha	SSL
1	10	.88	9.54
2	9	.84	9.36
3	6	.84	6.16
4	5	.76	5.16
5	4	.67	5.07
6	4	.71	4.43
7	5	.67	4.30
8	2	.56	4.07
9	2	.83	3.88
10	2	.48	3.36
11	3	.61	3.33
12	2	.09	2.67

Factor 1 accounted for 9.5% of the variance, with Factor 2 also accounting for a large amount of variance (9%). Subsequent factors accounted for decreasing amounts of variance (between 3% and 6%). Each factor is described in more detail in Section 9.4.4.

Ten of the twelve factors were revealed to have acceptable Cronbach Alpha coefficients for a questionnaire under development, i.e. greater than 0.5 (Nunnally, 1967), with four factors possessing very high coefficients (> 0.8). Three factors had alpha levels below 0.6 and Factor 12 had an extremely low and unacceptable alpha (0.09) indicating problems with this factor in relation to its reliability. All factors and the variables they contain are discussed in more detail below.

9.4.2 Factor Loadings

Table 9.4 presents the variable factor loadings taken from the rotated component matrix, loadings greater than 0.364 (Stevens, 1992) are highlighted in bold. Although the sample size of this dataset is larger than the previous two datasets this cut-off for inclusion in a factor was retained in order to ease the comparison of the results arising from the three separate organisations.

Table 9.4 – Factor Loadings, Org3

Question Number	Component												H ²
	1	2	3	4	5	6	7	8	9	10	11	12	
q53 - Advice about risk and procedures is always available to me	.781	.030	.169	.097	.143	-.018	.129	.004	.137	.043	.089	-.022	.72
q52 - I am happy with the way in which I receive information about risk issues at work	.723	.261	.215	.072	.101	.062	.164	.052	.116	-.052	.036	.008	.70
q51 - The managers encourage me to report any risk control problems I might discover	.662	.105	.134	.117	.122	-.115	.075	.217	.139	.044	.197	-.060	.63

q34 - The management in ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk	.573	.162	-.013	.072	.007	.197	.060	.062	.212	.159	.185	.313	.61
q45 - I feel satisfied with the attention given to risk and governance awareness within this environment	.547	.237	.249	.156	.275	.073	.180	.095	.038	-.003	.033	.092	.58
q28 - As long as I have followed the procedures for this role I will receive the support of management if something goes wrong	.541	.025	.201	.321	.114	-.015	.078	.023	-.011	.194	-.122	-.020	.51
q35 - If I have to make a decision that I think is risky I know support is available to help me	.526	.051	.164	.187	-.019	.037	-.073	.193	.123	.392	.147	.046	.58
q55 - The management of are aware of the risks we have to take in order to do our work	.496	-.002	.035	.041	.367	.054	.074	.091	.007	.334	.176	-.089	.55
q49 - The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk	.464	-.071	.177	.102	.086	.107	.169	.133	.288	.328	.202	-.007	.56
q40 - My colleagues believe the internal risk control procedures are effective	.377	.188	.297	.010	.122	.004	.305	.294	.134	.126	.105	.082	.51
22 - There are occasions in my role when I do not follow all the risk controls, rules and guidelines	.102	.745	.138	.081	.108	.076	.014	.147	.098	.093	-.045	-.066	.66
38 - My colleagues take short cuts in set procedures to get their work done	.068	.676	.071	.214	-.107	.129	-.020	.003	.024	.224	.203	.114	.65
26 - I take short cuts in set procedures to get my work done more effectively	.056	.670	.146	.115	.010	.048	-.001	-.082	.076	.041	.085	-.366	.64
50 - My colleagues know of short cuts that would get their work done more effectively	.030	.664	-.079	.062	-.129	.164	.005	-.065	-.062	-.091	.262	.068	.59
31 - Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role	-.053	.661	.009	.165	-.058	.198	-.003	.157	-.024	.180	.029	.259	.64
q24 - I always work within the risk control rules and guidelines of my role	.158	.635	.180	.182	.257	.049	.084	.154	.003	.084	-.093	.090	.62
12 - Management are aware that risk controls, rules and guidelines are not always followed	.202	.604	.008	.075	-.064	-.044	.080	.024	.076	-.078	-.114	.103	.46
9 - I know of short cuts that would get my work done more effectively	.042	.575	.042	.018	-.118	.222	.185	-.201	-.026	-.160	.136	-.258	.58
21 - My manager sometimes implies that I should disregard a rule or guideline	.404	.407	.041	.300	.211	.089	-.011	.212	.037	-.165	-.083	-.115	.57
q33 - If asked, I could explain my company's policy towards risk	.103	.009	.879	.105	.047	.037	.079	.034	.024	.009	-.008	-.038	.81
q23 - If asked, I could explain my company's attitude towards risk	.168	.067	.829	.068	.100	.065	.132	-.021	-.016	-.036	.045	.037	.76
q46 - I encourage my colleagues to work within the risk control guidelines	.260	.263	.573	-.026	.156	.013	-.009	.175	.048	.173	.000	-.139	.57
q39 - I am aware of the risk controls, rules and guidelines which govern the work I do	.266	.177	.537	.018	.274	-.186	.185	.203	.153	.211	.047	-.005	.65
q17 - The management of issue strict guidelines for risk control	.276	-.003	.500	.348	.071	-.091	.221	.132	.161	.125	.077	.132	.59
q47 - I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially	.303	.114	.454	.014	.414	-.029	.033	.180	.143	.154	.059	-.153	.59
54 - People here will often take a chance on a risky decision, if they think it is likely to improve their results	.020	.254	.005	.625	.029	.174	.082	.001	-.069	.115	.212	-.082	.56
32 - Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome	.292	.316	.038	.584	.127	.105	.062	-.036	.131	.114	.105	-.112	.61
44 - Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk	.240	.450	.035	.568	-.022	.040	.033	.014	.101	.122	-.077	-.078	.63
16 - Management only emphasise the importance of rules and guidelines if a problem has been identified	.168	.216	.219	.517	-.096	.075	-.076	.032	.041	-.005	.275	.045	.49
q8 - The people I work with appreciate the need for an effective risk control system	.210	.180	.163	.414	.127	.007	.276	.394	.086	.189	-.009	.001	.57
q10 - The management in know what risk control procedures people should be	.330	-.005	.269	.358	.200	-.134	.177	.348	.143	.111	.029	.078	.56

following														
q20 - I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially	.055	-.089	.136	.080	.769	.018	-.007	.065	.051	.116	.149	.124	.69	
q19 - In terms of limiting financial losses I am happy with my decisions	.252	.017	.122	.067	.653	-.165	.087	.175	.059	.001	-.023	-.044	.58	
q15 - I am encouraged by my colleagues to only take acceptable risks in the decisions I make	.182	-.230	.068	-.056	.581	-.021	.205	-.236	.082	.117	.081	.095	.57	
q56 - I do my best to follow risk control procedures even though this might reduce profitability	.396	.161	.220	-.075	.431	-.063	.126	.171	.078	.091	.143	-.239	.56	
q6 - If I am not sure about the implications of a particular decision I will always ask for advice	.311	.143	.100	.131	.319	.076	.023	.182	.311	.161	.162	-.254	.50	
18 - Time constraints sometimes lead to me making errors	.008	.197	.048	-.027	.031	.766	-.088	.058	-.087	-.013	.099	-.114	.67	
1 - Time constraints sometimes lead to my colleagues making errors	.013	.035	-.031	-.071	-.129	.747	.008	-.069	-.046	.168	-.031	.022	.62	
29 - Time constraints sometimes prevent me from sufficiently evaluating risk	-.046	.199	.001	.375	-.009	.625	.030	.030	.108	-.102	-.053	.060	.60	
37 - Time constraints sometimes prevent me from consulting the instruction manual	.145	.251	-.014	.265	-.014	.617	-.060	.069	-.005	-.105	.004	.183	.59	
q13 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues	.179	.001	.202	.119	.157	-.067	.734	.282	.018	-.031	.045	-.026	.74	
q14 - My co-workers refer to procedures and guidelines where necessary	.218	.016	.140	.124	.063	-.030	.609	-.047	.092	.194	.197	-.001	.55	
q48 - I believe my attitude towards risk is the same as my co-workers	-.028	.112	.008	-.268	-.024	-.127	.459	.259	.331	.219	.024	.082	.55	
q25 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself	.212	.230	.274	.361	.219	.007	.409	.174	.010	.091	-.092	.145	.59	
q41 - Management are happy with the training given to people in respect of risk awareness	.362	.148	.123	-.065	.112	.106	.379	.376	.156	-.070	.143	.242	.59	
q7 - The managers here are satisfied with the risk control procedures currently in place	.125	.105	.058	.159	.173	.020	.277	.699	.099	-.137	.023	-.059	.68	
q4 - My managers are satisfied with the results of audits	.181	-.037	.117	-.067	-.030	.042	.017	.695	-.099	.078	.143	.019	.57	
q43 - The people I work with attend meetings concerning business objectives	.208	.032	.054	.054	.030	-.029	.115	-.025	.857	.069	.009	.038	.81	
q42 - When there are meetings at work concerning business objectives I attend them	.259	.085	.094	.063	.179	-.062	.067	.014	.802	-.016	.079	-.036	.78	
q2 - The people I work with would support me if I had a concern about a possible breach of risk control procedure	.227	.078	.056	.254	.101	.013	.086	-.027	-.032	.667	.080	.084	.60	
q27 - My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure	.114	.112	.155	-.010	.340	-.010	.196	-.017	.139	.583	-.072	-.090	.58	
q5 - I am encouraged to report any errors I make	.256	.022	.054	.237	.183	-.041	.124	.157	-.021	.020	.685	.061	.67	
q30 - My colleagues are encouraged to report any errors they make	.301	.085	.009	.026	.156	-.024	.346	.066	.093	.115	.641	-.039	.68	
36 - I don't always report the errors that I've made	-.001	.456	.053	.131	.052	.189	-.168	.097	.295	-.017	.514	-.047	.66	
q11 - The instruction manual for my role is user friendly	.147	.300	.064	-.007	.071	.262	.253	.011	.005	.074	.022	.599	.62	
3 - I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome	.106	.434	.141	.187	-.017	.189	.159	.032	.004	.064	-.022	-.524	.60	

9.4.3 Adequacy of Solution in Relation to Individual Questions

The individual items included in the PCA are discussed below in relation to their crossloadings, measure of sampling adequacy (MSA) figures, and communalities.

Two questions (q10 and q6) failed to load onto any factor at the 0.364 level

The factor-loading table (Table 9.4) revealed that 11 questions had crossloadings, (i.e. loadings greater than 0.364 on more than one factor). The crossloading questions were q3, q8, q21, q26, q29, q35, q41, q44, q47, q55, q56,

In relation to the MSA score, no questions were below the 0.5 level. The range of values for all questions was .639 to .956.

The communality values (h^2) are shown in Table 9.4. None of these exceeded 1 or were less than 0.4 which indicated that the factor solution was acceptable and accounted for an adequate amount of variance in each variable

9.4.4 Naming the Factors

Factor 1 - General Satisfaction with Risk Information

The first factor extracted contained 10 variables and accounted for approximately 9.5% of the variance. As is often the case for the first and most important factor identified through factor analysis techniques the items comprising this factor covered a number of issues (Dunteman, 1989) suggesting it is a general risk factor. The questions covered satisfaction with risk information and procedures (q34, q45, q52, q40), encouragement to discuss/report risk issues (q49, q51), personal satisfaction

with available support about risk issues (q35, q28, q53), and management knowledge of the risk environment (q55). Two variables (q35, q55) crossloaded onto another factor. This factor was named *General Satisfaction with Risk Information, Communication and Support*.

Factor 2 - Employee Risky Acts

Factor 2 contained nine items and explained approximately 9% of the variance. Eight of the items (q31, q38, q12, q50, q9, q26, q22, q21) were related to employee non-adherence to risk controls, for example not following procedures. The final item (q24) related to employee adherence to risk controls, however this item loaded onto the factor in the opposite direction thereby retaining consistency with the other variables. One variable (q21) crossloaded onto another factor. This factor was named *Employee Risky Acts*.

Factor 3 - Personal Knowledge of Company Policy and Attitude Towards Risk

The third factor contained six variables and accounted for approximately 6% of the variance. The two highest loading variables were both related to personal knowledge of company attitude and policy toward risk (q33, q23). The other variables were related to personal awareness of risk controls and procedures (q39, q47) and general encouragement to work within risk controls (q46, q17). One variable crossloaded onto another factor (q47). The factor was named *Personal Knowledge of Company Policy and Attitude Towards Risk*.

Factor 4 - Management Risky Acts

A total of five items loaded onto Factor 4 and approximately 5% of the variance was explained. Three of the variables (q44, q32, q16) related to management non-adherence to risk controls. One variable related to the general taking of risky decisions (q54). The final, and lowest loading, item related to general appreciation of the need for effective risk controls (q8). The factor was named after the highly loading items as *Management Risky Acts*. Two items (q44, q8) crossloaded onto other factors.

Factor 5 - Employee Satisfaction with Decision-Making

Four items loaded onto Factor 5, which accounted for approximately 5% of the variance. Three questions related to personal knowledge and satisfaction with decision-making (q20, q15, q19) and the fourth to personal following of risk control procedures (q56). No variables crossloaded onto other factors. The factor was named *Employee Satisfaction with Decision-Making*.

Factor 6 - Time Constraints

A total of four items loaded onto Factor 6 and approximately 4% of the variance was explained. All four questions (q1, q18, q29, q37) related to time constraints in the workplace. One variable (q29) loaded onto another factor. This factor was named *Time Constraints*.

Factor 7 - Perceived Adequacy and Effectiveness of Risk Controls

Factor 7 contained five items and explained approximately 4% of the variance. The main theme contained in this factor was employee beliefs that risk controls were

adequate and effective (q13, q25). The other three variables contained related themes, i.e. holding the same attitudes towards risk as colleagues (q48), colleagues referring to procedures where necessary (q14), and management satisfaction with training (q41). One item crossloaded with other factors (q41). Factor 7 was named *Perceived Adequacy and Effectiveness of Risk Controls*.

Factor 8 - Management Satisfaction with the Risk Environment

The eighth factor contained two variables and accounted for 4% of the variance. The correlation matrix (R) revealed that the correlation between these two variables was low (0.397) suggesting this factor should be interpreted with caution. The variables loading onto this factor related to management satisfaction with the risk environment (q7, q4). A further question (q41), which originally loaded onto Factor 7, could have been allowed to load onto Factor 8 (and therefore increase the internal reliability of the factor) since it loaded at almost the same level on both factors. Conceptually this would be acceptable as q41 relates to management satisfaction with training.

However, for the purposes of these initial PCA's no questions were moved between factors (although this process is considered and discussed in Chapter 10). Neither variable crossloaded onto other factors. This factor was named *Management Satisfaction with the Risk Environment*.

Factor 9 - Employee Involvement in Meetings

Factor 9 contained two items and explained approximately 4% of the variance. The correlation between these variables was high (0.712), and each were uncorrelated with other variables in the dataset, indicating that although it contains only two variables this factor may still be reliable (Tabachnick and Fidell, 2001). Both items (q42, q43)

related to personal and colleague attendance at meetings and had high loadings.

Neither variable crossloaded onto other variables. The factor was named *Employee Involvement in Meetings*.

Factor 10 - Employee Expectations of Support

Two items loaded onto Factor 10, which accounted for approximately 3% of the variance. The correlation between the two items was low (0.371) suggesting the factor may not be reliable and should be interpreted with caution. Both questions related to employee expectations of support regarding risk control breaches (q27, q2) and neither variable crossloaded onto another factor. The factor was named *Employee Expectations of Support*.

Factor 11 - Reporting Errors

The eleventh factor contained three variables and accounted for approximately 3% of the variance. All items related to the reporting of errors (q30, q5, q36). One item crossloaded onto another factor (q36). This factor was named *Reporting Errors*.

Factor 12 - Accessibility of the Instruction Manual

Factor 12 comprised two variables accounting for approximately 2.5% of the variance in the dataset. This was the hardest factor to name as there was no clearly identifiable theme, and no correlation between the items ($r = 0.043$). One of the two items also crossloaded onto a different factor (q3). It was considered possible that this factor contained variables that were linked due to their complexity rather than their content (Tabachnick and Fidell, 2001, p. 587). The factor and the variables it contained were looked at carefully in subsequent analyses, see Chapter 10. The first variable (q11)

stated that 'the instruction manual for my role is user friendly', the second variable (q3) related to the ignoring of risk control procedures and crossloaded onto Factor 2 (Employee Risky Acts). The internal consistency of this factor ($\alpha = 0.09$) was practically non-existent and was further indication that this factor was inadequate and should not be interpreted. Despite these concerns, the identification of a poorly performing factor, particularly one which was the last to be extracted from a dataset, does not mean the entire factor solution is questionable. Indeed Tabachnick and Fidell, (2001) detailed how factors that account for a very small amount of variance add little to a solution and could be considered for exclusion. Due to the concerns about this factor it was provisionally named after the highest loading variable (q11) as *Accessibility of the Instruction Manual*.

9.5 Summary

This chapter introduced Org3 as a major UK bank and described the identification by senior management of the Processing Division of Org3 as appropriate for the risk culture survey. General background information to the organisation has been given and demographic data outlined. Employees in Org3 reported involvement in 90 (24.3%) errors and 113 (30.5%) near misses.

The principal component analysis of the risk culture questionnaire data ($n=370$) was presented and the rationale for accepting a 12-factor structure as the best representation of the data detailed. Characteristics of the preferred solution and factor loadings were provided, and the factors described and named.

Table 9.5 reports the number of items contained in each factor, factor names, and their Cronbach alpha coefficients. This information, although already produced above, is presented in this format for ease of reference, for example when factor structures are compared in the following chapter.

Table 9.5 – Risk Culture Factors - Names and Properties (Org3)

Factor Number	Factor Label	Number of Items	Alpha
1	General Satisfaction with Risk Information, Communication and Support	10	.88
2	Employee Risky Acts	9	.84
3	Personal Knowledge of Company Policy and Attitude Towards Risk	6	.84
4	Management Risky Act.	5	.76
5	Employee Satisfaction with Decision-Making	4	.67
6	Time Constraint.	4	.71
7	Perceived Adequacy and Effectiveness of Risk Controls	5	.67
8	Management Satisfaction with the Risk Environment	2	.56
9	Employee Involvement in Meetings	2	.83
10	Employee Expectations of Support	2	.48
11	Reporting Errors.	3	.61
12	Accessibility of the Instruction Manual	2	.09

The following chapter outlines the statistical and theoretical rationale for comparing and combining the three risk culture datasets and investigates the degree of similarity between them. Also described in Chapter 10 is the PCA conducted on the combined dataset and the 12-factor solution accepted as representative of each organisation.

10. Combined Dataset – Rationale and Analysis

10.1 Introduction

Preceding chapters have detailed how the risk culture questionnaire was distributed within three financial organisations and the resulting datasets independently analysed. This process led to the identification and description of the most representative factor solution for each organisation. In order to establish the generalisability of the risk culture questionnaire and the factors derived from it, attention turned to assessing the degree of similarity between these three solutions. As this chapter details, a high degree of similarity was revealed therefore supporting the decision to combine the three datasets prior to further analysis.

This chapter begins by outlining the rationale for comparing and combining the individual datasets and details the degree of similarity revealed between the three factor structures. The principal component analysis (PCA) conducted on the combined dataset is then detailed, including the identification of the most representative factor solution and the naming of the factors. Finally, the use of structural equation modelling (SEM) to perform a confirmatory factor analysis is described.

10.2 Comparing and Combining the Risk Culture Data

10.2.1 Rationale for Comparing and Combining Individual Datasets

If sufficient similarity across separate datasets can be established there are statistical and theoretical reasons why it is advantageous to combine them prior to conducting further analyses.

If different samples are shown to produce the same factors, the samples should be pooled in order to allow the increase in sample size (Tabachnick and Fidell, 2001). The benefits of increasing the size of the risk culture dataset are twofold. First, it will serve to enhance the PCA and result in the extraction of a more robust factor solution. Second, it will benefit the logistic regression analysis (i.e. with the risk culture factors as predictors of errors and near misses, see Chapter 11). As expected, and in concurrence with the reporting of accidents and near misses in safety culture research, errors and near misses within the financial organisations were reported by small numbers of employees (i.e. between 7.5% and 30%). For example, in Org1 only 15 employees reported involvement in an error, whereas the combined risk culture dataset contains 136 employees who had reported errors. This increase serves to improve the statistical power of subsequent logistic regression analyses.

In addition to the benefits of conducting a PCA on a larger combined dataset, establishing that the three independent factor solutions were sufficiently similar to warrant the combining of the datasets also provided strong support for the existence

of a replicable factor structure and indicated that the findings were likely to be generalisable to other financial organisations (Gorsuch, 1974; Field, 2000).

10.2.2 Similarities Between the Three Factor Structures

10.2.2.1 Inspection of observable content

The similarities between the factor solutions of the three samples were firstly investigated through inspection of the observable content of each factor. Table 10.1 shows the factors that were considered to be similar across the three samples, i.e. those factors which contained all or some of the same questions.

This comparison revealed a number of similar factors across the three organisations. One factor (Time Constraints) was identical in each solution i.e. it contained the same four questions. A further six factors (Employee Risky Acts, Employee Satisfaction With Decision Making, Employee Involvement in Meetings, Management Risky Acts, Personal Knowledge of Company Policy and Attitude Towards Risk, and General Satisfaction with Risk Information Communication and Support) were very similar in content across the three solutions. Similarities between two of the datasets were evident for an additional five factors (Reporting Errors, Management Satisfaction With the Risk Environment, Personal Adherence to Risk Controls, Perceived Adequacy and Effectiveness of Risk Controls, and Employee Expectations of Support).

Table 10.1 - Similarity of factors across samples

Factors - Org1	CC Org1 Org2	Factors - Org2	CC Org2 Org3	Factors - Org3	CC Org1 Org3	No. of correspo- nding q's
Employee Risky Acts (6)	.80	Employee Risky Acts (8)	.88	Employee Risky Acts (9)	.79	4
Employee Satisfaction with Decision-Making and Support (5)	.72	Employee Satisfaction with Decision-Making (3)	.72	Employee Satisfaction with Decision-Making (4)	.77	3
Time Constraints (4)	.86	Time Constraints (4)	.89	Time Constraints (4)	.87	4
Reporting Errors (4)	-		-	Reporting Errors (3)	.77	3
Employee Involvement in Meetings (3)	.66	Employee Involvement in Meetings (2)	.84	Employee Involvement in Meetings (2)	.65	2
Management Risky Acts (4)	.77	Management Risky Acts (3)	.74	Management Risky Acts (5)	.74	2
Personal Knowledge of Company Policy and Attitude Towards Risk (3)	.84	Personal Knowledge of Company Policy and Attitude Towards Risk (3)	.86	Personal Knowledge of Company Policy and Attitude Towards Risk (6)	.86	3
General Satisfaction with Risk Information, Communication and Support (14)	.87	General Satisfaction with Risk Information, Communication and Support (13)	.87	General Satisfaction with Risk Information, Communication and Support (10)	.88	8
Management Satisfaction with the Risk Environment (2)	-		-	Management Satisfaction with the Risk Environment (3)	.49	1
Personal Adherence to Risk Controls (5)	.67	Personal Adherence to Risk Controls (4)	-		-	2
	-	Perceived Adequacy and Effectiveness of Risk Controls (6)	.69	Perceived Adequacy and Effectiveness of Risk Controls (5)	-	4
Management Satisfaction with Risk Controls? (4)	.67	Management Knowledge of, and Satisfaction with, the Risk Environment (4)	-		-	2
	-	Employee Expectations of Support (2)	.65	Employee Expectations of Support (2)	-	2

Note: the number in parenthesis indicates the total number of questions loading onto a factor.

Whilst the above process was useful in establishing that there was some degree of similarity between the individual factor solutions, a more rigorous test of the degree of similarity was required in order to justify the combining of the datasets.

10.2.2.2 *Congruence coefficients (CC's) for the three datasets*

The congruence coefficient (CC) is a statistical measure of similarity between factors for which the degree of similarity is expressed as between -1 and $+1$. CC's were calculated for the factors derived from the three individual solutions. Those revealed to be similar are reported in Table 10.1 (to view the full matrices containing the CC's between each factor see Appendix 12).

Using 0.8 as the lower bound indicating an acceptable degree of factor similarity, four factors were revealed to be similar across each of the three datasets (Employee Risky Acts, Time Constraints, Personal Knowledge of Company Policy and Attitude Towards Risk, and General Satisfaction with Risk Information, Communication and Support). The CC's for a further two factors (Employee Satisfaction with Decision-Making and Support and Management Risky Acts) fell just below the 0.80 cut-off. High levels of similarity were also evident between two of the datasets, e.g. the factor 'Employee Involvement in Meetings' was present in all three datasets and had a CC of 0.86 between Org2 and Org3, although the CC was lower between Org1 and Org2 (0.66) and between Org1 and Org3 (0.65).

As detailed above, a reasonable amount of similarity was revealed through statistical comparison of the three individual samples. However, there were a number of factors evident which, whilst showing a degree of similarity (i.e. they had a congruence

coefficient of 0.60 and above) were not shown to be invariant. There were two potential explanations for this, either the factor structures revealed through the analysis of the three organisations were significantly different or the poorer fit on some of the factors was a reflection of the sample size of the individual datasets. McCrae et al. (1996) described how replicating factors between samples does depend on having a sufficiently large sample size as 'increasing sample size is likely to give increasingly precise estimates of the population factor structure' (p.563). Korth and Tucker (1975) discussed sample size as a factor which is known to influence the congruence coefficient and Cliff (1970) discussed how only two to three factors (from a four factor structure) were recoverable with a sample of 200, however when the sample was increased to 600 all four factors were identified. Upon consideration and given the restricted sample size of the individual datasets it was decided that there was a reasonable amount of similarity across the factor structures.

Since the process revealed a reasonable amount of similarity between the organisations it was appropriate to combine the three datasets. However, prior to conducting further analysis on the combined dataset, the CC was further employed to ensure it was appropriate to combine the datasets in this manner. Section 10.2.3, below, details this analysis.

10.2.3 Congruence Coefficients on Randomly Split Full Dataset

In a process similar to that proposed by Chan et al. (1999) the individual datasets (Org1 n = 201, Org2 n = 198, Org3 n = 370) were combined giving a dataset with n = 769, this combined dataset was randomly split in two and a PCA requesting 12 factors

run on each half. CC's were then calculated on the resulting factor matrices, see Table 10.2 (high coefficients are presented in bold). This process enables the degree of similarity in the combined dataset to be assessed.

In addition to the similarities revealed between the three individual datasets (described in Section 10.2.2), high congruence coefficients between the two randomly split halves of the combined dataset provided further evidence that similar factor structures were being revealed through separate PCA's.

Table 10.2 - Congruence Coefficients for full datafile (n=769) randomly split in two

1st half = rows
2nd half = columns

1 st /2 nd	1	2	3	4	5	6	7	8	9	10	11	12
1	.94	.32	.59	.49	.41	.66	.56	.24	.42	.26	.35	.26
2	.39	.94	.63	.26	.54	.30	.32	.41	-.03	.11	.04	.03
3	.35	.49	.32	.15	.23	.13	.16	.90	-.09	-.02	.02	-.01
4	.42	.41	.35	.58	.89	.37	.30	.14	.38	.31	.21	.24
5	.44	.20	.37	.90	.39	.31	.36	.11	.29	.26	.18	.23
6	.64	.27	.55	.54	.46	.50	.82	.10	.32	.24	.17	.20
7	.47	.44	.40	.28	.35	.85	.34	.12	.23	.20	.20	.11
8	.30	.16	.25	.37	.31	.28	.32	.01	.20	.84	.13	.16
9	.41	.15	.43	.45	.43	.40	.54	.13	.42	.27	.01	.62
10	.28	-.10	-.09	.27	.11	.24	.32	-.10	.78	.14	.31	.17
11	.39	.16	.48	.32	.42	.41	.36	.05	.40	.19	.75	.18
12	.31	-.02	-.32	.13	-.08	.02	.40	-.18	.16	.11	.06	.28

The coefficients presented in Table 10.2 revealed a high degree of similarity between the two factor structures. In total eight factors had congruence coefficients greater than 0.80, with four in excess of 0.90 indicating very high factorial similarity. An additional two coefficients were just below the 0.80 cut-off. The increase in the size of these coefficients compared to those found through the comparison of the

individual samples (Section 10.2.2) suggested that, as expected, increasing the sample size by combining the dataset resulted in increased factorial similarity.

The high degree of similarity revealed through the CC analyses described above, i.e. comparing both the three individual samples and the two randomly split halves of the full dataset, provided strong support for the existence of a replicable factor structure across the different samples. It was decided that conducting a PCA on the combined dataset ($n = 769$), would give the most robust and representative factor structure for the risk culture data. This process is detailed in Section 10.3.

Upon completion of the PCA, the factor structure derived from the combined dataset was assessed for its suitability in relation to the individual datasets (i.e. Org1, Org2, and Org3) through the use of confirmatory factor analysis. The results of the CFA is described in more detail in Section 10.4 and provides further support for the validity of combining the datasets.

10.3 The Factor Structure of the Combined Dataset (n=769)

This section reports the PCA conducted on the combined dataset, i.e. employee responses from Org1, Org2 and Org3 (total $n = 769$). Background information on the combined dataset (e.g. response rates and demographics) is provided, the procedure followed whilst conducting the PCA described and finally, the factor solution interpreted and the factors named. Information on the individual questions for the combined dataset (i.e. mean and standard deviation) can be found in Appendix 13.

10.3.1 Response Rate

Of the 2049 surveys distributed 769 responses were received, giving an acceptable response rate of 38% (Baruch, 1999).

10.3.2 Demographic Variables

Of the 769 respondents 333 were male and 422 female, with 14 employees not disclosing their gender. Ages ranged from 18 to 59, with an average age of 35.

10.3.3 Error and Near Miss Rates

In response to the questions regarding financial risk outcomes (i.e. involvement in an error or a near miss in the previous six months) 136 (17.7%) employees reported involvement in an error and 160 (20.8%) reported involvement in a near miss.

10.3.4 Data Considerations

10.3.4.1 *Variables selected for inclusion in the combined factor analysis*

Poorly performing questions identified during the analysis of the individual datasets are outlined below (and detailed in Chapters 7, 8 and 9). Examination of these, in order to assess whether or not questions should be considered for exclusion, was made prior to conducting PCA on the combined dataset.

- q47 failed to load in the solution for Org2, and both q6 and q10 failed to load in the solution for Org3.
- Two questions (q1, q12) were below the preferred level for MSA scores for Org1 (all MSA scores were acceptable in the other two analyses).
- Community values were acceptable in all three solutions.
- Each individual factor solution revealed a number of crossloading items, i.e. items that loaded onto one or more factors. However, no single item crossloaded in all three analyses. Furthermore, it was expected that the increase in sample size obtained through the combining of the datasets would result in a reduction in the number of crossloading items.

No individual item was consistently identified as problematic therefore all items were included in the combined analysis.

Further inspection of poorly performing questions followed the PCA of the combined dataset and is described in Section 10.3.8.1.

10.3.4.2 Sample size

The combined dataset comprised 769 responses and had a very good case to variable ratio of 769:56 or 13.7:1.

10.3.4.3 Missing data

The amount and pattern of missing values was inspected within each individual dataset and was reported in Chapters 7 to 9. Given the random distribution and low incidence of missing data, and the adequate size of the datafile, listwise deletion of

cases prior to analysis was selected as the most suitable method of dealing with missing values.

10.3.4.4 Factorability of the dataset

Examination of the variable correlation matrix revealed a large number of significant correlations, a proportion of which were > 0.3 which indicated that the data was suitable for factor analysis.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.923 and Bartlett's test of sphericity was significant at the $p < 0.001$, both of which indicated that the dataset was suitable for factor analysis and should yield distinct and reliable factors.

10.3.4.5 Selection of rotation method, oblique or orthogonal

In order to establish the suitability of the dataset for orthogonal rotation a PCA with oblique rotation was conducted and the factor correlations inspected.

PCA with oblique (oblimin) rotation revealed a 12-factor structure. Examination of the component correlation matrix revealed no correlations greater than 0.32 indicating that orthogonal rotation was preferable. The dataset was therefore subjected to analysis using PCA with orthogonal rotation, as detailed below.

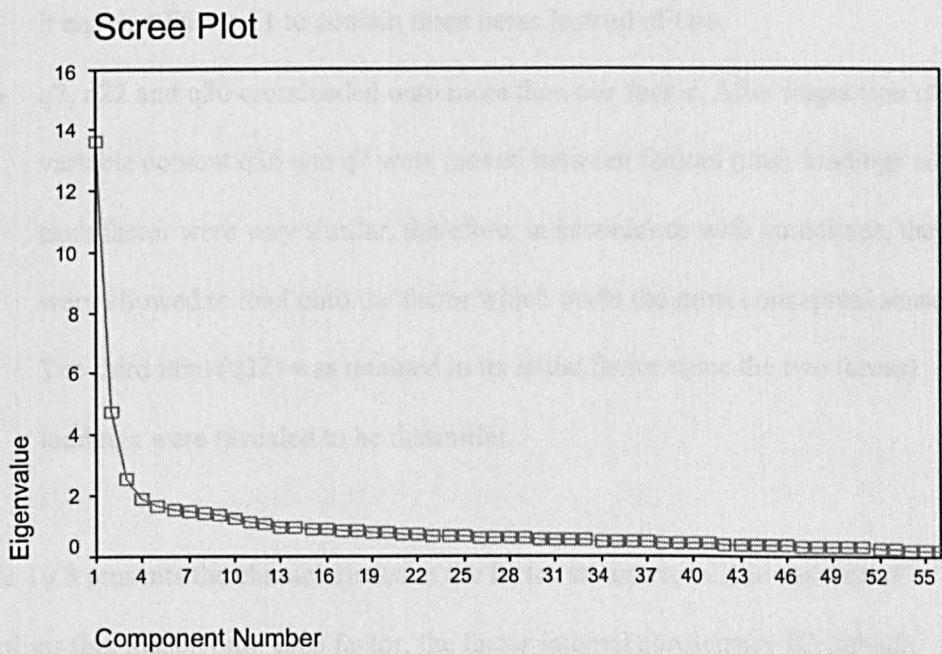
10.3.5 Identification of Factor Structure

The 56 risk culture questions were subjected to PCA with varimax rotation. The resulting factor solution accounted for 60% of variance and extracted 12 factors with

Eigen values > 1 . Inspection of the Scree plot (Cattell, 1978) also indicated that 12 factors was an acceptable number of factors to retain, see Figure 10.1.

Since the Eigen values and Scree plot concurred in proposing a 12-factor solution the 12-factor solution was accepted.

Figure 10.1 - Scree plot, Combined Data



10.3.6 Characteristics of the Factor Structure

The sample size of the combined dataset had increased substantially from those discussed in previous chapters, therefore the cut-off level for item inclusion in a factor was raised to 0.45 in accordance with accepted guidelines (Comrey and Lee, 1992).

A small number of variables which either crossloaded onto factors at similar levels or fell just below the 0.45 cut-off were examined in turn. Items that had similar loadings on two factors were retained in the factor for which they were the most salient (Gorsuch, 1974). Only a small number of items needed to be considered, each of which are detailed below:

- q41 loaded at the 0.44 level (i.e. just below the 0.45 cut-off) but was allowed to remain in the factor solution since the items were conceptually similar and it enabled Factor 11 to contain three items instead of two.
- q7, q22 and q36 crossloaded onto more than one factor. After inspection of variable content q36 and q7 were moved between factors (their loadings on each factor were very similar, therefore, in accordance with guidelines, they were allowed to load onto the factor which made the most conceptual sense). The third item (q22) was retained in its initial factor since the two (cross) loadings were revealed to be dissimilar.

Table 10.3 presents the characteristics of the factor structure, i.e. the number of questions that loaded onto each factor, the factor internal consistency (Cronbach Alpha) values, and the Sum of Squared Loadings (SSL).

Table 10.3 – Characteristics of the risk culture factors (Combined Dataset)

Factor	Number of items	Alpha	SSL
1	10	.89	9.92
2	9	.85	8.08
3	4	.66	5.29
4	4	.65	5.25
5	3	.80	5.06
6	4	.76	4.72
7	4	.77	4.57
8	2	.75	3.93
9	3	.62	3.73
10	2	.87	3.57
11	3	.55	2.89
12	2	.53	2.80

Factor 1 accounted for 10% of the variance, with Factor 2 also accounting for a large amount of variance (8%). As expected subsequent factors accounted for decreasing amounts of variance (ranging between 3% and 5%). Each of the factors are described in more detail in Section 10.3.9.

All 12 factors had acceptable internal consistency coefficients for a questionnaire under development, i.e. greater than 0.5 (Nunnally, 1967). Factors 1, 2, 5 and 10 had very high coefficients (> 0.8) and a further three factors had high coefficients (> 0.7). Only two factors, and as would be expected these factors were extracted last in the solution and therefore accounted for the least amount of variance, had an alpha level less than 0.6.

10.3.7 Factor Loadings

Table 10.4 presents the variable factor loadings taken from the rotated component matrix, loadings greater than 0.45 are highlighted in bold. The cut-off for inclusion in

a factor was higher in the combined dataset since the sample size was substantially larger than the individual datasets (Comrey and Lee, 1992).

Table 10.4 - Factor Loadings, Combined Dataset

Question Number	Component												h ²
	1	2	3	4	5	6	7	8	9	10	11	12	
53 - Advice about risk and procedures is always available to me	0.72	0.04	0.10	0.17	0.19	0.19	0.10	0.13	0.10	0.12	0.02	-0.04	.68
52 - I am happy with the way in which I receive information about risk issues at work	0.68	0.18	0.13	0.18	0.16	0.14	0.11	0.09	0.03	0.08	0.09	-0.03	.63
34 - The management in ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk	0.68	0.14	-0.04	0.15	-0.02	0.14	0.17	0.05	0.01	0.12	0.01	0.05	.58
55 - The management of are aware of the risks we have to take in order to do our work	0.66	0.06	0.05	-0.09	0.05	-0.09	-0.04	0.02	0.19	-0.03	0.09	0.12	.52
35 - If I have to make a decision that I think is risky I know support is available to help me	0.64	0.05	0.03	0.12	0.05	0.19	0.10	0.16	0.13	0.03	0.02	0.14	.54
49 - The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk	0.61	0.04	0.10	0.22	0.05	0.09	0.09	0.32	0.05	0.13	-0.01	0.15	.59
45 - I feel satisfied with the attention given to risk and governance awareness within this environment	0.58	0.19	0.25	0.19	0.25	0.11	0.05	0.05	0.12	0.08	0.05	-0.02	.58
51 - The managers encourage me to report any risk control problems I might discover	0.55	0.07	0.18	0.22	0.06	0.22	-0.04	0.38	0.14	0.04	0.15	0.06	.63
40 - My colleagues believe the internal risk control procedures are effective	0.50	0.22	0.17	0.33	0.20	-0.01	-0.06	-0.01	0.03	0.04	0.29	0.00	.56
28 - As long as I have followed the procedures for this role I will receive the support of management if something goes wrong	0.48	-0.04	0.07	0.15	0.12	0.38	0.10	0.07	0.18	-0.01	0.07	0.24	.53
11 - The toolkit for my role is user friendly	0.43	0.26	-0.03	0.29	-0.01	-0.04	0.30	0.02	0.00	-0.12	0.00	0.06	.44
38 - My colleagues take short cuts in set procedures to get their work done	0.19	0.75	0.00	0.09	0.06	0.15	0.15	0.10	-0.04	0.02	0.02	0.16	.70
31 - Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role	0.09	0.74	0.07	0.23	-0.01	0.07	0.16	-0.01	-0.01	-0.01	0.03	0.05	.65
50 - My colleagues know of short cuts that would get their work done more effectively	0.06	0.72	-0.02	-0.02	0.01	0.04	0.17	0.14	-0.01	0.00	0.01	-0.01	.58
26 - I take short cuts in set procedures to get my work done more effectively	-0.02	0.60	0.42	-0.05	0.13	0.15	0.10	0.10	0.03	0.08	-0.06	0.00	.60
9 - I know of short cuts that would get my work done more effectively	0.10	0.58	0.21	-0.03	0.03	0.02	0.14	0.01	-0.06	0.06	-0.22	-0.20	.51
22 - There are occasions in my role when I do not follow all the risk controls, rules and guidelines	0.05	0.56	0.51	0.13	0.05	0.14	0.16	0.07	-0.04	0.03	0.04	0.05	.65
12 - Management are aware that risk controls, rules and guidelines are not always followed	0.10	0.51	0.12	0.05	0.02	0.19	0.00	-0.14	-0.04	0.00	0.10	-0.11	.36
54 - People here will often take a chance on a risky decision, if they think it is likely to improve their results	0.16	0.50	0.02	0.12	0.03	0.40	0.05	0.17	-0.03	-0.05	0.00	0.08	.50
56 - I do my best to follow risk control procedures even though this might reduce profitability	0.23	0.06	0.62	0.02	0.12	0.04	-0.11	0.06	0.14	0.13	0.17	0.09	.55
3 - I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome	0.00	0.18	0.61	0.07	0.02	0.24	0.17	0.15	-0.11	0.06	-0.12	-0.04	.55
24 - I always work within the risk control	0.08	0.36	0.58	0.19	0.12	0.15	0.14	0.05	0.12	-0.07	0.07	0.14	.61

rules and guidelines of my role														
46 - I encourage my colleagues to work within the risk control guidelines	0.26	0.15	0.51	0.07	0.35	-0.05	-0.07	0.04	0.04	0.04	0.20	0.14	.54	
6 - If I am not sure about the implications of a particular decision I will always ask for advice	0.10	0.07	0.39	0.16	0.05	0.12	0.14	0.38	0.23	0.30	-0.02	0.03	.51	
13 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues	0.33	0.02	0.16	0.67	0.10	0.05	-0.03	0.06	0.02	-0.01	-0.04	0.01	.60	
48 - I believe my attitude towards risk is the same as my co-workers	0.19	0.18	-0.02	0.53	-0.02	-0.26	-0.09	0.06	0.01	0.14	0.10	0.17	.49	
25 - I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself	0.30	0.13	0.32	0.53	0.21	0.24	0.09	0.04	0.00	-0.02	-0.05	0.13	.62	
14 - My co-workers refer to procedures and guidelines where necessary	0.20	0.08	0.00	0.49	0.11	0.16	0.04	0.19	0.32	0.09	-0.01	0.07	.48	
7 - The managers here are satisfied with the risk control procedures currently in place	0.10	0.04	0.11	0.48	0.09	0.14	0.08	0.17	0.16	0.03	0.48	-0.22	.62	
8 - The people I work with appreciate the need for an effective risk control system	0.12	0.11	0.12	0.43	0.18	0.28	0.09	0.19	0.13	0.15	0.27	0.16	.52	
17 - The management of issue strict guidelines for risk control	0.17	0.03	0.02	0.42	0.40	0.24	-0.01	0.03	0.16	0.13	0.17	0.09	.50	
10 - The management in know what risk control procedures people should be following	0.35	0.00	0.00	0.41	0.26	0.28	-0.01	0.20	0.14	0.06	0.18	0.06	.53	
33 - If asked, I could explain my company's policy towards risk	0.10	0.05	0.07	0.09	0.88	0.08	0.04	0.03	0.04	0.06	0.04	0.01	.82	
23 - If asked, I could explain my company's attitude towards risk	0.10	0.03	0.08	0.08	0.85	0.06	0.09	0.08	0.05	0.04	0.00	0.02	.77	
39 - I am aware of the risk controls, rules and guidelines which govern the work I do	0.33	0.08	0.24	0.19	0.57	0.06	-0.03	0.03	0.12	0.13	0.13	0.17	.59	
47 - I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially	0.29	0.05	0.35	0.08	0.41	-0.01	-0.02	0.07	0.27	0.17	0.14	0.11	.52	
44 - Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk	0.14	0.37	0.14	0.08	0.06	0.65	0.03	0.03	-0.05	0.07	0.07	0.13	.64	
32 - Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome	0.20	0.36	0.13	0.08	0.07	0.64	0.07	0.11	0.06	0.11	-0.02	0.12	.65	
21 - My manager sometimes implies that I should disregard a rule or guideline	0.16	0.21	0.38	0.11	0.02	0.52	0.16	0.00	0.03	0.07	0.12	0.05	.55	
16 - Management only emphasise the importance of rules and guidelines if a problem has been identified	0.28	0.22	0.08	-0.01	0.12	0.48	0.11	0.16	-0.11	-0.07	-0.05	-0.05	.43	
18 - Time constraints sometimes lead to me making errors	0.09	0.19	0.14	-0.08	0.03	-0.02	0.78	0.03	-0.03	-0.06	0.14	0.01	.71	
1 - Time constraints sometimes lead to my colleagues making errors	0.07	0.07	-0.02	-0.05	-0.02	-0.03	0.77	-0.03	-0.11	-0.02	0.05	0.11	.64	
29 - Time constraints sometimes prevent me from sufficiently evaluating risk	0.09	0.25	0.08	0.10	0.08	0.21	0.69	0.00	0.02	0.01	-0.06	-0.09	.62	
37 - Time constraints sometimes prevent me from consulting the toolkit	0.21	0.34	0.01	0.08	0.04	0.22	0.59	0.07	0.00	-0.02	-0.02	-0.09	.57	
5 - I am encouraged to report any errors I make	0.27	0.07	0.07	0.12	0.07	0.13	0.01	0.77	0.04	-0.02	0.07	0.06	.71	
30 - My colleagues are encouraged to report any errors they make	0.31	0.10	0.08	0.20	0.04	0.03	-0.05	0.73	0.04	-0.01	0.02	0.11	.71	
36 - I don't always report the errors that I've made	0.03	0.50	0.20	-0.09	0.07	0.05	0.09	0.51	0.00	0.12	0.11	0.00	.60	
20 - I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially	0.17	-0.07	0.09	0.04	0.08	-0.01	-0.04	0.05	0.76	-0.01	0.07	0.09	.65	
15 - I am encouraged by my colleagues to only take acceptable risks in the decisions I make	0.20	-0.01	-0.12	0.10	0.05	-0.17	-0.03	0.06	0.69	0.00	-0.04	0.11	.59	
19 - In terms of limiting financial losses I am happy with my decisions	0.10	-0.09	0.25	0.15	0.12	0.20	-0.12	-0.02	0.63	0.12	0.15	0.05	.61	
43 - The people I work with attend meetings concerning business objectives	0.16	0.03	0.05	0.11	0.08	0.02	-0.04	0.01	-0.01	0.89	0.00	0.06	.85	
42 - When there are meetings at work concerning business objectives I attend	0.09	0.03	0.13	0.05	0.13	0.07	-0.06	0.04	0.08	0.88	0.07	0.03	.84	

them														
4 - My managers are satisfied with the results of audits	0.10	-0.04	0.05	0.01	0.06	0.06	0.07	0.06	0.05	0.00	0.80	0.05	.67	
41 - Management are happy with the training given to people in respect of risk awareness	0.35	0.06	0.15	0.26	0.16	-0.13	0.05	-0.01	0.06	0.18	0.44	0.02	.49	
27 - My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure	0.06	-0.08	0.21	0.15	0.13	0.09	-0.03	0.03	0.22	0.02	0.02	0.72	.67	
2 - The people I work with would support me if I had a concern about a possible breach of risk control procedure	0.30	0.06	0.02	0.06	0.06	0.13	0.04	0.14	0.08	0.09	0.00	0.70	.64	

10.3.8 Adequacy of Solution in Relation to Individual Questions

The individual items included in the PCA are discussed below in relation to their crossloadings, measure of sampling adequacy (MSA) figures, and communalities.

The factor-loading table (Table 10.4) revealed that only three questions had crossloadings (i.e. loadings greater than 0.45 on more than one factor). The crossloading questions were q22, q7 and q36. As described above (Section 10.3.6) each question was considered in turn with regard to in which factor they should be retained.

In relation to the MSA score no questions were below the 0.5 level. The range for all questions was from 0.722 to 0.969.

The communality values (h^2) are shown in Table 10.4. None of these exceeded 1, and all variables bar one had communalities greater than 0.4 indicating that the factor solution was acceptable and accounted for an adequate amount of variance in each variable. Variable 12 had a communality of 0.36, however since this was the only low communality score and it was only marginally below the cut-off it was not considered necessary to exclude it from the analysis.

10.3.8.1 *Poorly fitting questions across analyses*

For the combined dataset six items (q11, q6, q8, q17, q10, q47) were excluded from the factor solution since they loaded below the cut-off level. Items that failed to load in the individual PCA's also failed to load in the present analysis (i.e. Org2 – q47, Org3 – q6 and q10).

These six items could be considered for exclusion from future risk culture questionnaire studies since they are not adding anything to the factor solution.

During discussion of the PCA's on the individual datasets (Chapters 7 to 9) a number of factors were identified as difficult to define, i.e. Factor 5 in Org1, Factor 11 in Org2 and Factor 12 in Org3. Further inspection of these factors revealed that each contained one or more of the items identified as excluded from the current solution. It is likely that the lower sample size in the individual datasets resulted in poorly performing questions being incorrectly linked to factors. The increase in sample size achieved through the combining of the datasets enabled a clearer factor structure to be identified and these poorly performing questions to be excluded from the solution.

10.3.9 **Naming the Factors**

Factor 1 - General Satisfaction with Risk Information, Communication and Support

The first factor extracted contained 10 variables and accounted for approximately 10% of the variance. As is often the case for the first and most important factor identified through factor analysis techniques the items comprising this factor covered a number of issues (Dunteman, 1989) indicating that it can best be described as a

general risk factor. In particular the questions covered satisfaction with risk information and procedures (q34, q45, q40, q52), encouragement to discuss/report risk issues (q49, q51), personal satisfaction with available support about risk issues (q35, q28, q53), and management knowledge of the risk environment (q55). No variables crossloaded onto other factors. This factor was named *General Satisfaction with Risk Information, Communication and Support*.

Factor 2 - Employee Risky Acts

Factor 2 contained nine items and explained approximately 8% of the variance. All of the items (q31, q54, q38, q12, q50, q22, q26, q9, q36) related to employee non-adherence to risk controls, for example not following procedures. Two variables (q22, q36) crossloaded onto another factor. This factor was named *Employee Risky Acts*.

Factor 3 - Personal Adherence to Risk Controls

Factor 3 explained approximately 5% of the variance in the dataset and contained four variables, all related to employee adherence to risk control procedures (q24, q3, q46, q56). None of the variables crossloaded onto other factors. This factor was named *Personal Adherence to Risk Controls*.

Factor 4 - Perceived Adequacy and Effectiveness of Risk Controls

Factor 4 contained four items and explained approximately 5% of the variance. The main theme covered by this factor was employee beliefs that risk controls were adequate and effective (q13, q25). The two remaining variables were on related themes, i.e. holding the same attitudes towards risk as colleagues (q48), and colleagues referring to procedures where necessary (q14). No item crossloaded with

other factors. Factor 4 was named after the highest loading variables as *Perceived Adequacy and Effectiveness of Risk Controls*.

Factor 5 - Personal Knowledge of Company Policy and Attitude Towards Risk

The fifth factor contained three variables and accounted for approximately 5% of the variance. The first two variables were related to personal knowledge of company attitude and policy toward risk (q33, q23). The third variable (q39) related to personal awareness of risk controls. None of the variables crossloaded onto other factors. The factor was named *Personal Knowledge of Company Policy and Attitude Towards Risk*.

Factor 6 - Management Risky Acts

A total of four items loaded onto Factor 6 and 4.7% of the variance was explained. Each of the variables (q16, q32, q44, q21) were related to management non-adherence to risk controls therefore the factor was named *Management Risky Acts*. No items crossloaded onto additional factors.

Factor 7 - Time Constraints

Four items loaded onto Factor 7 explaining 4.5% of the variance. All four questions (q1, q18, q29, q37) related to time constraints in the workplace and there were no crossloading items. This factor was named *Time Constraints*.

Factor 8 - Reporting Errors

The eighth factor contained two variables and accounted for approximately 4% of the variance. Both items related to the reporting of errors (q30, q5) and neither

crossloaded onto another factor. The correlation between these variables was 0.618, and each were relatively uncorrelated with other variables in the dataset, therefore indicating that although it contained only two variables the factor may still be reliable (Tabachnick and Fidell, 2001). This factor was named *Reporting Errors*.

Factor 9 - Employee Satisfaction with Decision-Making

Three items loaded onto Factor 9 which accounted for approximately 4% of the variance. All questions related to personal knowledge and satisfaction with decision-making (q20, q15, q19) and no variables crossloaded onto another factor. The factor was named *Employee Satisfaction with Decision-Making*.

Factor 10 - Employee Involvement in Meetings

Factor 10 contained two items (q43, q42) and explained 3.5% of the variance. The correlation between these variables was high (0.763) and each was uncorrelated with other variables in the dataset, indicating that although it comprised only two variables the factor may still be reliable (Tabachnick and Fidell, 2001). Both items related to personal and colleague attendance at meetings and had very high loadings. Neither variable crossloaded onto another factor. The factor was named *Employee Involvement in Meetings*.

Factor 11 - Management Satisfaction with the Risk Environment

The eleventh factor comprised three items (q4, q41, q7) each relating to management satisfaction with the risk environment. One item (q7) loaded at a similar level onto two factors but was allowed to load onto the most relevant (Gorsuch, 1974). A further item (q41) loaded at 0.44, which was slightly below the selected cut-off for inclusion

in a factor. However since this item was only marginally below the cut-off, the content was highly similar for the three items, and it was considered preferable to increase the number of items in a factor as this should improve its stability (Tabachnik and Fidell, 2001) the item was retained in Factor 11. This factor accounted for approximately 3% of the variance, contained one crossloading item (q7) and was named *Management Satisfaction with the Risk Environment*.

Factor 12 - Employee Expectations of Support

Two items loaded onto Factor 12, which accounted for approximately 3% of the variance. The correlation between the two variables was low (0.399). This low correlation suggested that the factor should be interpreted with caution. Both questions related to employee expectations of support regarding risk control breaches (q27, q2) and neither variable crossloaded onto another factor. The factor was named *Employee Expectations of Support*.

Table 10.5 reports the factor names, their mean score, number of items and Cronbach alpha coefficients.

Table 10.5 – Risk Culture Factors - Names and Properties (Combined Dataset)

Factor Number	Factor Label	Mean Score	Number of Items	Alpha
1	General Satisfaction with Risk Information, Communication and Support	4.58	10	.89
2	Employee Risky Acts	4.01	9	.85
3	Personal Adherence to Risk Controls	4.94	4	.66
4	Perceived Adequacy and Effectiveness of Risk Controls	5.05	4	.65
5	Personal Knowledge of Company Policy and Attitude Towards Risk	4.89	3	.80
6	Management Risky Acts	3.43	4	.76
7	Time Constraints	4.65	4	.77
8	Reporting Errors	4.43	2	.75
9	Employee Satisfaction with Decision-Making	4.91	3	.62
10	Employee Involvement in Meetings	4.97	2	.87
11	Management Satisfaction with the Risk Environment	5.07	3	.55
12	Employee Expectations of Support	5.11	2	.53

10.4 Confirmatory Factor Analysis

The AMOS Structural Equation Modelling (SEM) package (Arbuckle and Wothke, 1999) was used to perform a confirmatory factor analysis (CFA) on the scales suggested by the exploratory factor analysis.

After SEM was conducted on the combined factor structure a number of goodness of fit indices were inspected. The comparative fit index (CFI) = 0.979, the normed fit index (NFI) = 0.970, and the root mean squared error of approximation (RMSEA) = 0.055. As would be expected when conducting CFA on the dataset from which the factor structure was derived each goodness of fit score was within acceptable limits thereby indicating that the proposed factor model had adequate fit.

The value of conducting CFA on the three individual datasets (rather than the combined data) is more apparent as it enables an investigation of the fit of the factor structure to these individual datasets. As discussed previously poor model fit in any one of these individual datasets would indicate that the decision to combine the datasets was questionable and suggest that they should instead be analysed separately.

The combining of the individual datasets was justified by establishing that the combined factor structure had adequate fit for each individual organisation (i.e. Org1, Org2, and Org3). The CFA's verified that the proposed structure fitted the individual organisations (Table 10.6 reveals the goodness of fit indices for the individual and the combined datasets). The results of each of these analyses satisfied the criteria for goodness of fit indicating that the proposed factor structure adequately fitted the data for each individual organisation as well as the combined data.

Table 10.6 – Goodness of Fit Indices, Structural Equation Modelling

	CFI	NFI	RMSEA
Org1	0.964	0.934	0.074
Org2	0.967	0.935	0.068
Org3	0.975	0.957	0.060
Combined	0.979	0.970	0.055

10.5 Computation of Factor Scores

Risk culture factor scores were computed by summing the scores on the individual questions which loaded highly on each factor, a technique which has been shown to be highly effective and supported through cross-validation studies (Comrey and Lee, 1992; Tabachnick and Fidell, 2001, Dunteman, 1989). The sum of the individual questions was subsequently divided by the number of questions included in each factor. This produces factor scores that are not influenced by the number of questions contained within a factor and ensures the factor scores fall within the scale of the individual questions, thereby aiding their interpretation.

Since the negatively worded individual risk culture questions were recoded prior to computation of the risk culture factors, a higher score on each of the 12 risk culture factors indicated a more positive organisational risk culture.

10.6 Summary

This chapter has identified and discussed the similarities between the three individual factor solutions proposed for Org1, Org2, and Org3 (see Chapters 7 to 9). Similarities were identified through inspection of the observable content of the factors and through the use of the congruence coefficient. The degree of similarity revealed provided support for the existence of a replicable factor structure and indicated that the decision to combine the three datasets was valid. The advantages of the increase in sample size allowed through the combining of the datasets were also discussed.

The combined dataset (n=769) was subjected to PCA. The resulting 12-factor structure was discussed and each factor detailed and named. Confirmatory factor analysis using SEM was conducted on this factor structure, which revealed that it had adequate fit for both the combined data and for each of the individual datasets.

The next chapter details further analysis of the combined risk culture data. Specifically it looks at whether or not the risk culture factors can discriminate between employees who reported involvement in an error / near miss and those who reported no involvement. Also investigated is whether the scores on the factors differ significantly between the organisations involved in the research.

11. Discriminative Ability of the Risk Culture Questionnaire

11.1 Introduction

The previous chapter presented the accepted factor structure of the risk culture questionnaire, identified following the combining of the three datasets (n = 769). Chapter 11 assesses whether or not an organisation's risk culture is related to their experience of errors (and near misses) leading to financial loss, and details the analyses conducted to investigate the discriminative ability of the factors.

The three main sections of this chapter address the following areas. Sections 11.2 and 11.3 seek to establish whether or not scores on the 12 risk culture factors discriminate between employees who reported involvement in an error or near miss in the last six months and those who reported no involvement in an error or near miss. Section 11.4 investigates whether scores on the risk culture factors differ significantly between the organisations involved in the research, which can be interpreted as an indication that the organisation's cultural values towards risk are different.

Since involvement (or not) in errors and near misses are dichotomous outcome measures, logistic regression was selected as the most appropriate test for the first two research questions (Chapter 6 described the rationale for the use of logistic regression). Analysis of variance (including post-hoc analyses) was used to address the third research question.

Evaluation of the correlation matrix of the factors (i.e. the predictor variables) revealed no evidence of multicollinearity (high levels of multicollinearity increase the probability of a type two error) indicating that the analyses should be able to identify any significant predictors.

The negatively worded risk culture questions were recoded prior to computation of the risk culture factors (see section 10.5) therefore the higher the score on each factor the more positive the organisational risk culture. It was anticipated that the direction of any significant difference between employees reporting involvement in an error or near miss and employees reporting no involvement would be such that employees who reported involvement would also have reported more negative risk cultures.

11.2 Discriminating Between Employees Involved / Not Involved in an Error

In addition to answering the risk culture questions included in the questionnaire, employees were asked to self-report their involvement in an error 'In the last six months have you been involved in any incidents or errors that could cost (the organisation) financially?'. In the combined dataset a total of 136 (17.7%) employees reported involvement in an error, 614 (79.8%) employees reported they had not been involved in an error and 19 (2.5%) did not respond to the question. The sample size of the combined dataset (n=769) was assessed and found to be large enough to be suitable for regression analysis, using Green's (1991) formula of $N \geq 50 + 8m$ (where m is the number of IV's). Logistic regression analysis was therefore conducted to determine whether or not the risk culture factors were related to employee self-reported involvement in errors.

11.2.1 Main Effects

The main effect of the individual factors was assessed to establish which factors successfully discriminated for involvement in an error. Table 11.1 reports the main effects, including the effect size, and Table 11.2 reports the mean scores, standard deviations and the mean difference on each factor for both groups (i.e. error / no error).

Table 11.1 - Logistic Regression Main Effects – Involvement in an Error

Factor	B	Wald	p	r ² (Nagelkerke)	Effect Size	Exp(B)	CI (width)
1	-.037	0.10	0.756	0.00	0.02	0.96	0.76 – 1.22 (0.46)
2	-.509	20.40	0.000**	0.05	0.30	0.60	0.48 – 0.75 (0.27)
3	-.197	2.64	0.104	0.01	0.11	0.82	0.65 – 1.04 (0.39)
4	-.106	0.61	0.433	0.00	0.05	0.90	0.69 – 1.17 (0.48)
5	.129	1.46	0.228	0.00	0.08	1.14	0.92 – 1.40 (0.48)
6	-.210	5.78	0.016*	0.01	0.16	0.81	0.68 – 0.96 (0.28)
7	-.614	35.57	0.000**	0.08	0.40	0.54	0.44 – 0.66 (0.22)
8	.055	0.37	0.543	0.00	0.04	1.06	0.89 – 1.26 (0.37)
9	.301	6.27	0.012*	0.01	0.17	1.35	1.07 – 1.71 (0.64)
10	.008	0.01	0.925	0.00	0.01	1.01	0.86 – 1.19 (0.33)
11	-.068	0.22	0.640	0.00	0.03	0.94	0.70 – 1.24 (0.54)
12	.207	3.44	0.064	0.01	0.12	1.23	0.99 – 1.53 (0.54)

* p < .05

** p < .01

Table 11.2 - Factor Means for Error / No Error Respondents

Factor	Error	Mean	SD	n	Mean Difference
1	Yes	4.65	0.95	136	-0.03
	No	4.68	0.76	607	
2	Yes	3.81	0.97	135	-0.38
	No	4.19	0.85	599	
3	Yes	4.88	0.96	136	-0.12
	No	5.00	0.74	610	
4	Yes	4.86	0.74	136	-0.06
	No	4.92	0.69	609	
5	Yes	4.67	1.00	136	0.10
	No	4.57	0.87	611	
6	Yes	4.39	1.18	134	-0.26
	No	4.65	1.07	609	
7	Yes	2.84	1.03	135	-0.59
	No	3.43	0.98	606	
8	Yes	4.95	1.17	136	0.06
	No	4.89	1.05	612	
9	Yes	5.04	0.86	136	0.19
	No	4.85	0.78	605	
10	Yes	4.97	1.30	136	0.01
	No	4.96	1.10	613	
11	Yes	4.72	0.76	135	-0.03
	No	4.75	0.64	609	
12	Yes	5.26	0.87	136	0.15
	No	5.11	0.86	614	

Main effects were revealed for four of the twelve risk culture factors. These were Factor 2 (Employee Risky Acts), Factor 6 (Management Risky Acts), Factor 7 (Time Constraints) and Factor 9 (Employee Satisfaction with Decision-Making). Three of these were in the anticipated direction, i.e. as employee's scores on factors two, six and seven increased, indicating an improvement in the risk culture, the likelihood of them being involved in an error decreased. The fourth factor (Factor 9 - Employee Satisfaction with Decision-Making) revealed a significant difference in the opposite direction, i.e. the greater the score on this factor the more likely the employee was to have reported involvement in an error. Using Cohen's (1988) values (i.e. 0.1, 0.3 and

0.5 = small, medium and large respectively) a medium effect was found for Factor 2, a medium to large effect for Factor 7, and small effects for Factors 6 and 9.

11.2.2 Stepwise Analysis

Following identification of the main effects, stepwise logistic regression was conducted using all 12 factors. Stepwise analysis selects the most statistically significant factor for insertion in the regression model, subsequent factors are only included in the model if they account for a significant proportion of variance after the effect of the already inserted factors has been taken into account. Factor 7 (Time Constraints) was revealed to be the only significant factor ($B = -0.610$, Wald = 34.089, $\text{Exp}(B) = 0.544$, $CI = 0.443$ to 0.667 , $p < 0.000$, effect size = 0.39) and accounted for 8% of the variance (Nagelkerke $r^2 = 0.08$). Since the three factors identified as significant in the previous analysis (i.e. Factors 2, 6 and 9) were not revealed as significant in the stepwise analysis all four factors must share variance. The effect size for Factor 7 in this stepwise analysis was identified as medium to large (Cohen, 1988).

No values >1 were identified for Cook's distance or the $dfbeta$ statistic (see Section 7.8.3) which indicated that no individual cases were impacting adversely on the models ability to predict all cases, or were poorly fitted by the model. Hosmer and Lemeshow's goodness of fit test was non significant ($p = 0.335$) which suggested that the model was predicting the data fairly well. A total of 9 (1.2%) cases had standardised residuals >3 .

The difference on Error / No Error scores on Factor 7 in the stepwise analysis was in the anticipated direction, i.e. as employee's scores increased the likelihood of involvement in an error decreased. Conversely, the lower employee's scores were on this factor, i.e. the less satisfied employees reported being with the time constraints they worked under, the more likely they were to report involvement in an error.

11.3 Discriminating Between Employees Involved / Not Involved in a Near Miss

In addition to reporting their involvement in an error, employees were asked to self-report their involvement in a near miss 'In the last six months have you been involved in any 'Near Misses' at work, that is incidences that had the potential to cost (the organisation) financially but didn't'. A total of 160 (20.8%) employees reported involvement in a near miss, 583 (75.8%) reported no involvement in a near miss, and 26 (3.4%) did not respond. Logistic regression analysis was conducted to determine whether or not the risk culture factors discriminated between employees who reported involvement or non-involvement in a near miss.

11.3.1 Main Effects

The main effect of the individual factors was assessed to establish which factors successfully discriminated for involvement in a near miss. Table 11.3 reports the main effects of the risk culture factors, including the effect size, and Table 11.4 reports the mean scores, standard deviations and the mean difference on each factor for both groups (i.e. near miss / no near miss).

Table 11.3 - Logistic Regression Main Effects – Involvement in a Near Miss

Factor	B	Wald	p	r ² (Nagelkerke)	Effect Size	Exp(B)	CI (width)
1	-.026	0.05	0.817	0.00	0.01	0.97	0.78 - 1.22 (0.44)
2	-.457	18.49	0.000**	0.04	0.27	0.63	0.51 - 0.78 (0.27)
3	-.192	2.81	0.094	0.01	0.11	0.83	0.66 - 1.03 (0.37)
4	-.143	1.24	0.266	0.00	0.07	0.87	0.67 - 1.12 (0.45)
5	.076	0.56	0.453	0.00	0.05	1.08	0.89 - 1.32 (0.43)
6	-.228	7.60	0.006**	0.02	0.17	0.80	0.68 - 0.94 (0.26)
7	-.450	22.77	0.000**	0.05	0.30	0.64	0.53 - 0.77 (0.24)
8	.015	0.03	0.859	0.00	0.01	1.02	0.86 - 1.20 (0.34)
9	.322	8.02	0.005**	0.02	0.18	1.38	1.10 - 1.73 (0.63)
10	-.135	3.03	0.082	0.01	0.11	0.87	0.75 - .074 (0.27)
11	-.074	0.29	0.587	0.00	0.03	0.93	0.71 - 1.21 (0.50)
12	.167	2.54	0.111	0.01	0.10	1.18	0.96 - 1.45 (0.49)

* p < .05

** p < .01

Table 11.4 - Factor Means for Near Miss / No Near Miss Respondents

Factor	Error	Mean	SD	n	Mean Difference
1	Yes	4.66	0.87	158	-0.02
	No	4.68	0.78	577	
2	Yes	3.85	0.90	157	-0.35
	No	4.20	0.87	570	
3	Yes	4.89	0.83	160	-0.11
	No	5.00	0.77	579	
4	Yes	4.85	0.74	159	-0.07
	No	4.92	0.69	579	
5	Yes	4.64	0.95	157	0.06
	No	4.58	0.88	583	
6	Yes	4.38	1.13	158	-0.28
	No	4.66	1.08	578	
7	Yes	2.97	0.99	157	-0.45
	No	3.42	1.00	577	
8	Yes	4.91	1.22	160	0.02
	No	4.89	1.02	581	
9	Yes	5.05	0.87	160	0.20
	No	4.85	0.77	575	
10	Yes	4.83	1.26	160	-0.17
	No	5.00	1.09	582	
11	Yes	4.72	0.72	158	-0.04
	No	4.76	0.64	580	
12	Yes	5.23	0.91	160	0.12
	No	5.11	0.85	583	

Main effects were revealed for four of the twelve risk culture factors. These were Factor 2 (Employee Risky Acts), Factor 6 (Management Risky Acts), Factor 7 (Time Constraints) and Factor 9 (Employee Satisfaction with Decision-Making). In accordance with the results that related to involvement in an error, three of these were in the anticipated direction, i.e. as employee's scores on factors two, six and seven increased, indicating an improvement in the risk culture, the likelihood of them being involved in an near miss decreased. Similarly, the fourth factor (Factor 9 - Employee Satisfaction with Decision-Making) again revealed a difference in the opposite

direction, i.e. the greater the score on this factor the more likely the employee was to have reported involvement in a near miss. Using Cohen's (1988) values a medium effect was found for Factors 2 and 7, and small effects for Factors 6 and 9.

11.3.2 Stepwise Analysis

Stepwise logistic regression was conducted to identify the most important factors (i.e. those factors which accounted for variance not shared by other factors) in relation to the prediction of involvement in a near miss. Four factors were identified as significant; Factor 2 (Employee Risky Acts); Factor 7 (Time Constraints); Factor 9 (Employee Satisfaction with Decision-Making) and Factor 10 (Employee Involvement in Meetings). Table 11.5 presents the results of this stepwise regression, including the effect size. All results were in the anticipated direction with the exception of Factor 9 which was identified as significant in the opposite direction in each analysis.

No values >1 were identified for the df_{beta} statistic or Cook's distance (see Section 6.8.3) indicating that no individual cases were poorly fitted by the model, or were adversely impacting on the models ability to predict all cases.

Table 11.5 - Stepwise Logistic Regression – Involvement in a Near Miss

Step	Hosmer and Lemeshow Test (p.)	r ² (Nagelkerke)	Factor	B	Wald	p.	Effect Size	Exp (B)	CI (width)
1	0.370	0.05	7	-.466	22.91	<0.001**	0.30	0.63	0.52 – 0.76 (0.24)
			2	0.375	0.07	7	-.446	21.06	<0.001**
3	0.339	0.09	9	0.335	7.63	0.006**	0.17	1.40	1.10 – 1.77 (0.67)
			7	-.458	21.67	<0.001**	0.29	0.63	0.52 – 0.77 (0.25)
			9	0.393	9.79	0.002**	0.20	1.48	1.16 – 1.89 (0.73)
4	0.064	0.09	10	-.211	6.46	0.011*	0.16	0.81	0.69 – 0.95 (0.27)
			2	-.254	4.36	0.037*	0.13	0.78	0.61 – 0.99 (0.38)
			7	-.355	10.46	0.001**	0.20	0.70	0.57 – 0.87 (0.30)
			9	.391	9.58	0.002**	0.20	1.48	1.15 – 1.90 (0.75)
			10	-.193	5.19	0.023*	0.14	0.83	0.70 – 0.97 (0.27)

* p < .05

** p < .01

Table 11.5 reveals that Hosmer and Lemeshow's goodness of fit test was non-significant for each step, which indicated the model was predicting the data fairly well. However, in Step 4 (i.e. when Factor 2 was added to the model) the significance value of Hosmer and Lemeshow's test dropped dramatically which indicated that although Factor 2 was significant, its inclusion reduced the ability of the model to predict the data accurately. It is likely therefore, when identifying a model which best predicts which individuals are most likely to be involved in a near miss, that a more reliable model would result if model building was stopped after Step 3 since the inclusion of Factor 2 had a negative effect on the predictive ability of the overall model. For the purposes of the present analysis however, Step 4 was allowed to remain since Factor 2 was correctly identified as significantly discriminating between near-miss and no near-miss respondents. A total of 9 (1.3%) cases had standardised residuals >3.

11.4 Differences Between Organisations on the Risk Culture Factors

Analysis of variance (ANOVA) was utilised to explore whether or not the scores on the 12 risk culture factors differed significantly between the three organisations (Org1, Org2, and Org3). Significant differences in factor scores would indicate that the organisations possessed different risk cultures / attitudes towards risk.

Significant differences between the three organisations were revealed on 11 of the 12 risk culture factors. Table 11.6 reports the ANOVA statistics and Table 11.7 reports the mean and standard deviation of the factor scores for each organisation.

Table 11.6 - ANOVA, Differences on Risk Culture Factors Across Orgs 1, 2 and 3

Factor	Sum of Squares	df	Mean Square	F	p.
1	27.38	2	13.69	22.84	.000**
Error	453.72	757	.60		
2	25.31	2	12.65	16.72	.000**
Error	567.61	750	.76		
3	5.69	2	2.85	4.70	.009**
Error	461.20	762	.61		
4	16.26	2	8.13	17.29	.000**
Error	357.79	761	.47		
5	2.23	2	1.12	1.39	.251
Error	614.72	763	.81		
6	16.08	2	8.04	6.81	.001**
Error	896.04	759	1.18		
7	48.24	2	24.12	24.67	.000**
Error	738.13	755	.98		
8	36.53	2	18.26	16.69	.000**
Error	834.74	763	1.09		
9	8.33	2	4.17	6.59	.001**
Error	477.69	756	.63		
10	55.74	2	27.87	22.57	.000**
Error	944.58	765	1.24		
11	4.26	2	2.13	4.92	.008**
Error	328.81	759	.43		
12	8.49	2	4.24	5.70	.003**
Error	570.10	766	.74		

** p < .01

Table 11.7 - Risk Culture Factors Mean and Standard Deviation for Orgs 1, 2 and 3

Factor	Organisation	Mean	SD	n
1	1	4.82	0.77	201
	2	4.35	0.83	196
	3	4.75	0.75	363
	Total	4.67	0.80	760
2	1	4.37	0.74	197
	2	3.86	1.00	197
	3	4.13	0.86	359
	Total	4.12	0.89	753
3	1	5.12	0.74	200
	2	4.93	0.84	198
	3	4.91	0.76	367
	Total	4.97	0.78	765

Table 11.7 (cont.) - Risk Culture Factors Mean and Standard Deviation for Orgs 1, 2 and 3

Factor	Organisation	Mean	SD	n
4	1	5.12	0.68	199
	2	4.72	0.69	198
	3	4.88	0.69	367
	Total	4.90	0.70	764
5	1	4.66	0.84	201
	2	4.59	0.96	198
	3	4.53	0.89	367
	Total	4.58	0.90	766
6	1	4.83	1.04	200
	2	4.47	1.18	197
	3	4.53	1.06	365
	Total	4.59	1.09	762
7	1	3.74	1.05	197
	2	3.13	1.07	197
	3	3.19	0.91	364
	Total	3.32	1.02	758
8	1	4.92	1.14	201
	2	4.55	1.07	198
	3	5.08	0.98	367
	Total	4.90	1.07	766
9	1	5.05	0.81	195
	2	4.77	0.73	197
	3	4.85	0.82	367
	Total	4.88	0.80	759
10	1	4.73	1.16	201
	2	5.40	0.85	198
	3	4.82	1.21	369
	Total	4.95	1.14	768
11	1	4.85	0.63	201
	2	4.73	0.67	197
	3	4.67	0.67	364
	Total	4.73	0.66	762
12	1	5.25	0.88	201
	2	4.97	0.92	198
	3	5.16	0.82	370
	Total	5.13	0.87	769

11.4.1 Posthoc Analysis of Differences Between Org1, Org2 and Org3

Significant differences were identified by the ANOVA procedure, therefore posthoc analyses were conducted in order to establish the differences between the organisations (see Appendix 14). Factor 5 was excluded from the post-hoc analysis since no main effect was identified on this factor. In the interests of parsimony both Tukey and Games-Howell posthoc tests were utilised, the results of which are displayed in Table 11.8. Tukey was used since it has been shown to have good power and controls the type 1 error rate (Field, 2000). Games-Howell was used alongside Tukey's procedure to ensure unequal variances were not adversely affecting the results. Field (2000) recommended using the Games-Howell alongside other posthoc tests due to the uncertainty of knowing whether or not the population variances are equivalent. Since both posthoc procedures revealed the same differences between the organisations, the indication is that unequal variance was not adversely affecting the findings.

Inspection of the results of the post hoc tests revealed significant differences between Org1 and Org2 on all the risk culture factors bar Factor11. Seven factors (2,3,4,6,7,9 and 11) possessed significant differences between Org1 and Org3, and six factors (1,2,4,8,10,12) possessed significant differences between Org2 and Org3. Figure 11.1 presents a graphical representation of the differences between the organisations mean scores on the risk culture factors.

Table 11.8 - Posthoc Tests - Differences Between Organisations on the Risk Culture

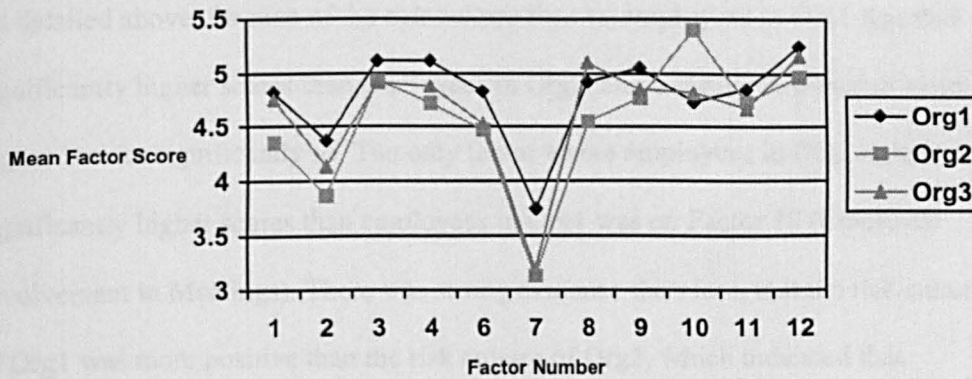
Factors

Factor	Comparison between	Mean Difference	p. (Tukey)	p. (Games-Howell)
1	Org1 & Org2	.474	.000**	.000**
	Org1 & Org3	.069	.567	.555
	Org2 & Org3	-.404	.000**	.000**
2	Org1 & Org2	.507	.000**	.000**
	Org1 & Org3	.239	.006**	.002**
	Org2 & Org3	-.267	.002**	.005**
3	Org1 & Org2	.188	.042*	.048*
	Org1 & Org3	.200	.010*	.007**
	Org2 & Org3	.012	.983	.985
4	Org1 & Org2	.401	.000**	.000**
	Org1 & Org3	.240	.000**	.000**
	Org2 & Org3	-.161	.022*	.023*
6	Org1 & Org2	.360	.003**	.004**
	Org1 & Org3	.308	.004**	.003**
	Org2 & Org3	-.052	.851	.863
7	Org1 & Org2	.616	.000**	.000**
	Org1 & Org3	.548	.000**	.000**
	Org2 & Org3	-.068	.721	.732
8	Org1 & Org2	.367	.001**	.003**
	Org1 & Org3	-.165	.171	.196
	Org2 & Org3	-.532	.000**	.000**
9	Org1 & Org2	.278	.002**	.001**
	Org1 & Org3	.203	.011*	.014*
	Org2 & Org3	-.075	.534	.506
10	Org1 & Org2	-.670	.000**	.000**
	Org1 & Org3	-.094	.602	.635
	Org2 & Org3	.577	.000**	.000**
11	Org1 & Org2	.127	.134	.129
	Org1 & Org3	.181	.005**	.004**
	Org2 & Org3	.055	.616	.623
12	Org1 & Org2	.284	.003**	.005**
	Org1 & Org3	.093	.435	.433
	Org2 & Org3	-.191	.033*	.039*

* p < .05

** p < .01

Figure 11.1 - Org1, Org2 and Org3 - Risk Culture Factor Mean Scores



Inspection of the data presented in Tables 11.7 and 11.8 and Figure 11.1 revealed that employees in Org1 generally reported higher (i.e. more positive) risk culture scores than employees in both Org2 and Org3. Similarly, although the differences were less acute, employees in Org3 reported higher scores than those in Org2 on the majority of risk culture factors. The most notable exception was on factor 10 (Employee Involvement in Meetings) where Org2 had a far higher score than either Org1 or Org3.

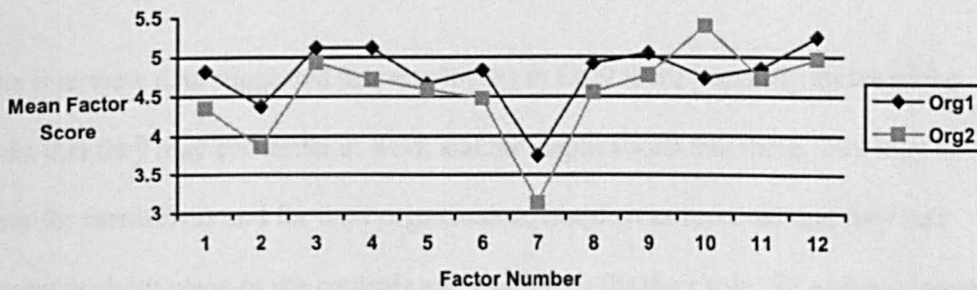
The identification of significant differences between organisations on the risk culture factors provided strong support for the existence of different risk cultures within the individual organisations.

Section 11.4.2, below, reviews the differences in risk culture between Org1 and Org2 and presents it alongside the qualitative interview data reported and discussed in Chapter 5.

11.4.2 Differences Between Org1 and Org2, Quantitative and Qualitative

As detailed above, for nine of the risk culture factors, employees in Org1 reported significantly higher scores than employees in Org2, and a further two factors were higher but not significantly so. The only factor where employees in Org2 reported significantly higher scores than employees in Org1 was on Factor 10 (Employee Involvement in Meetings). There was strong evidence therefore, that the risk culture of Org1 was more positive than the risk culture of Org2, which indicated that employees in Org1 were generally more satisfied with the environment in which they worked. Figure 11.2 shows the mean scores on each risk culture factor for the two organisations.

Figure 11.2 - Mean Risk Culture Factor Scores – Org1 and Org2



As discussed in Chapter 5 a number of interviews that enabled insight into the organisational risk culture of both Org1 and Org2 were conducted with employees prior to questionnaire distribution. A brief summary of the findings from these interviews is reproduced below.

11.4.2.1 *Overview of Interview Findings (Org1)*

The interview data suggested that employees in Org1 were generally aware of the risks they may encounter whilst at work and were also aware of the implications these risks may have for their organisation. Employees reported being reasonably happy with the controls and guidelines which were applicable to their role, and the support and advice they received which enabled them to do their job without taking unnecessary risks. Although there were a few issues raised which employees believed to be troublesome, i.e. the over use of email to communicate information, people were generally positive about most aspects of their work, their management and their colleagues. On the whole, the qualitative data indicated a positive risk culture was in place in Org1.

11.4.2.2 *Overview of Interview Findings (Org2)*

The interview data suggested that employees in Org2 were generally aware of the risks that they may encounter at work and the implications that these risks may have both for themselves and for their organisation. Employees reported that they had concerns about some of the controls and guidelines for their role, for example some expressed the belief that these controls could be too restrictive. Employees also reported that they had doubts about some of the working practices in place and were generally not satisfied with the level of communication and support that was available to them. In general, the interview data suggested that the financial advisors in Org2 were not entirely happy with the culture of the organisation although some employees described how they believed there had been improvement in the organisational culture

over recent years. On the whole the qualitative data indicated a more negative risk culture was in place in Org2 than in Org1.

11.4.2.3 Summary of Differences Between Org1 and Org2

The qualitative interview findings, outlined above, were in concurrence with the findings of the quantitative risk culture questionnaire (Section 11.4.1), with employees in Org1 reporting more satisfaction with their risk environment and a more positive risk culture than employees in Org2. The findings of the risk culture questionnaire were therefore supported by the qualitative data gathered in the two organisations.

Finally, and although not investigated statistically due to the small number of organisations involved, the percentage of errors reported by employees within Org1 and Org2 were in accordance with the findings of both the qualitative and quantitative data analysis. In Org2 15.7% employees reported involvement in an error, whereas in Org1 (which as described above had a more positive risk culture than Org2) only 7.5% employees reported involvement in an error. It was therefore considered possible that organisational error rates (as opposed to individual error involvement) might be related to an organisations risk culture. However, the results in Org3 did not follow this same trend (i.e. it had a higher error rate (17.7%) than Org2 but employees did not report a more negative culture) and this issue was not developed further in this thesis.

11.5 Summary

This chapter has reported the analyses conducted to assess the discriminative ability of the factors derived from the risk culture questionnaire.

Four factors (Employee Risky Acts, Management Risky Acts, Time Constraints, and Employee Satisfaction with Decision-Making) were revealed to have main effects for distinguishing between employees who reported involvement / no involvement in errors and near misses. The risky act and time constraint factors were revealed to have differences in the expected direction, i.e. as employee scores increased on these factors indicating an improvement in the risk culture, the likelihood of involvement in an error or near miss decreased. Analysis of the decision making factor revealed a significant difference in the opposite direction.

Stepwise analysis revealed Time Constraints to be the most influential factor for both errors and near misses although, for near misses only, Employee Risky Acts, Employee Satisfaction with Decision-Making, and Employee Involvement in Meetings were also identified as significant.

Inspection of the risk culture scores across the three organisations involved in the research revealed significant differences on a number of factors. These differences were discussed in this chapter and related to the qualitative research described in Chapter 5. Specifically, it was noted that Org1 employees reported a more positive risk culture in both the qualitative and quantitative elements of the research. This supports the contention that different organisations can possess significantly different

risk cultures and it is proposed that this is likely to be associated with their involvement in financial losses.

The final chapter of this thesis discusses the findings of all analyses and relates these to existing research in both the financial and industrial sectors.

12. Discussion

12.1 Introduction

Examination of the literature pertaining to the management of operational risk (defined as distinct from market and credit risk, see Section 3.5.2) in the financial sector, reveals that organisational culture is increasingly seen as important to financial organisations, particularly in relation to their experience of, and exposure to, financial loss events. There is growing emphasis on the need for cultural awareness (e.g. Kingsley et al. 1998; Chen, 2003), accompanied by assertions that some financial loss events can be explained within a cultural framework (e.g. Sheaffer et al. 1998; Stead and Smallman, 1999). However, although there is an assumption that culture is relevant to financial losses, this premise has not previously been examined empirically.

Cultural breakdown has been identified as a causal factor in both financial loss events and industrial accidents (e.g. Sheaffer et al. 1998; Stead and Smallman, 1999; Soane et al. 1998; Toft and Reynolds, 1997). The measurement of employee attitudes, which have been shown to be related to behaviour (Fishbein and Ajzen, 1975; Ajzen, 1991; Hanisch et al. 1998) provides insight into an organisation's culture (Guldenmund, 2000; Cheyne et al. 2002). It was hypothesised that just as employees' safety attitudes influence their behaviour, safety performance, and the likelihood of them being involved in an accident (e.g. Donald and Young, 1996, Meams et al. 1998), the risk attitudes of employees working in the financial sector will influence their behaviour at work and the subsequent likelihood of their being involved in a financial loss.

This thesis describes how insight into the risk culture of a financial organisation is gained through an investigation of employee attitudes towards risk, in a similar way to which knowledge of safety culture within industrial organisations is achieved through the investigation of employee attitudes towards safety (e.g. Donald and Canter, 1993; Mearns et al. 1998). The research presents a risk culture questionnaire that is shown to successfully measure employee attitudes towards risk.

This chapter begins with a review of the study. Following sections: outline the factor structure of the risk culture questionnaire; detail similarities between risk culture and safety culture; discuss the relationship between the risk culture factors and employee reporting of involvement in errors and near misses; and detail the differences in risk culture scores between the organisations. Finally, the implications and limitations of the research are discussed.

12.2 Review of Study

The research presented in this thesis explores the premise that the risk culture of a financial organisation can be measured and will be related to employee experience of loss events. As described above there is growing interest from financial organisations in applied research of this type. Moreover, interest is evident from financial sector regulatory bodies who are urging organisations (both informally and formally through regulatory changes) to recognise the influence of cultural / people issues to loss events (e.g. Basle Committee on Banking Supervision, 1998; BIS, 2003, 2004). Financial organisations' interest in the current research is fuelled by these regulatory changes and their recognition of the need to investigate ways in which exposure to loss events can be understood, and where possible reduced.

Discussions about risk culture, e.g. with risk and compliance personnel, senior management and employees, provide evidence and support for the growing awareness of the importance of cultural issues and reveal that financial organisations are beginning to appreciate and investigate the impact of culture on their operations. The trend towards recognising cultural issues as important to financial organisations mirrors that seen in industry where lack of knowledge of the attitudes of employees towards safety was recognised over a decade ago as an area in which safety could be improved (Donald and Canter, 1993).

Case study examination of the Barings and AIB loss events reveals a number of cultural inadequacies that played a role in the financial losses they experienced. For example, the existence of intimidating and bullying environments, which serve to discourage people from reporting any concerns they may have, are apparent in both cases. Similar cultural failings are evident in both these (and other) loss events. Furthermore, parallels are apparent between the cultural failings which are evident in industrial disasters / accidents and those evident in financial loss events.

Discussions and interviews with personnel from financial organisations (and their regulatory bodies) gave insight into the culture of financial organisations and, in conjunction with knowledge of safety culture, aided the development of a risk culture questionnaire. The risk culture of three financial organisations was measured using this questionnaire. Results indicate that the risk culture of financial organisations can be measured in a similar way to which safety culture is measured in industrial organisations. The questionnaire, which was designed to gather information on respondent's attitudes and beliefs, provides information on a number of factors, for

example Employee Risky Acts (Factor 2) and Personal Adherence to Risk Controls (Factor 3). Evidence is presented which suggests that some elements of risk culture are related to the experience of financial loss events (i.e. errors and near misses), a premise that is discussed in other texts (e.g. Sheaffer et al. 1998; Stead and Smallman, 1999) but one that has not been empirically tested. Furthermore, the results demonstrate that the different organisations involved in the research possess significantly different attitudes towards risk.

12.3 Factor Structure of Risk Culture

The identification of a stable risk culture factor structure indicates that it is possible to quantitatively measure the risk culture of financial organisations, in a similar manner to which the safety culture of industrial organisations can be measured (i.e. through the use of employee attitude questionnaires). Examination of the structure of the risk culture factors in relation to the safety culture factors derived from the SAQ is made in Section 12.4 below.

The high degree of similarity between the three risk culture factor structures, identified following analysis of data gathered in three separate organisations, provides strong support for the existence of a replicable risk culture factor structure (Gorsuch, 1974; Field, 2000). Moreover, the combining of the three datasets and the results of additional analysis (i.e. randomly splitting the data and establishing high congruence coefficients between factors derived from each half) provide further support for this contention. The apparent general nature of the risk culture factors is in accordance with safety culture research, where it is generally agreed that a core, basic set of

factors is emerging (Flin et al. 2000) and that although not yet identified (possibly as a result of studies being conducted by different research groups) a generic factor structure is believed to exist (Cheyne et al. 2002).

In total 12 factors are derived from the risk culture questionnaire. To prevent unnecessary repetition the factors are not reproduced here, however a description of each factor can be found in Section 10.3.9 (Chapter 10). Each of the factors relate to an element of the risk environment in which the respondents work. For example, how satisfied are people with the risk information they receive in the workplace, do people generally adhere to risk controls, and are people encouraged to report any errors they may be involved in?

Examination of mean scores on the risk culture factors (see Table 10.5) reveals a positive skew. There are two possible explanations for this. First, that this is a reflection of the positive risk environment of the organisations included in this study (and an indication that organisations with positive risk cultures are more likely to become involved in research of this type than organisations with negative risk cultures). Second, that the positive skew is a reflection of the nature of safety / risk attitude questionnaires, indeed the positive skew revealed through some attitude measures has been recognised previously and was discussed by Cooper (2000) as problematic. Both of these explanations are likely to have influenced the positive skew in the risk culture data. The skew in the factor scores was taken into consideration when selecting statistical tools and does not prevent discrimination between groups, for example between individuals involved (or not) in loss events (see Section 12.5).

12.4 Comparing Risk Culture and Safety Culture

The case study examination of events at Barings and AIB (see Appendices 1 and 2) reveals similar cultural problems in the organisations in the run up to the losses being uncovered. Many of these cultural issues are also evident in industrial disasters and accidents (e.g. inadequate supervision and poor communication). The parallels evident between cultural elements of financial loss events and industrial disasters provide support for the proposal that similar psychological processes are relevant to the experience of adverse events in both sectors.

The qualitative data detailed in Chapter 5 provides further support for the existence of similarities between safety culture in industrial organisations and risk culture in financial organisations. Areas identified as important to both risk and safety culture include: management commitment to safety or risk; the promotion of productivity over safety or risk; the existence of a blame culture and the availability of support; the quality of communication in the workplace; management turning a blind eye to risks employees are taking.

Inspection of the results of the quantitative research reveals that similar factors to those identified from use of the SAQ in industry (Donald and Johnson, 2004; Nananidou, 2000) are identified in risk culture in finance. However, although it is apparent that a degree of similarity exists, it is also evident that the different working environments of the industrial and financial sector require the inclusion of items specific to each sector. This section details and discusses the parallels that can be drawn between safety culture and risk culture research. First, the risk culture

questionnaire and the SAQ are directly compared. Second, some general comparisons between risk culture and safety culture research are drawn.

12.4.1 Risk Culture and the SAQ

The evidence presented in this thesis describes how there are similarities between the cultural failings in organisations in the run up to both financial loss events and industrial accidents. It was expected that there would be similarities between the factors derived from the safety attitude questionnaire (SAQ, detailed in Chapter 4, Section 4.2) and the factors derived from the risk culture questionnaire. The risk culture questionnaire is in part developed from the SAQ and existing knowledge into safety culture, and it was hypothesised that employee risk attitudes would inform on risk culture in a similar manner to which employee safety attitudes inform on safety culture. However, despite the expected similarities, it was not possible to directly compare their content exactly (i.e. map matching questions and factors). The risk culture questions went through a number of iterations in the development of the risk culture questionnaire (Chapter 4, Section 4.3) in order to ensure they contained appropriate terminology and meaning for financial organisations. As a result of this process a number of questions and topics were incorporated into the risk culture questionnaire that were not included in the SAQ (e.g. the questions on time constraints). Conversely a number of questions in the SAQ were not included in the risk culture questionnaire (e.g. questions relating to safety representatives were excluded as there was no comparable role within financial organisations).

Although the content of the SAQ and risk culture questionnaire are not identical due to the differences detailed above, they are comparable at factor level. A comparison of the factors derived from both the SAQ and the risk culture questionnaire was therefore conducted.

The risk culture factors are detailed in Table 10.5 (Chapter 10, Section 10.3.9) and the SAQ factors in Table 4.1 (Chapter 4, Section 4.2.3). Following consideration of factor content, those factors that address similar issues were identified, see Table 12.1.

Table 12.1 – Similar Factors Extracted from Safety and Risk Questionnaires

Safety Attitude Questionnaire	Risk Culture Questionnaire
1. Personal evaluation of the safety system	1. General satisfaction with risk information, communication and support
3. Personal safe working practice	3. Personal adherence to risk controls
4. Workforce’s perceived evaluation and involvement in safety meetings	10. Employee involvement in meetings
6. Unsafe working practices	2. Employee risky acts 6. Management risky acts
8. Workforce’s (perceived safety encouragement and) support	12. Employee expectations of support
10. Management’s perceived evaluation of the safety system	11. Management satisfaction with the risk environment

Comparable factors from the risk and safety culture research are evident in a number of areas. For example; a general factor covering satisfaction of safety or risk in the workplace; personal safe working practice and adherence to risk controls; employee involvement in meetings; unsafe or risky working practices; employee support; and management satisfaction and evaluation of the safety or risk environment.

Factors relating to unsafe or risky working practices are present in both factor structures. For the risk culture data, risky acts are divided into two factors pertaining to employees and management, whereas the SAQ has only one general factor relating to unsafe acts. However, as detailed in Section 4.2.3, additional analysis of the SAQ's 'Unsafe Working Practices' factor, results in the extraction of three separate factors that incorporates management and employee unsafe working practices, thereby increasing the degree of similarity between the risk and safety questionnaires.

The above comparison reveals a number of similar factors identified in both the industrial and financial research. At a more general level, the factors from both research areas also distinguished between the respondent's attitudes towards risk and safety and their beliefs as to their colleagues and management attitudes towards risk and safety. However, as would be expected, due to the different natures of the working environments, differences were also apparent between the factor structures. That is, there were factors identified in each of the datasets that are not replicated in the other. Nevertheless the contention that the risk culture of financial organisations is structured in a similar manner to safety culture in industrial organisations is supported.

The literature review, case study analysis, qualitative and quantitative data collection all provide evidence to suggest that the risk culture of a financial organisation can be measured in a similar way to the safety culture of an industrial organisation.

Moreover, the research shows that the risk culture of a financial organisation is important to its experience of financial losses in a similar way to which safety culture is important to the experience of accidents (i.e. similar factors are identified as related

to adverse incidents in both sectors, see Section 12.5) The following section discusses two broad areas of similarity between risk and safety culture research, (1) risky acts and time constraints (2) the importance of management attitudes.

12.4.2 Similarities Between Risk and Safety Culture Research

12.4.2.1 Risky Acts and Time Constraints

Researchers have identified employee awareness of the occurrence of unsafe acts in the workplace as an important factor in relation to the safety culture of industrial organisations (e.g. Donald and Young, 1996; Mearns et al. 1998). It is unsurprising therefore, that the present research identifies the awareness of risky acts occurring in the workplace as important to the risk culture of financial organisations. Moreover, safety culture research identifies that unsafe acts relate to involvement in an accident, and the present risk culture research identifies that risky acts relate to involvement in an error (see Section 12.5).

In their investigation of employee safety culture, a number of studies have looked at employees taking shortcuts, e.g. Seo's (2005) study of safety climate looked at the taking of shortcuts as a direct result of time pressures. Other research teams have focussed solely on the taking of shortcuts, i.e. not specifically in relation to time constraints (e.g. Donald and Young, 1996; Harvey et al. 2001; Cheyne et al. 2002). The present study includes questions on both time constraints and shortcuts (within the Employee Risky Acts factor) and consistently reveals them to be separate factors. The indication is that they are separate concepts, although it is considered likely that there will be a relationship between shortcuts and time constraints since time

constraints may lead to employees taking shortcuts in order to get work done. Future studies into risk and safety culture will benefit from the inclusion of both sets of items. This will enable further exploration of the precursors of time pressures and risky acts, the relationship between the concepts, and the links to errors and accidents.

Inspection of safety and risk literature reveals that time constraints (or related concepts) are included in some safety climate studies, e.g. in Flin et al's (2000) review of safety climate, questions relating to work pressure were identified in a third of questionnaires and Seo (2005) describes how, of the four studies he reviewed, two studies include work and time pressures in their models of safety climate and unsafe behaviour. Flin et al. discuss their belief that work pressure is likely to influence safety climate when time and resources become stretched, particularly in a global economy of increased competitiveness and cost reduction. It is proposed that the relationship of time pressures to risk culture is similar within finance, i.e. organisational competitiveness and the desire to minimise cost and maximise profit leads to an increase in time constraints which negatively affect the ability of employees to complete their work. In the financial sector, where people are traditionally rewarded for the profit they bring to an organisation, it is likely that employees (and management) will concentrate on the profit making rather than risk reduction aspects of the job, thereby increasing the exposure of the organisation to risky situations and to financial loss events.

Seo (2005) provides support for the influence of time pressure on safety in his model of unsafe work behaviour and establishes that workload, workpace and time pressure are causal factors of both accidents and unsafe behaviours. Seo concludes that

resources and efforts should be focussed on elements of safety climate and work pressure in the development of interventions designed to prevent accidents at work. This conclusion is both supported and reiterated in relation to risk in finance and the reduction of involvement in financial loss events.

As outlined above, some safety studies do not explicitly investigate the impact of time constraints on accident involvement. However, a number of studies have examined the related concept of the push between safety and production, where employees find themselves torn between compliance with safety rules and support of production quotas, i.e. time pressures can result in a choice of one of these at the expense of the other (e.g. Brown et al. 2000; Janssens, Brett and Smith, 1995; Lee and Harrison, 2000). Lee and Harrison (2000) report that their 'risk versus productivity' factor is significantly associated with employee involvement in accidents on a number of measures (i.e. medical treatment, absence from work, number of injuries). Similarly, in the present study the conflicting demands of risk management and profit are reflected in the importance of the Time Constraint factor to employee involvement in errors / near misses (see Section 12.5). Moreover, specific instances of 'risk versus productivity' are also described during interviews with employees of the financial organisations involved in the research. For example the financial advisors (see Section 5.3.4.1) described the conflicting demands of completing paperwork on time and meeting clients.

12.4.2.2 *Importance of Management Attitudes*

People are influenced by the attitudes of 'salient others' in the workplace (Ajzen, 1991) and use their perceptions of other peoples attitudes and behaviours as references to guide their own behaviour. Managers in an organisation have a degree of influence over many aspects of an employee's working life, for example through the implementation and promotion of rules and regulations. Therefore management's (perceived) attitudes towards working practices are likely to influence an employees beliefs as to what is acceptable or unacceptable behaviour at work. That management attitudes and behaviour towards safety at work influence employee attitudes and behaviour towards safety is widely accepted by safety culture theorists. Management attitudes and behaviour have been described as the most useful measure of safety climate (Gadd and Collins, 2002). For example, Clarke (1999) describes how people are less likely to report incidents if they believe their managers are not committed to safety and Lee and Harrison (2000) outline how managers and senior managers are the people most likely to exert pressure on employees to put production before safety. O'Toole (2002) proposes a connection between managements approach to safety and employees perception of how important safety is, which can be expected to have an impact on both the way in which employees work with regard to safety in their organisation and to their subsequent experience of accidents and near misses. Evidence for the importance of management attitudes is also demonstrated through analysis of the SAQ which reveals that the factor 'management's perceived involvement in unsafe working' discriminates between accident free and accident involved respondents (Donald and Johnson, 2004, Nananidou, 2000).

Given the degree of importance placed on management attitudes in safety culture research, it is unsurprising that factors relating to employee perception of management attitudes towards risk are also identified in the risk culture research. Two factors specifically relating to management are derived from the risk culture questionnaire, Factor 6 (Management Risky Acts) and Factor 11 (Management Satisfaction with the Risk Environment). Furthermore, Factor 6 is identified as relevant to employee involvement in errors / near misses in a similar way to which management unsafe working is related to employee involvement in accidents / near misses (Donald and Johnson, 2004). The identification of risky acts perpetrated by management (for example turning a blind eye to breaches of procedure or implying rules and guidelines should be disregarded) as important to the experience of employee involvement in an error or near miss, indicates that managements perceived attitudes influence employee behaviour within financial organisations. The results of this study therefore demonstrate that management attitudes are important to risk in financial organisations as well as safety in industrial organisations, providing further demonstration of the similarities in the psychological processes occurring in the two sectors.

12.5 Errors and Near Misses

Safety culture factors have been shown to discriminate between employee self-reported involvement in accidents and other accident history criteria (e.g. Donald and Young, 1996; Lee, 1998; Lee and Harrison, 2000). Similarly, organisational theorists and reports into financial loss events propose that culture is an important factor in the experience of a financial loss. A further aim of the current research was therefore to

establish if the risk culture factors are related to error involvement in a similar manner to which safety culture factors are related to involvement in an accident.

12.5.1 Error and Near Miss Reporting

A question relating to errors that resulted in operational losses for the organisation was included in the risk culture questionnaire (*In the last six months have you been involved in any incidents or errors that could cost (your organisation) financially?*). The wording of this question was discussed with financial sector personnel during the initial consultation phase of questionnaire development and further validated during the semi-structured interviews conducted with personnel working in the organisations involved in the risk culture questionnaire data collection. As discussed previously the monitoring of operational losses within financial organisations is in its infancy and there is a lack of objective data available. The problems associated with the self-reporting of errors is discussed in Section 12.8.1 and although it is acknowledged that the inclusion of objective error data would benefit the research it was not possible to include this (indeed risk and compliance personnel in the financial organisations involved in the initial consultations lamented the lack of objective data for their own understanding of the operational losses that were occurring in their organisations).

In addition to asking respondents to self-report their involvement in an error, a question relating to involvement in a near miss was included in the questionnaire in order to establish its value as an outcome variable in the financial sector (*in the last six months have you been involved in any 'near misses' at work, that is incidences that had the potential to cost (your organisation) financially but didn't*). The rationale

for this came from safety culture research, where near misses have been shown to be useful indicators of accidents (e.g. Hurst et. al, 1996), and, since they are typically more common than accidents (Barling et al. 2002) their inclusion in safety culture studies enables more data to be captured and analysed than the reporting of accidents alone. Financial organisations have been urged to look at near miss incidents as a way of capturing and learning about loss events (Muermann and Oktem, 2002) and the current research indicates that the term 'near miss' is becoming increasingly accepted in the financial sector, although its use is not, as of yet, inclusive of all employees. Nevertheless, the interviews and discussions (with both management and employees) and the questionnaire validation procedures conducted during this research indicate that financial organisations are beginning to collect data on near-miss events, and people are beginning to be comfortable with the term 'near miss'.

Inspection of error and near miss reporting levels reveals that, in accordance with the reporting of near misses within industry, more near misses than errors are reported in two of the three financial organisations involved in the research (with only a marginal difference in the opposite direction in the third). This suggests it may prove to be a useful way to monitor risk exposure in financial as well as industrial organisations and is likely to provide more information than error rates alone about involvement in incidents. The higher proportion of near misses compared to errors, and the finding that the risk culture factors which relate to involvement in an error also relate to involvement in a near miss (see below) provides additional support for the use of near misses as an outcome measure within the financial sector and indicates that similar issues are relevant to the experience of both errors and near misses.

12.5.2 Risk Culture Factors and Involvement in an Error / Near Miss

Analysis of the risk culture factors' ability to predict whether or not employees have reported involvement in errors or near misses reveals that 4 of the 12 risk culture factors (Employee Risky Acts, Management Risky Acts, Time Constraints and Employee Satisfaction with Decision Making) show main effects, i.e. they discriminate between employees reporting involvement or non-involvement in an error or near miss in the last six months. The difference is in the expected direction for three of these factors (Employee and Management Risky Acts, and Time Constraints), i.e. lower (more negative) scores on these factors are associated with an increased likelihood of employees reporting involvement in a loss event. The fourth factor (Employee Satisfaction with Decision Making) has a significant effect in the opposite direction, i.e. higher scores (more positive) are associated with an increased likelihood of involvement in a loss event.

That only 4 of the 12 risk culture factors are predictive of errors does not mean that the other risk culture factors are meaningless. Each of the factors provides insight into different aspects of employee's working environment and enables the identification of areas where employees may have concerns or be experiencing problems. It is possible that the other factors will be related to different outcomes, for example increases in stress or decreases in job satisfaction although further research is required to establish this. Providing an organisation with a picture of the entire risk culture of their organisation will allow greater understanding of employee attitudes and behaviours in a number of areas. However, if the sole purpose of a study of a workplace is to investigate errors and near misses then data collection would be best concentrated on these four areas.

Once the shared variance between the factors identified as related to errors and near misses is taken into account, the most discriminatory factor for both errors and near misses is Time Constraints, indeed no other factor contributes significantly to the ability of the model to predict whether or not employees will report involvement in an error. For near misses, in addition to Time Constraints, the inclusion of Employee Risky Acts and Employee Satisfaction with Decision Making (already established as possessing main effects) improve the predictive ability of the model. Additionally, Employee Involvement in Meetings is also identified as related to the reported experience of near misses. As with the main effects, each difference is in the expected direction with the sole exception of the decision making factor. It is likely that the higher proportion of near misses compared to errors enables the identification of more predictive factors. It is proposed that, with an increase in sample size and subsequent numbers of errors included in the model, these factors are also likely to be revealed as predictive of errors.

Each of the risk culture factors revealed to be associated with the reporting of errors and near misses are discussed in more detail below and the implications for financial organisations outlined. Four sections cover Time Constraints, Risky Acts, Meetings, and Satisfaction with Decision Making.

12.5.2.1 *Time Constraints*

The results of the study highlight the importance of time constraints through the finding that this is the most influential factor for both errors and near misses, i.e. of all 12 factors, Time Constraints is the strongest predictor of self-reported involvement in errors and near misses. The factor includes questions such as 'Time constraints

sometimes lead to me making errors' and 'Time constraints sometimes prevent me from sufficiently evaluating risk'. The finding that there is a significant difference on this factor between the scores of respondents who reported involvement in errors and near misses and the scores of those who did not, suggests that employee perceptions of the degree of time pressure they are required to work under is a crucial factor underpinning the experience of loss events. This is not surprising as it makes conceptual sense that more mistakes (e.g. omissions in procedures) will occur if people are working under extreme time pressures. Organisations should consider whether it is wise to impose more stringent rules and regulations on employees with a view to decreasing losses, if one of the outcomes of increased rules and regulations is that employees then have to work under increasing time pressures which will serve to increase the risk of a loss occurring.

The relevance of time constraints to risk in financial organisations is also illustrated by the fact that questions relating to time constraints were only included in the risk culture questionnaire following interviews with financial personnel, a number of whom proposed that time pressures in their workplace were relevant to the degree of risk they believed to which they were exposed.

12.5.2.2 *Risky Acts*

Awareness of the occurrence of employee risky acts in the workplace (e.g. the taking of shortcuts) is revealed as important to the experience of errors and near misses. This indicates that financial losses are not necessarily completely unexpected, at least for those employees in direct contact with the 'risky' acts. This is in concordance with the basic premise of the attitudinal approach to the monitoring of safety in the workplace

(Donald and Canter, 1993) which proposes that although people do not deliberately aim to cause an accident they are nonetheless aware of their actions and the behaviour that leads to an accident occurring is intentional. Similarly, the findings of this research indicate that whilst people are generally not deliberately trying to cause a loss, they are often aware that risky acts are taking place that will increase the risk of a loss occurring. This awareness means that it is possible for the occurrence of risky acts to be identified (and potentially reduced) prior to a loss being experienced. From a risk management perspective it is important to not only identify where and when risky acts are taking place but to also question why. For example, if employees are taking risks because they believe management condone these actions, then clearer messages from management as to the importance of risk controls may help. Similarly, if time pressures are leading to risky acts, management should endeavour to reduce the pressure employees are experiencing.

That management risky acts are also related to reported errors and near misses is not surprising. Section 12.4.2.2 details how management attitudes and behaviour are recognised as important in safety culture research, and similar issues have been discussed in relation to risk management. For example Bozeman and Kingsley (1998) describe how people are more likely to take risks if they feel that their colleagues or superiors are taking risks.

Given the degree of influence that management attitudes and behaviour are believed to have on employee attitudes and behaviour (Clarke, 1999; Ackroyd and Thompson, 1999; Shover and Hochstetler, 2002) it is proposed that 'management risky acts' will

influence 'employee risky acts' and that, as demonstrated in this study, both will adversely affect an organisations' involvement in loss events.

The need for organisations to recognise the influence management attitudes and behaviour have on employee attitudes and behaviour is discussed in Section 12.7.

Employee awareness of the occurrence of risky acts is evident in the case-studies described in Chapter 3. For example, the people working alongside Leeson in Barings, although not actively involved in the fraud were nevertheless aware they were not conducting necessary checks and that they were on occasion actively going against the specific control guidelines of the bank. It is also apparent that these employees believed these control lapses were acceptable to management. It is debatable whether or not the Baring's management team were aware of these control lapses, and the focus of this research is not to ascribe blame. Nevertheless, it is evident that the management in Barings at the very least passively condoned the state of affairs, since they took no action when control breaches were brought to their attention. The acceptance of control breaches by management (i.e. a management risky act) is also evident in the AIB loss.

Awareness of unsafe acts has been identified as an important element of safety culture and a predictor of safety performance and accident rates (Donald and Canter, 1993; Zohar, 2000). The relevance of both risky acts and time constraints to behaviour and outcomes at work was discussed in relation to existing safety research in Section 12.4.

12.5.2.3 *Meetings*

Employees' reporting increased involvement in meetings is associated with lower reporting of involvement in near misses, indicating that involvement of employees in meetings has a positive effect on incident rates. A similar relationship between employee involvement in meetings and accidents / near misses was reported by Donald and Johnson (2004) in their report into safety culture, and Clarke (1999) discusses communication about safety issues as crucial to ensure employees and management have similar perceptions about the importance of safety in the workplace. Meetings are an important element of worklife, providing face-to-face contact between management / supervisors and employees, and the direct contact afforded by meetings result in there being less potential for distortion of messages than if they are received through other means (e.g. email or memos). Clarke (1999) and other theorists (e.g. Schein, 1992; O'Toole, 2002) have posited that management attitudes and behaviour towards safety influence employee perceptions and behaviour regarding safety. The finding that meetings are related to employees reporting involvement in near misses suggests similar issues are occurring with regard to employee perceptions of the importance management place on risk, i.e. employee involvement in meetings about risk issues will demonstrate to employees that management believe risk to be an important issue.

12.5.2.4 *Satisfaction with Decision Making*

The factor 'Employee Satisfaction with Decision Making' is consistently revealed to have an effect opposite to the predicted direction, with higher scores (i.e. the more employees report they are satisfied with their decision-making) relating to an increased likelihood of involvement in an incident. One possible explanation of the

reversal of the direction of effect is that high scores are indicative of employee complacency and may be a reflection of employee reluctance to view their own decision making as posing a risk to their organisation.

It is proposed that it is this lack of awareness by employees as to the importance of the decisions they make that is resulting in an increase of the risk of a loss occurring. Over confidence in their decision making ability may result in a poorer evaluation of the risks to which they may be exposing their organisation.

12.6 Differences in Risk Culture Scores Between Organisations

As detailed in Section 12.3 it is proposed that a generic risk culture factor structure has been identified, with the replicability of the risk culture factors indicating that the structure of the risk culture factors is constant. An organisation's scores on the risk culture factors indicate whether a positive or negative risk climate is in place in the organisation. Differences between organisations on the risk culture factors are believed to reflect differences in the organisations' prevailing risk climate, a premise originally proposed by Cheyne et al. (2002) in relation to safety culture. An organisation's scores on the risk culture factors can therefore be expected to change as the risk climate in place in the organisation changes, e.g. over time or as a result of disruption within an organisation. For example, a dramatic change such as a merger could be expected to bring about a quick and noticeable change in the risk climate, whereas minor changes (e.g. small changes to pay or promotion opportunities) could be expected to bring about a more gradual change.

Both the qualitative and quantitative findings of the research indicate that different organisations possess different risk climates (i.e. employees report differing attitudes towards the risk environment in which they work). Comparing the factor scores between the three organisations involved in this research reveals significant differences on 11 of the 12 factors with the most striking differences evident between Org1 and Org2. This indicates that the risk culture questionnaire has discriminant validity. Employees in Org1 repeatedly reported more positive risk culture factor scores than employees in Org2. That employees in Org1 have more positive risk attitudes is also supported through the interviews conducted with employees working in Org1 and Org2 during which Org1 is described more positively in terms of risk.

An anomaly to the finding that employees in Org2 generally reported the most negative risk attitudes is evident on factor 10 (Employee Involvement in Meetings) where Org2 had a far higher score than either Org1 or Org3. The positive response from employees in Org2 on Factor 10 (Employee Involvement in Meetings) when compared to both their more negative responses on the other risk culture factors, and to the scores on Factor 10 for Org1 and Org3, can also be explained through consideration of the qualitative data. It is likely that employees in Org2 reporting positive attitudes towards attendance at meetings is a reflection of the recent training courses and introduction of new working procedures that have been targeted at all financial advisors (these involved attendance at both training events and meetings to discuss the planned changes). Although all employees were involved in these meetings employees reported that the organisation was only implementing these changes as a result of inadequate working practices and pressure from the regulators rather than as an exercise that was designed to involve and aid employees. In this

context, reporting involvement in meetings alongside negative attitudes towards other aspects of the organisation's risk culture is understandable.

In addition to the differences in risk culture identified between Orgs 1, 2 and 3, the interview data provides further indication that organisations can possess different risk cultures. Employees describe being aware of the risk culture in place in their organisation and are able to compare the prevailing risk culture of their organisation both to other organisations they had worked in and to different points in time. For example, an employee in Org2 described how the culture of their organisation had improved over recent years, and the individual involved in a loss event (TH) described how they were aware that the organisation wasn't as controlled or well run as other organisations they had worked in. Employee awareness of the risk culture in place in their organisation, and their ability to compare risk cultures across organisations and different points in time, provides support for the contention that an organisation both possesses a risk culture and that this risk culture is changeable.

12.7 Implications for Financial Organisations

A risk culture questionnaire is a quick and relatively cheap way for organisations to determine the risk attitudes of its employees and is therefore a highly practical tool that organisations can use as part of their risk management strategy. Other benefits include the fact that all employees can be included in risk surveys, and comparisons can be made both between organisations and within the same organisation at different points in time. Using a risk culture questionnaire of this type will increase management understanding of employee attitudes and provide them with information they can use in order to develop interventions that can improve risk attitudes (and

potentially reduce the number of errors and amount of financial losses they experience).

Organisations within the financial sector do not currently assess and monitor their culture, although increasing emphasis is being placed on this as an important factor in the experience of operational loss (BIS, 2003). This type of culture assessment is already carried out in many industrial organisations and it has been demonstrated that it is possible to reduce accident rates through interventions designed to improve the safety culture of the company (Canter and Donald, 1990). The implication of this study is that similar assessments and interventions within the financial sector will provide important information to organisations and may prove useful in the drive to reduce errors and operational losses.

The similarities between safety culture and risk culture and the potential benefits industrial and financial organisations can gain from understanding and attending to these concepts also indicates that other organisations may benefit from similar measurement tools. For example, the insurance industry has expressed an interest in the risk culture questionnaire, and there is currently an increasing interest in culture issues within the healthcare industry as a way of understanding some of the problems they are experiencing. It is clear to see how issues such as risky acts and time constraints are likely to be of importance to all organisations, although the potential impact on organisations as a result of employee errors will obviously depend on the individual organisations.

Providing information to an organisation on the way in which its employees respond to each of the risk culture factors enables a profile of the prevailing risk culture to be built, thus giving senior management access to previously unavailable information on staff attitudes and behaviour. This information will increase knowledge and understanding of an organisation and will complement current audit procedures, which have been criticised for not gathering data of this type (Chen, 2003).

Information can be presented at an overall organisational level and for individual departments / sections, thereby enabling comparisons within the organisation. As more organisations are profiled in this way it will also become possible to compare across organisations (taking care to ensure confidentiality is not compromised) thus providing organisations with benchmarking information. This is an area in which each financial organisation involved in the research to date has been extremely interested, an apparent reflection of both the competitiveness that exists within the financial sector and of the organisations' desire to not be left behind in the current rapidly changing environment with regard the management of operational risk.

It has been established that time constraints and risky acts are related to errors, therefore if assessment of an organisation's risk culture reveals that employees are reporting high occurrence of risky acts and high time constraints, then the organisation has a greater likelihood of experiencing errors than if employees had reported fewer risky acts and less time constraints. Information of this type could prove very valuable to organisations as a warning signal that their risk exposure is high. If risk culture is assessed for sections / departments within an organisation it is also a way to identify potential problem areas, i.e. those areas that reveal low risk culture scores.

The results of this research also indicate that organisations should pay particular attention to ensuring positive management attitudes about risk are successfully communicated to employees. As described above, management attitudes and behaviour (i.e. Management Risky Acts) are related to the experience of errors and near misses. It is arguable, however, that it is not management attitude per se that is important, but rather employees perception of management attitudes. That is, if employees incorrectly perceived negative management attitudes, the impact of this perception on employee attitude and behaviour would be the same. Therefore, as Clarke (1999) proposes with regard to safety, if positive risk attitudes are in existence at senior management level it should not be assumed that these attitudes will automatically cascade down an organisation's hierarchy. Organisations need to actively and continuously demonstrate (through words and actions) positive attitudes towards risk from senior management down. If an organisation ensures a positive attitude towards risk is repeatedly and consistently seen by employees, this will result in employees being aware of management's real attitudes towards risk and reduce the likelihood that employees will incorrectly interpret their attitudes and behaviour. Furthermore, it will also serve to reduce the potential negative impact of individual managers influencing the culture of their department or area to the extent that a negative subculture is created. If employees do not have clear evidence to the contrary, it is easy for managers (whether deliberately or not) to mislead staff as to the ethos of senior management towards risk, and in some circumstances to persuade junior staff to circumvent procedures (Dedman and Robert-Tissot, 2001).

It is apparent that management play a crucial role in establishing and promoting a positive culture. It is also apparent that managers can abuse their power to persuade juniors to circumvent procedures and that sometimes employees are made into

scapegoats after an event by being identified as the sole cause of a fraud or accident, even though management condoned their actions and so were also culpable. This abuse of power by management is evident in both the Barings and AIB case studies and it is arguable that, in both cases, if employees had received clear guidelines as to whom they should approach if they had concerns about risk at work (outside of their immediate management team) the losses would have been uncovered far sooner. It is necessary, therefore, for an organisation to have clear guidelines in place where employees can raise any concerns they have with people other than their immediate managers and be reassured that it is acceptable (and expected) that they do so.

12.8 Limitations and Future Research

The present study indicates that it is possible to measure risk culture in sectors other than industrial safety. However, the study incorporated only three financial organisations. Therefore further research into measuring risk culture will provide more detailed information as to the general applicability and usefulness of the questionnaire within the financial sector. Given the diverse nature of financial organisations, research into areas other than those covered in the above study would be especially useful in establishing the areas in which this type of research is most suitable. Additionally, there is scope for the measurement of risk culture to be transferred into sectors other than finance, for example insurance companies have expressed an interest in developing this work to be relevant to their own operations.

It has been argued that only gathering information on safety factors that have been identified through prior research may result in the failure to identify further important factors that are specific to a particular organisation (Coyle et al. 1995). It is therefore

considered beneficial to conduct interviews within an organisation prior to distributing a questionnaire to enable additional questions to be added and it is recommended that this process be followed for any future risk culture studies. Whilst it is anticipated, and supported through the results of this research, that the core risk culture factors will be applicable to all financial organisations, it would be foolish to automatically exclude the investigation of other relevant issues. This process was adhered to for the present research and although each organisation did propose additional questions they are not discussed in this thesis since space restrictions prevent their exploration, discussion of some of the questions has the potential to breach organisational anonymity and the primary aim of the research was the identification of the core risk culture factors.

Interventions designed to improve the risk culture of an organisation may prove to be a useful management tool for financial organisations, in a similar way to which interventions to improve safety culture have proved to be of benefit within industry (e.g. Donald and Young, 1996). Longitudinal research, with a risk culture measurement taken before and after an intervention designed to improve risk culture, would enable the assessment of whether or not an organisations risk culture does improve following an intervention. Furthermore, observed changes in risk culture can be assessed alongside the reporting of errors to establish if, as would be anticipated, error rates go down as risk culture improves. Longitudinal research of this nature would also negate the potential influence of the concurrent measurement of errors and near misses and perceptions of risk culture. It is possible that an individual's involvement in an error or near miss influences their attitudes towards the risk culture of their organisation and therefore their responses on the risk culture questionnaire.

Measuring the risk attitudes of an individual and then assessing their subsequent involvement in errors or near misses would eliminate the possibility that people only hold certain attitudes towards risk because they have already been involved in an incident. The findings of this research rest on the assumption that employee attitudes were held prior to an incident and in some way were a causal factor of an error or near miss. However, this cannot be determined definitively without longitudinal data collection.

Risk culture data has the capacity to enable comparisons within, as well as between, organisations. Indeed some researchers propose that employees are more likely to identify with a subculture than a global organisational culture (e.g. Gadd and Collins, 2002). Further research should therefore seek to assess the existence and identification of subcultures within financial organisations, for example at departmental level.

As the existence and status of dedicated operational risk personnel within financial organisations grows as a result of the push from regulators to tackle operational risk issues, and increased recognition by organisations that operational risk is of major importance, the inclusion of questions pertaining specifically to their roles in a similar way to which safety representatives are included in safety culture research should be considered (Donald and Canter, 1993). Questions of this type were not included in the current research since the role of operational risk personnel is not currently recognised by employees.

This research has focussed upon the direct relationship between risk culture and errors and near misses. A potential area for exploration is to look at risky acts as an outcome

variable, as done in some safety culture studies in recognition of low accident rates as problematic.

An area that is beginning to be investigated within safety culture and climate research and one which could be transferred to risk and finance is the investigation of causal pathways through the use of SEM. Future research into risk culture could therefore seek to establish whether risk culture influences risky acts which in turn influence involvement in an error / near miss, as Seo (2005) proposes is the case in safety.

Limitations and areas for future research specifically relating to the reporting of errors are discussed further in Section 12.8.1 below.

12.8.1 Self-reporting errors

The self-reporting of errors leading to a financial loss is a potential limitation of the research. Cooper (2000) describes how correlations between two sets of perceptual data (e.g. safety culture scores and self-reported errors) tend to be somewhat larger than perceptual – objective data capturing techniques and Gadd and Collins (2002) criticise self-reports due to the potential impact of social desirability. However, self-report accident rates have been validated against ‘real’ measures (Donald, 1994; Donald and Young, 1996; Hurst et. al, 1996) thereby strengthening the findings of safety culture studies. This validation process needs to be replicated for the financial sector. However, since objective data collection on operational loss events within financial institutions is in its infancy, it could not be incorporated into the study at the present time.

Issues that may have affected the reporting of errors by respondents include the possibility that individuals may have forgotten errors they were involved in and therefore will not report them, and problems with the concurrent measurement of errors and near misses and risk attitudes (discussed in more detail above). It is also possible that people will interpret the error and near miss questions differently which would have a negative impact on the comparability of results between individuals. Although care was taken during questionnaire development to ensure the questions would be clearly understood by employees the current emphasis that organisations are placing on errors and operational losses and the corresponding increase of awareness of the potential impact of operational losses within organisations may have resulted in a difference between individuals in their understanding of exactly what an error (or near miss) constitutes. It is possible then that what one individual would report as an error, another may feel does not warrant that label. As operational loss becomes more prominent and understood by all individuals within financial organisations it may be possible to be more specific with the wording of these items (and possibly to include more than one item that relates to different types of error). An additional aspect of including self-report errors in this manner is that the size of the loss that results from an error is not taken into account, that is the fact that not all errors are equivalent in terms of the financial impact they have on financial organisations is not addressed. Using objective loss data, discussed in more detail below, would enable the size of losses to be included in a study of risk culture and its links to employee involvement in errors.

Financial organisations are being urged to collect data on their operational losses (BIS, 2002) and it is anticipated that within five years much richer data will be

available on operational losses than there is to date. This data should prove useful in a number of ways. First, it will be possible to compare the actual number of losses experienced by an organisation against self-reported losses, thereby establishing the validity of self-reports within the financial sector. Second, in addition to self-reports, the results of risk culture surveys can be assessed alongside these actual losses (e.g. to both the number of losses experienced and the monetary value of those losses).

It is unlikely that self-reports will be made redundant as they enable the anonymity of respondents, which is difficult to achieve using actual loss data. However, actual loss data can easily be compared at the organisational and / or departmental level to reveal differences which may be attributable to risk culture. Additionally, longitudinal comparisons of both risk culture and the prevalence of loss events can be made, following planned interventions to improve the culture of an organisation.

This research establishes a link between employee's self-reported experience of errors and their perception of the risk culture of the organisation and indicates, but does not attempt to prove, a link between the percentage of employees reporting errors and overall organisational risk culture. As the risk culture of more organisations is measured, the relationship between overall organisational risk culture and the proportion of employees involved in self-reported (and actual) losses can be investigated in further detail.

Finally, it is possible that the existence of loss databases will ultimately lead to a reduction in the number of losses experienced within an organisation. Donahoe (1998) discussed the importance of collecting and archiving information on losses and near

misses and stressed that sometimes narrowly averted catastrophes are not written down and therefore only exist in organisational memory. Data is therefore liable to be lost forever when people leave the organisation, so databases that gather this information would be an extremely useful tool in assessing past and future risks and ways of dealing with risky situations. Databases holding information such as this are in existence (e.g. the British Bankers' Association, BBA 2002) but they are still in their infancy. It is envisaged that as the concept of operational risk is increasingly recognised these databases will become more detailed and therefore more useful to financial organisations. Longitudinal research would enable close examination of trends in both organisational culture and losses experienced. Databases of this type will also facilitate information sharing between organisations which should help organisations learn from the failures experienced by others.

12.9 Conclusion

This research establishes that the risk culture questionnaire identifies specific and separate elements of an organisation's risk culture, and identifies 12 risk culture factors that provide information on employee risk attitudes and the organisational risk environment.

The risk culture factors are similar in many respects to those produced through analysis of an organisation's safety culture, thereby supporting the contention that similar psychological processes are at play in both the industrial and financial sectors in relation to employee involvement in accidents / loss events.

As expected, the risk culture of an organisation is related to their experience of errors leading to financial loss with four of the Risk Culture factors significantly linked to self-reported involvement in errors. The most important factor was revealed to be time constraints, although also identified as important were the occurrence of risky acts (from both employees and management) and employee satisfaction with decision-making.

The discriminant validity of the risk culture questionnaire is demonstrated by the identification of significantly different scores on the risk culture factors for the organisations involved in the study. This suggests that the organisations possess different risk culture, i.e. employees report more or less positive attitudes towards risk. The differences in the quantitative results for the organisations are supported through inspection of the qualitative interview data.

It is proposed that, as in industry where organisations increasingly use knowledge of their safety culture to determine their risk exposure in relation to accidents, financial organisations can use similar information to determine their risk exposure in relation to involvement in a financial loss event.

Regulators of the financial industry and organisational theorists (e.g. Kingsley et al. 1998; Hofstedt, 2003) are calling for financial organisations to view their risk culture as a potential causal factor of loss events. This research has developed a reliable questionnaire which can be used to measure and monitor the risk culture of financial organisations and has presented, for the first time, empirical evidence which supports the call for greater emphasis on cultural issues.

13. References

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14. Appendices

14.1 Appendix 1 – Cultural Breakdown in Barings Bank

Cultural Breakdown in Barings Bank

Regulatory failures

Leeson was in charge of both the front and back office in Singapore, a fact that was brought to the attention of Baring's Senior Management in an internal audit report. This report formally stated that there was a significant risk of internal controls being overridden as a result of Leeson overseeing both offices (Lim and Kuang, 1995). Leeson (2002) described how, if he was based in the front office, he should have had a counterpart in the back office who would, under normal circumstances, check the positions every day. If these checks had taken place they would have immediately exposed the position being held in the 88888 account. Allowing one person to oversee both offices is against explicit regulatory guidelines because of the degree of risk associated with it. However, despite the warnings that the bank was being exposed to unnecessary risk, Baring's management took no action to rectify the situation. It is therefore apparent that Senior Management within Barings were prepared to not follow rules and guidelines and, even when alerted to the risks inherent in the situation, were prepared to turn a blind eye to potential problems. Leeson was able to hide his losses more effectively as a direct result of being in charge of both the front and back office simultaneously (Stonham, 1996).

Inadequate supervision

Leeson received inadequate supervision at Barings, which resulted in him not being questioned about his actions and ultimately in him being able to circumvent the rules without detection. Lim and Kuang (1995) described how Barings Group management based in Singapore viewed BFS as Leeson's responsibility and did not check on his

activities, whereas the Barings Group management based in London believed that since BFS was a Singapore company Leeson was accountable to the local managers. The net result of this misunderstanding was that neither management group were monitoring Leeson's activities in the mistaken belief that others were doing so.

Theoretically Leeson had lots of supervisors; in reality none exercised any real control over him.

(Riskinstitute, 2002b)

<http://newrisk.ifci.ch/137580.htm>

In addition to the lack of effective management Leeson (2002) described how, in contrast to other financial organisations he had worked in, there were no risk management or compliance officers working in Singapore (the role of risk management and compliance officers is to ensure work is being done in an appropriate manner and within the risk framework of the bank).

Undue influence on other employees

Leeson (1996) described how he was able to ask the back office staff to take actions that were clearly against the control guidelines of the bank and he would not be questioned. For example, if the people working in the back office were asked by anyone other than Leeson to print out any details relating to the 88888 account they would first call Leeson to ask him what they should provide. Although this implies that they were complicit in shielding Leeson from discovery he stressed that they were unaware of the implications of their actions. Leeson (1996) described how he believed that the back office staff were loyal to him because he treated them well and

fought for their bonuses. He also detailed how they were intimidated by other managers and would therefore be reluctant to report things to them. It appears that it was generally accepted within BFS that Leeson had control over the 88888 account and although the back office staff must have known that procedures were not being followed correctly they did not view it as their job to ask him what he was doing. Since he was their boss they would simply follow his instructions.

Unclear reporting mechanisms and inadequate communication

The reporting lines at Barings have been described as 'hazy and inbred' (Fay, 1996) and these unclear reporting lines resulted in people not being sure who they could / should approach if they had any concerns about their working environment. To compound this, employees were not made aware of the procedure for raising concerns further up the management chain. The net result of these inadequate reporting procedures was that either concerns went unreported or they were reported directly to Leeson who had a good rapport with other employees. The impact of these unclear reporting lines on the losses incurred has been discussed in other articles, e.g. Stonham (1996) who described how an ill-defined organisational structure with confused reporting lines both locally and to head office had a negative impact on events which resulted in Barings group departments not being sufficiently coordinated to recognise discrepancies between the money being sent to Leeson and his reportedly 'profitable' trading.

Incorrect assumptions

There is evidence to suggest that people assumed checks (e.g. on transactions and balances) were being done, when in reality they were not, or the losses would have come to light far sooner. Nobody was in charge of overseeing activities and ensuring that procedures and guidelines were being followed, which resulted in basic checks being repeatedly overlooked. This relates partly to the issues already discussed above, e.g. Leeson being in charge of both the front and the back office and therefore effectively checking his own work.

Employees wary of management

As detailed above, the reason there were such unclear reporting lines was partly because people were wary of management (and therefore unlikely to approach them). Moreover, people were not encouraged to talk about any problems. It was proposed by Leeson that events began because of a simple mistake made by a member of staff and he was reluctant to report this to higher management because the individual would have been sacked (Leeson, 2002; Fay, 1996) which is further evidence for employee's mistrust of management. Whilst it is not possible to be sure that this was the case, since the events were not documented, it is clear that communication and trust between employee and management was extremely poor.

Inadequate auditing

The Singapore report described how audits were conducted incorrectly and the auditors made simple mistakes, which resulted in them not picking up on the fraud earlier. For example, fax messages that Leeson provided to the auditors as evidence

supporting his trading activities were accepted as from his clients even though they were clumsy forgeries and the address header stated that the fax was from 'Nick and Lisa' (Lisa being Leeson's wife) (Reyes, 1995).

Management and auditors did not work together to ensure a good control environment was in place. The failure of management to openly and actively support the auditor's work signals to employees that the audit and regulatory process is not seen as important. For example, at one point during an audit Leeson was asked by senior management to provide confirmation of some trades to the auditors even though the management were at that point aware that the contents would be fake (Lim and Kuang, 1995).

Inadequate control environment

The Bank of England Report stated that the lack of controls within Barings was 'absolute' and that it was this that provided Leeson with the opportunity to undertake his unauthorised activities and significantly reduced the likelihood of his actions being detected (Fay, 1996). Controls such as the checking of positions and ensuring positions were not breached were not consistently in place, and even when control breaches were identified to management no action was taken. A specific example is the occasion when Leeson's boss questioned whether he had credit risk approval for a trade and Leeson admitted he had not. The response from management was merely to ensure that the documents required to keep the auditors happy were made available. At no point either during this discussion or later was Leeson reprimanded for breaching controls (Leeson, 1996).

14.2 Appendix 2 - Cultural Breakdown in Allied Irish Bank

Cultural Breakdown in Allied Irish Bank

Inadequate supervision

The report concluded that there was a “failure of Rusnak’s superiors to adequately supervise his activities” (p19) with his supervision being described as inconsistent and unreliable for a number of reasons. First, there was ambiguity in the workplace as to who should be supervising and monitoring particular activities. Second, the physical location of offices was counter intuitive, with the Treasurer’s office located on a different floor to the treasury operations department, which effectively meant that the Treasurer was unable to physically oversee the day to day running of the office. It also resulted in issues such as the bullying of employees, described in more detail below, being more likely to go unnoticed. Third, although the Treasurer in Allfirst was experienced in foreign exchange, he delegated the responsibility of Rusnak’s supervision to the Treasury Funds Manager (Mr Ray) who had limited knowledge of foreign exchange. Mr Ray was subsequently criticised about the quality of his supervision, the report stated that he discouraged outside control groups from gaining access to information in his area despite the fact that he was aware of his own inexperience:

The manager directly supervising Mr Rusnak, Mr Ray, contributed significantly to the environment that allowed Mr Rusnak’s fraud to occur.

(p. 34)

Finally, more senior management (based in Baltimore and Dublin) were criticised in the report which stated that they did not focus enough attention on the Allfirst trading operation.

Inadequate control environment

The control environment within Allfirst had weaknesses in a number of areas, which Rusnak manipulated to his advantage. Rusnak first sustained losses in 1997, as a result of which he created fictitious options to cover his losses and prevent their detection. Back office staff failed to obtain confirmation on these options even though organisational controls stated that all trades should be confirmed. The employee responsible for this confirmation process claimed during the investigation into the loss that it was agreed at a meeting (with senior staff present) that these trades were not to be confirmed. This statement is however, disputed by management. Whatever the truth, it is clear that at least some Allfirst employees were aware that controls were not being adhered to. If confirmation had been sought on these fictitious options then the losses would have been uncovered immediately.

Other checks were also being performed incorrectly. For example, checks on spreadsheets provided by Rusnak were performed using only the figures provided by Rusnak (i.e. nobody double checked that these figures were correct, which is a basic control procedure). The failure to check the figures properly occurred throughout the organisation, with individual employees, internal audit and Treasury all failing to notice any discrepancies.

The failure of some employees within Allfirst to correctly perform checks was attributed partly to them being “inadequately trained and supervised” (p. 40)

Certain treasury operations personnel exhibited careless behavior. There existed a combination of inadequate written procedures, a failure to follow those procedures that did exist, and a propensity to modify practices at will.

(p. 40)

Inadequate auditing

Internal audit in the Bank failed to check any of Rusnak’s transactions in 1999, in 2000 they checked only one. This transaction was not faked, however closer inspection by the internal auditors would have revealed that approximately fifty percent of Rusnak’s transactions were faked.

Incorrect assumptions

The report criticised AIB senior management in that they assumed the controls and audits at Allfirst were sufficiently robust (which they clearly weren’t) and did not do enough to ensure controls were both adequate and being adhered to.

Employees wary of management, and communication failures

Rusnak is described as having a bad temper and behaving in a bullying fashion. For example when confronted with suspicion of his trades, and questioned about the fact these trades were not being confirmed, he threatened to leave if back office staff continued to question his actions. His supervisor further compounded Rusnak’s

actions when he stated that Rusnak's departure would inevitably lead to subsequent job losses, a statement that was presumably intended to prevent people from speaking out about control failures.

The culture of Allfirst's risk, operations and internal audit functions, as applied on the whole, to the Allfirst treasury operations, was too deferential to the business lines. It is true that individuals in these functions were bullied from time to time by Mr Ray and Mr Rusnak

(p. 43)

The report concluded that a number of employees in the operations area of Allfirst spotted signs of Rusnak's fraud but "inexperience or fear of retribution kept them from following up leads" (p. 50).

Undue influence on other employees

Rusnak took advantage of weak and inexperienced employees who facilitated him in circumventing controls. The reason for the help he received from employees was attributed in the report to their inexperience, poor training, poor supervision and in some cases laziness.

Inadequate reporting mechanisms

Within Allfirst there was the front office where Rusnak worked, the back office where employees were responsible for confirming and settling trades, and a third division in charge of risk control. The same manager was in charge of all three divisions but had

stronger links with the front office and with Rusnak than with the other areas. This unsatisfactory set-up meant that when Rusnak behaved in a bullying fashion towards employees in the other two divisions his behaviour was not acted upon, since employees were aware of the close relationship between their manager and Rusnak. Furthermore, since one manager was in charge of all divisions, the employees affected by Rusnak's behaviour had no other manager to whom they could report events (Dunne, Helliard and Power, 2004).

It is clear from this brief outline of the events at AIB, that in addition to poor controls there were instances where employees were not adhering to controls already in place. More specifically, and of relevance to the culture of the organisation, although at times staff members queried control lapses, management took no action. Indeed, the report comments on this:

The failure by treasury management to follow through on back office inquiries may have contributed to an attitude among operations staffers that the confirmation process was a pointless formality.

(p. 21)

It is apparent that although the perpetrator of the fraud was Rusnak "there are substantial reasons to be highly critical of many of the individuals within Allfirst treasury" (p. 43).



THE UNIVERSITY
of LIVERPOOL

Organisational Research Group

... Collections - Risk Culture Questionnaire – 2002

The Organisational Research Group at the University of Liverpool is carrying out research on risk culture within financial institutions and ... Collections have agreed to be involved in this research project. We would be very grateful if you could take the time to complete the attached questionnaire.

The information gathered through these questionnaires will be treated **in the strictest confidence**. The questionnaires are designed to be **completed anonymously** and returned directly to the University of Liverpool. This ensures that only the Organisational Research Group at the University of Liverpool will have access to completed questionnaires. Only general trends will be reported and **no individual will be identified**.

Please put your completed questionnaires in the FREEPOST envelope provided and mail it back to us at the University of Liverpool. **No stamp is needed.**

Thank you very much for your help with this project.

Sheena Johnson

INSTRUCTIONS

On the following pages there are a number of statements about risk within your workplace. Please see below for definitions of risk and risk controls.

Risk - the likelihood that there will be a negative outcome of a decision, for example a customer paying lower amounts on a debt than they could / should, or mistakes being made resulting in losses for ... Collections.

Risk Controls – the procedures and guidelines in place for your role to ensure unnecessary risks are not taken.

Please show how much you agree with each statement by putting a circle around the number that best represents your view.

Some statements refer to other people's feelings. It doesn't matter if you're not certain what they feel. We want to know what YOU THINK they feel. There are no right or wrong answers.

Do not spend too long thinking about each statement. Give your opinion as quickly as possible. Please give your opinion of all the statements.

Please complete the questionnaire on your own

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- | | | | | | | | | |
|-----|--|---|---|---|---|---|---|---|
| 1) | Time constraints sometimes lead to my colleagues making errors. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2) | The people I work with would support me if I had a concern about a possible breach of risk control procedure. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3) | I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4) | My managers are satisfied with the results of audits. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5) | I am encouraged to report any errors I make. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6) | If I am not sure about the implications of a particular decision I will always ask for advice. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7) | The managers here are satisfied with the risk control procedures currently in place. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8) | The people I work with appreciate the need for an effective risk control system. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9) | I know of short cuts that would get my work done more effectively. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10) | The management in ... Collections know what risk control procedures people should be following. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11) | The toolkit for my role is user friendly. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12) | Management are aware that risk controls, rules and guidelines are not always followed. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13) | I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14) | My co-workers refer to procedures and guidelines when necessary. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15) | I am encouraged by my colleagues to only take acceptable risks in the decisions I make. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16) | Management only emphasise the importance of rules and guidelines if a problem has been identified. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17) | The management of ... Collections issue strict guidelines for risk control. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 18) Time constraints sometimes lead to me making errors. 1 2 3 4 5 6 7
- 19) In terms of limiting financial losses I am happy with my decisions. 1 2 3 4 5 6 7
- 20) I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially. 1 2 3 4 5 6 7
- 21) My manager sometimes implies that I should disregard a rule or guideline. 1 2 3 4 5 6 7
- 22) There are occasions in my role when I do not follow all the risk controls, rules and guidelines. 1 2 3 4 5 6 7
- 23) If asked, I could explain my company's attitude towards risk. 1 2 3 4 5 6 7
- 24) I always work within the risk control rules and guidelines of my role. 1 2 3 4 5 6 7
- 25) I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself. 1 2 3 4 5 6 7
- 26) I take short cuts in set procedures to get my work done more effectively. 1 2 3 4 5 6 7
- 27) My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure. 1 2 3 4 5 6 7
- 28) As long as I have followed the procedures for this role I will receive the support of management if something goes wrong. 1 2 3 4 5 6 7
- 29) Time constraints sometimes prevent me from sufficiently evaluating risk. 1 2 3 4 5 6 7
- 30) My colleagues are encouraged to report any errors they make. 1 2 3 4 5 6 7
- 31) Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role. 1 2 3 4 5 6 7
- 32) Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome. 1 2 3 4 5 6 7
- 33) If asked, I could explain my company's policy towards risk. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 34) The management in ... Collections ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk. 1 2 3 4 5 6 7
- 35) If I have to make a decision that I think is risky I know support is available to help me. 1 2 3 4 5 6 7
- 36) I don't always report the errors that I've made. 1 2 3 4 5 6 7
- 37) Time constraints sometimes prevent me from consulting the toolkit. 1 2 3 4 5 6 7
- 38) My colleagues take short cuts in set procedures to get their work done. 1 2 3 4 5 6 7
- 39) I am aware of the risk controls, rules and guidelines which govern the work I do. 1 2 3 4 5 6 7
- 40) My colleagues believe the internal risk control procedures are effective. 1 2 3 4 5 6 7
- 41) Management are happy with the training given to people in respect of risk awareness. 1 2 3 4 5 6 7
- 42) When there are meetings at work concerning business objectives I attend them. 1 2 3 4 5 6 7
- 43) The people I work with attend meetings concerning business objectives. 1 2 3 4 5 6 7
- 44) Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk. 1 2 3 4 5 6 7
- 45) I feel satisfied with the attention given to risk and governance awareness within this environment. 1 2 3 4 5 6 7
- 46) I encourage my colleagues to work within the risk control guidelines. 1 2 3 4 5 6 7
- 47) I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially. 1 2 3 4 5 6 7
- 48) I believe my attitude towards risk is the same as my co-workers. 1 2 3 4 5 6 7
- 49) The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 50) My colleagues know of short cuts that would get their work done more effectively. 1 2 3 4 5 6 7
- 51) The managers encourage me to report any risk control problems I might discover. 1 2 3 4 5 6 7
- 52) I am happy with the way in which I receive information about risk issues at work. 1 2 3 4 5 6 7
- 53) Advice about risk and procedures is always available to me. 1 2 3 4 5 6 7
- 54) People here will often take a chance on a risky decision, if they think it is likely to improve their results. 1 2 3 4 5 6 7
- 55) The management of ... Collections are aware of the risks we have to take in order to do our work. 1 2 3 4 5 6 7
- 56) I do my best to follow risk control procedures even though this might reduce profitability. 1 2 3 4 5 6 7

Background Questions

In this section there are a number of questions about your job. Please answer them by ticking the appropriate box or by filling in the space provided.

All answers are in the **strictest confidence**. No one outside the Organisational Research Group at the University of Liverpool will see the completed questionnaires. No attempt will be made to identify you from the responses you make. Our interest is in understanding risk culture.

Please indicate in which area of ... you are based.

- A
- B
- C
- D
- E
- F

Please indicate your gender

- Male
- Female

Please indicate which contract you have

Full Time ↑
 Part Time ↑
 Flexible Contract ↑

Age:

How long have you worked for ...? (years/months)

How long have you been in your present role within ...?

Are you in a customer-facing role?

Yes ↑
 No ↑

In the last six months have you been involved in any incidents or errors that could cost ... Collections financially?

Yes ↑
 No ↑

If Yes please indicate the number of incidences

In the last six months have you been involved in any 'near misses' at work, that is incidences that had the potential to cost ... Collections financially but didn't?

Yes ↑
 No ↑

If Yes please indicate the number of incidences

Please indicate by circling a box on the following scale how you think your overall performance should be rated in relation to the last six months.

Exceptional	Good	Above average	Average	Below average	Poor	Fail
-------------	------	---------------	---------	---------------	------	------

Please indicate by circling a box on the following scale how you feel your performance should be rated in terms of financial benefit to ... Collections in the last six months.

Exceptional	Good	Above average	Average	Below average	Poor	Fail
-------------	------	---------------	---------	---------------	------	------

In addition to the above information on risk, opportunity is being taken through this survey for you to give your opinion on ... at work. The following questions are answered in the same way as the first group of questions.

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

Note: questions have been removed to protect organisation confidentiality

- a) 1 2 3 4 5 6 7
- b) 1 2 3 4 5 6 7
- c) 1 2 3 4 5 6 7
- d) 1 2 3 4 5 6 7
- e) 1 2 3 4 5 6 7
- f) 1 2 3 4 5 6 7

Thank you for completing this questionnaire.

**Please check that you have answered all the questions.
Please put the completed questionnaire in the enclosed FREEPOST envelope
and post it back to the University of Liverpool as soon as possible.**

Jan 2004

The Organisational Research Group at the University of Liverpool is conducting research into people's experience and views at work. In particular we are asking people working in financial institutions about some of the risks that are taken for them to be able to do their job.

We are interested in people's beliefs and attitudes about the work they do and the rules and controls that govern that work. As you will see the questionnaire is designed to look at both your attitudes about these things and also your opinion about other people's attitudes, for example your colleagues or management. Don't worry if you are not sure what other people's attitudes are, what is important for our work is what *you think* their attitudes are.

... have kindly agreed to be involved in the research, however, the work is being conducted independently, and all your responses are completely confidential. At no point in the research will any individuals be identified. To help ensure this, the questionnaires are completed anonymously and returned directly to us at the University.

The questionnaire should take you approximately fifteen minutes to complete. We would be very grateful if you could complete the questionnaire and return it to us using the prepaid envelope supplied.

Thank you for your help with this research it is very much appreciated. If you would like to know more about the research, or there are any questions that you would like to ask, please feel free to get in touch with us.

Sheena Johnson
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14.5 ***Appendix 5 - Mean and Standard Deviation of Individual Items (Org1)***

Table 14.1 - Mean and Standard Deviation of Individual Questionnaire Items (Org1)

Item	N	Mean	Std. Dev.	Item	N	Mean	Std. Dev.
q1r	200	3.20	1.39	q29r	201	4.10	1.29
q2	201	5.26	1.19	q30	201	4.91	1.27
q3r	200	5.33	1.43	q31r	200	4.32	1.14
q4	201	4.78	0.86	q32r	201	5.10	1.45
q5	201	4.93	1.26	q33	201	4.38	0.95
q6	200	5.87	0.92	q34	201	4.49	1.41
q7	201	5.01	0.87	q35	201	5.00	1.12
q8	201	5.24	0.93	q36r	201	4.53	1.39
q9r	201	4.27	1.33	q37r	198	4.02	1.36
q10	200	5.27	1.06	q38r	201	4.28	1.13
q11	199	4.55	1.49	q39	201	5.11	0.90
q12r	201	3.89	1.04	q40	201	4.61	0.85
q13	201	4.93	1.02	q41	201	4.77	0.94
q14	201	5.44	0.95	q42	201	4.74	1.22
q15	199	4.60	1.15	q43	201	4.72	1.19
q16r	201	4.00	1.42	q44r	200	4.89	1.42
q17	201	5.34	1.01	q45	201	4.69	0.98
q18r	201	3.68	1.49	q46	201	4.75	0.89
q19	199	5.41	0.90	q47	201	5.09	0.92
q20	199	5.13	1.05	q48	201	4.96	0.84
q21r	201	5.34	1.25	q49	201	4.85	1.09
q22r	201	4.97	1.40	q50r	199	3.93	1.05
q23	201	4.47	1.10	q51	201	5.09	0.99
q24	201	5.31	0.96	q52	201	4.64	1.13
q25	199	5.18	0.95	q53	201	4.92	1.05
q26r	201	4.94	1.32	q54r	200	4.17	1.23
q27	201	5.24	0.96	q55	201	4.61	1.04
q28	201	5.31	1.11	q56	201	5.07	0.84

Note – Negatively worded questions were recoded prior to calculation of mean and standard deviation.

Organisational Research Group

...- Risk Culture Questionnaire – 2003

The Organisational Research Group at the University of Liverpool is carrying out research on risk culture within financial institutions and ... have agreed to be involved in this research project. We would be very grateful if you could take the time to complete the attached questionnaire.

The information gathered through these questionnaires will be treated **in the strictest confidence**. The questionnaires are designed to be **completed anonymously** and returned directly to the University of Liverpool. This ensures that only the Organisational Research Group at the University of Liverpool will have access to completed questionnaires. Only general trends will be reported and **no individual will be identified**.

Please put your completed questionnaires in the FREEPOST envelope provided and mail it back to us at the University of Liverpool. **No stamp is needed.**

Thank you very much for your help with this project.

Sheena Johnson

INSTRUCTIONS

Please note, if you are based in a branch or estate agency when we refer to colleagues this is in relation to other financial advisors rather than branch staff.

On the following pages there are a number of statements about risk within your workplace.

Please show how much you agree with each statement by putting a circle around the number that best represents your view.

Some statements refer to other people's feelings. It doesn't matter if you're not certain what they feel. We want to know what **YOU THINK** they feel. There are no right or wrong answers.

Do not spend too long thinking about each statement. Give your opinion as quickly as possible. Please give your opinion of all the statements.

Please complete the questionnaire on your own

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- | | | | | | | | | |
|-----|--|---|---|---|---|---|---|---|
| 1) | Time constraints sometimes lead to my colleagues making errors. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2) | The people I work with would support me if I had a concern about a possible breach of risk control procedure. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3) | I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4) | My managers are satisfied with the results of audits. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5) | I am encouraged to report any errors I make. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6) | If I am not sure about the implications of a particular decision I will always ask for advice. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7) | The managers here are satisfied with the risk control procedures currently in place. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8) | The people I work with appreciate the need for an effective risk control system. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9) | I know of short cuts that would get my work done more effectively. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10) | The management in ... know what risk control procedures people should be following. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11) | The instruction manual for my role is user friendly. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12) | Management are aware that risk controls, rules and guidelines are not always followed. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13) | I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14) | My co-workers refer to procedures and guidelines when necessary. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15) | I am encouraged by my colleagues to only take acceptable risks in the decisions I make. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16) | Management only emphasise the importance of rules and guidelines if a problem has been identified. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17) | The management of ... issue strict guidelines for risk control. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 18) Time constraints sometimes lead to me making errors. 1 2 3 4 5 6 7
- 19) In terms of limiting financial losses I am happy with my decisions. 1 2 3 4 5 6 7
- 20) I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially. 1 2 3 4 5 6 7
- 21) My manager sometimes implies that I should disregard a rule or guideline. 1 2 3 4 5 6 7
- 22) There are occasions in my role when I do not follow all the risk controls, rules and guidelines. 1 2 3 4 5 6 7
- 23) If asked, I could explain my company's attitude towards risk. 1 2 3 4 5 6 7
- 24) I always work within the risk control rules and guidelines of my role. 1 2 3 4 5 6 7
- 25) I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself. 1 2 3 4 5 6 7
- 26) I take short cuts in set procedures to get my work done more effectively. 1 2 3 4 5 6 7
- 27) My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure. 1 2 3 4 5 6 7
- 28) As long as I have followed the procedures for this role I will receive the support of management if something goes wrong. 1 2 3 4 5 6 7
- 29) Time constraints sometimes prevent me from sufficiently evaluating risk. 1 2 3 4 5 6 7
- 30) My colleagues are encouraged to report any errors they make. 1 2 3 4 5 6 7
- 31) Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role. 1 2 3 4 5 6 7
- 32) Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome. 1 2 3 4 5 6 7
- 33) If asked, I could explain my company's policy towards risk. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 34) The management in ... ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk. 1 2 3 4 5 6 7
- 35) If I have to make a decision that I think is risky I know support is available to help me. 1 2 3 4 5 6 7
- 36) I don't always report the errors that I've made. 1 2 3 4 5 6 7
- 37) Time constraints sometimes prevent me from consulting the instruction manual. 1 2 3 4 5 6 7
- 38) My colleagues take short cuts in set procedures to get their work done. 1 2 3 4 5 6 7
- 39) I am aware of the risk controls, rules and guidelines which govern the work I do. 1 2 3 4 5 6 7
- 40) My colleagues believe the internal risk control procedures are effective. 1 2 3 4 5 6 7
- 41) Management are happy with the training given to people in respect of risk awareness. 1 2 3 4 5 6 7
- 42) When there are meetings at work concerning business objectives I attend them. 1 2 3 4 5 6 7
- 43) The people I work with attend meetings concerning business objectives. 1 2 3 4 5 6 7
- 44) Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk. 1 2 3 4 5 6 7
- 45) I feel satisfied with the attention given to risk and governance awareness within this environment. 1 2 3 4 5 6 7
- 46) I encourage my colleagues to work within the risk control guidelines. 1 2 3 4 5 6 7
- 47) I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially. 1 2 3 4 5 6 7
- 48) I believe my attitude towards risk is the same as my co-workers. 1 2 3 4 5 6 7
- 49) The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 50) My colleagues know of short cuts that would get their work done more effectively. 1 2 3 4 5 6 7
- 51) The managers encourage me to report any risk control problems I might discover. 1 2 3 4 5 6 7
- 52) I am happy with the way in which I receive information about risk issues at work. 1 2 3 4 5 6 7
- 53) Advice about risk and procedures is always available to me. 1 2 3 4 5 6 7
- 54) People here will often take a chance on a risky decision, if they think it is likely to improve their results. 1 2 3 4 5 6 7
- 55) The management of ... are aware of the risks we have to take in order to do our work. 1 2 3 4 5 6 7
- 56) I do my best to follow risk control procedures even though this might reduce profitability. 1 2 3 4 5 6 7

Background Questions

In this section there are a number of questions about your job. Please answer them by ticking the appropriate box or by filling in the space provided.

All answers are in the **strictest confidence**. No one outside the Organisational Research Group at the University of Liverpool will see the completed questionnaires. No attempt will be made to identify you from the responses you make. Our interest is in understanding risk culture.

Please indicate your job role:

↑
↑
↑
↑

Please indicate where you are based:

↑
↑

Please indicate in which area you are based:

Scotland	↑	Yorkshire and North East	↑	West Midlands and Wales	↑
North West	↑	North Midlands	↑	East Anglia and London	↑
M62	↑	Devon and Cornwall	↑	London and South East	↑
South Coast	↑				

Please indicate your gender

Male	↑
Female	↑

Age:

How long have you worked for ... ? (years/months)

How long have you been in your present role within ... ?

If you are a financial advisor do you have the support of an admin team?

Yes	↑
No	↑

If you are a financial advisor are you happy with the quality of referrals you get from your colleagues within the branch / estate agency?

Yes	↑
No	↑

Have you ever worked for another financial institution?

Yes	↑
No	↑

This section is concerned with any errors or incidences that may have occurred in ... during the last six months. Please remember our interest is in understanding risk culture and no individuals will be able to be identified through this research.

In the last six months have you been involved in any incidents or errors that could cost ... financially?

Yes	↑
No	↑

If Yes please indicate the number of incidences

July 2003

The Organisational Research Group at the University of Liverpool is conducting research into people's experience and views at work. In particular we are asking people working in financial institutions about some of the risks that are taken for them to be able to do their job.

We are interested in people's beliefs and attitudes about the work they do and the rules and controls that govern that work. As you will see the questionnaire is designed to look at both your attitudes about these things and also your opinion about other people's attitudes, for example your colleagues or management. Don't worry if you are not sure what other people's attitudes are, what is important for our work is what *you think* their attitudes are.

... have kindly agreed to be involved in the research, however, the work is being conducted independently, and all your responses are completely confidential. At no point in the research will any individuals be identified. To help ensure this, the questionnaires are completed anonymously and returned directly to us at the University.

The questionnaire should take you approximately fifteen minutes to complete. We would be very grateful if you could complete the questionnaire and return it to us using the prepaid envelope supplied.

Thank you for your help with this research it is very much appreciated. If you would like to know more about the research, or there are any questions that you would like to ask, please feel free to get in touch with us.

Sheena Johnson
Organisational Research Group
University of Liverpool

0151 794 1408
sheenajj@liv.ac.uk

14.8

Appendix 8 - Mean and Standard Deviation of Individual Items (Org2)

Table 14.2 - Mean and Standard Deviation of Individual Questionnaire Items (Org2)

Item	N	Mean	Std. Dev.	Item	N	Mean	Std. Dev.
q1r	198	2.83	1.24	q29r	198	3.52	1.29
q2	198	4.96	1.16	q30	198	4.49	1.15
q3r	198	5.30	1.50	q31r	198	3.66	1.20
q4	197	4.87	0.92	q32r	198	4.68	1.58
q5	198	4.61	1.20	q33	198	4.37	1.17
q6	197	5.57	1.07	q34	197	3.95	1.50
q7	198	4.72	0.99	q35	198	4.28	1.34
q8	198	4.84	1.08	q36r	198	4.22	1.45
q9r	198	3.79	1.51	q37r	197	3.19	1.47
q10	197	4.85	1.11	q38r	197	3.58	1.31
q11	197	3.31	1.37	q39	198	4.91	1.00
q12r	198	3.59	1.09	q40	198	4.29	0.91
q13	198	4.71	1.05	q41	198	4.59	0.97
q14	198	4.85	0.88	q42	198	5.47	0.93
q15	198	4.34	1.11	q43	198	5.32	0.86
q16r	198	3.64	1.43	q44r	198	4.60	1.47
q17	198	5.12	1.03	q45	198	4.39	1.01
q18r	198	2.96	1.33	q46	198	4.69	0.88
Q19	198	5.27	0.86	q47	198	4.96	0.93
q20	197	4.71	1.07	q48	198	4.52	1.06
q21r	197	4.95	1.51	q49	197	4.34	1.20
q22r	198	4.23	1.53	q50r	198	3.40	1.20
q23	198	4.49	1.22	q51	198	4.57	1.11
q24	198	4.64	1.18	q52	198	4.13	1.18
q25	198	4.82	1.01	q53	198	4.43	1.12
q26r	198	4.42	1.46	q54r	198	3.88	1.29
q27	198	4.97	0.99	q55	198	4.13	1.27
q28	198	4.93	1.38	q56	198	5.07	0.92

Note – Negatively worded questions were recoded prior to calculation of mean and standard deviation.



THE UNIVERSITY
of LIVERPOOL

Organisational Research Group

Risk Culture Questionnaire – 2004

The Organisational Research Group at the University of Liverpool is carrying out research on risk culture within financial institutions and ... have agreed to be involved in this research project. We would be very grateful if you could take the time to complete the attached questionnaire.

The information gathered through these questionnaires will be treated **in the strictest confidence**. The questionnaires are designed to be **completed anonymously** and returned directly to the University of Liverpool. This ensures that only the Organisational Research Group at the University of Liverpool will have access to completed questionnaires. Only general trends will be reported and **no individual will be identified**.

Please put your completed questionnaires in the FREEPOST envelope provided and mail it back to us at the University of Liverpool. **No stamp is needed.**

Thank you very much for your help with this project.

Sheena Johnson

INSTRUCTIONS

On the following pages there are a number of statements about risk within your workplace.

Please show how much you agree with each statement by putting a circle around the number that best represents your view.

Some statements refer to other people's feelings. It doesn't matter if you're not certain what they feel. We want to know what **YOU THINK** they feel. There are no right or wrong answers.

Do not spend too long thinking about each statement. Give your opinion as quickly as possible. Please give your opinion of all the statements.

Please complete the questionnaire on your own

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

Note: Some questions have been removed to protect organisation confidentiality.

- 1) Time constraints sometimes lead to my colleagues making errors. 1 2 3 4 5 6 7
- 2) The people I work with would support me if I had a concern about a possible breach of risk control procedure. 1 2 3 4 5 6 7
- 3) I sometimes ignore risk control procedures if I am confident it will mean a more profitable outcome. 1 2 3 4 5 6 7
- 4) My managers are satisfied with the results of audits. 1 2 3 4 5 6 7
- 5) I am encouraged to report any errors I make. 1 2 3 4 5 6 7
- 6) 1 2 3 4 5 6 7
- 7) The managers here are satisfied with the risk control procedures currently in place. 1 2 3 4 5 6 7
- 8) The people I work with appreciate the need for an effective risk control system. 1 2 3 4 5 6 7
- 9) I know of short cuts that would get my work done more effectively. 1 2 3 4 5 6 7
- 10) The management in my Centre know what risk control procedures people should be following. 1 2 3 4 5 6 7
- 11) The instruction manual for my role is user friendly. 1 2 3 4 5 6 7
- 12) Management are aware that risk controls, rules and guidelines are not always followed. 1 2 3 4 5 6 7
- 13) I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by my colleagues. 1 2 3 4 5 6 7
- 14) My co-workers refer to procedures and guidelines when necessary. 1 2 3 4 5 6 7
- 15) I am encouraged by my colleagues to only take acceptable risks in the decisions I make. 1 2 3 4 5 6 7
- 16) Management only emphasise the importance of rules and guidelines if a problem has been identified. 1 2 3 4 5 6 7
- 17) 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 18) Time constraints sometimes lead to me making errors. 1 2 3 4 5 6 7
- 19) In terms of limiting financial losses I am happy with my decisions. 1 2 3 4 5 6 7
- 20) I know how much of a risk it is reasonable for me to take when making decisions that could cost the organisation financially. 1 2 3 4 5 6 7
- 21) 1 2 3 4 5 6 7
- 22) There are occasions in my role when I do not follow all the risk controls, rules and guidelines. 1 2 3 4 5 6 7
- 23) If asked, I could explain my company's attitude towards risk. 1 2 3 4 5 6 7
- 24) I always work within the risk control rules and guidelines of my role. 1 2 3 4 5 6 7
- 25) I believe the risk controls, rules and guidelines are adequate to ensure excessive risks are not taken by myself. 1 2 3 4 5 6 7
- 26) I take short cuts in set procedures to get my work done more effectively. 1 2 3 4 5 6 7
- 27) My colleagues would expect me to support them if they had concerns about a possible breach of risk control procedure. 1 2 3 4 5 6 7
- 28) 1 2 3 4 5 6 7
- 29) Time constraints sometimes prevent me from sufficiently evaluating risk. 1 2 3 4 5 6 7
- 30) My colleagues are encouraged to report any errors they make. 1 2 3 4 5 6 7
- 31) Sometimes my colleagues do not follow all the risk controls, rules and guidelines for this role. 1 2 3 4 5 6 7
- 32) Management would turn a blind eye to breaches of procedure if they thought it would mean a more profitable outcome. 1 2 3 4 5 6 7
- 33) If asked, I could explain my company's policy towards risk. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 34) The management in my Centre ensure all relevant people receive adequate training to ensure they do not expose the company to excessive risk. 1 2 3 4 5 6 7
- 35) If I have to make a decision that I think is risky I know support is available to help me. 1 2 3 4 5 6 7
- 36) I don't always report the errors that I've made. 1 2 3 4 5 6 7
- 37) 1 2 3 4 5 6 7
- 38) My colleagues take short cuts in set procedures to get their work done. 1 2 3 4 5 6 7
- 39) I am aware of the risk controls, rules and guidelines which govern the work I do. 1 2 3 4 5 6 7
- 40) My colleagues believe the internal risk control procedures are effective. 1 2 3 4 5 6 7
- 41) Management are happy with the training given to people in respect of risk awareness. 1 2 3 4 5 6 7
- 42) When there are meetings at work concerning business objectives I attend them. 1 2 3 4 5 6 7
- 43) The people I work with attend meetings concerning business objectives. 1 2 3 4 5 6 7
- 44) Management would turn a blind eye to breaches of procedure if they thought it would not expose the company to unacceptable risk. 1 2 3 4 5 6 7
- 45) I feel satisfied with the attention given to risk and governance awareness within this environment. 1 2 3 4 5 6 7
- 46) I encourage my colleagues to work within the risk control guidelines. 1 2 3 4 5 6 7
- 47) I am aware of the procedures which should be followed when faced with a decision that could cost the organisation financially. 1 2 3 4 5 6 7
- 48) 1 2 3 4 5 6 7
- 49) The staff here are encouraged to talk about any problems they may experience when faced with a decision that may expose the organisation to excessive financial risk. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Very Strongly Agree

- 50) My colleagues know of short cuts that would get their work done more effectively. 1 2 3 4 5 6 7
- 51) The managers encourage me to report any risk control problems I might discover. 1 2 3 4 5 6 7
- 52) I am happy with the way in which I receive information about risk issues at work. 1 2 3 4 5 6 7
- 53) Advice about risk and procedures is always available to me. 1 2 3 4 5 6 7
- 54) 1 2 3 4 5 6 7
- 55) The management of my Centre are aware of the risks we have to take in order to do our work. 1 2 3 4 5 6 7
- 56) I do my best to follow risk control procedures even though this might reduce profitability. 1 2 3 4 5 6 7
- 57) If I am not sure about the implications of a particular decision I will always ask for advice. 1 2 3 4 5 6 7
- 58) The management of my Centre issue strict guidelines for risk control. 1 2 3 4 5 6 7
- 59) My manager sometimes implies that I should disregard a rule or guideline. 1 2 3 4 5 6 7
- 60) As long as I have followed the procedures for this role I will receive the support of management if something goes wrong. 1 2 3 4 5 6 7
- 61) Time constraints sometimes prevent me from consulting the instruction manual. 1 2 3 4 5 6 7
- 62) I believe my attitude towards risk is the same as my co-workers. 1 2 3 4 5 6 7
- 63) People here will often take a chance on a risky decision, if they think it is likely to improve their results. 1 2 3 4 5 6 7

Please continue to the next section...

Background Questions

In this section there are a number of questions about your job. Please answer them by ticking the appropriate box or by filling in the space provided.

All answers are in the **strictest confidence**. No one outside the Organisational Research Group at the University of Liverpool will see the completed questionnaires. No attempt will be made to identify you from the responses you make. Our interest is in understanding risk culture.

Please indicate which Business Unit you work in:

✓
✓
✓
✓
✓
✓
✓
✓
✓
✓

Please briefly describe your job role:

.....

Please indicate your gender

Male ✓
Female ✓

Age:

How long have you worked for ...? (years/months)

How long have you been in your present role within your Centre?

In the last six months have you been involved in any incidents or errors that could cost ... financially?

Yes ✓
No ✓

If Yes please indicate the number of incidences

In the last six months have you been involved in any 'near misses' at work, that is incidences that had the potential to cost ... financially but didn't?

Yes ↑
No ↑

If Yes please indicate the number of incidences

Thank you for completing this questionnaire.

**Please check that you have answered all the questions.
Please put the completed questionnaire in the enclosed FREEPOST envelope
and post it back to the University of Liverpool as soon as possible.**

14.10 ***Appendix 10 - Covering Letter (Org3)***

May 2004

The Organisational Research Group at the University of Liverpool is conducting research into people's experience and views at work. In particular we are asking people working in financial institutions about some of the risks that are taken for them to be able to do their job.

We are interested in people's beliefs and attitudes about the work they do and the rules and controls that govern that work. As you will see the questionnaire is designed to look at both your attitudes about these things and also your opinion about other people's attitudes, for example your colleagues or management. Don't worry if you are not sure what other people's attitudes are, what is important for our work is what *you think* their attitudes are.

... have kindly agreed to be involved in the research, however, the work is being conducted independently, and all your responses are completely confidential. At no point in the research will any individuals be identified. To help ensure this, the questionnaires are completed anonymously and returned directly to us at the University.

The questionnaire should take you approximately fifteen minutes to complete. We would be very grateful if you could complete the questionnaire and return it to us using the prepaid envelope supplied.

Thank you for your help with this research it is very much appreciated. If you would like to know more about the research, or there are any questions that you would like to ask, please feel free to get in touch with us.

Sheena Johnson
Organisational Research Group
University of Liverpool

0151 794 1408
sheenajj@liv.ac.uk

14.11 ***Appendix 11 – Mean and Standard Deviation of Individual Items (Org3)***

Table 14.3 - Mean and Standard Deviation of Individual Questionnaire Items (Org3)

Item	N	Mean	Std. Dev.	Item	N	Mean	Std. Dev.
q1R	367	2.67	1.17	q29R	369	3.46	1.15
q2	370	5.23	1.06	q30	368	5.04	1.08
q3R	370	5.15	1.34	q31R	368	3.84	1.16
q4	367	4.64	0.87	q32R	369	4.72	1.53
q5	369	5.12	1.15	q33	368	4.24	1.12
q6	369	5.41	1.00	q34	369	4.35	1.37
q7	368	4.78	0.92	q35	370	4.88	1.18
q8	369	5.00	0.97	q36R	369	4.69	1.42
q9R	370	3.85	1.35	q37R	368	3.50	1.31
q10	369	5.25	1.01	q38R	369	3.98	1.26
q11	367	3.98	1.31	q39	370	4.99	0.92
q12R	369	3.78	1.19	q40	370	4.56	0.84
q13	368	4.88	0.93	q41	369	4.57	0.89
q14	370	4.98	0.97	q42	369	4.79	1.36
q15	367	4.52	1.18	q43	369	4.86	1.24
q16R	370	3.87	1.31	q44R	369	4.62	1.45
q17	368	4.78	1.03	q45	367	4.55	1.01
q18R	370	3.15	1.30	q46	370	4.67	1.07
q19	370	5.16	0.93	q47	370	4.90	1.07
q20	370	4.86	1.13	q48	370	4.75	1.13
q21R	367	4.92	1.36	q49	369	4.86	1.11
q22R	366	4.45	1.45	q50R	370	3.78	1.12
q23	369	4.37	1.11	q51	370	5.01	0.97
q24	368	4.82	1.04	q52	368	4.56	1.05
q25	369	4.91	0.99	q53	370	4.75	0.98
q26R	370	4.45	1.46	q54R	368	4.23	1.33
q27	370	5.08	0.96	q55	369	4.91	1.03
q28	370	5.09	1.20	q56	369	5.04	0.92

Note – Negatively worded questions were recoded prior to calculation of mean and standard deviation.

14.12

***Appendix 12 - Congruence Coefficients Between Factors
Across the Three Individual Samples (Org1, Org2 and Org3)***

Table 14.4 - Congruence Coefficients for Org 1 factors and Org 2 factors
 Org1 = rows, Org2 = columns

Org1 / Org2	1	2	3	4	5	6	7	8	9	10	11	12
1	.87	.36	.20	.49	.39	.27	.67	.28	.45	.28	.06	.26
2	.43	.40	.67	.48	.43	.12	.47	.45	.45	.36	.41	.24
3	.39	.80	.35	.25	.16	.31	.40	.48	.23	.08	.21	-.04
4	.39	.03	.06	.31	.27	-.14	.27	.16	.36	.54	.12	.72
5	.53	.18	.07	.35	.31	-.00	.47	.31	.67	.19	.31	.21
6	.34	.37	.23	.22	-.05	.86	.09	.30	.11	-.00	.02	-.14
7	.59	.37	.38	.19	.24	.11	.21	.16	.35	.41	.52	.03
8	.36	.32	.32	.31	.66	.09	.28	.21	.22	.14	.14	.15
9	.51	.51	.40	.28	.06	.31	.19	.77	.16	.12	.18	-.06
10	.32	.25	.24	.84	.30	.13	.35	.15	.37	.18	.12	.18
11	.15	.58	.49	.10	.25	.16	.20	.27	.10	.08	-.02	-.07
12	.17	.05	.19	.24	.25	.14	.23	-.03	.47	.10	-.05	.25

Table 14.5 - Congruence Coefficients for Org 1 factors and Org 3 factors
 Org1 = rows, Org3 = columns

Org1 / Org3	1	2	3	4	5	6	7	8	9	10	11	12
1	.88	.32	.55	.46	.48	.18	.59	.52	.44	.54	.41	.23
2	.58	.58	.61	.50	.59	.05	.40	.47	.37	.34	.16	-.26
3	.31	.79	.21	.57	.04	.29	.23	.17	.26	.22	.30	.13
4	.46	.03	.39	.26	.77	-.12	.40	.27	.21	.64	.24	-.02
5	.51	.14	.42	.43	.44	-.08	.71	.64	.34	.24	.22	-.01
6	.21	.34	.15	.29	-.05	.87	.04	.12	.00	.09	.04	.06
7	.45	.31	.33	.38	.32	.11	.37	.31	.33	.36	.77	-.03
8	.38	.36	.29	.35	.25	.10	.34	.21	.65	.19	.24	-.09
9	.43	.55	.24	.74	.12	.31	.20	.16	.16	.24	.25	-.07
10	.36	.26	.86	.24	.36	.08	.37	.27	.23	.13	.26	.08
11	.18	.56	.23	.15	.09	.21	.16	.04	.19	.08	.19	-.36
12	.34	.13	.26	-.12	.31	.06	.23	.49	.10	.12	.24	.05

Table 14.6 - Congruence Coefficients for Org 2 factors and Org 3 factors
 Org2 = rows, Org3 = columns

Org2 / Org3	1	2	3	4	5	6	7	8	9	10	11	12
1	.87	.40	.46	.59	.38	.27	.58	.43	.39	.47	.55	.20
2	.36	.88	.27	.53	.08	.43	.21	.16	.20	.16	.40	-.10
3	.31	.69	.32	.36	.28	.33	.10	.30	.18	.15	.29	-.34
4	.52	.29	.86	.39	.38	.07	.38	.34	.35	.26	.12	.02
5	.44	.16	.39	.13	.40	-.07	.36	.32	.84	.31	.17	-.09
6	.19	.41	.07	.24	-.06	.89	.00	.13	-.02	.06	.11	.08
7	.50	.38	.50	.32	.34	.05	.69	.56	.31	.34	.13	.21
8	.41	.52	.24	.74	.15	.24	.23	.27	.15	.19	.07	-.09
9	.51	.24	.53	.33	.40	-.01	.44	.77	.27	.23	.26	.03
10	.36	.04	.29	.23	.43	-.16	.24	.13	.20	.65	.22	-.10
11	.12	.20	.14	.34	.13	-.03	.18	.30	.26	.07	.38	-.22
12	.27	-.05	.25	.02	.72	-.14	.16	.16	.20	.28	.01	.13

14.13 ***Appendix 13 - Mean and Standard Deviation of Individual Items (combined dataset)***

Table 14.7 - Mean and Standard Deviation of Individual Questionnaire Items (Combined Dataset)

Item	N	Mean	Std. Dev.	Item	N	Mean	Std. Dev.
q1R	765	2.85	1.27	q29R	768	3.65	1.25
q2	769	5.17	1.13	q30	767	4.86	1.17
q3R	768	5.24	1.41	q31R	766	3.92	1.19
q4	765	4.73	0.89	q32R	768	4.81	1.53
q5	768	4.94	1.21	q33	767	4.31	1.10
q6	766	5.57	1.02	q34	767	4.28	1.43
q7	767	4.83	0.93	q35	769	4.76	1.24
q8	768	5.02	1.00	q36R	768	4.53	1.43
q9R	769	3.95	1.40	q37R	763	3.56	1.39
q10	766	5.15	1.07	q38R	767	3.95	1.26
q11	763	3.96	1.45	q39	769	5.00	0.94
q12R	768	3.76	1.13	q40	769	4.50	0.87
q13	767	4.85	0.99	q41	768	4.63	0.93
q14	769	5.06	0.97	q42	768	4.95	1.26
q15	764	4.50	1.15	q43	768	4.94	1.16
q16R	769	3.84	1.38	q44R	767	4.68	1.45
q17	767	5.02	1.05	q45	766	4.55	1.01
q18R	769	3.24	1.38	q46	769	4.70	0.98
q19	767	5.25	0.91	q47	769	4.96	1.00
q20	766	4.89	1.10	q48	769	4.75	1.05
q21R	765	5.04	1.38	q49	767	4.72	1.15
q22R	765	4.53	1.48	q50R	767	3.72	1.14
q23	768	4.43	1.14	q51	769	4.92	1.03
q24	767	4.90	1.09	q52	767	4.47	1.13
q25	766	4.95	0.99	q53	769	4.71	1.05
q26R	769	4.57	1.44	q54R	766	4.12	1.30
q27	769	5.10	0.97	q55	768	4.63	1.15
q28	769	5.11	1.23	q56	768	5.05	0.90

Note – Negatively worded questions were recoded prior to calculation of mean and standard deviation.

14.14 ***Appendix 14 - Posthoc Analysis Results Comparing Factor Scores Across Orgs 1, 2 and 3***

Table 14.8 - Posthoc Results Comparing Factor Scores Across Orgs 1, 2 and 3

Factor		Comparison between	Mean Difference	Std. Error	Sig.	95% Confidence Interval
F1	Tukey	Org1 & Org2	.4735	.07772	.000	.2910 to .6560
		Org1 & Org3	.0692	.06807	.567	-.0907 to .2290
		Org2 & Org3	-.4043	.06862	.000	-.5655 to -.2432
	Games-Howell	Org1 & Org2	.4735	.08038	.000	.2843 to .6626
		Org1 & Org3	.0692	.06675	.555	-.0879 to .2262
		Org2 & Org3	-.4043	.07116	.000	-.5718 to -.2368
F2	Tukey	Org1 & Org2	.5065	.08765	.000	.3006 to .7123
		Org1 & Org3	.2393	.07713	.006	.0581 to .4204
		Org2 & Org3	-.2672	.07713	.002	-.4484 to -.0861
	Games-Howell	Org1 & Org2	.5065	.08825	.000	.2988 to .7142
		Org1 & Org3	.2393	.06948	.002	.0759 to .4027
		Org2 & Org3	-.2672	.08434	.005	-.4657 to -.0687
F3	Tukey	Org1 & Org2	.1882	.07799	.042	.0051 to .3714
		Org1 & Org3	.2001	.06838	.010	.0396 to .3607
		Org2 & Org3	.0119	.06860	.983	-.1492 to .1730
	Games-Howell	Org1 & Org2	.1882	.07951	.048	.0012 to .3753
		Org1 & Org3	.2001	.06577	.007	.0455 to .3548
		Org2 & Org3	.0119	.07183	.985	-.1571 to .1809
F4	Tukey	Org1 & Org2	.4009	.06883	.000	.2393 to .5625
		Org1 & Org3	.2403	.06036	.000	.0985 to .3820
		Org2 & Org3	-.1606	.06046	.022	-.3026 to -.0186
	Games-Howell	Org1 & Org2	.4009	.06883	.000	.2390 to .5628
		Org1 & Org3	.2403	.06024	.000	.0986 to .3820
		Org2 & Org3	-.1606	.06059	.023	-.3031 to -.0181
F6	Tukey	Org1 & Org2	.3604	.10907	.003	.1043 to .6165
		Org1 & Org3	.3084	.09559	.004	.0839 to .5329
		Org2 & Org3	-.0520	.09606	.851	-.2776 to .1736
	Games-Howell	Org1 & Org2	.3604	.11136	.004	.0984 to .6224
		Org1 & Org3	.3084	.09208	.003	.0918 to .5250
		Org2 & Org3	-.0520	.10053	.863	-.2886 to .1846
F7	Tukey	Org1 & Org2	.6155	.09963	.000	.3815 to .8494
		Org1 & Org3	.5480	.08746	.000	.3426 to .7534
		Org2 & Org3	-.0675	.08746	.721	-.2728 to .1379
	Games-Howell	Org1 & Org2	.6155	.10685	.000	.3641 to .8669
		Org1 & Org3	.5480	.08886	.000	.3389 to .7572
		Org2 & Org3	-.0675	.08956	.732	-.2783 to .1433
F8	Tukey	Org1 & Org2	.3674	.10473	.001	.1215 to .6134
		Org1 & Org3	-.1650	.09178	.171	-.3805 to .0506
		Org2 & Org3	-.5324	.09223	.000	-.7490 to -.3158
	Games-Howell	Org1 & Org2	.3674	.11065	.003	.1071 to .6278
		Org1 & Org3	-.1650	.09543	.196	-.3896 to .0596
		Org2 & Org3	-.5324	.09132	.000	-.7473 to -.3175
F9	Tukey	Org1 & Org2	.2780	.08030	.002	.0894 to .4666
		Org1 & Org3	.2030	.07044	.011	.0375 to .3684
		Org2 & Org3	-.0751	.07021	.534	-.2399 to .0898
	Games-Howell	Org1 & Org2	.2780	.07773	.001	.0951 to .4609
		Org1 & Org3	.2030	.07201	.014	.0336 to .3724
		Org2 & Org3	-.0751	.06734	.506	-.2334 to .0833
F10	Tukey	Org1 & Org2	-.6701	.11126	.000	-.9314 to -.4089
		Org1 & Org3	-.0936	.09741	.602	-.3224 to .1351
		Org2 & Org3	.5765	.09789	.000	.3466 to .8064
	Games-Howell	Org1 & Org2	-.6701	.10133	.000	-.9086 to -.4317
		Org1 & Org3	-.0936	.10296	.635	-.3358 to .1485
		Org2 & Org3	.5765	.08696	.000	.3721 to .7809
F11	Tukey	Org1 & Org2	.1265	.06599	.134	-.0284 to .2815

		Org1 & Org3	.1812	.05784	.005	.0453 to .3170
		Org2 & Org3	.0546	.05822	.616	-.0821 to .1914
	Games-Howell	Org1 & Org2	.1265	.06517	.129	-.0268 to .2798
		Org1 & Org3	.1812	.05678	.004	.0476 to .3147
		Org2 & Org3	.0546	.05891	.623	-.0839 to .1932
F12	Tukey	Org1 & Org2	.2841	.08638	.003	.0812 to .4869
		Org1 & Org3	.0931	.07559	.435	-.0844 to .2706
		Org2 & Org3	-.1909	.07596	.033	-.3693 to -.0126
	Games-Howell	Org1 & Org2	.2841	.09022	.005	.0718 to .4963
		Org1 & Org3	.0931	.07541	.433	-.0843 to .2706
		Org2 & Org3	-.1909	.07801	.039	-.3745 to -.0073