

RESEARCH NOTE

THE USE OF COMPUTER ASSISTED QUALITATIVE DATA ANALYSIS SOFTWARE (CAQDAS) IN EMPLOYMENT RELATIONS RESEARCH: A CASE STUDY OF THE AUSTRALIAN AND NEW ZEALAND TELECOMMUNICATIONS SECTORS

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Computer Assisted Qualitative Data Analysis Software (CAQDAS) is a tool that assists researchers to engage in comprehensive and rigorous analysis of qualitative data. It allows researchers to organise large amounts of field work data into coherent logical structures and create an integrated data base. This paper examines how the CAQDAS program, NVIVO, was used to provide a robust analysis of qualitative data collected during research into organisational and workforce restructuring in the New Zealand and Australian telecommunications sectors. Primary data included interviews with management supplemented by interviews with union representatives and other stakeholders. Interviewing techniques present researchers with a number of challenges. Interviewees have their own personal beliefs and prejudices, which influence their perceptions of events and issues. Collecting data through interviews also creates the potential for bias on the part of the interviewer – the ‘self full-filling prophesy’ syndrome. CAQDAS programs may reduce these problems by allowing researchers to code and better corroborate data from different stakeholders. The paper concludes that CAQDAS tools may provide valuable support for qualitative research projects.

Introduction

This paper discusses research methodologies that were used to examine large amounts of fieldwork data gathered during research into organisational and workforce restructuring at the Telecom Corporation of New Zealand (TCNZ) and Telstra (Australia’s largest telecommunications company), following the deregulation and

privatisation of the New Zealand and Australian telecommunications sectors. The paper begins by discussing why a qualitative approach was adopted, before examining the potential benefits and limitations of computer assisted qualitative data analysis software (CAQDAS) tools. The paper outlines the methods used for data collection during this research project. These included interviews with managers, union representatives and other stakeholders conducted between 1997 and 2003. It then discusses how CAQDAS tools assisted in this analysis.

Qualitative Research: Strengths and Limitations

Researchers have commented on the strengths associated with in-depth studies of organisations. Hakim (2000: 68) states that this method has been shown to be well suited to the analysis of employment relations (ER), management and organisational change — issues that were addressed by this research project. Qualitative methods also enable researchers to investigate perspectives that are often beyond the reach of quantitative methods. For example, as Gillham writes (2000: 11):

- To explore complexities that are beyond the scope of more controlled approaches;
- To get ‘under the skin’ of a group or organisation to find out what really happens — the informal reality which can only be perceived from the inside; and
- To view the case from the inside out, seeing it from the perspective of those involved.

These three statements succinctly sum up why this project took a qualitative approach to the study of TCNZ and Telstra. The organisational, workforce restructuring and ER strategies of these firms were complex issues that involved many different stakeholders. Examining the perspectives of the people who were associated with and/or affected by these actions provided an effective analysis of TCNZ and Telstra’s responses to deregulation.

One criticism associated with researching a limited number of organisations is the perceived difficulty in extrapolating broad conclusions from the study of a relatively small number of firms (Hamel et al. 1993: 20). Some researchers suggest that this may yield narrow and/or idiosyncratic models of firm behaviour (Eisenhardt 1999: 154–5). However, in response to this argument Platt advises that:

If there is a rich and detailed account of many features of the case(s), it may be a considerable achievement to devise an interpretation which can deal with all of them, and this may pose a greater challenge than the fitting of superficial generalisations to larger numbers (1999: 176).

This ability to gain rich, detailed data makes qualitative analysis an

appropriate vehicle for theory development (Fielding and Fielding 1986; Lewin 1992; Eisenhardt 1999: 154).

Lewin (1992: 86–7) suggests that it is rare to find research that is solely concerned with either theory testing or theory development. Rather most research involves some combination of the two approaches. This research applied an established theory — transaction costs economics (TCE) — to the activities of two firms. It then developed an organisational restructuring model for telecommunications companies facing deregulation that linked TCE theory to strategic human resource management (SHRM) issues, such as external constraints. In-depth studies of TCNZ and Telstra provided detailed empirical data that could be compared against that predicted by TCE. This was supported by personal observations of what was occurring at the workplaces at TCNZ and Telstra and discussions with other stakeholders, including union officials. This close interaction with the actual evidence meant a strong case could be made for whether TCE theory supported or did not support specific actions and/or circumstances (see Eisenhardt 1999: 154).

Critics of qualitative and case study methods often fail to take into account the fact that case studies are seldom selected at random (Hamel et al. 1993: 41–4). Rather the two firms selected for this research project were chosen after an initial investigation revealed their similar historical backgrounds and the fact that they were required to respond to a like event. TCNZ and Telstra were both former public monopolies that faced the deregulation of their respective telecommunications sectors. Given their similar historical backgrounds, the events that followed the earlier deregulation and privatisation process at TCNZ in New Zealand could be seen as precursors for possible future strategies at Telstra.

The decision to use a qualitative approach was further influenced by other researchers who compared firms in like industries across countries (see Dore 1973; Lansbury and Breakspear 1995; Katz 1997; Lansbury et al. 2002). Katz examined and compared changing ER in telecommunications companies in industrialised market economies (IMEs). This research suggested that telecommunications companies in other countries had to respond to similar issues to those faced by TCNZ and Telstra (Katz 1997). Thus the actions and strategies of stakeholders at TCNZ and Telstra may have implications for other former public monopolies in the telecommunications sector.

Computer Assisted Qualitative Data Analysis Software (CAQDAS¹)

Researchers have pointed to the benefits of CAQDAS (Coffey and Atkinson 1996; Gahan and Hannibal 1998; Buston 1999: 183–202). This includes allowing researchers to organise large amounts of fieldwork data into coherent logical structures. It then enhances the researcher's ability to analyse this material rigorously. Gibbs et al. (2002) suggest

that CAQDAS tools allow qualitative researchers to analyse larger amounts of data than would have been possible with simple manual techniques. While CAQDAS tools have previously been linked to grounded theory methodologies (Pandit 1996), the development of more flexible software packages have allowed CAQDAS-supported research to engage in a wider variety of qualitative analytic techniques (see Gibbs et al. 2002).

Doolan and Ayland outline the basic method, characteristics, perceived advantages and disadvantages of CAQDAS supported research (see Table 1). They noted that one of its main advantages is the enhanced ability to manage high volumes of material by breaking down large amounts of field work data — such as interview transcripts — into smaller, linked, more manageable pieces of information (also see Welsh 2002). CAQDAS makes it relatively easy to locate information that has been coded, which obviates the need to continually search back and forth through written documents for like information. This in turn helps to cancel out human error and arguably allows for a

Table 1
CAQDAS analytic approach

CAQDAS	
Basic Method	<ul style="list-style-type: none"> • Transcribe tapes • Format transcripts appropriately for CAQDAS • Copy transcripts into CAQDAS • Code transcripts • Prepare networks (i.e., visual representations of links between codes) • Interpretation and report
Characteristics	<ul style="list-style-type: none"> • Allows respondent data to be kept whole • Process dependent on quality of coding (Note: the computer does not lend objectivity) • Captures a lot of detail
Advantages	<ul style="list-style-type: none"> • Makes a high volume of material manageable • Easy to identify and use quotes • Can identify subgroups of respondents • Challenging findings/reanalysis is easy/efficient
Disadvantages	<ul style="list-style-type: none"> • Steep time-consuming learning curve • No benefit where data is low volume • Output is not always user friendly

Source: Doolan, A. and Ayland, C. (2001) 'Analysis on trial', *International Journal of Market Research*, Vol. 43, Quarter 4, p. 384.

more accurate analysis of the data. Should the research findings be challenged then the data can be easily retrieved and reanalysed. Coding the data also requires the researcher to analyse the entire transcript and/or field notes, which helps to ensure a comprehensive examination of the material.

A perceived disadvantage of CAQDAS is the amount of time required to code the data. For this reason it is not recommended for analysing low volumes of data. CAQDAS programs may also require researchers to invest a considerable amount of time in learning to effectively use a new software package. This may potentially discourage less 'computer literate' researchers and/or those who need to analyse data within a short time frame. Booth suggests that a desirable feature of any CAQDAS program is that it "should be readily usable by the non computer expert" (1993: 206). Other researchers have further complained that putting their transcript material onto a computer 'distances' them from the data (Gibbs 2002).

While CAQDAS programs generally require researchers to 'splice' their fieldwork data, the decision on how and where to 'cut up' interview transcripts can be difficult (Welsh 2002: 2). Some researchers suggest that the perceived advantage of CAQDAS programs' ability to divide large amounts of information into smaller coordinated groups of data, carries the risk of the researcher missing themes that may only become readily apparent when the data is analysed in its entirety (Welsh 2002). For example, under a CAQDAS approach, interview transcripts are coded and broken down into groups of sentences and/or paragraphs. Interviewers that rely solely on this material may miss overall themes that more easily come to light when the interview transcripts are read and/or re-read as a whole. To use a cliché, the researcher may then 'not be able to see the wood for the trees'. Doolan and Ayland found this to be the case when they tested CAQDAS-supported research against more traditional holistic and interpretative qualitative analysis practices. However, supporters of CAQDAS approaches counter that the liberation of researchers from the manual chores involved in handling the data "engenders a more playful and insight driven" approach to the analytic process (Mangabeira 1996).

Data Collection and Analysis

Organisational and workforce restructuring at TCNZ and Telstra was a dynamic changing process. Because new sections were regularly created or disbanded, organisational structures soon became out of date. Therefore it was not practical to attempt to include the latest data on TCNZ and Telstra's organisational structures. Rather, this research project identified and analysed the main trends that underpinned the organisational and workforce changes that happened at TCNZ and Telstra from the late 1980s to 2000. It was during this period that many major changes occurred. This allowed this project

to take a 'snapshot' of how these firms looked at the end of the 1990s, following a decade of deregulation.

Primary and secondary data was collected from a broad range of sources. In examining organisational and workforce changes at TCNZ and Telstra and its effects on ER, it quickly became apparent that much of the data held by both firms was commercial in confidence. For example, internal company reports on downsizing and collective bargaining strategies were sensitive issues. To circumvent these restrictions data was collected via a number of methods. Therefore interview data was supported, cross-checked and compared with data from a broad range of sources. These included:

1. TCNZ and Telstra published reports (for example, annual reports);
2. Internal company reports supplied by TCNZ and Telstra managers (for example, TCNZ managers supplied primary data that included a breakdown of their workforce for the period 1995-2000);
3. Government reports: this was particularly helpful in the case of Telstra, which remained majority government owned. Therefore committees, such as the Federal Senate Environment, Recreation, Communications and the Arts References Committee (SERCARC), provided much useful information. Telstra was also required to table its Equal Employment Opportunity (EEO) Reports and associated workforce data in the federal parliament. Hence these EEO reports were available for public perusal;
4. Supranational organisations: these included reports from the International Labour Organisation; Organisation of Economic Cooperation and Development; and World Trade Organisation;
5. Union documents, including newsletters, internet based information; leaked documents; and
6. Journal articles; theses; book chapters; newspaper and magazine articles; internet and other electronic data sources.

Gathering data on the same issue by different methods created a multi-method approach, whereby the strengths of one research method helped to compensate for potential limitations in other approaches (Gillham 2000: 13–14). This has similarities to what has been termed data triangulation (Denzin 1978; Fielding and Fielding 1986: 18–46). When differently sourced data converged to tell a similar story, it suggested that a clearer picture of a particular topic or issue had been developed, which increased confidence in the findings (see Fielding and Fielding 1986: 24–5; Gillham 2000: 13–14). Conversely, discrepancies between data and/or sources suggested the need for further research and analysis of events. Within this multi-method approach interviews from different stakeholders provided an important data source.

Interviews

During the course of this research more than 40 semi-structured

interviews were conducted across a broad range of stakeholders associated with TCNZ and Telstra. Interviewees included past and present managers and employees at TCNZ and Telstra, as well as managers of associated firms and subsidiaries. During interviews, particular attention was focused on decisions made by management in relation to organisational restructuring, downsizing, outsourcing and training. Many of the people interviewed were involved to some degree in the planning and/or implementation of these decisions.

When discussing interviews as a research technique, Gillham points out that what people say may not be what they actually do (2000: 13). Interviewees have their own personal beliefs and prejudices, which influence their perceptions of events and issues. Company loyalty may also induce managers to promote company doctrine and policies, while concerns over job security may limit their ability to speak freely. For example, former TCNZ and Telstra managers tended to be more critical of the policies of these firms than current employees. Because of this potential for bias, information from TCNZ and Telstra managers was compared and contrasted with that provided by union representatives. In relation to TCNZ these included interviews with past officials of the former Communications and Electrical Workers Union (CEWU); officials of the Engineering, Printing and Manufacturers' Union (EPMU); and discussions with executive members of the New Zealand Council of Trade Unions (CTU). The CTU helped to provide a macro perspective on events at TCNZ. With regard to Telstra, interviews were conducted with officials of the Communications, Electrical and Plumbers Union (CEPU) and the Community and Public Sector Union (CPSU). This strategy of interviewing both managers and union representatives was designed to balance the predisposition that each group had towards TCNZ and Telstra's strategies and issues. Interviews with different stakeholder groups also elicited additional explanations for strategies and events. Thus the interview data was compared and analysed across a broad range of participants.

Collecting data through interviews also creates the potential for bias on the part of the interviewer. For example, researchers may seek only those answers that agree with their original hypotheses. This 'self-fulfilling prophecy' problem may be reduced through the implementation of good operational definitions and research protocols (see de Vaus 2001: 83). This research project addressed this issue through setting guidelines for the interviewing process and related questions. The interview data was then collated and segmented through the NVIVO qualitative computer analysis program that provided a robust analysis of the results (discussed in further detail below).

Within these constraints the interviews provided a powerful tool to gain insights and perspectives at the firm level. Because it is a personal and interactive form of data collection interviews can be an effective method for eliciting information on sensitive topics (Crano

and Brewer 2002: 223). Most TCNZ and Telstra managers were more open to discussing sensitive issues on a one-on-one basis rather than providing written material. Some of these managers were interviewed on a regular basis over a number of years, which further increased trust. These interviews gave access to the insights and expertise of managers at an operational level.

Interviews also provided the contextual and circumstantial factors behind organisational decisions and brought variables and issues to light that were not previously apparent (see Hakim 2000: 36). This helped to explain why the firms acted in certain ways. For example, while TCNZ and Telstra's reports outlined specific changes to their organisational structures they did not adequately explain why these processes took place. Interviews then helped to explain many of the reasons behind these decisions. During interviews, many TCNZ and Telstra managers and union officials were also able to provide approximate numbers for workforce reductions in certain areas and sections. Thus they were able to segment the workforce. This information could then be compared with available secondary data.

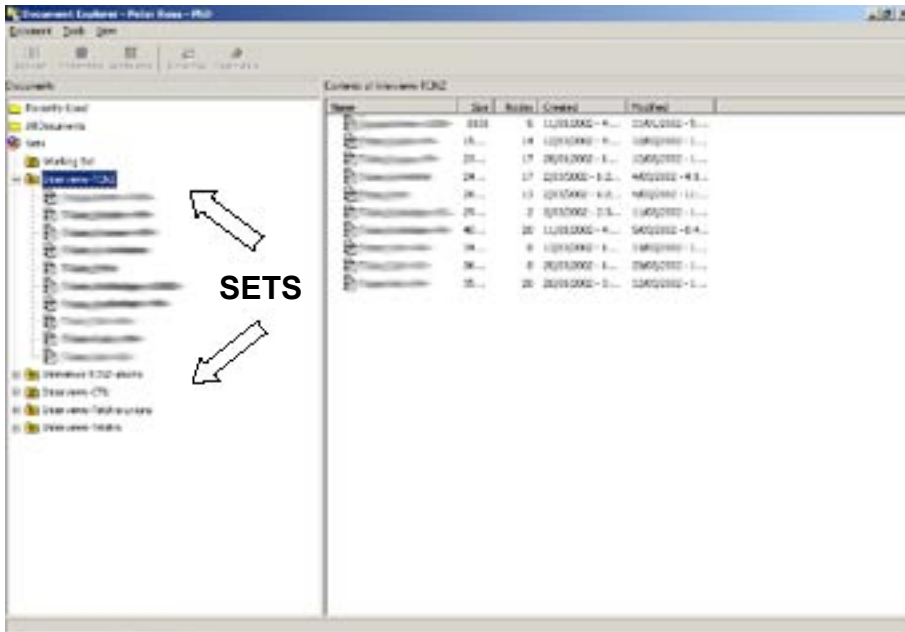
The ability of stakeholders to interpret this secondary data was an important research tool. For example, Telstra's annual and equal employment opportunity (EEO) reports showed a decrease in total employee numbers during the early 1990s. However, a former Telstra manager advised that during this period many former field workers were re-employed on a casual or atypical employment basis. These workers did not show up in the official figures. Thus while the published data was showing a reduction in the size of Telstra's workforce during this period, interviews suggested that this may not have been the case. This information was put to union officials who agreed that this situation had occurred. Thus interviews across a number of stakeholders helped to clarify discrepancies between data sources (see Hakim 2000: 36). The following section outlines how the CAQDAS program, NVIVO, assisted in the examination of this interview data.

*NVIVO*²

The NVIVO program is recognised as a leading computer based qualitative software system (see Richards 1999; Gibbs 2002). The system works by building and integrating documents into a data base. The data base developed for this project included the research project outline, records of interviews, field notes, memos, other internal documents and links to external documents. These documents were divided into five coordinated data sets that related to (1) TCNZ; (2) Unions at TCNZ; (3) CTU; (4) Telstra; and (5) Unions at Telstra. Thus documents that pertained to the same firm or union group were placed together in a logical format (see Figure 1). The NVIVO system then had the capacity to combine and compare data across these sets.

Interviews at these organisations elicited a number of common themes, ideas and concepts that related to the research questions.

Figure 1
Data Sets

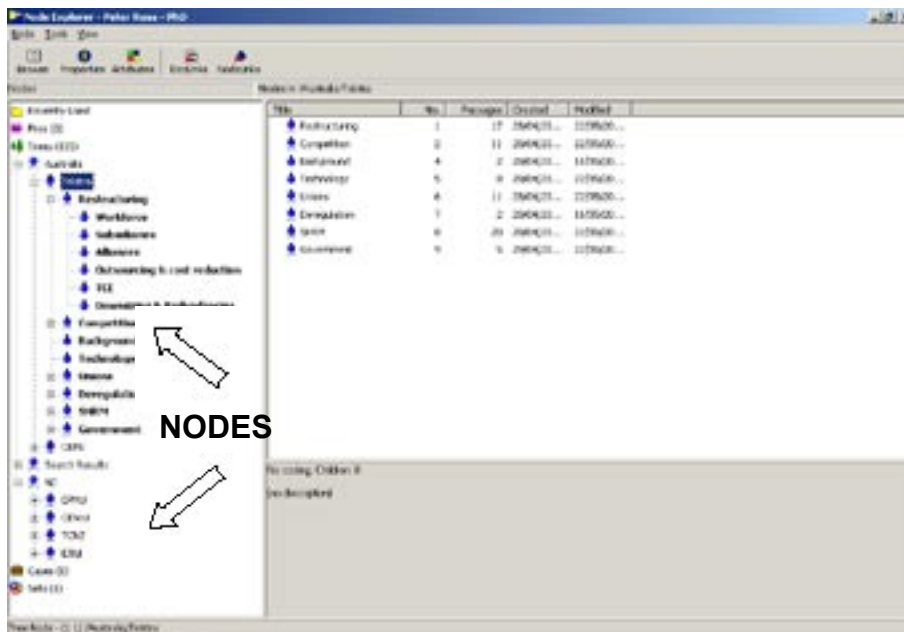


Note: Names of interviewees have been obscured to protect anonymity.

These themes were used to segment and code each document. Under the NVIVO system these various data segments are known as 'nodes'. The software system could then simultaneously retrieve these nodes from all the coded documents. For example, a request for the node 'outsourcing' simultaneously retrieved the separately coded segments of information on 'outsourcing' from all documents within that set.

The data could then be further segmented as required. Interview transcripts that pertained to managers at TCNZ were initially segmented under twelve headings that included the heading 'downsizing'. This downsizing information was then split into a number of subheadings that included themes such as 'redundancies', 'outsourcing' and 'transaction costs economics (TCE)'. This created a data tree with a hierarchy of different levels of information. By conducting a simple search operation for these nodes of information the computer could then display all the sections within the interview transcripts that related to these areas. Thus, themes were narrowed down to better focus on more specific areas. Over time a directory 'tree' of information was created, with a smaller number of general themes grouped together at the top of the tree and a larger number of more specific themes grouped at various levels along the tree structure. Thus the NVIVO program supported the development of a line of thought and/or methodology over time; that is, an inductive approach.

Figure 2
Nodes



Under this software system the length of the segments of coded information – or nodes – may be set at the researcher’s discretion. The data base for this project contained nodes that ranged in size from a single sentence to several paragraphs long. This made it relatively easy to retrieve and compare information on similar issues from different sources. For example, union responses to questions on particular issues, such as outsourcing and downsizing practices, could be quickly compared to management responses to similar questions. This research project also kept hard copies of the full interview transcripts together with the electronic formats located in the NVIVO computer data base. Reading the transcripts in full gave a well rounded overall analysis of the data that helped to elicit general themes. Meanwhile the segmented ‘nodes’ made it easier to: (1) compare the data across the various stakeholders; and (2) locate specific quotes and information. Therefore the NVIVO system worked well in conjunction with more traditional qualitative analysis techniques. This approach accords with the results of previous studies on CAQDAS supported research (Doolan and Ayland 2001; Welsh 2002).

Interview transcripts were linked to other internal and external documents. For example, while the interviews were taped, written notes were also made to record direct observations and other data. These notes included such things as body language and the way people responded to certain questions. Some interviewees also sketched

diagrams to help explain their replies, which were then kept. Under the NVIVO system this information could be linked to the interview documents in two ways. Firstly, data that could be typed was linked to the interview transcript as an internal 'memo'. The text of this internal memo was coded to form part of the above information tree. A search for specific coded information would then display the information from these internal memos along with the interview transcript material. Secondly, information that could not be typed was linked as an external document. In this case, an annotation was imbedded within the interview document file explaining the name of the external document and where it could be located.

External links were also made to other documents that were not in electronic format. For example, nodes were created that advised where newspaper clippings and journal articles were filed. The program also contained sophisticated search engines that could locate and simultaneously bring together phrases and/or words across documents. Thus this research project used the NVIVO functions to create a data base that was developed into a prime resource, which assisted in both the analysis of the data and the subsequent writing up of the findings.

Conclusion

This paper added to previous research showing that a qualitative approach can be well suited to the in-depth analysis of employment relations within firms. The multi-method approach used to analyse TCNZ and Telstra drew on a broad range of data from multiple sources. This data was rigorously analysed in conjunction with a CAQDAS package (NVIVO). This research found that CAQDAS programs can help to support a vigorous analysis of detailed and complex data. However, there were some caveats. Firstly, during the course of this research the original hard copies of the interview transcripts and other supporting data were also concurrently perused and analysed. Thus CAQDAS tools provided valuable support for this research, but did not replace the need for good traditional qualitative data analytic techniques. Secondly, while the NVIVO package is relatively 'user friendly', researchers still require a period of time in which to learn to effectively use the software. Lastly, qualitative analysis by its very nature requires a degree of interpretation on the part of the researcher. Thus while CAQDAS programs may assist researchers to analyse data, in the end it is up to the researcher(s) themselves to interpret it. Therefore researchers should consider utilising and combining the best features of manual and electronic methods (Welsh 2002: 4). It is hoped that future research in this area will provide more data on CAQDAS supported research studies, in what is emerging as an important and growing field of qualitative research.

Endnotes)

Notes

- 1 The term CAQDAS was first introduced by Lee and Fielding (1995), who used the term to describe their networking research project (Gibbs, Friese and Mangabeira 2002: 2).
- 2 The program was developed from earlier NUD.IST qualitative software programs. Therefore the full name for the program is NUD.IST VIVO; NVIVO for short (Gibbs 2002: xxii).

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