

C H A P T E R 5

RESEARCH METHODOLOGY

5.1. Basic approach : qualitative research

This study has attempted to utilise appropriately a qualitative research method. According to Patton (1980, p 327) "the purpose of qualitative analysis is to provide useful, meaningful and creditable answers to the research questions posed by the researcher".

Typically, qualitative data consist of detailed descriptions of situations, events, people, interactions and observed behaviours; direct quotations and excerpts from documents. Quantitative measurement relies upon the use of instruments that provide a standardised framework in order to limit data collection to certain predetermined response or analysis categories. Qualitative measures describe in depth people's experiences, situations and events (Merton, Coleman & Rossi, 1979, p 12; Bailey, 1982, pp 62-63).

Regarding its advantages, qualitative data are attractive. They are sources of well-grounded, rich descriptions and explanations of processes occurring in local contexts. With qualitative data one can preserve chronological flow, assess local causality and derive fruitful explanations. Furthermore,

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qualitative data are more likely to lead to serendipitous findings and to new theoretical integrations; they help researchers go beyond initial preconceptions and frameworks (Miles and Huberman, 1984; Patton, 1980; Van Maanen, 1983; Guba, 1979). The findings from qualitative studies have a quality of "undeniability" as Smith (1978) has put it.

However, the demands of conducting good qualitative research are not small. Qualitative measures are longer, more detailed and variable in content (Patton, 1980, p 28). Collecting data is a labour-intensive operation (often making it expensive), and field notes can take many months to complete a thoughtful analysis. Furthermore, the bulk of data collected makes it unlikely that a sample of more than a few dozen cases can be managed. So usually there is a serious question of sampling involved or otherwise stated, the generalisability of qualitatively derived findings. Also, given the fact that words are slippery and ambiguous, the possibility of researcher bias looms quite large. The replicability of qualitative analysis is a concern (Miles and Huberman, 1984, pp 15-16).

"The most serious and central difficulty in the use of qualitative data is that methods of analysis are not well formulated" (Miles, 1979, p 11).

Interestingly, more and more "quantitative" methodologists, operating from a logical positivist stance (for example Campbell, Bronfenbrenner,

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Croubach and Snow, 1982, p 28) are using naturalistic and phenomenological approaches to complement tests, surveys and structured interviews. On the other side, an increasing number of ethnographers and qualitative researchers are using predesigned conceptual frameworks and prestructured instrumentation, especially when dealing with more than one institution or community (Mishler, 1979).

So without our realising it very clearly, the paradigms for conducting social research have shifted beneath our feet, and most people now see the world with more ecumenical eyes.

It is important to note that this approach necessarily involves orderliness, thoroughness, and explicitness and therefore a certain degree of formalisation of the analysis process. This methodical and structured way could be seen in Miles and Huberman's (1984, p 20) approach to qualitative data analysis, which is briefly outlined in the following section.

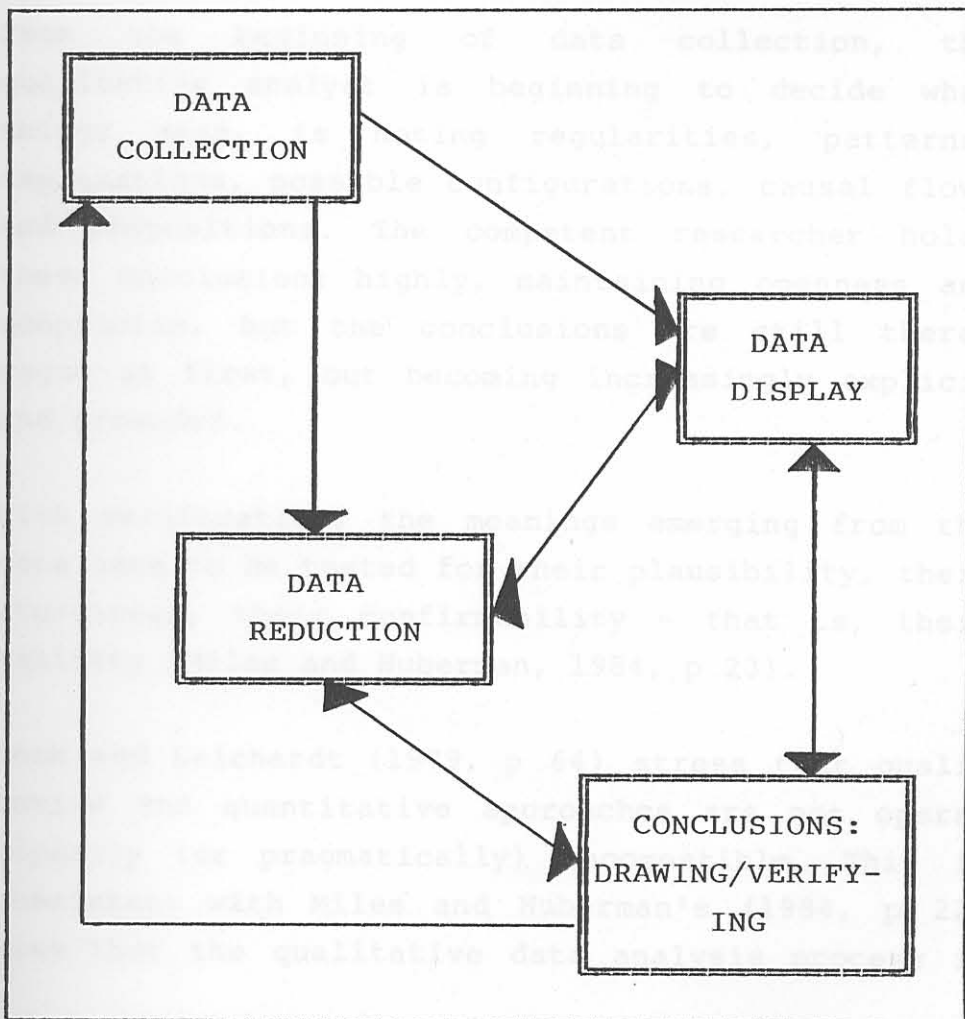
5.1.1 Miles and Huberman's qualitative data analysis approach

Their approach as seen in the following figure comprises mainly four components:

CONCLUSIONS:
DRAWING/VERIFYING

- (i) Data collection
- (ii) Data reduction
- (iii) Data display
- (iv) Conclusions and verification

FIGURE 5.1: Components of qualitative data analysis.



As already stated the data collected appears mainly in words rather than numbers and may have been collected in a variety of ways, for example, observation, interviews and extracts from documents. Data reduction refers to the process of selecting, focusing, simplifying, abstracting, and transforming the raw data that appear in written-up field notes; while data display refers to presenting information in a compressed, ordered, spatial format, so that the user can draw valid conclusions, and take the needed action (Miles and Huberman, 1984, p 22).

From the beginning of data collection, the qualitative analyst is beginning to decide what things mean, is noting regularities, patterns, explanations, possible configurations, causal flows and propositions. The competent researcher holds these conclusions highly, maintaining openness and scepticism, but the conclusions are still there, vague at first, but becoming increasingly explicit and grounded.

With verification, the meanings emerging from the data have to be tested for their plausibility, their sturdiness, their confirmability - that is, their validity (Miles and Huberman, 1984, p 23).

Cook and Reichardt (1979, p 64) stress that qualitative and quantitative approaches are not operationally (or pragmatically) incompatible. This is consistent with Miles and Huberman's (1984, p 22) view that the qualitative data analysis process is

actually no more complex, conceptually speaking, than the analysis modes used by quantitative researchers. They, too, must be preoccupied with data reduction (computing means, standard deviations, indexes), with display (correlation tables, regression printouts), and with conclusion drawing/verification (significance levels, experimental/control differences). The point they make is that these activities are carried out through well-defined, familiar methods, have canons guiding them, and are usually more sequential than iterative or cyclical. Qualitative researchers on the other hand, are in a more fluid and a more pioneering position.

5.2. Conceptual framework

Typically qualitative research involves a loosely structured, emergent, inductively grounded approach to gathering data. However, Miles and Huberman (1984, p 27) believe that when one is interested in some better understood social phenomena within a familiar setting, a loose, highly inductive design is a waste of time. Usually the researcher has a fairly good idea of the parts of the phenomenon that are not well understood and knows where to look for these things, - in which settings, within which processes or during what class of event.

Finally, the researcher usually has some initial ideas about how to gather the information - through interviews, observations, perhaps even a

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well-validated instrument. The abovementioned researchers as well as Patton (1980, p 28) suggest that from the outset, at least a rudimentary conceptual framework, a set of general research questions, some notions about sampling, and some initial data-gathering devices should exist.

Advantages of this method include the fact that the research

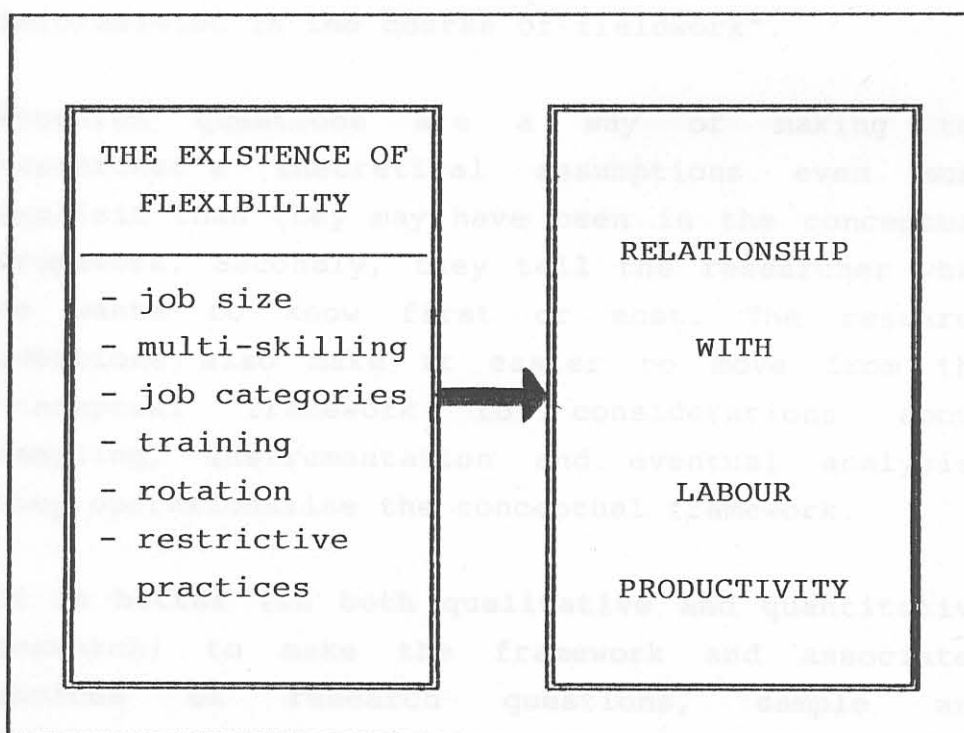
- can be completed over a shorter period of time,
- comparability across sites is improved,
- less information overload is experienced, and
- more in-depth site-sensitive information can be obtained (Miles & Huberman, 1984, p 29).

A conceptual framework basically explains, either graphically or in narrative form, the main dimensions to be studied - the key factors, or variables - and the presumed relationships among them.

Although these frameworks are focusing and bounding devices they need not be blinding and limiting. As qualitative researchers collect data, they revise their frameworks, make them more precise, replace empirically inefficient factors with more meaningful ones and reconstrue relationships.

In this study use was made of a very simple conceptual framework to map the territory being investigated.

FIGURE 5.2 : Conceptual framework of this study



As seen in the above figure the study was to focus on the existence of flexibility in the South African motor manufacturing industry as determined by certain indicators such as multi-skilling, rotation etc. Furthermore, the aim was to see whether there was any relationship between the existence of flexibility and the level of labour productivity.

5.3. Formulating research questions

According to Miles and Huberman (1984, p 35) this is a direct step from the elaboration of a conceptual framework, and represents the facets of an empirical domain that the researcher most wants to explore. "Research questions can be general or particular, descriptive or explanatory. They can be formulated at the outset or later on, and can be refined or reformulated in the course of fieldwork".

Research questions are a way of making the researcher's theoretical assumptions even more explicit than they may have been in the conceptual framework. Secondly, they tell the researcher what he wants to know first or most. The research questions also make it easier to move from the conceptual framework to considerations about sampling, instrumentation and eventual analysis; they operationalise the conceptual framework.

It is better (in both qualitative and quantitative research) to make the framework and associated choices of research questions, sample and instrumentation explicit, rather than pretending a sort of inductive purity, typical of qualitative social research (Miles & Huberman, 1984, p 36; Van Maanen, 1983, p 59; Krippendorff, 1980, p 26).

In this study two important research questions are considered:

- (i) To what extent does flexibility exist within the South African motor manufacturing industry, and
- (ii) is there any relationship between the extent to which flexibility exists and labour productivity.

5.4. Sampling

Sampling involves not only decisions about which people to observe or interview, but also about settings, events and social processes (Wright, 1979, p 57; Kerlinger, 1973, pp 117-118). Multiple-site studies also demand clear choices about which sites to include.

In this research the danger existed that one could sample too narrowly and therefore the total population was involved. In fact, the total population represented a whole industry.

For the purpose of this research it was decided to focus on the South African motor manufacturing industry. The main reason for the selection of this industry was the similarity with the companies where flexibility had been implemented, namely, Nissan (UK), British Leyland and Ford. The idea was therefore to determine whether flexibility existed in the South African motor manufacturing industry as it did in similar overseas companies and whether it

would have a similar impact. However, the most important reason for the selection of the South African motor manufacturing industry is because it is going through a very difficult but interesting period where some are achieving excellent results through the efficient utilisation of their people while others are struggling to place their relationships with their employees on a sound footing. A clear need for an investigation into the different results obtained through different approaches became apparent.

For comparative purposes the study focused on one department within all the companies, namely the trim and mechanical department which involves mainly assembly work. The primary responsibility of this department is to ensure that all the different parts which constitute a vehicle are fitted into the body shell up to a point where a complete unit is produced. This department constitutes the most labour-intensive department in the companies and involves short, routinised operations on a mechanised, moving line. The work is therefore physical and repetitive by nature, involving little variety. Walker and Guest (1952, p 12) in their study on the vehicle assembly line, described the characteristics of the average mass production job as follows:

- "mechanical pacing of work,
- repetitiveness,

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- minimum skill requirement,
- predetermination in the use of tools and techniques,
- minute subdivision of product worked on, and
- minimum mental attention required".

Due to the way the work is organised and because of the assembly line, workers are closely linked to each other; for example, an absent worker can influence a number of other workers. This is the same for a slow, new, untrained or an uncaring, irresponsible worker who fits parts incorrectly making the next workers' job more difficult. The workers are therefore highly interdependent on each other. This is why this type of department is ideal when studying the issue of flexibility.

The data was collected from two different sources, namely, the production and personnel directors at each company. By using two different sources the reliability and validity of the findings were enhanced.

5.5. Approach to the collection of data

The seven South African motor manufacturing companies were approached by way of a letter to their respective Chief Executive Officers, Chairmen or Managing Directors asking for their participation

in the research and their permission to visit their factories and speak to the production and personnel directors. They were assured of the confidentiality of the study. All the companies responded positively and interviews and tours were set up, which took place over a period of three months.

5.5.1. Instrumentation

There are both arguments for and against prior instrumentation in qualitative research. Miles and Huberman (1984, p 43) suggest that for an exploratory, descriptive study where the parameters are unknown, heavy front-end instrumentation is inappropriate. And with a confirmatory study, with relatively focused research questions and a well-bounded sample of persons, events or processes, well-structured instrument designs are the logical choice. They go further by saying that within a given study, there can be exploratory and confirmatory aspects that call for differential front-end structure. Also a multiple-site study requires more front-end preparation, for example, standardised instruments, so that findings could be laid side by side during analysis and cross-site comparisons made.

Minimal prior instrumentation puts the emphasis on construct and contextual validity, where qualitative studies can be especially strong. The heavy prior instrumentation emphasises internal validity, generalisability and manageability, all worthy causes. However, the amount and type of instrumentation should be a function of one's conceptual focus, research questions and sampling criteria (Blackler & Brown, 1978, p 50).

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Based on the particular aims of this research two approaches to the collection of data were selected, a semi-structured and an unstructured approach.

In the absence of a well-developed, valid and reliable questionnaire regarding flexibility, a rather simple interview guide was developed to determine whether flexibility existed in the South African motor manufacturing industry.

This interview guide (see Annexure 1) comprised the semi-structured approach while the unstructured approach mainly involved the observations made during a tour through the trim and mechanical department.

The questions in the interview guide were derived from the literature, and more specifically, from the chapter on flexibility in Wickens' book (1989, pp 39 - 54), and as covered in this dissertation's literature review (see Chapter 4 pp 61 - 66). By considering what was done to enhance flexibility in Nissan (UK) questions were formulated that would indicate whether flexibility existed within the departments of the companies researched.

The relationship factor, namely, labour productivity, was selected based on the results of flexibility as recorded in all available literature on flexibility.

In designing the interview guide the following features as stressed by Patton (1980, p 200) and Miles and Huberman (1984, p 46) are important:

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- (i) It must be a guide not a schedule, and must have latitude for asking and sequencing the questions and to segment them appropriately for different respondents.
- (ii) The guide must be developed after initial fieldwork (to clarify context), has been done, but prior to deeper and broader data collection (therefore tested before used).
- (iii) The guide must be a way of ensuring that the minimum data is collected from the respondents and must provide some basis of reliable and valid comparison between the respondents from which certain patterns, correlations, and deductions could be made.

In designing the interview guide the purpose was therefore not to create an absolutely valid and reliable questionnaire that would withstand any test on either. According to Miles and Huberman (1984, p 46) the issues of instrument validity and reliability in qualitative research relies largely on the skills of the researcher. The latter was interviewing, observing and recording, while modifying these from one field trip to the next.

Regarding the question of how valid and reliable the researcher is likely to be as an information-gathering instrument, the following can be regarded as the researcher's best investment:

- (i) Some familiarity with the phenomenon and the setting under study,
- (ii) strong conceptual interests,

- (iii) a multi-disciplinary approach, as opposed to a narrow grounding or focus in a single discipline, and
- (iv) good investigative skills, including the ability to draw people out, and the ability to ward off premature closure (Miles & Huberman, 1984, p 47; Patton, 1980, p 260; Van Maanen, 1983, p 58).

5.5.2 Data collection

With the aid of the abovementioned guide the production and personnel directors at each company were interviewed separately. Where either person was not available the manager(s) just below these levels were interviewed. The interviewees were briefly informed about the purpose of the interview and the background to the research.

Throughout the interview the confidential nature of the information was emphasised. The assurance was given that under no circumstances would the companies be referred to by name in the final report, but that a coded format would be used.

In the semi-structured interviews that followed any misinterpretations on the part of the interviewee were clarified. Due to the open-ended, in-depth, intensive interviewing approach followed, much other valuable information came to the fore during the interview. This information added richness, quality and even explanations to the study.

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The tours through the trim and mechanical departments in the company of the production directors presented a further opportunity to observe and question the existing work practices, to get a better understanding of the complexities of the situation and to verify the information obtained during the interview. This information complemented and extended data collected during the interview.

Detailed notes were taken throughout the interviews as well as during the tour of the departments. After the visits the observations and impressions were summarised.

It is accepted that the reliability of the responses during the interview can be questioned as well as the notes taken, seeing that it did not take place in a controlled environment. However, everything possible was done to record and reflect accurately the true responses and situation.

Furthermore, by having interviews with people from different functions within the same company, namely, production and personnel, very interesting perspectives were obtained giving a more detailed scenario. Although the production director was the main source of information (due to his first-hand experience of work practices in his trim and mechanical department), the personnel director could enrich and verify the information and was more able to provide the information pertaining to, for example, job categories and training. The result was that, in fact, each company's data was produced and verified by two knowledgeable respondents thereby improving the validity and reliability of the findings.

5.6. Data analysis

According to Patton (1980, p 297) there is typically not a precise point at which data collection ends and analysis begins. The first step of analysis involved converting the field notes into logical detailed reports which took on the format of a table. In so doing the field notes, which contained only half of the actual content, were improved considerably by adding the missing content, as well as the researchers' reflections and commentary on issues that emerged during the process.

Seeing that seven sites or companies were studied it was decided to cross-site analyse the data, of which the aim was to increase generalisability and to determine the kinds of social structures to which a theory or sub-theory would be applicable.

Although there are no agreed-upon data display methods, and analysts are encouraged to invent their own, it was found on reviewing the data, that the site-ordered descriptive matrix of Miles and Huberman (1984, pp 158 - 165) would be a functional method that would provide valid answers to the questions asked.

Miles and Huberman (1984, p 160) describe this matrix as one that "contains first-level descriptive data from all sites, but the sites are ordered according to the main variable being examined, so that one can see the difference among high, medium and low sites. Thus it puts in one place the basic data for a major variable, across all sites".

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The first step in building the first detailed report was to place the companies in order of labour productivity levels, ranging from the company with the highest labour productivity, to the company with the lowest labour productivity.

Seeing that labour productivity figures were not available from any independent institution such as the National Productivity Institute (NPI) or the National Association of Automobile Manufacturers of South Africa (NAAMSA), the figures were obtained from the interviewees and the following formula was used to determine the labour productivity for the individual companies:

Labour productivity=

$$\frac{\text{Average no. of cars produced per day}}{\text{No. of operators in the trim and mech. dept.}} \times \frac{100}{1}$$

The term, "cars" in the above formula, refers to passenger vehicles and therefore excludes light and heavy commercial vehicles. Jobs in truck assembly, for example, differ considerably from their equivalents in car assembly. Cycle times are much longer, mechanical pacing is much less and each vehicle is different in line with customer requirements. Truck assembly is therefore more enriched than car assembly under normal circumstances. Regarding the number of operators only direct operators in the trim and mechanical departments were taken into consideration. Indirect operators as well as operators in other departments were excluded. For comparative purposes both the number of cars and the number of operators reflect average figures taken over a period of a year.

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The average number of cars produced per day greatly varied from company to company. All companies strove to produce the highest quality and volume of vehicles possible.

Because of the confidentiality of the study and especially the sensitivity regarding the number of cars produced by the different companies the researcher agreed not to reveal this information.

After the interview guide and the detailed report had been read carefully the flexibility indicators were selected and the information systematically arranged into these categories.

Having done this the detailed report was refined again, because it appeared that the information had been abstracted too much and valuable, rich information was lumped together too grossly into categories. More categories were decided on and the raw data summarised into brief phrases, sentences and direct quotes. These were put into the various categories with the emphasis being placed on not losing rich information. This second detailed report was reviewed again and the inputs checked against the original field notes. When working through successive iterations the findings became conceptually crisper and more inclusive. (The second detailed report is included in Annexure 2.) To ensure that companies remained unidentifiable certain data had to be withheld from the detailed report in Annexure 2. This was, however, done in such a manner that the final results were not influenced in any way.

The next step was to construct a summarised report which would be in a more refined format for the reader. This report gives the reader a readily accessible overview of the detailed report, the existence of flexibility, and secondly, the relationship between flexibility and labour productivity across all the companies. (See full summarised report in Annexure 3 and sections of report in Chapter 6.)

In creating this summarised report, which is more focused and simplified, the researcher was forced to decide on the conceptual basis of the decision rules. Since Miles and Huberman (1984, p 164) stress that the decision rules for data transformation and entry must be explicit, the decision rules are given below:

- (i) Companies were ordered again according to their labour productivity levels - from highest to lowest.
- (ii) Where numbers, percentages or "Yes/No" answers were given these were used; therefore the shortest possible reflection was used.
- (iii) Where the answer given was definite yet did not reflect the full picture or was not a true reflection or where the information was uncertain and needed further qualification, the data was put into brackets.
- (iv) Detailed information that was interesting but not crucial was omitted.
- (v) Information was described in such a way that

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patterns could be seen for the three different categories, and would eventually give rise to the emergence of possible explanations.

From the summarised report it became possible to see patterns for higher and lower labour productivity and explanations regarding flexibility began to emerge. The report required well-grounded data from the companies and did not allow vagueness or premature abstraction to occur.

There is a direct link between the interview guide used to collect the raw data and the rows in the matrix. As far as possible raw data was kept without running into excessive size or complexity. Naturally, valid ordering (which was not difficult in this study) is crucial to the use of this method.

In this study the interest lay in the ramifications of two variables, and since the labour productivity variable was a well-known, simple, quantitative variable and was easily ordered, a second variable was chosen, namely, the relatively unknown flexibility variable. Not only could the extent to which flexibility exists be determined but also whether labour productivity is related to the existence of flexibility, by using indicators of the existence of flexibility. This produced a very rich report allowing many patterns to come forward. This would not have been possible had the only aim of the research been to determine whether a statistically significant correlation at the 0,05 and 0,01 level between flexibility and labour productivity existed. However, by making use of qualitative methodology it was possible not only to identify clear and meaningful patterns indicating where associations do

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exist, but also to explain and expand on the data collected and analysed. This would not have been achievable with a quantitative technique. (The nature of the research subject and the variations in ranges as seen in the results, causes a quantitative technique such as the Spearman rank-order coefficient of correlation to be less applicable.)

The qualitative method of site-ordered descriptive matrix is therefore very useful when studying the relationship between two variables thought to be associated, but where the direction of causality is unknown or ambiguous.