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UNIVERSITY OF LONDON

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CAREERS, COMMITMENT AND WORK INVOLVEMENT;

A study of work and career attitudes amongst professional engineers.

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Submitted for the degree of
Philosophie Doctor,

August 1979.

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ABSTRACT

This thesis tries to explain variations in the work involvement of a group of professional engineers. Focusing upon the influence of the work career, a circular model of career development is suggested, in which achievements in career status affect feelings of career success, enhance work involvement, and thus further influence career status. The implications of this process for occupational behaviour are also considered, and hypotheses suggested regarding a person's commitment to their work activities.

Empirical study is undertaken involving a questionnaire survey of 194 professional engineers in six British companies, supplemented by a questionnaire survey of 128 engineering undergraduates. Within the limitations of this cross-sectional data, the results largely confirm the consistency of the proposed hypotheses.

Two facets of work involvement are distinguished: work effort and work centrality. While the origins of the latter seem to lie outside the workplace, the former appears to be strongly influenced by the engineer's job satisfaction and feelings of career success. Analysis indicates the subjective interpretation of career status on which feelings of career success depend, with the motivation to compete for higher career status deriving both from aspects of socialisation and from the experience of success itself, this latter illustrating its self-reinforcing component.

However analysis of the engineers' commitment to their current department, company, branch, and occupation does not fully support the hypotheses; possibly, it is suggested, because of the diversity of strategies which may be employed in pursuing career aims.

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LIST OF ABBREVIATIONS

ACAS	Advisory, Conciliation and Arbitration Service.
AEUW-TASS	Amalgamated Union of Engineering Workers: Technical, Administrative & Supervisory Section.
APST	Association of Scientific, Technical & Managerial Staffs.
BIM	British Institute of Management.
CEI	Council of Engineering Institions.
C. Eng.	Chartered Engineer.
CPC	Conservative Political Centre.
CSEU	Confederation of Shipbuilding & Engineering Unions.
CSO	Central Statistical Office.
CSU	Central Services Unit for Careers and Appointments Services.
DoI	Department of Industry.
EEC	European Economic Community.
EEF	Engineering Employers Federation.
EITB	Engineering Industry Training Board.
EMA	Engineers' and Managers' Association.
ESQ*	Engineer Survey Questionnaire.
HMSO	Her Majesty's Stationary Office.
ICE	Institution of Civil Engineers.
IEE	Institution of Electrical Engineers.
IME	Institution of Mechanical Engineers.
IPCS	Institution of Professional Civil Servants.
MIT	Massachusetts Institute of Technology.
NALGO	National & Local Government Officers' Association.
NEDO	National Economic Development Office.
PCS*	Psychological Career Success.
R & D	Research and development.
RD & D	Research, design and development.
SIMA	Steel Industry Management Association.
SSQ*	Student Survey Questionnaire.
TUC	Trades Union Congress.
UKAPE	United Kingdom Association of Professional Engineers.

(* These abbreviations are peculiar to the thesis.)

AKNOWLEDGEMENTS

I would like to thank Mr. Arthur Francis of the Department of Social & Economic Studies, Imperial College, for his valuable assistance in supervising this research, and the other members of the Department for their comments and help over the course of the project. I am also grateful to Mr. Terry Robbins, Secretary of the Institution of Mechanical Engineers, for furnishing introductions to a number of industrial companies, and to the men in the six organisations of the Engineer Survey who helped arrange the fieldwork in each. Most of all, I am indebted to the 194 anonymous engineers who took the time and trouble to complete the lengthy questionnaires that were sent out: without them the following would not be possible.

CHAPTER ONE

INTRODUCTION

> Work abolishes those three great evils:
> boredom, vice and poverty.
>
> Voltaire; Candide.

Paid work is the main time consuming activity of most men and a large proportion of women in this country under the age of retirement. Through the simple consumption of their waking hours, it dominates the structure of their lives. However the experience which different people have of work may vary considerably: some may find work the most satisfying and interesting of their activities, others as the most irksome; some may work long hours of unpaid overtime, while others race from their place of work the minute 'time' is sounded. The purpose of this thesis is to try and explain such differences in the work involvement of a particular occupational sample; for a sample, in fact, of professional engineers.

In Britian, most professional engineers are employed within large organisations of one kind or another, in many cases fulfilling key roles in these enterprises. Variations in the work involvement of such employees may therefore have considerable organisational implications, and an understanding of their origins thus be of some value.

Although systemmatic analysis of this effect is rather limited, several recent studies in Britian (Sofer, 1970) and the U.S.A. (McKelvey & Sekaran, 1977; Ritti, 1971) have suggested that aspects of the work career exert a large influence over the current work experiences of professional engineers. Attention in this present study is thus directed towards a more rigorous investigation of the relationships between the careers of engineers and their level of work involvement. This follows the suggestion of Van Maanen (1977), in a recent book of readings on organisational careers, that:

> To develop an empathetic understanding of the individual, we must have some idea of the person's experienced past and anticipated future. More specifically, to grasp certain situationally-denoted constructs such as 'work involvement' or 'job satisfaction', we must view people within their careers - a context that explicitly directs attention towards the changing patterns of involvement or satisfaction. (Van Maanen, 1977:3)

Extending a theory of "career subidentity development" suggested by Hall (1971), a general Career Development Model is postulated, with the level of work involvement representing one aspect in the development process. The two main hypotheses incorporated into this model are, very roughly, that engineers will feel more successful to the extent that certain important career goals are achieved, and that this subjective sense of career success exerts a strong influence over their level of work involvement.

It is also postulated that this relationship between work involvement and developments in the career will have

broader implications for certain aspects of labour market behaviour. Consideration is given to the commitments of the engineers to their present lines of work activity, and a Commitment Model suggested, relating attributes of their careers and their level of work involvement with these commitments.

Like other professional, managerial, and similarly prestigious white-collar groups, in general professional engineers are likely to portray a fairly high level of involvement in their work. Without undertaking inter-occupational analysis however the reasons for this overall level cannot be assessed, since only intra-occupational variations may be accounted for in a study of one occupation. Nevertheless, this concentration does enable specific intra-occupational effects to be studied without inference from wider occupationally-derived variations in work involvement; it is also a concentration which greatly facilitates the conduct of empirical research.

The hypotheses, in fact, are assessed using data from two empirical studies. Most of the analysis is based upon a questionnaire survey of 194 professional engineers employed in six British engineering organisations, refered to in the thesis as the Engineer Survey. This is supplemented where appropriate by data from a questionnaire survey of 128 final year engineering undergraduates at Imperial College, London, refered to as the Student Survey. Results from a small survey of 40 Total Technology students, also at Imperial College, are additionally used on occassions.

The thesis is divided into two parts. Part I reviews the relevant literature and outlines a number of hypotheses for testing. Part II reports the empirical analysis of the Career Development and Commitment Models.

Part I is composed of four chapters. Chapter 2 takes a wide brief and examines possible sources of variation in work involvement, as suggested both directly, by writers dealing with this specific concept, or indirectly, by those considering other facets of the subjective experience of work. Chapter 3 looks at the ways careers have been studied by different authors and, following Hall's schemata, a career-based model of work involvement is proposed. By considering the social context in which career attitudes arise, this is extended to provide a general Career Development Model. Chapter 4 then examines the concept of commitment and suggests how this will be influenced by work involvement and factors related to the work career. Chapter 5 concludes Part I by considering the general context of the engineering profession in which the study was set.

Part II presents the empirical analysis, reporting and discussing the research used to assess the Career Development and Commitment Models. Chapter 6 describes the research strategy, method, and general conduct of the surveys. This is followed in Chapter 7 by the first of the main analytical chapters, commencing with a discussion of the methodology adopted, before examining directly the factors related to variations in work involvement in the Engineer Survey. Chapter 8 looks at

the factors influencing the engineers' feelings of career success in the light of the hypotheses, with Chapter 9 completing the analysis of the remaining facets of the Career Development Model. Chapter 10 draws these results together, considering circular developments in the model with increasing age. Chapter 11 then turns to consider the Commitment Model and the influence of the level of work involvement and the engineers' careers on their commitment to their present department, employing organisation, branch of engineering, and to the occupation in general. Chapter 12 rounds off the thesis by summarising the main findings and discusses some of their implications for the organisational employment of professional engineers.

PART ONE

THEORETICAL BACKGROUND

CHAPTER TWO

A FRAMEWORK FOR THE STUDY OF WORK INVOLVEMENT

> I like work; it fascinates me. I can sit and look at it for hours. I love to keep it by me: the idea of getting rid of it nearly breaks my heart.
>
> Jerome K. Jerome;
> 'Three men in a boat'.

2.1 Introduction

This thesis investigates the variations in work involvement of a particular occupational group, seeking to explain why some people are more involved in their work than others. In itself however the actual concept of work involvement has not been well formulated by sociologists. A number of writers have employed the notion of "job involvement" (eg, Lodahl & Kejner, 1965; Patchen, 1970) to refer to the extent that a person is involved in a particular job. Some, in a very different sociological tradition, have used the idea of "alienation" to describe various aspects of the 'separation' between a person and facets of their work, rather in a sense that is the converse of work involvement (eg, Blauner, 1964; Marx, 1973). However since professional occupations are probably the least alienated of groups in our society, this concept does not seem to have much discriminating value for the present study. A few other authors have used the notion of work involvement directly, but offer little

conceptual clarification (eg, Bailyn, 1977; Pym, 1969).

The concept of work involvement taken for the purposes of this thesis follows closely that of "job involvement", and is discussed in detail in Section 2.3 below. However while the latter refers to involvement in a current job, work involvement is concerned with a more general involvement in work irrespective of the particular job. In the course of their lives, people engage in a variety of "social roles", which contribute to their sense of personal identity, the "work role" representing one of these[1]. Conceptually, the notion of work involvement can be taken as the extensiveness of a person's work role, although it is not concerned with the detailed nature of that role (cf. Hall,1976:30). As such,work involvement is an important'summary' parameter, giving some coherence to the various expressions of affection, identification, importance, participation, etc, connected with the experience of work. By understanding a person's work involvement, a variety of other attitudes and behaviour may thus become more explicable.

Nevertheless, work involvement represents only one particular facet of the "subjective experience of work" which sociologists and others have employed in investigating

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1. The concept of "role" derives from the theatrical analogy, although it's use in practice is not unambiguous (eg, Jackson, 1972:3-6). Banton (1965:29) defines it as "a set of norms and expectations applied to the incumbent of a particular position", although goes on to suggest that "a psychological approach is likely to concentrate upon how these ideas are held by individuals. The structural approach traces the way the sharing of norms and expectations creates networks of rights and obligations". The former usage is the sense of "work role" employed here, although in the following section two facets are considered: the 'structure of the work role', and the 'orientations to the work role', together with the subjective experiences associated with the work role.

an individual's experiences of work. As Parker (1967) outlines, other such concepts include job satisfaction, alienation, motivation, orientation, and a variety of assorted work attitudes. Since research investigating the specific concept of work involvement has been rather limited, this chapter commences with a wide brief and considers the types of factors which have been found to influence any of these other facets of the subjective experience of work. In this way, a comprehensive conceptual framework may be established for the subsequent study of the determinants of work involvement. The inter-relationships between these various other parameters may not necessarily be strong, but insofar as they each reflect a particular facet of the subjective experience of work, then factors found to influence any one might reasonably be subsumed within a general framework of <u>possible</u> determinants of the level of work involvement.

The approach taken in the first part of this chapter will thus be to try and identify the main sources of variation in the subjective experience of work, and hence, by inference, the sources of variation in work involvement. The concern is to try and isolate major types of factors, not with examining substantive details of them. Clearly many of these will be inter-related, making causality inferences from observed associations problematic. These however are the consideration of later chapters. This present is concerned only with establishing a framework of sources of variation in work involvement and not with the detailed nature of inter-relationships.

2.2 Sources of variation in the subjective experience of work:

There is no shortage of sociological research identifying factors related to differences in the subjective experience of work. As Krause (1971:34) suggests:

> From the individual's point of view, the meaning of work is constructed out of past experiences, present aims, expectations of the future, and those factors in the social situation which support or oppose him in his lifetime search for meaningful work.

The difficulty is in presenting these factors in some general substantive framework from which the relative importance of particular variables may be assessed.

Probably the one factor that first comes to mind as a source of variation in work experiences is a person's occupation. It is natural to suppose a surgeon will have a different experience of work to a dustman, a concert pianist to a tax inspector, although it is less obvious for a plumber and a lathe operator, and not at all obvious for a doctor and a dentist. Nevertheless the plethora of occupational studies that have been reported, indicate that such categories do provide a useful basis for organising groups of workers of broadly similar work experiences (eg, Blauner,1964; Fraser, 1967,1968; Weir, 1973).

For instance it is typically observed that unskilled manual workers are uninvolved in their work, have rather low job satisfaction, portray an instrumental orientation, and represent the most alienated group of workers; skilled craftsmen on the other hand may have a greater intrinsic work motivation and derive a sense of satisfaction and self-respect from their work; professional and managerial groups are typically highly involved and satisfied in their work, have an intrinsic work motivation (particularly the former), with work representing an important part of their lives; other white-collar groups may have a work experience somewhat in between these cases (eg, Parker, 1967).

However while it is clear that a person's occupation may be linked with their experience of work, occupational categories per se do not provide a particularly good basis for examining variations in the subjective experience of work. For one thing, it is not apparent how much variation exists within a single occupational category and to what extent the above descriptions are gross over-generalisations. For another, there is the problem of how to categorise occupational groups. Occupations can be distinguished from each other on a whole range of dimensions, some of which may be important factors influencing the experience of work, some of which may not. Such dimensions may also vary internally within the occupation and account for intra-occupational differences in the experience of work. If analysis is to progress beyond simply listing discrete occupations

and their associated work experiences, then some basis must be chosen for categorisation. There is thus a need to go beyond occupational categories and examine what precise attributes of occupational groups are responsible for differences in their work experiences.

In fact, the above descriptions of different groups implicitly uses occupational status as a basis of categorisation, a parameter which alone represents a major source of variation in work experiences per se (eg, Blauner, 1960). Crudely, those at the bottom of the status pyramid, the unskilled and semi-skilled workers, have little work involvement, low job satisfaction, are most alienated, and work largely for instrumental motives; at the top, professional and managerial workers are typically highly involved, more satisfied, and more influenced by intrinsic motives; occupations of intermediate status range, with some flexibility, between these extremes.

However, although occupational status is clearly one important factor associated with differences in the subjective experience of work, causality may not be uni-directional. For instance, the nature of the work experience may be one attribute upon which occupational status is based, and both may be related to the level of pay; indeed, the level of such extrinsic rewards may accordingly have motivational implications which affect the work performance (eg, Lawler, 1973:112-147). Certainly, the relationship between work experiences and occupational status does not appear simple, and certain high status groups may be identified bearing the work experiences of lower status occupations and vice versa,

(eg, Oppenheimer, 1973). As such, characteristics other than occupational status need consideration in this regard.

Closely related to an occupation's status, of course, is its position in the class structure. Although this issue is complex, particularly when arguing directions of causality, it does appear that an occupation's position within the productive system (eg, Marx, 1973), or within some general system of authority relations (eg, Dahrendorf, 1959), or its relative position within some wider bargaining framework (eg, Johnson, 1977) may be various expressions, perhaps arguably definitions of, this class position, which have significant implications for the subjective experiences of work.

In more general terms in fact it seems possible to distinguish occupational groups by a number of structural attributes at two distinct levels. On the one hand there are characteristics of the wider social, political, and economic organisation of the occupation, and on the other there are the lower level attributes of a particular work task and immediate organisational environment. These may conveniently be termed "occupational" and "organisational" factors respectively, together providing a specification of the structure of a particular work role (cf. Jackson,1972:3-6).

The effect of "occupational" factors on the subjective experience of work may take various forms. For instance, "occupational communities" (eg, Salaman,1971)

may develop within a traditional environment of one dominant occupation and a tightly knit and proximate social community, which give distinctive meanings and significance to work. Dockers (eg, Hill,1976) and miners (eg, Dennis et al,1956) are examples of such occupational groups. More widely, certain "occupational ideologies" (eg, Mack,1957) may be developed due to a variety of institutional or informal mechanisms which strongly colour the work experience. The professional socialisation of doctors, for example, may be brought about by the qualification procedures which they must undergo, and be backed up by a strong central organising body (eg, Becker et al,1961; Merton et al,1957); the distinctive conception of work held by jazz musicians some time ago in America appeared to be sustained by informal social pressure based upon colleague recognition (Becker, 1963:79-119).

Economic factors may also influence a person's experience of work. A national depression may make people thankful for any job they have (eg, Hall & Mansfield,1971); specialist qualifications may make some highly dependent upon one occupation, perhaps one employer, and condition their thinking about work according to the nature of that occupation or employer (eg, Becker & Carper,1956; Hall et al,1970).

A variety of 'structural' attributes may thus be identified which characterise a particular work role at the wider'occupational' level. Their influence on the experience of work may take various forms, although from

the examples cited, it is apparent that one of the more important is through facilitating a normative framework which influences people's conceptions of their work. This is discussed again a little later.

At the lower level of the work situation, the effect of various "organisational" factors on the subjective experience of work has received quite substantial study. Using a categorisation similar to that suggested by Homans (1950), it is possible to classify attributes of the work situation in terms of 'task characteristics', 'the work organisation', and 'the nature of social interaction'. The research literature indicates how each of these attributes has some influence on the experience of work.

The effects of such task characteristics as job autonomy, complexity, challenge, and variety on certain work experiences have been studied by a number of researchers (eg, Hackman & Lawler,1971;Lawler & Hall,1970; Turner & Lawrence, 1965), providing some general indication that the individual's perception of such characteristics has a stronger influence over work experiences than has some 'objective' measurement.

The influence on work experiences of aspects of the work organisation, such as: the degree of centralisation and bureaucratisation (eg, Aiken & Hage,1966); the nature of hierarchical control (eg, Tannenbaum,et al,1974);and the type of supervision and leadership styles (eg, Fiedler, 1967; Fleishman & Harris, 1962; Lewin et al, 1939), are also well documented.

Aspects of social interaction within the workplace have received attention from a number of writers, especially those in the Human Relations and Socio-technical schools, emphasising the normative controls of primary work-groups and the fact that social participation at work can offer a significance to the job beyond that related to the work task (eg, Miller & Rice,1967; Roethlisberger & Dickson,1939; Trist et al,1963).

In addition to these three 'dimensions' of the work situation, its "technology" may be found to influence the subjective experience of work (eg, Blauner,1964; Woodward, 1965), although conceptually this effect may be thought of as mediated by these three dimensions. The determination of them by the "technology" may be greater or lesser in different cases, but in general is likely to be only partial.

The 'structure of the work role' may thus be specified in terms of a number of workplace or "organisational" factors, together with a number of broader "occupational" factors (which might include any at a "societal" level too), These may each be taken as major sources of variation in the subjective experience of work.

However this experience is not only affected by the 'structure of the work role', but by the definition of that role given by its occupant. For instance, Lieberman (1956) has illustrated the effect of role structure in a study of industrial workers: labourers, on being promoted to foremen, shifted certain work attitudes closer to those held by existing foremen, although on subsequent demotion reverted back to the attitudes which they had previously held as labourers. However, in contrast,

Boggs (1963) has shown that in a group of laboratory workers he studied, men doing essentially identical jobs held very different attitudes about the significance of their work, depending upon their social background and former work experiences.

Goldthorpe et al (1968) in their 'Affluent Worker' studies emphasised the actor's prior orientation to work as a critical factor influencing work experiences. Following the subjectivist traditions of Meade (1934) and others (eg, Berger & Luckman, 1967), they developed an "action frame of reference". As Daniel (1969: 366) explains:

> The action approach stresses the concept of orientation to work; ie the actor's definition of the work situation in terms of the expectations and needs he brings to it as a result of his socialisation outside the particular working environment.

Such prior orientations to work may in fact arise from a whole variety of sources. Various personal characteristics such as age (eg, Super, 1957), sex (eg, Rapoport & Rapoport, 1971), family and financial commitments (eg, Becker, 1960), children's education (eg, Pahl & Pahl, 1971), leisure and social involvements (eg, Rapoport & Rapoport, 1975), and various "inherent personality factors" (eg, McClelland, 1967) may all have a bearing on the way in which a person approaches work. In addition, aspects of previous socialisation experiences connected, for example, with specific educational or social class backgrounds (eg, Miller & Wagner, 1971: Wilensky & Edwards, 1959), may also influence these current orientations. Such attributes of the

past social experiences and present characteristics might conveniently be labelled "personal factors", which give rise to differences in work orientations and hence to differences in the subjective experience of work.

In distinguishing prior orientations from the structure of the work role, explicit recognition is given to the normative basis of work experiences. At an occupational level it has already been suggested that various structural attributes may facilitate such a normative basis, thus giving rise to differences in the subjective experience of work. In fact such normative factors may operate at a number of levels. The influence of primary groups on norms within the workplace represents one way in which social interaction affects the experience of work (eg, Roethlisberger & Dickson,1939); the influence of occupational communities, and various kinds of formal and informal occupational organisations may facilitate a normative framework at a broader level. In fact normative and 'cultural' differences between countries, or between the same country at different periods of time, may foster differences in the conception of work and accompanying experiences, irrespective of characteristics in the structure of the work role (eg, Gallie, 1978; Tilger,1930).

While the concept of prior orientations used by Goldthorpe et al (1968) is theoretically able to recognise these normative factors, as well as the various "personal factors" suggested above, their

argument that orientations will arise principly from social experiences outside of the workplace seems unnecessarily restricted. Certainly it does seem important to recognise that the experience of work will depend upon more than just the structure of the work role; it will depend also upon the subjective definitions with which a person confronts that role. However these orientations may just as easily arise from socialisation experiences within the workplace as from those outside it.

The effect which past work experiences have on a person's present work experiences and present orientations has not received a great deal of study. Some illustration of this effect is given by by Wilensky & Edwards (1959) and argued theoretically by Blau (1956). Since it will be a major concern of this thesis to examine this effect in more detail, further discussion is suspended until later. The various aspects of work history and socialisation experiences connected with past jobs may simply be refered to as "career factors" within the present framework.

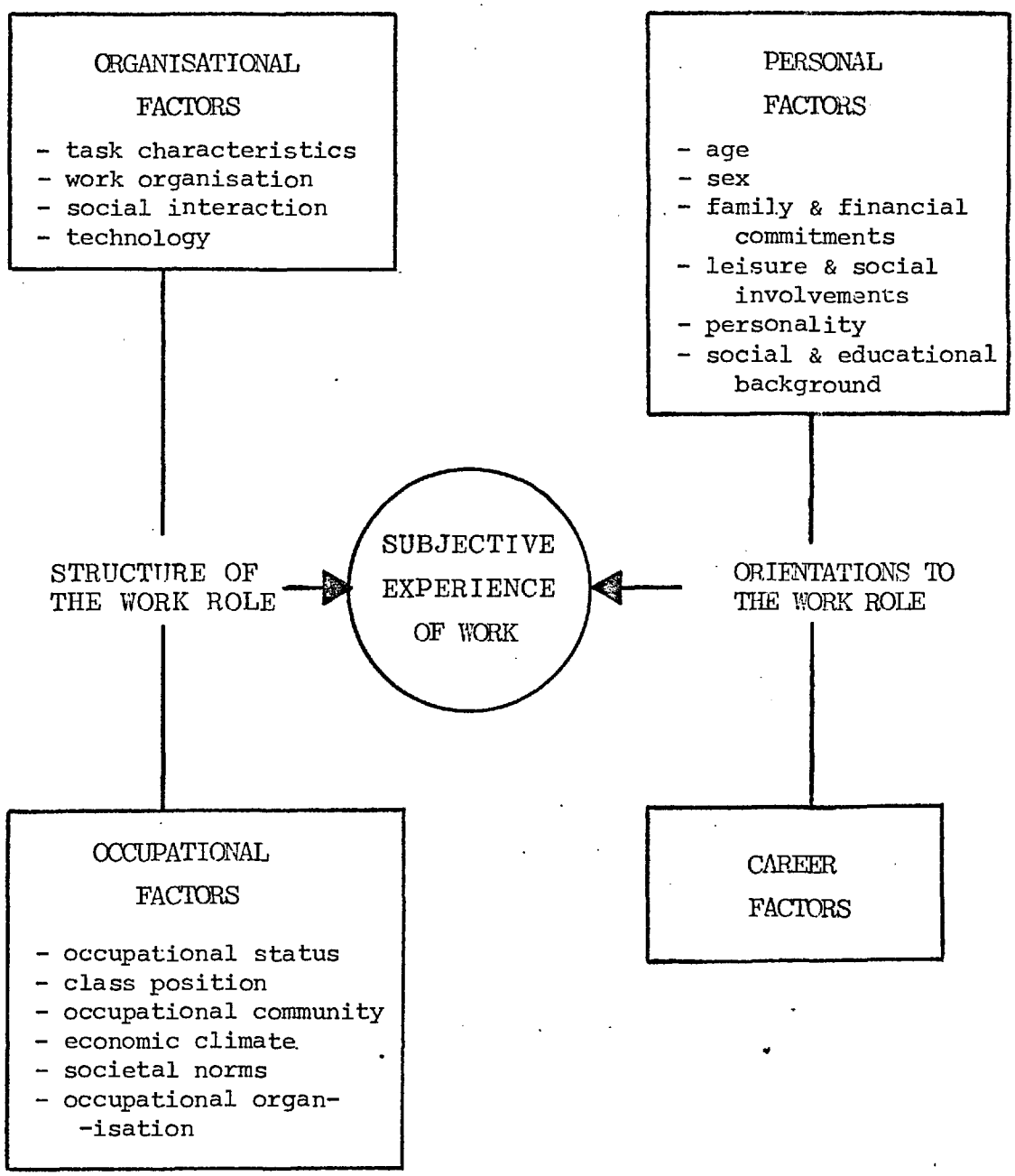
A person's subjective experience of work can thus be seen as the outcome of an interaction between two major components: some structural definition of the work role, and the orientations with which an individual approaches that role. Empirically this is supported by Wedderburn & Crompton (1972) and Beynon & Blackburn (1972). These latter conclude their study of variations in the perception of work by suggesting that (Beynon & Blackburn, 1972:157):

the way in which work is experienced, therefore, depends neither on work factors nor orientations alone, but on the interaction of the two.

Figure 2.1 illustrates this position, with the subjective experience of work arising from some interaction between the structure of the work role and the actor's prior orientations to that role. From the discussion, the former may be classified into "organisational factors" , those relating to the immediate work situation; ie task characteristics, the work organisation, nature of social interaction, and the technology: and into "occupational factors", which refer to aspects of the wider occupational and social organisation. The orientations to the work role may arise from a number of sources. "Personal factors" may be identified, including various present characteristics of the individual and attributes of former socialisation experiences outside of the workplace. In addition "career factors" are also suggested as having a possible influence over these prior orientations. Normative effects are manifested through particular orientations and may operate at a number of different levels: the bases of these effects and their attributes may be subsumed within the main dimensions of this framework.

Although broad, this conceptual framework appears to encapsulate the main sources of variation in the subjective experience of work identified from particular studies. The nature of inter-relationships between elements are not outlined, but in organising variables

FIGURE 2.1 SOURCES OF VARIATION IN THE SUBJECTIVE EXPERIENCE OF WORK



in terms of role structure and orientation under the general headings of "organisational", "occupational", "personal", and "career" factors, a general schemata is available from which to study the determinants of work involvement. Before attempting this however, some greater consideration of the concept of work involvement is needed.

2.3 The concept of work involvement

At the start of this chapter it was suggested that the concept of work involvement could be taken as representing the extensiveness of a person's work role. In fact the research literature does not offer a good conceptualisation and definition of work involvement per se, although more rigorous attention has been given to "job involvement". While this refers to involvement in the current job, work involvement represents a broader, more general sense of involvement in work. However since work involvement is manifested at any one time through involvement in a particular job, the only real difference between the two concepts is in terms of the time perspective considered and the representativeness of a present job compared to others in the past. In practice, the broad attitudinal statements typically used by researchers to measure job involvement suggest that empirically work and job involvement might be considered identical to all intents and purposes. Although a distinction will be maintained in this chapter between the two, results found for job involvement might be assumed applicable to work involvement and vice versa. Subsequent reference however will be made only to work involvement unless there is a specific need to distinguish the two.

The conceptualisation of these parameters which has been reported in the literature is by no means

unanimous. Parker (1967:167) suggests that work involvement embraces three facets: "the meaning that is attached to work, the feeling of identification with or alienation from work, and the degree to which work is a central life interest". The third of these has been used by Dubin et al (1975:411) and defined as a person's "expressed preference for carrying out their activities in given institutional settings". Employing the more widely used notion of job involvement, Patchen (1970:7) suggests that:

> job involvement is merely a convenient label to summarise several characteristics which make the job more important, more salient, and potentially more satisfying to the individual.

The measurement of job involvement by Lodahl & Kejner (1965) has served as a basis for many subsequent researchers, although their definition was not very tight. In fact Lawler & Hall (1970) criticise them for offering two definitions in their paper: the first being the extent to which a person's work performance affects his self-esteem, and the second, prefered by Lawler & Hall, being the degree of psychological identification with work. Gurin, Veroff & Feld (1960) considered job involvement as the extent to which individuals seek some expression and actualisation of the self in their work, a formulation which McKelvey & Sekaran combined with Lodahl & Kejner's to define job involvement as "the merging of a person's ego identity with his or her job" (McKelvey & Sekaran, 1977:282).

The problem encountered by Lawler & Hall (1970) in examining Lodahl & Kejner's (1965) definitions of job involvement, may in fact reflect a fundamental duality in this concept; this indeed may have inhibited unanimity in its use by the above authors. Thus, on the one hand, involvement may refer to the 'absolute' magnitude of participation in work, and on the other to the 'relative' importance of work compared to other aspects of a person's life. Corresponding to the initial suggestion in this chapter, the first of these might represent the absolute 'size' of the work role, the second its 'size' relative to other non-work roles. This distinction seems to be an important one, for although the two components may well be related, they do seem to have a conceptual difference that ought to be recognised. Thus, in the present study, the empirical treatment of work involvement considers these two dimensions: the actual extent of involvement or participation, ie. the degree of "work effort"; and the relative importance of work vis-a-vis non-work aspects of a person's life, ie. the degree of "work centrality".

Empirical measurement of job involvement has typically been conducted through questionnaire or interview techniques, with subjects being asked various questions about their normal behaviour at work, about their attitudes and feelings towards work, and occasionally about their likely behaviour

in hypothetical situations. A measure of involvement is then constructed as some overall parameter from these various expressions. Externally measured behavioural data is not common, and,given that certain responses may be more "socially acceptable" than others, the extent to which attitudinal expressions are actually manifested, must certainly be questioned. Only insofar as research is academic, with the rather broader questions yielding no material gains, might behavioural validity be supposed.

The most extensive measurement of job involvement in fact has been reported by Lodahl & Kejner (1965) who constructed an index from 20 attitudinal items off a questionnaire sent to samples of American nurses and engineers. A number of subsequent writers (Section 2.4) have employed a condensed version of this index to provide measures of job involvement as part of wider studies. Pym (1969) is quite rare in taking a measure of involvement in work from the frequency with which the engineers in his sample took work home or stayed to do unpaid overtime; of course, such behavioural expressions may very well depend upon the nature of a particular situation, so that their broader validity as measures of work involvement would be limited. McKelvey & Sekaran (1977) employ a measure of job involvement based upon the sum of the responses to two questions, whose reliability is reported by Patchen (1970):

- Some people are completely involved in their jobs; they are absorbed in them night and day. For other people, their jobs are only one of several interests. How involved do you feel in your job ?

- On most days of your present job, how often does the time seem to drag to you ?

(Responses on five-point numerical scales, all points labelled.)

In the empirical analysis based upon data from the Engineer Survey reported in Part II, indices of work involvement are constructed from a number of attitudinal questions, similar to those used by Lodahl & Kejner (1965) (Section 7.2). The two above items are included in the questionnaire and provide some verification of these indices.

2.4 Sources of variation in work involvement; A review of the literature:

Although research on the subject of work involvement per se has been fairly limited, a number of studies may be reviewed as a basis for investigating the sources of variation in work involvement. Most of the empirical work here has been cross-sectional, so that correlational analysis provides measures of association and not strictly of causality, even though this is typically assumed. For the purposes of this present discussion it is sufficient merely to identify sources of variation from which further hypotheses may be suggested.

In their research of American nurses and engineers, Lodahl & Kejner (1965) correlated their index of job involvement against various organisational and personality characteristics. The following attributes correlated at a 1% level of significance, (Pearson correlation coefficients in brackets) :

Engineers (N=70):	Number of people contacted per day		(.30)
	Interdependence of the job with others		(.34)
	Satisfaction with:-	the work itself	(.29)
		promotion	(.38)
		supervision	(.38)
		colleagues	(.37)
Nurses (N=137)	Age		(.26)

Using a condensed version of this index, Hackman & Lawler (1971) found significant correlations at the 5% level between job involvement and their four 'core' task dimensions in a study of 208 manual workers employed in various occupations. These were 'variety' (r=.24), 'autonomy' (r=.22),'task identity'(r=.21), and 'feedback' (r=.24).

Job involvement was also found to correlate significantly at this level with one aspect of social relations: the perceived opportunities for making friends at work (r=.16).

Another study, by Lawler & Hall (1970),also found job involvement correlated significantly with a number of perceived job characteristics for a sample of 291 American R & D scientists. At the 1% level, these were: 'creativity' (r=.19),'influence in the department' (r=.21), 'freedom to use skills' (r=.18), and 'job suitability' (r=.18). In another report on this study, Hall & Lawler (1970) indicate that job involvement was significantly correlated with the 'quality pressures' the scientists felt were on them to do a good job (r=.56).

However the rather low correlations found between their measures of perceived job characteristics lead Lawler & Hall (1970) to suggest that job involvement may be more a function of "the person" than "the job", a suggestion raised previously by Lodahl & Kejner (1965). Hall & Mansfield (1971) offer some empirical support to this idea in their study of several American R & D organisations in the aerospace industry. Cutbacks in research funds over the period 1967 to 1969 lead to considerable changes in 'organisational climate', including an increased emphasis on short-term applied research. While many work attitudes showed significant changes in response to this 'organisational stress', no significant changes in job involvement were observed. Both Hall & Mansfield (1971) and Lawler & Hall (1970) used condensed versions of the Lodahl & Kejner (1965) job involvement index.

In a later paper based upon a larger sample of American R & D scientists and engineers, Hall & Mansfield (1975) report the changes in various personality characteristics associated with the age of the respondents. Job involvement was one of the most strongly age-dependent variables in the study, many of the others being affected by environmental changes between the 1967 and 1969 samples. Their results correspond to those found by Lodahl and Kejner (1965) in their sample of nurses; that is, job involvement increased with age.

Schneider, Hall & Nygren (1970) also considered job involvement in their study of 157 professionals employed by the U.S. Forest Service. Higher job involvement was found to be associated with the extent to which the individual accepted the values and goals of the Service as his own, and with the length of time in the Service.

Whether job involvement is more a function of "the person" than "the job" however is questionable. Lawler & Hall (1970), Hall & Lawler (1970), and Hackman & Lawler (1971) all found significant correlations between job involvement and measures of perceived job characteristics. While Hall & Mansfield (1971) usefully illustrate the sense of continuity inherent in this concept, it may be that job involvement is not very responsive to minor or short run changes in job characteristics. For example, increasing the variety of assembly-line work is hardly likely to have a large and immediate influence on the job involvement of veteran car plant workers; however, if such changes are

conducive to a pleasanter working experience, then over time an increased job involvement may develop.

In general, the above studies seem to indicate that both "organisational" and "personal" factors, as described in the general framework for the subjective experience of work, represent major sources of variation in work involvement. "Occupational" and "career" factors have received much less attention in the research literature, most of these studies being conducted with rather narrow, organisationally-confined, perspectives. Several studies do however provide illustration of the latter, and indirectly, give some indication of the former.

Bailyn (1977), surveying past MIT graduates, found that amongst a sample of scientists, engineers and managers in their late 30's and early 40's the engineers employed in "staff positions" had lower levels of work involvement than the rest of the sample. Lower income offered a partial although incomplete explanation of these differences, which Bailyn suggested were probably due to aspects of the engineers' careers; the more 'successful' pattern being a move into management jobs.

In Britain, Pym (1969), in a survey of 200 university graduate and 200 non-graduate members of the Institution of Mechanical Engineers, found that non-graduates aged 40 and over had lower work involvement than graduates, as indicated by the frequency of taking work home and

staying to do unpaid overtime. Below 40, however, there was little difference between the two groups. Although several explanations are clearly possible, Pym argues that these differences are due to discrimination against non-graduates in promotion on the ascriptive criterion that they did not possess the qualification of a university degree.

McKelvey & Sekaran (1977), in a survey of 441 scientists and engineers in 4 American aerospace organisations, also concluded that career factors seemed to have a strong influence on job involvement, and that these had largely been ignored by previous job involvement studies. Initially they identified 49 variables from previous studies as possible correlates of job involvement, grouped under the headings of 'professional training and personality', 'perceived organisational structure', 'satisfaction variables', 'orientations, expectations and other variables'. Zero order correlations with their job involvement index revealed a number of significant results at the 1% level: age (r=.16), a 'local' orientation (r=-.29), 'interest in innovation' (r=.28), and a 'challenging job' (r=.27). Nevertheless, entering all 49 variables into a regression analysis with job involvement, only 38% of the variance could be accounted for.

However splitting the sample into certain basic groups - managers and non-managers, engineering and science majors - fewer variables could account for rather more of the variance. Furthermore, the factors which

were most strongly related to job involvement were different for each of the groups. For the engineers, for example, job involvement was particularly susceptible to aspects of organisational structure, especially the 'extent of decentralisation' and 'stratification'; for scientists, the 'interest in innovation' was a particularly important variable. From these results McKelvey & Sekaran suggest that a career-based theory of job involvement might fruitfully be developed, since certain basic differences between the groups of scientists, engineers, and managers seemed to have a large effect on their levels of job involvement. Precisely what aspects of their careers might have this result however were not analysed in detail in their paper.

Nevertheless they did propose a "general schemata for a career-based theory of job involvement". They suggested that various "cultural" and "personality" factors would influence a person's identification with particular aspects of their work or career, their "ego identity type". Where the work setting and ego identity type were congruent, a high job involvement would ensue.

In effect, this schemata seems to be a refined version of the general conceptual framework suggested for the sources of variation in the subjective experience of work; that is, the level of job involvement is seen as the outcome of some interaction between the 'structure of the work role' and the individual's 'orientations to that role'. Their scheme selects relevant facets of each of these factors.

At the start of their paper, McKelvey & Sekaran (1977) summarise the results of previous studies investigating the correlates of job involvement. This is reproduced as Table 2.1 , most of the references cited by them having been discussed here. As their table illustrates however, the variety of these sources of variation seem adequately covered by the general framework suggested earlier for the subjective experience of work, a framework that provides a general expression of the schemata suggested by McKelvey & Sekaran at the conclusion of their paper. That is, variations in work involvement may be traced to two main sources, representing in some way the 'structure of the work role' and the person's orientations to that role', with parameters being categorised in terms of of "organisational", "occupational", "personal" and "career" factors. It is thus proposed to adopt this basic scheme as the main Conceptual Framework for the subsequent study of the determinants of work involvement.

In addition both Bailyn (1977) and McKelvey & Sekaran (1977) suggested that factors connected with the work career had an important influence on levels of work involvement for their samples. Although the generality of these ideas to other groups must be questioned, since they both were surveying groups of professional engineers and managers, they are clearly very relevant for this present thesis.

Although not directly concerned with the concept of work involvement per se, both Sofer (1970) and Ritti

TABLE 2.1 THE CORRELATES OF JOB INVOLVEMENT

Correlations between Job Involvement and Demographic, Job, Organisation, and Satisfaction Variables Used in Earlier Studies. From McKelvey & Sekaran (1977:283).

Variables	Studies	r*	N	Population
DEMOGRAPHIC				
Age	Lodahl & Kejner	.26	137	Nurses
Education	Siegal & Ruh	.62	2618	Highly educated
		.42		Medium educated
		.51		Low educated
Tenure	Schneider et al	n.s.	157	US Forest Service professionals
15 demographic factors	Ruh, White & Wood	(R^2=.32)	1328	Six manufacturing organisations
JOB				
Quality pressure	Hall & Lawler	.56	291	R & D Scientists
Challenge	Hall & Lawler	.34	291	R & D Scientists
	Patchen	.25	834	TVA Groups
Autonomy	Hall & Lawler	.21	291	R & D Scientists
Use of skills	Lawler & Hall	.18	291	R & D Scientists
Initiative	Lodahl & Kejner	**	137	Nurses
Technology	Argyris	**	300	Skilled craftsmen
Time pressures	Hall & Lawler	n.s.	291	R & D Scientists
ORGANISATIONAL				
Opportunity for achievement	Patchen	.53	834	TVA Groups
Participation in decision making	Siegal & Ruh	.51	2618	Manufacturing organisations
Promotion chance	Lodahl & Kejner	.38	70	Engineers
Open communication	" "	.38	70	Engineers
Leadership	" "	.31	137	Nurses
Teamwork	" "	.34	70	Engineers
No. people contacted daily	" "	.30	70	Engineers
Technical ability of supervisor	" "	.29	70	Engineers
Role clarity	Lyons	.24	156	Staff nurses
SATISFACTION				
Satisfaction with:-				
promotion	Lodahl & Kejner	.38	70	Engineers
supervision	" "	.38	70	Engineers
people	" "	.37	70	Engineers
work itself	" "	.29	70	Engineers
motivational variables	Weissenberg & Greenfeld	.30	96	Male supervisors in US State Dept.

* Product-moment correlations that were statistically significant
** Exact correlation not available

This table is shown as presented in McKelvey & Sekaran (1977:283); References to studies shown are given in bibliography.

(1971) have emphasised the important influence of career factors on work attitudes and behaviour in their studies. Sofer, looking at managers and technical specialists in two large British companies, notes the importance attached by the men to their careers, a concern which seemed to colour many of their other attitudes: the claim by many engineers that their skills were under-utilised, for instance, is seen by Sofer as an adaptive mechanism to lack of promotion. Similarly Ritti, in a study of American engineers, found that career advancement represented the men's primary work goal: he argues that the large proportions claiming under-utilisation were due to the concern over demonstrating skills so that promotions may be achieved, but that in some cases the nature of the 'managerial environment' inhibited this portrayal; moreover, job satisfaction appeared strongly dependent upon these feelings of under-utilisation.

At a broader level across different types of occupations, the influence of differences in careers on work involvement has been argued by Ashton & Field (1976) in their book "Young Workers", which expanded a number of ideas earlier developed by Ashton (1973;1974;1975). They attempt to trace the identity development of young workers through their childhood, school and early work experiences, arguing that the school experiences largely reinforce those of particular social class origins, and in turn are reinforced by occupational choice and particular work experiences. Differences between

"careerless" (eg, unskilled manual), "short-term" (eg, apprenticeships), and "extended careers" (eg, middle class organisational careers) correspond to differences in work involvement, with the third of these helping to sustain a high work involvement amongst initially ambitious youths. As Ashton & Field (1976:88-90) suggest, for those in "extended careers":

> their experience of work confirms the ways of looking at their world which they developed in the home and school. In particular they are confirmed in their acceptance of the beliefs transmitted by the media and their teachers that every-one should make a career, and that to progress from positions of low prestige, income and authority to positions of higher income, prestige and authority is an indication of personal worth. To these young people such ambition is something every-one ought to have and the lack of it is seen as a sign of inadequacy. To improve oneself through success in a competitive struggle for advancement at work is seen as a universal characteristics of life.
> ... Their work thus becomes of central interest, in the sense that they subordinate their other activities to it and start to use their success at work as a means of measuring their personal worth.

Thus while the framework of "organisational", "occupational", "personal" and "career" factors seems an adequate categorisation of the variety of results arising from the research of the correlates of job or work involvement, there are several indications that the fourth of these may be particularly important. The generality of this suggestion is of course questionable given the concentration of empirical research on managers and technical specialists. However since these will subsequently form the subjects of study in this present thesis, within this bounded caveat, a Working Hypothesis may be proposed :

WORKING HYPOTHESIS: Of the four groups of factors representing the Conceptual Framework of sources of variation in work involvement, "career factors" will be the most important.

This hypothesis may be valid only for certain middle class occupations, in particular for managers and technical specialists.

However none of the empirical studies examining variations in work involvement have analysed the effect of "career factors" in a particularly rigorous manner. As such, the following chapter attempts to give a more systematic consideration of these effects, and in doing so suggests a general model of career development.

CHAPTER THREE:

CAREERS AND WORK INVOLVEMENT:

> a man's work is one of the things by which he is judged, and certainly one of the more significant things by which he judges himself.
>
> Everett Hughes; Men and their work.

3.1 Introduction:

In line with the Working Hypothesis, this chapter attempts to explore in detail the relationships between a person's career and their involvement in work, insofar as these have been discussed by previous authors. After suggesting a paradigm for the study of careers, the conceptualisation of the work career as such is considered, and interactions between the structural and attitudinal facets of the paradigm are examined. The discussion looks at the development of career ambitions and orientations and the way in which these influence and are influenced by feelings of career success. Following a model outlined by Hall (1976), it is suggested that a person's sense of work-based self-esteem and work-based "subidentity" will depend on such feelings of success, which will thus influence their involvement in work. The main proposition is that certain types of status mobility enhance feelings of success, which thus encourage a high work involvement and facilitate further status mobility. The complementary influence of social factors on career attitudes is also considered and a general model of career development proposed.

3.2 Conceptualisation of the work career:

3.2.1 The Career Paradigm:

Although there is no definitive "sociology of the career" per se, from the various collections of readings on the subject (eg, Glaser,1968; Hall,1976; Van Maanen, 1977) one theme is most predominant: that the career should be regarded as a two-sided concept involving, on the one hand, some 'objective' or 'structural' definition of work roles and their changes over time, and on the other some consideration of the 'subjective attitudes' and experiences connected with these roles (eg, Hughes,1937 ; Mansfield, 1973).

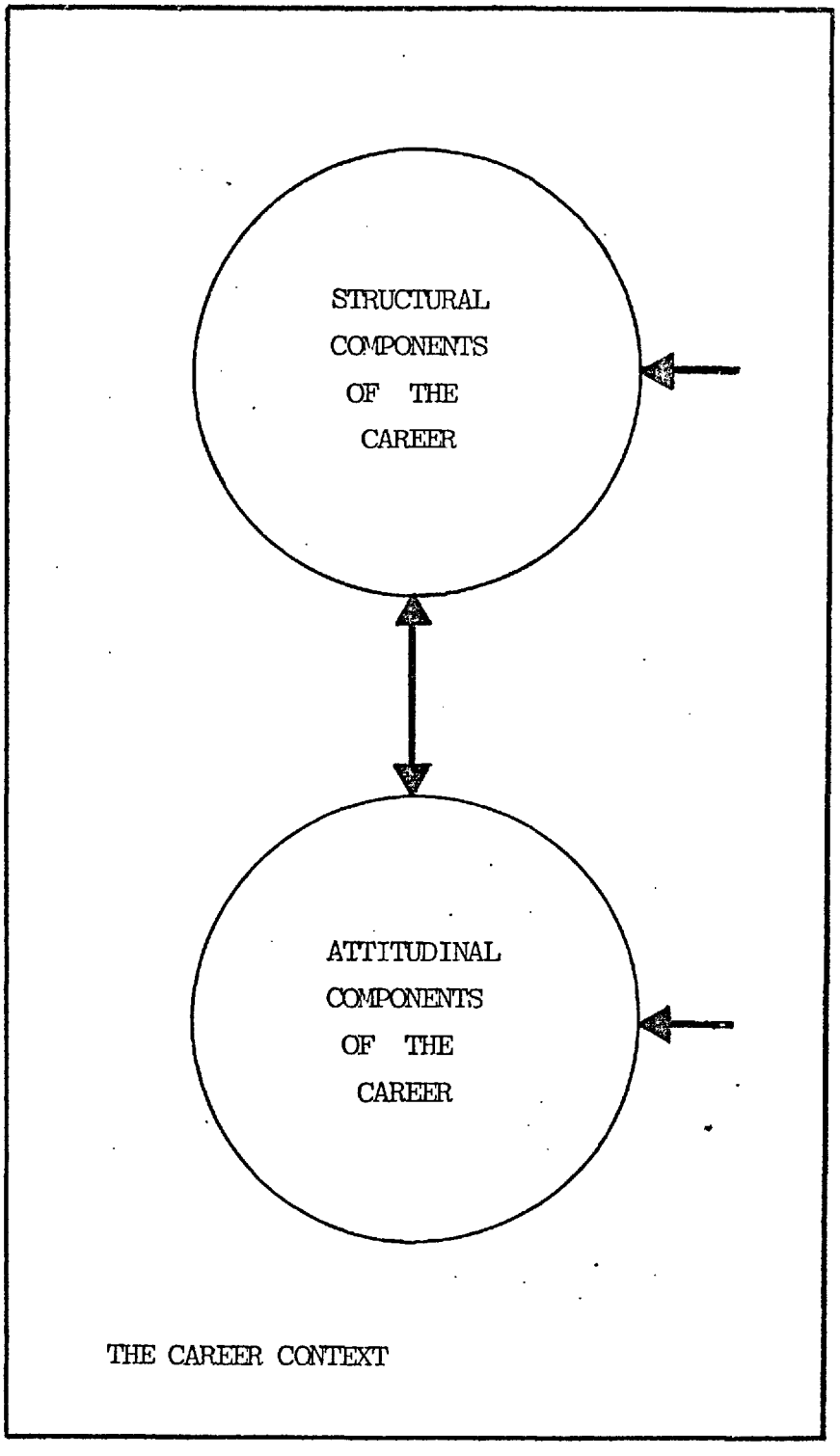
Beyond this, it is possible to distinguish at least three different definitions of "a career" in the academic literature. Hall (1976:4), for example, defines a career as the "individually perceived sequence of attitudes and behaviours associated with work-related experiences and activitites over the span of a person's life". This is a rather broad definition, incorporating the individual's changing experience of work roles, together with some structural specification of those roles, within his notion of a career. This is somewhat different from the more popular conception of a career, which Wilensky employs in defining it as " a succession of related jobs, arranged in a hierarchy of prestige, through which persons move in an ordered, (more-or-less predictable) sequence" (Wilensky,1961:523). On this definition only

a fraction of the labour force would experience a career. The third usage refers to a career simply as any work history, defined in a similar structural sense, but irrespective of the nature of that history (eg, Slocum, 1966:6).

The last two definitions focus on the structural parameters of the work career and not on the accompanying subjective experiences. Of course, whichever is employed in a particular context is somewhat arbitary, reflecting the concerns of a particular investigation. However, for the purposes of this thesis there does seem to be some merit in adopting the first kind of definition, thus deliberately incorporating within the term "career" itself this idea of 'structural' and 'attitudinal' components, although without actually specifying their nature. Insofar as Wilensky's definition corresponds to popular usage however, it is also valuable to employ the label "extended careers" (Ashton & Field, 1976) to indicate this particular kind of structural career pattern. While it is also possible to speak of a career in situations unconnected with work (eg, Roth, 1963), the term will be restricted to a work context here unless a suitable adjunct is used.

If this dual conceptualisation of the career is viewed within some general evironmental or social context, then a useful paradigm is provided for the study of careers. This Career Paradigm is illustrated in Figure 3.1, comprising the structural and attitudinal components of

FIGURE 3.1 THE CAREER PARADIGM



the career, set within a general Career Context. The process of career development may then be viewed as the interactions between the structural and attitudinal aspects of the career, within this Context. This is outlined by Mansfield (1973:108) who suggests that:

> career development may be conceived as a process in which the objective and subjective sides of an individual's career interact to precipate each successive stage. This interaction will be limited by the constraints imposed by the social systems within which the individual's career is worked out.

Before this interaction can be considered however, it is necessary to examine in turn the nature of the concepts involved in this Career Paradigm.

3.2.2 The Structural Components of the Career:

The specification and measurement of the structural components of a career can give rise to considerable methodological problems, chiefly because of the large amount of information needed to provide such a specification. Since this concept involves the changing structure of work roles over time, the most typical approach to this problem by researchers has been to attempt some static specification of the structure of the work role and assess changes in it over intervals of time.

For example, analysts of the labour market have usually employed occupational categories of various kinds to define a current work role and then considered mobility with respect to these categories over a fixed time period (eg, Form & Miller, 1949; Lipset & Bendix, 1952).

More recent social mobility work in Britian has continued to employ similar kinds of occupational groups (eg, Goldthorpe & Hope,1974), although attempts have been made to try and incorporate broader features of a person's life both inside and outside work, such as their geographical location, household composition, or wife's occupation (eg, Lienard & Llewellyn,1977) within a description of their 'life-histories'.

However, occupational categories represent only one way of specifying work roles, and are clearly suitable for only certain kinds of inquiry. For instance, in studying careers within a single occupation, they are obviously inappropriate. The parameters that may be employed in defining a work role are in fact numerous and those used will depend upon their relevance to a particular study and, pragmatically, upon the way in which changes in these parameters may be assessed.

For instance, salary is a common parameter used as one attribute of work roles for assessing temporal changes, valuable because of the broad comparisons it permits across the whole labour force (eg, Spilerman, 1977). Its sociological relevance however may be more limited. Wilensky's definition of a career (1961:523) focused upon the importance of ascending prestige as a characteristic of 'extended careers', but the structural attributes upon which prestige itself depends may be various, and include such things as responsibility, power, and salary (eg, Dreyfus,1938).

There are many ways in which work roles may be defined and changes in them over time assessed. One useful sociological analysis of these involves a classification of work roles into "status" and "situs" dimensions. Since this framework permits careers within a single occupation to be traced out, it will be adopted in this thesis for the subsequent study of engineering careers. The classification appears to have been first developed by Hatt (1950) and later by Morris & Murphy (1959), although Sorokin (1959) also considers societal structure in terms of a "social space" embracing a similar plurality of vertical and horizontal dimensions.

Although the concept of status is widely employed by sociologists, its use can be problematic. As Gowler & Legge explain(1975a:254):

> The term 'status' is confusing, as it may be used in two distinct but related ways. It may mean simply a social position which is defined and identified by the cluster of rights and obligations attached to it. Alternatively,it may be used to refer to how a social position is ranked relative to other positions.

The latter usage may involve ambiguous assessments because not every-one evaluates social positions in the same way in a particular society (eg, Runciman,1966:45-47). While one person may have a certain conception of their social position in some status hierarchy, others may judge this differently. Consequently the evaluation of status in this sense may be a highly subjective affair.

In contrast however the former usage of status above refers to the objective characteristics associated with

a particular social role. These may be "ascribed" or "achieved" characteristics (Linton,1936), but they are objectively defined. They may include such characteristics as age and sex (ascribed statuses), or income and occupation (achieved statuses). In defining the status characteristics of a work role a number of parameters may have relevance. Salary may be one of these of course, and within organisations, a person's level of responsibility might be another, This latter in fact is often made visible by a number of "status symbols", such as the size of one's office, access to private secretaries, the type of company car permitted, etc, which themselves may become sought after as indications of status: of course, to the extent that they are widely achieved, their function as "status symbols"is devalued (eg, Burns,1977:97-106; Gowler & Legge,1975a:256-257). In the Engineer Survey of Part II,four dimensions of achieved status are employed: responsibility level, salary, the number of patents and publications, and the extent of membership in professional institutions.

For a particular work role a number of'objective' characteristics of status may thus be identified in this way, and used as the various 'vertical' dimensions of a status-situs framework representing work roles. Evaluation of some overall sense of social status may be based upon a combined assessment of these status attributes, but the meaning that is placed upon different dimensions and the basis of comparison employed is likely to differ between different people, making such an evaluation highly subjective (eg, Coser & Rosenberg,1957:339).

In contrast, the concept of "situs" is less complex. It refers to any structural differences in work roles other than those of status, which are thus taken as forming the 'horizontal' dimensions of the status-situs framework. What dimensions are in fact employed in a given instance is rather less obvious and clearly depends upon their particular relevance, since these may be numerous. The original use of this framework was to provide occupational classifications (eg, Hatt,1950;Morris & Murphy,1959) and situs categories were taken along the single dimension of occupational sector; eg, such as the professions, business, agriculture, etc. Extending the concept beyond this however, it is clear that any number of situs dimensions may be identified for classifying work roles without involving status attributes. For example, in the Engineer Survey, current situs categories are based upon the engineer's branch, company, type of work, and being in management[1] (Section 7.3).

Together the various status and situs dimensions may be used to provide a specification of the work role at one moment in time. The structural description of the career may then be taken from the changes occurring in these over time.

Expressing this mathematically, if x(i) and y(j) represent values or categories of situs i and status j at some time t, then if X_t and Y_t are the multi-dimensional sets containing measures of all relevant situs and status dimensions i and j, then at time t the work role is specified by the vector space, (X_t , Y_t). Considering changes in

1. This final category does, of course, have certain 'status' implications as well; cf. Section 7.3, and Section 9.4.

these dimensions over time, the structure of the work career is described by the vector space (X,Y,t), which thus provides a structural specification of the "career history".

However in practice, depending upon just what parameters were employed, such a vector space would encompass a vast amount of information. Since the concern of researchers has often been with the effect of changes per se over the course of the career (ie, with status or situs mobility or both), then consideration may simply be given to the nature of changes in status or situs dimensions over particular periods of time, or to the time intervals for fixed changes. This assessment may be used to describe some "career trajectory" (Spilerman, 1977:551), representing a summary parameter that describes the nature of these changes.

Certainly sociologists have typically been content with extracting a few summary parameters to describe the career trajectory, from which a small number of categories may be devised. For example, social mobility studies have tended to focus on inter- and intra-generational mobility based upon upward, static, or downward positions within some hierarchy of occupational prestige (eg, Blau, 1956; Lipset & Bendix,1959). Although such categorisation entails considerable simplification, significant results may be observed from it (eg, Wilensky & Edwards,1959). Wilensky (1961) uses the concept of "orderliness", based on fractions of the working life spent within a 'natural' succession of jobs, from which to identify six types of

career trajectory. Similarly Bell (1968) assesses geographical mobility over the working life in terms of a"mobility quotient", constructed from years in the labour force divided by the number of towns worked in. Watson (1964) distinguishes "spiralists" from "burgesses" as patterns of social mobility, the former embracing geographical as well as vertical "status mobility". Spilerman (1977) distinguishes four types of career patterns according to whether people were in the same or different occupation and the same or different industry within particular age bands. Another parameter that describes the career trajectory might simply be the number of jobs people have had.

Another way of presenting the whole career history in visual form is by graphical techniques, from which the career trajectory may be observed (Miller & Form, 1951; Lienard & Llewellyn,1977). While these are useful in presenting a lot of information in simple pictorial form, they are restricted to portraying only one dimension other than that of time (or to labelling discrete changes on the plot). As individual histories are added to one graph, the picture may become complex very quickly. In any case, the main purpose of the graph is to identify particular trends, and further analysis of some kind on the career trajectory is typically needed.

The career trajectory may also be handled by focusing on 'events', rather than on a 'time-based' description of the career. For example, Glaser & Strauss (1971), following

the ideas of Van Gennep (1960), have developed a classification of types of"status passage", which they use to discuss the medical careers of dying hospital patients. Faulkner (1974),in a study of the careers of symphony musicians and hockey players, stresses the significance of particular "turning points" as symbols outlining the definition of success. Such an 'event-based' approach to the description of a career trajectory may complement a 'time-based' approach, but in principle at least one may be derived from the other (Carr-Hill & MacDonald,1973:60-63).

In general,sociologists have been much happier using simple summary measures to construct a few categories of career trajectories, rather than attempting more rigorous analysis of detailed career history data. Carr-Hill & MacDonald (1973) discuss some of the attempts that have been made in this field, but little emerges of immediate practical use from their paper. March & March (1977) report a recent Markov chain analysis of the careers of superintendents in Wisconsin schools which does attempt a global statistical treatment of career trajectories, but their analytical endeavour is considerable and the substantive output small. Spilerman (1977) suggests labour market mobility might best be examined by identifying all the different career trajectories using a network analysis, grouping together those with identical trajectories; however, this requires a fairly crude specification of work roles and/or a very large sample.

For the purposes of the Engineer Survey, career trajectories are specified in terms of status and situs mobility along each of the corresponding status and situs dimensions. The absolute measures of career status provide some overall parameters of achievements gained during the course of the engineers' careers; controlling for variations in age during partial correlation analysis also gives a measure of status mobility with respect to other engineers of a similar age; differences in the engineers' background are also considered in Chapter 8 in this regard. Situs mobility is taken as the number of different situs categories worked in by the men over their careers for each dimension of career situs. In this way the status-situs framework facilitates a summary description of the career trajectories of the engineers in terms of a number of distinct mobility dimensions.

3.2.3 The Attitudinal Components of the Career:

Complementary to this 'objective' structural specification of the career, the attitudinal components represent the subjective experiences connected with work roles over time. These are also likely to change, inter alia, with structural developments, although the analysis of these changes has not received the same kind of formal attention in the research literature as the structural components. It is much more typical for the notion of "career history" to refer only to a structural history, for example. Partly this has

a pragmatic justification: it is much easier to gather retrospective structural data than attitudinal, which largely necessitates longitudinal study. Consequently there has been little attempt at a conceptual treatment of 'attitudinal careers', although a number of writers have given qualititative descriptions of such developments (eg, Chinoy, 1955; Faulkner,1974; Glaser & Strauss,1971; Roth,1963).

At one particular point in time, the attitudes and subjective experiences associated with work roles are clearly numerous. Just as the structural specification of these roles will depend upon the relevance of particular facets to a given study, so with the accompanying experiences. The previous chapter began by looking at sources of variation in the subjective experience of work, and each of these experiences would represent attitudinal components associated with work roles. This includes the concept of work involvement, which is a central concern of the thesis. However, in terms of the experiences connected with the career as a developmental phenomenon, it seems useful to focus rather more closely on several attitudinal components more integral to the career, which, it is suggested,may mediate between the structural components and other subjective work experiences.

In this regard, the concepts of "career ambitions" and "career orientations" may be identified, representing the two major attitudinal components bound up directly with developments in career structure.

Career ambitions are attitudinal expressions directly related to career status; they refer in some way to the level of status sought after by some time in the future. Three aspects of the concept seem to be variable components in the specification of career ambitions: the type of career status involved, the level of status aimed for by a certain time, and the expected likelihood of attaining this level.

The status-situs framework suggested for specifying work roles embraces a number of vertical dimensions, representing status attributes of those roles. Correspondingly, career ambitions may be directed towards the attainment of certain levels or categories of status on each of these dimensions. Thus, for example, they may involve monetary ambitions (eg, Rice, 1964), the desire for higher occupational status (eg, Turner, 1964), or organisational advancement (eg, Presthus, 1965). Non-work ambitions amongst hospital patients might include the desire to achieve the status of being'healthy'.

The actual magnitude of a person's ambitions is thus typically an expression of the level of status aspired to in the future, with possibly a number of different types of ambitions being involved, corresponding to different types of status. The time by which it is hoped to reach these levels must also be considered as an element of the ambition; in some cases this may be quite a critical facet of the ambition, with a sense of "career timetable" arising (Faulkner, 1974; Roth,1963).

In addition, however, it is necessary to consider the person's expected likelihood of attaining this hoped for status mobility. For instance, 'expectations', 'aspirations' and 'fantasies' may all represent types of ambition which differ in the expected likelihood of the outcome. One concept employed later in the discussion is that of "career goals" (eg, Hall,1976:29-33), refering to the level of status realistically being aimed for at some future time; career goals are more likely to be realised than 'aspirations', less likely than 'expectations', and might be taken as "realistic aspirations".

Complementary to ambitions, career orientations refer to the importance attached to the particular type of status mobility, or,indirectly, to the environment in which these may be achieved. For example, Schein et al (1964) distinguish "technical" and "managerial" orientations, and "institutional" and "non-institutional" orientations in a study of R & D specialists; the former refering to the kind of work and the latter to the organisational context most prefered by the men for advancing their careers. The familiar "local-cosmopolitan" distinction (Gouldner,1957) is another dichotomy of career orientations relating to differences in organisational and professional reference groups, which themselves reflect differences in sought after career status. More recently, Schein (1977) has identified five types of "career anchor", which he sees as important in guiding the careers of MIT graduates in his panel study: these are "managerial competance", "technical-function competance", "security", "creativity", and "autonomy", each of which seem to reflect different status attributes

connected with the work role and the performance of work. Although the nomenclature may vary amongst writers, the notion of career orientation represents an important complement to that of ambition in refering to the importance attached to particular types of status mobility, either directly or through preferences for particular work settings that facilitate this mobility. As such, it is employed later in the discussion as a measure of the saliency attributed to different types of career status as criteria of career success.

Career ambitions and career orientations are taken here as the main attitudinal components of the work career. Although specified in this way for one moment in time, it is clear that temporal changes will occur. However, the actual nature of such developments has not received analytical formalisation comparable to that of the career trajectory for structural components, although it is possible to trace changes in these attitudes with a longitudinal study in some crude way: since each attitude may be expressed in single dimensions, some graphical or comparable technique would suffice, for example. As the empirical study reported in Part II is cross-sectional, no consideration is specifically given to the attitudinal career trajectories of particular individuals, and as such this static specification is presently sufficient.

Obviously other attitudes may be identified in connection with career developments, and in the Engineer Survey consideration is given to the perception of various career moves, as well as the evaluation of career success (discussed

later in this chapter). However, for the main specification of the attitudinal components of the Career Paradigm, and as a basis for investigating its interactions, the two concepts of career ambitions and orientations are alone employed.

3.2.4 The Career Context:

Having examined the structural and attitudinal components of the Career Paradigm and suggested certain specifications appropriate to the subsequent study, some consideration is necessary of the context in which these components interact and develop. Again the problem of generality means that the specification of this Career Context will largely depend upon the relevance of factors to a given investigation. As the Conceptual Framework of Chapter 2 outlined, a whole gamut of "organisational", "occupational" and "personal" factors may, in addition to the "career" factors" , affect the attitudinal components of the career, whilst an equally broad range of labour market and related factors may influence structural components. Nevertheless two particular aspects of the Career Context are worth picking out for attention.

As suggested later in this chapter, career attitudes depend not only upon certain structural developments but on the social context of the actor. As such, recognition of the impact of particular social contexts is necessary, although their actual specification may be complex and is not attempted as such in the thesis. One illustration of a possible scheme however is given by Brim (1966) who suggests

that socialisation settings may be classified according to the formality of the social relationship, the personal support it involves, and the group context of the experience.

Structural developments of the career will be affected by a variety of labour market and related parameters that influence both status and situs mobility. These may involve a variety of social, economic, political, organisational, or occupational factors. As a device for organising these within a single framework the notion of a "Career System" may be suggested, encompassing on each of the identified dimensions of status and situs the various 'structural' and 'processual' factors that influence status and situs mobility. The actual boundary of such a Career System would depend upon the Context in which the career develops, and the consideration needed for mechanisms of boundary control. Basing such a system on organisational boundaries is clearly convenient although theoretically not the only option. With an organisational Career System, for example, the promotion procedures may be identified as a mechanism of the System influencing organisational status mobility; policies regarding departmental moves, as one affecting certain kinds of situs mobility; the hiring and firing process representing the mechanism of boundary control. Both 'structural' and 'processual' elements of such a System might be identified, the former representing the existing distribution and availability of career status and situs, the latter the mechanisms by which mobility

is influenced. Descriptions of the Career Systems in each of the six companies of the Engineer Survey are given in Appendix IV.

Career development simply refers to changes in either of the structural or attitudinal components of the career over time. As illustrated in the Career Paradigm, this may be thought of as a process of interaction between these two components, set within a particular Career Context. Now that each of these facets of the Paradigm have been examined, the details of this interaction may be considered. In line with the status-situs framework describing the structural components of the career, it is convenient to look at interactions with each of these 'vertical' and 'horizontal' dimensions in turn.

3.3 Paradigm Interactions with Career Status:

3.3.1 The Success Model:

The interaction between career status and career ambitions and orientations appears to be a complex two-way affair, with these attitudes influencing status mobility and this in turn affecting these attitudes. In the conventional folklore it is the ambitious youth who works hard and is rewarded by 'success', an achievement which may breed the desire for still greater 'success'. Yet while many are encouraged to compete for high career rewards, by the nature of things in practice only a few are likely to achieve them. For instance, the typically hierarchical nature of organisational positions imposes severe constraints on organisational advancement. As Burns suggests in his BBC study (Burns,1977:116):

> There has (also) to be universal acceptance of career success - in society's terms - as one of the valuable goals in life. We seem in Western society to be increasingly adept at inculcating this necessary belief, in children as in adults. However, in the nature of things, out of the many who attempt to succeed, who seek to establish in the minds of the patrons and sponsors of the system their claim to higher status, only a few can succeed - fewer and fewer as one approaches the highest positions. So, in our society, the vast majority - one might indeed say everyone - is at times confronted with the fact of failure.

Chinoy (1955) was one of the earliest sociologists to investigate this contradiction between the general values in society espousing competition for higher status and the lack of opportunities for achieving it. In a study of American car assembly-line workers he tried to understand how the men coped with the 'failure' of

their low income and lack of independence. Most, he found, still subscribed to the values of financial success, many projecting their unfulfilled ambitions on to hopes for their children. Some also maintained a quixotic hope of setting up various small businesses, in this way seeking to persuade themselves that they were still ambitious, still had a chance of 'making it'. These findings are also supported by Guest (1954). In fact, the redefinition of 'failure' in other, more acceptable, terms has been observed by a number of writers (eg, Herman,1962). Sofer (1972) argues that the managers and technical specialists in his study employed various methods of rationalising lack of promotion, including criticism of their personnel departments and claims of skill under-utilisation. Fairhurst (1975) suggests that the ability to justify promotion or lack of it in terms of "luck" provides a similar means of preserving personal "identity". Goffman (1952) has refered to this process of accommodating failure as "cooling out" and outlines a number of possible mechanisms, although in general which might operate in a given instance is not well understood. Their variety is numerated by Burns (1977: 116) in the remainder of the passage quoted above:

> .. And since, for almost all of us, or for all of us most of our lives, the fact of failure is impossible to face if we are to continue living in the situation to which we have been consigned, we have, instead of facing the fact, to alter it by seeing the criteria by which success is awarded as illegitimate, or inappropriate, the judges as ignorant, misinformed, or biased, success as overpriced or the system itself as contemptible or somehow false.

Certainly there are some indications that many young people commence work with 'unrealistically' high ambitions, only to experience a "reality shock" (eg, Hall,1976:37-38) as these ambitions prove untenable. In fact, this may be so more for middle class than working class youths, because of

the lower ambitions of the latter, although of course different opportunities also tend to be available to each (eg, Ashton & Field,1976). To the extent that there is some discrepancy between ambitions and opportunities, subsequent employment experience is typically found to reduce it (eg, Mansfield,1973; Roberts,1968). Although this process of adaptation may be complex, it does seem to represent a general 'coming to terms with reality'.

Faulkner (1974) studied this process amongst 'little league' hockey players in America. Most begin their careers with the high ambition of getting into a major professional team. However, there are fairly well defined age limits - "turning points" - by which time a player needs to have moved on or he must accept that he will never make it into a major team. As Faulkner describes (1974: 157-158):

> What occurs during these early and mid-career years of adult socialisation is not so much a stark collision of success dreams with the realities of recruitment and differential promotion by age as much as a condition of new mobility outlooks and motivations.... This kind of personal adaptation is rarely consummated in one dramatic movement or turning point. Rather it is contained in a process of self-redefinition that extends over time and is subjectively experienced in different ways by those affected.

The interaction between career ambitions and the achievement of higher career status thus appears to represent some process of adjustment, some 'coming to terms with reality', in which ambitions change over time to allow a redefinition of success against more attainable criteria.

Lewin (1936), reviewing a number of small scale psychological experiments, provides a useful discussion of the 'psychology of success and failure'. His conclusions on the basis of this review still seem highly relevant and worth quoting at length (Lewin, 1936: 930):

> These studies point to a relation between the level of aspiration for a specific task and something that one may call self-esteem, which means the feeling of the person about his own status and general standards. All experiments indicate that this relation is very fundamental. There is, for instance, a marked tendency in the case of failure, to blame an inadequate tool or an accident for the lack of achievement. To experience success or failure the person has to attribute the result of an action to himself in a very specific way. In cases of inadequate performance, the person often tries to get rid of the feeling by cutting the tie of belongingness between him and the result, and by rejecting his responsibility for the outcome. Also the tendency to raise the level of aspiration as high as possible seems to be closely related to the self esteem, particularly to the feeling of the person about his status in the social group. The level of aspiration is determined first by the upper limit of the person's achievement - in other words by his ability. A second fundamental factor is the level of achievement prevailing in the social group to which a person belongs - for instance, among his business friends, his comrades, his playmates. The social group can have a strong influence in keeping the level of aspiration either too high or too low for a person's ability.

Although the general validity of these conclusions beyond the small scale experiments on which they were based clearly requires empirical testing, Lewin's discussion is important in offering a general mechanism for the development of aspirations and the importance attached to them as a result of feelings of success or failure connected with a task. In general, feelings of success are reckoned to follow from the independent achievement of some important aspiration, and lead to the setting of higher levels of aspirations in the future; they will also

help maintain or increase the importance attached to this achievement. In contrast, failure to achieve some task may lead to lower aspirations in the future and a reduced importance being assigned to it, thus inhibiting the feelings of failure connected with the lack of achievement.

As a prelude to his model of "career sub-identity development", Hall (1971) discusses Lewin's ideas using the concept of "goals" to represent the level of achievement a person is aiming for, their 'realistic aspiriations' as it were. From this he describes the conditions under which feelings of success ("psychological success") will arise (Hall,1971:61):

> If (1) the individual sets a challenging goal for himself (ie, a goal representing a high level of aspiration), and (2) he determines his own means of attaining that goal, and (3) the goal is related to his self-concept, then he will experience psychological success upon attainment of that goal. This sense of personal success will lead, in turn, to an increase in self-esteem.

As Hall goes on to suggest, this mechanism of the development of success and failure may be applied in the case of the work career. Roth (1963) has described how the medical recovery careers of TB patients are punctuated by "benchmarks", small institutionally-defined signs of behaviour and privileges,which indicate to the patient how well they are progressing. In the same way it can be suggested that the attributes of career status serve as "benchmarks" which tell a person how 'well' they are progressing in their careers. The various dimensions of career status allow a person to evaluate their position

within the competitive activity of their careers, from which a sense of self-esteem may be derived. Career goals, representing particular kinds of career ambitions, are directed towards the attainment of particular levels of career status. Feelings of success or failure follow from the extent to which these goals are achieved.

Given the multi-dimensional nature of career status outlined earlier however, the situation is not quite so simple as that described by Lewin or Hall, since feelings of success connected with the career may arise from achievement of various types of career status. The importance attached to these different types may vary from person to person, being a subjective evaluation; this importance or saliency is reflected however in the concept of career orientations, so that a sense of success connected with attainment on one particular dimension of career status will depend upon the extent to which career goals are achieved and upon the saliency of the status-type.[1] Although there is little indication from previous research as to what form it may take, an overall sense of career success may be presumed to be some function of the feelings of success derived from all relevant types of status. This general feeling of career success is subsequently refered to here as "Psychological Career Success" (c.f., Hall, 1976:31), and for convenience is abbreviated to PCS .

1. This theoretical formulation is somewhat analagous to the prediction of levels of job satisfaction by 'expectancy theory', ie. that the level of job satisfaction depends upon the extent to which certain attributes expected in a job actually are to be found, and upon the saliency of these various attributes, although the precise nature of this saliency effect varies amongst theorists (eg, Locke, 1976:1303).

Expressing this relationship in mathematical symbols, if:

PCS_{t2} = Feelings of career success at time t_2

$G_{t1}(i)$ = Level of career goals of status-type i at time t_1

$Y_{t2}(i)$ = Level of achieved status of type i at time t_2

$O_{t2}(i)$ = Career orientations of status-type i at time t_2

F = Some function relating feelings of career success to salient goal attainment over all relevant types of status i.

* = Some function denoting effects of saliency on feelings of success derived from goal attainment

Then:

$$PCS_{t2} = F\left[(G_{t1}(i) \rightarrow Y_{t2}(i)) * O_{t2}(i)\right]$$

No consideration is given here to the nature of this function, the manner in which the saliency effect operates,[1] or the time interval involved in the mapping operation. These are discussed briefly in Part II with the available evidence. Very crudely, the above equation suggests that a person will feel a sense of career success to the extent that certain important career goals are achieved. While there is perhaps a certain amount of tautology to this equation (it might be argued that this is a definition of success), in fact the formulation does appear to be very important. It outlines a mechanism whereby certain 'objective' career achievements are 'subjectively' interpreted, an interpretation that may vary considerably from

1. Psychological treatments of "motivation theory" have typically used multiplicative relationships in handling the effects of "valence" - ie. the importance attached to different rewards (eg, Lawler, 1973:44-45).

person to person. Since the sense of PCS is thus very much a subjective assessment, the value of the above formulation lies in its ability to predict this level of PCS from the various postulated elements. This prediction is unlikely to be complete, since it is probable that the origins of PCS are rather complex, and other hypotheses may certainly be suggested.(For instance, a sense of career success might also depend, in part, upon the extent to which present career status appears to be conducive to the future attainment of some specific long-term career goal). The merit of the above formulation is thus dependent upon the extent of the PCS prediction achieved. It may be expressed as one of the Primary Hypotheses of the thesis, with an additional element (c) being added in Section 3.4.3, recognising the social basis behind evaluations of success:

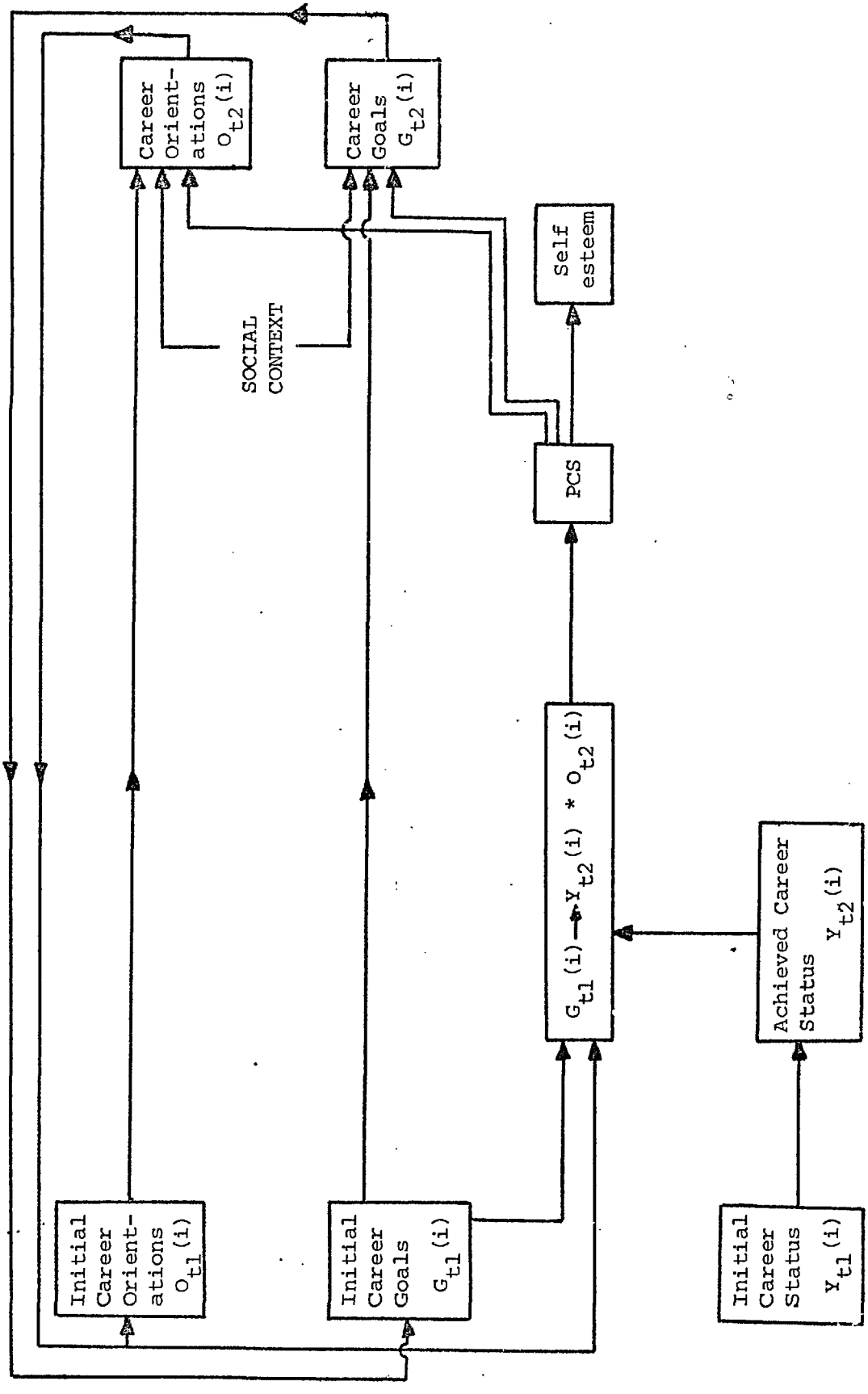
THE PCS HYPOTHESIS: The level of a person's PCS is influenced by:

(a) the extent to which their achieved career status fulfills their prior career goals;

(b) the current saliency of the achieved career status;

In line with this hypothesis and the ideas suggested by Lewin for the development of aspirations and feelings of success, several postulates may be made regarding the influence of PCS on career goals and orientations. Lewin suggested that success appears to raise aspirations and make them more important, failure having the opposite effect; the social context in which the task is set also having an influence on aspirations independent of this development. On this basis, the Success Model of Figure 3.2 is suggested

FIGURE 3.2 THE SUCCESS MODEL



for the development of career goals, orientations and PCS as career status is achieved. The following hypotheses are incorporated into the Model, supplementing the PCS Hypothesis:

- Feelings of career success resulting from achievement of career goals of status-type i will tend to increase future career goals and orientations of status-type i, whilst lack of achievement will tend to reduce them.

- Career goals and orientations will also be influenced by the social context of the actor.

The second of these hypotheses is examined in greater detail in Section 3.4.2 later this chapter. First, the influence of PCS on the level of a person's work involement is considered, thus completing the circularity of the Success Model of Figure 3.2, and outlining in specific terms a relationship between "career factors" and the level of work involvement, as originally suggested in the general Working Hypothesis.

3.3.2 The Involvement Model:

Following the ideas of Lewin(1936) and Hall (1971), the Success Model also postulates that feelings of career success (PCS) will influence a person's self-esteem. This concept is closely related to that of 'personal identity', to "how one defines oneself, what one means to oneself, how others define one and what one means to them" (Sofer,1972:8). The sense of personal identity derived from work will represent only one of a number of "sub-identities" (Hall,1976:29-33); family and other social activities may all contribute in some way to the formation of a person's overall sense of identity.

Work serves a number of different functions for people in general. As Sofer enumerates (1970:85):

> The main functions of work roles appear to be:
> (1) To provide economic returns that are a means to other ends.
> (2) To provide the person with opportunities to relate himself to society.
> (3) To enable the person to sustain status and self-respect.
> (4) To provide opportunities for interaction with others.
> (5) To contribute to personal identity.
> (6) To structure the passage of time.
> (7) To help ward off distressing thoughts and habits.
> (8) To provide scope for personal achievement.
> (9) To test and affirm personal competance.

Apart from (1) and possibly (6),all of these seem to contribute directly or indirectly to the establishment of personal identity and self-esteem. Hughes (1958:43) also emphasises this function of work in claiming that:

> ... a man's work is one of the more important parts of his social identity, of himself; indeed, of his fate in the one life he has to live.

The sense of self-esteem derived from PCS is clearly only one of the bases by which work influences this personal identity. For example, for many manual workers, their relationships with their colleagues and their status within work-groups may have a considerable bearing on their work-based 'sub-identity' (eg, Roethlisberger & Dickson,1939), which in turn may be a relatively small part of their overall personal identity. However, to the extent that career advancement is important to people, to the extent that their work-based'subidentity' is relatively 'large' , then a sense of PCS will be an important factor influencing their self esteem. The achieved positions of career status thus act as indicators of personal worth, through the feelings of PCS which they engender. The more a person's self-esteem comes to depend upon this feeling of career success, the more their personal identity becomes bound up with a work-based self-esteem, then the more career success is sought after. This means competing for higher career status, which, given the usual nature of organisational Career Systems, typically accrue on the basis of hard work.

Ashton & Field (1976) have illustrated this inter-relationship between work involvement, the importance of a work-based identity, and feelings of career success for different groups of 'young workers'. For those in "extended careers" they argue that :

> The fact that such occupations provide a relatively long career ladder means that the young people who enter them are once again working, as they were at school, for long-term rewards. The images they have of themselves are shaped not only by their present occupational activities, but also by their potential achievements. Once again they are involved in a competitive struggle for advancement, this time within a career in which the fruits of success, in terms of the salary they can eventually obtain and the authority and prestige they can command, are substantially greater than those available to other young people. However, for them to be certain of achieving this success they will have to concentrate their efforts and subordinate their other interests to their work.
>
> (Ashton & Field,1976:91-92)

As feelings of career success enhance self-esteem, so the work-based 'subidentity' becomes a relatively more important part of the individual's personal identity; as such a high work involvement is necessary to gain further career status, maintain the feeling of success and thus sustain this identity. Hall (1976:32) has traced out this circular mechanism, suggesting that the "choice of challenging goals" is conducive to "independent effort","goal attainment", and thus to "PCS"; this in turn "increases self esteem",leads to a "more competent identity", and an "increased career involvement", which results in more challenging goals being chosen. The influence of self-esteem on work involvement, in turn influencing career status,is thus added to the Success Model to produce Figure 3,3 , which is refered to as the Involvement Model. This completes the circularity of the former model,outlining explicitly a mechanism by which career developments influence and are influenced by the level of work involvement.

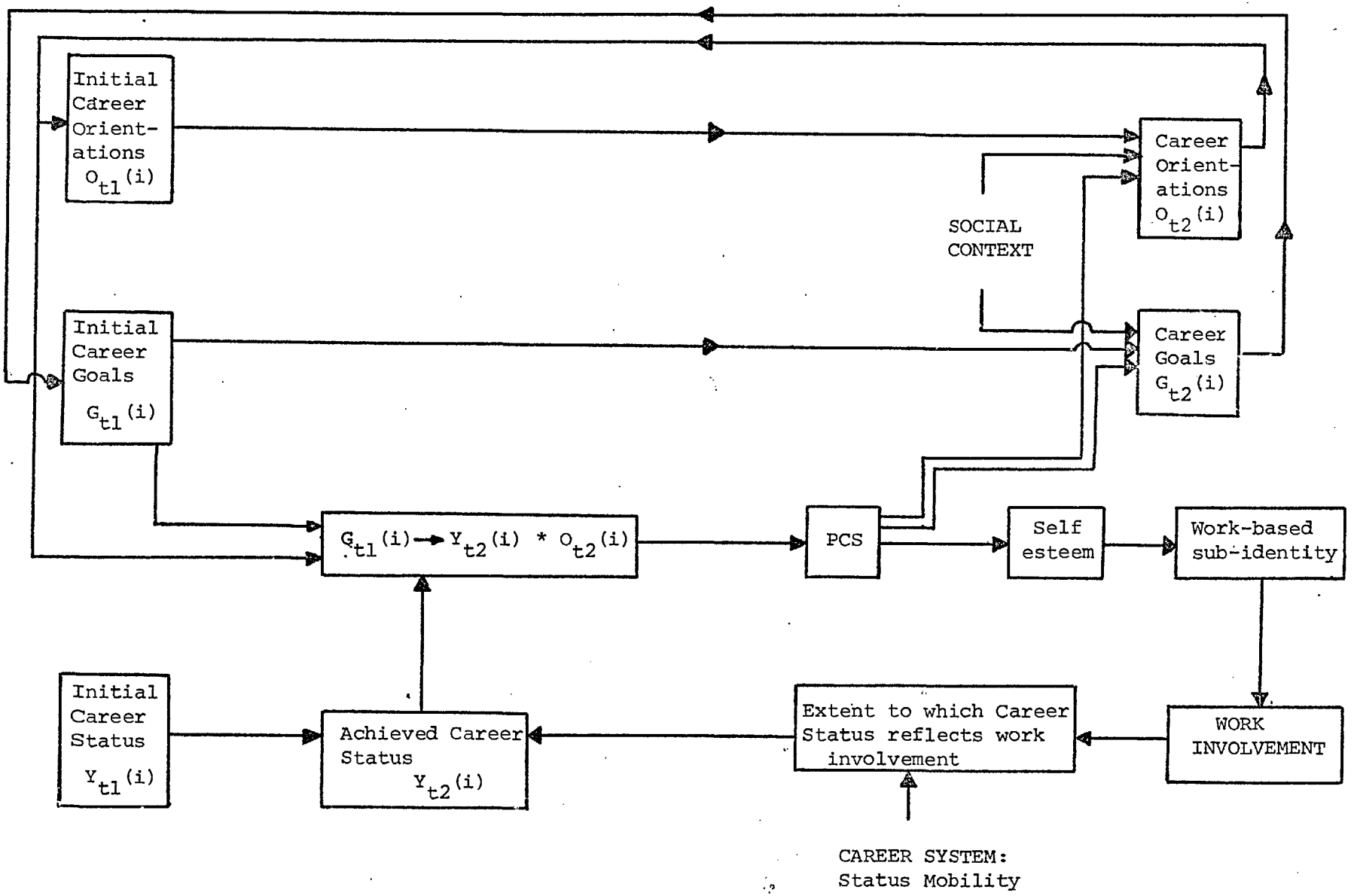


FIGURE 3.3 THE INVOLVEMENT MODEL

The extent to which work involvement will actually result in higher career status being achieved depends on the nature of a particular Career System, as indicated in Figure 3.3. Although it may typically be supposed that hard work forms the basis for gaining higher career status, in practice this may also depend upon such factors as company seniority, age, particular qualifications, or knowing the 'right people', etc. Even in cases where, for example, promotion is based mainly on results, the production of these results may also depend less upon hard work than 'innate ability', upon occassional flashes of brilliance which have nothing to do with the hours worked or the effort expended in the job. The extent to which work involvement does lead to higher career status will be an important attribute of a particular Career System, and it may be that where this does not occur, where there is no "closure" to the Involvement Model, other relationships may affected.[1]

As shown however, the Involvement Model allows the Working Hypothesis to be formulated more precisely, so providing another of the Primary Hypotheses of the thesis. Because of likely empirical difficulties over measuring the

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1. Vroom's"expectancy theory" specifically embodies this probability that a given effort will be directly rewarded. As he argues (1964:284): " The force on a person to exert a given amount of effort in performance of his job is a monotonically increasing function of the albebraic sum of the products of the valences of different levels of performance and his expectancies that this amount of effort will be followed by the attainment". Indeed, psychological treatments of "motivation theory" (eg, Lawler, 1973:112-147) typically relate the motivation to expend effort with the rewards directly accruing. The Involvement Model extends such ideas by arguing that the extent of goal attainment additionally serves to motivate further effort in the competition for future career status.

concepts of "work-based self-esteem" and "work-based subidentity", this is more conveniently formulated in terms of a relationship between PCS and work involvement:

INVOLVEMENT HYPOTHESIS: PCS is an important determinant of the level of work involvement.

Or, in other words, because some people feel more successful than others in their careers, they will tend to be more involved in their work.

3.4 Paradigm Interactions with career situs:

The Involvement Model postulates that career factors influence the level of work involvement, as part of an interaction between career status and certain career attitudes. To complete this model as a scheme of career development and thus to establish a general basis for the factors influencing PCS and work involvement, consideration is also necessary of the interaction with the other structural dimension of the Career Paradigm, the career situs.

In outlining his scheme of career development, Mansfield (1973:108) identified three development processes:

> First, there is the process of socialisation, by which the individual adapts to his social environment. Secondly, there is the process of career choice, in which the individual decides between the various alternatives he sees open to him at a given time. Thirdly there is the process of environmental change, in which the individual's social environment alters.

The Paradigm interaction described in the previous section might be considered as a process of 'socialisation' in these adaptation terms, although this instance does not represent a particularly common use of the term (eg, Brim & Wheeler,1966). For the purposes of examining interactions with career situs however, both "career choice" and "socialisation" may be seen as twin mechanisms of the way in which the social context (ie,the career situs) is influenced by and influences a person's career attitudes. The third mechanism of "environmental change" is not considered explicitly here, although insofar as aspects of the Career Context do constrain Paradigm interactions, their change will be reflected accordingly.

3.4.1 Career Choice:

During a person's career various kinds of jobs may be chosen or offered to them, perhaps involving changes in work organisation or just changes in their job within a current organisation. Although such changes may involve status mobility, career choice may conceptually be thought of as involving choice between different career situs; status mobility being something that is achieved rather than chosen. Such choice may occur at times throughout the whole course of a person's career, although the bulk of the academic literature on this subject tends to be confined to "occupational choice", an emphasis only partially justified by its considerable importance on the course of career developments.

Few of the theories that have emerged in the literature regard occupational choice as a random phenomena. Despite the differences amongst theoretical writers, most consider occupational choice, to be a purposive affair. Most too seem to agree with Ginzberg's classical outline of occupational choice as a lengthy process that is largely irreversible and which involves a compromise between an individual's occupational preferences and the constraints of the labour market (Ginzberg et al,1951). However, it is mainly in attempting to add greater precision to this model of occupational choice that differences emerge among the various writers.

The theoretical framework suggested by Blau et al (1956) embodies this notion of an interaction between "individual"

and "occupational" factors as its central feature and subsumes under each category most of the characteristics utilised by other writers before or since. Unfortunately this very broadness strips it of much practical value. In contrast, Super (1957) has developed a theory of occupational choice based more simply upon the implementation of a "self concept": he suggests that individuals tend to enter occupations they see to be congruent with their evaluation of their own identity. This wholly psychological formulation extends Ginzberg's ideas of a career as a process of growing self-actualisation and incorporates a mechanism of adjustment between occupational aspirations and expectations.

Although Super's theory has received some empirical support (eg, Brown,1968; Timperly & Gregory,1971), as a theory of occupational choice it is incomplete because it fails to consider the social context in which the self-concept arises and the part played by social institutions in the choice process. Clearly, occupational choice will be affected by a variety of labour market and similar factors which constrain individual discretion (eg, Roberts,1968). However, wholly sociological treatments of occupational choice have proved largely inadequate in handling individual discretion (eg, Ashton & Field,1976; Musgrave,1967).

While there seems little doubt that some degree of self-selection takes place between individuals and occupations, the particular basis of this selection is less apparent. Holland (1966) and Roe (1956) have developed work based upon matching personality characteristics to occupational

categories, but while some self-selection can be distinguished, in general such occupational stereo-types are not sufficiently powerful to account for much overall prediction. Furthermore, such approaches are rather static and fail to consider the ongoing nature of the interaction between occupational preferences and job opportunities.

As Ford and Box (1967: 288) suggest, most of the theories of occupational choice:

> can be summarised as entailing the view that occupational choice represents the culmination of a process in which hopes and desires come to terms with the realities of the occupational market situation.

In other words, occupational choice represents some compromise between an individual's preferences and the labour market constraints of the occupational structure. To the extent that career ambitions and orientations are expressions of such preferences, then occupational choice may be viewed as the outcome of some interaction between these career attitudes and the constraints of the labour market. The precise nature of this interaction however cannot reasonably be generalised from previous studies.

Subsequent career choice, after an initial occupational choice has been made, has received rather limited empirical study. However in this regard, Roos (1978) and Spilerman (1977) both illustrate the effect of intra- and inter-organisational labour market factors on career developments, while Box & Cotgrove (1966) suggest that the scientists in their study tended to choose work in an industrial, governmental, or university context congruent with certain "scientific orientations"; a self-selection by both parties which was

thought to reduce the incidence of "role strain". Katz & Martin (1962) argue that career choice typically involves a "series of unplanned, situation-bound acts", although to what extent these follow the same general pattern as initial occupational choice is questionable, given the limited research on this subject. However it seems a reasonable proposition, for the purposes of constructing a general model of career development, to suggest that this will be the case: ie, that the outcome of particular career choice decisions at stages throughout the career will represent some interaction between the individual's career preferences - his career ambitions and orientations - and the constraints of the labour market. This latter in fact is embraced by the dimensions of the incumbent's Career System, insofar as these are germane to situs mobility. The outline of this postulated career choice process is shown in Figure 3.4 produced later.

3.4.2 Socialisation:

The influence of the social context on a person's aspirations was remarked upon by Lewin (1936) in the passage quoted above (Section 3.3.1), and in general it seems that the desire to compete for career rewards and the levels aimed for have this distinct social basis. That is, in addition to any effect which PCS may have on them, career ambitions and orientations may also be influenced by the social context of the actor. Such contexts may be delineated by categories of career situs, although not necessarily all career situs categories may be relevant in this regard.

The effect of differences in social class background on the level of a person's ambition is well documented (eg, Hyman,1953;Reissman,1953). Crudely, people of higher social class origins tend to have higher levels of ambition, although in terms of relative social mobility this may not necessarily be so (Empey,1956). Particular educational experiences, such as attending high status schools or universities, may have a corresponding effect on subsequent levels of ambition (eg, Kelsal et al,1972; Turner,1964). Similarly,certain kinds of career orientations may develop as a result of experiences in particular institutions or social environments (eg, Merton et al,1957). For example, Miller & Wagner (1971),in a survey of American scientists and engineers, found that people with a longer university education tended to have a stronger "professional orientation" to their work. In general it appears that certain career attitudes - both ambitions and orientations - may develop as a result of particular socialisation experiences, and are retained to a greater or lesser degree for later periods of time.

Complementary to such "prior socialisation" however, within a given social context a person's attitudes may change as a result of being in that context. For example, Newcomb (1943),in the Bennington study, has illustrated how students' political attitudes developed at college according to the reference group they adopted. Frank (1935), in a psychological experiment, illustrates the effect of group norms on the level of aspiration, a finding echoed by Lewin (1936).

The members of certain categories of career situs may thus function as a "normative reference group" (Kelly,1952), exerting a normative influence on the level of a person's future career goals and the type of career orientations presently held. In general,a normative reference group will be one in which a person is a member, although not all situs categories will serve this function, nor all normative reference groups be situs categories.

The actual choice of a particular career situs may be influenced by a person's career ambitions and orientations in some way, as discussed above, but where some discrepancy exists between the attitudes of prior socialisation and the prevalent group norms some interaction may take place between them. For example, Barnes (1971), in a study of British science graduates, has illustrated how their scientific ideal of publication freedom was quickly eroded in the face of organisational restrictions; the scientists' main interests being to "make out" in their companies. Similarly Becker et al (1961) report the decay of "idealism" regarding the extent of study work possible amongst student doctors who were faced with increasingly heavy work-loads; they argue that socialisation should be seen as an interactive process in which the individual's prior attitudes adapt to the demands of a particular situation.

However, the actual nature of this interaction appears complex. Becker (1964) stresses the individual's commitment to the particular context as an important factor influencing the degree to which group norms are adopted. The "role

theory" approach to this socialisation process has been outlined by Brim (1966: 8-9):

> In the life of every person, there are a number of people directly involved in socialisation who have great influence because of their frequency of contact, their primacy, and their control over rewards and punishment....
> the individual learns the behaviour appropriate to his position in a group through interaction with others who hold normative beliefs about what his role should be, and who reward or punish him for correct or incorrect action.

In role theory terms, the concept of socialisation itself may be considered as one of "learning to occupy roles" (Musgrave,1967: 34). However, the extent to which particular norms are taken up, why some are adopted and not others, and how much "deviancy" may be tolerated in a particular context; these issues are not very well handled by this approach (eg, Becker,1963).

For the purposes of a general model of career development, it appears sufficient to consider socialisation as a general process of interaction between prior attitudes and situational norms. That is, the career ambitions and orientations that develop in a particular career situs as a result of socialisation will be the outcome of some interaction between the norms prevalent in that social context and the prior ambitions and orientations with which a person enters it. However, the details of this interaction are left unspecified in this discussion.

3.4.3 The Social Context of Success:

In addition to this development of career ambitions and orientations through socialisation, it also seems likely that feelings of career success will be affected by the social context of the actor. Given the evaluative nature of this concept however, it is the "comparative" rather than the "normative"functions of reference groups which appear to be involved.(Kelly,1952).

As discussed earlier (Section 3.2.2), the concept of status is used in two ways by sociologists: one refering to the 'objective' attributes of a particular role, the other to the 'subjective' evaluation of its position in some general hierarchy of status. In defining the 'objective' characteristics of the career, the former concept has been employed, although in assessing PCS it is some'subjective'evaluation that is undertaken. Using the previous symbols, it is the mapping: $G_{t1}(i) \longrightarrow Y_{t2}(i)$ that represents the'subjective' interpretation of an 'objective' position, providing a specific case of the general framework suggested in Chapter 2; that the subjective experience of work is the outcome of some interaction between the structure of the work role and a person's orientations to it.

It is a person's career goals that represent the 'subjective' criteria against which 'objective' career status is evaluated on this formulation, thus giving a sense of PCS. As such,people with different career goals will interpret similar levels of career status in

different ways. For example, the son of a coal-miner, who is earning £7,000 a year as a dentist, may think he has been very successful in his career; the son of a cabinent minister in a similar job may consider himself very unsuccessful.

The concept of PCS is thus analogous, in an inverted sense, to that of "relative deprivation" (Stouffer et al, 1949). Indeed the proposition suggested by Hopper & Pearce (1973:241) as a formulation of "relative deprivation" is rather similar to that used in the PCS Hypothesis.

> The greater the size of the relative discrepancy between a level of normative expectations and a level of achievement (goal orientation) with respect to an object which has been highly valued as a goal (achievement orientation; with respect to income, an economic orientation), the greater the feelings of relative deprivation with respect to this goal.

Runciman also employed the concept of relative deprivation to account for the acceptance of social inequality in Britian. As his theoretical discussion begins (1966:13):

> The related notions of "relative deprivation" and "reference group" both derive from a familiar truism: that people's attitudes, aspirations, and grievances largely depend on the frame of reference within which they are conceived.

At a particular time people will have some idea about 'successful' levels of career status from standards they pick up from certain others. Sofer (1970), for example, noted that the managers and technical specialists of his study had a fine age-related conception of the level of promotion that constituted "success".at points

in their careers. In this case, the cues for evaluating "success" appeared to be taken from the promotion levels of other managers and technical specialists, both within their companies and outside them.

In the same way that feelings of relative deprivation are affected by the "comparative reference group" (Kelly, 1952) of the actor, so feelings of PCS are likely to be influenced by a person's "comparative reference group", establishing criteria for evaluating success at particular times. This may complement the development of PCS that arises from the attainment of salient career goals held some time in the past, as postulated by the PCS Hypothesis, effectively modifying the levels of past goals against which present status is evaluated.

For example, Mansfield (1971) has suggested that the career goals of young graduates on starting work in industry may be very vague and imprecise. Thus it may be that for such people "successful" levels of career status are formulated more precisely by the cues taken from some particular comparative reference group. In fact it might well be that their initially vague career goals serve mainly to select particular comparative reference groups, from which more specific evaluations of PCS may be derived.

Whether or not this is the case, which people actually represent a person's comparative reference group at a particular time tends to be problematic (eg, Merton

& Rossi,1949). In evaluating social status there is evidence to suggest that comparisons tend to be made with visible, socially-proximate groups (eg, Reissman,1953; Runciman,1966). Festinger in fact has expressed this as the postulate (1954:121):

> Given a range of possible persons for comparison, some-one close to one's own ability or opinion will be chosen for comparison.

However, it is difficult to generalise much further on this subject for present purposes. Comparative reference groups may be ones in which a person is a member or they may be ones to which he aspires (eg, Hyman, 1942). Certain categories of career situs, representing particular social groupings to which a person belongs, may function as comparative reference groups, although not all such groups will thus necessarily be covered.

In summary then, the Success Model of Figure 3.2 may be complemented in two distinct ways, representing the influence of particular social contexts on career developments. The first is the process of socialisation in which certain situs categories may function as normative reference groups: through influencing the levels of future career goals, they will affect future evaluations of PCS; through influencing career orientations they will affect current evaluations of PCS. Secondly, however, certain situs categories may function as comparative reference groups, thus influencing the level of career goals against which present career status is judged and PCS evaluated.

3.4.4 The Career Development Model:

These effects, together with that of Career Choice, are added to the Involvement Model to produce Figure 3.4. This provides a general description of mechanisms involved in career development, as well as illustrating the impact of career factors on work involvement. It is refered to as the Career Development Model and forms the basis for much of the subsequent empirical investigation reported in Part II. Following the discussion of the previous three sections, a number of additional hypotheses are suggested.

- Choice of career situs throughout the work career represents a compromise between a person's career goals and orientations and the labour market and other situs constraints of a particular Career System.

- Certain career situses may function as normative reference groups; as such, a process of socialisation may be postulated in which career goals and orientations develop over time, the result of some interaction between the norms prevalent within the context and the prior goals and orientations with which a person enters it.

- PCS Hypothesis:

  The level of a person's PCS is influenced by:

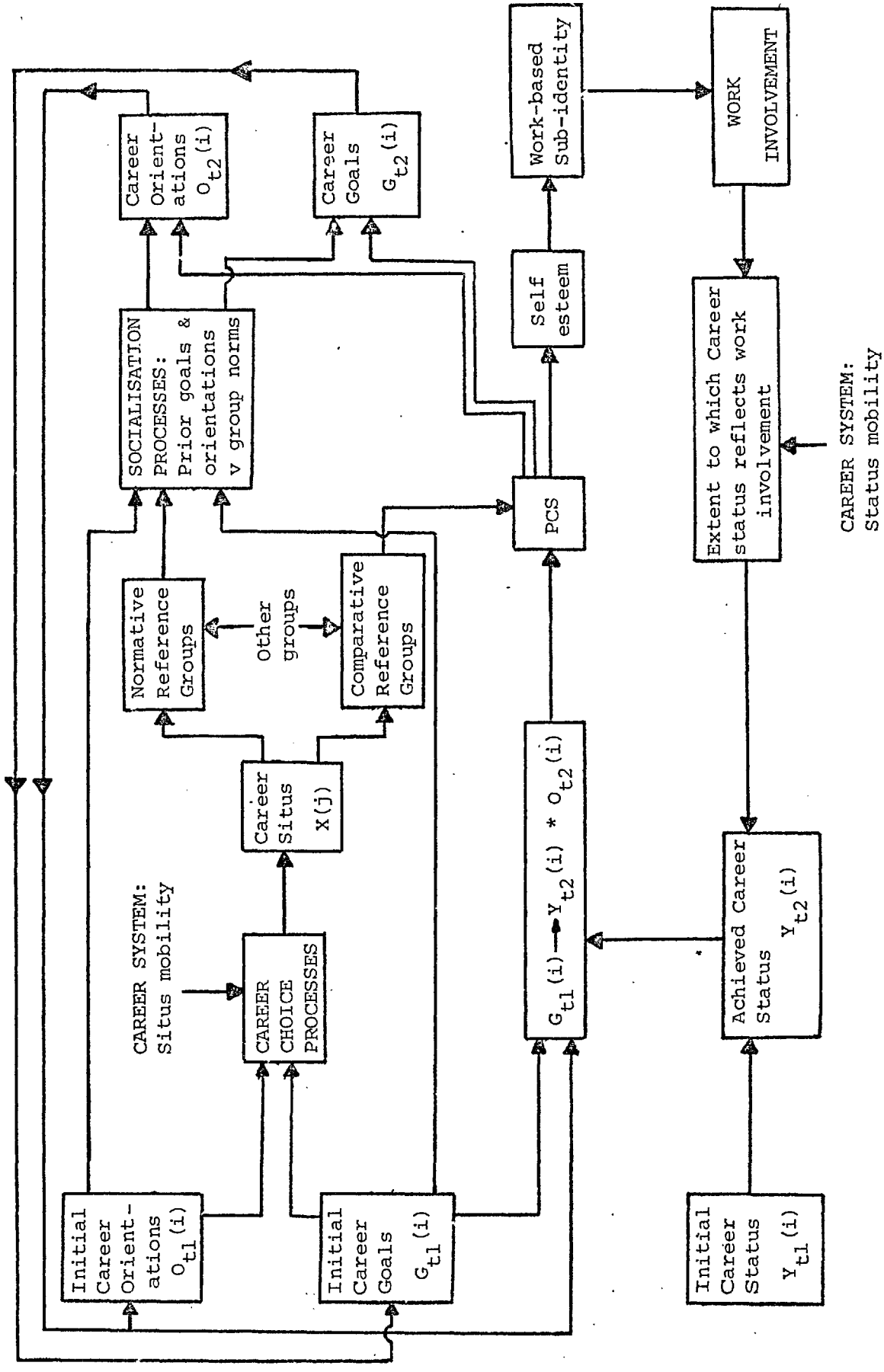
  (a) the extent to which their achieved career status fulfills their prior career goals;

  (b) the current saliency of the achieved career status;

  (c) the effects of their comparative reference groups on standards of achieved career status;

The Career Development Model however does not specify the periods of time involved in any of the feedback loops or in the mapping of career goals on to career status. With little available evidence, these issues are left open for later exploration. As such, the Model

FIGURE 3.4 THE CAREER DEVELOPMENT MODEL



as presented is essentially 'ahistorical', although some differences in the nature of career development over the course of the career might seem likely. A number of writers have, in fact, suggested that particular "career stages" may be identified, involving distinct phases of career development.

Erikson (195) has outlined an 8-stage model of identity development over the life-cycle; Miller & Form (1951) distinguish five distinct stages of occupational development, while Super & Bohn (1970) suggest a model of career development effectively combining these two. Their scheme identified three main stages in the adult career: from starting work to about 25 years; from 25 to 45; and from 45 to retirement. The first is an early period of "exploration", the second a period of "establishment and advancement", and the third a period of "maintenance and stability". This three-fold division is also employed by Hall (1976) in his discussion of careers in terms of "early", "middle", and "late" career stages. Some empirical support for the validity of a 3-stage model is offered by Hall & Mansfield (1975), although the ages at which these were found to occur do not correspond exactly with those found by Super & Bohn.

In fact the transition from "middle" to "late" career stages may represent a period of "mid-life crisis". This was classically identified by Jaques (1965) for a number of creative "artists". He argued that the period around the ages of the late 30's and early 40's seemed to be one of considerable stress, as evidenced by a high

suicide rate and a sharp transition in the work of these artists before and after the period. This age period also seems to generally correspond to a time when physical aging and the awareness of future death become more acute (Levinson,1969). At work, people begin to realise the limitations on their future achievements, and some may switch to a new line of work (Sofer,1970), in this way attempting to gain more meaning from their scarce working years.

However, the actual prevalence of this mid-life crisis throughout the labour market and the form in which it takes has not been well-documented. Theoretically the phenomena represents a mechanism of sharp adjustment; a brutal 'coming to terms with reality'. Whether this adjustment is so traumatic for workers other than the emotional and highly involved groups of artists and executives studied by Jaques (1965) and Levinson (1969) respectively may be questionable. For instance, it may be that other groups hold fewer illusions of reality, and that in consequence their adjustment is more continuous throughout their careers.

The generality of a sequence of career stages as an'inherent' developmental phenomena is also debatable. Such stages may, for example, reflect highly specific institutional arrangements surrounding education, the career and family life-cycle developments, particularly amongst the American middle classes from which most of the schemes are devised. Although suggesting that 3 career stages could be distinguished for their sample of R & D

specialists, Hall & Mansfield (1975) also aknowledge that age-related trends were weak. Environmental changes had a much greater impact on measures of "needs" and other work attitudes, leading them to suggest that (1975:209):

> The different environmental conditions also affected the relationships between age and the career variables. This suggests that the age-related differences which were found may reflect not only natural development changes, but also the results of differential treatment of people in various age groups under different conditions in organisations.

While thus recognising the possible influence of such "natural development changes", there seems little virtue in further complicating the Career Development Model by additionally considering discrete career stages explicitly within the schemata. Figure 3,4 is thus taken as the main model for subsequent empirical investigation of career developments and their effects on work involvement.

3.5 Summary

This chapter has attempted to examine at a broad theoretical level certain of the processes involved in an individual's career development, seeking in this way to account for differences in the levels of work involvement between different people. After suggesting a basic Career Paradigm and looking at the interaction between its structural and attitudinal components, a general Career Development Model has been built up, as depicted in Figure 3.4. A number of mechanisms are postulated, two of which represent Primary Hypotheses of the thesis: that PCS is an important determinant of work involvement; and that PCS itself will depend upon the extent to which past career goals are achieved, the saliency of the type of status involved, and the influence of particular comparative reference groups. The remainder of the suggested mechanisms are summarised by the Figure.

CHAPTER FOUR

COMMITMENT AND IT'S BASES

> We can explain the fact that men ordinarily settle down to a career in a limited field, and do not change jobs with the alacrity of the proverbial economic man under changing market conditions, by refering to a process whereby they become committed to a particular occupation.
>
> Howard Becker;
> Notes on the Concept of Commitment.

4.1 Introduction

The mechanisms suggested in the Career Development Model are likely to have significant implications for the engineers' occupational behaviour - for the various movements between career situses that are made over the course of the career. In particular, certain lines of work activity are likely to prove attractive or otherwise according to their significance for the engineers' career advancement. Resultant occupational behaviour will, of course, depend in part upon the 'structural' constraints of particular labour markets, but it will also partly be influenced by the engineers' commitments to remain in particular career situs. While occupational behaviour is only manifested at certain moments over the career, some indication of likely moves can be gathered from the sense of commitment expressed at any particular moment. Thus, this present chapter turns to examine the bases of workplace commitment and the influence which career developments and the level of work involvement are likely to have on them. This involves a change of focus from the

previous chapters - from an examination of the determinants of work involvement, to a consideration of one particular consequence. In this way, some illustration of the significance of this concept to one important aspect of work-place behaviour is provided.

4.2 The Concept of Commitment:

Commitment is an important theoretical concept in sociology. In accounting for regularities in patterns of behaviour, for example, an analysis of commitment may help explain the existance of 'social order'. Probably the most useful theoretical treatment of the concept is provided by Becker, who begins his discussion by outlining the variety of its uses (1960:32):

> The term "commitment" enjoys an increasing vogue in sociological discussion. Sociologists use it in analyses of both individual and organisational behaviour. They use it as a descriptive concept to mark out forms of action characteristic of particular kinds of people or groups. They use it as an independent variable to account for certain kinds of behaviour of individuals and groups. They use it in analyses of a wide variety of phenomena: power, religion, occupational recruitment, bureaucratic behaviour, political behaviour, and so on.

Becker goes on to argue (1960:32) that "sociologists typically make use of the concept of commitment when they are trying to account for the fact that people engage in consistent lines of activity", and it is in attempting to account for this consistency that he employs the concept.

Within industrial sociology, attention has predominantly focused on commitment to two particular "lines of activity". A large number of studies have examined "organisational commitment" and its determinants, usually from a social psychological perspective, while others have considered "occupational commitment", particularly where this is seen as resulting from past socialisation experiences and the development of professional values.

Concepts are rarely identical however and in the research literature at least three aspects of "organisational commitment" can be discerned ; "identification", "involvement", and "loyalty" (eg, Steers,1977). These have been employed singly or together, although some empirical association is typically observed (eg, Buchanan,1974). In general, identification refers to "the extent to which the individual accepts the values and goals of an organisation as his own" (Schneider et al,1971:397), organisational involvement to the "willingness to exert a great deal of effort to achieve organisational goals" (Porter et al, 1974:605), and loyalty to a "strong desire to maintain membership in the organisation" (Steers,1977: 46).

Although embracing somewhat different facets of the concept, each of these involve a particular kind of bond or attachment between the individual and the organisation. It is this attachment which gives rise to the consistent behaviour argued by Becker. In fact the variety of its uses means that commitment may refer to attachment to a number of different concepts: to certain values or principles, to the achievement of certain outcomes, etc. However, for the present discussion there seems some merit in following Becker's example and just considering commitment in terms of attachment to particular "lines of activity" (Becker,1960:32). In this way some problems of generality are avoided in examining the bases on which commitment rests, since it may be that these involve different mechanisms in the above cases. Thus for the purposes of this discussion,

which is concerned to investigate work-related commitments, commitment will refer to a sense of attachment between an individual and particular lines of work activity. In the empirical analysis reported in Part II, these lines of activity are represented by commitments to the present department, organisation, engineering branch, and occupation.

At a particular moment in time commitment is thus essentially a latent concept. It refers to a sense of attachment between a person and certain lines of activity, and as such represents a personal disposition or inclination on their part to those lines. This inclination may be infered empirically from expressed attitudes, as well as past and anticipated future behaviour regarding the activity. However, the extent to which actual behaviour manifests this sense of commitment at a given time will depend upon the strength of other competing allegiances, as well as other external determinants of behaviour. For example, Marsh & Mannari (1977) suggest that present organisational turnover will depend upon a person's organisational commitment at some previous time, together with"other determinants of turnover", eg, the state of the labour market. In their longitudinal study of psychiatric technicians, in fact, Porter et al (1974) found that organisational commitment measures only predicted subsequent turnover in time periods closest to when people left. Thus while organisational turnover may be one behavioural manifestation of organisational commitment, it may not reflect the sense of attachment directly because of other influences on behaviour.

This sense of attachment to particular lines of work activity may be of different kinds. March & Simon (1958), for example, distinguish between a person's "decision to participate" and their "decision to stay" in an organisation, outlining a different basis for each. Flowers & Hughes (1973) suggest that while some people may "want to stay" in an organisation, others may "have to stay", because of the various losses involved by leaving. Similarly, two distinct types of commitment are proposed for use in the present instance. These are refered to as Affective and Necessitative Commitment. Affective Commitment involves people actively wanting to stay and participate in some line of activity, as expressed behaviourally through a high level of participation and attitudinally through feelings of identification. Necessitative Commitment involves people having to stay in some line of activity; it is manifest behaviourally through low turnover and attitudinally through a sense of 'being trapped', of 'having no other option'(eg,Guest, 1954). These two types of commitment are not mutually exclusive, but represent two distinct kinds, either of which may be strong or weak. Thus, for example, following Flowers & Hughes (1973),a typology of high and low, Affective and Necessitative Commitment may be drawn as shown in Figure 4.1.

On the basis of this distinction, it may be postulated that a person's commitment to some line of activity may be represented by the sum of their Affective and Necessitative Commitments, of them 'wanting to stay' and

FIGURE 4.1 A TYPOLOGY OF COMMITMENT

Figure shows examples of occupational groups who may typically portray the types of organisational commitment suggested by the general typology.

NECESSITATIVE COMMITMENT	AFFECTIVE COMMITMENT: Weak	AFFECTIVE COMMITMENT: Strong
Strong	Eg. Old, unskilled manual workers	Eg. Some professionals and specialists
Weak	Eg. Young, unskilled manual workers	Eg. Some managers and executives

'having to stay'. That is:

COMMITMENT TO STAY	=	AFFECTIVE COMMITMENT	+	NECESSITATIVE COMMITMENT

While it may be that the Commitment to Stay does indeed depend upon both Affective and Necessitative Commitments, this formulation goes further in postulating an additive relationship, with the Commitment to Stay fully determined by the two. This is perhaps a fairly crude presumption, although it is one which later assists the empirical analysis of Chapter 11; in fact, as the results of that chapter suggest, it is not entirely groundless.

In the case of commitment to a particular employing organisation for example, the above formulation posits that the Commitment to Stay will be given by the sum of the Affective and Necessitative Commitments, of the extent to which people want to stay and have to stay in the organisation. Of course, the extent to which this Commitment to Stay is actually manifested as organisational turnover will also depend upon various other 'external' factors, such as the current labour market (eg, Marsh & Mannari, 1977). Thus it may be suggested that if:

$P(j)$	=	Probability that a person will actually leave work activity j.
F	=	Some function
$C_s(j)$	=	Commitment to Stay in line of work activity j
Δ	=	External factors influencing turnover; job market conditions, etc.

Then:

$$P(j) = F(C_s(j), \Delta)$$

4.3 The Bases of Commitment

While commitment may thus be used as a theoretical concept to explain consistency in behaviour, its value obviously depends upon the extent to which the origins of commitment themselves may be accounted for; that is, upon understanding why one person should be more committed to some line of activity than another.

Although theoretical explanations of commitment are few, rather more empirical studies have attempted to investigate those factors related in some way to variations in commitment, thus seeking to account for its origins. These latter tend to be of two kinds: one in a sociological, the other in a rather more social-psychological tradition.

The former emphasises the importance of socialisation and the values acquired during some particular periods of education, training, or early work experiences (eg, Berlew & Hall,1966;Merton et al,1957;Miller & Wagner,1971). The development of occupational commitment is most frequently treated in this way, seen as the product of professional or other socialisation, with the values of occupational commitment thus acquired remaining stable, to a greater or lesser extent, throughout later years. However commitments to other lines of work activity seem less readily interpretable through this sort of approach. While socialisation may help understand why a person holds certain values, it does not seem to offer a full explanation of commitment mechanisms.

The second group of studies tends to be more social pyschological in approach, focusing upon an individual's commitments as they appear at one particular time. Most of this research is thus ahistorical, and tends to be restricted to looking at organisational commitment and factors related to it, although some attention may also be given to occupational commitment as a source of competing allegiances. This work is largely American and seems to have been undertaken with a view to recommending ways of increasing organisational commitment. Consequently, organisational and individual characteristics as possible influences on commitment have been heavily studied, to the neglect of wider social or economic variables outside the work-place. A summary of the main empirical research in this tradition is presented in Table 4.1.

While a number of themes appear to recur in these studies, for the amount of work undertaken the results are fairly inconclusive. Reviewing a number of them, Buchanan (1974) suggests that the key factors most frequently correlating with organisational commitment are years of service in the organisation ("tenure"), aspects of social interaction with peers or superiors, job achievement, and hierarchical advancement, as these terms are variously employed by the different authors.

Steers (1977) adopts a similar line in distinguishing a framework of three basic factors, which he suggests have most influence on commitment: "personal characteristics", "job characteristics" and "work experiences". Under the

TABLE 4.1 THE CORRELATES OF COMMITMENT: REVIEW OF RESEARCH

(Table summarises main findings of major empirical research into organisational & other commitments and their correlates.)

Author(s) and year.	Details of sample (American unless specified.)	Commitment variable studied	Factors found to be related to commitment variable at 5% significance level or lower; (Generally Pearson correlations, although other tests for non-scalar variables.)
Allutto, Hrebiniak & Alonso (1973)	395 nurses & 318 teachers	Organisational commitment	Age, marital status, satisfaction with bases of organisational advancement, lack of further educational plans.
		Occupational commitment	Existance of further educational plans.
Brown (1969)	834 TVA employees	Organisational identification	Satisfaction with: salary, co-workers, promotion Seniority, rank.
Buchanan (1974)	279 business & government managers	Organisational commitment	Factors relating to seniority, social interaction, job achievement, hierarchical advancement.
Dubin et al (1975)	409 bank staff, 605 blue collar workers	Organisational commitment	Central life interest
Flowers & Hughes (1973)	406 workers	Organisational commitment	Job satisfaction, "environmental pressures".
Grusky (1965)	1,649 business managers	Organisational commitment	Overcoming obstacles to organisational rewards
Hall & Schneider (1972)	72 priests, 90 R & D staff 141 Forest Service workers	Organisational identification	Job satisfaction, job challenge, seniority (not R & D staff), self-image (Foresters only), type of career pattern.

TABLE 4.1 (cont.)

Hall et al (1970)	141 Forest Service workers	Organisational identification	Organisational tenure, commitment to service ethic, satisfaction of "higher order needs".
Hrebiniak & Allutto (1972)	395 nurses, 318 teachers	Organisational commitment	Role tension, tenure, dissatisfaction with bases of organisational advancement, sex, marital status, father's occupation.
Lee (1971)	170 Health Service scientists	Organisational identification	Sense of work accomplishment, relations with superiors, tenure, age.
Marsh & Mannari (1977)	1033 Japanese factory workers	Organisational commitment	Job satisfaction,"employee cohesiveness", organisational status, job autonomy, perceived promotion chances.
Palmer et al (1962)	352 Manual workers	Organisational "attachments"	Seniority, level of skill, occupation, job history, job satisfaction.
		Occupational "attachments"	Level of skill, occupation,"occupational experience"
Patchen et al (1970)	834 TVA employees	Organisational identification	Participation in decision-making, solidarity with work-group, opportunities for expression, satisfaction with promotion, expectancy of promotion, alignment of personal & organisational goals.
Porter et al (1974)	60 Psychiatric technicians	Organisational commitment	Job satisfaction
Raby (1975)	92 British engineers	Organisational commitment	age, "satisfaction with higher order needs", role tension, "environmental factors", family responsibilities, perceived job opportunities.

Ritzer & Trice (1969)	419 Personnel managers	Organisational commitment	Inter-company mobility, salary.
		Occupational commitment	Degree subject, field of first job.
Schneider et al (1971)	141 Forest Service workers	Organisational identification	Tenure, self-image, perceived job challenge.
Sheldon (1971)	102 R & D staff	Organisational commitment	Age, tenure, hierarchical position, social involvements, opportunities for social interaction.
		Occupational commitment	Age, work history.
Steers (1977)	382 Hospital workers, 119 R & D staff	Organisational commitment	"Need for achievement", group attitudes towards the organisation, level of education, sense of organisational dependability & personal importance to the organisation, task identity.

former is included (again as variously defined): age, opportunities for advancement, education, lack of role tension, and central life interest. Job characteristics include: job satisfaction, job challenge, opportunities for social interaction, and feedback on results. Work experiences include: seniority, group attitudes to the organisation, organisational dependability and trust, personal interests, rewards and expectations of rewards.

While such factors have been found to be related to variations in organisational commitment, the nature of causality is rarely questioned. It is typically assumed that these variables determine organisational commitment, although the perceptual basis of many of them suggests other explanations may well be possible. In fact, the predictive capacity of such factors also tends to be weak and their importance often varies from study to study.

Nevertheless the three types of factors identified by Steers as "antecedents" of organisational commitment do broadly correspond to those in the Conceptual Framework suggested for the study of work involvement in Chapter 2. If a fourth is added on the basis of the socialisation approaches to (occupational) commitment outlined above, then the four-fold framework of "organisational", "occupational", "personal" and "career" factors may also serve as a general basis for investigating commitment to lines of work activity. As such, the same Conceptual Framework is employed in Part II for studying variations in commitment as is used for examining the variations in work involvement.

Although a substantial number of research studies have thus investigated sources of variation in organisational and, to a lesser extent, occupational commitment, only two general theoretical mechanisms appear to have been suggested to interpret these findings. These may be refered to as those of "accrual" and "exchange" (Hrebiniak & Alutto,1972).

The first of these is proposed by Becker (1960) to account for the behavioural consistency involved in his conceptualisation of commitment. He argues that commitment to some line of activity results from a process of accrual, in which certain "investments" are built up in the activity and whose loss would jepordise other "side bets" dependent upon it. As he suggests (1960:35):

> Thus, whenever we propose commitment as an explanation of consistency in behaviour, we must have independent observations of the major components in such a proposition: (1) prior actions of the person staking some originally extraneous interest on thus following a consistent line of activity; (2) a recognition by him of the involvement of this originally extraneous interest in his present activity; and (3) the resulting consistent line of activity.

(1) represents the external "side bets", (2) the "investments" which develop, and (3) the resulting commitment. For a given set of"side bets" then, the greater the "investments" in a particular line of activity, the greater the commitment to it. These are suggested by Becker to build up over time by a process Hrebiniak & Alutto (1972) refer to as "accrual". They represent all the factors that would be lost if the activity were discontinued. For example, in a particular company, they

might involve not only pay, which may be equalled elsewhere, but also the loss of seniority, of colleague friendships, of the ease of doing the job and 'knowing the system'. It is suggested that such "investments" build up in some cumulative manner, developing over time by a process of "accrual".

Becker also emphasises that these accrued "investments" must be considered with respect to their effect on other "side bets" in understanding the strength of commitment they engender. As he argues (1960:40):

> the idea of the side bet allows us to specify the elements of commitment independently of the consistent line of behaviour they are used to account for and thus avoid tautology ... Beyond this, the conception of commitment I have sketched gives us the theoretical tools for assimilating the common-sense notion that people often follow lines of activity for reasons quite extraneous to the activity itself.

For example, when a married man has a wife and children to support he has given "hostages to fortune" (eg, Ryan,1978), which represent a form of "side bet" preventing him from jepordising a secure income.

In general, this outline of commitment serves to emphasise it's relative nature, setting commitment within some broad framework of inter-dependent activities. Commitment to one particular line is maintained only insofar as other competing commitments are insufficient to overcome this allegiance. For example, in a one-employer-town, people may be committed to working in that company to the extent that they do not want to move location, commute, or be unemployed. At some hypothetical limit however such competing commitments would be sufficient to

lead to the activity being discontinued: without available options, the concept of commitment is meaningless.

As distinct from this mechanism of "accrual", a second theoretical approach to commitment can be derived from "exchange theory". This theory has had a fairly well-developed tradition in sociology, for it may be employed in the form of "social exchange" to explain "social order" within a particular society (eg, Gouldner, 1960, Heath, 1976). The individualistic treatment of exchange is outlined by Blau (1964) who suggests that commitment to some line of activity will be proportional to the ratio of "benefits" or "gains" resulting from the activity to the "costs" or "losses" it entails. This trade-off may involve both material and "psychological" 'items', with commitment involving a purposive involvement undertaken for the sake of personal gain. Ekeh summarises part of Blau's argument as follows (1974:169):

> In the final analysis, exchange processes flow from the anticipated and calculated gains that individuals expect from associations. One does not go into associations from altruistic motives - ultimately altruism is reducible to egoism.

Both exchange and accrual theories seem to go some way towards explaining the bases of commitment, although neither appears to offer a complete explanation on its own. Becker's accrual theory seems to overlook the 'positive' side of the mechanism. He offers an account of why people 'have to stay', but not why they should 'want to stay'. Since it seems likely that commitment may also be based upon the possibilities of future 'gains' as well as the possible 'losses' entailed by

breaching the commitment, this is a serious ommission. Exchange theory aknowledges this basis and postulates that commitment depends upon some notional ratio of "costs" to "benefits". However it is not obvious that a ratio formulation (eg, as opposed to the arithmetic difference) is a priori appropriate, and empirical testing is difficult; "psychological costs" and "benefits" are not readily ammenable to quantitative analysis and confinement to purely economic factors does insufficient justice to the theory. Furthermore the restriction of the exchange to the single transaction gives it a narrow perspective that fails to consider the effects of external developments on the commitment evaluation. Accrual theory in contrast sets commitment within a wider framework which considers these effects.

Hrebiniak & Alutto (1972), in a study of organisational commitment amongst American teachers and nurses, compared the two approaches and found that both offered appropriate and complementary explanations of commitment. They concluded (1972:569-570):

> This research suggests that commitment in utilitarian organisations is partially an exchange and partially a structural phenomenon. That is, commitment depends in part on perceptions of inducements-contributions balances or, similarly, the ratio of rewards received from the organisation in relation to the costs incurred to receive these rewards.... in addition to being influenced by exchange transactions, organisational commitment is partially a structural or accrual phenomenon affected by length of service in the organisation and its attendent investments.

In fact the difference in these two explanations of commitment seems to correspond to the distinction in types of commitment suggested in the previous section.

Since it derives from the "benefits" gained over the "costs" incurred, exchange may account for why some-one should want to stay in a particular line of activity; in view of the investments involved, accrual may explain why they have to stay. As such, it is suggested here that the different types of commitment will arise in different ways: Affective Commitment through an exhange mechanism, Necessitative Commitment through an accrual.

This distinction may prove useful in helping to clarify the diverse results found in many commitment studies. For example, while "tenure" and organisational advancement both typically correlate with organisational commitment, it may be that the first gives rise to Necessitative Commitment, through an accrual mechanism, and the second to Affective Commitment, through an exchange. These may each have different consequences for the nature of organisational commitment, which might not be recognised if this is treated simply as the 'Commitment to Stay'.

Both accrual and exchange mechanisms suggest commitment is based upon some rational evaluation of the various economic and psychological items it entails. At a conscious level at least, however, such evaluations are hardly likely to be continuous, and may perhaps only occur at stages in the career when some decision is necessary, a decision that may arise as much from external 'structural' reasons as from individual initiative (eg, Katz & Martin, 1962). For much of the time "inertia" may keep people in a consistent line of activity (Flowers & Hughes,1973). They may not have thought about any alternative, perhaps

because there was no apparent need to consider one (eg, March & Simon,1958). The decision which a person makes may not necessarily be "rational" (eg, Simon,1959). In fact precisely how such evaluations regarding commitment are actually made is difficult to say. Exchange and accrual theories predict the outcome of possible evaluations, but do not explain the decision process involved. In employing them it is thus necessary to recognise these limitations and the assumption of rationality they entail, although further refinement is beyond the scope of this present discussion.

One feature of both the exchange and accrual theories which may give rise to apparently 'irrational' behaviour but which is actually consistent with rationality, concerns the different saliency of particular 'items' in an evaluation. People may assign different values, a different sense of importance, to the "costs" and "benefits" of an exchange balance or to the "investments" and "side bets" of an accrual. As such,particular factors may have different effects on the commitment of different people. This was recognised by both Blau and Becker:

Blau (1964:20):

> The psychological needs and dispositions of individuals determine which rewards are particularly salient for them and thus to whom they will be attracted.

Becker (1960:40):

> In short, to understand commitments fully, we must discover the systems of value within which the mechanisms and processes described earlier operate. By doing so, we understand not only how side bets are made but the kinds of counters with which they can be made.

In contributing to the formation of particular sets of values, the socialisation approach to the study of commitment identified above may thus complement the exchange and accrual mechanisms in explaining the bases of a person's commitment. None of these processes are necessarily contradictory as such, but each may contribute towards an understanding of the origins of commitment in a combined mannner.

The effect of differences in value on commitment in this way however has implications for the influence of work involvement on commitments to work activities. It is likely that the importance attributed to particular "costs", "benefits", "investments" and "side bets" will vary, inter alia, with differences in the level of a person's work involvement, Consequently through contributing to such differences in assigned importance work involvement will come to have an effect on the nature of a person's work-place commitments.

4.4 Commitment and Work Involvement:

Of the empirical studies summarised in Table 4.1, only that by Dubin et al (1975) directly investigates the influence of work involvement or a similar concept on organisational commitment. In fact, they found that organisational commitment tended to be higher amongst people for whom work was a greater "Central Life Interest". However a number of studies have reported that "career factors" correlate significantly with organisational commitment, particularly the perceived opportunities for future promotion (eg, Brown, 1969; Buchanan, 1974; Hrebiniak & Alutto, 1972; Marsh & Mannari, 1977). At a qualitative level too,studies of engineers and managers have emphasised the importance of "career factors" in influencing organisational commitment (eg, Pahl & Pahl, 1971; Sofer, 1970).

In general, it may be suggested that "career factors" will have more influence on work-place commitments for people of higher work involvement rather than lower. This follows from the Involvement Model of Figure 3.3: where work involvement is high, there will be a large work-based "sub-identity" and feelings of career success will have a strong influence on a person's self-esteem. As such, achievements connected with the work career will be more important for people of higher work involvement. Consequently the various "costs", "benefits", "investments" and "side-bets" associated with the career will be more important for persons of higher work involvement, and a given level of each parameter accordingly have a greater influence on their work-place commitments. For example, for those of high work involvement

promotion may be valued strongly, and the perception of favourable promotion opportunities or otherwise have a large influence on Affective Organisational Commitment (eg, Buchanan, 1974). However, to those of lower work involvement promotion may not be so desirable - it may undermine colleague friendships for example (eg, Chinoy, 1955) - and thus the perception of good promotion opportunities may be irrelevant as far as Affective Organisational Commitment is concerned. In line with the postulated mechanisms of exchange and accrual, a range of "career factors" may represent particular "costs", "benefits", "investments" or "side-bets" which influence commitment. For example, promotion and higher salary may represent salient career goals and so be considered as potential "benefits" of high importance. Company seniority, as a factor contributing to promotion, may be an important accrued "investment" which would be lost if the commitment were discontinued. The greater a person's work involvement, the stronger will be the influence of such factors on their work-place commitments and vice versa.

As people seek to achieve particular goals over the course of their careers, then it is perhaps more likely that the perceived"benefits"connected with career achievements will be particularly important in influencing their commitments. The result observed by Dubin et al (1975) may be a reflection of this. Where work involvement is high, organisational career goals may become particularly salient, and organisational commitment accordingly enhanced. Thus, there may be a general tendency for Affective Commitments to be higher (with achievements in career status representing important perceived "benefits") for people of higher work

involvement. In other words, there will be a positive correlation between work involvement and Affective Commitments, particularly commitment to the employing organisation as one major source of career status. This relationship may not be very strong, of course, since it is dependent upon the perception of appropriate "benefits"continuing within the given line of activity. More generally, it may be suggested that factors connected with the work career - whether representing "benefits", "costs", "investments" or"side-bets" - will have a greater influence on both Affective and Necessitative Commitments the higher the level of work involvement.

In the previous section, four sets of factors have been identified as posssible influences on a person's work-place commitments - "organisational", "occupational", "personal", and "career" factors - each of which may include a number of "costs", "benefits", "investments" and "side-bets" that affect their commitment. If the "career factors" have an increased influence on a person's work-place commitments the higher their work involvement, then by inference it may be argued that the other three types of factors will have a diminished effect, although where work involvement is lower all four types may well operate.

In general then, it can be hypothesised that work involvement will have a strong <u>contingent</u>[1] influence on a person's commitment to their lines of work activity. Where

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1. The term 'contingent' is used in the sense that a relationship between two particular factors is dependent upon the magnitude or presence of a third, a form of usage quite common within recent areas of "organisational theory" (eg. O'Shaughnessy,1976: 233-259).

work involvement is low, any of the "organisational", "occupational", "personal" or "career" factors may influence commitment, in line with the exchange and accrual mechanisms postulated. Where work involvement is higher, the first three of these will have a diminished effect, whilst "career factors" will increase in importance as determinants of commitment. This suggestion is formulated as the third and final Primary Hypothesis of the thesis, the Commitment Hypothesis:

COMMITMENT HYPOTHESIS: The level of work involvement will have a strong contingent effect on the determinants of a person's commitment to lines of work activity.

In fact, some kind of relationship between the level of work involvement and a person's work-place commitments might also be anticipated, given their conceptual similarity: while Affective and Necessitative Commitments refer to a person's commitments to specific lines of work activity, in a certain sense work involvement refers to some broader commitment to work in general. The fact that the same Conceptual Framework of "organisational", "occupational", "personal", and "career" factors is suggested for examining the determinants of each is also recognition of this similarity, although because a contingent rather than a linear relationship is postulated between work involvement and work-place commitments, analytical problems of direct and indirect linear relationships between them are avoided[1]. For the purposes of empirical analysis,

1. For instance, it may be that the same factor is found, from correlational analysis, to be related to both the level of work involvement and a person's workplace commitments. Any linear relationship between work

a particular level of work involvement may legitimately be taken as given, and differences in the relationships between commitments and the elements of this framework examined to assess the Commitment Hypothesis. Figure 4.2, refered to as the Commitment Model, illustrates this hypothesis, as well as those suggested previously in the chapter. These may be formulated as follows:

- A person's commitment to remain in some line of work activity can be represented as the sum of their Affective and Necessitative Commitments.

- Affective Commitment arises from a mechanism of exchange, Necessitative Commitment from a mechanism of accrual.

- Affective Commitments will probably tend to be higher, the higher a person's work involvement.

- More generally, "organisational", "occupational", "personal", and "career" factors will all influence commitment to lines of work activity for persons of low work involvement, in accordance with the postulated exchange and accrual mechanisms. Where work involvement is higher, the first three types will have a diminished effect, whilst "career" factors will be of increased importance, representing the main determinants of such commitments.

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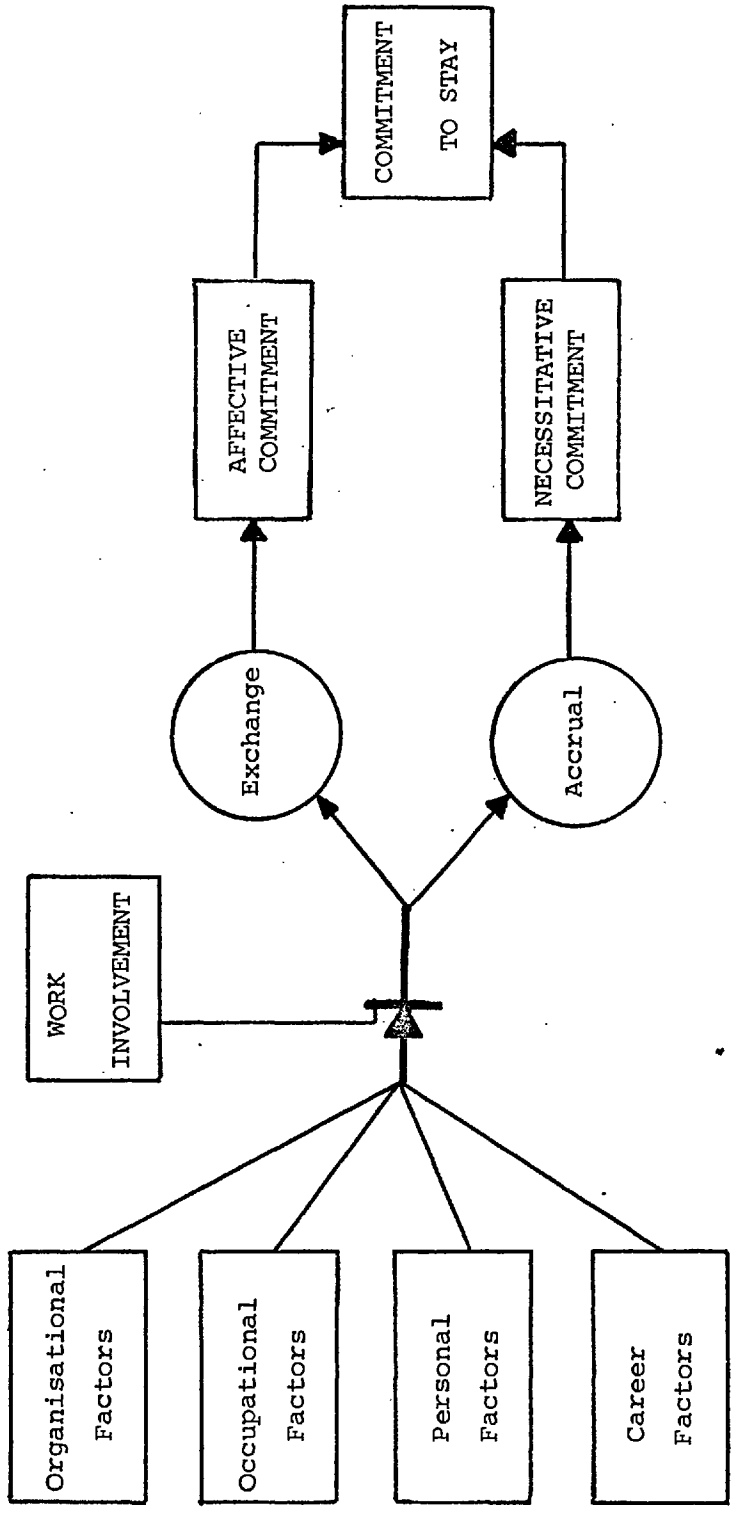
involvement and such commitments might thus represent 'spurious correlation', the result of this third factor influencing both. However because a contingent relationship is postulated, it is legitimate to investigate the differing linear relationships (eg, correlations) between this third factor and the work-place commitments for different levels of work involvement, even though such levels may in turn be influenced by this factor. Providing different correlations are encountered across the various levels of work involvement, the Commitment Hypothesis would be upheld.

FIGURE 4.2 THE COMMITMENT MODEL

(The contingent effect of work involvement is illustrated by a thyristor symbol; ie, an electronic device which conducts current according to the nature of the gate potential.)



4.5 Recapitulation of Hypotheses

The Commitment Model completes the theoretical exploration of careers, commitment and work involvement: the previous chapter has examined the influence of career developments on work involvement, summarised by the Career Development Model; this present has looked at the influence of work involvement on commitment and its bases, summarised by the Commitment Model. It is thus a useful stage at which to recapitulate the various hypotheses incorporated into these models.

PRIMARY HYPOTHESES:

INVOLVEMENT HYPOTHESIS: PCS is an important determinant of the level of work involvement.

PCS HYPOTHESIS: The level of a person's PCS is influenced by:-

- the extent to which their achieved career status fulfills their prior career goals;
- the current saliency of the achieved career status;
- the effect of their comparative reference groups on standards of achieved career status.

COMMITMENT HYPOTHESIS: The level of work involvement will have a strong contingent effect on the determinants of a person's commitment to lines of work activity.

SECONDARY HYPOTHESES:

The Career Development Model

- Feelings of career success resulting from achievement of future career goals of status-type i will tend to

increase future career goals and orientations of status-type i, whilst lack of achievement will tend to reduce them.

- Choice of career situs throughout the work career represents a compromise between a person's career goals and orientations and the labour market and other situs constraints of a particular Career System.

- Certain career situses may function as normative reference groups; as such, a process of socialisation may be postulated in which career goals and orientations develop over time, the result of some interaction between the norms prevalent within the context and the prior goals and orientations with which a person enters it.

The Commitment Model

- A person's commitment to remain in some line of work activity can be represented as the sum of their Affective and Necessitative Commitments.

- Affective Commitment arises from a mechanism of exchange, Necessitative Commitment from a mechanism of accrual.

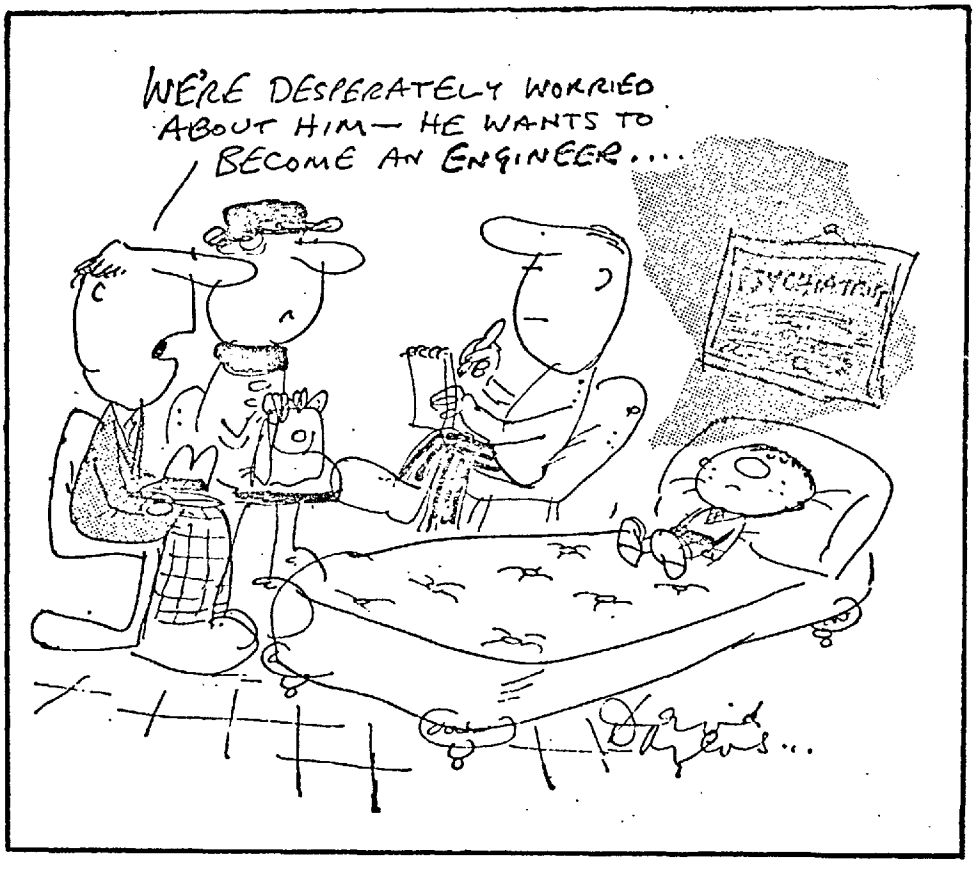
- Affective Commitment will probably tend to be higher, the higher a person's work involvement.

- More generally, "organisational", "occupational", "personal" and "career" factors will all influence commitment to lines of work activity for person's of low work involvement, in accordance with the postulated exchange and accrual mechanisms. Where work involvement is higher, the first three types will have a diminished effect, whilst "career" factors will be of increased importance, representing the main determinants of such components.

As indicated in the opening chapter, it is proposed to test these hypotheses with data from a sample of professional engineers. Before considering the method and results of this empirical study, it is thus perhaps useful to examine some of the general characteristics of this occupational group at the time of the research.

CHAPTER FIVE

THE PROFESSIONAL ENGINEER



5.1 Introduction

As a prelude to the subsequent empirical report in Part II of the thesis, this chapter concludes Part I by looking briefly at the nature of professional engineers and their occupation at the time of the survey. Clearly there is much that can be said, and it is not the intention here to present an 'occupational sociology of engineering'. Rather the chapter attempts to review a number of issues of contemporary and contextual significance that may usefully illuminate the theoretical analysis.

5.2 The Engineer and his Occupation

Engineering has a long history. Many of the structural achievements of Ancient Civilisations still remain as testaments to the skills of long-forgotten engineers. However as a distinct occupational group, professional engineers have rather more recent origins. In Britain some engineers were employed by the military as early as the 16th Century, and a number could be found engaged in mining and hydraulic operations throughout the 17th; the term "civil engineer" distinguishing such people from their military counterparts. However it was the widespread construction of canals, roads, bridges and harbours throughout the 18th Century that really gave rise to groups of professional engineers in any substantial numbers (Armytage, 1961). The formation of the Institution of Civil Engineers in 1818 is an important landmark in the development of the profession; by 1841 their membership numbered 853 and by 1881 it stood at 7,124 (Reader, 1966:211).

However the Industrial Revolution, gathering momentum in the latter part of the 18th Century, also saw the emergence of other types of engineers; men designing, building and running the railways, textile factories, blast furnaces and machine shops of the early Industrial Revolution. These had little in common with the civil engineers and formed the Institution of Mechanical Engineers in 1847 (Reader,1966).

The development of new technologies and industries based around them - electricity, chemicals, radio, aircraft, electronics, etc - has given rise to a spate of new engineering disciplines from the latter half of the 19th Century to the present day, each opening up new areas of employment for professional engineers. Their development is reflected in the growth of new Engineering Institutions, like the Institution of Gas Engineers, founded in 1863, of Electrical Engineers (1871), of Automobile Engineers (1906), Structural Engineers (1908), Aeronautical Engineers (1919), Chemical Engineers (1922), Electrical and Radio Engineers (1925), Electronics (1930), and Nuclear Engineers in 1958 (Millerson, 1964).

The impetus given by wartime demand and the deliberate encouragement to engineering given by various governments has seen considerable growth in the numbers of professional engineers in Britian this century, as illustrated in Table 5.1. Definitions as to who is a "professional engineer" may vary, but on both Institutional membership and degree qualifications, the size of the occupation has more than doubled in the last 20 years or so, a growth in fact that is a reflection of the general expansion of the 'professional' white-collar sector. Total membership of the Engineering Institutions now stands at some 320,000 and, since this by no means exhausts all professional engineers, a total occupational size of between 400,000 and 500,000 may be estimated (Wright, 1978).

TABLE 5.1 RECENT GROWTH OF THE ENGINEERING PROFESSION

(a) Total membership of the main Engineering Institutions

Institutions	1933	1957	1963	1978
Civils	10,000	18,745	30,393	59,000@
Mechanicals	10,000	42,027	58,049	72,240
Electricals	11,500	35,936	51,297	70,555
"Big Three"	31,500	96,708	139,739	201,795

SOURCES: 1933 figures from Carr-Saunders & Wilson,1933 (approx.)
1957 figures from Payne G.L., 1960.
1963 figures from Millerson G., 1964.
1978 figures from personal correspondence with each Institution. Statistics are for June 1978; @ - the data for Civils membership is to the nearest 1000.

(b) Total stock of economically active 'qualified engineers'; ie, persons with first degrees or higher in engineering.$

	1956	1961	1971
Stock of 'Qualified Engineers'	80,770	142,000	185,000

SOURCES: 1956 figure from Payne G.L.,1960, quoting Ministry of Labour sources.
1961 figure from Triennial Manpower Survey, HMSO, 1966.
1971 figure from 1971 Census of Population, HMSO, 1976.

$ - There are several exceptions to this definition with non-graduates from several engineering colleges falling in the classification. See Payne G.L., 1960 for details.

(c) Numbers of persons in major occupational groups, 1951-71 ('000s).

	1951	1961	1966	1971
Managers and administrators	1,245	1,270	1,514	2,085
Higher professionals	435	718	829	928
All white-collar workers	6,948	8,479	9,461	10,405

SOURCE: Price R. and Bain G.S., 1976, quoting Census of Population data for appropriate years.

In the early part of the 19th Century, engineers were either self-taught or served a costly apprenticeship with a practicing engineer. University courses in engineering started up around the middle of the 19th Century, as did a number of Mechanics Institutes and other technical colleges, providing a part-time engineering education for the sons of the working class (Reader,1966:100-145). Both expanded over subsequent years, establishing a dual system of recruitment to the profession. Men could become Chartered Engineers either through formal university training, or through part-time study at technical colleges and night-school classes. This latter has for many years provided an opportunity for bright apprentices and technicians to work their way "off the shopfloor" to professional status without university qualifications.

In the mid-1960's however, following the recommendation of the Robbin's report (HMSO,1963), university courses in engineering were considerably expanded. In 1960, 3423 people graduated in engineering and technology; in 1970 7933 did so (Gibbins & Fidgett,1977:17), and in 1976 this figure stood at 8513 (CSU, 1977a). Concommitant with this expansion of the universities, and latterly the polytechnics, has been a dismantling of the former technical college system. As such, few now gain professional engineering qualifications by the non-graduate route: in 1970 5435 persons did so; by 1974 this had dropped to 1108 (Gibbins & Fidgett,1977:17). Thus in 1977, 50% of Chartered Engineers aged 30 and over held a degree, in contrast to 96% of those under 30 (CEI, 1977). Moves are also afoot to formalise this trend completely and make the degree qualification

complusory for gaining the Chartered Engineering qualification (eg. ICE, 1975). This change in the 'mix' within the profession has received a good deal of criticism (eg, Stansell & Valery,1977). As one writer in the Economist suggests:

> When in Britain it was common practice for craftsmen to be able to draw and read blueprints, and for draughtsmen to make things, then there were no formal barriers between the two and apprentices regularly became respected engineers. Now, because all but the dimmest can get a place in an engineering department (fairly low-grade "A" levels will suffice), there are few left to become apprentices. Britain has more than its share of craftsmen who cannot draw; draughtsmen who cannot make things; and professional engineers who cannot draw, cannot make things, and cannot communicate with craftsmen and draughtsmen. (Economist, 25.2.1978:75)

In providing an opportunity for gaining professional status without university qualifications, engineering has served as an "avenue of upward social mobility" for many working class youths. Even with increasing graduate recruitment to the profession, there is some evidence that in both Britain and America working class youths figure relatively prominantly amongst engineering graduates[1](cf. Table 10.3; Gerstl & Hutton,1966; Perucci & Gerstl,1969a). In Britain professional engineers are also almost exclusively male. Only 200 of the 180,000 Chartered Engineers are female, much the lowest proportion of the British 'professions' and lower than in most other countries of the world (Lowrey,1978).

This shortcoming is only one of those outlined by a spate of criticisms recently aimed at the profession. Their main premise is that professional engineers play a vital role in British industry, and thus the supply of large numbers of well-trained engineers is essential

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1. For example, Gerstl & Hutton's 1962 survey (1966:25); Percentage of engineers whose fathers were of "Manual" occupation: Non-graduates, 45%, Graduates, 22%.

for the nation's prosperity: many, however, have pointed to deficiencies in the quality and quantity of this 'supply'. In 1960, Payne highlighted some of the weaknesses in Britian's technical manpower compared with other industrial countries. The Robbin's report (HMSO, 1963) aimed, inter alia, to remedy these deficiencies. However the mounting body of criticism suggests this has not entirely been achieved (British Association,1977a; BIM 1977; CPC,1978; DoI,1977; EEF,1977; EITB,1974; Gibbins & Fidgett,1977; HMSO,1968,1977; NEDO,1975).

Data on current engineering manpower in Britian is available from several sources. Government censuses provide a broad global picture of deployment patterns, although offer little other detail and rarely correspond with other definitions of "professional engineers" (eg. HMSO, 1976).The CEI has been conducting surveys of its members about every two years since 1966, and although these people are not strictly representative of all "professional engineers", the CEI surveys do provide a very valuable source of detailed national data which is up to date and frequently conducted. Annual salary surveys by the main Engineering Institutions also usefully supplement this overall picture of Chartered Engineers (for example, ICE, 1978 ; IEE, 1978 ; IME, 1978). In 1971 the EITB undertook a manpower survey of professional engineers and scientists within the engineering industry that offers further data within one industrial sector (Venning,1975). For information on specific characteristics of engineers and their work

however, the interview survey of 977 members of the Institution of Mechanical Engineers conducted by Gerstl & Hutton (1966) in 1962 still remains unsurpassed, although it is now somewhat dated.

Each of these sources point to the wide variety of industries and types of work in which engineers are engaged. In terms of current branch of employment, census data (HMSO,1976) indicates "mechanical engineers" to be the most common (98,230), followed by "electrical and electronic engineers" (68,250) and "civil engineers" (49,680). The 1977 CEI survey indicates that under half of all Chartered Engineers are actually employed in private industry, and still less in manufacturing alone: taken across all sectors of employment, considerable diversity may be observed, with no one particular sector appearing predominant. Across the different types of work undertaken by engineers, the survey also found that 41% were in 'Operations' and 43.5% in'RD & D' (See Appendix IIb); in fact these proportions are similar to those shown later in Table 6.2 for the men of the Engineer Survey, with 45% in 'Operations' and 47% in'RD & D'. This suggests that, at least in terms of the major types of work undertaken (although clearly not the engineering branches and sectors of industry), the Engineer Survey is fairly representative of the profession as a whole.

Within these broad categories however, what engineers 'actually do' has not been well discussed or understood by sociologists, who all too readily have treated them as "applied scientists". Danielson

(1960) is one of few who has attempted some empirical analysis of job activities, although he makes little progress, merely emphasising the diversity of engineering work. Gerstl & Hutton (1966) also looked briefly at job activities, echoing the same results. They also found that two-thirds of their sample of mechanical engineers had never done any manual work since becoming Chartered, only one-seventh doing so occassionally: it is a remarkable testimony to the public image of engineers that this question should have been included in their survey (1966:68-77). Both Danielson and Gerstl & Hutton found that their engineers also engaged in a good deal of 'social interaction'; indeed, teamwork seems to be a characteristic feature of much engineering work, as Goldner & Ritti suggest (1967:493):

> The bulk of the engineering carried on by large industrial employers is group effort. It is programmatic rather than individualistic. Few, if any, engineering projects can be accomplished by one man. There is a complex division of labour resulting from, among other things, the need for specialised skills and the time pressures created by market competition. In turn specialisation means that individuals with different skills are required to perform complementary assignments. Complex engineering efforts can easily involve several years of effort on the part of hundreds of engineeers.

Ritti in fact begins his discussion of systems design engineers with a useful description of their work (1971:20-21):

> A large part of the engineering activity in the systems development laboratory is comprised of tasks that can be described as formatted... A formatted task is one which is governed by relatively fixed procedures, standards, rules, which are relatively free from ambiguity and contingencies...

> The majority of engineers are occupied in the performance of formatted tasks created for them by the innovations of the few.

In fact only 8.7% of engineers are engaged in R & D work at the present time, a proportion that has dropped steadily from 13% in 1971 (CEI,1977:12). For many engineers their work may also involve a mixture of technical and managerial activities (Gerstl & Hutton,1966:71), such that there may be no clear distinction between an "engineer" and a "manager" as such. In the CEI survey, 31.3% of the Chartered Engineers described their work as either "technical administration" or "general management" (CEI,1977:12), thus indicating the importance of this managerial facet. The issue is discussed in detail in Section 5.4. First, the role of the Engineering Institutions within the occupation is considered.

5.3 The Engineer and the Engineering Institutions

There are 16 chartered Engineering Institutions and 45 non-chartered Institutions in Britian today, comprising the constituent bodies of the CEI. The qualification of Chartered Engineer (C.Eng.) is based upon corporate membership of one of the 16 chartered Institutions or one of 7 affiliated non-chartered Institutions (CEI,1977). Of the 180,000 Chartered Engineers in the country at present, 125,000 are corporate members in either the Institutions of Civil, Electrical or Mechanical Engineers, the "Big Three" of the CEI (Wright,1978).

The Engineering Institutions have two main functions (Prandy,1965). They serve as "learned bodies", providing technical information, lectures, periodicals, and a general forum for debate. They also function as "qualifying associations" (Millerson,1964), setting standards of professional competence. Since the post-Robbins expansion of university education has largely eliminated the Institutions' role in setting professional examinations (graduates gaining exemption from them), this latter function is mainly restricted to ensuring satisfactory work experience has been undergone before corporate membership is granted.

However, there are few instances where such a qualification is particularly advantageous to an engineer. It is so where there is a legal requirement (eg, mining), or where is operates as a career necessity (eg, civil engineering consultancy). But

apart from these, the C.Eng. qualification is generally regarded as at best 'useful', especially when changing jobs, and at worst 'irrelevant', particularly for advancement in a single organisation. It is essentially a minimum qualification which most engineering graduates can obtain without much difficulty after four years or so of working in engineering. In fact some engineers choose not to join the Institutions, (cf. Appendix IId) seeing little benefit for their annual subscriptions, typically of about £20 (June, 1978).

In contrast to the strong position of the British Medical Association, the professional Engineering Institutions have a much more peripheral role in the fragmented engineering profession. The setting up of the CEI in 1965 was an attempt to change this situation. However as the present editor of the "Engineer" writes (Mortimer, 1978:25):

> In 1965 the Council of Engineering Institutions was formed to co-ordinate the work of the major engineering institutions. Hampered by its charter however it has proved a considerable disappointment to all concerned with engineering as a profession. Engineers, looking for an organisation which might lift the respect of the public, found to their horror a body which fanned the flames of discontent within the profession. The CEI plainly did not have the respect or the ear of government or any other body in high places. Nor could it speak out without fear or favour. It was certainly not an organisation which could weld the engineering profession together.

In fact it was partly discontent with the organisation of the CEI and the inadequacy of its own attempted internal review and partly the mounting

criticism over the quality and quantity of engineers being supplied to the profession, that lead to pressure for a government lead in instigating reform. Much of this pressure came from within the profession itself; prominant among the malcontents were Ewen McEwen, then president of the IME[1]; E.S. Booth, then president of the IEE, and John Lyons, General Secretary of the Electrical Power Engineers' Association, now the Engineers' & Managers' Association.

In January 1976, Eric Varley, Secretary of State for Industry, was asked by the Prime Minister, Harold Wilson, to consider a possible government inquiry into the engineering profession. The CEI were, perhaps understandably, somewhat opposed. Sir Charles Pringle, then Chairman of the CEI, wrote in the Times (18.3.1977:23):

> The CEI has sincere reservations about the value of a Government inquiry, stemming largely from our belief that it could be interpreted as a denigration of the performance of the United Kingdom's engineers; this could only do harm in the eyes of our overseas customers as well as those of the public. Our engineers generally command worldwide respect and a Government inquiry could suggest a lack of confidence in a profession which, as a whole, has good reason to be proud of itself.

Initially there was some confusion over who should undertake the investigation and what its terms of reference should be. Varley originally proposed that the British Association for the Advancement of Science conduct the inquiry, and indeed they went on to produce their own report in August 1977 (British Association, 1977a). However, he decided against this proposal and announced in December 1977 (nearly two years after its first being

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1. Details of these standard abbreviations are given at the front of the thesis.

considered) that a 17 strong independent Committee of Inquiry would be set up under the chairmanship of 'industrialist' Sir"Monty" Finniston. It's terms of reference were: To review for manufacturing industry, and in the light of national economic needs:-

- the requirements of British industry for professional and technician engineers, the extent to which these needs are being met and the use made of engineers by industry.
- the role of the engineering institutions in relation to the education and qualification of engineers at professional and technician levels.
- the advantages and disadvantages of statutory registration and licensing of engineers in the UK.
- the arrangements in other major industrial countries, particularly the EEC, for handling these problems, having regard to relevant comparative studies.

.... and to make recommendations. (IEE News, Feb, 1978:13)

The Committee has received over 500 submissions of evidence and is due to report in the Autumn of 1979, although whatever recommendations are forthcoming seem unlikely to have much influence on the engineering profession in the immediate future.

In both Britian and America, the engineering occupation tends to be rather fragmented (Perrucci & Gerstl,1969a;Prandy, 1965), a characteristic that may be a cause and a consequence of the typically low degree of 'professionalism' shown by many engineers relative to other kinds of 'professional' occupations (eg, Fores & Glover, 1978; Hickson & Thomas, 1969; Jackson, 1970). Nonetheless, Perrucci & Gerstl (1969a), surveying a range of American engineers, found that a number of characteristically 'professional' values were evident throughout their sample (cf. Greenwood, 1957); these included a concern over work autonomy, some

involvement in professional activities, and a strong importance attached to colleague esteem. They argued that these developed as a result of professional socialisation in the engineers' education, although their low social origins and subsequent mobility experiences inhibited the development of any "service ethic". Armstrong (1972), in a study of British design/development engineers, argues that a "product-centred" professionalism is developed as a result of professional socialisation amongst colleague groups (1972:Summary):

> Young engineers tend to enter industry with something of an academic ("knowledge-centred") orientation which is arguably inculcated by the engineering schools. They are also rather instrumental and, partly for that reason, they orientate towards their superiors. Later, they internalise the professional values of these superiors and, themselves, become "product-centred" rather than instrumental. In the process they lose their initial tendency towards academicism. When (and if) they are promoted, the engineers become peer-group rather than "upwards" orientated. It is this peer-group of responsible engineers which maintains the professional orientation towards engineering.

The primary sense of professionalism developed amongst engineers seems to be concerned essentially with technical competence ; in Armstrong's terms it is "product-centred". This mirrors the concern of the Engineering Institutions with the "learned body" functions, although they themselves are not active in maintaining this professionalism. As Armstrong continues (1972:Summary):

> The Engineering Institutions play no part in professional socialisation or the maintenance of professionalism. To professional engineers in industry, they appear to embody the academic values associated with the engineering schools. It follows that the real organisation of the engineering profession is not centred on the Engineering

Institutions. It is informal and centred on the first or second promotional level in industry.

It is to a consideration of the engineers in their employing organisations that the discussion thus turns.

5.4 The Engineer and his Employing Organisation

The bulk of engineers are employed by large organisations. Gerstl & Hutton (1966:70) found that nearly three-quarters of their mechanical engineers were working in firms of over 500 employees; for the engineering industry, the EITB survey found that 80% of engineers were in firms of over 1000 people, 43% in firms of over 5000 (Venning,1975:31). Only rarely are these organisations of a "professional" kind; for instance about one-tenth of graduate engineers work in consulting firms (CEI,1977:14). More usually they are of "bureaucratic" form,engineers taking a place in the organisational hierarchy (Harries-Jenkins,1970).

The role of engineers and their experience of work in such organisations has received a mixed treatment by sociologists. For a long time this issue had been handicapped by the failure of many sociologists to recognise engineers as being different from scientists. As Glover writes, complaining about the lack of research on engineers compared to scientists (1976a:43):

> Part of the blame for this neglect can be laid at the door of those sociologists of science who wrote at such length between the mid-1950s and the late 1960s about a hypothetical clash between the values of industry and science and its effects on the experiences of "industrial scientists". Many of those who reported data on this topic misclassified engineers in the category of "science", apparently expecting them to behave like scientists in the industrial environment. In 1962 Kornhauser, in an American study that was a classic of its type, discussed data about the industrial employment of scientists and engineers in terms of Merton's "norms of science" (communalism, universality, disinterestedness, and organised scepticism). He concluded that such "scientists" had been diverted from a disinterested pursuit of truth by managerial dictates. More recently, however, students of industrial Research and Development men have come to understand that they are as other men in their desires to rise in management, increase their take-home pay, and "beat the next guy".

The difference between the organisational behaviour of scientists and engineers is further emphasised by Allen (1977:99):

> Most engineers are employed by bureaucratic organisations. Academic scientists are not. The engineer sees the organisation as controller of the only reward system of any real importance to him and patterns his behaviour accordingly. While the academic scientist finds his principle reference group and feels a high proportion of his influence from outside the organisation, for the engineer, the exogenous forces simply do not exist. The organisation in which he is employed controls his pay, his promotions, and to a very great extent, his prestige in the community. He therefore behaves in ways that he feels the organisation desires.

Ritti (1971) and Sofer (1970) have reported detailed studies on the employment of engineers in industrial organisations, both of them emphasising, like Glover and Allen, that such engineers are strongly concerned with organisational advancement and the pursuit of their careers, and that their behaviour in such organisations accordingly reflects this concern. For instance, claims of dissatisfaction or skill under-utilisation may be found attributable to the failure of certain career expectations being met (eg, Kingston & Wolfe,1972; Landis,1971). In fact Goldner & Ritti (1967) have argued that the development of professionalism may be a "cooling out" response to career immobility, a result given some empirical support by Armstrong (1972) and Kelly (1975).

The organisational careers of engineers may take many forms, some people advancing higher than others, some by different routes. As such, generalisation may

be problematic. Orth (1975) and Dalton et al (1977) have suggested a number of stages may be involved, as different activities need different personal skills and approaches to the work. Some 'structural' longitudinal data has been reported on cohorts of engineering graduates from MIT (Bailyn & Schein,1972, 1974) and Imperial College (Tilley,1969): while about a third of the former had taken up non-engineering jobs at certain times of their careers, less than 10% of the latter had done so at any time. The Imperial College survey also indicated that respondents aged over 40 years had worked in an average of between 4 and 5 different organisations, a finding echoed by Perucci & Gerstl (1969a)for American engineers. Gerstl & Hutton's sample of British mechanical engineers averaged 2.64 different organisations for those under 35 years old, 3.40 for the 35-44 age group, and 4.06 for those aged over 44 (1966:95-96). The EITB survey suggests that the organisational mobility of engineers in the engineering industry is somewhat less: those in their 40's for example averaging only 2½ jobs, and those over 50 still averaging less than 3 (Venning, 1975:110).

However, perhaps one of the most characteristic features of engineering careers, if any, is the trend towards management. Both the MIT and Imperial College surveys found that over half the engineering graduates were engaged in "general" or "technical management" after the age of 40. In America, Kemper (1967) cites

a report from the National Engineers' Register showing that half the engineers over 35 could be classed as managers, a proportion rising to two-thirds for those aged over 45. Gerstl & Hutton found that 38% of their sample aged 35-44 and 52% of those over 44 were in management jobs, those from RD & D tending to move into them sooner than those from Operations (1966:91). The EITB survey further illuminates this position; a third of their sample of managers had first been promoted within the"RD & D" function, some 30% being promoted from "RD & D" to "production"; furthermore while nearly all the promotions to management jobs in "RD & D" were internal to the function, only 60% of those in "production" were internal (Venning,1975:106).

In general, there is also some evidence to suggest that promotion within engineering is essentially meritocratic, or at least based upon 'universalistic' factors. Perucci & Perucci (1970) found that 'ascriptive' factors had little influence on the promotion rates of a large sample of American engineers, although social origins did influence education levels, thus indirectly affecting mobility. In fact although a distinct range of salaries are in evidence across the MIT (Bailyn & Schein,1972) and Imperial College (Tilley, 1969) surveys of past engineering graduates, the strong age-related trends suggest that this factor alone is important in setting some general rate of promotion (cf. Section 9.4). Granick (1972) argues that managerial promotions in Britain are largely competitive, based

mainly on work performance. This contrasts, for example, with the case in France, where educational qualifications have a strong overriding influence on the organisational attainment of engineers. Pym (1969) however disagrees with this, arguing that non-graduate mechanical engineers are discriminated against relative to graduates in not possessing the ascriptive criterion of a university degree, although his cross-sectional evidence is not unambigious. One of the factors prompting many engineers into taking management jobs, in fact, suggest Rothman & Perrucci (1970), may also be the obsolescence of their technical knowledge.

While a good many engineers clearly do go into management jobs of one sort or another during the course of their careers, it seems that relatively few actually attain the highest posts. Indeed, some writers have criticised the scarcity of qualified engineers at higher management levels in Brit n compared to other industrial countries , thus offering an account of the relatively poor productive performance of British industry (eg, Glover, 1976b; Granick, 1972). While the latter part of this argument is somewhat difficult to justify, there is a certain amount of evidence to support the former - that rather few top managers and executives have technical qualifications - although much of this data is now out-of-date (eg, Acton Society Trust, 1956; Clark, 1966; Clements, 1958; Copeman, 1955;

Nichols, 1969). Nevertheless, a recent survey of BIM members found that 29% of chairmen/managing directors and 25% of Board members had engineering qualifications, proportions rising to 39% for those in "middle management" (Melrose-Woodman, 1978:66). While the representativeness of the sample is clearly open to question, the difference between "middle" and "top" management in terms of their engineering qualifications might suggest that there is still some difficulty for engineers in reaching Board level.

Considering this from the perspective of the engineers themselves, the 1977 CEI survey of Chartered Engineers reports that 10.8% of non-graduates and 8.9% of graduates classed themselves as "Directors, partners or principals" (CEI, 1977:15). Given that most of these people would probably not gain such posts until late on in their careers, in fact this data suggests that the chances of a new engineer becoming a "Director, partner of principal" are really quite fair. However, the statistics are probably rather flattering in this regard. For one thing, it may be that while 20 years or so ago a Chartered Engineer did stand a fair chance of reaching such jobs, the chances for a new engineer today could be very different. For another, there is clearly a certain flexibility in the interpretation of these terms, and a director or a partner in a very small engineering company may compare rather poorly with a senior engineer in a large corporation in terms of salary and 'responsibility'. In fact, salary data illustrates

a somewhat different situation: in 1977, 1.7% of Chartered Engineers were grossing over £15,000 annually, and the earnings profile of the highest decile reached £10,000 a year only for engineers aged over 50.

While many engineers do go into "middle management" jobs - particularly within the large organisations in which the bulk of engineers are to be found - the hierarchical nature of such organisations must enevitably limit the number of higher openings available. Although the evidence is not conclusive, it seems that only rather few may make it to the highest posts. Nonetheless, managerial positions do appear to be widely aspired for: Ritti (1968:126), for example, found that 60% of a sample of Purdue engineering graduates agreed that "the goal of most engineers is to become a member of management". Indeed, it is this definition of a management job as a criterion for judging a successful career, that leads Goldner & Ritti (1967:490) to argue that for engineers professionalism is a possible response to career immobility:

> Management attempts to impose professionalism as a definition of success within the organisation in order to maintain commitment on the part of those specialists who would ordinarily be considered failures for not having moved into management. Identification as a professional has become a way to redefine failure as success.

However, there are indications of some disillusionment amongst engineers about their employment in large industrial organisations, and there have been a stream of recent complaints about their inadequate status and rewards (eg, Cookson,1978; HMSO,1977; Leonard,1978; Valery,1977). Others have reported a reluctance of graduates in general to enter industrial organisations and a tendecy for them to leave

industry during their careers (eg, Fores, 1977; Kelsall et al,1972; Rudd & Hatch,1968). As one careers guide book opens (Owens,1973:1):

> Today's graduate feels he has been swindled. His teachers were anxious for him to go to university. So, probably, were his parents. He was promised increased status and that his degree would be the key which would open the door to an Aladdin's cave of attractive and well-paid jobs. But, with some exceptions, it doesn't turn out that way at all.

The trend of increasing unionisation amongst engineers may, inter alia, be a consequence of such disillusionment. At present 44.3% of Chartered Engineers are in trade unions (CEI,1977:24-25). These are predominantly in the public sector where 77% of such engineers are unionised, many having been so for some time (Clegg,1976:89). NALGO and IPCS in fact cover one-third of all unionised engineers.[1] In the private sector 20% of Chartered Engineers are in trade unions, and here there does seem to have been a recent trend of increasing white-collar trade unionism (Price & Bain,1976:345). While statistics are lacking, impressionistic evidence suggests it was unusual for professional engineers to have been in trade unions 15 or 20 years ago (eg, Prandy,1965:146; Howie,1977:2).

Commenting upon the remarks of a SIMA delegate, a steel engineer, in favour of union membership and action, a Times labour writer recently interpreted this militancy as (MacIntyre,1978:24):

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1. Details of standard abbreviations used are given at the front of the thesis.

> a pointer both to the frustrations felt by engineers in particular, and the professional classes in general, about their position in the earnings and status league, and a growing, though by no means universal, acceptance that trade unionism is needed to correct it. That acceptance has been assisted not only by anxiety over pay but also by a level of redundency amongst engineers unknown since the 1930s and the growth of industrial relations legislation.

The trade unions which professional engineers have tended to join however are not noted for their militancy. UKAPE, APST, and SIMA, representing 12% of unionised Chartered Engineers (CEI, 1977:24-25), are not affiliated to the TUC (TUC, 1978:714), whilst UKAPE itself is actively hostile to the idea of striking (Dickens, 1972). Nevertheless, professional engineers' unions are not necessarily docile in their actions, as recognition battles fought by the EMA and UKAPE have recently indicated. The current dispute involving recognition of UKAPE at W.H. Allen Ltd. is in fact seen as a test case for others of a similar nature and its outcome may influence the future course of unionisation amongst engineers.[1] In this respect, and with the Finniston Inquiry due to report in the Autumn of 1979, there are some indications of future changes within the engineering profession, although what form these are likely to take is presently unclear.

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1. After conducting a ballot in which 79% of the engineers had shown a preference for joining UKAPE, ACAS supported the EEF line (also supported by the TUC and CSEU) that the introduction of another union in the company would be detrimental to industrial relations. ACAS accordingly recommended that the engineers should join AEUW-TASS, which already represented technicians at the plant, but only 10% of the engineers wanted to join them. UKAPE took ACAS to court to try and gain recognition, and in June 1978 a High Court ruled in their favour (Times, 30.6.1978). This decision was upheld in the Court of Appeal in January 1979 (Financial Times, 18.1.1979), and an ACAS appeal to the House of Lords is currently pending (May, 1979).

To conclude Part I of the thesis, this present chapter has examined a number of features of the engineering profession, its past development and present characteristics, including also some consideration of the position of engineers within their work organisations. In this way, some perspective is established for the empirical study of professional engineers used to test the various theoretical hypotheses. This is now reported in Part II of the thesis.

PART TWO

EMPIRICAL ANALYSIS

CHAPTER SIX

RESEARCH STRATEGY AND SAMPLES

> All the business of war, and indeed all the business of life, is to endeavour to find out what you don't know from what you do.
>
> The Duke of Wellington;
> The Croker Papers.

6.1 Research Strategy

In the first part of this thesis a number of theoretical hypotheses have been suggested: work involvement is seen as one facet in a process of career development, dependent upon the feelings of career success arising over the career, with the further implications of these factors for workplace commitments also being considered. The various hypotheses are summarised in Section 4.5 and illustrated by the Career Development and Commitment Models of Figures 3.4 and 4.2 respectively. Although these hypotheses are presented in general form, it is within a group of professional engineers that they are to be tested; while some broader validity may in fact be likely, it is principally with this occupational group in mind that they have been devised (cf. Working Hypothesis, Section 2.4). Against the general perspective outlined in the previous chapter, Part II of the thesis thus reports the empirical evidence from a study of professional engineers used to assess these hypotheses.

Confining the study to one occupational group, of course, clearly restricts its academic value. For instance, a number of writers within the field of industrial sociology (eg, Gallie,1978 ; Goldthorpe et al,1968; Wedderburn & Crompton, 1972) have sought to account for variations in work experiences (cf. Chapter 2); however the contribution which this present inquiry may make to this debate is limited, since any account of variations in work involvement that is forthcoming can only be justified within this single occupational group. In terms of the Conceptual Framework of Figure 2.1, the influence of "occupational factors" on society-wide variations in work involvement is not investigated. Nevertheless, this concentration also has its advantages, for analytical controls are thus excercised over occupationally-derived variations in work involvement, whilst the influence of "organisational", "personal" and "career factors" may accordingly be assessed.

From a more practical viewpoint, the importance of professional engineers within modern industrial organisations gives some substantive value to any findings; variations in work involvement - and in workplace commitments - are likely to be of considerable organisational significance, and an account of their origins valuable in its own right. The concern of the Finniston Inquiry and others (Section 5.3) with the current state of the engineering profession would, it was hoped, also give some topical interest to the survey results; certainly, this did seem useful for gaining research access and in promoting a good response rate amongst the samples.

Pragmatically, of course, the study of one occupation is also attractive, given the limitations of time and resources entailed by Ph.D. research. Locating groups for study is relatively easy and the samples readily comparable; for example, in the survey of professional engineers it was possible to use the same questionnaire for all the people studied.

Nevertheless, although the inquiry was thus concentrated on the engineering profession, a strictly occupationally-representative sample of professional engineers did not seem readily accessible for surveying. The Engineering Institutions, for instance, (which might provide a possible sampling base) cover only a certain proportion of engineers within selected branches of the profession. Fortunately, for the purposes of testing the theoretical hypotheses, a strictly representative sample did not seem necessary, since the study is concerned with the bases of individual differences rather than with 'demographic' patterns. An approach based upon a number of different employing organisations thus seemed both feasible and attractive.

With the assistance of the Institution of Mechanical Engineers in gaining introductions, a number of industrial organisations were approached. Six of these agreed to co-operate in the research and permit a study of their professional engineers be undertaken. These six embraced a variety of different types of companies, thus providing a range of organisational characteristics which might be investigated. As the rather precise formulation of the hypotheses seemed to lend themselves to quantitative

empirical testing, a structured questionnaire was used as the main basis of this survey. The respondents, being reasonably literate and intelligent, completed this themselves.

For testing many of the hypotheses, a longitudinal study would have been preferable. However, given the need to conduct the research within a fairly brief time period, a cross-sectional survey had to be undertaken. This limits the analytical inferences which may be drawn from the results; in particular, it means that causal inferences from observed associations are problematic, and only the consistency of the hypotheses may actually be tested (See Section 7.3). Nevertheless, to provide some broader illustration of differences across the career, an additional survey of engineering under-graduates was carried out. The proximity of a large population of engineering students within Imperial College made them a natural choice for this research, and again a self-completion questionnaire seemed the most feasible and efficient approach. Since the survey was undertaken before the main study of practicing engineers, some piloting of the techniques and questions used in this larger survey was also possible.

The main empirical research undertaken to test the proposed hypotheses thus comprises two cross-sectional questionnaire surveys: one of engineering under-graduates at Imperial College, London, refered to as the Student Survey; and one of professional engineers in six British industrial organisations, refered to as the Engineer Survey.

6.2 Research samples:

6.2.1 The Student Survey:

The Student Survey was conducted during June 1977 at Imperial College, London. Imperial is a prestigious institution for the education of engineers and one with a relatively long history. Formed in 1907 from an amalgamation of the Royal College of Science, the Royal College of Mines, and the City and Guilds College, the tradition of engineering education in these colleges dates back to the middle of the 19th Century. At present, engineering students comprise nearly half the student body of the College; in the 1977-78 year, there were 2126 engineers out of a total of 4470 students. Engineering departments are organised around the main branches of engineering: aeronautics, chemical, civil, electrical, mechanical, engineering, mining and metallurgy, a pattern that is similar in many other engineering institutions. Courses at the College are run on a departmental basis and engineering specialisms chosen when the students first start. Subsequent change is difficult and unusual.

The questionnaires were sent out to the 3rd year students in the six engineering departments during June 1977, several weeks before these under-graduates were due to leave, but after they had taken their final examinations. Imperial has a large overseas contingent of students but for the survey purposes it seemed expedient to exclude such people, restricting the population to the 3rd Year British engineers studying full-time at the College.

After under-taking pilot interviews with 20 students, questionnaires were distributed to the remainder of this population. A total of 224 were sent out, with 130 being returned, 2 of which were not usable. This sample size of 128 represented a response rate of 57%. The variation between departments, shown in Table 6.1, is not significant at the 5% level.

The survey had a number of aims. Firstly, it was designed to collect information about the students' attitudes to their work and future careers just prior to their commencing full-time employment. Such attitudes might then be compared with those of engineers at later stages in their careers. Clearly the under-graduates in the sample are hardly likely to be representative of British engineering students as a whole, since Imperial College tends to attract high calibre students. However some general illustration of differences over the career do appear possible from such results, particularly since Imperial's engineers might, in many ways, be thought of as'prototypical' of the wider corpus. In addition to this illustration, analysis within the sample allows the bases of such initial career attitudes to be examined.

Secondly, the Student Survey allows one facet of career choice to be explored. The under-graduates were at a critical juncture in their careers; they had made an initial occupational choice on entering university and were faced with a subsequent intra-occupational

choice on leaving. At the time of the survey most had arranged future jobs. Thus, in line with the general career choice mechanism postulated in the Career Development Model, certain aspects of this choice process could be investigated.

Finally, the Student Survey offered a useful opportunity for piloting questions and techniques that could be employed in the more extensive Engineer Survey the following year.

A copy of the questionnaire used in the Student Survey is shown in Appendix Ia.[1] Given these aims outlined, it was designed to gather information on the following themes:

- The students' attitudes towards their work and careers, their career goals and orientations, and their general career plans for the future.
- Details of the jobs the students had obtained or expected to obtain, how they found them, and the sorts of jobs they would have prefered given a free choice.
- Details of various 'personal' characteristics of the students, including present attributes (their department, expected degree class, etc), their social and educational background, and past work experiences.

6.2.2 The Total Technology Sample

In addition to the 128 under-graduates of the Student Survey, the opportunity arose in April 1978 to survey another small batch of students on a "Total Technology" course at Imperial College.

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1. References to questions in the thesis are given in the form: Eg., (SSQ:20), to question no. 20 of the Student Survey Questionnaire.

Imperial College organises a form of industrial sandwich course of five years duration known as "Total Technology". Students are sponsored by firms and spend their first year working with them, where they undertake a variety of carefully-organised jobs as part of their training as engineers. The following three years comprise a conventional mechanical engineering degree course, except that the students spend part of their vacations working in their sponsoring companies. The fifth year is similar to the first, although the jobs are more responsible. Competition for these courses is high, as are the academic requirements.

During their first year, the students have two week-long residential courses at Imperial College, where they are taught industrial sociology, economics and management studies. As a teaching aid by the industrial sociology lecturers, a questionnaire was given to the students during April 1978, which included a section on work and career attitudes used in the Engineer Survey (Question 28, Appendix Ib). All were obliged to complete the questionnaires.

Thus, data on the work and career attitudes of a further 40 students was obtained. Since these tend to be of high academic calibre, the sample constitutes a rather special group of young, talented engineers at the outset of their careers, who have had some experience of working in large industrial organisations. This data is accordingly used to supplement the picture of work and career attitudes prior to full-time employment provided by the Student Survey.

6.2.3 The Engineer Survey

Most of the research hypotheses are tested with data from the Engineer Survey. This was conducted between December 1977 and April 1978 on a sample of professional engineers employed in six British companies.[1] In four of them access was obtained after an introduction from the Institution of Mechanical Engineers; in two after writing directly to the company. Because of the difficulties in actually getting such access, these six were not chosen on any systemmatic basis. They simply represented a range of different types of organisations which were prepared to grant permission for a questionnaire survey of their engineers to be undertaken. In return, a general statistical report was provided of the results of the overall survey. For the purposes of testing the theoretical hypotheses however, this sample appeared to be adequate, embracing a certain diversity of organisations: two were in civil engineering, two in manufacturing, one in 'process engineering', and one a public corporation engaged in an engineering activity. In order to preserve the confidentiality of these companies, they are refered to by the following pseudonyms.

CONSULTANT	Civil engineering consultancy
CONTRACTOR	Civil engineering contractor
NORTHERN	Medium-sized manufacturing company
SOUTHERN	Medium-sized manufacturing company
NATIONAL	Large, materials processing company
PUBLIC	Public corporation.

1. This term is convenient and as such is used throughout the the thesis. It is however inaccurate to the extent that Consultant is a partnership and Public a public corporation.

The survey was designed to study "professional engineers", although who precisely came within this category was somewhat problematic. For instance, not all "professional engineers" appear to join the Engineering Institutions. The definition of a "professional engineer" suggested by the Conference of the Engineering Societies of Western Europe & USA has been found useful by some (eg, CPC, 1978:24), but this refers more to what engineers should be than to what in practice they are. Rather, for the purposes of defining the boundaries of populations in each company of the Engineer Survey, an approach similar to that used by Mace (1979:60-62) was adopted, the following criteria corresponding with popular use of the term "professional engineer" as far as possible:

(a) Persons who are Chartered Engineers (C. Eng.);
ie, those holding corporate membership in any of the 16 Chartered Engineering Institutions or the 7 Non-chartered Affiliate Members of the Council of Engineering Institutions (CEI).

(b) Persons currently performing 'engineering-type' work comparable to that undertaken by Chartered Engineers;
eg, those engineers who may not have bothered to take up membership of an Institution. In this context, 'engineering-type' work refers to 'operations' or 'Research, design, or development' (RD & D), as defined in Appendix IIb.

(c) Persons with a university degree in engineering or related disciplines currently performing 'engineering type' work or undergoing engineering training;

(d) Persons who were, for much of their careers, professional engineers as defined by (a), (b) or (c), but who no longer perform 'engineering-type' work;
eg, because they have moved into management jobs or ancillary functions such as personnel.

The boundaries of the occupational group "professional engineers" are not unambiguous, and as such these criteria are rather arbitary. The final category (d) is included so that a broad picture of 'engineering careers' might be obtained, even where this includes leaving the occupation. Of course, since the survey is restricted to six industrial'companies', people leaving the engineering industry completely will not be surveyed. The category is aimed primarily at those engineers who go into management or ancillary functions within industrial companies. Whether the nomenclature is appropriate for these people is, of course, debatable.

For pragmatic reasons it was not possible to include engineers at Board Level in the survey, although a complete spectrum of engineers of all ages was otherwise surveyed. The exception is that the survey was restricted to men. There are very few female engineers in Britian (under 1%), and only in the case of National would possibly one or two women have featured in any sample.

The first'company' to be surveyed was Consultant, during December 1977. This provided the opportunity to test th questionnaire and 12 personal interviews were initially undertaken, structured around it. The experience of the Student Survey, together with these interviews; seemed to provide adequate piloting, and a batch of 35 questionnaires was thus distributed to a random sample of the 750 engineers currently employed by Consultant in the UK . Indded after the returns from this sample were examined, only several minor modifications seemed necessary, and these

had no significant effect on comparability with the other samples.

As access was gained in the other companies, so questionnaires were distributed to samples of professional engineers employed in each during the Spring of 1978. Permission from senior management to conduct the research was solicited in each case, and assistance in sending out the questionnaires internally within the companies was obtained. Each subject received the questionnaire, an introductory letter of explanation, and a stamped adressed envelope for returning the questionnaire anonymously to Imperial College.

In all, 337 questionnaires were sent out to engineers in the six companies . In the cases of Consultant and Contractor, the survey was a random sample of professional engineers employed by them in the UK ; for Northern and Southern the whole population of professional engineers within the companies was surveyed; while in National and Public a random sample of professional engineers within one division was undertaken. In each case, the population boundaries were taken as being defined by men, below Board Level,fulfilling the criteria (a),(b),(c),or (d) above.

Of these 337, 194 usable questionnaires were returned, giving a response rate of 58%. Considering the questionnaires took about an hour to complete and the engineers were not specifically granted time at work for this purpose (although doubtless some took it) then the response rate appears fairly good. Variations

between companies , shown in Table 5.1, are not significant at the 5% level.

Supplementary to these structured questionnaires, a small number of personal interviews were conducted with further samples of engineers in each company. Certain topics covered in the questionnaire, were repeated in more open, qualititative fashion, and information was also gained about the engineers' perceptions of certain aspects of the Career System pertaining to their organisation. These interviews lasted about 45 minutes to 1 hour each and took place during working hours. More'institutional' views and data on the Career System were gained by an interview with a personnel representative in each company , which also provided some background information on each of these organisations. 'Details of all this empirical research, together with that of the Student Survey and Total Technology Sample, is provided in Table 6.1, which thus summarises the extent of the field work undertaken in conjunction with the thesis.

The Engineer Survey serves as the main source of data for testing the research hypotheses. The qestionnaire forming the basis of the survey, refered to as the Engineer Survey Questionnaire, is shown in Appendix Ib . (Question numbers referenced to this are given in the form: (ESQ:20, ESQ:21, etc).) This was designed to collect information on the following main issues:

- The engineers' attitudes towards work in general, their present jobs, career goals & orientations, and their general career plans for the future.

TABLE 6.1 DETAILS OF EMPIRICAL RESEARCH UNDERTAKEN

SURVEYS:-	QUESTIONNAIRES					INTERVIEWS	
	Categories	No. out	No. back	% response	Variation	Numbers	
STUDENT SURVEY	Department					Students	
	Aeronautics	21	11	52	$x^2 = 1.57$	3	
	Chemical	27	12	44		3	
	Civil	46	29	63	5 degrees of freedom	3	
	Electrical	55	30	56		4	
	Mechanical	56	35	64		4	
	Mining	19	11	58	$p = .9$	3	
	ALL	224	128	57		20	
TOTAL TECHNOLOGY	ALL	40	40	100	-	0	
ENGINEER SURVEY	Company					Engineers	Personnel
	Consultant	35	26	74	$x^2 = 5.67$	12	1
	Contractor	80	38	48		3	1
	Northern	55	23	42	5 degrees of freedom	5	1
	Southern	39	23	59		3	1
	National	80	55	69		5	1
	Public	48	29	60	$p = .5$	3	1
	ALL	337	194	58		31	6

- The engineers' expressions of commitment to various lines of work activity.

- Miscellaneous attitudinal questions of a topical nature; eg, concerning professional institutions, trade unions, the status of engineers.

- Details of the engineers' perception of their present job and organisational characteristics, and of the operation of the "Career System".

- Details of the engineers' career history and present career status & situs.

- Details of various 'personal' characteristics of the engineers, including certain non-work attributes, (eg, family "life-cycle position", type of accommodation) and aspects of their social and educational background.

The respondents comprised a sample of engineers within a particular part (Consultant, Contractor, National & Public) or the whole (Northern & Southern) of each company. As no details were available on the nature of these populations, there is no way of ensuring these samples are representative of them for the purposes of the survey; clearly on their propensity to return questionnaires they are not. Although it is not actually necessary for these samples to be representative in order to test the hypotheses since analysis focuses on individuals not groups, it is convenient to make this assumption so that comparisons between the companies may at times be made. With an overall response rate of 58% this seems reasonable.

Some basic details of the samples found within each company from the returns are shown in Table 6.2. This indicates the numbers of men in each of the different engineering branches, types of engineering work, and who classed themselves as 'managers' (ESQ:33). One of the

TABLE 6.2 DETAILS OF SAMPLE IN ENGINEER SURVEY

Table shows breakdown on Engineer Survey returns by company and: (a) Branch of Engineering
(b) Type of Work
(c) Those in 'management' (ESQ:33)

CATEGORIES	COMPANIES						ALL
BRANCH	CONSULTANT	CONTRACTOR	NORTHERN	SOUTHERN	NATIONAL	PUBLIC	
Mechanical	-	-	20	22	22	9	73
Civil	26	38	-	-	3	-	67
Electrical	-	-	1	1	11	10	25
Chemical	-	-	-	-	13	-	13
"Specialist"	-	-	-	-	-	10	10
Metallurgy	-	-	-	-	6	-	6
TYPE OF WORK							
RD & D	22	-	8	19	42	1	92
Operations	4	38	8	3	10	25	88
Services	-	-	6	1	1	-	8
Training	-	-	1	-	2	3	6
MANAGEMENT							
Managers	6	6	14	5	18	24	74
Non-managers	20	32	9	18	37	5	120
ALL	26	38	23	23	55	29	194

branches is refered to simply as "specialist", in order to preserve the anonymity of Public. The main categories of work-types are "RD & D" and "Operations" (eg, Gerstl & Hutton,1966: 84): the former includes "Research, design or development", the latter " production, quality control, construction, installation, maintenance, servicing, instrumentation, and general management" (CEI,1977:12).

As the table illustrates, there are considerable differences in the make-up of the companies on each of these factors. Consultant and Contractor are entirely composed of civil engineers, Northern and Southern almost entirely of mechanicals, while National and Public comprise a mixture of several engineering branches. The men in Consultant, Southern and Northern are mostly engaged in RD & D, while those in Contractor and Public mostly in Operations. Only in Public and Northern do more than a third of the engineers class themselves as 'managers'.

These differences reflect the widely different nature and function of each of the companies. To conclude this description of the research samples, it is thus useful to outline a few brief details about each of them. These descriptions are based upon documentary sources (mostly company reports) and verbal information provided by a personnel representative in each company, together with some impressions suggested by the handful of engineers also interviewed in them. Some of this basic information is also summarised in Table 6.3.

CONSULTANT

Consultant is a London-based civil engineering consultancy, employing some 2000 people, of whom around 750 are professional engineers, almost entirely civils. The main function of the professional engineers is the design of civil engineering projects, with the remainder of the staff being employed in an ancillary capacity; for example, as draughts-persons, secretaries, etc. Almost the whole work-force is thus white-collar. Consultant's main offices are in central London, although there are several small regional branches. It is usual for the engineers to spend some time working on construction sites, assisting with the building of projects from Consultant's designs, often those the engineers themselves have worked on. This may involve working throughout Britain or abroad, the Middle East being a very common area of activity at present. For survey purposes however, only engineers employed in UK design offices were sampled. Consultant is a partnership, with 14 Partners who 'own' the firm, and 11 Consultants - senior members without the same ownership rights as Partners. The general image of Consultant is one of a traditional large consultancy, that has built up a good reputation in a specialist activity, reliable but unspectacular, a place for steady workers rather than 'whizz-kids'.

CONTRACTOR

Contractor is a large British civil engineering contracting firm. It is a public company, split into a number of operating groups and subsidiaries, working both in the UK and overseas. The survey was limited to the British side of the civil engineering contracting operations, a group employing some 1500 people in total and around 450 professional civil engineers. There is a small Head Office staff in the South of England, but most engineers work permanently on site locations around the country. Their job is to translate the paper design into a finished civil engineering product, a task that involves managing the site labour force as well as trouble-shooting design modifications with the consultant. The engineers typically move site when a job is completed, on average every 2 or 3 years. The sites represent the main organisational basis of the company, for Contractor is highly decentralised, devolving much autonomy onto the local site agents. Central administration is cut to a minimum. Overall, Contractor appears to be a fairly dynamic company, although like other firms in the construction industry was faced with a rather depressed market at the time of the survey.

NORTHERN

Northern is a medium-sized company located in the North of England. It manufactures large, batch-produced items for a specialist part of a much larger domestic and international market. About half the components for the product are made by the company, about half are bought from outside; the company thus engaging in the dual operations of manufacture and assembly. Northern is located on one site only and employs around 3000 people, of whom about 50 are professional engineers in the terms of this thesis. These are mainly mechanical engineers, working in a variety of production and RD & D functions as well as several 'Service' functions, such as marketing and computing; many engineers are in management positions in these functions. In addition there is a large support staff of technicians and technician engineers, many trained in the company's school. Although a public company, shareholder control by the original founding family remains strong; the Chief Executive bears the company name after his father. Indeed although recent financial trouble brought government assistance and the appointment of an external chairman, Northern still bears the trappings of a 'traditional family firm'; in other ways too it is very much 'an engineer's firm'.

SOUTHERN

Southern resembles Northern in many ways, except that it is located in southern England, and historically was formed from an amalgamation of small companies; as such, it does not bear the same kind of family ethos. Southern is a medium sized company of some 3000 employees, the bulk of whom work on one site, although there are several small locations in other parts of the country. About 40 professional engineers are employed, almost all mechanicals, and most of them confined to the Engineering Department, engaged upon design work. The company's products are not dissimilar from those of Northern, although they operate in a different specialty of the same general industry. There are a number of different product lines, around which the organisational structure of the firm is based, each involving manufacture and assembly of the light/medium engineering kind. Southern's premises are a 'green-site' development, appearing clean and spacious in contrast to the drab, cramped premises of Northern. However, the regional isolation of the local town gives Southern a distinctly provincial atmosphere.

NATIONAL

National is the largest of the six companies, with many plants throughout Britian. While these make a diverse range of products, the principle operations are of process engineering, although of various kinds. The survey was confined to the Engineering Department of one northern Division, a Division of 15,,000 people spread on 6 sites. The Engineering Department itself has a staff of 900, a quarter of whom are professional engineers. These include a range of disciplines; in particular mechanical, chemical and electrical engineering, with engineers working in either a design or Operations capacity. Research is essentially a scientific concern, undertaken by a separate Department, employing few engineers. However some men may take up jobs in the Works Department for a time, most returning to the Engineering Department after this experience. National is a public company, well known both home and abroad, and in general the reputation is a good one; their personnel policies are considered progressive, and financially the company has been very successful for many years. Domestically, it is the giant of its field.

PUBLIC

The sixth company, Public, is the only one not located in the private sector: it is a public corporation. Like National, it is a very large enterprise with operations throughout many parts of Britian involved in the production of a commodity important to both industrial and domestic consumers alike. The survey however was confined to one Midlands Division, employing alone some 1200 people, a tenth of whom were professional engineers. This Division comprises one Head Office and over a dozen sites dispersed throughout the area. Of the 120 engineers, about a third are mechanicals, a third electricals, and the remainder of a"specialist" branch. Most of the engineers are employed in an Operations capacity, either in a managerial or production role, or engaged in maintenance or servicing work. For many their jobs would involve a combination of these functions. Public has a monopoly over its product, although this does not prevent the effects of substitutive competition from being felt. Its post-war history has been unsettled, and there has been a decline in the labour force due to such competition and increasing automation. However the immediate economic prospects of Public appear to be fair.

TABLE 6.3 COMPANIES IN THE ENGINEER SURVEY

DESCRIPTION	COMPANIES					
	CONSULTANT	CONTRACTOR	NORTHERN	SOUTHERN	NATIONAL	PUBLIC
LEGAL ENTITY:	Partnership	Public company	Public company	Public company	Public company	Public corporation
POPULATION UNIT:	All in UK	UK Contracting Division	All company	All company	Engineering Department, 1 Division	Regional Division
NO. EMPLOYEES IN UNIT: (Approx.)	2000	1500	3000	3000	900	1200
NO. ENGINEERS IN UNIT: (Approx.)	750	450	55	40	236	120
GEOGRAPHICAL LOCATION:	All UK	All UK	North	South	North	Midlands
GEOGRAPHICAL DISPERSION:	Several offices plus sites	Many construction sites	1 site	1 main site	Several major sites all close	Several dozen sites all close

CHAPTER SEVEN

THE INVOLVEMENT HYPOTHESIS

> while the managers characteristically felt that their wife and children were of greatest importance in their lives, they felt that their greatest achievements were made at work.
>
> Pahl & Pahl;
> Managers and their wives.

7.1 Introduction:

Using data from the Engineer Survey thus described, this chapter now commences the empirical analysis, investigating the factors related to variations in work involvement as a basis for assessing the consistency of the Involvement Hypothesis; ie, that PCS is an important determinant of work involvement. Indices are proposed for measuring the two suggested facets of work involvement - work effort and work centrality - and the typical nature of the engineers' involvement is discussed. Based around the Conceptual Framework of Figure 2.1, variables are suggested for an Analytical Framework for examining factors related to these indices. Following a discussion of the methodology and its limitations, partial correlation and multiple regression techniques are used to investigate these relationships.

7.2 The work involvement of professional engineers:

In measuring the "job involvement" of a sample of American engineers, McKelvey & Sekaran (1977) employed an index of two questions (Section 2.3), whose reliability had been reported by Patchen (1970). These were also included in the Engineer Survey Questionnaire (ESQ:5,6), the responses being shown in Figure 7.1. As these illustrate, 60% claim to be "strongly" or "very strongly involved" in their work, and 63% that "time never seems to drag" at work. Unfortunately, since both were concerned primarily with the correlates of job involvement, neither McKelvey & Sekaran nor Patchen reported details of their frequency responses, thus preventing comparability with the engineers' replies[1]. However, assuming the engineers are reasonably'honest' in their attitudinal statements about their work (the likely behavioral validity of these responses has been discussed in Section 2.3), then most appear to have a fairly high level of work involvement, although obviously some are more involved than others.

To investigate their work involvement more thoroughly, eight attitudinal items were also included in the Engineer Survey Questionnaire (ESQ:29 b,e,g,h,n p,u,v) inquiring about somewhat different aspects of the men's work and career experiences. Most of these items were taken from previous studies (Bailyn,1977:111; Lodahl & Kejner,1965:29; Pahl & Pahl,1972:278), the

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1. This largely occurs in other studies of job involvement too. Most do not report details of replies to specific questions, at best presenting overall index values, eg. Bailyn, 1977; Lodahl & Kejner,1965.

FIGURE 7.1 RESPONSES TO TWO JOB INVOLVEMENT ITEMS

(The figures give details of the responses of men in the Engineer Survey to the two questions shown, taken from McKelvey & Sekaran, 1977.)

SOME PEOPLE ARE COMPLETELY INVOLVED IN THEIR JOBS; THEY ARE ABSORBED IN THEM NIGHT AND DAY. FOR OTHER PEOPLE, THEIR JOBS ARE ONLY ONE OF SEVERAL INTERESTS. HOW INVOLVED DO YOU FEEL IN YOUR JOB ? (ESQ:5)

	N	%
1. Very little involved; my other interests are more absorbing.....	1	1
2. Slightly involved	5	3
3. Moderately involved; my job and my other interests are equally absorbing	72	37
4. Strongly involved.....	103	53
5. Very strongly involved; my work is is the most absorbing interest in my life.....	13	7
TOTAL	194	100

ON MOST DAYS OF YOUR PRESENT JOB, HOW OFTEN DOES THE TIME SEEM TO DRAG TO YOU ? (ESQ:6)

	N	%
1. About half the day or more.....	4	2
2. About one-third of the day.....	2	1
3. About one-quarter of the day.....	10	5
4. About one-eighth of the day.....	55	28
5. Time never seems to drag.....	123	63
TOTAL	194	100

engineers expressing the extent of their agreement with them on a 7-point numerical scale of labelled extremities; '1' being "disagree strongly" and '7' "agree strongly" (c.f. Bailyn, 1977: 110-111). Undertaking a factor analysis on the responses with an oblique rotation, two factors were identified, the three items loading most heavily on to each being used to form separate indices of involvement (Appendix IIa). The items in each index were:-

I try very hard to be successful in my career.
On the whole, I don't get very involved in my work.
I get a great sense of personal satisfaction from my work.

Probably the most important things that happen to me involve my career.
A man ought to get the main meaning in his life from his work.
On the whole, work takes priority over my social life.

The nature of items in each group seems to generally correspond with the two facets of work involvement suggested in Chapter 2; the first representing"work effort" , some 'absolute' sense of involvement, and the second "work centrality", the importance of work 'relative' to other aspects of a person's life.

Factor analysis was repeated for the three items in each group to provide weights for constructing indices of work effort and work centrality. The weighted summation of the normalised responses to these items thus providing measures of the magnitude

of these facets of involvement. Pearson correlations between the indices and the responses to McKelvey & Sekaran's two job involvement questions were quite strong, providing some validation of the work effort and centrality measures (Appendix IIa).

However, the Pearson correlation between the indices themselves was quite low (r=.253;p=.001), as expected from the output of a factor analysis. This implies that within the sample the relative importance attached to work and involvement in work at the work-place are not necessarily related. The frequency distributions of responses to each of the index items, shown in Figure 7.2, illustrates this further. While the work effort items are heavily skewed towards the 'high' end of the scale, the work centrality items show a wider range, approximating towards a Normal distribution about mid-scale. Thus, while most engineers claim to have quite a high work effort, there is much less unanimity about the relative importance of work in their lives.

Previous studies of British managers largely echo this position (eg, Child & MacMillan,1972). For instance, Guerrier & Philpot (1977:10), in reporting a survey of BIM members, suggest that:

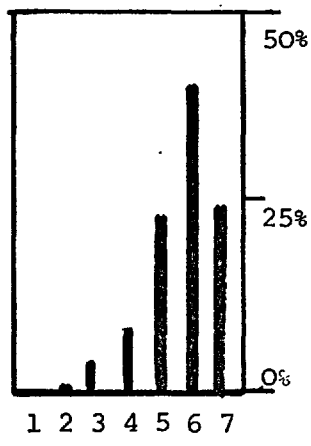
> For the British manager, work and home are both important and he tends to try to keep one separate from the other. The desire for'more hours in the day to split between job and family' is a typical comment which reflects the problems of coping with a challenging job as well as finding time for a home life.

FIGURE 7.2 FREQUENCY DISTRIBUTIONS OF ITEMS IN WORK EFFORT AND CENTRALITY INDICES

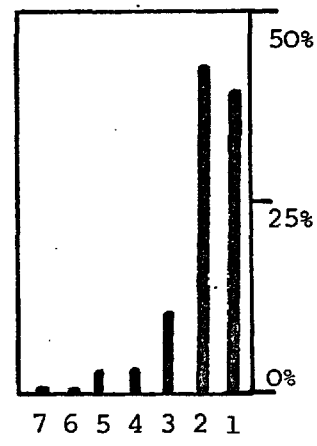
(Responses are on 7 point scales of labelled extremities: 1 representing "disagree strongly" and 7 "agree strongly".)

WORK EFFORT ITEMS

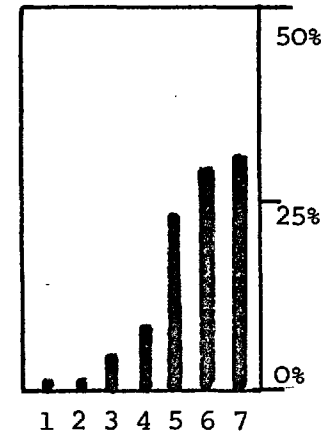
I TRY VERY HARD TO BE SUCCESSFUL IN MY CAREER (ESQ: 28v)



ON THE WHOLE, I DON'T GET VERY INVOLVED IN MY WORK: (ESQ:28p)

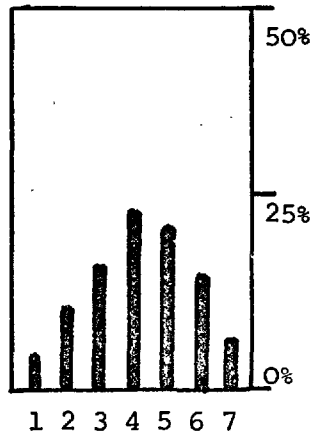


I GET A GREAT SENSE OF PERSONAL SATISFACTION FROM MY WORK (ESQ:28b)



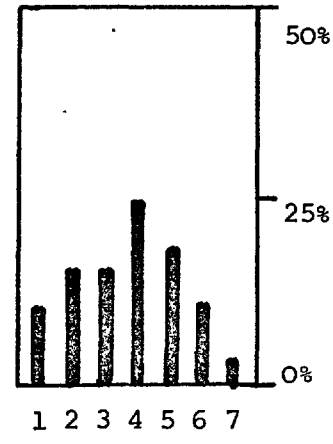
WORK CENTRALITY ITEMS

PROBABLY THE MOST IMPORTANT THINGS THAT HAPPEN TO ME INVOLVE MY CAREER (ESQ:28g)



A MAN OUGHT TO GET THE MAIN MEANING IN HIS LIFE FROM HIS WORK (ESQ:28u)

ON THE WHOLE, WORK TAKES PRIORITY OVER MY SOCIAL LIFE (ESQ:28e)



Pahl & Pahl (1971:235), in an interview study of managers who had attended a particular management course, expand this theme further, suggesting that:

> while the managers characteristically felt that their wife and children were of greatest importance in their lives, they felt that their greatest achievements were made at work.

The engineers interviewed in conjunction with the Engineer Survey tended to show a similar position. Corresponding to the survey results, whilst at work the involvement of these people was generally high:

> I get a great deal of enjoyment from my work and all aspects of civil engineering design. I don't dread coming into work of a morning. I should hate it if I did. (47 year old civil engineer, Consultant).
>
> On the whole the work is varied which I enjoy. Some of it is better than others. I really like finding solutions to difficult engineering problems, particularly when I can see my design built and being used. That's when I get most involved in my work. (52 year old civil engineer Consultant.)
>
> There's never enough time to do all you would like and sometimes I think I'd like to be able to spend longer over some of the jobs. On the whole though I really like what I'm doing now. It gives me a real sense of satisfaction, particularly when things work out well. (29 year old chemical engineer, National).

There were also indications that, like the British managers reported above, the engineers were keen to keep their work and home lives as separate as they could.

> I don't take work home with me. I could do, but I try to keep my work and home life separate. (49 year old, mechanical engineer, Northern.)
>
> I have a personal rule not to take work home, although sometimes I break it occasionally. I try and adopt a principle that when I walk out of

the gate, that's it, finished. Otherwise work can take over and rule your life. I do know people who are Southern men through and through, first to last, breakfast to dinner.... While I'm here I get extremely involved in my work. I feel rotten about coming in to work Monday morning just the same as anybody else, but once you get your teeth into the job, I'm not looking for things to fill my time, far from it. I get a lot of enjoyment from my job and it means a lot to me. (34 year old mechanical engineer, Southern.)

I try to aviod taking work home, but I do it when I have to. I think one is never really divorced from one's work completely. I don't take routine work home, of course, but if there's a problem and it has to be cleared up quickly, I'm happy to do it. (52 year old civil engineer, Consultant.)

I don't usually work at weekends, but quite often I work outside working hours during the week. You've got to live with that. I still get a lot of free time with my family. (48 year old chemical engineer, National.)

Pahl & Pahl (1971) argued that there was a conflict or "tension" between the time demands of their managers' work and home activities, that the men would like to spend more time in each but were forced to make some compromise given the limited hours in a day. This seemed less evident however for the engineers interviewed, partly perhaps because the nature of their jobs tended to restrict their work activities to standard 'office hours'.

I rarely stay on to work after 4.30. You can't spend another hour at night to finish the job. You'd have to spend another year. It's that sort of job. It's very much a fixed day's work and you just do the 7¾ hours. (35 year old mechanical engineer, Southern.)

Our working hours are quite long. 8 to 6 weekdays and 8 to 1 on Saturdays so you try not to work outside the hours. Occasionally you've got to if something comes up. Sometimes I do a bit of programming or report writing at home, 'cause you can do it so much quicker, but mostly you can only work when the site's operating. In the winter you get a bit of a bonus. The blokes on site finish at 4.30 and in the office we're usually away by 5.30. (27 year old civil engineer, Contractor)

On a daily basis this lack of particularly strong "tension" over the allocation of the engineers' time, may facilitate some separation of work and home 'lives'. In fact only in two companies did there appear to be specific occassions, inherent in the job, which gave rise to some possible conflict. In Contractor, the engineers had to move sites every 2 or 3 years, usually on completion of the job, and had little choice over where in the UK they went. This continual moving of homes is clearly disruptive to family life within a particular community (eg, Bell,1968). As several men explained:

> I am deemed to be available to move anywhere in the UK. I don't mind moving personally but now the children are older, I'm reluctant to move schools. Its the family that suffers from the moves. Its easy for me. You work 5 or 6 days a week, but they are stuck with new schools, making new friends. I'm very fortunate; I've got an adaptable wife and very adaptable children. (50 year old civil engineer, Contractor).

> The job means a lot to me. Obviously it doesn't mean as much as my wife. She's away training as a nurse at the moment and can't be with me here. As soon as she's finished she'll be able to move around where-ever I have to go. But everything is dependent on that. The wife's first and everything else is after. (23 year old civil engineer, Contractor.)

The other case of such "tension" between work and home activities, an integral part of the job, arose in Public, where the engineers were "on call" 24 hours a day.

> You're on call the whole time and have to go out at a moment's notice if necessary. These occur about once or twice a month now. At my level it has got to be something pretty serious. It's inconvenient on your family life, although now the children are grown up its not so bad. (49 year old mechanical engineer, Public.)

> I need to be available outside working hours and that restricts you. I went into the job with my eyes open and those were the conditions, that's what I accepted. It's more than just a job. There has to be this total commitment, otherwise the thing just won't gel. If I'm in the pub and some-one phones up to say you're needed, if the pint's half empty it stops on the bar; it's automatic. You don't just work 9 to 5.... There are functions I have to attend outside work as representative of Public, and things like Institution functions loosely connected with work. In my real social life, I manage to retain a separate social existance. I feel now the more complete person you are the better. I think earlier I tended to bury myself completely in my work. Now I make a point of making my friends outside the company. (42 year old "specialist" engineer, Public.)

In the case of engineers in Contractor and Public specific occassions arose where there was some obvious conflict between their work and home interests, although this did not lead to there being significant differences in the work effort or centrality of these men compared with those in other companies (see Table 7.5). They may however have facilitated a less ambivalent evaluation of work centrality. For the men of the Engineer Survey in general the lack of "tension"between their work and home lives may have meant that there was little basis on which to evaluate the relative importance of work.(Even for those in Contractor and Public such conflict arose quite rarely). Thus by keeping their work and home lives fairly separate, it may have been difficult for the men to assess their work centrality; both work and home activities being important in different ways and on different, largely non-conflictual, issues. This may be a possible explanation for the tendency of the responses to the work centrality items to predominate around mid-scale, expressing neither strong agreement nor disagreement (Figure 7.2).

The engineers' average levels of work effort and work centrality surprisingly showed no dramatic changes with their age, although Figure 7.3, plotting the mean index values for 5-year age-groups, indicates that there is a general tendency for both to increase with age. Not all the items used to construct these indices could be asked in the Student Survey or Total Technology sample since the students were not actually working, but one item from each on the subject of their careers did seem valid, the responses being shown in Figure 7.4. This also illustrates how engineers of different ages answered these two questions. Although relatively more of the Total Technology students assigned primary importance to their careers than any other group, there is remarkable stability in the other responses both for the students and for engineers of different ages, the work effort and centrality items showing only small changes whether the engineer was young or old, a student or practising engineer.[1] Most claim they try very hard to be successful in their careers, and between a third and half say their careers are of primary importance in their lives.

What factors contribute to the variation in responses within the sample may now be considered. For this purpose an Analytical Framework is suggested, based around the Conceptual Framework of Figure 2.1.

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1. The validity of longitudinal inferences from these cross-sectional observations is discussed in Section 10.2.

FIGURE 7.3 VARIATION IN MEAN WORK INVOLVEMENT WITH AGE

(Graph shows mean values of work effort and work centrality indices in each of the 5-year age-groups in the sample. Values are normalised across the whole sample; the extremities of the graph representing ± 1 standard deviation of each.)

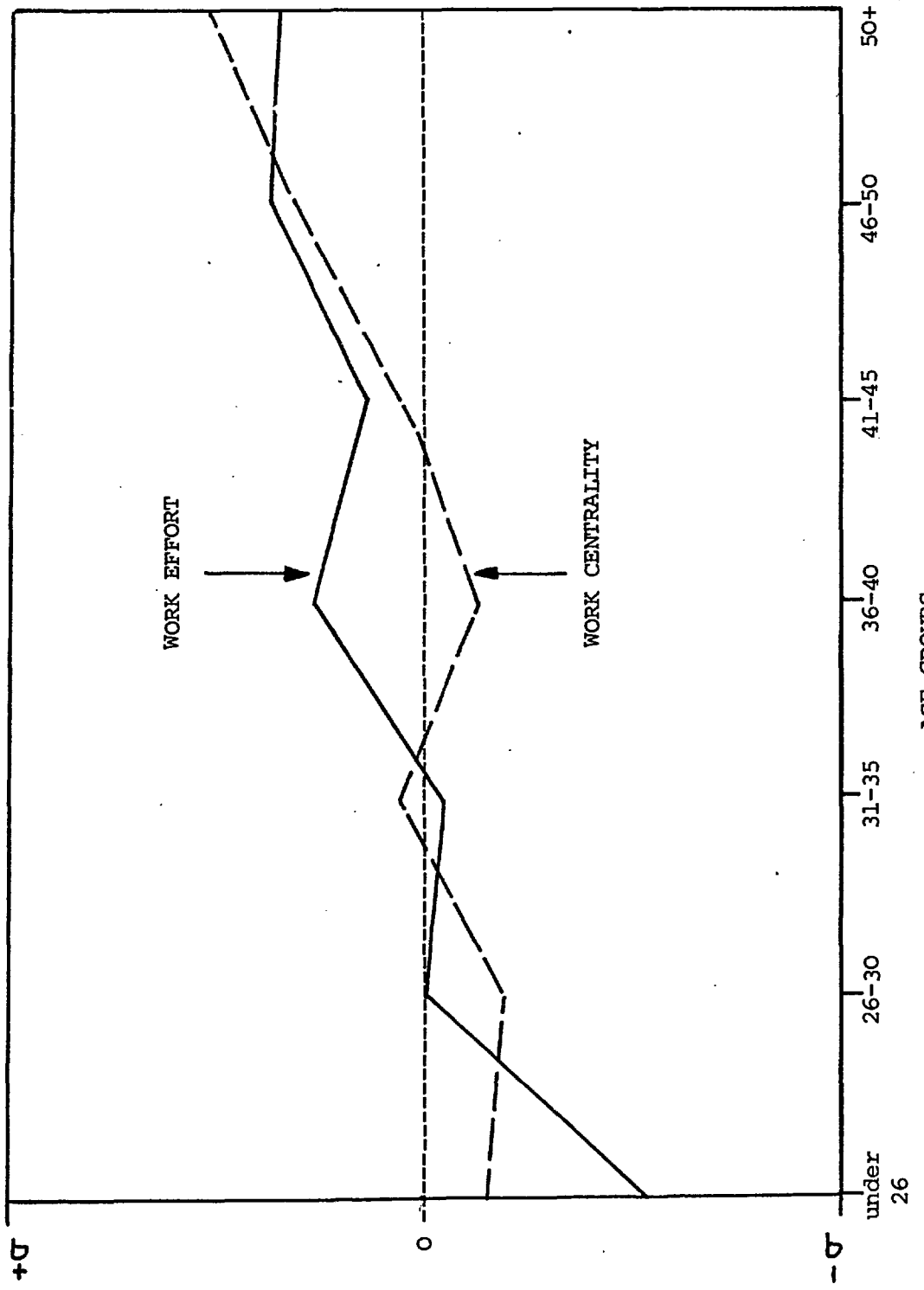
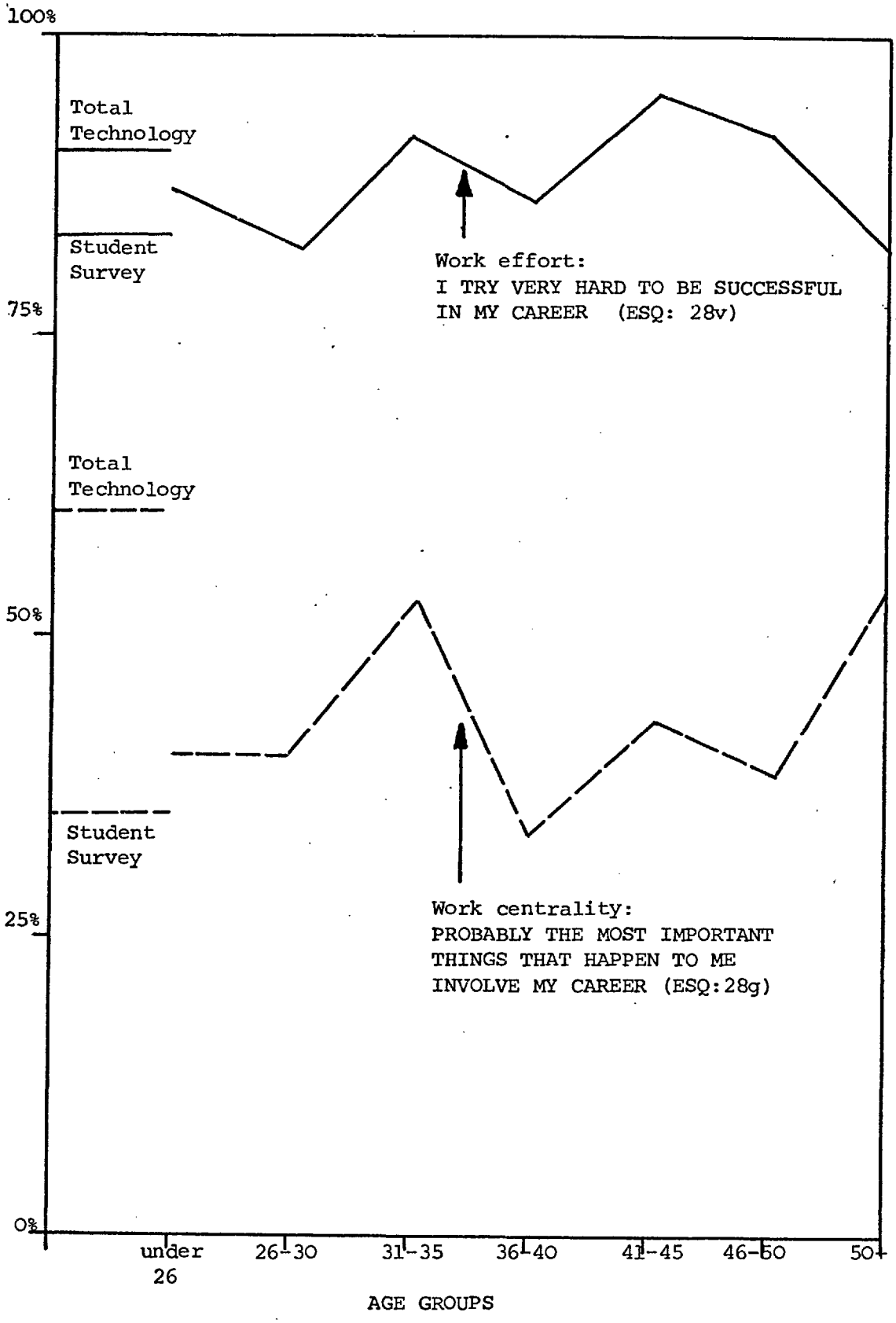


FIGURE 7.4 THE STABILITY OF TWO INVOLVEMENT ITEMS WITH AGE

(Graph shows % of each group'agreeing'with the two statements, ie answering 5,6,or 7 to the 7-point disagreement/agreement scales.)



7.3 Analytical Framework and Methodology:

The Conceptual Framework of Figure 2.1 suggests that the sources of variation in work involvement may be classified into "organisational", "occupational" "personal", and "career" factors . On the basis of the accompanying and subsequent discussions of previous research, the Analytical Framework of Figure 7.5 is proposed. This includes a number of specific items, representing possible determinants of work involvement, classified under these headings. The classification is merely one of convenience, for no precedence or ordering of the individual variables is assumed.

"Organisational" factors include a number of perceived job characteristics, job attitudes, categories of present career situs, and trade union membership. "Occupational factors" per se cannot be considered in a study of one occupation, although several intra-occupational parameters (branch of engineering, possession of a C.Eng. qualification) warrant possible attention; for convenience however these are categorised under "organisational" and "career" factors respectively. "Personal" factors include age, social and educational background characteristics, and several aspects of non-work commitments. Following the scheme outlined in Chapter 3, "career" factors include measures of career status and situs mobility, and company seniority; attitudinally, these also comprise measures of career goals and orientations, various evaluations of possible career moves, and PCS, the evaluation of psychological career success.

FIGURE 7.5 THE ANALYTICAL FRAMEWORK

(Factors shown in the figure form the Analytical Framework used in the thesis. Details of variables are given in Appendix II.)

ORGANISATIONAL FACTORS

- Job characteristics:-
  - Variety
  - Autonomy
  - Formalisation
  - Teamwork
  - Colleague sociability
- Job attitudes:-
  - Job satisfaction
  - Job utilisation
  - Work-based self-esteem
- Present career situs:-
  - Company @
  - Branch of engineering @
  - Type of work @
  - Manager $
- Trade union member $

(OCCUPATIONAL FACTORS)

- (Chartered Engineer $)
- (Branch of engineering @)

CAREER FACTORS

- Career status (& mobility):-
  - Organisational
  - Monetary
  - Technical-scientific
  - Technical-professional
- Career situs mobility:-
  - Organisational
  - Goegraphical
  - Type of work
- Company seniority
- Chartered engineer $
- Career goals:-
  - Organisational
  - Monetary
  - Technical
- Career orientations:-
  - Organisational
  - Monetary
  - Technical
- Career orientation type @
- PCS
- Career evaluations:-
  - Organisational promotion rate
  - Organisational promotion basis
  - Occupational openness
  - Difficulty of changing jobs
  - Degree of job specialisation

PERSONAL FACTORS

- Age
- Social class of origin $
- Type of school $
- Level of education $
- Type of university $
- Class of degree
- 1974 General Election vote @
- Family life-cycle position $
- Type of accommodation $

(@ - These variables are non-scalar
$ - These variables are non-scalar but have some sense of ordering, and as such are used at times in a scalar manner in addition to any non-scalar operations.
All other variables are taken as scalar.)

Details of the construction of these variables are given in Appendix II. They are each based upon the individual's responses to the Engineer Survey Questionnaire. The majority are of scalar form, the magnitude of the variable representing the strength of the conceptual parameter. Many are also attitudinal variables, based, for example, on responses to 7-point numerical scales of labelled extremities. Some are constructed as indices from the responses to a number of questions. Appendix II indicates some validation of such indices and other measures where this has been possible. Non-scalar variables are based upon 'standard' classifactions where appropriate; eg, for "type of university" (Halsey & Trow,1970); "type of work" (CEI,1977: 12).

Following the theoretical discussion of Chapter 3, the engineers' career status was evaluated in terms of three 'structural' dimensions:"organisational", "monetary" and "technical" status. These each seemed to be structural attributes of the career likely to form relevant bases for the engineers' career status (eg, Sofer,1970; Schein et al,1964). The first of these was taken as a measure of organisational responsibility from a type of job evaluation scale developed by UKAPE and employed by the Engineering Institutions in salary surveys (eg, ICE, 1978). The parameter representing the level of responsibility is the unweighted index of four items which describe the duties, technical responsibility, supervision received and authority that the respondent assesses

for himself out of 5 hierarchical categories. This measure has the advantage over formal organisational position of enabling comparability across all the companies, and of representing a situation as it actually appears to the individual, rather than as it is meant to be on paper. (When the two are used as alternative measures within one company, it is the UKAPE scale which appears the more powerful measure of status; see Table 8.6.)

Gross salary was used as a convenient measure of monetary status, although the third dimension of technical status is rather harder to quantify because of its varied and often imprecise nature. While this may have implications for its facticity as a measure of career status, exploration of this dimension is seriously impaired by the paucity of accessible and comparable data. Two indices were constructed to try and gain a very rough measure of this dimension: the first is based upon the number of publications and patents produced by the engineer (although of course here quality may be more important than quantity), and represents the extent of an engineer's "scientific output". The second is based upon the level of professional qualifications he has attained, as judged by the type of Institutional membership held, with membership in up to two bodies being considered in the index. Neither of these offer particularly good measures of an engineer's technical achievements and for this reason each is retained separately as an alternative indicator of technical

status. The Pearson correlation between them is low (r=.200;p=.003), suggesting this may be the best approach.

These measures of responsibilty level, salary, scientific output and professional qualifications comprise the parameters of career status at one point in time. Measures of status mobility are evaluated where necessary through the use of partial correlations, controlling for variations in age: this provides a measure of "age-relative status". Further refinement is employed in the subsequent chapter by considering differences in education level, as a basis of differences in career status mobility.

Corresponding to the organisational,monetary and technical dimensions of status, attitudinal expressions of career goals and orientations are assessed. A parameter of organisational goals is based upon the extent of agreement with the statement: " I THINK SOME DAY I'VE A GOOD CHANCE OF BECOMING A PARTNER OR DIRECTOR IN A COMPANY OR FIRM" (ESQ:28i), although clearly the terms in this question are open to somewhat differing interpretations. A measure of monetary goals is taken from the maximum salary the engineer expected in his career (ESQ:30), and that of technical goals from the extent of agreement with the statement: " ONE OF MY AMBITIONS IS TO BE INVOLVED WITH A NEW TECHNOLOGICAL DEVELOPMENT IN MY FIELD" (ESQ:28t).

Three career orientation indices were also constructed, representing the importance assigned by

the engineers to organisational, monetary, and technical status mobility (Appendix IId). A number of different kinds of attitudinal elements were used to construct each index, with factor score coefficients employed as weights. Although both were quite strongly correlated with the monetary orientation measure, the organisational and technical orientation indices were only weakly related to each other. As such, they were combined to form a four-fold typology of career orientations, depending upon whether the engineer was above or below the median value of each index (Appendix IId). This typology is discussed in detail in the next chapter.

Categories of career situs which seemed of likely relevance to the engineers' careers were: their present company, branch of engineering, type of work, and whether or not they were (on a self-classification) a "manager"; although this fourth item clearly has status implications, as a dichotomy it could possibly be a significant situs parameter. In assessing situs mobility over the career however, the second and fourth of these offer little value: few if any engineers change branches, while the fourth is a simple dichotomy, usually operating in one way. Rather, situs mobility was assessed on the three dimensions of organisational, work-type and geographical mobility over the work career. Career history data was analysed to discover the number of different organisations, types of work, and geographical regions (12 in UK and 1 for overseas) worked in to provide these measures.

The structual and attitudinal components of the engineers' careers were thus described by a number of measures based around the organisational, monetary, and technical dimensions of status, and these various categories of career situs. The measure of PCS was taken as the index to two questions asking for an evaluation of career progress and reputation, while several other evaluations of possible career moves were also included in the Analytical Framework under the "career factors" category. These were : the perceived rate of future promotion in the present organisation, the relative contribution of seniority to results in this promotion, the perceived meritocratic nature or "openness" of the engineering occupation in general, the ease with which the respondent could get a comparable job elsewhere, and the extent to which he felt his skills were specialised or general.

In all, 44 different variables are included in the Analytical Framework of Figure 7.5, of which 30 are assumed to be scalar variables, 5 are categorised parameters of no real ordering, and 9 are categories whose sense of ordering permits additional scalarity assumptions in certain instances, (so that partial correlations may also be investigated, these being more economical than multiple regression). This Framework provides the basis for investigating factors related to the two work involvement indices, thus enabling the Involvement Hypothesis to be assessed; (ie. that PCS is an important determinant of work involvement).

The technique adopted for this purpose in the present chapter, and in later parts of the thesis for other hypotheses, involves linear analytical methods; primarily, partial correlation and multiple regression. These provide a means of assessing the strength of an association between work involvement and the parameters of the Analytical Framework. Where such associations arise through intermediary factors, these effects may be controlled for, allowing the evaluation of 'direct' relationships to be made - providing of course that the intermediaries are included within the Analytical Framework. To the extent that a given variable is associated 'directly' with work involvement, it may represent a possible <u>determinant</u> of work involvement. As Heise begins (1975:3):

> The notion of causality applies whenever the occurrence of one event is reason enough to expect the production of another.

If a given factor within the Analytical Framework "causes" a certain level of work involvement to arise, then at one moment in time some association will be observed between it and the work involvement measures. However, the observation of such an association is no guarantee of causality in this way: causality may operate in either direction or be the result of a third factor operating on both (eg, Blalock, 1961). For example, if the dichotomous variable "manager" were found to correlate positively with the work effort index (ie, managers had a higher work effort than non-managers), then this might be because of the following possible relationships:

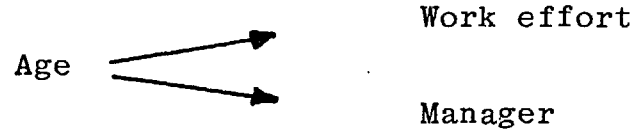
(a) The demands of a manager's job call for a higher work effort:

Manager ⟶ Work effort

(b) Those with a higher work effort get promoted to managerial jobs:

Work effort ⟶ Manager

(c) Managers tend to be older; older people have a higher work effort:



Notwithstanding any intermediary factors that may operate between "manager" and "work effort", a correlation between them at any one time is liable to these basic interpretations. Even if intermediary parameters and additional variables (such as in case (c)) may be considered through the use of partial correlation and multiple regression techniques, there is no way of telling from cross-sectional results whether a person is a manager because he works harder or works harder because he is a manager. Only to the extent that either (a) or (b) becomes untenable (eg, on grounds of temporal or logical priority), are causal inferences possible. For example, if age correlates directly with work effort, causality may operate in only one direction. In such cases path analysis allows useful inferences to be made from cross-sectional data. Path analysis is (Nie et al, 1975:383):

> primarily a method of decomposing and interpreting linear relationships among a set of variables by assumption that (1) a (weak) causal order among

these variables is known and (2) the relationships among these variables are causally closed.

The normalised beta coefficients derived from a multiple regression analysis are conventionally adopted as the path coefficients. They indicate the proportionate change in the'dependent'variable for unit change in the'independent'variable, and as such provide a measure of the direct 'causality' between the two variables. They are reported where applicable in the subsequent analyses. However, since neither of the above assumptions are likely to be rigorously upheld for the variables in the Analytical Framework and their relations with work involvement, it seems unwise to place great weight on their validity.

Rather, for testing the main hypotheses with the cross-sectional data from the Engineer Survey, the most rigorous approach seems to be to effectively posit null hypotheses in each instance: for example, that PCS and work involvement are not related, etc. If in fact they are then found to be so in the analysis, then the null hypothesis can be rejected. This does not mean that, eg, the Involvement Hypothesis is itself then accepted, but that its consistency is upheld. Since the relationships between such parameters may be associative or operate in a contrary causal direction the Involvement Hypothesis cannot be proven as such. Of course, the testing of the various null hypotheses is not particularly powerful, although it does serve as a useful basis for initial

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1. For a discussion of path analysis techniques see: Blau & Duncan, 1967:163-187; Duncan, 1966. Broader discussions on causal modelling may be found in Blalock, 1961, 1972; Heise, 1975.

investigation of the Primary and Secondary Hypotheses, insofar as their consistency may thus be assessed. Where this is affirmed, then further longitudinal research would be warranted to provide more rigorous proof.

Some way towards this however is possible with the cross-sectional data insofar as a weak causal order can be infered, as outlined above (eg, for a relationship between 'age' and 'work effort'.) Where this is possible then further support may be given to the hypotheses, increasing the power of the test by allowing certain causal inferences to be made.

The analysis adopted in this present chapter will thus be to undertake partial correlational computations between the two work involvement indices and all the scalar variables of the Analytical Framework. By controlling at the 1st Order level for the factor correlating most strongly at the Zero Order level (Pearson correlations), then the'direct' relationships of two parameters with work involvement may be examined. This process may be repeated to higher order levels, thus illuminating those scalar variables that have significant direct relationships with work involvement (or at least those unmediated by other scalar variables of the Analytical Framework). Multiple regression analysis, using a dummy variable technique (Nie et al, 1975:373-383), allows the effect of variations across non-scalar categories on the level of work involvement to be assessed. Entering significant non-scalar

parameters into a multiple regression analysis with those from the partial correlational analysis, all the variables of the Analytical Framework having a significant 'direct' relationship with work involvement can be ascertained. To the extent that causal inferences may be upheld with these variables (eg, Heise, 3-37), then the normalised beta coefficients of the regression analysis can be taken as path coefficients, representing the strength of direct relationships with the work involvement indices. The multiple regression analysis also permits the total variance of work involvement explained by such factors to be ascertained in this way, allowing the predictive power of the hypothesis to be assessed. This general technique is extended in turn to the main attitudinal variables related to work involvement and is employed in certain subsequent parts of the thesis.

The measures of association calculated from partial correlation and multiple regression analysis, however, assume linear relationships (eg, Nie et al, 1975:302); when calculated across the whole sample they rely upon the relationship holding in all instances. Neither of these assumptions are necessarily valid: relationships between factors may be non-linear; they may perhaps only operate for selected groups within the sample. Linear analytical techniques are one of the simplest and easiest ways of testing associations between certain parameters, but where more complex relationships are likely to arise, they may be too weak or simplistic. For the results arising in this present chapter such

methods do appear satisfactory. In the following chapter where more complicated relationships are postulated to exist this is not the case and a different approach is necessary, breaking the sample down into a number of groups to examine contingent effects.

Linearity is also assumed by these methods in the variables employed in the analysis, an assumption unlikely to be upheld with any rigour for many of the parameters of the Analytical Framework, particularly the attitudinal ones (eg, Cicourel,1964). Notwithstanding any reservation about the suitability of particular questions themselves (eg, Payne,1951; Moser,1961:210-245), the 7-point scale construction may give a certain spread of responses, but any scalarity is necessarily approximate. Nonetheless, whatever non-linearity may thus arise, any measures of association would be reduced, so maintaining the reliability of a null hypothesis test. However because of this potential non-linearity, the significance levels, particularly of higher order partial correlations, must be treated with some scepticism (eg, Galtung,1967:186-189).

7.4 Analysis:

As the first step in the analysis, the Pearson correlation coefficients may be computed between the two work involvement indices and the scalar variables of the Analytical Framework (Table 7.1). Values of multiple regression coefficients, computed with the non-scalar variables using a dummy variable technique, are shown in Table 7.4.

Table 7.1 indicates a remarkable contrast between the work effort and work centrality correlations. The former correlates strongly with a number of variables, the greatest being: job satisfaction (r=.527;p=.001), PCS (r=.473;p=.001),perceived work variety (r=.448; p=.001), and current organisational status (r=.337; p=.001); while the latter, work centrality, correlates significantly[1]with only the third of these (r=.146; p=.022), and in general is related to far fewer of the variables in the Analytical Framework and much less strongly: the highest is with the engineer's age (r=.251; p=.001).

The work effort and work centrality indices are thus related to very different kinds of factors, suggesting that they may arise from different origins. In any event, these differences require that each of the indices be considered separately.

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1. Unless otherwise indicated, a 5% level of significance is used throughout the thesis. Below this level, significance probabilities are specified up to p=.001, a level which continues to be used for those of p <.001; above 5% the values are not specified, but given as p= *.

TABLE 7.1 CORRELATIONS WITH WORK INVOLVEMENT INDICES:

(Table shows Pearson correlations between work effort & centrality indices and scalar variables of Analytical Framework.)

Pearson correlations with:-	WORK EFFORT		WORK CENTRALITY	
	r	sig.	r	sig.
ORGANISATIONAL FACTORS:				
Variety	.448	.001	.146	.022
Autonomy	.286	.001	.034	*
Formalisation	.180	.006	.028	*
Teamwork	.129	.038	.105	*
Colleague sociability	.315	.001	-.023	*
Job satisfaction	.527	.001	.081	*
Job utilisation	.324	.001	-.046	*
Work-based self-esteem	.368	.001	.005	*
Manager	.076	*	.087	*
Trade union member	-.115	*	-.007	*
PERSONAL FACTORS:				
Age	.226	.001	.251	.001
Social class of origin	.007	*	.012	*
Type of school	.002	*	.041	*
Level of education	.046	*	.101	*
Type of university	.076	*	.023	*
Class of degree	.094	*	.030	*
Family life-cycle position	.163	.013	.129	.040
Type of accommodation	.109	*	.022	*
CAREER FACTORS:				
Organisational status	.337	.001	.101	*
Monetary status	.288	.001	.153	.018
Technical-scientific status	.108	*	.178	.007
Technical-professional status	.131	.036	.142	.024
Organisational mobility	.100	*	.125	.045
Geographical mobility	.069	*	.073	*
Work-type mobility	.110	*	.134	.034
Company seniority	.189	.004	.217	.001
Chartered Engineer	.238	.001	.076	*
Organisational goals	.208	.002	-.033	*
Monetary goals	.260	.001	.052	*
Technical goals	.099	*	.026	*
Organisational orientations	.165	.012	.080	*
Monetary orientations	-.091	*	-.056	*
Technical orientations	.121	.049	.137	.031
PCS	.473	.001	.077	*
Perceived promotion rate	.136	.034	-.106	*
Perceived promotion basis	-.066	*	-.109	*
Perceived occupational openness	.076	*	-.014	*
Perceived market difficulty	-.146	.022	.019	*
Perceived job specialisation	-.159	.014	-.074	*

(Levels of significance above 5% are shown by '*' .)

7.4.1 Work effort:

Taking the variable correlating most strongly with work effort in Table 7.1, job satisfaction, and computing partial correlation coefficients at the 1st Order level for work effort and the scalar variables of the Analytical Framework whilst controlling for variations in job satisfaction, the first column of Table 7.2 is produced. A number of factors correlating significantly with work effort at the Zero Order level no longer do so here, thus indicating that their association with work effort is indirect, mediated by the level of job satisfaction. At this 1st Order level, PCS correlates most strongly with work effort (B=.377; p=.001). Repeating the partial correlation calculations at the 2nd Order level, controlling for both job satisfaction and PCS, the second column of Table 7.2 is derived. The measure of perceived work variety shows the strongest partial correlation in this case (B=.246; p=.001). Controlling also for this parameter at the 3rd Order level clears all significant partials with the exception of "Chartered Engineer", the dichotomous variable representing whether or not the respondent has a C. Eng. qualification.

The multiple regression analysis of Table 7.4 shows that just two non-scalar variables have a significant relationship with work effort: the engineer's company and "Chartered Engineer". If these are entered into a regression analysis after job satisfaction, PCS, and work variety, both continue to have a significant relationship

TABLE 7.2 PARTIAL CORRELATIONS WITH WORK EFFORT

(Table shows Partial Correlations between work effort index and scalar variables of Analytical Framework at 1st,2nd & 3rd Order levels.)

Partial correlations	1st Order		2nd Order		3rd Order	
Controlling:-	Job satisfaction		Job satisfaction, PCS		Job satisfaction, PCS, Variety.	
	B	Sig.	B	sig.	B	sig.
ORGANISATIONAL FACTORS:						
Variety	.288	.001	.246	.001	-	
Autonomy	.145	.034	.066	*	.025	*
Formalisation	.089	*	.039	*	-.015	*
Teamwork	.104	*	.076	*	.047	*
Colleague sociability	.192	.008	.146	.033	.108	*
Job satisfaction	-		-		-	
Job utilisation	.027	*	.061	*	.006	*
Work-based self-esteem	.238	.001	.078	*	.074	*
Manager	.026	*	-.011	*	-.077	*
Trade union member	-.180	.011	-.191	.008	-.112	*
PERSONAL FACTORS:						
Age	.087	*	.112	*	.069	*
Social class of origin	.040	*	.066	*	.061	*
Type of school	.010	*	-.050	*	-.043	*
Level of education	.002	*	.007	*	.002	*
Type of university	.065	*	.040	*	.023	*
Class of degree	.022	*	.031	*	.008	*
Family life-cycle position	.068	*	.095	*	.046	*
Type of accommodation	.007	*	.007	*	-.039	*
CAREER FACTORS:						
Organisational status	.190	.008	.165	.019	.102	*
Monetary status	.169	.016	.151	.029	.098	*
Technical-scientific status	.033	*	.004	*	-.007	*
Technical-professional status	.126	*	.165	.019	.125	*
Organisational mobility	.082	*	.129	*	.101	*
Geographical mobility	.114	*	.161	.022	.113	*
Work-type mobility	.103	*	.192	.008	.098	*
Company seniority	.076	*	.088	*	.050	*
Chartered Engineer	.226	.002	.239	.001	.234	.002
Organisational goals	.244	.001	.147	.033	.118	*
Monetary goals	.247	.001	.160	.022	.072	*
Technical goals	.071	*	.057	*	.031	*
Organisational orientations	.246	.001	.205	.005	.083	*
Monetary orientations	.004	*	.007	*	.041	*
Technical orientations	.041	*	.026	*	.007	*
PCS	.377	.001	-		-	
Perceived promotion rate	.119	*	-.007	*	.023	*
Perceived promotion basis	.022	*	.001	*	-.047	*
Perceived occupational openness	.070	*	.035	*	.011	*
Perceived market difficulty	-.170	.016	-.145	.034	-.115	*
Perceived job specialisation	-.059	*	-.087	*	-.075	*

(Levels of significance above 5% shown by '*')

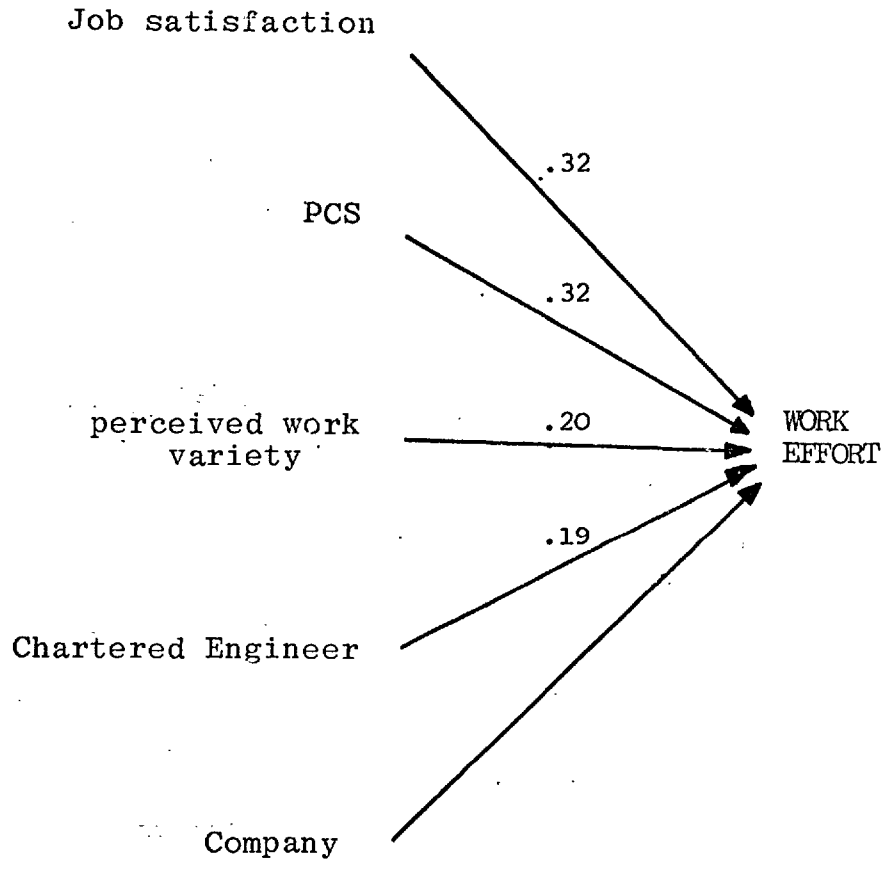
with work effort; these persist in fact wherever the two are placed in the regression. Figure 7.6 illustrates these relationships with the work effort index and gives details of the multiple regression. If it is assumed that these five variables are logically or temporally prior to work effort, then the path coefficients can be computed as shown in the diagram. Job satisfaction and PCS are the two factors having the strongest relationships with work effort : in fact together they may account for some 39% of the variance of work effort; the five together extending this to 49%.

Nevertheless the assumption of causality must be questioned. Both PCS and job satisfaction are attitudinal variables measured at the same time as the work effort items, such that there is no immediate basis for supposing causal inferences in either direction. By looking at the factors related to each of these parameters however, further assessment of these relationships is possible.

The Pearson correlations between job satisfaction and the scalar variables of the Analytical Framework (Table 7.3) indicate a very strong association with the job utilisation parameter (r=.580;p=.001), ie that representing the extent to which the engineer feels his skills and capacities are well used in his work (the converse being "under-utilisation", eg Sofer,1970). At the 1st Order level, controlling for variations in work effort, so that factors influencing job satisfaction through this parameter are not considered, then

FIGURE 7.6 FACTORS RELATED TO WORK EFFORT

(With path coefficients shown on Figure.)



Multiple Regression Analysis with Work Effort

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Job satisfaction	.531	0	.531	.282	.282	0
PCS	.473	.000	.622	.387	.105	.000
Variety	.447	.001	.652	.425	.039	0
C. Eng.	.236	.002	.674	.454	.029	.000
Company	.250	-	.701	.491	.047	0

TABLE 7.3 CORRELATIONS WITH JOB SATISFACTION & PCS

(Table shows Pearson correlations between job satisfaction & PCS measures and the scalar variables of the Analytical Framework.)

Pearson correlations with:-	JOB SATISFACTION		PCS	
	r	sig.	r	sig.
ORGANISATIONAL FACTORS:				
Variety	.431	.001	.246	.001
Autonomy	.323	.001	.305	.001
Formalisation	.202	.002	.196	.003
Teamwork	.077	*	.111	*
Colleague sociability	.303	.001	.236	.001
Job satisfaction	-		.322	.001
Job utilisation	.580	.001	.128	.039
Work-based self-esteem	.337	.001	.519	.001
Manager	.103	*	.125	.043
Trade union member	.071	*	.015	*
PERSONAL FACTORS:				
Age	.295	.001	.053	*
Social class of origin	.077	*	.077	*
Type of school	.021	*	-.135	.032
Level of education	.091	*	.040	*
Type of university	.137	*	.019	*
Class of degree	.148	.036	.170	.019
Family life-cycle position	.203	.003	.015	*
Type of accommodation	.196	.003	.063	*
CAREER FACTORS:				
Organisational status	.353	.001	.202	.003
Monetary status	.286	.001	.164	.012
Technical-scientific status	.152	.017	.122	.046
Technical-professional status	.045	*	-.051	*
Organisational mobility	,058	*	-.074	*
Geographical mobility	-.051	*	-.104	*
Work-type mobility	-.043	*	-.166	.011
Company seniority	.240	.001	.066	*
Chartered Engineer	.090	*	-.044	*
Organisational goals	.002	*	.287	.001
Monetary goals	.098	*	.293	.001
Technical goals	.074	*	.067	*
Organisational orientations	-.083	*	.121	.049
Monetary orientations	-.179	.007	-.065	*
Technical orientations	.165	.011	.095	*
PCS	.322	.001	-	
Perceived promotion rate	.065	*	.335	.001
Perceived promotion basis	-.159	.016	.050	*
Perceived occ. openness	.032	*	.104	*
Perceived market difficulty	.002	*	-.094	*
Perceived job specialisation	-.210	.002	-.014	*

(Significance levels above 5% are shown by '*'.)

TABLE 7.4 RELATIONSHIPS BETWEEN WORK ATTITUDES AND NON-SCALAR VARIABLES

(Table shows multiple regression coefficients and, in brackets, the significance levels of F-test for each work attitude and the non-scalar variables of the Analytical Framework using a dummy variable technique. Significance levels above 5% shown by '*'.)

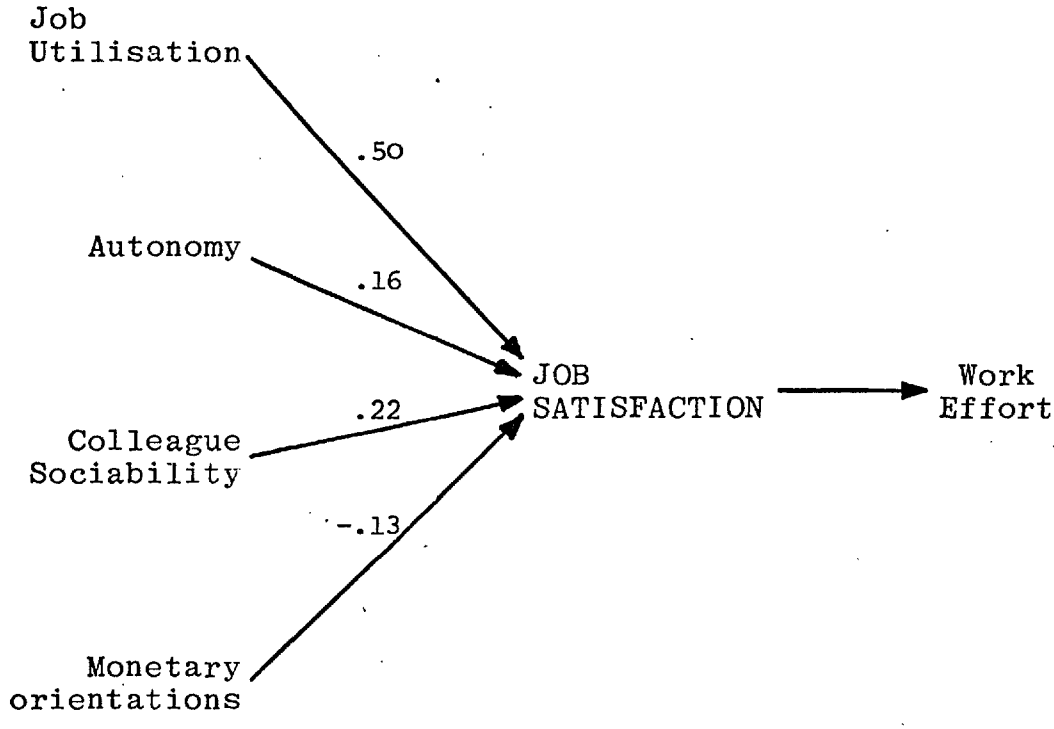
MULTIPLE REGRESSION: (Dummy variables)	Work Effort	Work Centrality	Job satis-faction	PCS	Job util-isation	Self-esteem
Company	.250 (.035)	.154 *	.338 (.000)	.193 *	.366 (.000)	.176 *
Engineering Branch	.079 *	.128 *	.207 *	.158 *	.255 (.026)	.067 *
Type of work	.150 *	.075 *	.237 (.030)	.185 *	.198 *	.191 *
Manager	.076 *	.099 *	.101 *	.128 *	.153 (.034)	.057 *
Trade Union Member	.114 *	.002 *	.075 *	.015 *	.021 *	.009 *
Social class of Origin	.015 *	.035 *	.116 *	.152 *	.083 *	.041 *
Type of School	.060 *	.064 *	.022 *	.115 *	.156 *	.108 *
Type of University	.136 *	.142 *	.094 *	.093 *	.141 *	.056 *
1974 Election vote	.109 *	.101 *	.140 *	.126 *	.078 *	.108 *
Family life-cycle position	.133 *	.012 *	.145 *	.056 *	.255 (.002)	.078 *
Type of Accommodation	.090 *	.077 *	.182 (.042)	.088 *	.250 (.002)	.239 (.004)
Chartered Engineer	.235 (.001)	.080 *	.088 *	.053 *	.035 *	.046 *
Orientation-type	.195 *	.146 *	.126 *	.129 *	.190 *	.137 *

job utilisation continues to show the highest partial correlation with job satisfaction (B=.440;p=.001). Repeating this procedure to the 3rd Order level, controlling for work effort, job utilisation, and work autonomy parameters, eliminates all significant partials except for colleague sociability and monetary career orientations. Several non-scalar variables have significant relationships with job satisfaction on their own (Table 7.4), but none have any significant effect on job satisfaction if entered into a multiple regression analysis after job utilisation, autonomy, colleague sociability, and monetary orientations. Figure 7.7 gives details of the regression analysis between job satisfaction and these four parameters, path coefficients being shown on the basis of assumed directionality. Job utilisation has by far the strongest effect, accounting for some 34% of the variance of job satisfaction; the four together taking this to 45%.

Repeating this general procedure for factors related to job utilisation leads to the relationships shown in Figure 7.8 As indicated, job utilisation has significant direct relationships with organisational responsibility level, class of university degree, work variety, organisational career orientations, and the engineer's company. In most of these cases causal inferences are fairly plausible: that is, <u>because</u> engineers are of lower responsibility level, see their work as less varied, and assign a higher importance to organisational advancement, they feel most under-

FIGURE 7.7 FACTORS RELATED TO JOB SATISFACTION

(With path coefficients shown on Figure.)

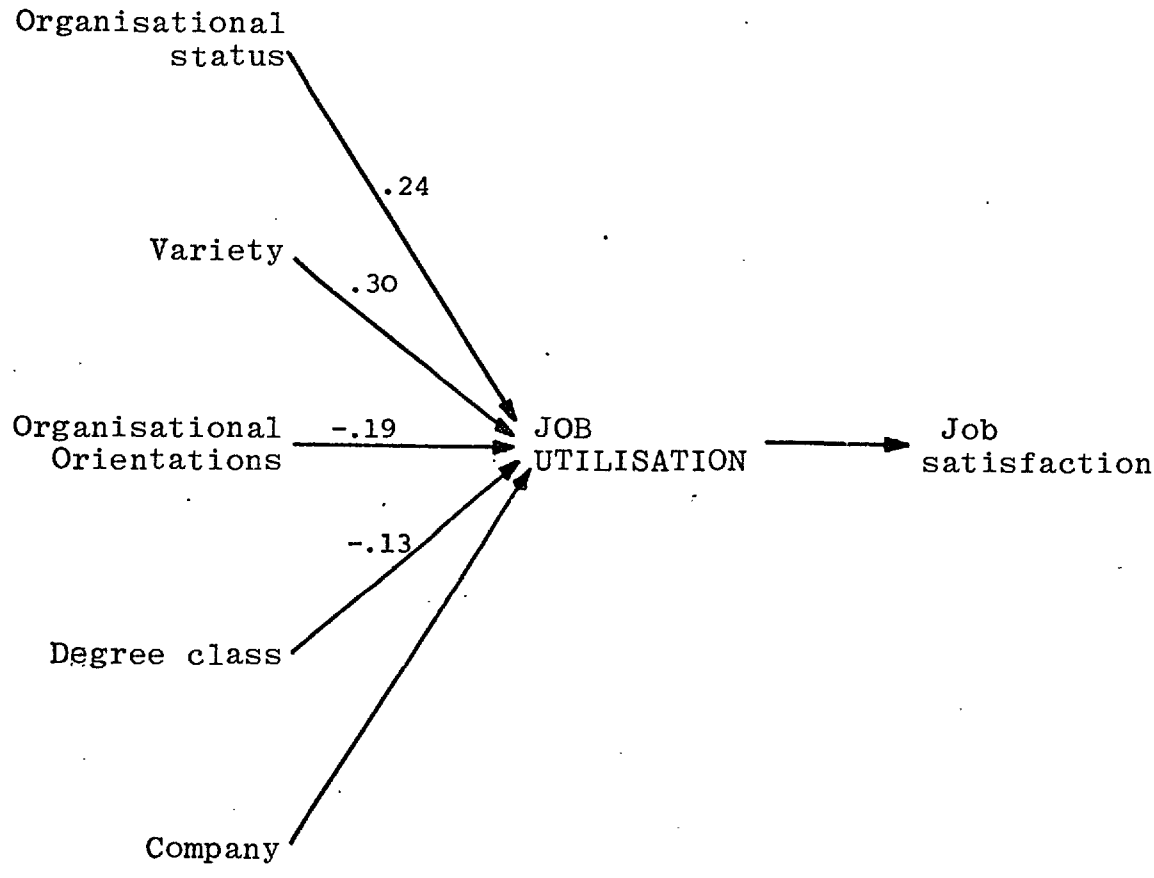


Multiple Regression Analysis with Job Satisfaction

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Job utilisation	.581	0	.581	.337	.337	.000
Autonomy	.326	.000	.621	.386	.048	.000
Colleague Sociability	.296	.000	.658	.434	.048	.000
Monetary Orientations	.179	.017	.672	.451	.017	.000

FIGURE 7.8 FACTORS RELATED TO JOB UTILISATION:

(With path coefficients shown on Figure.)



Multiple Regression Analysis with Job utilisation

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Organisational status	.388	.000	.388	.151	.151	.000
Variety	.391	.000	.468	.219	.068	.000
Organisational orientations	.239	.000	.518	.269	.050	.000
Degree class	.090	.017	.539	.291	.022	.000
Company	.366	-	.575	.331	.040	.000

TABLE 7.5 MEAN VALUES OF WORK ATTITUDES IN COMPANIES

(The table shows the mean values of a number of work attitude variables across the six companies of the Engineer Survey; details of the construction of these variables are given in Appendix II.)

Mean values of each attitude in companies:-	Work Effort	Work Centrality	Job satis--faction	PCS	Job util--isation	Self esteem
CONSULTANT	6.4	26.3	4.8	-3.97	-.12	-1.43
CONTRACTOR	-9.8	-21.4	4.1	1.27	-1.18	.12
NORTHERN	38.6	1.0	5.3	1.78	-.04	-1.89
SOUTHERN	-13.8	3.2	4.7	-1.85	.09	1.39
NATIONAL	7.9	4.1	5.3	.61	.24	1.85
PUBLIC	-26.2	-4.9	4.4	.88	-1.03	-1.96
ALL: Mean	0	0	4.8	0	-.33	0
Standard deviation	74.6	86.5	8.4	1.46	1.65	8.92

-utilised (logical priority); because they have a higher degree class (and therefore higher expectations ?) and because they work in Public and Contractor (Table 7.5) they feel most under-utilised (temporal priority). The fact that three of these variables are non-attitudinal gives further support to these directionality inferences[1]. On the basis of such inferences, path coefficients may be computed as shown in Figure 7.8 The five variables together contributing some 33% to the variance of job utilisation.

By accounting in this way for a considerable part of the variance in job utilisation[2], then it is much more likely that job utilisation is a determinant of job satisfaction than vice versa. This is both logically reasonable and supported in other research (Ritti,1971). Similarly,by thus establishing that some 34% of the variance of job satisfaction depends upon the engineer's feelings of under-utilisation or otherwise, then it may be infered that job satisfaction is a likely determinant of work effort rather than vice versa. The relationships thus being:

Job-utilisation ⟶ Job satisfaction ⟶ Work effort

---

1. With cross-sectional data it seems much more likely that certain attitudes follow from non-attitudinal factors (eg, Bem,1970). This is by no means always the case however; certain attitudes may affect the choice of particular contexts, for example; Section 9.3.

2. That is by social science standards at least, where the likely error terms in the variables employed severely reduce the likely predicted variance that may be achieved. Eg, Blalock, 1961 :143-162; McKelvey & Sekaran, 1977: 290-292.

This would give some support to the directionality assumptions in Figures 7.6,7.7 & 7.8 and to the validity of the path coefficient computations.

Complementary to job satisfaction, PCS is the other major factor related to the work effort index. Undertaking similar analysis, controlling for work effort and computing 1st Order partials with the scalar elements of the Analytical Framework, the work-based self esteem parameter shows the strongest partial correlation with PCS (B=.519;p=.001). Controlling for this factor at the 2nd Order level gives the largest correlation with the perceived future promotion rate (B=.274;p=.001), which if additionally controlled for at the 3rd Order level clears all significant partials. Multiple regression analysis also indicates that, of the non-scalar variables, the engineer's company has a further significant relationship with PCS. These results are shown in Figure 7.9 . With directionality assumed[1], 36% of the variance of PCS may be accounted for, the self-esteem parameter making the major contribution.

However unlike the job utilisation factor, it is not possible to establish a large independent basis for variations in self-esteem, and thus assign directionality to these relationships. If 1st Order partials are computed with work-based self-esteem,

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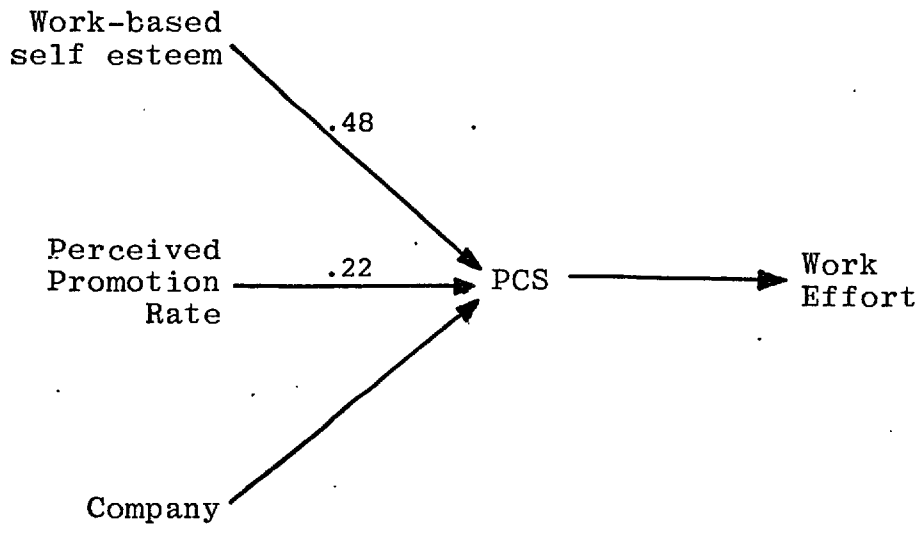
1. In fact it is more likely that perceived promotion rate is an outcome rather than an antecedent of PCS.

FIGURE 7.9 FACTORS RELATED TO PCS

(With path coefficients shown on diagram.)



Multiple Regression Analysis with PCS

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Self esteem	.524	0	.524	.275	.275	0
Promotion rate	.316	.001	.567	.321	.046	.000
Company	.193	-	.601	.361	.040	.000

controlling for PCS to obtain direct relationships, then the strongest associations are found with the engineer's age (B=.227; p=.003). Controlling also for age at the 2nd Order level and the measure of monetary goals at the third, clears all significant partials. Only one non-scalar variable, accommodation-type, is significantly related to the self-esteem measure, and if all three factors are entered into a regression analysis,a bare 13% of the variance in work-based self-esteem may be accounted for (notwithstanding doubts over the direction of the monetary goals relationship; Figure 7.10).

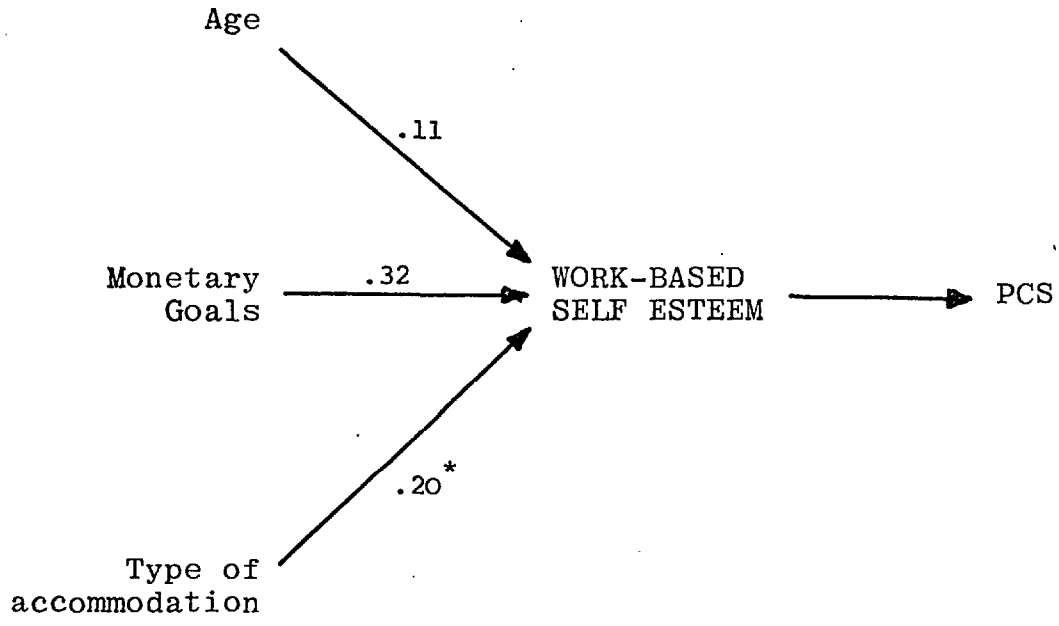
If variations in PCS are controlled, the 1st Order partial between self-esteem and work effort is not significant (B=.112;p= *). If self-esteem is controlled for, 1st Order partials between PCS and work effort remain fairly high (B=.355;p=.001). The sequence thus implied is:

Work-based self esteem ——— PCS ——— Work Effort

although the directionality in these relationships is problematic. However this link does allow the rejection of one part of the hypothesised Involvement Model: that is, PCS does <u>not</u> influence work involvement through the intermediary effect on work-based self esteem. PCS is very strongly related to work effort but there is no analytical basis for infering causality. The <u>consistency</u> of the Involvement Hypothesis is upheld, but its causal nature cannot be affirmed. Only to the

FIGURE 7.10 FACTORS RELATED TO WORK-BASED SELF ESTEEM

(with path coefficients shown on diagram.)



Multiple Regression Analysis with Work-based self esteem

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Age	.167	.032	.167	.028	.028	.032
Monetary goals	.270	.000	.344	.118	.090	.000
Type of accommodation	.239	-	.394	.155	.037	.000

(* : This path coefficient computed on scalar version of this variable.)

extent that there is a possible logical priority, are there any grounds for the directionality assumption used for constructing the path coefficients of Figure 7.6. This shows that those who claim the highest work effort are (a) those who feel most satisfied in their jobs, and (b) those who feel most successful in their careers. These two largely orthogonal parameters[1] account for 39% of the variance of the work effort index - a good prediction by social science standards. In addition those who see their jobs as more varied, and who work for Northern, Consultant, or National (Table 7.5) also tend on average to have a higher work effort; in both cases causal inferences seem plausible. Those who are C. Eng. also tend to have a higher work effort: although there is temporal priority here, the relationship seems more likely to arise because engineers of higher work effort feel the C. Eng qualification is more useful (or some similar basis); the converse direction is more difficult to explain.

7.4.2 Work centrality:

As Table 7.1 indicates, the Pearson correlations between the scalar elements of the Analytical Framework and the work centrality index are very different from those with the work effort index. Age shows the strongest correlation with work centrality (r=.251;p=.001). In

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1. Controlling for work effort, 1st Order partial correlation between PCS and job satisfaction: B=.097;p= * .

fact as Figure 7.3 illustrates, the engineers' work centrality increases gradually over the course of their careers on average (although there is a slight fall in the 36-40 years age-group.). Controlling for variations in age, only one significant 1st Order partial remains; with the type of accommodation lived in by the engineer (r=.152;p=.028), those with unmortgaged property having a higher work centrality than those with mortgaged property, who in turn have a higer work centrality than those in rented or other accommodation[1].

If the directions in these relationships are assumed, as seems reasonable given their nature, then the two variables can account for only 10% of the variance of the work centrality index,as shown in Figure 7.11. Although this is clearly very small,it is interesting that neither of these factors are connected directly with work or the career, suggesting that (at least for variations within the occupational group), the origins of work centrality are to be found outside the workplace.

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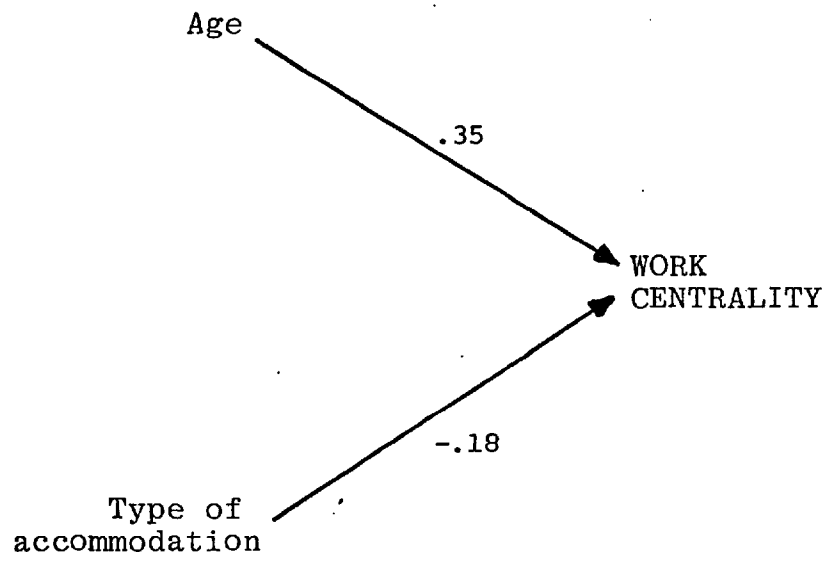
1. Types of Accommodation:

	Values of Work centrality: Mean	Standard Deviation	
Rented & other property	-1.72	69.0	... (i)
Mortgaged property	.72	84.7	... (ii)
Unmortgaged, owned property	5.78	115.9	... (iii)

T-tests: None signicant.
F-tests: (i) - (iii).... F = 2.82, p=.008
(ii) - (iii).... F = 1.87, p=.032

FIGURE 7.11 FACTORS RELATED TO WORK CENTRALITY

(With path coefficients shown on diagram.)



Multiple regression analysis with work centrality

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Age	.263	.000	.263	.069	.069	.000
Type of accommodation	.077	-	.315	.099	.030	.000

(* : This path coefficient computed on scalar version of the variable.)

7.5 Discussion:

In general, the men in the Engineer Survey tend to be highly involved in their work. However, while many exhibited fairly high levels of work effort, there is much less unanimity about the relative importance of work in their lives. In fact there are indications from the interviews that some tried to keep their work and home lives fairly separate, a position argued elsewhere for British managers (eg, Guerrier & Philpot, 1977:10), The apparent lack of "tension" over the time devoted to work and home activities may have facilitated this, although in two companies there did seem to be some inherent basis for occasional conflict of a more general kind.

Certainly, lack of "tension" of this kind would make the results of the analysis understandable, with the two involvement indices only weakly related, and arising from very different sources. While work effort is strongly related to several factors connected with work and the career, work centrality was largely unaffected by such variables.

Although the prediction of the work centrality index is weak, the two parameters having significant direct relationships with it - age and type of accommodation - do not arise from within the work-place: the first may possibly be a reflection of personality developments, the second refers to one aspect of an engineer's life outside work, (possibly reflecting certain family and attendant social relationships), although quite what mechanism is involved here is not obvious.

The weak prediction of work centrality from the regression analysis means that some other basis must be sought to account for differences in the level of work centrality within the sample, rather different from the sorts of ideas put forward in Chapter 3 to account for variations in work involvement. This is particularly so since the range of work centrality suggested by Figure 7.2 appears to be quite substantial.

Explanations can only be speculative in this regard: following the discussion in Section 2.2,it may be that certain normative factors could be responsible for some differences in work centrality, factors which were not adequately tapped by the elements used in the Analytical Framework - possibly because relevant social groups cut across the simple 'institutional' boundaries employed, with some espousing a greater "work ethic" than others.

If anything however, the evidence from the data at hand does seem to suggest that variations in work centrality within the sample might better be accounted for through more individually-located factors; that it is "more a function of the person than the job" (cf. Section 2.4). The large number of work-place and career factors included within the Analytical Framework had little or no effect on variations in work centrality (Table 7.1), whilst it was the two non-work factors - age and type of accommodation - which show significant relationships in the regression analysis of Table 7.11. While the number of such non-work related parameters in the Framework are rather few, there is thus perhaps an indication that it is amongst such non-work factors that an account of the men's

work centrality level may be found. It is a similar thesis that is argued by Goldthorpe et al (1968) to account for the work orientation of their Luton sample.

In contrast, however, variations in work effort can to a considerable degree be explained by parameters connected with work. While differences between companies, with the possession of a C. Eng. qualification, and with the extent of perceived work variety, are all significantly related to the work effort index, it is the two parameters of job satisfaction and PCS that have the strongest relationships with work effort.

Job satisfaction appears largely to depend upon the engineer's feelings of under-utilisation. These can be traced to certain characteristics of the work situation and the engineer's approach to it: those of lower responsibility level and who see their work as less varied claim most under-utilisation; those of higher degree class and organisational orientation also feel most under-utilised , possibly because of their higher expectations and the greater importance attached to organisational advancement. Such results support Ritti's thesis (1971), that for engineers career advancement is very important, promotions being gained through demonstration of their skill; where the work situation inhibits this, engineers feel under-utilised and thus dissatisfied in their jobs.

By illustrating the origins of job satisfaction in this way, it may be inferred from the results of the analysis that job satisfaction is a likely determinant of the level of work effort. However this is not possible with PCS. The fact that work effort and PCS are strongly related is consistent with the Involvement Hypothesis; (the null hypothesis being rejected). PCS represents one of the two major correlates of that facet of work involvement concerned with participation at the work-place.

If the Involvement Hypothesis is assumed to be valid, then the level of work effort would appear to arise from two major sources. One, probably a longer term characteristic , depending upon the general feelings of success arising at the particular stage of the career; the other, probably shorter term, arising from the immediate feelings of job satisfaction within the particular workplace, themselves depending upon the extent to which expectations about the content of the job are being fulfilled.

Inferences concerning the direction of the PCS-work effort relationship are not really possible with the data at hand. However, what is apparent is that this is not mediated by the sense of work-based self-esteem as postulated in the Involvement Model. Rather, the indications appear to be that the self-esteem arises, in part at least, external to the workplace (insofar as it is related to age and the type of accommodation lived in); possibly it arises from

some wider areas of an engineer's personality; possibly it is partially dependent upon feelings of PCS but simply does not influence work involvement in the predicted manner; this latter would be consistent with the observed "self-esteem/PCS/work effort" relationships.

The Career Development Model postulated that high PCS would enhance a work-based self-esteem and sustain a strong work-based "subidentity", thus leading to a high work involvement. Since measurement of the work "subidentity" did not seem feasible through questionnaire techniques, this concept was not assessed as such in the Engineer Survey Questionnaire. Thus it may be that feelings of self-esteem assessed within the workplace[1] have rather wider origins, deriving from some general self-esteem that is itself built upon a variety of sources and which has an 'umberella' effect on the sense of work-based self-esteem. As such, this parameter would not be related to work involvement in the predicted fashion. However, the data at hand does not allow the issue to be adequately resolved.

Since the relationship between PCS and work effort is not mediated by the sense of work-based self-esteem as postulated, then an explanation of the relationship which is found between these two parameters is problematic. Notwithstanding doubts concerning the empirical measurement of the self-esteem variable, several interpretations are possible. One may be that , as postulated, PCS does

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1. Based upon the index of the two questions: "IN GENERAL, DO YOU THINK YOU ARE WELL REGARDED BY (a) YOUR COLLEAGUES AT WORK,(b) YOUR SUPERIORS AT WORK". (ESQ:19).

influence a work-based "subidentity" directly, and hence is related to the level of work effort; because some engineers feel more successful in their careers, work may be a more important part of their personal identity, but this may be an 'internal' conception, not influenced by their self-esteem in the eyes of other people. A second interpretation which may be suggested is that the relationship between PCS and work effort is in the contrary directed to that postulated. Because some engineers express a higher work effort than others (for whatever reason), then they may claim a stronger sense of PCS , possibly as a personal rationalisation for their working harder. This is similar to Sofer's interpretation (1970) that feelings of under-utilisation amongst his sample of managers and engineers arose to justify lack of promotion, and indicates a similar kind of personal "dissonance reduction" (cf. Festinger, 1957). The linear analysis does not allow the direction of the relationship between PCS and work effort to be ascertained, and such interpretations must remain speculative. However this issue is considered further in Chapter 10 where some additional inferences are suggested.

Nevertheless, although the direction of the relationship is problematic, the strong association between PCS and work effort is consistent with the Involvement Hypothesis. As such, further inquiry into the bases of PCS is fruitful, and in the next chapter attention is thus turned to an assessment of the PCS Hypothesis.

CHAPTER EIGHT

THE PCS HYPOTHESIS

There is no success without hardship.

Sophocles; Electra.

8.1 Introduction:

Having established the consistency of the Involvement Hypothesis, this present chapter looks in turn at the factors influencing PCS. The linear analyses shown in Figures 7.9 and 7.10 do not provide a good explanation of the origins of PCS, the direction of most relationships being problematic. While work effort and PCS are strongly inter-correlated, this relationship appears complex, possibly inter-active, which might thus account for the results found in these figures. Consequently in this present chapter, no attempt is made to unravel the priority of these two variables and attention is focused on the determinants of PCS alone. While the analysis goes beyond the linear, whole-sample techniques of Chapter 7, given the near limitless possible approaches to breakdowns within the sample, it is confined solely to an evaluation of the PCS Hypothesis. This postulates that:

> The level of a person's PCS is influenced by:
> (a) the extent to which their achieved career status fulfills their prior career goals;
> (b) the current saliency of the achieved career status;
> (c) the effects of their comparative reference groups on standards of achieved career status.

After an examination of the observed PCS within the sample, each of these are assessed in turn for the Engineer Survey.

8.2 The PCS of the engineers:

Psychological Career Success (PCS) is defined as the extent to which an individual feels successful in his or her work career (Hall,1976:31). This parameter was measured in the Engineer Survey by an index, constructed (Appendix IId) from responses to two questions, shown in Figure 8.1. As indicated, 79% 'agreed'[1] that they had been 'pretty successful in their careers so far', and 88% that they 'had established a good reputation for themselves in their particular line of work'. The combined PCS index thus represents the level of success felt by the engineers over their work careers.[2] While the responses illustrate that most felt fairly successful, there are indications that some felt distinctly more successful than others, and that a few - perhaps about a tenth - did not feel successful at all. Whether this was experienced as 'failure' however is doubtful, as a number of interview quotations illustrate:

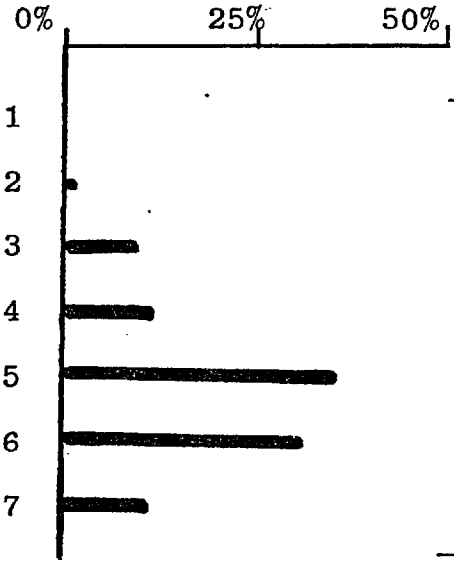
> Question: DO YOU THINK YOU HAVE BEEN SUCCESSFUL IN YOUR CAREER SO FAR ?
>
> I think I could have been a little more successful but, to be realistic, whatever ambitions you've got can't be completely fulfilled.
> (52 year old mechanical; Northern)
>
> I suppose I might not have been as successful as I could. (34 year old mechanical; Southern)

---

1. As given by responses of 5,6 or 7 to the 7-point scale.
2. In fact the two items are not of identical form, the first representing agreement with a'fixed'level of success, the second representing the 'level' of a particular kind of success. However the inter-correlation is quite good ($r=.354; p=.001$), and the response distributions similar, so that their combination usefully increases the measurable variance of the PCS parameter. Unfortunately it was not possible to further validate the index.

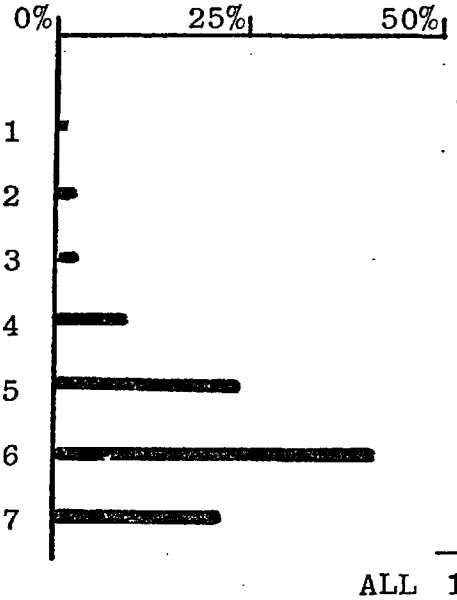
FIGURE 8.1 FREQUENCY DISTRIBUTIONS OF THE PCS INDEX ITEMS

ESQ:28w ALL THINGS CONSIDERED I THINK I'VE BEEN PRETTY SUCCESSFUL IN MY CAREER SO FAR.



		%	(N)
Disagree strongly	1	0	(0)
	2	1	(2)
	3	9	(17)
	4	11	(21)
	5	36	(70)
	6	31	(60)
Agree strongly	7	12	(24)
	ALL	100	(194)

ESQ:29 IN YOUR CAREER SO FAR, DO YOU THINK YOU HAVE ESTABLISHED A GOOD REPUTATION FOR YOURSELF IN YOUR PARTICULAR LINE OF WORK ?



		%	(N)
No, not particularly	1	1	(1)
	2	2	(4)
	3	2	(3)
	4	8	(16)
	5	24	(46)
	6	42	(81)
Yes,a good reputation	7	22	(42)
	ALL	100	(193)

> Looking back and trying to think what I thought I'd be doing at this time, well, perhaps not; perhaps I had big ideas about zooming up the ladder, but things haven't worked out that way.
> (28 year old civil; Consultant)

> Clearly one could have been more successful. At my age, one could have been a partner in the firm and to that extent I haven't been entirely successful,
> (48 year old civil; Consultant.)

> Moderately. I would have been dissapointed if I hadn't made it this far. I don't know if I'll go up any further. I don't know to what extent my ambitions will push me. I would like the next job up and I feel able to do it, but I'll leave it at that. I'm not going to cry all day if I don't get it. I'm not going to feel a failure in any case.
> (42 year old "specialist";Public.)

In fact, most of the engineers seemed to feel they had been fairly successful in their careers; some felt they might have"done better", others that they had done "all right". Only a few felt like one of the managers in Northern who had 'worked his way up off the shop-floor':

> Oh yeah, very successful. I've always worked bloody hard and I've always lived bloody hard. My career as far as I'm concerned has been very successful indeed.

The PCS index represented such gradations of 'relative'success; that is, while most felt moderately successful,there were some who felt more or less successful than others. The extent to which such variations were consistent with the PCS Hypothesis may now be assessed. As in the previous chapter, causality in observed associations cannot be analytically justified from the cross-sectional results; however where PCS is associated with variations in career status,there does seem to be a reasonable logical basis for causal inferences.

8.3 Achieved status, career goals and PCS

The PCS Hypothesis-(a) postulates that the level of PCS is influenced by the extent to which achieved career status fulfills prior career goals. In view of the cross-sectional nature of the survey, data on prior career goals per se is not available and this hypothesis can only be assessed by making inferences about these goals from information collected in the survey.

Because of differences in such goals, it is postulated that the engineers 'objective' career status will be 'subjectively' interpreted in deriving a sense of PCS. Without such a 'subjective' interpretation then PCS would depend directly upon achievements in career status, assuming of course that it is against other engineers that success is evaluated (See Section 8.5 below). Indeed, as Figure 7.3 earlier has shown, Pearson correlations between career status and PCS are significant for three of the four types of status: organisational (r= .202; p= .003), monetary (r= .164; p= .012), and technical-scientific status (r= .122; p= .046), but not for the technical-professional status (r= -.051;p= *).

However a number of writers have suggested that it is achievements with respect to a particular age that are important in giving rise to a specific conception of PCS, especially as far as organisational

careers are concerned (eg, Faulkner, 1974; Sofer, 1970), where a "career timetable" may arise (Roth, 1963), involving certain levels of status to be achieved by a certain age in order for a particular PCS to arise.

Thus, by repeating the Pearson correlations between PCS and career status whilst controlling for variations in age, an assessment of this effect may be made. Surprisingly, however, the partial correlations show little change from the Pearson: the organisational (B= .213; p= .001) and monetary (B= .167; p= .002) correlations increasing marginally in size, the two technical indices being non-significant (technical-scientific, B= .110; p= * ; technical-professional, B= -.073; p= *).

These correlations are made with each of the different types of career status taken separately. However since feelings of career success may well arise from some combination of the achievements a person has made over the career, then consideration of the cumulative effects of these career statuses on PCS is also necessary. This is shown in Figure 8.2, where for convenience, in view of the above results, the influence of the technical-professional dimension is ommitted from the presented analysis.

In order to combine achievements of different types of career status, dichotomous values are computed according to whether the engineer is above ("high")

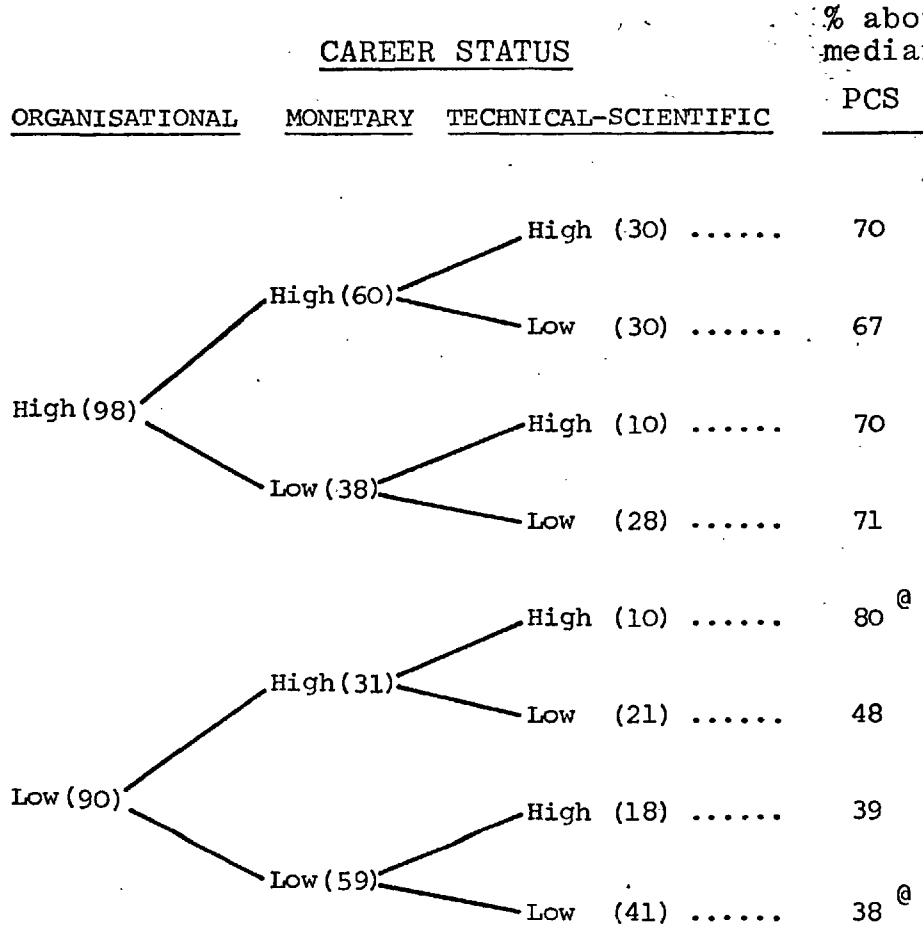
FIGURE 8.2 THE CUMULATIVE EFFECT OF STATUS ON PCS

(a) The cross-tabulations below show the numbers of engineers in each cell who are below ("low") and above ("high") the median value of the status index in each 5 year age-group against similar PCS values.

CAREER STATUS

ORGANISATIONAL		MONETARY		TECHNICAL-SCIENTIFIC		PCS
Low	High	Low	High	Low	High	
50	30	47	32	55	25	Below median
42	69	50	60	69	44	Above median
x^2 = 10.36		x^2 = 3.09		x^2 = 0.89		
p = .001		p = .079		p = .344		

(b) The configuration below shows the percentage of engineers who are above the median value of PCS for each of the "high/low" status categories taken in combination. Numbers of each type in brackets.



(@ - Difference of means test: t = 2.36; p = .031)

or below ("low") the median status value of each 5 year age-group. As Figure 8.2(a) shows, for each of the three types of status separately, cross-tabulations with the numbers of engineers of above and below the sample median value of PCS largely duplicate the findings of the partial correlations. However, combining "high" and "low" status values for each type of career status, the branch diagram of Figure 8.2(b) may be drawn, illustrating their cumulative effects. It is evident from the figure that achievements in organisational status have most influence over PCS, being only marginally affected by variations in monetary and technical-scientific status.[1] There is one exception, suggesting some possible complementarity, insofar as those engineers of "low" organisational but "high" monetary and technical-scientific status also have a high proportion of above average PCS; however, the sample size is small (n=10) and in general, since the cumulative effects are rather weak, career status values are treated separately in the subsequent analysis.

To illustrate the influence of differences in prior career goals on the evaluation of PCS, a familiar sociological observation may be used: that persons of

1. In fact this may be confirmed further by repeating the partial correlations between PCS and career status, controlling for age and each of the other types of career status in turn. Controlling age and organisational status, none of the other PCS-status correlations are significant; whilst correlations between PCS and organisational status remain significant, controlling age and: (a) Monetary status (B=.153; p=.019)
(b) Technical-scientific status (B=.201; p=.003)
(c) Technical-professional status(B=.224; p=.001)

higher social class origins and higher levels of more prestigious types of education tend to have higher ambitions; possibly due to socialisation effects or adjustment to better expectations (eg, Kelsal et al, 1972; Reissman, 1953; Rice, 1964; Turner, 1964). This effect can be demonstrated for respondents in the Student Survey as shown in Table 8.1. This presents Pearson correlations between measures of career goals and orientations similar to those used in the Engineer Survey (Appendix III c) and categories of social class origin, type of school, and expected degree class, assumed scalar for this purpose. As indicated, those students of more prestigious social and educational background tend to have higher organisational and monetary goals, although lower technical goals. This latter may perhaps arise because, for some, engineering represents an "avenue of upward social mobility" (Gerstl & Hutton, 1966), and it is towards the 'safe and familiar' technical functions that such people are drawn. Unlike the goals measures, however, only one orientation is so related: those of higher social class origin having higher organisational orientations.

Given that differences in social and educational background tend to be associated with differences in career goals - whatever these may be - then by breaking the sample of engineers down into such categories, differences in prior career goals may be inferred between these groups.

TABLE 8.1 THE BACKGROUND CONTEXT OF CAREER ATTITUDES; RESULTS FROM THE STUDENT SURVEY

(The table shows Pearson correlations and significance levels between values of career goals and orientations and the classes of social origin, type of school attended, and expected degree class - assumed scalar - for respondents of the Student Survey; N = 128)

PEARSON CORRELATIONS[@] WITH:-	Social class of origin		Type of school attended		Expected class of degree	
	r	sig.	r	sig.	r	sig.
CAREER GOALS:						
- Organisational	.179	.038	.181	.021	.056	*
- Monetary	.170	.046	.185	.033	.167	.046
- Technical	-.113	*	-.187	.031	.024	*
CAREER ORIENTATIONS:						
- Organisational	.279	.001	.024	*	.062	*
- Monetary	.067	*	.056	*	.033	*
- Technical	.053	*	-.134	*	.014	*

(@ - Details of categories of background are given in Appendix IIIa and career orientations & goals in Appendix IIIc. The former are classed such that higher values of the assumed scalar variable correspond with the more prestigious categories; higher degree class also is represented by a higher value in the variable.)

The PCS Hypothesis-(a) postulates that PCS is influenced by the extent to which achieved career status fulfills prior career goals. No specification has been suggested as to how prior these may be, but categories of pre-employment social and educational background would be assumed to correspond to pre-employment goals. From the formulation of the hypothesis, it follows that an engineer with lower prior goals would experience a higher level of PCS for a given level of achieved career status and vice versa. This effect is largely confirmed in Table 8.2 if the 'background' categories are assumed to correspond with pre-employment goals. Partial correlations are shown in the table between PCS and several 'background' categories, controlling for variations in career status of each type and also for age. Although the relationships are not strong, the trend is very consistent: those of less prestigious social class and type of school having higher PCS for a given level of achieved status.

Further illustration of this effect and the cumulative nature of different background experiences on (it is assumed) the level of career goals, is shown in Figure 8.3, where groups of different social class origin and education level are combined with those above and below the median responsibility level for their age-group to produce patterns of "life-cycle mobility" (cf. Goldthorpe & Llewellyn, 1977). Comparisons between

1. Level of education and type of university have no significant effect; that of degree class is in the opposite direction, ie, those of higher class having higher PCS, possibly because this itself is an indication of achieved status.

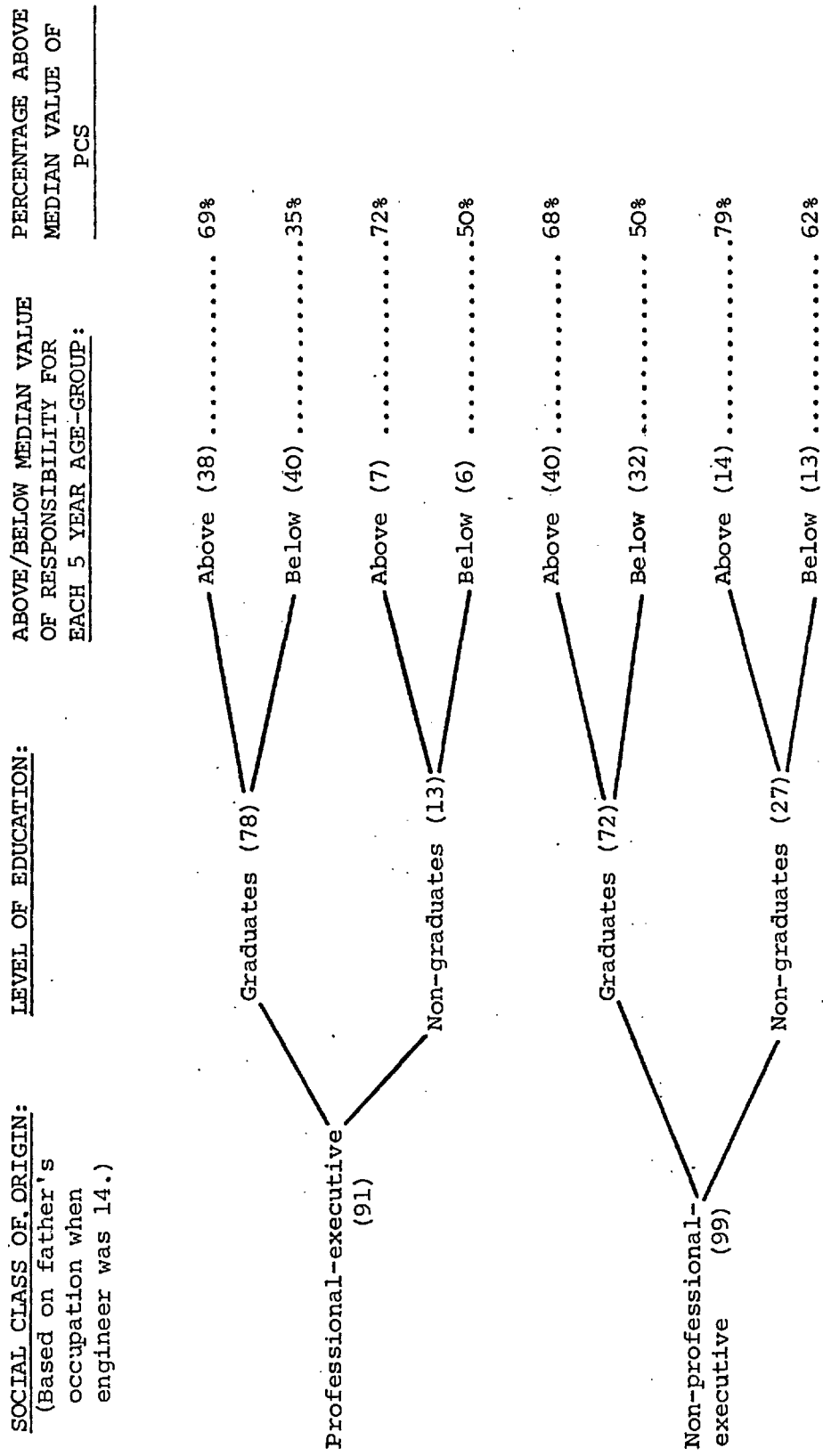
TABLE 8.2 RELATIONSHIPS BETWEEN PCS AND BACKGROUND CONTEXT

(Table shows partial correlations between PCS and aspects of social and educational background controlling for each type of career status (1st Order partials) and also for age (2nd order partials). Categories of background are assumed scalar. See Appendix IIc for details of classes. Higher values represent more prestigious classes.)

Partial correlations between background variables and PCS, controlling:-	CATEGORIES OF SOCIAL AND EDUCATIONAL BACKGROUND									
	Social class of origin		Type of school		Level of Education		Type of university (graduates only)		Class of degree (graduates only)	
a.Career status types:- (1st Order partials)	B	sig.	B	sig.	B	sig.	B	sig.	B	sig.
Organisational	-.123	.047	-.125	.045	.022	*	-.019	*	.165	.022
Monetary	-.132	.036	-.143	.026	-.009	*	-.021	*	.152	.032
Technical-scientific	-.129	.040	-.153	.019	-.035	*	-.010	*	.161	.025
Technical-professional	-.123	.047	-.129	.039	.005	*	-.007	*	.172	.018
b.Age and career status:- (2nd Order partials)										
Organisational	-.130	.039	-.129	.040	.001	*	.000	*	.184	.012
Monetary	-.140	.029	-.153	.019	-.035	*	-.019	*	.143	.039
Technical-scientific	-.113	.040	-.140	.028	.015	*	.001	*	.168	.020
Technical-professional	-.114	*	-.122	.050	.088	*	.009	*	.176	.016

FIGURE 8.3 PCS AND LIFE-CYCLE MOBILITY

(Figures in brackets indicate numbers of engineers at that step of the mobility pattern.)



the percentages above the median PCS value illustrate the distinctive effect of the 'background' categories for each pattern. It is "lower" class (ie, non-professional/executive) non-graduates of above average responsibility level who feel proportionately the most successful; "upper" class graduates of below average responsibility who feel the least. Nevertheless the 'background' effect is weaker than that of differences in responsibility (organisational status); the four mobility patterns with the highest PCS percentages are all those of above average responsibility.

While these results are consistent with the PCS Hypothesis-(a), other interpretations may be placed upon them. Greater feelings of career success amongst engineers of lower class origin for instance may result from their greater "relative status mobility" (Empey, 1956). In the sense that their 'initial status' is lower, they may feel they have 'climbed higher', and thus experience greater PCS. It is questionable whether this interpretation is in practice very different from that suggested by the PCS Hypothesis-(a), although conceptually the two are distinct. To see whether it is"relative status mobility" or goal fulfillment that has most influence on PCS,however, would require comparison of ambitious and unambitious youths from similar backgrounds at later stages in their careers. The data of the Engineer Survey does not allow this issue to be resolved, although a number of interview quotations suggest goal fulfillment plays at least some part in the evaluation of PCS:

> Yes, if I achieve the position of sub-agent in the next 12 months I certainly will have achieved my goal and probably a bit ahead of time actually. Yes, I think I've been quite successful.
> (27 year old civil; Contractor)

> The main feeling would be that, having set out to become one of the top engineers in the country, I would feel I had made it. I think its quite probable I won't make a partner, but I mustn't admit that to myself otherwise I won't.
> (30 year old civil; Consultant)

> I think I'm ambitious at the moment. I think in the past I've always gone for a particular target, something I've aimed for, although at the moment nothing specific comes to mind.
> (28 year old civil; Consultant)

> Oh yes, I've been very successful. I didn't start off with any ambition at all. It wasn't expected in those days to have ambition. Only probably to make a foreman. You know, if you were a foreman then you'd really got a good job.
> (48 year old mechanical; Public)

> Having failed my A levels, I think I've been fairly successful. I think I've been more successful than I expected to when I left school.
> (32 year old mechanical; Southern)

In addition to the influence of different 'background' categories directly on PCS, as Table 8.3 illustrates, they have a strong contingent effect on the correlations between PCS and career status. On the basis of the earlier results, organisational and monetary status are here taken as partial correlations with the effects of age controlled (Section 8.4). While the technical-professional index is not significantly correlated with PCS in any of the categories, the other three types of status are consistently more strongly correlated with PCS in the more prestigious 'background' categories. In the less prestigious categories - for engineers from non-professional/executive class origin, from

TABLE 8.3 THE CONTINGENT EFFECT OF BACKGROUND ON PCS

(Table shows correlations between PCS and career status in each of the different background categories - social class, school-type & education level.)

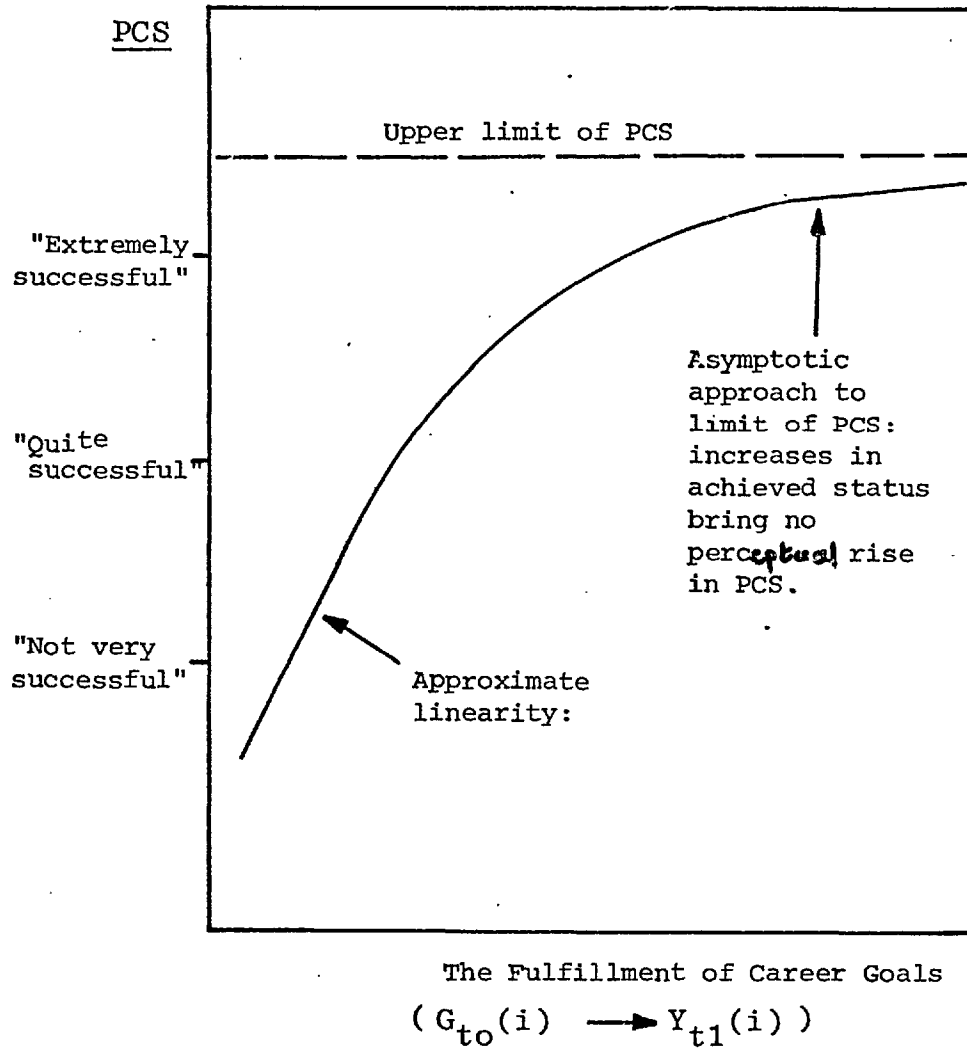
	Correlations between PCS and career statuses in each background category below:- ('n' given in brackets)	CAREER STATUS							
		Organisational (age-relative)[1]		Monetary (age-relative)[1]		Technical-scientific		Technical-professional	
		B	Sig.	B	Sig.	r	Sig.	r	Sig.
(a)	SOCIAL CLASS ORIGIN:[2]								
	'Lower' (96)	.222	.015	.127	*	.082	*	-.099	*
	'Upper' (92)	.202	.029	.227	.016	.143	*	-.031	*
(b)	SCHOOL TYPE:[2]								
	Technical, etc (38)	.148	*	-.049	*	-.064	*	.061	*
	Grammar (95)	.223	.017	.160	*	.146	*	-.062	*
	Public,etc (58)	.248	.034	.334	.006	.194	*	-.030	*
(c)	EDUCATION LEVEL:[2]								
	Non-graduates (41)	.034	*	.171	*	.028	*	-.150	*
	Graduates (153)	.289	.001	.237	.002	.154	.029	-.018	*

(1 : 1st order partial correlations with organisational and monetary status, controlling for age.
2 : Details of categories given in Appendix II c.)

technical colleges, and who are non-graduates, PCS is only weakly related to variations in career status. This seems to be because such engineers feel very successful - perhaps simply with the status of "professional engineer" - and further variations in career status do not register differences in PCS because of this. Thus a non-linear effect appears to be in evidence for the extent to which PCS is influenced by the fulfillment of career goals. To the extent that (assumed) career goals have been achieved - perhaps 'over-achieved' - and the engineers feel very successful, then increments in career status do not bring about any perceptual increase in PCS. This postulated non-linear effect is shown in Figure 8.4 and represents a kind of "saturation" condition, arising because the nature of the PCS concept is inherently bounded by some notional upper limit of "maximum success".

Even breaking the sample down into different 'background' categories however , as illustrated in Table 8.3, the correlations between PCS and the career status measures are not very high, even in those categories of higher prestigious 'background'. To obtain a better account of the origins of PCS it is in fact necessary to turn to the second part of the PCS Hypothesis and consider the effect of saliency.

FIGURE 8.4 THE POSSIBLE NON-LINEARITY OF THE PCS FUNCTION



8.4 The effect of saliency:

The PCS Hypothesis-(b) postulates that the contribution of career goal fulfillment to feelings of PCS depends upon the saliency currently attributed to the achieved career status. Since the measures of organisational, monetary, and technical career orientations (Appendix IId) were constructed to represent the importance of each type of status mobility to the engineer, they may be taken as saliency parameters. For this present analysis, each index is further dichotomised into "high" and "low" categories according to whether values are above or below the median in the Engineer Survey sample as a whole.

Repeating the correlations between PCS and career status, strong differences emerge between the correlations in each of these categories. For those in the "low" organisational career orientation category, PCS is not significantly related to age-relative organisational status; for those in the "high" category it is and strongly so (B=.360;p=.001). A similar although less distinct pattern is observed for PCS and age-relative monetary status across the "low" (B=.130;p= *) and "high" (B=.188;p=.040) monetary orientation category. However, the two technical status indices do not show significant correlations with PCS in either the "high" or "low" technical orientation categories, whether or not age variations are controlled,

Somewhat better illustration of this saliency effect is obtained by combining two different orientation dichotomies. As Appendix IId illustrates, while the monetary orientation index is related to both organisational and technical indices, these are only weakly correlated with each other; and the organisational and technical orientations are the only 2 x 2 dichotomy pairing not to produce a significant X^2. This near orthogonality suggests they are the best paired choice for a career orientation typology, a contention supported by their use as orientation types by previous writers (eg, Schein et al, 1964; Zaleznick et al, 1970).

The postulated career orientation typology is thus constructed of 4 categories of "high-low"/ organisational-technical orientations, the labels "technocratic" (high organisational-high technical), "bureaucratic" (high organisational-low technical), "scientific" (low organisational-high technical) and "apathetic" (low organisational-low technical) being applied to each. There is some validity for the use of the final label, insofar as engineers of this orientation-type have on average a significantly lower work centrality and show strong non-work ambitions (Appendix IId).

Repeating the PCS-career status correlations for each of these orientation-types leads to the rather interesting results shown in Table 8.4, where

TABLE 8.4 THE EFFECT OF SALIENCY ON PCS

(Table shows correlations between PCS and career status - Pearson and age-controlled 1st order partials - in each of the four categories of orientation-type.)

Career statuses	Zero-order Pearson correlations: r	Sig.	1st Order Partial correlations:- age-controlled B	Sig.	Zero-order Pearson correlations: r	Sig.	1st Order Partial correlations:- age-controlled B	Sig.
	(iii) 'BUREAUCRATIC'ORIENTATION:		(n = 52)		(iv) 'TECHNOCRATIC' ORIENTATION:		(n = 43)	
Organisational	.110	*	.386	.003	.232	*	[.374]	.010
Monetary	.111	*	[.473]	.001	.248	*	.327	.021
Technical-scientific	.000	*	.039	*	.054	*	.086	*
" -professional	-.159	*	-.053	*	-.137	*	-.102	*
	(i) 'APATHETIC' ORIENTATION:		(n = 44)		(ii) 'SCIENTIFIC' ORIENTATION:		(n = 51)	
Organisational	.240	*	.164	*	.217	*	.147	*
Monetary	.151	*	.044	*	.207	*	.124	*
Technical-scientific	.115	*	.041	*	[.230]	.050	.176	*
" -professional	.020	*	.024	*	.040	*	.072	*

differences between the categories are quite strong. For each orientation-type the strongest significant correlations occur with a different type of status in each case, except for those of"apathetic" orientation for whom there are no significant correlations. In the"scientific" category, only the technical-scientific index correlates significantly with PCS (r=.230;p=.050); in the "bureaucratic" and "technocratic" cells both measures of age-relative monetary and organisational status correlate significantly with PCS: in the former, monetary status has the largest correlation (B=.473;p=.001), in the latter it is organisational status (B=.374;p=.010). The effect of age is important in these last two cases, for without controlling for variations in age the correlations are not significant, although in the "scientific" cell such controls reduce the correlation with the technical-scientific index. For the technical-professional index, based upon the extent of institutional membership, there are no significant correlations in the table, although the largest ones found appear to be negative. These results are summarised:

Type of career status correlating most strongly with PCS in each career orientation type:

		B	Sig.
TECHNOCRATIC ..... (n=43)	Organisational (age-relative)	.374	.010
BUREAUCRATIC ..... (n=52)	Monetary (age-relative)	.473	.001
SCIENTIFIC ..... (n=51)	Technical--scientific	.230	.050
APATHETIC ..... (n=44)	None significant	-	-

Table 8.4 illustrates both the effects of saliency and of age-relativity. As discussed by Sofer (1970) and others, some engineers do then seem to critically evaluate their career status (in terms of organisational and monetary status at least) with respect to others of a similar age, for only when age variations are controlled do the correlations in the "technocratic" and "bureaucratic" cells become significant. This sense of "career timetable" (eg, Roth,1963) came out quite clearly in the interview responses.

> I shouldn't think I'll get a partnership now. I'm not nearly senior enough in the firm for my age. I think people who are going to be partners are partners by my age. (42 year old civil; Consultant)

> 30 is a very dangerous age. It used to be said in business generally that if you hadn't made it by 30, you wern't going to make it. I consider that possibly I'm not going quite fast enough within the firm. (30 year old civil; Consultant)

> At my age, one could be a partner in the firm. (48 year old civil; Consultant)

> As regards responsibility, I'm at about the right level for my age. (28 year old mechanical; Northern)

> There are a number of high fliers in the firm, of course. By their early 30's its obvious who these people are. (48 year old chemical; National)

> I suppose I compare myself with people of my own age; and some people a little older and younger too. In general you get a feel for who are the good people and who aren't. (37 year old civil; Contractor)

However, it is only for those of "technocratic" and "bureaucratic" orientation that age-relative organisational and monetary status are significantly related to PCS. For those of "low" organisational orientation (ie, "scientific" and "apathetic" types) this is not so and controlling for age variations has little effect on the relationships with PCS. This is

perhaps why the correlations between PCS and career status across the whole sample are not much influenced by partialling out variations in age. Certain types of career status seem to influence conceptions of career success - organisational and monetary status being age-relative in this effect - but only when such status-types are deemed important by the engineer. Surprisingly, the index of scientific status does not show an age-relative effect. For those of "scientific" career orientation the correlation between this index and PCS is reduced if age is partialled out. This may perhaps be because in deriving a sense of career success it is total achievements over the career that are important, not age-relative graduations of scientific output. However given the crude nature of this index and the large numbers of engineers registering zero on it (Appendix IId), the inference is inevitably tentative.

In general then, the effect of differences in career orientation types on PCS-career status correlations strongly supports the PCS Hypothesis-(b). Unfortunately limitations on cell sizes means that it is not feasible to combine these breakdowns with those of the different 'background' characteristics illustrated in the previous section, thus assessing the overall prediction of PCS given by the two effects in combination.

8.5 The effect of comparative reference groups

The PCS Hypothesis-(c) postulates that PCS is influenced by the engineer's social context, in particular by the effect of comparative reference groups on the standards of achieved status used to gauge PCS. That is, engineers , in addition to evaluating their achieved status against their prior career goals, will also compare their status with that of "significant others" in deriving a sense of PCS; these "others" forming a comparative reference group.

Unfortunately no explicit data was collected in the Engineer Survey about the men's reference groups, so that illustration of their effects in this regard can only be inferential. Where correlations have previously been undertaken between PCS and measures of career status across the whole sample, it has been implicitly assumed that "the sample of professional engineers" represented a comparative reference group within which gradations in career status are assessed in evaluating PCS. Partialling out the effects of age, this becomes " professional engineers of the same age". By examining the pattern of such correlations in other groups within the sample, it is thus possible to assess whether or not the group is used for status comparisons in this regard. However,the extent to which any group is a subset of some wider one cannot be ascertained; in addition,because of cell size limitations, variations in saliency and 'background'

cannot be controlled. As such,the analysis is at best only illustrative and at worst highly suspect.

In general, the number of possible comparative reference groups that a person may adopt are numerous. Given that evaluations of career status are being considered here and that comparisons are likely with visible, socially-proximate groups (See Section 3.4.3) then categories of career situs seem to form a probable basis for such comparative reference groups. Thus , analysis is restricted here to an assessment of the effects of company, engineering branch, type of work and managerial/non-managerial groups. Since variations in orientation-type and 'background' between these categories will, from the previous discussion, influence the evaluation of status, then Table 8.5 sets out these differences. However it is not possible to control them in the analysis and they serve only to assist in explanation of certain results.

Looking first at the company as a possible comparative reference group, the PCS-career status correlations of Table 8.6 are computed for each. Following the results of Table 8.4, organisational and monetary status correlations are given with age partialled out; the rank of formal organisational position within the company is also included as an additional parameter of organisational status.

From the nature of these correlations, it would appear that those engineers in Consultant, Contractor

TABLE 8.5 CHARACTERISTICS OF SITUS CATEGORIES:
(Table shows the number of engineers of different social class, education level & orientation-types in each of the 4 types of situs categories, and the % low/high PCS.)

Table shows distribution of social class, education level, & orientation types in situs categories below:-	Social class of origin		Level of Education		Orientation-type				PCS	
	'Lower' (non-prof. executive.)	'Upper'; (professional -executive)	Non-graduate	Graduates	Apathetic	Scientific	Bureaucratic	Technocratic	% below median PCS	% above median PCS
(i) COMPANY:										
Consultant	7	19	2	24	5	7	9	4	65	35
Contractor	18	19	6	32	14	4	16	4	38	62
Northern	18	5	13	10	5	5	5	8	30	70
Southern	11	12	12	11	1	14	1	5	48	52
National	29	26	7	48	12	19	14	9	33	67
Public	17	11	1	28	7	2	7	13	43	57
(ii) BRANCH:										
Civil	26	40	9	58	21	12	25	8	50	50
Mechanical	47	25	27	46	13	28	9	21	47	53
Electrical	13	12	3	22	4	4	8	8	20	80
(iii) WORK-TYPE:										
RD & D	53	47	26	74	19	34	25	19	43	57
Operations	42	44	14	74	23	17	26	21	39	61
(iv) MANAGER:										
Non-manager	58	62	14	59	16	16	19	20	58	42
Manager	42	30	27	94	28	35	33	23	48	52
ALL	100	92	41	153	44	51	52	43	41.5	58.5

TABLE 8.6 THE COMPANY AS COMPARATIVE REFERENCE GROUP

(Table shows correlations between PCS and career status by company.)

PCS correlated with career status in each company below: ('n' in brackets)	CAREER STATUS									
	Organisational:@ (Age-relative)		Monetary:@ (Age-relative)		Technical-scientific		Technical-professional		Formal rank @ (Age-relative)	
	B	Sig.	B	Sig.	r	sig.	r	Sig.	B	Sig.
Consultant (26)	.522	.004	.168	*	.472	.007	.356	.037	.439	.016
Contractor (38)	.260	*	.333	.024	.001	*	.105	*	.225	*
Northern (23)	.282	*	.047	*	.154	*	-.336	*	.270	*
Southern (23)	-.097	*	-.414	.031	.024	*	-.114	*	.167	*
National (55)	.098	*	.037	*	.202	*	.117	*	.046	*
Public (29)	.316	.050	.370	.026	.292	*	.044	*	.292	*
BRANCHES WITHIN NATIONAL:										
Mechanicals (20)	.196	*	.109	*	.441	.020	-.028	*	.152	*
Chemicals (11)	-.054	*	-.103	*	.199	*	.276	*	-.028	*
Electricals (9)	-.374	*	.145	*	-.558	.037	-.216	*	-.273	*

(@ - 1st order partial correlations, controlling for variations in age.)

and Public do adopt other engineers within their companies as comparative reference groups in evaluating career status: in Consultant, PCS correlates significantly with all the status measures except that of age-relative monetary status; in Contractor this is the only parameter correlating significantly with PCS, while for the engineers in Public, significant correlations are to be found with age-relative organisational and monetary measures . Since PCS is thus associated with specific types of career status in these companies, it may be infered that in evaluating status to derive a sense of PCS, these engineers compare themselves with others in the same company. Whether such groups are representative of some wider comparative reference group adopted by the men cannot be infered: it may well be, for example, that engineers in Consultant compare themselves with those in other consultancies, not simply those in their own firm, but to the extent that the latter is a representative subset of the former, such positive PCS-career status correlations would follow.

In contrast, in the other three companies, the PCS-career status correlations are rather different. In Southern a significant negative correlation occurs between PCS and age-relative salary, the reason for which is not obvious. It may possibly be because most of the engineers in Southern have a "scientific" career orientation (Table 8.5)and view higher salary unfavourably, perhaps as a testimony of 'scientific'

failure. The interpretation is tentative and the fact that salaries in Southern were the lowest of the six companies may have some relevance to this result (see Figure 9.6).

In Northern and National there are no significant correlations between PCS and the indicators of career status, thus suggesting that engineers in these companies do not evaluate their career status relative to those in their companies. In Northern, the result may arise because of the "saturation" effect suggested in Section 8.3; 78% of the engineers are from non-professional/executive origins (Table 8.5) and 70% are above the sample median PCS value - the highest proportion in the six companies. Consequently it may well be that most feel successful simply with the status "professional engineer", further variations in career status having no influence on PCS.

However, in the case of National there do not appear to be any factors mitigating the PCS-career status correlations in this way; categories of career orientation are mixed, social classes are equally represented, and the small number of non-graduates should accentuate these correlations (Table 8.5). In view of the size of the sample (n=55) a further breakdown by engineering branch is possible, as shown in the lower part of Table 8.6. There is some indication here that mechanicals do adopt other mechanicals within National for comparing technical-scientific status ($r=.441; p=.020$), although for the

electricals those feeling higher PCS have lower technical-scientific status (r=.-.558;p=.037); the numbers here are very small however (n = 9). The fact that 67% of the engineers in National are above the sample median PCS value may possibly be attributed to their employment in National per se, given its high prestige in the country. This may also be reinforced by the fairly generous salaries (Figure 9.6). While inferences are tentative, apart from the mechanicals and their technical-scientific status, it seems that engineers in National do not compare their status with others in the company but adopt wider frames of reference.

In general then, there are indications that men in Consultant, Contractor and Public evaluate their PCS with respect to others in their companies, although to what extent these reflect wider populations is impossible to say. In contrast, the engineers in Northern, Southern and National do not employ such specifically in-company comparisons.

Similar analyses across categories of engineering branch, type of work and managers/non-managers are shown in Table 8.7. The second and third of these have little influence on the correlation pattern, suggesting that neither of these distinctly form separate comparative reference groups, although since the correlations are positive they presumably do cut across other specific groups.

TABLE 8.7 OTHER SITUS CATEGORIES AS COMPARATIVE REFERENCE GROUPS

(Table shows correlations between career statuses and PCS across categories of engineering branch, type of work, and 'manager'.)

PCS correlated with career statuses for each situs category below :-	CAREER STATUS							
	Organisational[@] (Age-relative)		Monetary[@] (Age-relative)		Technical-scientific		Technical-professional	
	B	Sig.	B	Sig.	r	Sig.	r	Sig.
ENGINEERING BRANCH:[2]								
Civils (n=67)	.371	.001	.264	.017	.116	*	-.024	*
Mechanicals (n=73)	.183	*	.138	*	.145	*	-.101	*
Electricals (n=25)	-.357	.044	.286	*	.010	*	-.207	*
TYPE OF WORK:[2]								
'Operations' (n=88)	.202	.029	.127	*	.179	.049	.084	*
'RD & D' (n=92)	.172	.049	.205	.024	.164	.050	-.115	*
MANAGEMENT:[2]								
Manager (n=71)	.174	*	.083	*	.187	*	-.145	*
Non-manager (n=119)	.179	.028	.176	.030	.042	*	-.025	*
MECHANICAL ENGINEERS:								
'Lower' social class origin; (n=45)	.156	*	.114	*	.090	*	-.148	*
'Upper' social class origin; (n=23)	.213	*	,122	*	.201	*	-.079	*

(@ - 1st order partial correlations, controlling age.
All others are Pearson correlations.)

However variations between engineering branches are indicative of such reference group effects. Age-relative organisational status correlates significantly with PCS for civils (B=.371;p=.001), is not significant for mechanicals (B=.183;p= *), and is negatively related for electricals (B=-.357;p=.044).Civil engineers thus appear to represent a distinct comparative reference group, a result that superimposes the findings for Consultant and Contractor. For the mechanicals, even when the sample is divided by social class of origin to investigate possible "saturation" effects (given the large proportion of non-professional/ executive mechanicals) there are no significant PCS-career status correlations. The surprising negative correlation for the electricals seems to arise because half of the sample are employed by National, all of them showing above median PCS, probably as a result of the 'company' effect suggested above.

It thus appears that civil engineers do form a distinct comparative reference group for the evaluation of career status used to derive a sense of PCS, possibly one that is divided further between the consultancy and contracting functions of the two main civil engineering employers in the sample. Engineers in Public also seem to adopt a company basis for such evaluations. Although these results may only be infered from the analyses, they are highly plausible; civil engineers characteristically remain within their somewhat special, rather "professional", branch of

engineering for most of their careers, generally remaining in a consultancy or contracting function; men in Public, because of the nature of the work, very typically remain in Public all their working lives . Given the restricted nature of these career patterns, the adoption of these specific reference groups is thus perhaps explicable (cf. Hall & Schneider,1972).

To what extent reference groups beyond the bounds of the occupation are employed cannot be assessed with the data on engineers alone. Correlations between PCS and career status across the whole sample are not strong but they are sufficient to suggest that the occupation in general does serve as a basic framework for comparisons, with intra-occupational groups serving to add greater definition. Comparisons with other groups beyond the occupation, for example with other "professional" occupations in general, might in fact be anticipated (eg, Runciman,1966; Valery,1977). Some suggestion of this arose in a number of interview responses:

> Question: WHO DO YOU COMPARE YOURSELF WITH IN DECIDING HOW SUCCESSFUL YOU ARE ?
>
> Oh, I suppose I would compare my salary, say, with the headmaster of a large comprehensive or a local G.P. - those sort of people.
> (48 year old chemical; National)
>
> I compare myself with the people above me. They've had no better chances than myself. I always tend to look at it from a Public point of view.
> (52 year old electrical; Public)
>
> Being a professional, one compares oneself to other professionals, such as doctors and accountants in social standing.(28 year old civil; Consultant)

Oh, I compare myself with other managers; we tend to be a little in-grown in Public. We're a bit peculiar. But yes, now you touch on it, when I go and have a drink, I usually go with a friend whose an internal auditor for a brewery - senior man - and we compare notes and I probably do tend to compare my working life with his. And when you meet people socially at the golf club you tend to do this.

(42 year old "specialist";Public)

I must admit I do keep in very close touch with my friends I went through college with and we can gauge ourselves quite easily, seeing what type of work and salary we get.

(27 year old civil; Contractor)

Some of my contemporaries from college are earning more than I am, but it doesn't really bother me.

(25 year old civil; Consultant)

8.6 Discussion

This chapter has attempted to explain why some engineers feel a greater or lesser sense of career success than others. It has been confined to an assessment of the PCS Hypothesis, breaking the sample down into a number of categories as a basis for examining aspects of the hypothesis. Because of this approach, it has not been feasible to consider the effects of other variables from the Analytical Framework, although the 'whole sample' linear analysis shown in Figure 7.9 gives little encouragement for such techniques. This means, however, that there is no analytical justification for causal inferences, or for supposing relationships are 'direct', unmediated by others in the Framework. Nevertheless since there are some logical grounds for supposing feelings of career success do follow in some way or other from achievements in career status, such inferences do seem reasonable. It is the precise way in which status achievements influence career success that is more problematic, and - following the PCS Hypothesis - it is these that have been considered in this chapter.

In general, the analysis largely supports the consistency of the PCS Hypothesis, although inferences from particular results are not unambiguous. Of the four indicators of career status, on the whole organisational status (based upon a level of responsibility score) seems to provide the major

criterion for judging career success, a position reflected in the responses to ESQ:32, asking the engineers to rank nine ambitions in order of importance to them: 41% ranked " ADVANCE INTO HIGHER LEVELS OF RESPONSIBILITY" first, 65% placing it first, second or third. In the various PCS-career status correlations throughout the chapter, monetary status (ie, gross salary) tends to follow a similar pattern to organisational status and the two are strongly inter-correlated ($r=.690;p=.001$). Nevertheless, only 14% ranked " ADVANCE INTO HIGHER SALARY LEVELS" as their most important ambition, and in general it seems that salary provides a possible alternative, and fairly concrete, indicator of organisational status, and is one that offers wider comparability. As one civil engineer in Consultant explained:

> There are a number of reasons why I'd like to become a partner in the firm. For one, there is the money aspect, which I consider important. It's a mark that you have succeeded, which I consider for me is the most important thing, as a mark of success. Secondly, there are a number of things I'd like to change in the firm and the responsibility would enable me to bring them about.

Technical criteria provide a weaker basis for evaluating PCS. This is not to say that the technical aspects of the engineer's work are unimportant to him: 43% ranked to "DO MORE INTERSTING WORK" as one of their three most important ambitions, and job utilisation has a strong influence on feelings of job satisfaction (Section 7.4.1). Rather it seems that technical accomplishments may be less tangible, and

do not provide a very visible basis for evaluating career success in comparison to organisational and monetary criteria. Only 12% had ever taken out a patent and 75% had never published any technical material (Appendix IId). In addition, membership in professional institutions has little influence over PCS, possibly because it is not very difficult to attain and has limited benefits (Section 6.3). Correlations between PCS and the technical-professional index are mostly non-significant in all sample divisions, but they are typically negative, suggesting possible fuel to Goldner & Ritti's thesis (1967) that for engineers, "professionalism" is a response to career immobility.

The differences in saliency currently attributed by the engineer to the various types of status have a strong influence on their relationships with PCS, thus bearing out PCS Hypothesis-(b). Only for those engineers who assign above average importance to organisational advancement do variations in this status parameter appear to affect PCS; and in three different career orientation types, three different types of status correlate most strongly with PCS.

The influence of different comparative reference groups can not be considered in any depth given the lack of data in the Engineer Survey Questionnaire on this subject. However inferences from the pattern of PCS-career status correlations do suggest that in certain cases - in particular for

the civil engineers and those in Public - specific comparative reference groups do operate, thus giving some inferential support to the PCS Hypothesis-(c). This appears to be set within the context of a general framework in which respondents compare themselves with other engineers; for organisational and monetary status also with engineers of a similar age. To what extent wider reference groups are employed, however, cannot be ascertained. It is also difficult to assess the relative importance of these different effects on PCS, since cell size limitations restrict division of the sample. Each seem to have some influence when considered in isolation. The branch diagram of Figure 8.3 is an exception, suggesting that differences in 'background' in the sample have less influence on PCS than variations in age-relative responsibility.

Engineers of less prestigious social and educational background tend to have higher PCS for a given level of career status. This result is consistent with PCS Hypothesis-(a) , but open to other interpretations. It may be that "relative status mobility" (Empey,1956) of people from lower backgrounds is greater, thus leading to higher PCS. Whether PCS is the outcome of a comparison of prior goals against achieved status, or whether it derives from very different origins, based perhaps upon "relative status mobility", is problematic with the data at hand.

This is particularly so if a person's early career goals are thought to be tentative and unclear (eg, Mansfield, 1971). The hypothesis does not specify the length of the time period between the holding of such goals and the assessment of their fulfillment, nor can this be adequately considered with data from the Engineer Survey. To the extent that the analysis (all ages) based upon 'assumed' pre-employment goals is consistent with PCS Hypothesis-(a), there is some indication that the period may be fairly long.[1] The likelihood that such prior career goals actually form the basis for later conscious evaluations of career status is thus perhaps weak. Perhaps they should be considered merely as a conceptual device useful for interpreting the results but of only limited facticity ? Possibly what might happen is that prior career goals serve to establish some general level for assessing achieved career status, which attains greater definition within a particular reference group, with the prior goals themselves influencing the selection of the reference groups from which specific cues arise ? Unfortunately, without longitudinal data it is not possible to be conclusive on this issue, the results indicating that engineers of lower social and educational origins tend to feel more successful for a given level of career status, but not the reasons for this.

In conclusion then, this chapter has illustrated the subjective interpretation of career status involved in the

---

1. This is partially confirmed by analysis across age-groups, shown in Section 10.3.

derivation of a sense of PCS, an interpretation that is influenced by the engineers' social and educational background, the current saliency of the career status, and their membership of particular career situs. Inferring differences in prior goals from the background categories, and in the operation of comparative reference groups from the pattern of PCS-career status correlations within particular career situs, these results uphold the consistency of the PCS Hypothesis in its three parts. In the next chapter attention is accordingly turned to the remaining features of the Career Development Model yet to be analysed, thus illustrating how the various bases of PCS may come to develop.

CHAPTER NINE

CAREER ATTITUDES, STATUS AND CHOICE

The noble Brutus
Hath told you Caesar was ambitious:
If it were so, it was a grievous fault,
And grievously hath Caesar answer'd it.

William Shakespear;
Julius Caesar.

9.1 Introduction

This chapter completes the analysis of the Career Development Model, looking at the factors related to each of the constituents of the PCS Hypothesis. In the first section the determinants of career goals and orientations are considered, and the extent to which they are related to PCS and influenced by different social contexts is assessed. Since the actual choice of social context may also be affected by such attitudes, one example of career choice processes is considered using data from the Student Survey. Finally, the factors influencing career status achievements themselves are investigated and the "closure" of the Career Development Model entailed by different company-based Career Systems is examined.

9.2 Career goals and orientations:

Following the general discussion by Lewin (1936), the Career Development Model postulates that feelings of success resulting from the achievement of some career goal will lead to an increase in those goals in the future and an increase in orientations towards the type of status connected with those goals. In addition it is postulated that such career attitudes will be affected by socialisation processes, involving some interaction between a person's prior goals and orientations and the norms of a particular social group.

For each of the measures of organisational, monetary, and technical career goals and orientations (Appendix IId), linear analysis is undertaken similar to that used in Chapter 7. The results are summarised in Figures 9.1 and 9.2, details of the multiple regression being presented in Table 9.1. The figures show those elements of the Analytical Framework having "significant direct" relationships with the six career attitudes, although relationships between the attitudes themselves are not shown (see Appendix IId). Factors that have significant relationships as partial correlations, but which are likely to have associative or dependent connections with the career goal and orientation parameters, are also included in the figures but are not entered into the multiple regression. Path coefficients are given on this basis, assuming the necessary causality.

FIGURE 9.1 FACTORS RELATED TO CAREER GOALS

(Path coefficients shown in figures)

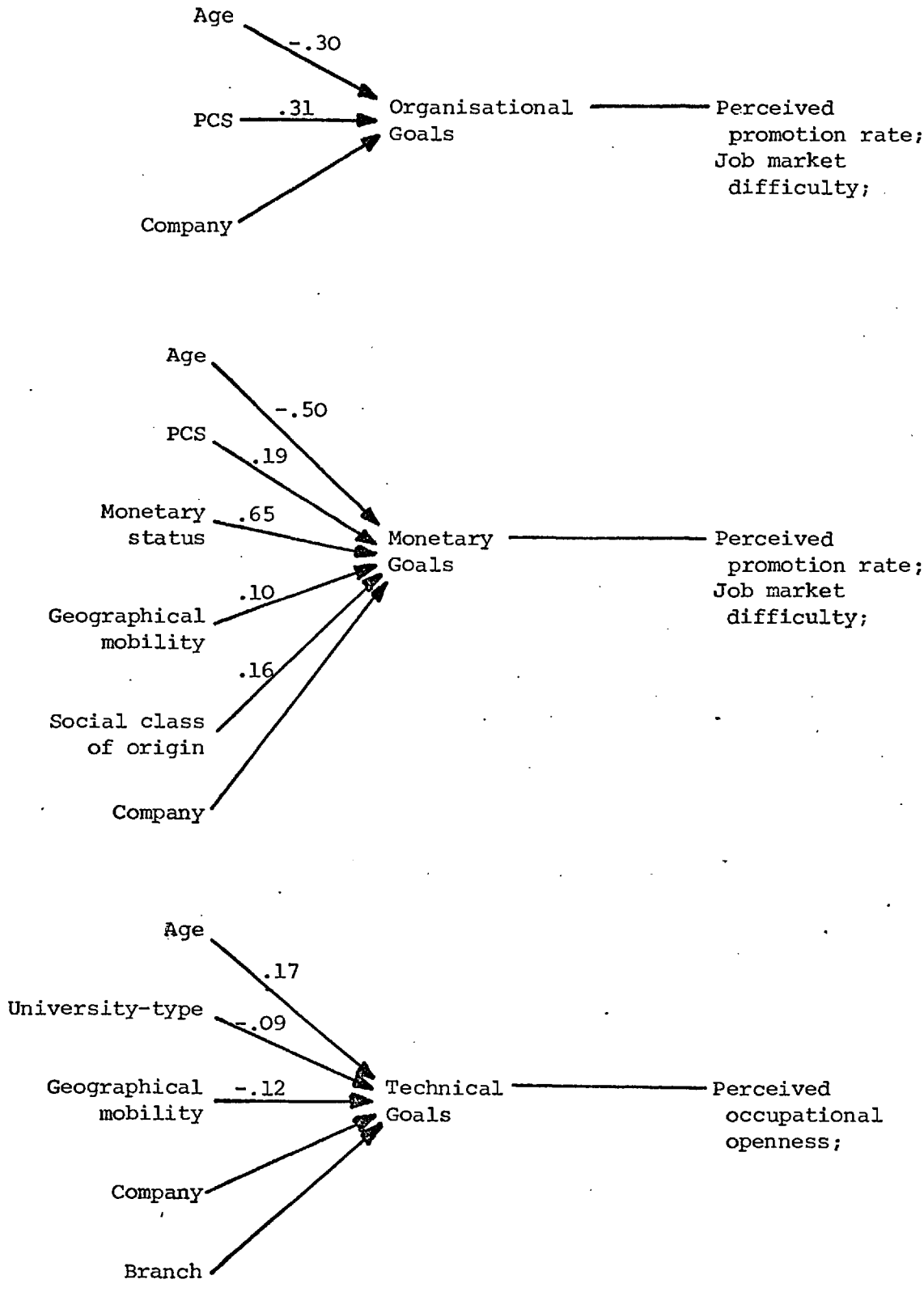


FIGURE 9.2 FACTORS RELATED TO CAREER ORIENTATIONS

(Path coefficients shown on Figures)

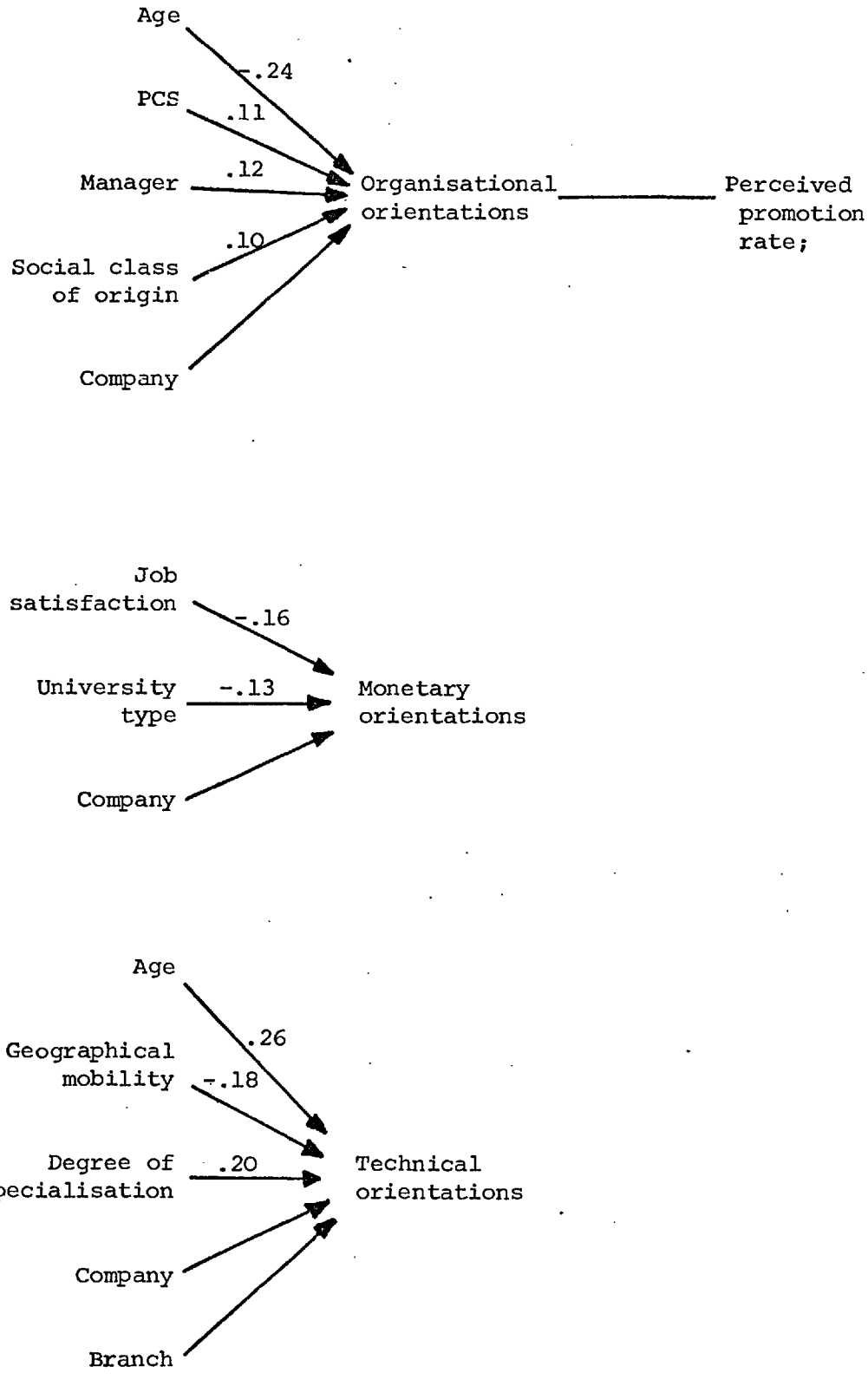


TABLE 9.1 MULTIPLE REGRESSION WITH CAREER GOALS AND ORIENTATIONS

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
ORGANISATIONAL GOALS:						
Age	-.308	.000	.308	.095	.095	.000
PCS	.282	.000	.428	.184	.089	.000
Company	.294	-	.504	.254	.070	0
MONETARY GOALS:						
Age	-.174	.028	.174	.030	.030	.028
PCS	.277	.000	.332	.110	.080	.000
Monetary status	.306	.000	.600	.360	.250	0
Geog. mobility	.141	.009	.623	.388	.028	.000
Social class	.176	-	.646	.417	.029	0
Company	.435	-	.708	.501	.084	0
TECHNICAL GOALS:						
Age	.145	.048	.145	.021	.021	.048
University-type	.174	-	.211	.044	.023	.015
Geog. mobility	-.192	.005	.291	.084	.041	.001
Company	.331	-	.370	.137	.053	.001
Branch	.337	-	.427	.183	.045	.001
ORGANISATIONAL ORIENTATIONS:						
Age	-.245	.001	.245	.060	.060	.001
PCS	.140	.046	.298	.083	.023	.001
Manager	.115	.044	.312	.097	.015	.001
Social class	.095	-	.364	.132	.035	.001
Company	.251	-	.394	.155	.023	.001
MONETARY ORIENTATIONS:						
Job satisfaction	-.179	.014	.179	.032	.032	.014
University-type	.138	-	.222	.050	.018	.009
Company	.229	-	.303	.092	.042	.013
TECHNICAL ORIENTATIONS:						
Age	.283	.000	.283	.080	.080	.000
Geog. mobility	-.161	.002	.358	.128	.048	.000
Specialisation	-.216	.030	.388	.151	.023	.000
Company	.377	-	.446	.198	.047	.000
Branch	.326	-	,484	,234	.036	.000

Particularly evident in the figures is the relationship between the engineer's age and five of the six career attitudes. Older engineers tend to have lower organisational goals and orientations, lower monetary goals, and higher technical goals and orientations. Since the relationship is not mediated by other aspects of the men's careers, it would appear to be the result of age per se, although whether this is due to personality developments, different historical experiences, or other differences in age-related characteristics not included in the Analytical Framework cannot reasonably be infered.

PCS is positively related to organisational goals and orientations and monetary goals. Although there is no real basis for infering causality in these relationships, they are generally consistent with those postulated in the Career Development Model. However, to what extent feelings of success following the fulfillment of a particular career goal lead to an increase in the future goals and orientations of that type of status cannot be assessed, given the contingent basis of PCS discussed in Chapter 8 and the cross-sectional data at hand. Nonetheless, insofar as such incremental effects are reflected in the overall magnitude of the goals and orientation variables, then the relationships in Figures 9.1 & 9.2 do offer some support to the hypothesis. Furthermore the relatively predominant emphasis placed upon organisational ambitions by the sample as a whole (Section 8.6), suggests that it is from the fulfillment of such organisational goals that PCS is most typically

derived, and it is for such organisational goals and orientations that significant relationships are observed in the figures. Indeed, dividing the sample into the four types of career orientation, Pearson correlations between PCS and organisational goals are only significant for engineers of above average organisational orientation:

Orientation-type	PCS v Organisational Goals	
	r	Sig.
Apathetic	.225	*
Scientific	.143	*
Bureaucratic	.475	.001
Technocratic	.356	.009

Possibly the fact that monetary goals but not monetary orientations are also significantly related to PCS is indicative of the role of salary as a secondary parameter of organisational status, as suggested in Section 8.6.

While PCS is thus related to a number of career attitudes, with one exception[1] no significant relationships are found with the measures of career status. This suggests that is the experience of career success which influences the goals and orientations, rather than achievements in career status per se.

In addition to age and PCS, there are indications that socialisation processes may have a further influence on the engineers' career attitudes. All vary significantly

1. The exception is the relationship between monetary goals and monetary status; ie, between maximum expected salary and present salary. This may perhaps arise because a person's present salary constrains the appraisal of future expected levels, fixing it within their current perspective. This exception may thus reflect differences in the career goal measures. While organisational and technical goal parameters require the engineer to assess the likelihood of attaining particular'fixed' levels of future career status, the measure of monetary goals is taken from the level of status itself which the engineer expects ('fixed probability') to attain.

across the engineers' companies; for the two technical parameters variations by engineering branch are also significant. In addition, aspects of social and educational background are related to four of the attitudes: higher social class origin with higher monetary goals and higher organisational orientations; higher status types of universities with lower technical goals and lower monetary orientations.

These results seem to be generally consistent with the Career Development Model. The influence of 'background' on career attitudes discussed in Section 8.3 for those graduates about to start their careers is still in evidence for the practising engineers: more prestigious social and educational background being associated with higher organisational goals and orientations, higher monetary goals, and lower technical goals and orientations; possibly the lower monetary orientations of higher status university graduates reflects the more intrinsic approach inculcated by such establishments ? The effect of differences in engineering branch on technical goals and orientations might be the result of differences in professional socialisation, the social context of particular specialisms, or the exigencies of different technical content. Certainly it is interesting that, given the division within engineering by technical specialism, it is only for such technical attitudes that variations across the branches are significant.

The strong variation in career attitudes across the six companies may reflect differences in their social

context, although it might be that the categories represent a'catch-all' for other workplace parameters not included in the Analytical Framework. However, to gain better illustration of this possible effect, Table 9.2(a) is computed, showing the Pearson correlations between PCS and the career attitudes in each company. Noticable in this is the lack of significant correlations with organisational and monetary goals in Southern and National in contrast to the other four companies. Complementary illustration of the effects of different background parameters on the monetary goals measure is shown in Table 9.2(b). (Of these two career goals, it is monetary goals which has, across the whole sample, a significant 'background' effect). Partial correlations are computed between various 'background' categories, assumed scalar, and the monetary goals parameter, controlling for variations in PCS. Only in Southern and National are any correlations significant, social class of origin correlating positively in both and level of education positively in National. Such results appear to be consistent with the Career Development Model, illustrating the complementarity of PCS and socialisation effects. It is in the two companies where PCS is not significantly related to monetary goals that the influence of 'background' is significant.

However, such results only illustrate one possible aspect of socialisation processes. To the extent that the 'background' categories correspond with differences

TABLE 9.2 CAREER ATTITUDES AND SOCIALISATION EFFECTS :

(@ These background variables assumed scalar; details in Appendix IIb)

a.

Pearson correlations between PCS and career attitudes in each company:-	CAREER ORIENTATIONS						CAREER GOALS					
	Organisational		Monetary		Technical		Organisational		Monetary		Technical	
	r	sig.	r	sig.	r	sig.	r	sig.	r	sig.	r	sig.
Consultant	.031	*	-.130	*	.254	*	.357	.037	.548	.006	.033	*
Contractor	.124	*	-.102	*	.011	*	.464	.002	.323	.038	-.216	*
Northern	-.030	*	.159	*	.131	*	.587	.002	.362	.045	.353	.049
Southern	-.090	*	-.265	*	.171	*	-.135	*	-.277	*	.190	*
National	.226	.050	-.114	*	.155	*	.110	*	.116	*	.055	*
Public	.263	*	.083	*	.203	*	.337	.040	.562	.001	.050	*
ALL	.121	.049	-.065	*	.095	*	.287	.001	.293	.001	.067	*

b.

1st Order partial correlations between monetary goals and background variables, controlling PCS, in each company:	SOCIAL AND EDUCATIONAL BACKGROUND CHARACTERISTICS @									
	Social class of origin		Type of school attended		Level of Education		Type of university attended		Degree class obtained	
	B	sig.	B	sig	B	sig.	B	sig.	B	sig.
Consultant	-.352	*	.240	*	.017	*	.018	*	.000	*
Contractor	.262	*	.252	*	.166	*	.092	*	-.022	*
Northern	.301	*	.025	*	-.098	*	.065	*	.012	*
Southern	.465	.047	-.047	*	.141	*	.037	*	-.019	*
National	.292	.020	.175	*	.386	.003	.040	*	.145	*
Public	.207	*	.192	*	.076	*	.000	*	.229	*
ALL	.192	.007	.135	.041	.222	.002	.075	*	.064	*

in prior goals and orientations, then some stability in such attitudes appears to be maintained over time. The socialisation process postulated in the Career Development Model suggests that some interaction will take place between such prior attitudes and the norms of particular social groups. This second facet is harder to illustrate however. Certainly Figures 9.1 & 9.2 indicate that variations between the companies are significant, but interpretations other than normative differences are clearly possible. To the extent that strong group norms might be presumed to result in attitude conformity within the company, then complementing the results in Table 9.2, the following are the standard deviations in monetary goals in the six companies:

Consultant	£ 3,170
Contractor	£ 6,010
Northern	£ 2,740
Southern	£ 1,680
National	£ 3,220
Public	£ 2,980

The standard deviation is lowest in Southern, one of the two companies in which monetary goals are unrelated to PCS, although in National the standard deviation is about average for the sample. Some limited illustration of this second aspect of socialisation is thus tentatively suggested.

As Figures 9.1 and 9.2 illustrate, the parameters of technical goals and orientations are inversely related to the engineer's geographical mobility, monetary goals being positively related, although none

of these relationships are particularly strong. Geographical mobility may possibly increase an engineer's "awareness context" (Glaser & Strauss, 1964) and hence their salary aspirations, although it may also be of course that the more'ambitious'engineers are prepared to move more frequently. Similarly, the inverse relationship between geographical mobility and technical goals and orientations is liable to various explanations. It could be that the more technically-inclined engineers develop narrow specialisms, which encourage a "local" outlook (cf. Gouldner, 1957; Ritti, 1967), although this specialisation might in itself inhibit job mobility. On the other hand, low mobility - arising, eg, from various 'personal' reasons - might lead to the development of a more technical outlook, whilst rather more "cosmopolitan" engineers, or at least those whose geographical mobility is greater, may broaden their perspectives and adopt a less specialist, technical inclination. It may be that some interaction occurs between mobility experiences and the engineer's career attitudes; certainly, inferences of causality in these cases are problematic.

The same is also true of several other relationships in Figure 9.1: those between organisational orientations and'manager', monetary orientations and job satisfaction, and technical orientations and the degree of specialisation. Even if causality is assumed in these instances, the overall prediction of the variance in career orientations remains low: 16%, 9% and 23% for organisational, monetary and technical orientations respectively. In contrast,

the three career goals are rather better predicted from the factors in Figure 9.1: 25%, 50%, and 18% of the variance in organisational, monetary and technical goals being accounted for. While Figures 9.1 & 9.2 are drawn with the direction of relationships assumed, apart from the exceptions mentioned, most of these inferences appear to be reasonable.

In general then, the analysis largely upholds the consistency of the Career Development Model, insofar as null hypotheses (that there are no significant relationships) may be rejected. However as Figures 9.1 & 9.2 indicate, the Career Development Model does not fully account for the observed relationships, and gives a rather better prediction of career goals than orientations. The influence of age on the parameters was not explicitly predicted, although in the case of career goals it may partly reflect the strong age-related nature of career status (eg, Section 8.4). PCS is related to the measures of organisational goals and orientations and to that of monetary goals largely in the manner anticipated; and although inferences must be tentative given the paucity of available data, there are indications that socialisation effects complement this influence. Differences in relationships with several social and educational background variables distinctly suggest this effect, although possible normative influences are less consistent.

To some degree, the parameters of career goals and orientations reflect an engineer's motivation to compete for positions of higher career status; they provide a

measure of his career aims and the importance attached to them. As such, these results illustrate the different origins of this motivation, arising in part from the influence of age alone, in part from socialisation within particular contexts, and in part from the personal experience over the career. This final aspect is significant, for it indicates a self-reinforcing component in the motivational process: achievements in career status influence PCS, which in turn influences the motivation to compete for higher career status. Or, more simply, that success breeds the desire for more success. Although it is not posssible to fully assess the significance of this effect with the static data at hand, insofar as the dynamic is self-reinforcing, it may thus be an important process for sustaining the engineer's motivation over the course of the career, keeping him working for positions of ever higher career status.

As the results illustrate, this effect is complemented by the influence of particular social contexts on career goals and orientations. However it may also be the case that the initial choice of these contexts is affected by such career attitudes. Consequently, in the next section, one example of the mechanism of Career Choice is examined.

9.3 Career choice; the Student Survey:[1]

The Career Development Model postulates that the choice of career situses over a person's career will represent the outcome of some interaction between their career goals and orientations and the various Career System constraints on situs mobility; eg, due to a particular labour market. The cross-sectional Engineer Survey data cannot adequately consider this process, essentially because of the development in career attitudes subsequent to any choice. However, it is possible to illustrate one example of career choice using the Student Survey. This allows the initial job choices of Imperial College engineering students to be studied and the validity of the general mechanism to be assessed in the one instance. Given the likely importance of initial job choice on the direction of the students' future careers, this example has some special relevance within the Career Development Model.

The Student Survey was conducted just before the 3rd Year engineering under-graduates left Imperial College. At that time all but 16 of the sample of 128 had arranged a future job. However since this had typically occurred within the previous few months and before any had started full-time employment[2], then

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1. For a more detailed account of the data and analysis described in this section, see Taylor (1979).

2. 35% had spent a year or more working at various times; and 16% were on sandwich courses.

their career attitudes at the time of the survey are unlikely to have been influenced post hoc by the arrangement of particular jobs. This may not be so for the few (12%) expecting jobs outside engineering, where technical goals and orientations would be untenable. For the others, however, any association between career attitudes and the selection of different types of jobs would be consistent with the Career Development Model; the general and long-term nature of these attitudes suggesting they form the basis of purposive choice, permitting causal inferences to be made.

Details of the jobs taken by the students in each of the engineering departments are presented in Table 9.3. The jobs are classified in terms of the main career situs categories used for the Engineer Survey: branch of engineering, type of work, and company, with the last categorised by type and size as shown. Most of the students without a job firmly arranged had a pretty good idea which engineering branch and type of work they would be going into and hence these expected classes are included in the table.

Most students entered a branch of engineering that corresponded to their department in the college. For whatever reason - suitability of the qualification and training, reluctance of employers to recruit outside the field, personal preference by the students, etc - their choice of jobs was strongly confined to the "segment" (Bucher & Strauss, 1961) of the occupation

TABLE 9.3 JOB SELECTION IN THE STUDENT SURVEY

(Tables shows numbers of students taking different types of jobs by engineering department. Further details in Appendix III.)

	Engineering department; Imperial College.	Aeronautics	Chemical	Civil	Electrical	Mechanical	Mining	ALL
(a)	BRANCH (expected)							
	Aeronautics	7	-	-	-	1	-	8
	Chemical	-	8	-	-	-	-	8
	Civil	-	-	27	-	-	-	27
	Electrical	-	1	-	23	-	-	24
	Mechanical	-	-	-	-	21	1	21
	Mining	-	-	-	1	1	10	12
	Production	-	-	-	-	6	-	6
	Computing	-	-	-	2	1	-	3
	Nuclear	1	-	-	-	-	-	1
	Petroleum	-	-	-	-	1	-	1
	Not engineering/ don't know	4	3	2	4	3	1	17
(b)	WORK-TYPE: (expect -ed)							
	Further study	1	-	-	-	-	-	1
	RD & D *	6	5	14	12	14	1	52
	Operations	1	3	13	9	13	9	48
	Trainee	-	1	-	4	2	-	7
	Services	1	1	1	5	6	1	15
	Don't know	2	2	1	-	-	-	5
(c)	COMPANY-TYPE:							
	University	-	3	2	1	4	-	10
	Consultancy	-	-	9	-	1	-	10
	Private-sector (under 5000)	-	-	3	3	4	3	13
	Private-sector; (5000 +)	5	5	7	13	23	6	59
	Public-sector	2	-	3	10	2	1	18
	Not arranged	3	3	5	3	1	1	16
(d)	COMPANY-SIZE:							
	Under 5000	-	-	13	3	5	3	24
	5000+ employees	7	5	9	21	23	7	72
	Don't know	4	7	7	6	7	1	32
	TOTAL:	11	12	29	30	35	11	128

	χ^2 tests: Breakdown by;	χ^2	Degrees of freedom	Significance:
(a)	Engineering branch expected	- test invalid; highly significant.		
(b)	Expected work-type; All: $	14.55	10	.149
	-Civil,electrical,mech.:	3.39	4	.495
(c)	Company-type; all :	64.52	25	.000
	-Civil,electrical,mech.:	33.09	8	.000
(d)	Company-size :	20.53	5	.001

* This category includes post-graduate researchers at university;

$ Based on RD & D, operations, and non-engineering classes only. Tests undertaken on reduced numbers of classes to improve validity.

defined by their engineering specialism. As such, it appears to represent a major constraint on the students' job choices. Within these branches a variety of different types of work and companies would be available to the students and their choices reflect this accordingly. While the selection of companies however did vary significantly between branches, the different types of work did not (Table 9.3).

Table 9.4 shows the differences in career goals and orientations between these job choice categories where any two pairs of classes give a significant t-test. Measures of career goals are the same and orientations similar to those used in the Engineer Survey, details being given in Appendix IIIc . The main difference in career attitudes occurs across the categories of work-type: those expecting to do Operations had on average higher organisational goals and orientations than those entering RD & D, both of whom had higher technical goals and orientations than those entering the non-engineering jobs, labelled "Services" (cf. Appendix IIb). In addition, those entering private-sector firms of under 5000 employees had higher monetary orientations than those joining larger private-sector firms. There were no significant differences in career attitudes between the engineering branches or between the different sized companies as a whole.

TABLE 9.4 CAREER ATTITUDES AND JOB CHOICE

(Table shows those pairs of job types for which there are significant differences (T-test) between any one of the student's career goals or orientations; classes of job-types are as used in Table 9.3, details in Appendix III b)

CAREER ATTITUDES	PAIRS OF JOB-TYPES (All significant)	MEAN ATTITUDE VALUES	T TEST (Pooled var. estimate)		
			t value	degrees of freedom	Sig.
Organisational orientations	RD & D Operations	-.215 .195	-2.66	96	.009
Organisational Goals	RD & D Operations	3.81 4.79	-2.93	97	.004
Monetary orientations	Private-sector, small Private-sector, large	.520 .000	2.34	69	.022
Technical orientations	Services: - RD & D - Operations	-.703 .109 .072	 -4.03 -3.62	 62 58	 .000 .001
Technical goals	Services: - RD & D - Operations	2.64 4.90 4.37	 -4.81 -3.67	 64 58	 .000 .001

Table 8.1 presented in the previous chapter has indicated that the student's career goals correlate significantly with their social class of origin and type of school: more prestigious social classes and schools being related to higher organisational and monetary goals and lower technical goals. Only the one orientation parameter was so related: organisational orientations correlating positively with social class of origin. The temporal priority in these relationships means that, whatever intermediary factors may be involved, they can only operate in one direction. Thus the career attitudes have an origin that is in some degree independent from the students' chosen jobs.

X^2 analyses of cross-tabulations between the job choices and these 'background' variables are not significant in any cases. Thus there is reasonable evidence to suggest that differences in career attitudes result in the selection of different types of work. In the case of those taking non-engineering jobs, some post hoc accommodation to the outcome of career choice may have taken place since the jobs were settled, insofar as technical goals and orientations are unlikely to be relevant ; it is tempting to suggest that low technical goals and orientations lead a student to leave engineering and indeed this may partly be the case, but with cross-sectional data the inference is suspect. However this post hoc accommodation would not explain differences in career goals and orientations between those entering RD & D and Operations, because the general and long-term nature of career attitudes are unlikely to be much affected by

a decision at this stage of the students' careers, and since they have a quite distinct social basis (and therefore a measure of independence from actual job choice), then it seems reasonable to infer that differences in career attitudes lead to the selection of one of these work-types: that is, because a student has high organisational goals and orientations he is more likely to enter Operations than RD & D. Possibly this is because such people see the characteristically "line" functions of Operations as offering better promotion opportunities than the typical"staff" positions of RD & D (eg, Dalton,1966). This is illustrated in Figure 9.3.

The choice of type and size of company is significantly related to the student's branch of engineering, which in restricting choice to a particular segment of the occupation presents different options of company type and size. Only one career attitude - monetary orientations - is significantly related to company selection, with those joining small private-sector companies having higher monetary orientations than those joining large private-sector ones. The relationship may provide another example of purposive selection, for although the difference is not significant on a t-test[1], those joining smaller, private-sector firms had a higher starting salary than those joining larger ones; (possibly because the smaller companies needed to

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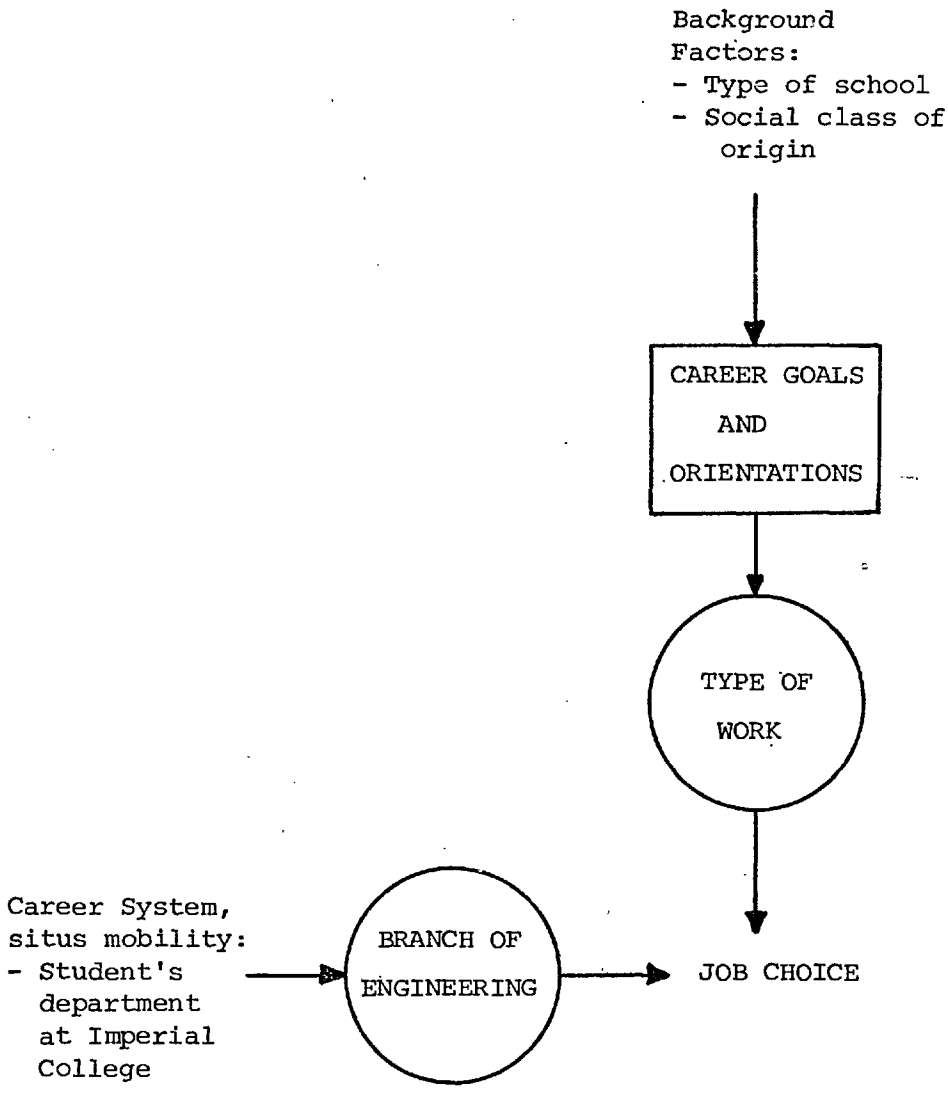
1.Mean starting salaries:
Private sector, under 5000 employees: £ 3,308
Private sector, over 5000 employees : £ 2,983
T-test: t = 1.02, 68 degrees of freedom, p = .313.

FIGURE 9.3 SCHEMATA OF JOB CHOICE PROCESS



pay more to attract graduates away from the larger, more prestigious firms ?). As such, within the constraints of a given engineering branch and selected type of work, it is possible that some further choice is exercised over the type of employer in line with the student's monetary orientations. However this inference must be tentative since the difference in starting salaries is not significant, and in general the choice of company-type and size does not appear especially critical in the business of job selection. It is the students' current department which severely constrains their choice to a particular engineering branch, within which discretion seems to be excercised primarily over the choice of work-type; higher organisational goals and orientations leading to a choice of Operations rather than RD & D.

For the one example of initial job choice then, this mechanism, illustrated in Figure 9.3, is generally consistent with the broader formulation of Career Choice suggested in the Career Development Model. Of course, to what extent this scheme is applicable to students from other institutions, perhaps facing rather different labour markets, or for subsequent choice later in the career, cannot be assessed with the available data. Nevertheless, in this one example, the selection of career situs does appear to be constrained by a particular Career System, yet at the same time consonant with certain career goals and orientations, thus providing one illustration of the validity of the proposed Career Choice mechanism.

9.4 Career Status

To complete the circularity of the Career Development Model, this final section examines the determinants of career status, insofar as these are embraced within the Analytical Framework. Using linear analytical techniques, Figure 9.4 is drawn up showing those variables which have significant, direct relationships with the parameters of organisational, monetary, technical-scientific and technical-professional status. Path coefficients are shown on the basis of assumed causality, and details of the multiple regression presented in Table 9.5. A number of variables also shown in the figure are significantly related to the status parameters but seem likely to be associative or dependent upon them and consequently are not entered into the regression.

As the figure indicates, age has a very strong influence over all four status variables; in particular it can account for 41% and 38% of the variance of organisational and monetary status respectively. Whether or not the engineer is a manager also makes a significant difference to his organisational, monetary and technical-scientific status; for example, on average managers earn £ 1,700 a year more than non-managers.(For the technical-scientific status it may be that 'scientific output' assists managerial appointments). Variations between companies also affect monetary, technical-scientific and technical-professional status; Figures 9.5 and 9.6 illustrate the organisational

FIGURE 9.4 FACTORS RELATED TO CAREER STATUS

(Path coefficients shown in figures)

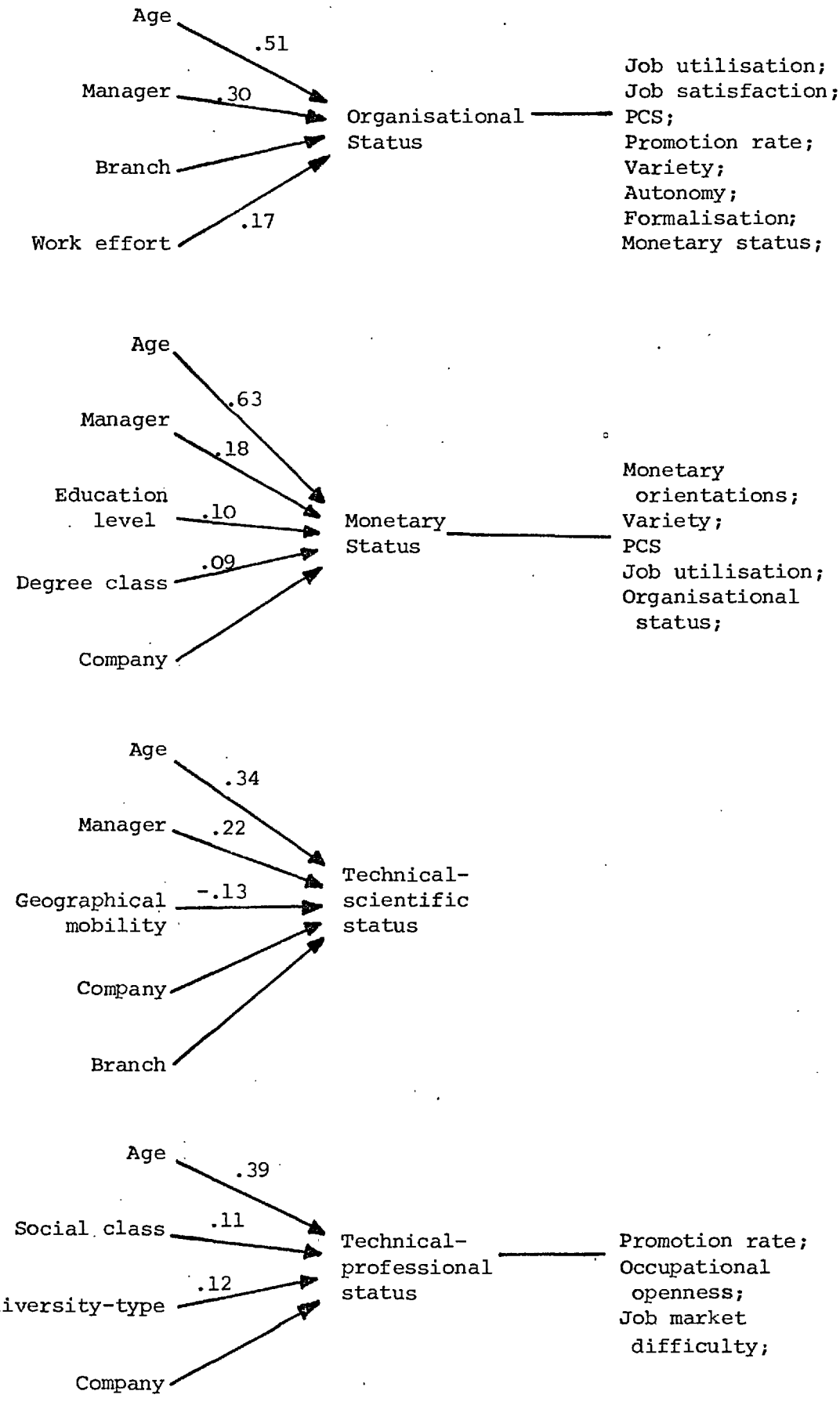


TABLE 9.5 MULTIPLE REGRESSION WITH CAREER STATUS

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
ORGANISATIONAL STATUS:						
Age	.640	0	.640	.410	.410	0
Manager	.475	0	.724	.524	.114	.000
Branch	.373	-	.739	.545	.021	.000
Work effort	.330	.001	.757	.574	.028	.000
MONETARY STATUS:						
Age	.619	0	.619	.383	.383	.000
Manager	.349	.000	.659	.434	.051	.000
Education level	.072	-	.690	.476	.041	.000
Degree class	.080	.039	.699	.488	.012	.000
Company	.479	-	.778	.606	.118	.000
TECHNICAL-SCIENTIFIC STATUS:						
Age	.443	.000	.443	.196	.196	.000
Manager	.228	.016	.470	.221	.025	.000
Geog. mobility	-.076	.037	.490	.240	.019	.000
Company	.426	-	.543	.295	.011	.000
Branch	.526	-	.562	.316	.019	.000
TECHNICAL-PROFESSIONAL STATUS:						
Age	.326	.000	.326	.106	.106	.000
Social class	.172	-	.380	.144	.039	.000
University-type	.169	-	.434	.189	.045	.000
Company	.553	.000	.673	.453	.016	.000

FIGURE 9.5 VARIATIONS IN ORGANISATIONAL STATUS BY COMPANY

(Graph shows mean responsibility level for the engineers computed over each 5-year age-group in each company.)

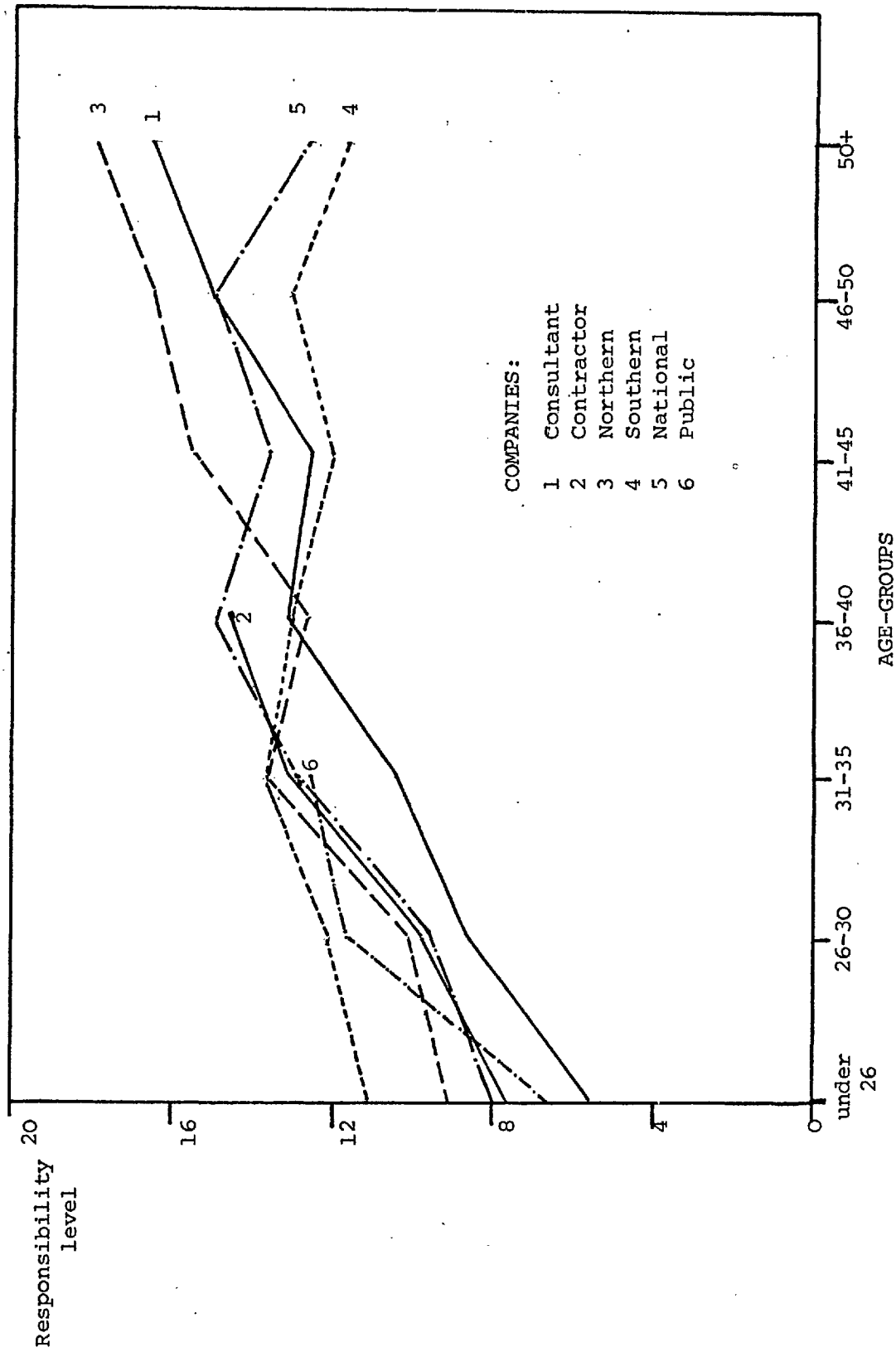
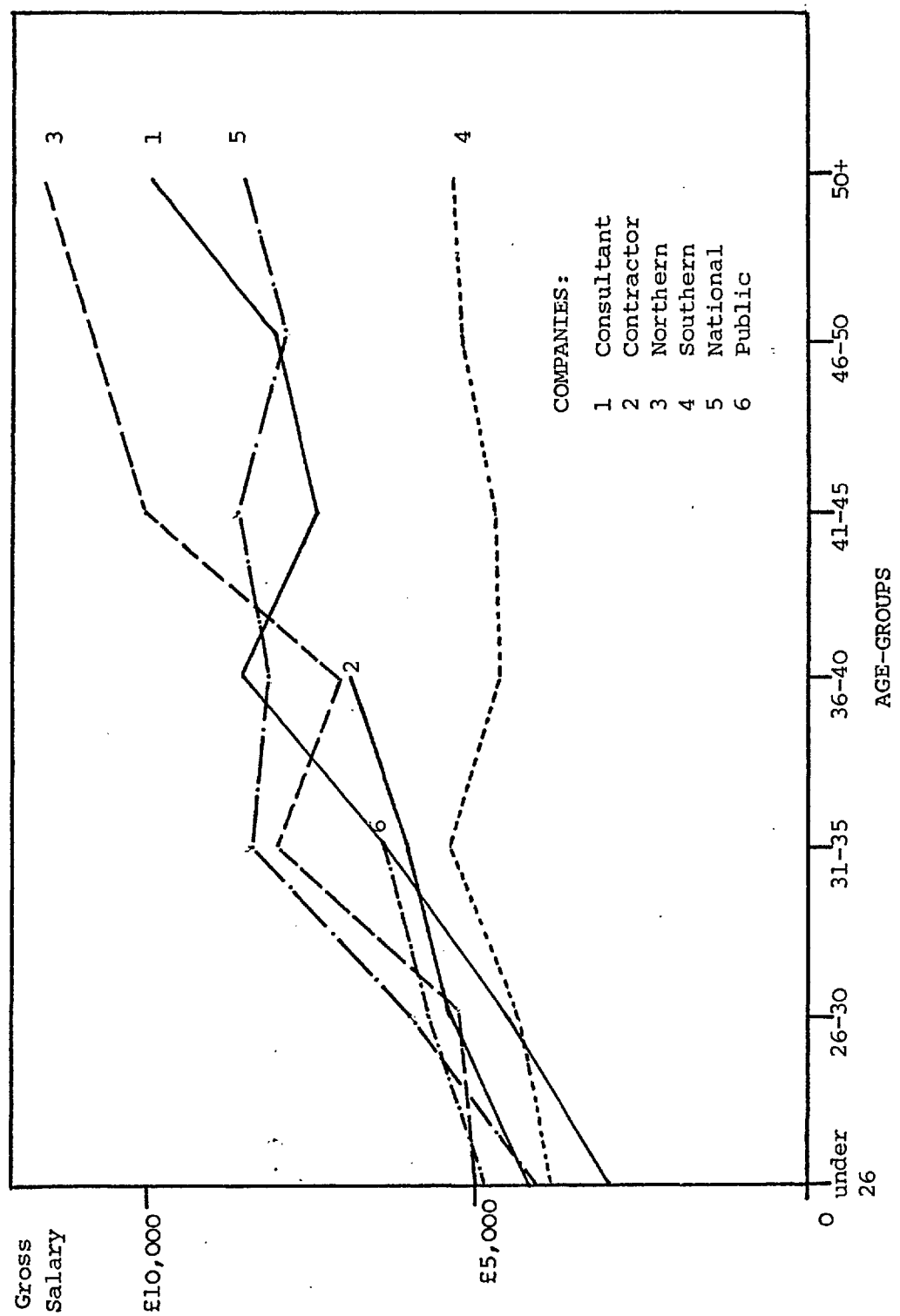


FIGURE 9.6 VARIATIONS IN MONETARY STATUS BY COMPANY

(Graph shows mean gross salaries for the engineers, computed over each 5 year age-group in each company)



and monetary status for engineers of different ages in each company. While organisational status does not vary significantly between companies, variations by branch are significant, as they are for the technical-scientific measure. Several aspects of social and educational background are weakly related to career status: graduates and those with higher degree classes have higher salaries than non-graduates and those with lower degree classes, although whether this is a reflection of 'ability' or the advantages of a paper qualification cannot be assessed. In addition, those of higher social class origins and those who attended more prestigious universities rate higher on the technical-professional index;(perhaps because of the greater sense of 'professionalism' developed in such contexts ?). Those engineers of lower geographical mobility also have higher 'scientific' output, a result similar to that observed for technical goals and orientations in Section 9.2 and of equally questionable interpretation.

The explained variance in career status measures is considerable (Figure 9.7): 57%, 61%, 32%, and 45% for organisational, monetary, technical-scientific and technical-professional status respectively, with the engineer's age and membership of career situs categories (company, branch, and manager) accounting for the bulk of these. While the remaining unexplained variance in these parameters may certainly reflect differences in, eg, 'ability' between particular individuals,[1] such results indicate that to quite a considerable degree the engineers' career status is

1. Measurement errors in these 'structural' variables are likely to be much less than with the attitudinal ones, so that the explained variance which may be achieved will probably be much higher, as 'residual' errors are reduced. cf. Section 7.5

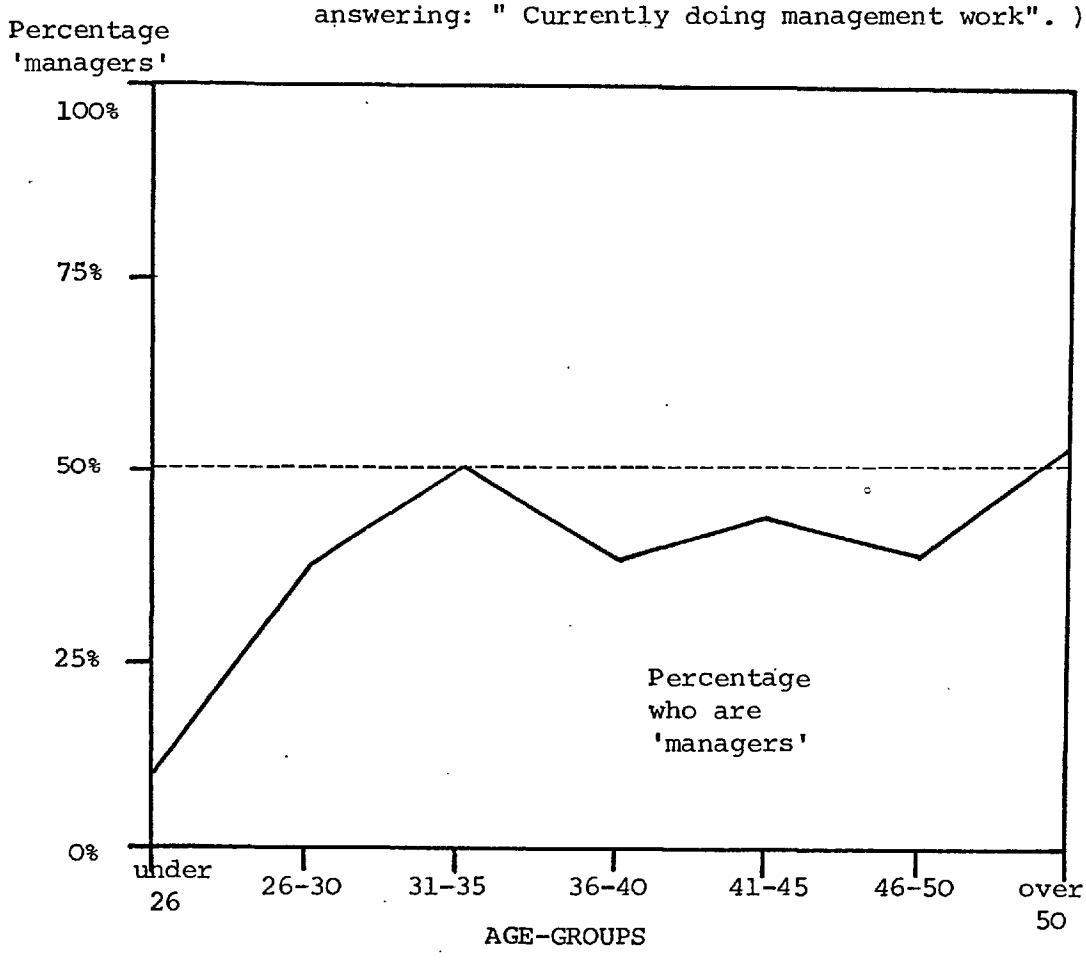
'institutionally' determined by their age and particular career situses. One possible exception to this position may arise through the factors influencing managerial appointments, since the dichotomy of being or not being a manager has a significant impact on career status beyond the constraints of age, company and branch.

Figure 9.7 shows the percentage of each age-group who are managers; for the sample as a whole the proportion rises to around half for those aged 30 or so, remaining at this percentage for older engineers: variations by company are fairly erratic, possibly because of the small cell sizes. Linear analysis with the elements of the Analytical Framework produces the results shown in Figure 9.8 for the factors related to 'manager'. A number of parameters having likely associative or dependent relationships are shown in the figure. However as the multiple regression indicates, again it is the engineers' age, company and branch which have a strong influence over whether or not they are a manager, accounting for some 42% of the variance in this dichotomy.

As Figure 9.4 illustrates, only for organisational status is there a significant relation with the engineer's work effort. Clearly the direction of this relationship is problematic and indeed the Career Development Model postulates a circular relationship operating through the intermediary effect of PCS: ie, Career status ⟶ PCS ⟶ Work involvement ⟶ Career status; (this circular relationship is considered in detail in Chapter 10).

FIGURE 9.7 VARIATIONS IN 'MANAGER' WITH AGE

(As given by the response to the question: "If you have not already done so, do you anticipate moving into management work later in your career or do you think you will stay on the engineering-side". Graph shows percentage of each 5-year age-group answering: " Currently doing management work".)

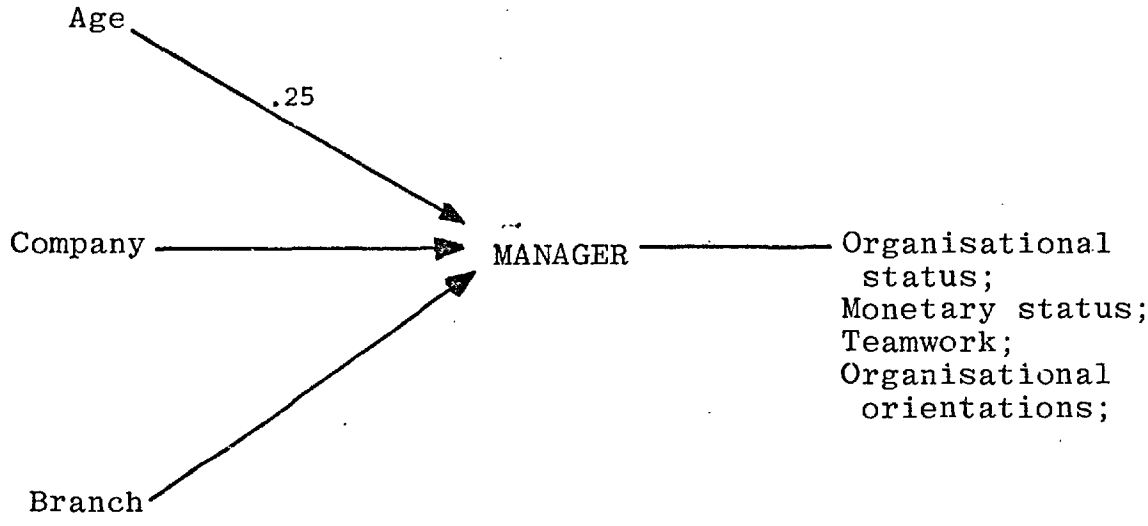


Percentage who are 'managers' by company:-

COMPANIES	AGE-GROUPS							ALL AGES
	under 26	26-30	31-35	36-40	41-45	46-50	over 50	
Consultant	0	0	20	50	0	33	75	23
Contractor	14	20	17	0	0	-	-	
Northern	0	0	83	50	75	100	75	61
Southern	0	20	33	0	0	33	50	22
National	0	13	17	50	75	25	37	33
Public	50	82	100	-	-	50	-	83
ALL SAMPLE	10	37	50	38	43	38	52	38

FIGURE 9.8 FACTORS RELATED TO"MANAGER"

(Path coefficient on figure)



Multiple Regression with"Manager"

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Sig. of F
Age	.203	.012	.203	.041	.041	.012
Company	.474	-	.542	.294	.253	.000
Branch	.436	-	.644	.415	.121	.000

However this result is consistent with the specific link of the postulated model, suggesting that higher work involvement will achieve higher career status, given the typical nature of organisational reward systems. If this directionality is assumed (and although there is no analytical basis for the inference, the results of Chapter 7 suggest work effort has a distinct basis in terms of job satisfaction and PCS), then the result indicates some degree of "closure" in the circular Career Development Model.

For the sample as a whole, organisational status is fairly weakly related to work effort. Table 9.6(b) however, presenting the 1st Order partials (controlling for age) between work effort and career status in each company, indicates that only in Contractor, Northern and Public are correlations with organisational status significant. In Contractor, monetary status also correlates significantly with work effort. The Pearson correlations between age and career status in each company shown in Table 9.6(a) in fact indicate that in all companies but Southern there are also strong relationships between organisational status and age, particularly in Consultant where age per se determines very closely an engineer's organisational, monetary and technical-professional status.[1] 1st Order partial correlations, controlling age, between an engineer's social and educational background characteristics and organisational status are significant only in National: higher school type

1. The curvilinear relationship between age and organisational status (Figure 9.5) would tend to increase correlations in Contractor and Public where the sample is predominantly young. However this would not explain differences in Table 9.6(a).

TABLE 9.6 THE EFFECTS OF AGE AND WORK EFFORT ON CAREER STATUS IN EACH COMPANY

(Table shows: (a) Pearson correlations between career status & 'manager' and age ; (b) 1st order partials between career status & manager and work effort, controlling for variations in age, in each of the six companies of the Engineer Survey.)

(a) Pearson correlations between age and career status in each of the companies below :-

	CAREER STATUS								MANAGER	
	Organisational		Monetary		Technical-scientific		Technical-professional			
	r	sig.	r	sig.	r	sig.	r	sig.	r	sig.
Consultant	.881	.001	.884	.001	.500	.005	.869	.001	.451	.010
Contractor	.537	.001	.596	.001	.131	*	.355	.014	.026	*
Northern	.570	.002	.763	.001	.534	.004	.140	*	.347	.050
Southern	.157	*	.354	*	.204	*	.322	*	.282	*
National	.603	.001	.608	.001	.302	.013	.287	.017	.272	.022
Public	.461	.006	.493	.003	.161	*	.085	*	-.088	*
ALL	.603	.001	.623	.001	.410	.001	.327	.001	.175	.007

(b) 1st Order Partial correlations between work effort and age-relative career status in each of the companies:-

	AGE-RELATIVE CAREER STATUS								MANAGER	
	Organisational		Monetary		Technical-scientific		Technical-professional			
	B	sig.	B	sig.	B	sig.	B	sig.	B	sig.
Consultant	-.183	*	.296	*	-.194	.043	.070	*	-.082	*
Contractor	.496	.001	.410	.007	.205	*	.464	.002	.183	*
Northern	.490	.017	.244	*	.144	*	-.018	*	.460	.027
Southern	.319	*	-.090	*	-.321	*	-.141	*	.146	*
National	.059	*	.011	*	.210	*	.337	.008	-.203	*
Public	.433	.012	.102	*	-.074	*	.059	*	.058	*
ALL	.258	.001	.194	.005	.017	*	.062	*	.112	*

correlating positively with higher status (B=.329; p=.010). Multiple regression analysis within each company also indicates that, after age, 'manager' has a significant relationship with organisational status only in Northern and National. From the pattern of organisational status in each company, the following inferences may thus be made about the factors influencing this status parameter:

Infered bases of Organisational Status

CONSULTANT	Age
CONTRACTOR	Age, work effort
NORTHERN	Age, work effort, manager
SOUTHERN	?
NATIONAL	Age, education, manager
PUBLIC	Age, work effort

In most companies age strongly determines the engineers' organisational status; in Northern and National being a manager makes some difference, although only in the former is this in turn related to differences in work effort (Table 9.6b). In Southern neither age, work effort nor 'background' characteristics seem to influence organisational status and it is thus difficult to infer on what basis promotions arise: "ability" cannot reliabilty be measured here, and certainly it may well be that this affects organisational status; on the other hand, it may be that promotions are fairly arbitary and that personal connections have some bearing on them. This is supported by the responses to ESQ:50b, asking men which qualities they thought were most important in getting promotion in their companies. 39% in Southern selected "HAVING GOOD CONTACTS" as 1st or 2nd most important, a proportion only exceded

in Northern (44%) (See Appendix IVa.i).

In Contractor, Northern, and Public the above results are consistent with "closure" of the Career Development Model; ie, that a higher work effort will lead to promotion in these companies.[1] As indicated in the Model, such differences may arise through differences in the company Career Systems. Descriptions of such Career Systems are given in Appendix IV for each company. Following the discussion of Section 3.2.4 these comprise the structural and processual attributes regulating the engineers' status and situs mobility within the company and across its boundaries. While many of these differences between companies might in principle influence "closure", for which there is no way of establishing analytical controls for a sample of six, a number of links may be identified directly, connecting the level of work effort with organisational status in each company, representing the "promotion system". Thus "closure" would seem to require that work effort be reflected in work results, that the individual's work results may be assessed in some way, forming the basis of promotion selection, and that promotion opportunities appear

1. In practice there is likely to be some time lag between the achieving of promotion and the effort put into work. Thus, eg, a person may work hard and gain promotion but subsequently reduce their work load. On cross-sectional computation, lack of significant correlation between PCS and age-relative organisational status would not actually represent non-closure. The inference from cross-sectional data is thus valid only insofar as there is stability in work effort over time. For the sort of time period involved this assumption is probably reasonable. Also see Figures 7.3 & 7.4. and the later analysis in Chapter 10.

attractive and realisable. Descriptions of the company"promotion systems" are given in Appendix IVb and summarised in Table 9.7. The one factor which most consistently reflects differences between the companies is the different type of work predominant therein, from which inferences about the link between work effort and work results are made. For those in RD & D it is thought likely that work effort will not strongly affect performance, good results depending more upon "ability". For those in Operations or Services it seems likely that work effort will influence performance rather more, results depending upon the "quantity" rather more than the "quality" of the work as it were. Whether or not this interpretation is valid, differences between those in RD & D and other engineers certainly reflect this position:

1st Order Partial correlations between work effort and organisational status, controlling for age:

	B	Sig.
RD & D	.038	.372
Others	.386	.001

Thus,for those engineers in RD & D,work effort has no apparent influence on promotion; for others however,results are consistent with the supposition that it has. Almost identical results are found if the "closure" and "non-closure" companies are examined (B=.372,p=.001; B=.032;p= *, respectively), the actual members in these groups being largely similar (Table 6.2).

TABLE 9.7 CHARACTERISTICS OF COMPANY PROMOTION SYSTEMS

(For details see Appendix IVb)

Companies	Companies with 'closure'			Companies without 'closure'		
	CONTRACTOR	NORTHERN	PUBLIC	CONSULTANT	SOUTHERN	NATIONAL
Promotion opportunities: (as estimated from Appendix IVa.i)	Good	Good	Poor	Medium	Good	Poor
Attractiveness of successive promotions: (as estimated from mean responsibility-agegroup profile, Figure 9.5)	Medium	Good	Medium	Good	Poor	Medium
Extent to which work results depend directly upon hard work: as infered from % not in RD & D. (% not in RD & D)	High (100%) ◀	Medium (65%) ◀	High (97%) ◀	low (15%)	Low (17%)	Low (24%)
Extent to which work results formally linked to promotions: (as given by formality of promotion system; Appendix IVb.)	Medium	Medium	High	Low	Medium	High

Thus,for the sample as a whole,while organisational status is strongly related to the engineer's age, branch of engineering and being a manager, differences in the level of work effort have relatively small effect, "closure" occuring for engineers in Operations and Services. The other three parameters of career status do not show significant relationships with work effort across the sample, although in Contractor variations in monetary status are related to work effort.

In general, the engineers' career status is not strongly affected by variations in their work effort. To quite a large extent it is 'institutionally' determined. Most engineers experience steady increases in career status with age; a judicious selection of company and branch and the undertaking of management work having most effect on status increments beyond the influence of age. Only for those engineers working outside RD & D are results consistent with "closure" of the Career Development Model; those engineers of higher organisational status for their age, tending to have a higher work effort.

In the following chapter, this relationship is considered further, as longitudinal developments over the career are assessed. Prior to this however,it is a convenient point in the thesis, now that each individual aspect of the Career Development Model has been examined separately, to summarise the main results thus far.

9.5 Summary of Results

- Two dimensions of work involvement can be identified; work effort and work centrality. While the former appears to be strongly influenced by a number of factors related to work and the career, the origins of the latter seem to derive from non-work factors, although the prediction of this variable is not strong.

- Work effort is strongly related to two orthogonal variables: job satisfaction and PCS. Job satisfaction seems to depend primarily upon how well the engineer feels his skills and capacities are being utilised, which in turn may be traced to certain characteristics of the work situation and his approach to it; because engineers feel more satisfied, their work effort tends to be greater.

- While PCS is also strongly related to work effort, upholding the consistency of the Involvement Hypothesis, causal inferences are less viable. However contrary to the Involvement Model, the sense of work-based self-esteem does not mediate the relationship.

- Contingent analysis within the sample is largely consistent with the PCS Hypothesis in its prediction of variations in PCS.

- Those engineers of higher organisational, monetary and technical-scientific status have higher PCS; for a given level of career status, those of lower social and educational background also tend to have a higher PCS. Since career goals prior to employment vary across such categories, the results are consistent with the hypothesis that PCS depends upon the extent to which achieved career status meets prior career goals. The stronger correlations between career status and PCS in more prestigious background categories suggests a "saturation" effect may occur as prior goals are fulfilled, entailing a non-linear function to the relationship.

- While organisational status provides the main criteria of success for the sample as a whole, only for those of above average organisational orientation does PCS correlate significantly with variations in age-relative organisational status. Across three different types of career orientation, three different types of career status correlate most strongly with PCS, thus emphasising the saliency effect. For organisational and monetary status, it is relative to engineers of a similar age that PCS is derived.

- For the civil engineers and those employed by Public there is also some indication that career status is evaluated within narrower comparative reference groups than those used by other groups in the sample.

- The determinants of career goals and orientations appear to be generally consistent with the postulated Career Development Model: those of higher PCS tend to have higher organisational goals and orientations and higher monetary goals. Relationships with a number of social and educational background characteristics and variations between companies suggest socialisation processes complement these relationships. In addition, older engineers have lower organisational and monetary and higher technical goals and orientations than younger ones, results not anticipated in the Career Development Model.

- Analysis of the jobs found by 3rd Year engineering students at Imperial College indicates that differences in career goals and orientations appear to influence the types of work chosen by the students within the constraints of their engineering branch, thus providing illustration of career choice that is consistent with the Career Development Model in the one instance.

- The engineers' career status is strongly influenced by their age, company, branch and by whether or not they are a manager. Several aspects of social and educational background also have weak relationships with career status. This strong 'institutional' determinism suggests that other differences between individual engineers have a rather weak influence on their career status.

- Work effort has a small direct relationship with organisational status for the sample as a whole, providing some evidence of "closure" to the postulated Career Development Model. In fact this arises only in three companies: Contractor, Northern, and Public. Examination of various differences in the Career Systems of these companies, focusing on their promotion systems and the links between work effort and organisational status, suggests that differences in the type of work prevalent in these companies are responsible for this variation. Indeed, for engineers working in RD & D, work effort and age-relative organisational status are unrelated; for others there is a fairly strong relationship.

CHAPTER TEN

THE TEMPORAL CAREER

Tempus edax rerum.

Ovid;
Metamorphoses.

10.1 Circularity in the Career Development Model

In the previous three chapters, analysis has concentrated on particular facets of the Career Development Model, testing the consistency of the postulated relationships at one moment in time, and making further interpretations where possible within the limitations of cross-sectional data. In the main, the results thus reported are largely consistent with the various hypotheses, even though in most instances additional explanations are needed to account for relationships in the linear analyses.

As discussed in Chapter 7, two facets of the work involvement concept may be distinguished - work effort and work centrality - which seem to arise from rather different origins. While variations in work centrality are not well predicted by elements of the Analytical Framework, and appear if anything to be influenced by factors external to the work-place, variations in work effort are strongly accounted for by differences in job satisfaction and PCS. This latter result thus upholds the consistency of the Involvement Hypothesis. However

the relationship between PCS and work effort is not mediated by the sense of work-based self-esteem, which would arise, it was postulated, from feelings of career success. Possibly this is due to inadequate measurement, possibly because of the wider origins of the sense of self-esteem. In any event, while there is some basis for arguing that job satisfaction operates as a determinant of the level of work effort, this is not the case with the PCS relationship, which can only be considered in associative terms with the data at hand.

Looking at the bases of such feelings of career success in Chapter 8, the results illustrate the subjective interpretation of career status from which PCS arises. This interpretation is influenced by differences in the engineers' social and educational background, by the saliency currently attributed to different kinds of career status, and by membership in particular career situs. Infering differences in prior career goals from such background categories, and the operation of comparative reference groups from the pattern of PCS-career status correlations in different career situs, these results support the three parts of the PCS Hypothesis. The types of achieved career status involved in this subjective evaluation thus vary from person to person, although organisational status (based upon a level of responsibility score) is typically most germane for the engineers as a whole, with assessments being made against those of a similar age in deriving a sense of career success.

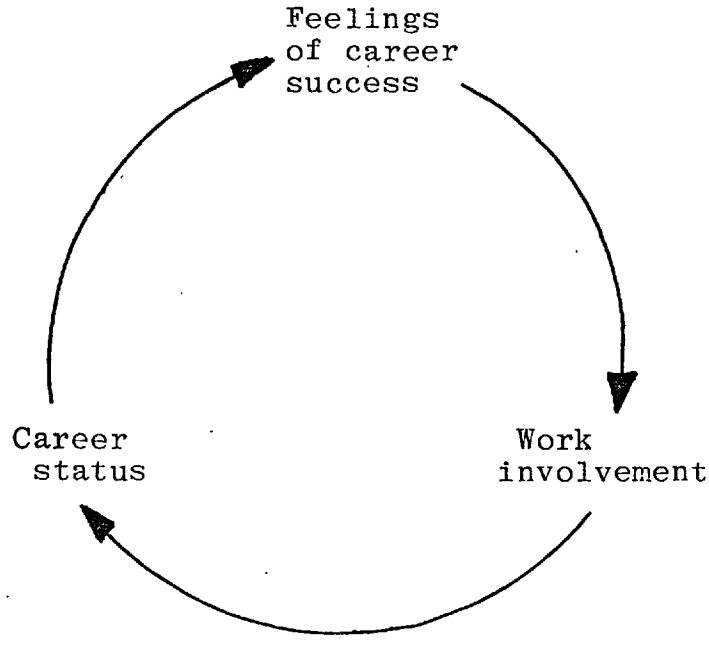
Analysis of the factors related to career status in Chapter 9, indicates that a greater level of work effort is associated with a higher level of organisational status relative to other engineers of a similar age. However this relationship is quite weak, with career status being 'institutionally' determined to a large degree by the engineers' age and career situs. Nonetheless, this result is consistent with "closure" in the Career Development Model.

Apart from the absence of the mediating effect of work-based self-esteem, individual facets of the Career Development Model thus appear to be related to each other in a manner consistent with its hypotheses. In several cases, relationships are perhaps weaker than anticipated and additional factors warrant consideration. And since they are based upon associations observed at one moment in time, in most instances there is little justification for infering the direction of causality. Nonetheless, it is clear from the above results, that while PCS is influenced by variations in organisational status, work effort is related to variations in PCS, and differences in work effort are also related to the level of organisational status. These three factors thus seem to represent an essential 'core' of the Career Development Model.

In its barest form, the circular relationships suggested in the Career Development Model are illustrated in Figure 10.1(a). This postulates that increases in career status (fulfilling prior career goals) will enhance

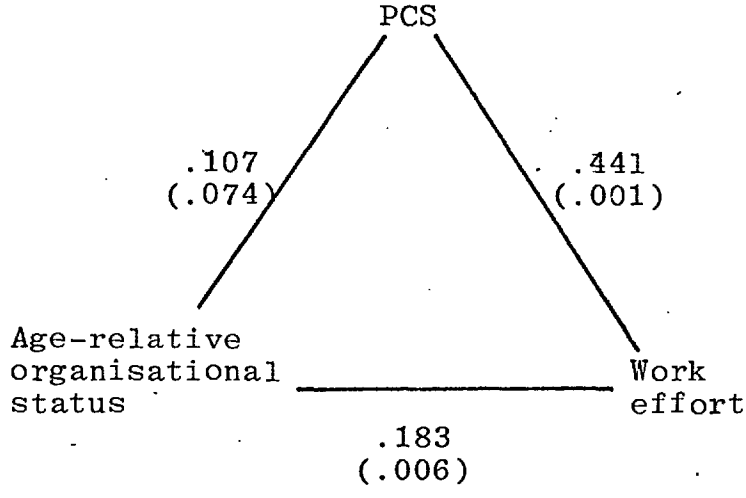
FIGURE 10.1 CIRCULARITY OF THE CAREER DEVELOPMENT MODEL

(a) Postulated circularity



(b) Relationships in the Engineer Survey

(Figure shows 2nd order partial correlations, controlling age and the other variable between pairs.)



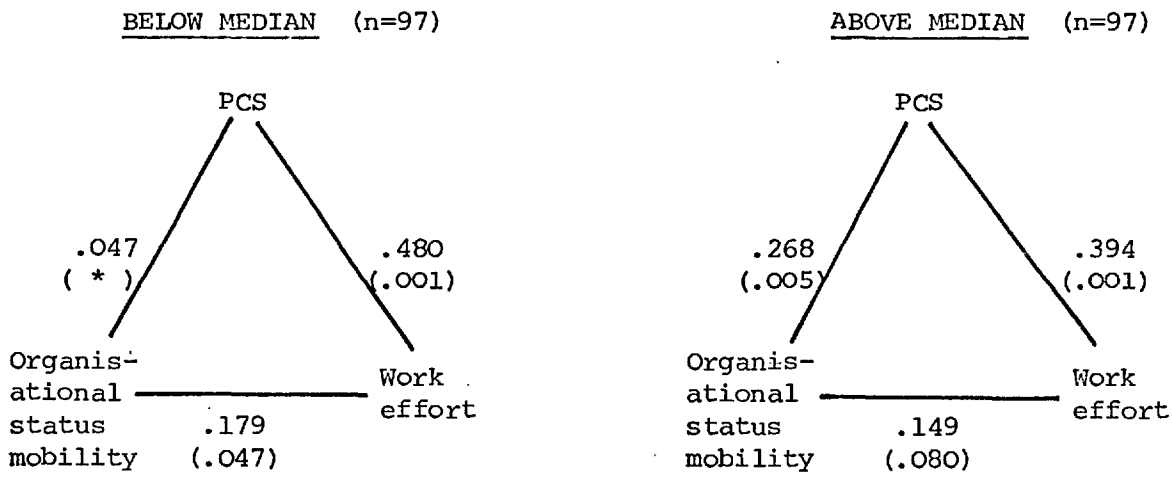
feelings of career success, increase work involvement and lead to higher career status. Below this diagram, in Figure 10.1(b), are the partial correlations found in the Engineer Survey between PCS, work effort, and age-relative organisational status. As the previous three chapters have shown, each of these parameters are related to other variables, and as such additional factors are likely to have some influence upon them. However the inter-relationships found between these parameters in the linear analyses suggests that some circularity may be involved.

In Figure 10.1(b) partial correlations are shown between pairs of variables, with the effects of the third controlled. In fact, these are 2nd Order partials because the influence of age is also controlled to give "age-relative organisational status" from the absolute parameter. For convenience, this is refered to as organisational status mobility in subsequent use here (eg, Section 7.3). These correlations are in fact consistent with the circular relationships postulated in Figure 10.1(a) above: higher PCS being associated with higher work effort and a higher organisational status mobility. At the 5% level, the partial correlation between PCS and organisational status mobility is not significant, apparently because of the subjective basis of PCS indicated in Chapter 8. However if the analysis is repeated for those above and below the median value of organisational career orientations, then the results shown in Figure 10.2(a) are produced. The effect of saliency is very distinctive; only for

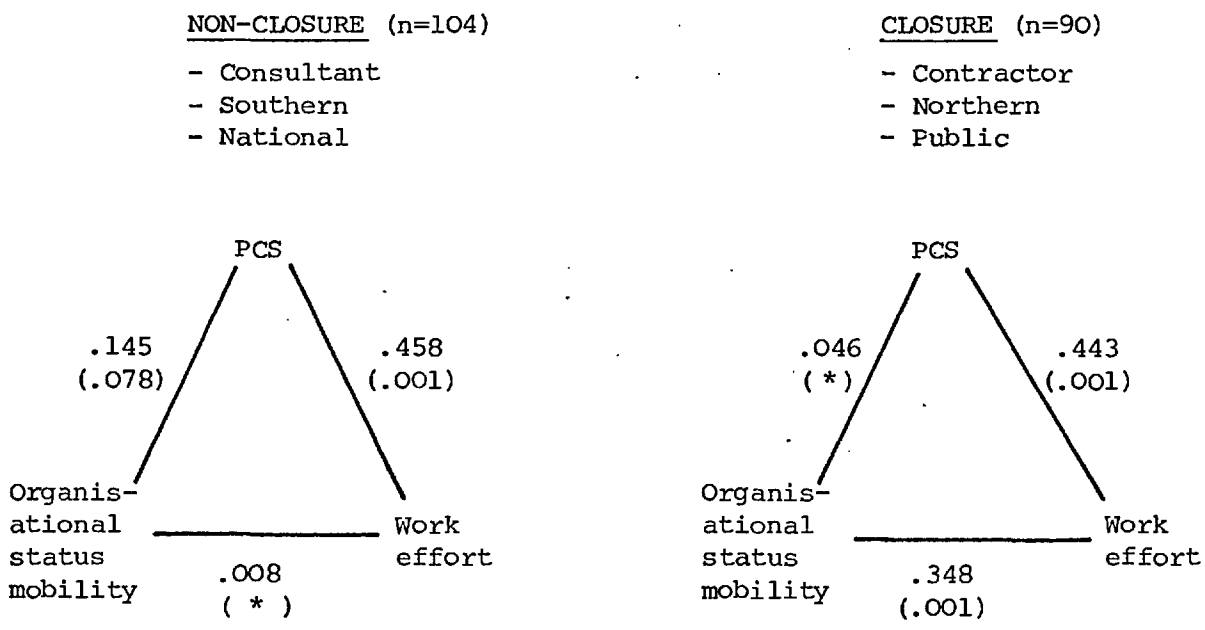
FIGURE 10.2 VARIATIONS IN 'CIRCULARITY' IN THE ENGINEER SURVEY

(Figures show 2nd Order partials, controlling for age - to give age-relative organisational status - and the third variable for correlations between the other two in each category shown.)

(a) Due to organisational career orientations:



(b) Due to "Closure":



those engineers of above average organisational orientation is there a significant relationship between PCS and organisational status mobility, with the other two correlations showing a slight diminution.

The analysis in Section 9.4 has indicated that only in Contractor, Northern and Public is there "closure" of the Career Development Model, with work effort and organisational status mobility being significantly related. As such, Figure 10.2(b) repeats the partial correlations of Figure 10.1(b) in each of these two groups of companies. As in the linear analysis, the difference between "closure" and "non-closure" remains distinct, with a slight reduction in PCS-organisational status mobility correlations occurring in the latter case. However, work effort and PCS remain strongly related, irrespective of whether or not work effort leads to higher organisational status; this provides an indication of the rather close relationship between these two parameters.

The results shown in Figures 10.1(b) and 10.2 are consistent with the circular model postulated in Figure 10.1(a), and indicate the contingent basis of two of the relationships. However, they offer no justification for infering the directions in which they may operate. While there is some logical basis for supposing that PCS is dependent upon organisational status mobility, this is not so for the other relationships, and a longitudinal study is need to provide analytical verification of the circular pattern.

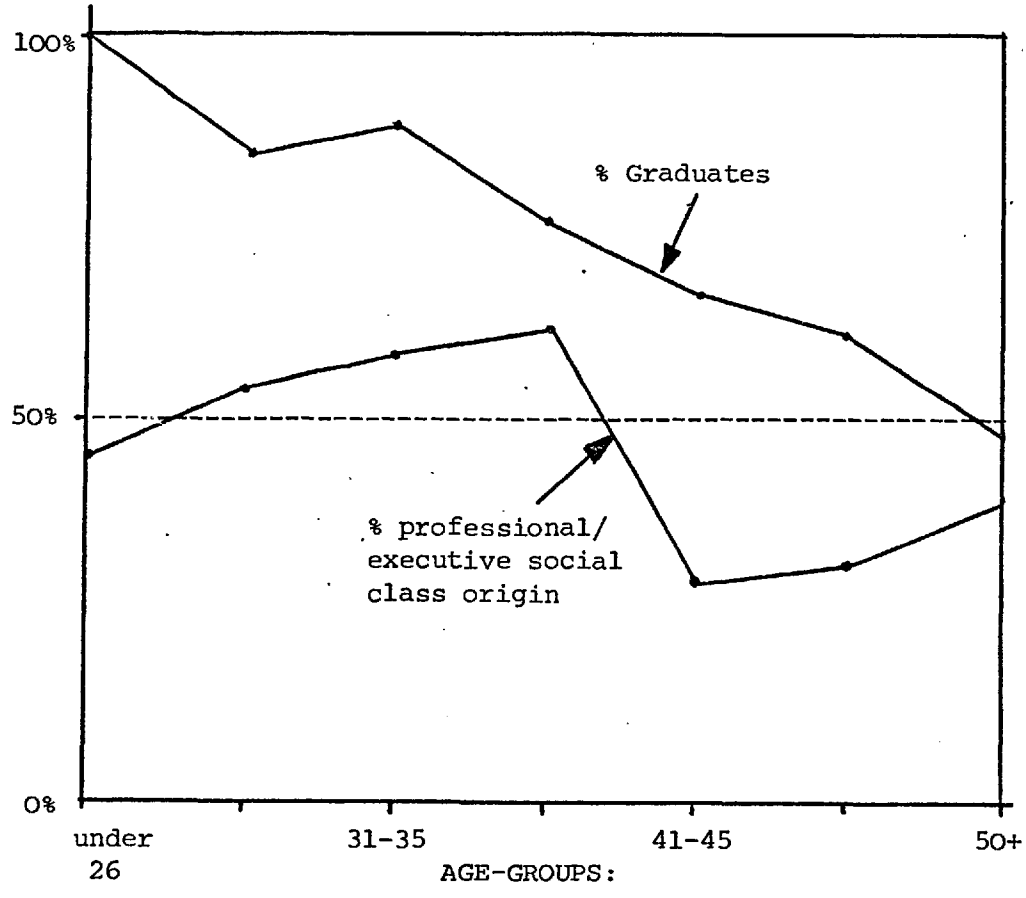
10.2 Longitudinal speculation

By making the 'heroic' assumption of longitudinality, illustration of this circularity is in fact possible. Computing mean values of particular characteristics within 5-year age cohorts (Appendix IIc), it is assumed for this purpose that cross-sectional differences in these characteristics between groups can be taken as representing developments in one group over time.

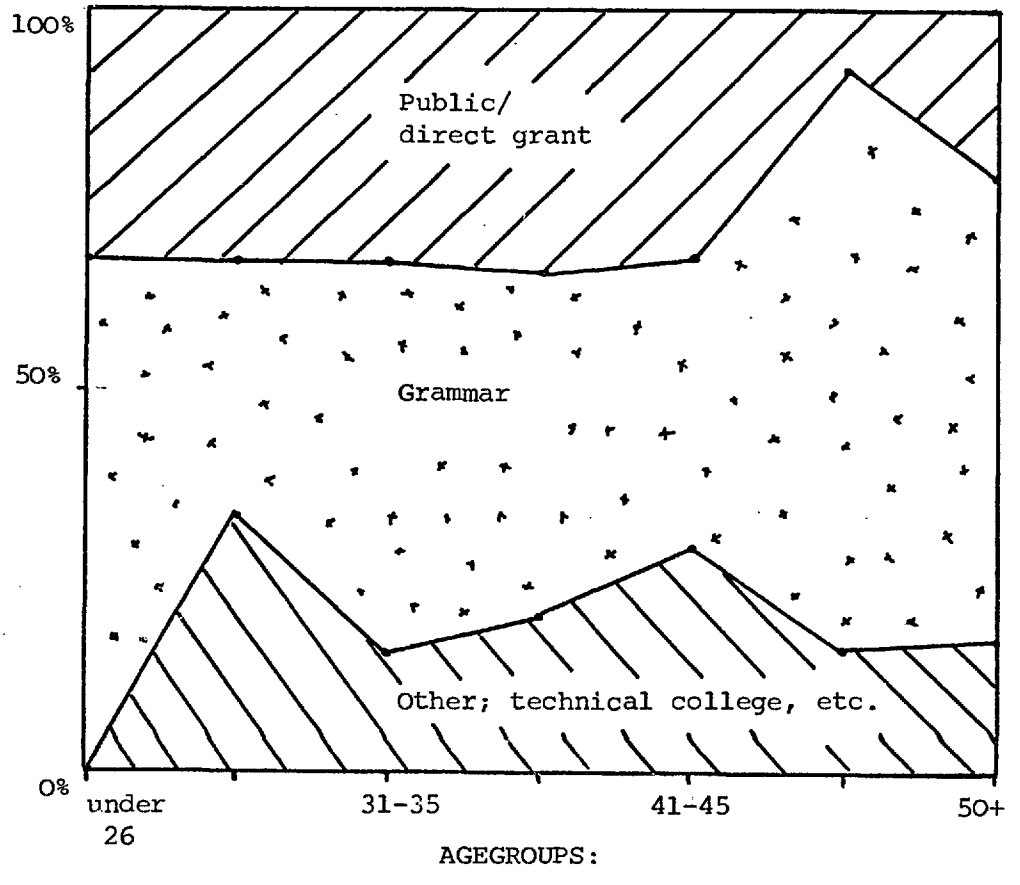
Such inferences are notoriously suspect (eg, Roos, 1978). Milkovich et al (1976) have suggested that longitudinal developments will be influenced by changes in "individual", "organisational", and "environmental" parameters, all of which must be constant for inferences from cross-sectional data to be valid. However it is unlikely that the social, political or economic "environment" of engineering is the same today as it was 20 or 30 years ago (eg, Davies 1978, Valery,1977), and different historical experiences may have a marked influence over an engineer's work attitudes and the development of his career (cf, Chapter 5). Similarly the "organisational" characteristics facing professional engineers have probably undergone some change (eg, Burns, 1977; Howie, 1977). Surprisingly however, there is some limited evidence, at least for the engineers in the sample, that "individual" features may not have altered substantially over the years spanned by the group. Figure 10.3 shows the different social and educational backgrounds across each of the age-groups. While younger engineers are much more likely to be graduates

FIGURE 10.3 VARIATIONS IN SOCIAL AND EDUCATIONAL BACKGROUND WITH AGE:

(a) Social class origins and education levels:



(b) Type of school attended:



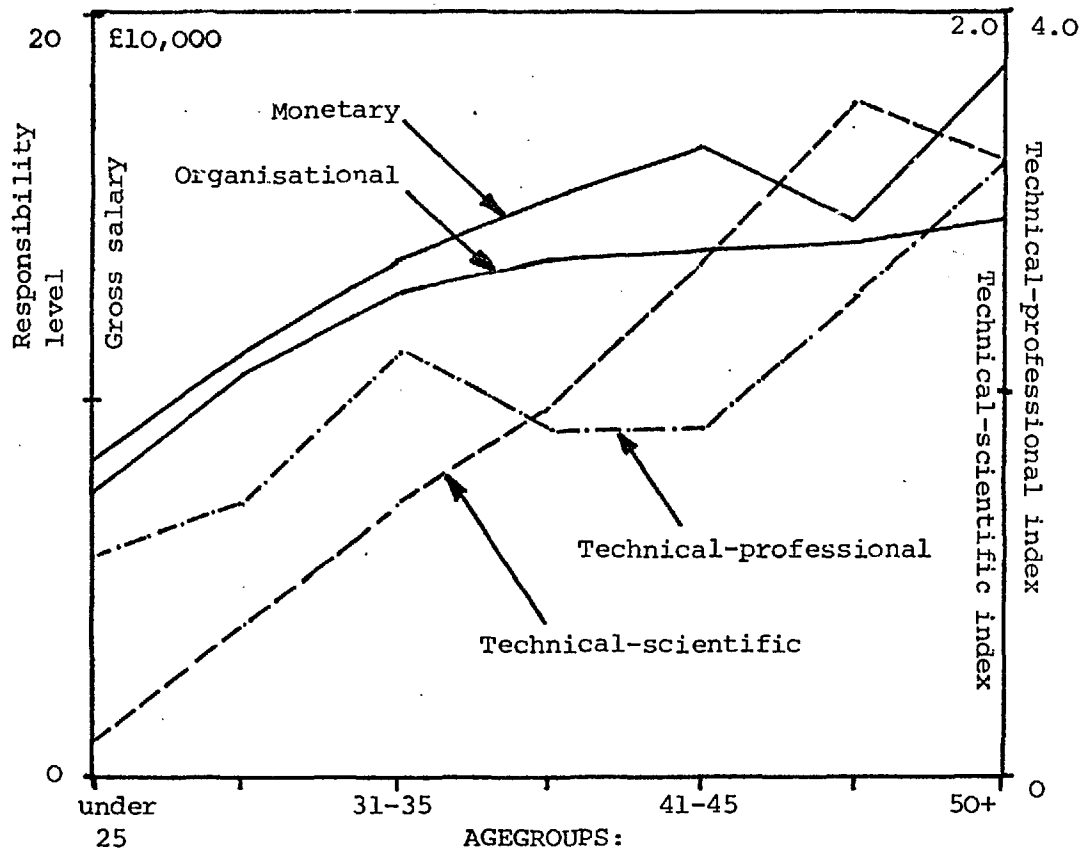
(Section 6.2), the composition of social class and school-type origins have undergone relatively limited changes, suggesting that the 'social mix' of the profession may not have altered substantially over this period. While this result augers well for the longitudinality assumption, it is clearly insufficient to provide any rigorous justification, and the assumption must be considered purely speculative, to be employed in this present context alone.

On this basis, age-profiles of "structural" and "attitudinal" career developments are drawn up in Figures 10.4, 10.5 & 10.7 for the seven 5-year age groups.

Figure 10.4(a) shows the age-profiles of mean career status for each of the dimensions. Organisational status increases steadily for the first three groups then begins to "plateau", a result observed by Kopelman et al (1971) for a sample of American professional engineers. Monetary status in contrast continues to increase steadily with age (cf. CEI,1977), although the small 46-50 age-group is an exception. Mean technical-scientific status increases almost linearly but in no group does the average excede the index value of 2.0, equivalent to one patent or more than one publication. The technical-professional index shows that on average most engineers gain (the equivalent of) corporate Institutional membership early in their careers, although only for those over 45 does the index rise further; 23 engineers in fact holding Institutional Fellowships.

FIGURE 10.4 VARIATIONS IN STATUS AND SITUS MOBILITY WITH AGE:

(a) Mean career status:



(b) Median career situs mobility:

(Number of different situs categories worked in, including present.)

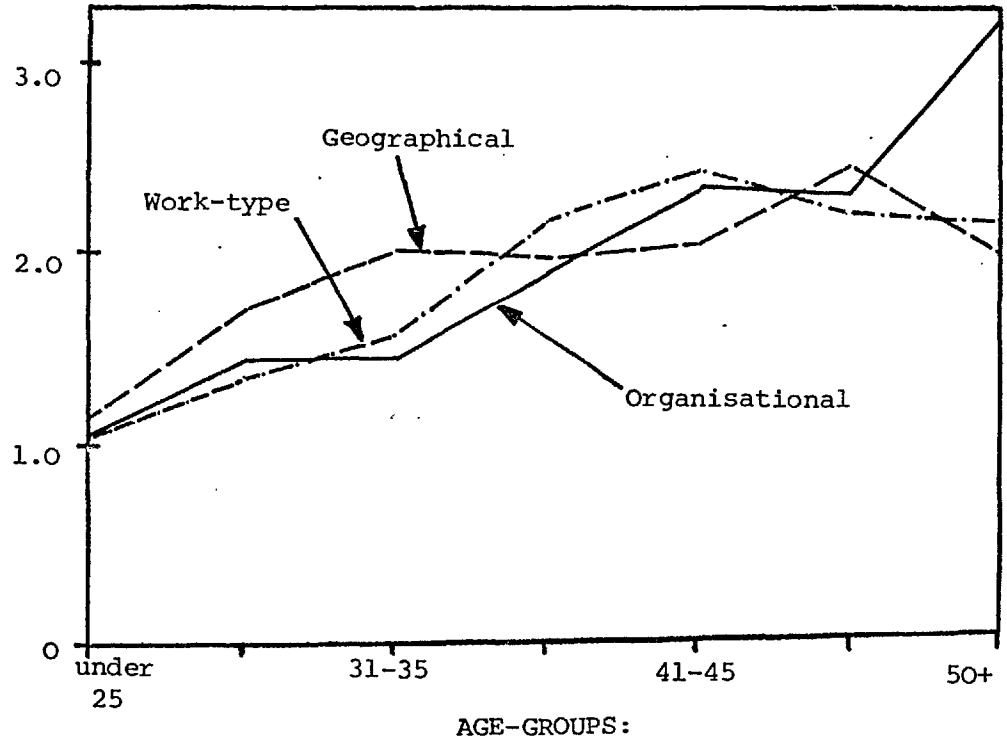


Figure 10.4(b) shows the median organisational, geographical, and work-type mobility across the seven age-groups. While all increase with age, these average values remain very low: only by the 41-45 age-group, for instance, have the engineers on average worked in over 2 organisations, including their present, and only for those over 50 does this reach 3. These results are similar to those found in the EITB survey reported in Section 5.4 (Venning,1975:110).

The changes in mean work effort and work centrality with age have been described in Section 7.2, both remaining fairly stable over the age-groups, but with a slight increasing trend. In contrast, the mean level of PCS, shown in Figure 10.5, exhibits a weak 'cyclical' profile, rising to a peak in the 26-30 age-group, falling to a minimum in mid-career (41-45 age-group), and rising to match its former maximum late in the career.[1]

With these profiles giving a perspective to career developments, Figure 10.6 repeats the partial correlations between PCS, work effort, and organisational status mobility in each of the 5-year age-groups. All values are given in the accompanying summary table, but for clarity only relationships significant at the 5% level are joined by lines in the figures. The results are remarkable: for those under 26 years old, only PCS and organisational status are significantly related and quite strongly so; in the next age-group it is PCS and work effort; in the third, work effort and organisational status mobility are related, as are organisational status mobility and PCS; in the fourth,

---

1. The trend is not strong, since the graph boundaries represent ± 1 sample standard deviation; differences between peaks and and troughs do not produce a significant 't' statistic.

FIGURE 10.5 VARIATIONS IN MEAN PCS WITH AGE

(Graph shows mean value of PCS computed in each 5 year age-group, and normalised for the whole sample; ie, boundaries of graph represent ± 1 sample-wide standard deviation in PCS.)

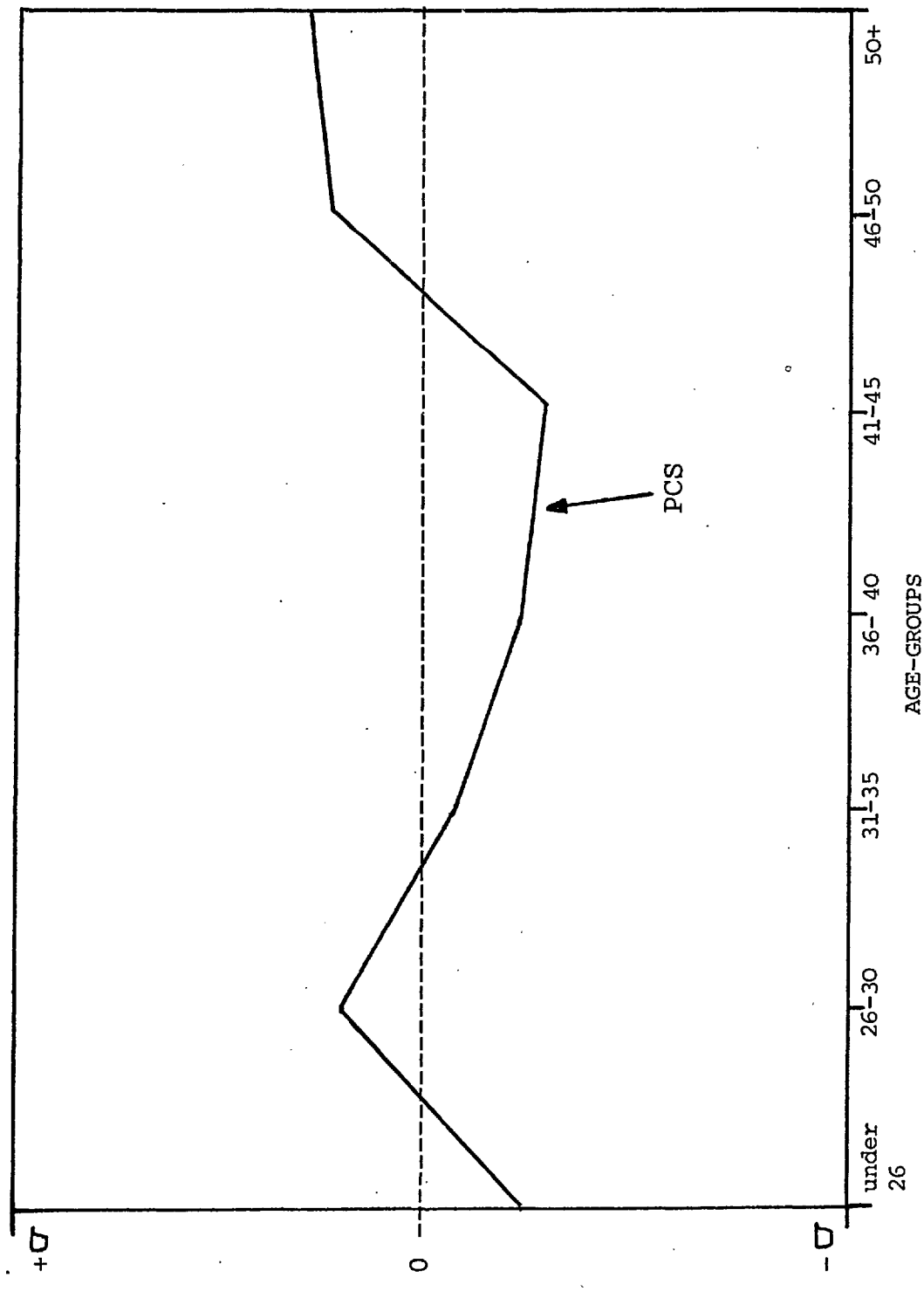
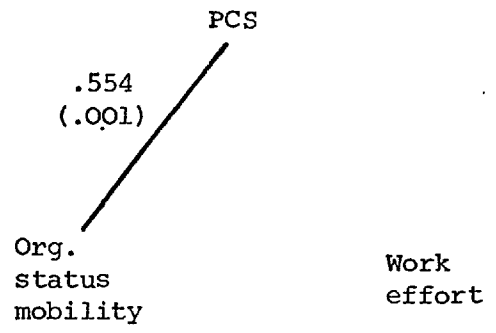


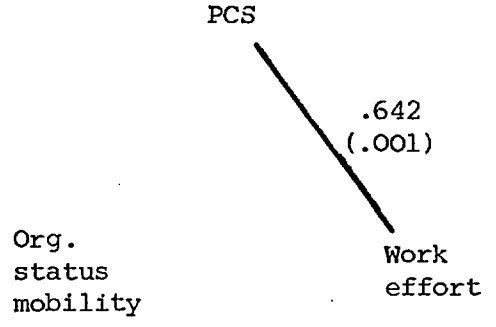
FIGURE 10.6 THE CAREER CYCLE

(Figures show significant partials between PCS, work effort, and organisational status mobility (age-relative organisational status) in each of the seven 5-year age-groups.)

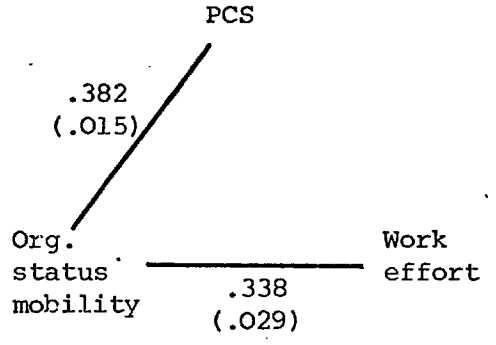
i. Under 26
(n=30)



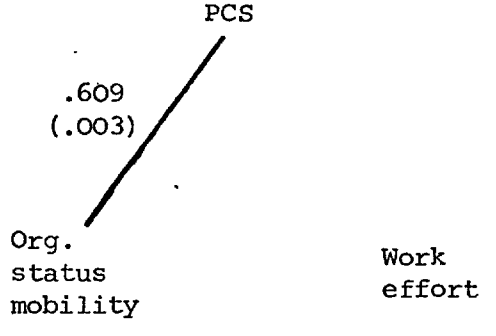
ii. 26-30
(n=52)



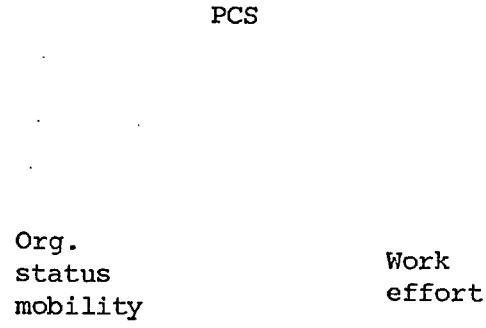
iii. 31-35
(n=34)



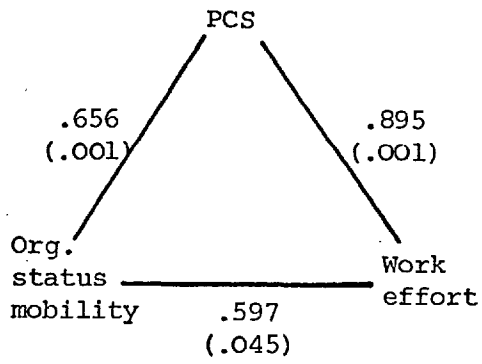
iv. 36-40
(n=21)



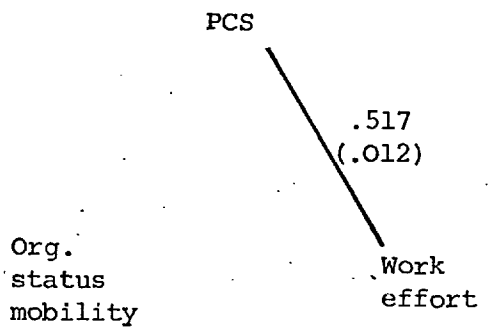
v. 41-45
(n=21)



vi. 46-50
(n=13)



vii. Over 50
(n=23)



Summary Table:

AGE GROUPS	N	PARTIAL CORRELATIONS[1]					
		a - b		b - c		c - a	
		B	sig.	B	sig.	B	sig.
Under 26	30	.554	.001	.248	.106	.177	.189
26 - 30	52	.099	.249	.642	.001	-.010	.474
31 - 35	34	.382	.015	.017	.464	.338	.029
36 - 40	21	.609	.003	-.061	.402	.282	.011
41 - 45	21	.145	.282	.353	.075	.159	.264
46 - 50	13	.656	.028	.895	.001	.597	.045
Over 50	23	-.050	.420	.517	.012	.297	.109
ALL	194	.107	.074	.441	.001	.183	.006

1. Abbreviations: a - Organisational status mobility
b - PCS
c - Work effort

organisational status mobility and PCS are related, again as in the first group quite strongly. In the fifth age-group no relationships are significant, in the sixth all are, and in the seventh just PCS and work effort are significantly related.

For the engineers under 26 years old, it thus appears that variations in their organisational status have a large influence over PCS; possibly because at this age the engineers feel very conscious about small differences with their contemporaries. In the 26-30 year age-group, most engineers have experienced fairly substantial rises in organisational status (Figure 10.4(a)) and mean PCS is high (Figure 10.5); perhaps this is why the two factors do not correlate significantly in this group, although PCS and work effort do show a strong inter-relationship. Only in the third age-group, however, are variations in work effort related to those in organisational status mobility; perhaps because promotions earlier than this are more 'institutionally' determined , but by this age further distinguishing criteria come to be applied. In the 36-40 age-group, however, this effect disappears, although PCS is again strongly influenced by differences in organisational status mobility. The partial correlations over these age-groups thus appear to form a 'cyclical' pattern, terminating in the 41-45 age-group in which no relationships are significant.

The 'clockwise' rotation of these significant partial correlations appears to reflect the direction of relationships postulated in Figure 10.1(a). The speculative nature of the longitudinal assumption precludes all but the most tentative inferences, and indeed within each age-group correlations

still imply associative relationships. Nevertheless it is tempting to infer that in the under 26 age-group differences in organisational status mobility influence PCS; in the next, PCS influences work effort; in the third differences in work effort become reflected in organisational status mobility, which in turn influences PCS in the 31-35 and 36-40 age-groups. Insofar as this circularity follows a temporal pattern, some basis for causal inferences between the three variables is thus suggested. This has important implications; for the first time in the thesis are there grounds for arguing that PCS is a determinant of work effort, rather than simply an associative factor; in other words, that because some engineers feel more successful in their careers than others, they will tend to work harder. Furthermore, the cycle of relationships between organisational status mobility, PCS, and work effort appears to be a long one; in Figure 10.6 it is over four age-groups - some 20 years - that this is completed.

In fact, the final two age-groups, for engineers over 46 years old, do not seem to continue this cyclical trend, although as the 46-50 age-group contains only 13 men, inferences from the analysis must be cautious. It would however hardly be surprising if, with retirement approaching and future career achievements enevitably limited, the pattern of relationships was different; certainly the motivational aspects of the Career Development Model concerning career goal fulfillment seem likely to be less effective, although in both groups correlations between PCS and work effort do remain significant.

In the 41-45 age-group no relationships between the three variables are significant. After the 'cyclical' results observed in the previous four, this period thus appears to mark a point of some transition. The age-profiles of mean career goals and orientations, drawn up in Figure 10.7, also show certain discontinuities between this group and the next: organisational and monetary orientations tend to drop, monetary goals drop sharply, while technical goals and orientations tend to rise. It is possible that this period could thus represent a "mid-career crisis" for the engineers, as described in Section 3.4.4, although perhaps the former age-group (36-40) would correspond more closely to the "crisis" period identified by Jaques (1965) for "artists" and Levinson (1969) for managers. In fact for the engineers there are some indications that the 36-40 period is one of "re-examination" (Hall,1977:80). Correlations between PCS and organisational status mobility are very strong for this age-group (Figure 10.6), but perhaps more significantly the following pattern of correlations are observed between the work effort and work centrality indices:

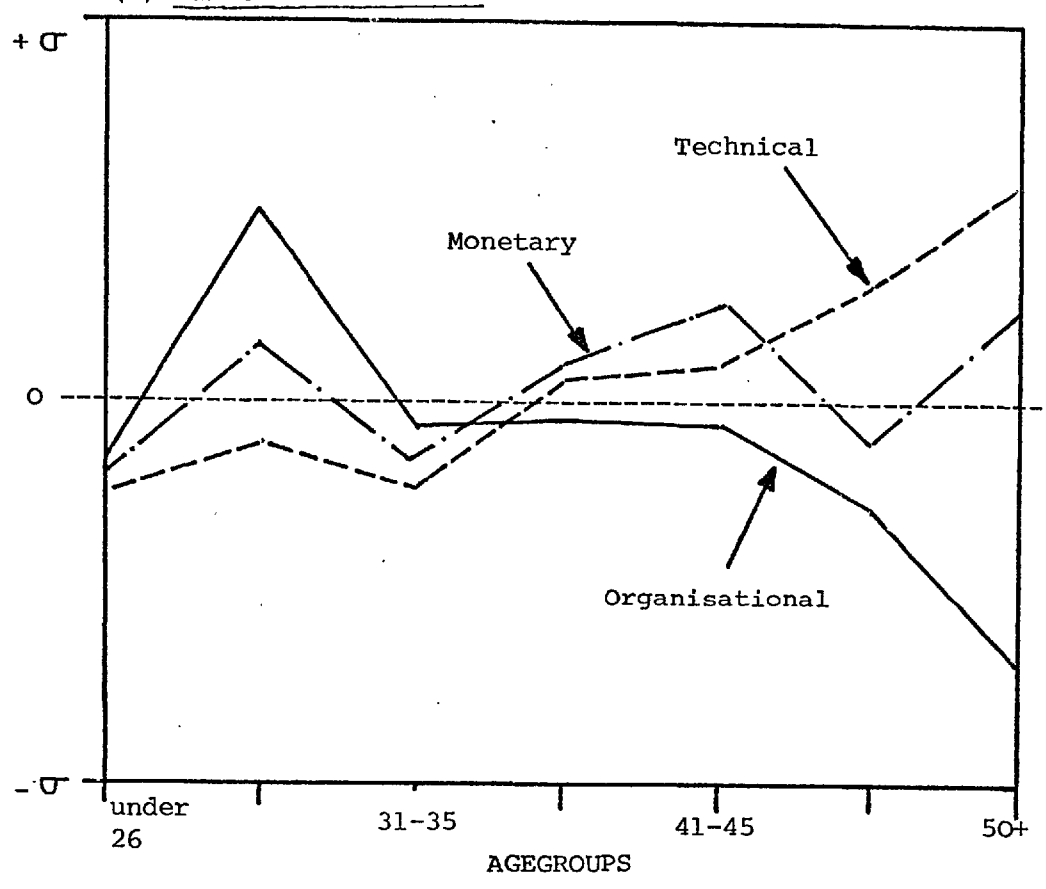
Pearson Correlations between work effort and work centrality indices in each age-group.

Age-group	r	sig.
Under 26	.529	.001
26-30	-.020	*
31-35	.076	*
36-40	.592	.003
41-45	.128	*
46-50	-.163	*
Over 50	.662	.001
ALL	.253	.001

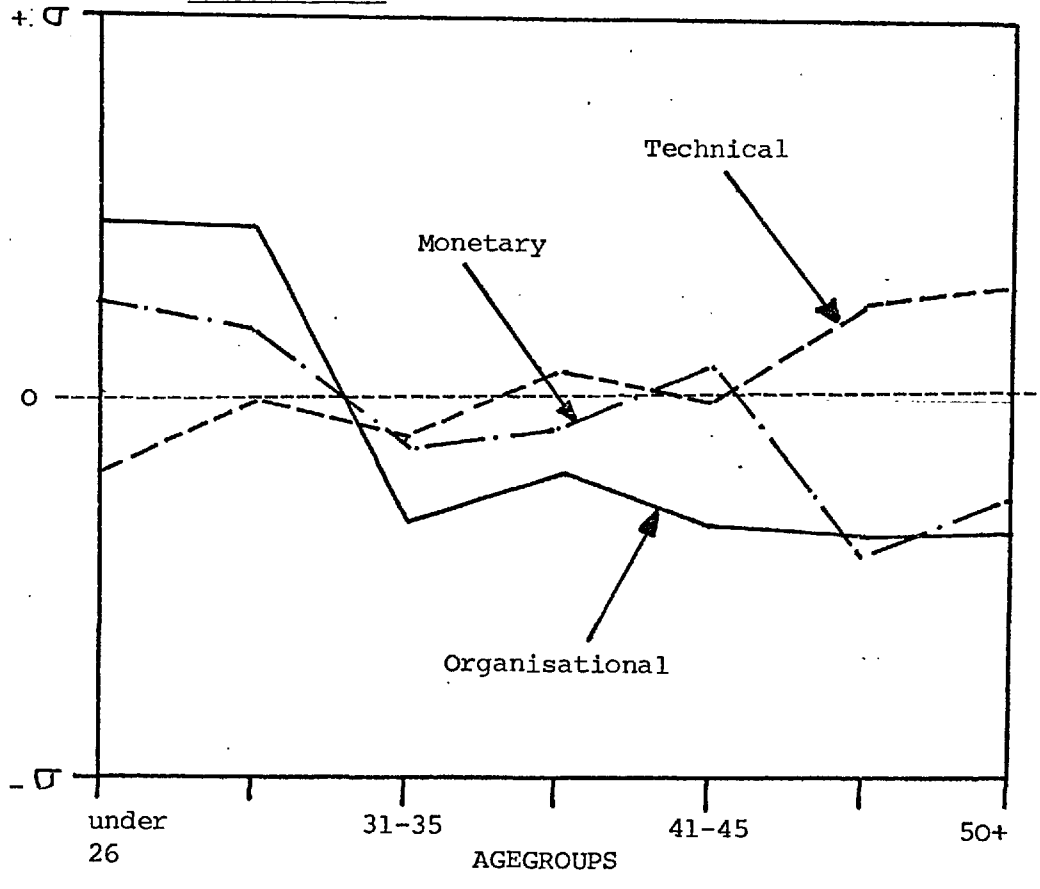
FIGURE 10.7 VARIATIONS IN CAREER ATTITUDES WITH AGE

(Graphs show mean values of career goals and orientations in each 5 year age-group, normalised across sample as a whole.)

(a) Career orientations:



(b) Career goals:



Given the proximity of the under 26 and over 50 age-groups to employment entry and retirement respectively, it is perhaps understandable that work effort and centrality should be strongly related, as features of life outside work come to influence behaviour within. For the 36-40 age-group however it may be that some re-assessment of the relative position of work and non-work spheres is taking place, such that aspects of life outside work are interacting more strongly with those in the work-place, giving rise to the strong inter-correlation of the two indices.

The interpretation must remain hypothetical however; the 41-45 age-group does appear to mark a certain transitition, but whether or not it is a time of "crisis" is difficult to say. There is no abrupt change in situs mobility over this time to support the contention (Figure 10.3), although of course the sample only considers men still working in engineering. It may be that others for whom there is some "crisis" choose to leave engineering altogether. Indeed the rise in technical goals and orientations after this period might only reflect such moves, as persons with high organisational orientations leave and high technical orientations and goals stay in the occupation (eg, Section 9.3). However the Engineer Survey data cannot resolve this question and there appears an absence of evidence elsewhere.

The age-profile of mean organisational goals in Figure 10.7 shows a different trend to the other career attitudes in dropping sharply between the 26-30 and 31-35

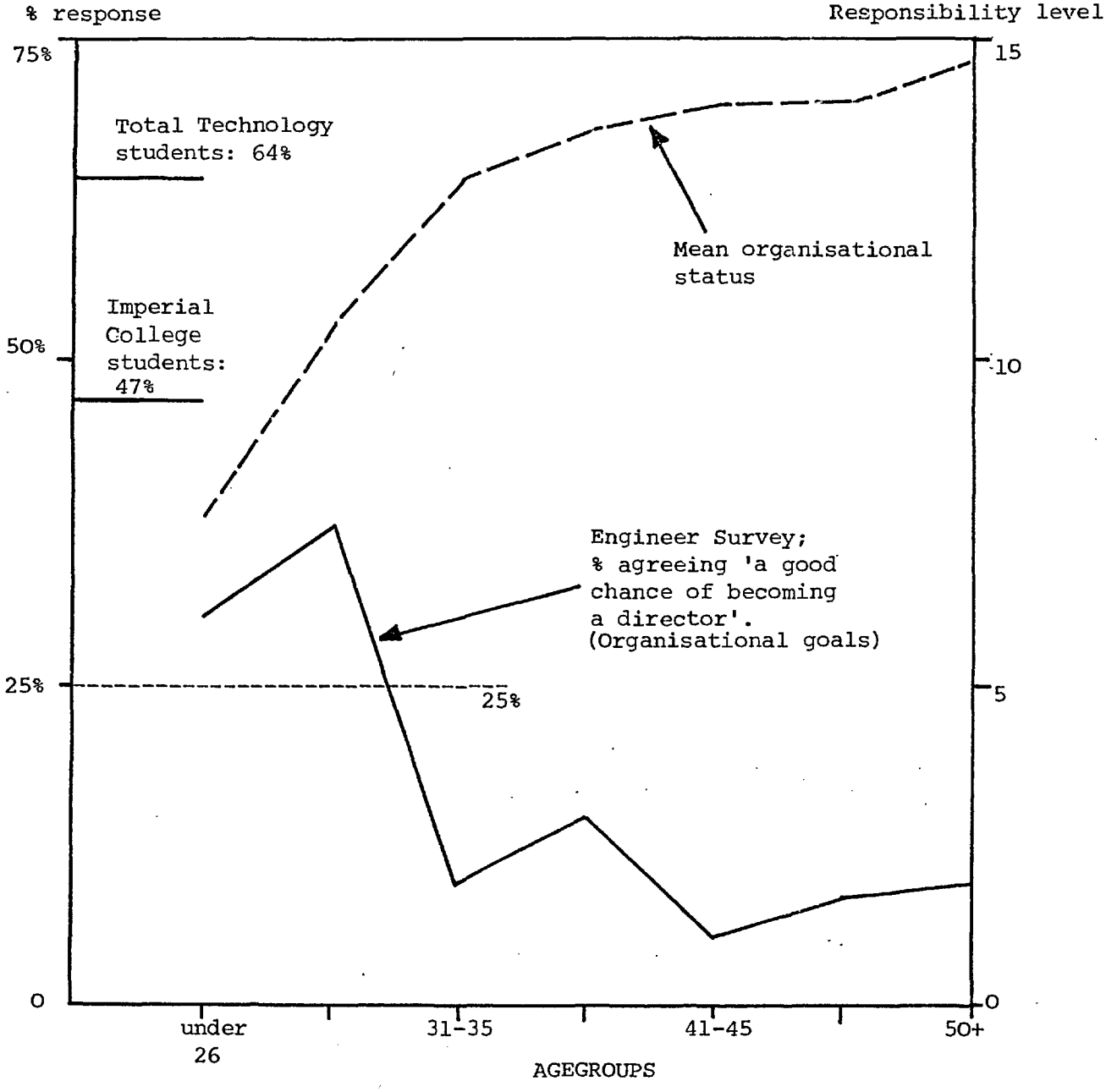
age-groups. This parameter is based upon responses to the question:" I THINK SOME DAY I'VE A GOOD CHANCE OF BECOMING A PARTNER OR DIRECTOR IN A COMPANY OR FIRM " (ESQ:28i). Figure 10.8 shows the percentage in each age-group replying '5,6 or 7' along the 7-point response scale, ie who may be taken as registering 'agreement' with the statement. Responses are also available from the Student Survey and Total Technology sample on this question and shown in the figure. While around two-thirds of the latter, half the former, and one-third of the engineers under 30 'agree' with the statement, for older engineers the fraction drops sharply to stay around 10%, This suggests that the engineers may experience a "reality shock" (Hughes,1958) around the age of 30, when most realise that dreams of company directorships are probably untenable, at least in the large organisations in which most are employed (Section 5.4). This may occur around the period when organisational responsibility, after rising steadily, begins to "plateau". As the correlations between organisational status and organisational goals, shown in Figure 10.8, indicate, there is a progressive "comming to terms with reality".

Landis (1971:25) offers a general qualitative account of engineers' typical career experiences over time, based upon a study of American R & D engineers:

> We start with the young college graduate whose first job will prove to be a "culture shock" which requires one or two years in industry for acclimatisation. By that time the young engineer will learn that his earlier fears are not justified; he will not become a cog in an impersonal machine, he will see his contributions do influence the whole, he will have a high learning curve during his first few years on the job.

FIGURE 10.8 VARIATIONS IN ORGANISATIONAL GOALS AND STATUS WITH AGE

(Graph shows mean values of organisational responsibility level for each age-group (dotted) and % of respondents in each age-group answering 'agreement', ie, 5,6,7 , to the statement: " I think some day I've a good chance of becoming a partner or director in a company or firm" (solid); ie, that used as organisational goals parameter. cf. Appendix IId.)



Pearson correlations between organisational status and goals:

Age-group	under 26	26-30	31-35	36-40	41-45	46-50	50+
r	-.025	-.116	-.011	.243	.574	.363	.376
Sig.	*	*	*	*	.003	*	.043

> However, starting at about age 30, the attitude of the engineer tends to change. Family pressures, and with them financial pressures, start to build up. The individual may well go through a crisis regarding the value of engineering to himself and to society. .. By the age of 40 the engineer will feel a lot better, perhaps he has become more sure of himself, perhaps he has learned to live with his limitations. He works hard, usually effectively, and has become completely enmeshed in the establishment. For many engineers, the forties and fifties represent their peak.

While one might want to question the loose generality assumed rather easily by Landis here, several similarities with the sample of engineers do emerge, particularly the change in attitudes around 30 and a possible "crisis", some years later. Interpretations must be limited given the assumptions made, but there are some indications from the Engineer Survey that the engineers 'typically' experience a "reality shock" around 30, have a "re-examination" of their careers during the 36-40 period, followed by a period of transition, possibly of "crisis" during the 41-45 years, beyond which some stability appears prior to retirement.

This'typical' scheme is based upon the speculative assumption of longitudinality and as such its validity can only be tentative. From this assumption the pattern of correlations between PCS, work effort and organisational status mobility suggests a 'cyclic' relationship over the first 20 years of the engineers' careers that is consistent with the Career Development Model and gives some support to causal inferences in the sequence. This result is an important one: for the first time in the thesis is there some evidence for the priority of PCS over work effort, ie for the contention that PCS is a determinant of the level of work effort.

10.3 Career Continuities

To the extent that such 'cyclical' relationships do operate over a 20 year period, evidence is suggested of the considerable temporal perspective against which the engineers set their careers. This long-term conception of the career has been illustrated by a number of writers examining the effects of both past career experiences and future career expectations on present attitudes and behaviour. Wilensky & Edwards (1959) for example found that "downward occupational mobility" ("skidding") promoted "ideological conservatism"; Faulkner (1974) notes how the 'success' schedule for Little League hockey players develops an "age consciousness" with certain activities being attributed importance as "turning points" along this continuous career schedule. The readiness of people to "defer gratifications" so that future benefits will accrue (eg, Wilensky,1961:523) is another instance of longer term career considerations impinging upon the present:

> A man may, at 21 years of age, make $10,000 a year as an accountant. He may, at 35, make $100,000 as President of the firm. If at 21 he has reason to expect that in the future he will be President of the company, his $10,000 a year job will hold an entirely different meaning for him than if he expects to remain in the job forever. If upwardly mobile, he may see his work as good'preparation' or as 'learning the discipline of work'. If his future is viewed with a more dismal prospect in mind, the person may interpret the exact same job as 'dull' or 'tedious'. (Van Maanen,1977:16)

The PCS Hypothesis-(a) postulates that PCS is influenced by the extent to which achieved career status fulfills prior career goals. Table 8.2 has illustrated this effect, infering differences in prior goals from different

categories of social and educational background. Repeating this analysis across each of the age-groups gives fairly inconclusive results[1], possibly because of the small cell sizes, although several significant correlations do arise amongst older engineers, giving some evidence of the long-term nature of this process.

By providing a series of career goals extending over time against which achieved career status may be evaluated, some sense of "temporal structure" is given to the engineers' lives. In situations where time "drags", such as in prison (Cohen & Taylor, 1972) or for unskilled factory workers (eg, Roy, 1960) some 'artificial' structuring of time may arise to make its passage more "psychologically manageable". Roth (1963), describing the "recovery careers" of TB patients also notes how "benchmarks" are derived from certain institutional signs - the patients' health classification, privileges granted, etc - which structure the passage of time in a similar way. Such "benchmarks" also serve to chart the patient's recovery in a series of discrete steps, so providing a sequence of goals to which they may aspire (Roth, 1963:115):

> Long stretches of time may be made more "psychologically manageable" by being broken up into smaller segments. When the markers used to divide periods of time into

---

1. 2nd Order partial correlations, controlling age and organisational status, between PCS and:- (See Table 8.2)

	AGE-GROUPS:						
	Under 26	26-30	31-35	36-40	41-45	46-50	Over 50
(a) Social class of origin:	-.104 *	-.176 *	-.077 *	-.022 *	-.203 *	-.551 (.046)	-.161 *
(b) Type of school:	.144 *	-.314 (.014)	.145 *	-.017 *	-.317 (.030)	-.578 (.040)	-.197 *

segments are also signposts in a given direction, we have the foundation of a career timetable.

The series of related jobs of increasing prestige, representing an "extended career" (Section 3.2.1), would in a similar way provide a set of long-term goals towards which a person may work, and in so doing provide a sense of purpose to the daily task.

> The image of a rewarding personal future generates, under most conditions, a pleasant emotional state that intrudes upon the person's current experience and motivates present behavior. Just as folktales prepare people in most cultures to see visions of the future in the present, being told that one will 'go far' can provide a person with an immediate sense of accomplishment and purpose. (Van Maanen, 1977:31)

This is discussed by Van Maanen, who refers to the sense of purpose resulting from the pursuit of career goals as part of the general process of "discovering a theme". (Van Maanen,1977:34):

> .. the concept of theme is critical to a person's definition of his work situation. It must be discovered and carved from experience. To the degree that the individual's past experiences, daily pattern of activities, and longer run vision of future events are perceived to be homologous, temporal continuity results.

For the men in the Engineer Survey the sense of purpose and temporal continuity engendered by the pursuit of long-term career goals is difficult to examine directly with the questionnaire data. From a number of the interview responses, however, some indications of this feature are suggested. Although some of the men may be unsure about specific details, most seem to have some long-term sense of purpose about their careers: in Van Maanen's terms, most of the men seem to have "discovered a theme":

Question: WHAT DO YOU SEE AS BEING YOUR MAIN AMBITIONS FOR THE FUTURE ?

I suppose what I'm looking for now is a partnership. Yes, if I decide to stay in civil engineering, I would like to become a partner.
(32 year old civil, Consultant)

Just building up basic design experience, rather than anything special. Something to build on, I suppose, for the future. (26 year old civil, Consultant)

I don't really have any great ambitions, just keep on moving up the ladder, taking on more and more responsibility and becoming more involved in larger jobs. Salary isn't all that important, providing you've got enough to live on; that I enjoy the work I'm doing, that's the important thing.
(25 year old civil, Consultant)

To have a continuation of jobs which not only interest me, but are within my competance to do and which turn out to be successful. I don't think I'm particularly ambitious. I like things the way they are now and hope they'll continue more or less the same.
(42 year old civil, Consultant.)

In the short run, to get Chartered. I'd like to get that out of the way. Then when my agreement's over, I'll see what happens. Things will follow on, but it's too early to decide anything really.
(23 year old civil, Contractor)

In the immediate future I'd like to achieve the grade of sub-agent, which is the next step up the ladder. That's the chap next door even though his office is actually smaller than my present one. As far as further than that goes, as I said, I want to stay in contracting, so I suppose when you reach agent you're looking for a contracts manager's job, and that's really the sort of management job I'm looking for, being in charge of several contracts.
(27 year old civil, Contractor)

To find my limit. I've still enough ambition to get as high as I can. I don't think I'd ever make board level at Northern, but perhaps in a smaller firm. Certainly I'd like to progress into senior executive level at Northern and I'd leave if there wasn't a chance of it happening. (34 year old mechanical, Northern)

I would like an executive position with my present department, I don't think quite honestly I can hope to get further than that because of the years left.
(52 year old mechanical, Northern.)

I've got a drive to get on, but I'm not sure if I want to go on the next step or two because I see what the people in those jobs have to do. They're rather divorced from the creative aspects of design which is what gives me my job enjoyment.
(34 year old mechanical, Southern)

> I could make it two grades higher I think before I retire. I'd be a bit disappointed I think if I didn't make this. One comes to expect these things and I think it's roughly in line with what I should get. (48 year old chemical, National)

> Regional Mechanical Engineer is the next step for me, and then to Regional Chief Engineer, but the chances are getting limited.
> (49 year old mechanical, Public.)

The long-term sense of purpose and temporal continuity engendered in this way by the pursuit of a sequence of career goals is likely to have considerable implications for occupational behaviour. One method by which this may be assessed is through the engineers' expressions of commitment to their work activities, with their attraction or otherwise likely to depend upon their role in assisting or impairing this long-term career development. As such, the following chapter now turns to consider the engineers' commitments to several lines of work activity, assessing in particular the influence of their careers and the level of work involvement on these commitments.

CHAPTER ELEVEN

THE COMMITMENT MODEL

I only ask to be free.
The butterflies are free.

Charles Dickens;
Bleak House.

11.1 Introduction

The previous four chapters of the thesis have analysed the Career Development Model, thus attempting to explain variations in the engineers' work involvement. The effects of the men's careers have been examined, and broader aspects of career development investigated as part of this inquiry. In this penultimate chapter, the focus of attention is changed, with consideration being given to the influence of the engineers' careers and their level of work involvement on one aspect of occupational'behaviour' - the commitment to particular lines of work activity.

The analysis seeks to assess the consistency of the Commitment Model suggested in Chapter 4, and investigates the engineers' commitments to remain in the four categories of career situs, given by their current department, employing organisation, engineering branch, and the occupation in general. The Commitment Model postulates that a person's Commitment to Stay in certain lines of work activity may be considered as the combination of their Affective and Necessitative Commitments, the former arising through a

mechanism of "exchange", the latter through one of "accrual". It is suggested that differences in the importance assigned to items in such mechanisms will follow from variations in the level of work involvement. Because of the likely importance of various work-related "benefits" in an exchange transaction, higher work involvement is postulated as leading to higher Affective Commitments.

More generally however, it is suggested that higher work involvement will result in the various "costs, benefits, investments and side-bets" related to the work career all being assigned greater importance. Thus, the Commitment Hypothesis postulates that work involvement will have a strong contingent effect on the determinants of both Affective and Necessitative Commitments, with "career factors" forming the relatively more important bases of commitment the higher the level of work involvement.

11.2 Commitments of the engineers

Commitment of the engineers to four lines of work activity is considered. These are given by the categories of career situs - department, company, branch, and occupation. They represent fairly well-defined 'institutional' boundaries, unlike the situs categories of "type of work" and"manager" used earlier, which seem less suitable in this connection and as such are not employed. The four categories form an approximate 'hierarchical set', insofar as the commitment to remain in the current department of the company is dependent upon remaining in the company, and so on. There are, of course, exceptions, insofar as engineers in one company may be employed in several branches; indeed, they may leave the occupation altogether but remain in the same company (eg, in personnel). However this 'hierarchical' property does not seem very significant here, since the commitments are examined separately in the analysis.

As discussed in Section 4.2, Affective Commitment refers to a person actively 'wanting to stay', Necessitative Commitment to their 'having to stay', the combination of the two giving the overall sense of Commitment to Stay in some line of activity.

Measures of the Commitment to Stay are based upon the engineer's estimated likihood of remaining in their current department and company for the next three years and their branch and occupation for the next five. Responses range from 1, "very unlikely" to

7 "very likely". Some validation of the second of these is shown in Appendix IIe, but for the remaining commitment variables, limitations on questionnaire size preclude verification. However their construction does follow techniques used in previous research (eg, Palmer et al,1962; Porter et al, 1974; Raby,1975), the expressed likelihood being taken to represent the strength of the Commitment to Stay.

The measures of Affective Commitment are obtained by asking the engineers if, 'knowing what they now know', they would choose to enter their present department, company, branch, and occupation again, with responses given on a 1-7 likelihood scale (Appendix IIe). This does not correspond exactly to the concept of 'wanting to stay' at a given point in time, since a person may think their choice was good in the past but still have a low Affective Commitment in the present as their conditions change, and clearly this is a limitation on the parameter. However, since it is based upon some overall estimate of the value of the particular line of activity in question, it is used here as the empirical measure of Affective Commitment. The problem of assessing Affective Commitment directly is that post hoc rationalisation is likely to influence the response (eg, Vroom & Deci,1971), making 'willingness to stay' and 'likelihood of staying' indistinguishable.

For similar reasons measurement of Necessitative Commitment is problematic. However, since it is hypothesised that the Commitment to Stay represents the combination of Affective and Necessitative Commitments,

then parameters of Necessitative Commitment are taken as the simple arithmetic difference between the Commitment to Stay and the Affective Commitment variables (Appendix IIe); that is, the 'need to stay' is represented by the difference between the likelihood of staying and the likelihood of joining again given a "free choice". This assumes direct comparability between the scales to justify the simple arithmetic computation, although given their similar construction this may be reasonable. It also assumes the two commitment types can be added together to completely define the 'likelihood of staying'. In fact, this likelihood will probably also be influenced by the perception of current labour market conditions (Section 4.2), so that the measure of Necessitative Commitment may in turn come to reflect such factors (eg. Marsh & Mannari, 1977).

Details of the 12 commitment measures are given in Appendix IIe, where inter-correlation matrices are also shown. Commitments of a similar type all inter-correlate strongly; apart from correlations with departmental commitments, all are significant beyond the .1% level. To the extent that there is some sense of contingent hierarchy to the four categories, then close inter-correlations would be expected. The weaker relationships with departmental commitments may perhaps reflect the greater freedom for departmental movement that characterises the internal labour markets of certain companies (Appendix IV; Mace, 1979). Also with this departmental exception, all correlations between Affective and Necessitative Commitments are negative and significant beyond .1%. Although in theory

not necessarily related, the relationships may reflect the weakness of constructing Necessitative Commitment from the Commitment to Stay and Affective Commitment in the manner described. (Indeed, insofar as significant inter-correlations are observed between the Affective Commitments and the Commitments to Stay, then the same would follow for the derived Necessitative Commitments, (eg. Galtung, 1967:186-187).)

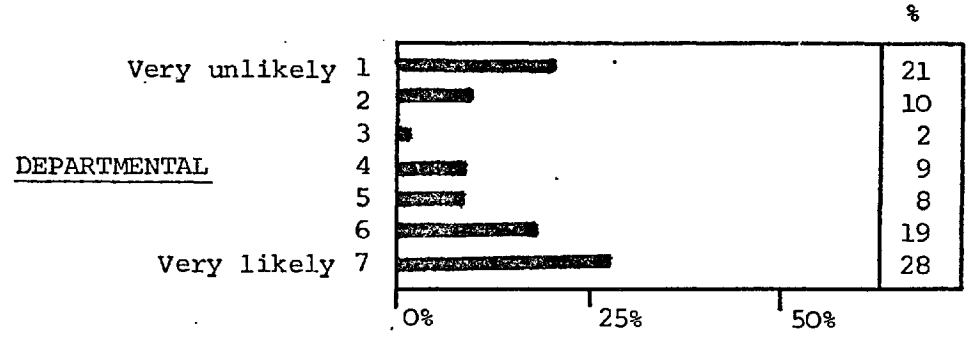
Responses of the engineers to these commitment parameters are given in Figures 11.1, 11.2 and 11.3, which show frequency distributions for their Commitments to Stay, Affective and Necessitative Commitments, respectively, in each of the four career situs categories. If responses of 5,6 & 7 are taken as "likely", then 45% of the engineers think it "likely" they will stay in their current department for the next three years, and 79% in their present company; the departmental response here being bimodal. 94% and 93% think it "likely" they will stay in their current branch and within the occupation respectively over the next five years. If given their choice again, 76%, 65%, 73%, and 74% would choose, respectively, their present department, company, branch, and occupation. The large number of engineers answering '7' on each of these scales is something of a weakness in their construction, since insufficient variance is generated at the 'high' end of the scales. This may give rise to artificially high inter-correlations between the commitment variables and is likely to reduce the levels of prediction that may be achieved for each in linear analysis with elements of the Analytical Framework (section 11.3).

FIGURE 11.1 COMMITMENT TO STAY OF THE ENGINEERS

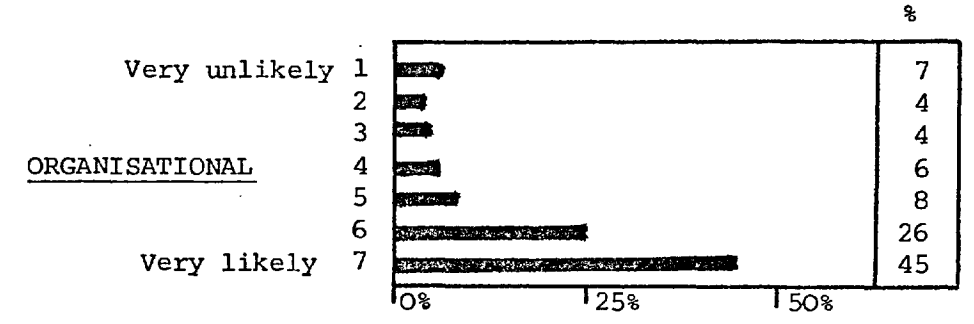
(Figures show frequency responses of engineers' estimated likelihood of staying in their current bodies in the medium term future.)

ES Q.24 HOW LIKELY DO YOU THINK IT IS THAT YOU WILL REMAIN, DURING THE NEXT 3 YEARS :-

- IN YOUR PRESENT DEPARTMENT ?

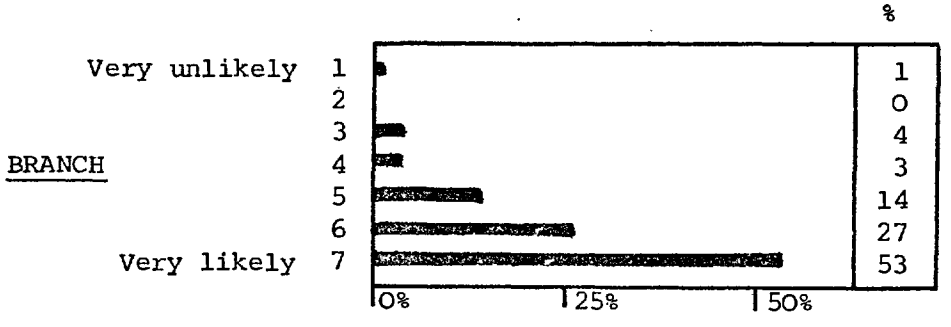


- WITH YOUR PRESENT EMPLOYER ?



ES Q.52 HOW LIKELY DO YOU THINK IT IS THAT WITHIN THE NEXT 5 YEARS YOU WILL REMAIN:-

- WORKING IN YOUR BRANCH OF ENGINEERING ?



- WORKING IN ENGINEERING ?

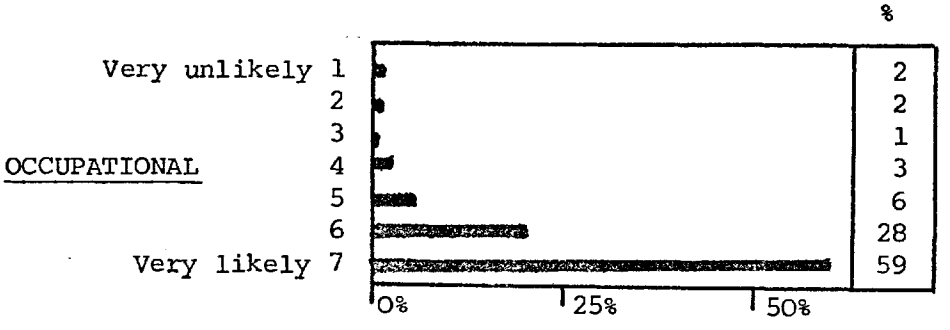
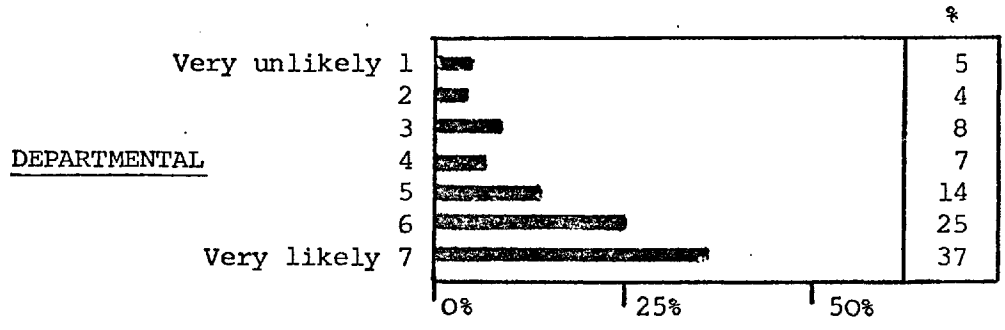


FIGURE 11.2 AFFECTIVE COMMITMENTS OF THE ENGINEERS

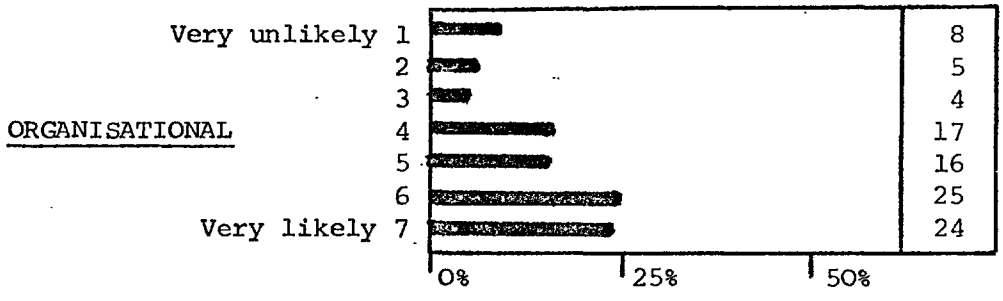
(Figures show frequency distributions of commitment responses for the four bodies.)

ESQ;20 IF YOU WERE GIVEN A FREE CHOICE OF WORKING IN ANY OF YOUR ORGANISATION'S DEPARTMENTS, WOULD YOU CHOOSE YOUR PRESENT ONE ?

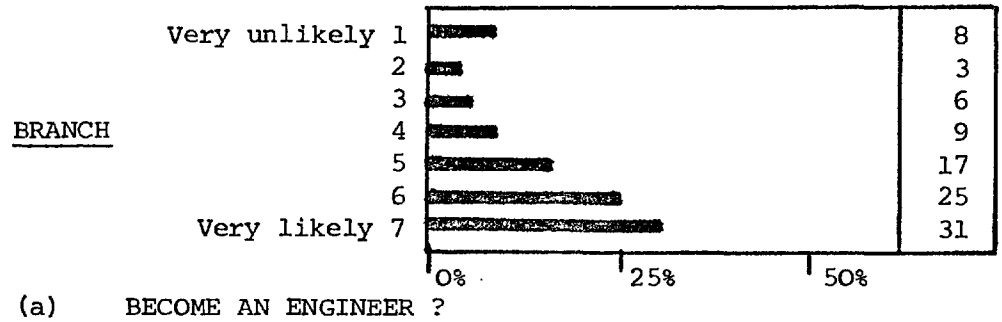


ESQ:53 KNOWING WHAT YOU NOW KNOW, IF YOU COULD HAVE THE CHOICE AGAIN, WOULD YOU CHOOSE TO ENTER

(e) JOIN YOUR PRESENT EMPLOYING ORGANISATION ?



(b) ENTER YOUR PARTICULAR BRANCH OF ENGINEERING ?



(a) BECOME AN ENGINEER ?

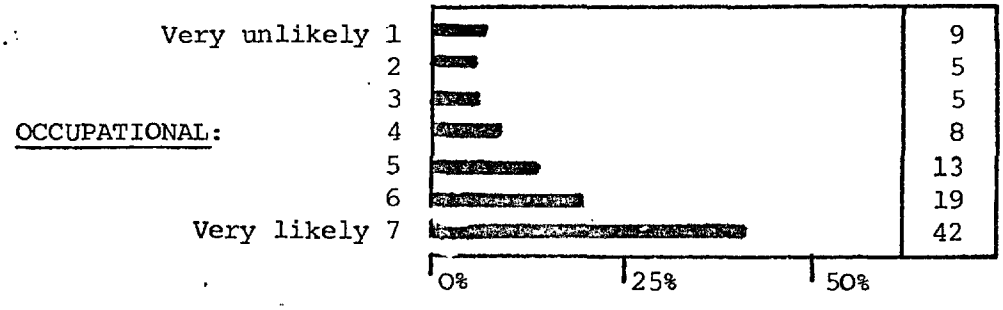
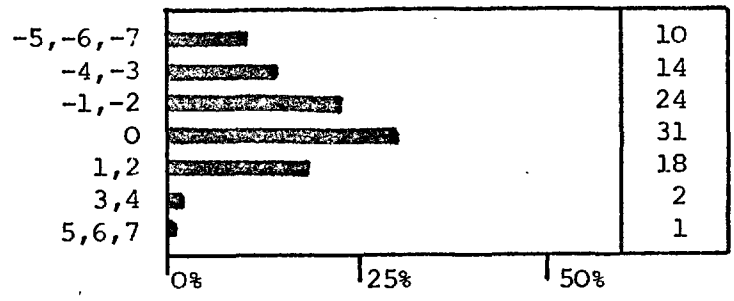


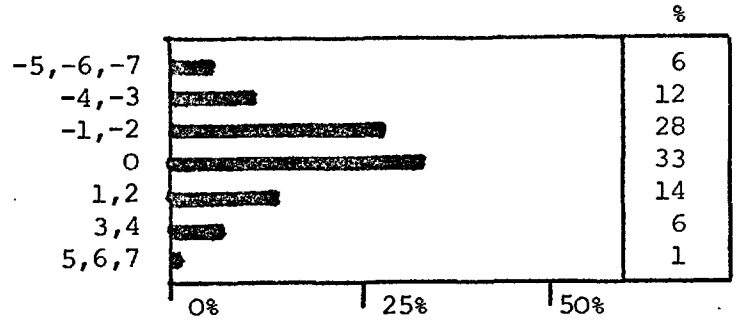
FIGURE 11.3 NECESSITATIVE COMMITMENTS OF THE ENGINEERS

(Based upon difference in response to Commitments to Stay and Affective commitments, computed for each engineer.)

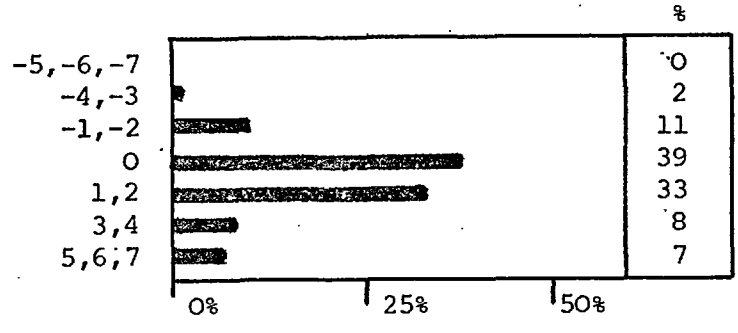
DEPARTMENTAL



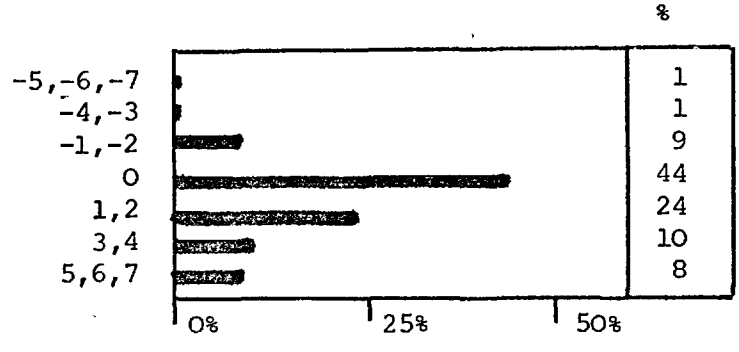
ORGANISATIONAL



BRANCH



OCCUPATIONAL



The difference between these two sets of responses forms the basis for the Necessitative Commitment measures shown in Figure 11.3, all approximating in contrast to Normal distributions. The modes in these figures all occur at zero, again a reflection of the fact that many engineers think it "very likely" they will remain ("7") and would rejoin the situs category if given the decision again. Nevertheless, for each Necessitative Commitment measure there is a definite variation about this mode, with some showing 'positive' and some 'negative' Necessitative Commitment on the constructed scales.

The engineers thus typically anticipate little situs mobility across these four categories in the medium term, an expectation that corresponds to the low situs mobility profiles of Figure 10.4(b). There is a clear distinction between those expecting to remain in their current departments and those not, but only a small fraction of the sample anticipate moving organisations, and fewer still their branch or occupation. The Affective Commitment measures show a broader range of responses, although in each case they rise to a maximum at the 'high' end of the scale, showing that in general the engineers tend to have high Affective Commitments to these four lines of activity. However, the difference in these sets of responses does give rise to a range of variation in Necessitative Commitments, the discrepancy between expectations and preferences indicating a certain 'regret' by the engineers over these past career choices.

11.3 Exchange and accrual

Section 4.3 suggests that the Analytical Framework for studying variations in work involvement is also suitable for investigating the determinants of commitment. Employing the same kind of techniques as before, partial correlation and multiple regression analysis between the elements of the Analytical Framework and each of the 12 commitment variables thus gives rise to the results summarised in Table 11.1. The factors shown in the table have 'significant direct relationships' with each particular commitment variable. Inter-relationships between commitment variables however are not included in the regression. Making necessary assumptions about the directions of these relationships, path coefficients are given in each case. Although there is no analytical justification for causal inferences, the commitment variables seem unlikely to form antecedents of others in the Analytical Framework, perhaps giving some logical basis to these assumptions. Details of the multiple regression are shown in Table 11.2.

Although a variety of factors are related to each of the different commitment variables, some general features emerge. In particular, job satisfaction shows the strongest relationships with Affective Departmental and Organisational Commitments, company seniority with Necessitative Departmental and Organisational Commitments. As Table 4.1 indicates, these correspond to results found in other commitment studies. Two factors related to the engineers' careers

TABLE 11.1 FACTORS RELATED TO COMMITMENT VARIABLES

(Table summarises multiple regression shown in Table 11.2 for factors of the Analytical Framework related directly to the commitment variables. Values of Multiple R^2 are shown and path coefficients in brackets.)

Commitments	DEPARTMENTAL	ORGANISATIONAL	BRANCH	OCCUPATIONAL
AFFECTIVE	Job satisfaction (.40) Variety (.22) Occupational openness (.21) R^2 = .302	Job satisfaction (.25) Education level (.20) Promotion rate (.21) PCS (.13) Autonomy (.16) Company R^2 = .371	Degree class (.33) Work effort (.26) Occupational openness (.14) Company Branch R^2 = .343	Variety (.31) Specialisation (.21) Company Branch R^2 = .179
NECESSIT-ATIVE.	Comp.seniority (.31) Occupational openness (-.28) Degree class (-.10) Company Branch R^2 = .255	Company seniority (.26) Degree class (-.21) Company R^2 = .167	Degree class (-.20) Variety (-.26) Company Branch R^2 = .368	Monetary orientations (.10) Comp. seniority (.08) Monetary goals (-.21) Company R^2 = .100
TO STAY	Organisational status (.19) Comp.seniority (.22) Job satisfaction (.20) Company Branch R^2 = .343	Job satisfaction (.22) Company seniority (.34) Promotion rate (.19) Company R^2 = .250	Autonomy (.19) Company R^2 = .157	Occupational openness (.11) Colleague sociability (.14) Company R^2 = .144

TABLE 11.2 FACTORS INFLUENCING COMMITMENT VARIABLES: MULTIPLE REGRESSION ANALYSIS:

	Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Overall sig. of F
(a)	DEPARTMENTAL COMMITMENT:						
	AFFECTIVE COMMITMENT WITH:-						
	Job satisfaction	.458	.000	.458	.210	-	.000
	Variety	.399	.001	.508	.258	.048	.000
	Occupational openness	.243	.001	.550	.302	.044	.000
	NECESSITATIVE COMMITMENT WITH:-						
	Company seniority	.303	.000	.303	.092	-	.000
	Occupational openness	.293	.000	.411	.169	.077	.000
	Degree class	.084	.027	.445	.198	.029	.000
	Company	.291	-	.472	.222	.024	.000
	Branch	.314	-	.505	.255	.033	.000
	COMMITMENT TO STAY WITH:-						
	Org. status	.381	.001	.381	.145	-	.001
	Company seniority	.396	.001	.441	.194	.049	.000
	Company	.321	-	.504	.254	.060	.000
	Branch	.356	-	.558	.311	.057	.000
(b)	ORGANISATIONAL COMMITMENT:						
	AFFECTIVE COMMITMENT WITH:-						
	Job satisfaction	.330	.000	.330	.109	-	.000
	Education level	.300	.000	.469	.220	.111	.000
	Promotion rate	.320	.001	.518	.268	.048	.000
	PCS	.303	.039	.535	.286	.018	.000
	Autonomy	.228	.018	.556	.309	.023	.000
	Company	.346	-	.609	.371	.062	.000
	NECESSITATIVE COMMITMENT WITH:-						
	Company seniority	.195	.020	.195	.038	-	.020
	Degree class	.176	.006	.300	.090	.052	.001
	Company	.355	-	.408	.167	.087	.001
	COMMITMENT TO STAY WITH :-						
	Job satisfaction	.324	.000	.324	.105	-	.000
	Company seniority	.321	.000	.413	.170	.065	.000
	Promotion rate	.065	.007	.453	.205	.035	.000
	Company	.356	-	.500	.250	.045	.000

TABLE 11.2 (cont): FACTORS INFLUENCING COMMITMENT VARIABLES; MULTIPLE REGRESSION ANALYSIS:

Variables	Simple R	Sig. to enter	Multiple R	R^2	ΔR^2	Overall sig. of F
(c) COMMITMENT TO THE BRANCH:						
AFFECTIVE COMMITMENT WITH:-						
Degree class	.394	.000	.394	.156	-	.000
Work effort	.325	.000	.490	.240	.085	.000
Occupational openness	.138	.057	.510	.260	.020	.000
Company	.356	-	.550	.302	.038	.000
Branch	.315	-	.586	.343	.041	.000
NECESSITATIVE COMMITMENT WITH:-						
Degree class	.351	.000	.351	.123	-	.000
Variety	.197	.018	.398	.158	.035	.000
Company	.421	-	.547	.299	.141	.000
Branch	.285	-	.607	.368	.069	.000
COMMITMENT TO STAY WITH:-						
Autonomy*	.123	.127	.123	.015	-	.127
Company	.313	-	.396	.157	.142	.000
(d) COMMITMENT TO THE OCCUPATION:						
AFFECTIVE COMMITMENT WITH:-						
Variety	.238	.001	.238	.057	-	.001
Specialisation	.171	.004	.311	.097	.040	.000
Company	.241	-	.367	.135	.038	.000
Branch	.208	-	.422	.179	.044	.000
NECESSITATIVE COMMITMENT WITH:-						
Monetary orientations*	.129	.099	.129	.017	-	.099
Company seniority*	.037	.612	.135	.018	.002	.226
Monetary goals	.195	.015	.232	.054	.036	.031
Company	.277	-	.316	.100	.046	.034
COMMITMENT TO STAY WITH:-						
Occupational openness*	.123	.110	.129	.017	-	.110
Colleague sociability*	.122	.124	.179	.032	.015	.086
Company	.291	-	.379	.144	.112	.002

* These variables are not significant in the regression analysis, although are included here because they gave significant results at the correlational stage of the analysis.

are connected with their Affective Organisational Commitment - their perceived future promotion rate, and their PCS. Class of university degree is related to Departmental, Organisational, and Branch Necessitative Commitments and with Affective Commitment to the branch. Variations between companies are also significant in most cases, and mean values are shown in Table 11.3. In particular, engineers in Southern have on average a low Affective Commitment to their company and a high Necessitative one, those in National have the highest average Affective Commitment and those in Public and National the greatest Commitment to Stay in their organisations. Engineers in Southern and Public also seem to be those with most 'regret' at their choice of engineering branch, showing the highest Necessitative Commitments.

The results give a certain amount of support to the postulates that Affective Commitments arise from mechanisms of "exchange", Necessitative from "accrual", although interpretations from such linear analyses can only be inferential. Unfortunately there appears to be no other basis for evaluating these postulates with the data available, which means that the inferences are far from unambigious or conclusive.

However, a number of factors positively related to each of the Affective Commitment variables may be taken as representing particular "benefits" resulting from the commitment; the larger the parameter, the greater the commitment. This is consistent with the notion of

TABLE 11.3 VARIATION IN COMMITMENTS BETWEEN COMPANIES:

(Table shows mean values of Affective & Necessitative commitments and Commitment to Stay in each company.)

BODY	DEPARTMENT			ORGANISATION			BRANCH			OCCUPATION		
TYPE OF COMMITMENT	Aff.	Nec.	to stay	Aff.	Nec.	to stay	Aff.	Nec.	to stay	Aff.	Nec.	to stay
COMPANIES:-												
Consultant	5.50	-1.40	4.04	5.39	.077	5.46	6.00	.615	6.62	5.62	1.08	6.69
Contractor	4.95	-1.95	3.16	4.89	-.250	4.45	5.36	.860	6.22	5.62	.73	6.35
Northern	5.57	-1.26	4.30	5.04	.390	5.44	5.30	.043	5.35	5.39	.04	5.44
Southern	5.30	- .09	5.14	3.52	2.040	5.57	4.00	2.264	6.26	4.27	2.04	6.26
National	5.48	- .83	4.64	5.64	.623	6.27	5.72	.340	6.07	5.32	1.13	6.41
Public	5.66	- .17	5.48	4.83	1.28	6.10	4.45	2.041	6.54	5.76	.69	6.45
ALL COMPANIES	5.43	- .99	4.41	5.01	.626	5.62	5.24	.926	6.18	5.36	.96	6.31

"exchange". For departmental commitment these might be job satisfaction and work variety; for organisational commitment, job satisfaction, perceived promotion rate, PCS, and autonomy; for occupational commitment, variety. The "costs" arising from such commitments are less evident however, partly because it is difficult to assess these meaningfully and few of the variables in the Analytical Framework could be interpreted as such. Perhaps only "work effort" would be legitimate in this respect, and although it does show a significant relationship with Affective Commitment to the branch, this is positive, and so contrary to an "exchange" interpretation. Thus while Affective Commitments are positively related to a number of variables that could be taken as possible "benefits", evidence of the contrary effects of "costs" is not available; as such, the notion of some ratio between the two, involving some exchange transaction, cannot be assessed,

Company seniority is positively related to the Necessitative Commitments to the department, company, and occupation; those engineers who have been in their companies the longest, having the greatest Necessitative Commitments to these lines of activity. This is consistent with the notion of "accrual", and is a result typically observed in other commitment studies (Table 4.1). Class of university degree is related to Departmental, Organisational and Branch Necessitative Commitments, lower degree class being associated with higher Necessitative Commitment. This may be because

'less bright' engineers feel they have more to jepordise by moving, whilst 'brighter' engineers are able to move situs more easily, an inference that might be interpreted in terms of an "accrued investment". Degree class is also positively related to Affective Branch Commitment, an interesting finding given that university engineering courses are typically arranged around the different engineering specialisms. However it weakens the hypothesis that the two types of commitment have different origins. Such also applies to the relationship between Necessitative Branch Commitment and 'variety', the only job characteristic connected with a Necessitative Commitment variable, three relationships occuring with Affective Commitments.

The influence of degree class on these various parameters might also be taken as an indication of background socialisation experiences influencing the engineers' commitment. Certainly the positive relationship between Affective Organisational Commitment and education level might be seen in these terms, those of higher education level having higher commitment. Variations either between companies or engineering branches or both have some effect on most of the commitment variables after other factors in the Analytical Framework have been considered, again possibly reflecting differences in socialisation within particular contexts. This result might also arise because other individual parameters not included in the Analytical Framework could vary between these categories,

although given the fairly broad scope of the Analytical Framework this is perhaps not so likely. More probable perhaps is that different labour market factors could be involved in each of these cases, thus influencing the sense of commitment.

Surprisingly in fact the perceived difficulty of moving jobs does not appear amongst the results of Table 11.1, although at a zero order level Necessitative - but not Affective - Organisational Commitment is related to this factor[1]. Apart from perceived promotion rate, one other variable involving 'career evaluations' is related to several commitment measures; the degree of perceived "occupational openness". This is positively related to Affective Department and Branch Commitments, and negatively to Necessitative Departmental Commitments. It is based upon the extent of agreement with the question: " IF A PERSON HAS TALENT HE CAN MAKE IT TO THE TOP IN ENGINEERING" (ESQ:28s). The reason for these relationships is thus not readily apparent, although it is possible they may reflect some general mobility aspirations which influence this parameter.

However, there are no indications of Necessitative Commitments being influenced by "side bets", factors external to the line of activity that depend upon the

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1. Pearson correlations between organisational commitments and the perceived difficulty of changing jobs (Appendix IId. ESQ:23a)

	ORGANISATIONAL COMMITMENTS		
	Affective:	Necessitative:	To Stay
Difficulty of changing jobs	-.003	.172	.170
	(*)	(.009)	(.009)

commitment, as postulated by Becker. Consideration of these factors was certainly limited in the Engineer Survey and no conclusive position can really be reached. In fact at a zero Order level some indication of these effects is apparent: those engineers with dependent children (ie, under 21) having higher Necessitative Commitments to the department, organisation, and occupation: none of the Affective Commitments were so related[1].

In sum then, Affective Commitments are related to the engineer's job satisfaction, several job characteristics and a number of "career factors" in a manner that may be interpreted as representing the "benefits" of an exchange transaction. No indication of the contrary effects due to "costs" is apparent however. The relationships between Necessitative Commitments and company seniority give some indication of a possible "accrual" mechanism, and relationships with degree class might be liable to a similar interpretation, although there is no conclusive evidence on the effects of "side bets" on Necessitative

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1. T-tests for average commitment values between those engineers with dependent children (n=101) and those without (n=87); see Appendix IIc for details.

	MEAN COMMITMENTS		T TEST (Pooled var. est.)	
Affective:-	No. dependents	Dependents	t	sig.
Department	5.32	5.51	-.73	*
Company	5.05	5.01	.14	*
Branch	5.42	5.13	1.07	*
Occupation	5.62	5.28	.98	*
Necessitative:-				
Department	-1.57	-.45	-3.44	.001
Company	.29	.83	-1.72	.001
Branch	.79	1.05	.93	*
Occupation	.46	1.36	-3.04	.003

Commitment. These interpretations are far from unambiguous and the inferences drawn must only be tentative.

However for both Affective and Necessitative Commitments neither exchange nor accrual mechanisms alone are sufficient to account for the variance of the commitment parameters. Other factors, possibly indicative of socialisation experiences, possibly also reflecting labour market effects, are involved in the analyses. With these considered, the accountable variance in the commitment parameters is quite good; this is apart from Necessitative Organisational Commitment and the two occupational commitments; these latter are perhaps due to the low variance in the occupational commitment measures across the sample (Figure 11.2 & 11.3).

With several exceptions the results of Table 11.1 do suggest that the origins of Affective and Necessitative Commitments are rather different. This justifies to some degree the separation of the two types. Furthermore the factors which are related to the Commitment to Stay represent some combination of those related to each of the commitment types separately, at least for departmental and organisational commitment, where job satisfaction and company seniority in particular are both related to the Commitment to Stay but separately only with one commitment type. In the case of organisational commitment, the cross-tabulations shown

in Figure 11.4 illustrate this effect quite well. While Affective Organisational Commitment is influenced by job satisfaction and Necessitative by company seniority, the two together exert a cumulative influence on the engineer's Commitment to Stay in the organisation. Given that the two types of commitment are likely to have rather different implications for behavior within the organisation, their separation from the overall Commitment to Stay thus appears quite fruitful.

FIGURE 11.4 THE DIFFERENT BASES OF ORGANISATIONAL COMMITMENT:

(Cross-tabulations show the percentage in each cell who are above the median values on each commitment variable.)

AFFECTIVE ORGANISATIONAL COMMITMENT: (Percentage above sample median.)

39	64
44	61

Above median / Below median — COMPANY SENIORITY

Below median Above median

JOB SATISFACTION

NECESSITATIVE ORGANISATIONAL COMMITMENT: (Percentage above sample median)

65	54
39	33

Above median / Below median — COMPANY SENIORITY

Below median Above median

JOB SATISFACTION

COMMITMENT TO STAY IN THE ORGANISATION: (Percentage above sample median)

43	71
22	65

Above median / Below median — COMPANY SENIORITY

Below median Above median

JOB SATISFACTION

11.4 Commitment and work involvement

With the exception of the Affective Commitment to the branch, neither of the work involvement indices appear amongst the results of Table 11.1. At a zero Order level, work effort correlates positively with all four Affective Commitments, with the Commitments to Stay in the department and company and negatively with the Necessitative Branch Commitment, as shown in Table 11.4. Work centrality correlates weakly with the Affective Commitments to the department and the branch. While offering some illustration of the postulate that higher work involvement would lead to higher Affective Commitment because of the greater value attributed to work-related "benefits", such relationships are mediated by others in the linear analysis.

Table 11.5 however does indicate that variations in work effort have a strong contingent effect on the determinants of commitment, thus supporting the Commitment Hypothesis. Repeating the same regression analyses, as undertaken in Table 11.1, for engineers below ("low") and above ("high") the median value of work effort, Table 11.5 presents the values of multiple R^2 found in each case. Although there is little difference in branch and occupational commitments, for the Affective and Necessitative Commitments to the department and organisation, the predicted variance is much lower in categories of "high" work effort. Furthermore it is differences in work effort which appear to have the greatest contingency effect in this

TABLE 11.4 THE EFFECT OF WORK INVOLVEMENT ON COMMITMENT:

(Table shows Pearson correlation coefficients and significance levels between work effort and work centrality indices and the commitment variables.)

CAREER SITUS	TYPE OF COMMITMENT	WORK INVOLVEMENT			
		Work effort		Work centrality	
		r	sig.	r	sig.
DEPARTMENT	Affective	.244	.001	.129	.038
	Necessitative	-.065	*	-.038	*
	To stay	.160	.014	.086	*
ORGANISATION	Affective	.387	.001	.016	*
	Necessitative	-.102	*	-.050	*
	To stay	.193	.004	-.037	*
BRANCH	Affective	.288	.001	.152	.018
	Necessitative	-.214	.002	-.079	*
	To stay	.103	*	.116	*
OCCUPATION	Affective	.146	.023	.081	*
	Necessitative	-.097	*	-.033	*
	To stay	.074	*	.077	*

TABLE 11.5 THE CONTINGENT EFFECT OF WORK EFFORT ON COMMITMENT

(Table shows values of R^2 found for the commitment variables repeating the regression analysis of Table 11.2 for those engineers above and below the median value of work effort.)

CAREER SITUS	TYPE OF COMMITMENT	VALUES OF R^2		
		All sample	Work effort below median	Work effort above median
DEPARTMENT	Affective	.30	.35	.11
	Necessitative	.26	.38	.29
COMPANY	Affective	.37	.57	.20
	Necessitative	.17	.33	.16
BRANCH	Affective	.34	.45	.41
	Necessitative	.37	.43	.42
OCCUPATION	Affective	.18	.17	.21
	Necessitative	.10	.24	.20

regard. Investigation of other likely contingecies - work centrality, organisational orientations, PCS - shows some similar variation in R^2 values but the greatest difference and largest single category prediction is given across work effort categories.[1] Clearly however there is a pragmatic limit to how many options might thus be explored, and it is possible that other larger contingencies might be found.

In fact investigating differences in Pearson correlations between the commitment variables and those 'determinants' given in Table 11.1, considerable reduction in the strength of the correlations is found across the two work effort categories. This is shown in Table 11.6, which also indicates those variables from the whole Analytical Framework having the largest correlations with each commitment variable in the two cases. In many instances these are the same factors, or at least are variables appearing in the Table 11.1 summary. The correlations are much stronger where work effort is "low" than if it is "high", even for relationships with branch and occupational commitments where changes in multiple R^2 in Table 11.5 are slight. Thus it would seem from Table 11.6 that it is largely the same variables that account for the variance of the

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1. Values of R^2 for Affective and Necessitative Organisational commitments:

Organisational Commitment:	All	Work effort Low	Work effort High	Work central. Low	Work central. High	PCS Low	PCS High	Org. Orient. Low	Org. Orient. High
Affective	.37	.57	.33	.38	.45	.45	.23	.43	.38
Necessitative	.17	.33	.16	.25	.17	.25	.17	.26	.14

TABLE 11.6 THE CONTINGENT EFFECT OF WORK EFFORT ON CORRELATIONS BETWEEN COMMITMENT VARIABLES AND THEIR SCALAR DETERMINANTS:

(Table shows Pearson correlation coefficients, with significance levels below 5%, between Affective & Necessitativ commitments and the scalar variables from the Table 11.2 regression analysis, for values above and below the median work effort.)

BODY	TYPE OF COMMITMENT	Pearson correlations with these variables: @	Work effort below median		Work effort above median	
			r	sig.	r	sig.
DEPARTMENT	Affective	Job satisfaction	.457	.001	.273	.003
		Variety	.392	.001	.271	.003
		Occupational openness	.299	.002	.145	*
	Necessit-ative	Seniority	.404	.001	.253	.006
		Occupational openness	-.294	.002	-.146	*
		Degree class	-.242	.018	-.056	*
ORGANISATION	Affective	Job satisfaction	.400	.001	.137	*
		Education level	.326	.001	.253	.007
		Promotion rate	.438	.001	.154	*
		PCS	.456	.001	.035	*
		Autonomy	.314	.001	.088	*
	Necessit-ative	Seniority	.415	.001	.247	.008
		Degree class	-.301	.004	-.028	*
BRANCH	Affective	Degree class	.433	.001	.325	.003
		Work effort	.347	.001	.108	*
		Occupational openness	.243	.009	.123	*
	Necessit-ative	Degree class	-.374	.001	-.269	.012
		Variety	-.227	.014	-.131	*
OCCUPATION	Affective	Variety	.294	.002	.118	*
		Specialisation	.161	*	.203	.023
	Necessit-ative	Monetary orient.	.323	.001	.082	*
		Seniority	.339	.001	-.020	*
		Monetary goals	-.241	.016	-.151	*
		Variety	-.295	.006	-.187	.033

(@ - The values under-lined in the table represent the highest correlation coefficients between the particular commitment variable and all the scalar variables of the Analytical Framework in each of the above and below median work effort categories.)

commitment measures whether work effort is "low" or "high" , but in the former case their influence is much stronger.

Such results are partially consistent with the Commitment Hypothesis. Certainly work effort does have a strong contingent effect on the determinants of the engineers' Affective and Necessitative Commitments. Where work effort is "low" , Pearson correlations with the commitment variables are stronger than where it is "high". This is reflected in the greater predicted variance of the departmental and organisational commitments in the "low" work effort case compared with the "high", although in both instances similar variables seem to be predicting commitment.

However, the hypothesis is not supported insofar as almost <u>all</u> the correlations are diminished for those of "high" work effort. The Commitment Hypothesis predicted that "organisational", "occupational" and "personal" factors would have a diminished influence on commitment the higher the level of work involvement, but that "career" factors would be more important. Insofar as such "career" factors are represented by perceived promotion rate, PCS, occupational openness, and company seniority, then this part of the hypothesis must be rejected. Each of these parameters show weaker Pearson correlations with their corresponding commitment variables in the "high" work effort category (Table 11.6), just like all the other elements.

Several explanations might account for this result. It may be that such variables do not satisfactorily represent the important aspects of the men's careers which influence their commitment; however this seems unlikely. It may be that engineers of higher work effort keep a more open mind about advancement opportunities and are more critical - simply because of the greater importance attached to their careers; this may make the pattern of their commitments more idiosyncratic. One analytical explanation might be that engineers of"high" work effort also have strong commitments, or at least a lower variance in their commitments which makes prediction from the correlation analysis problematic. The Pearson correlations in work effort shown in Table 11.4 suggest this may partially be the case, although analysis of differences in means and standard deviations does not support the latter; while mean Affective Commitments are higher in three cases where work effort is "high", the standard deviations are smaller only in two instances; for Affective Departmental and Necessitative Branch Commitments.[1] Such may partially account for the observed results in these cases, but clearly not in the remainder.

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1. T and F tests for commitment variables across categories of "high" and "low" work effort. (Comined variance estimate for T, 2-tail F test)

COMMITMENT:	MEANS				STANDARD DEVIATIONS			
	Work effort				Work effort			
Affective:-	Low	High	T-value	Sig.	Low	High	F-value	Sig.
Department	4.85	5.97	4.61	.000	1.90	1.46	1.68	.011
Company	4.72	5.29	2.17	.032	1.89	1.73	1.19	*
Branch	4.94	5.53	2.27	.025	1.85	1.77	1.09	*
Occupation	5.15	5.56	1.46	*	1.92	1.99	1.08	*
Necessitative:-								
Department	-.87	-1.11	.74	*	2.19	2.31	1.11	*
Company	.72	.53	.62	*	2.13	2.18	1.05	*
Branch	1.16	.70	1.70	*	2.08	1.64	1.62	.021
Occupation	1.11	.82	.99	*	1.99	2.07	1.08	*

11.5 Discussion

While only about half the engineers expected to stay in their present departments in the medium term, most anticipated remaining in their companies, branch of engineering, and engineering in general. Typically, most showed a high sense of Affective Commitment to these career situses, as assessed by their readiness to enter them again if faced with the same decision ; such responses were rather less unequivacable however, so giving rise to a range of Necessitative Commitments based upon the difference between these preferences and the future likelihood of staying. The analysis in this chapter has sought to examine relationships between elements of the Analytical Framework and variations in these commitment measures within the sample. These elements have been assumed to be antecedents of the commitment variables, permitting causal interpretations to be made.

However, the very general notions of "exchange" and "accrual" are difficult to test decisively using linear analysis and the data at hand (cf. Section 11.3; Hrebiniak & Alutto, 1972). Realistically, the items involved in such mechanisms may not be reducible to numerical parameters, and in the case of "exchange" transactions there is the problem of assessing the validity of a ratio formulation between "benefits" and "costs", rather than , eg, an arithmetic difference. For "accrual", the cumulative effects of different kinds of"investments" pose similar methodological problems. While the results

of the linear analyses show that a number of factors are related to variations in commitment in a manner that may in part be consistent with such broad theories, other inferences could feasibly be drawn and in no way can the results be said to prove the validity of the "exchange" and "accrual" hypotheses. This is particularly so since evidence of the operation of "costs" and "side bets" is lacking.

However, what the results do suggest more strongly is that while neither of these general mechanisms alone seem to provide a sufficient explanation of commitment processes, the origins of Affective and Necessitative Commitment do appear fairly different. For departmental and organisational commitment, the level of job satisfaction is the most important factor related to Affective Commitments, that of company seniority the major factor related to Necessitative Commitments. Since the engineers' Commitment to Stay seems to be affected by the combination of the two, there is some evidence for the usefulness of the distinction in types of commitment. In general, the results for departmental and organisational commitment are most consistent with the postulated Commitment Model in this way; this is hardly surprising given the attention in the research literature on organisational commitment, around which most ideas are structured. Furthermore the idea of leaving the engineering branch or the occupation altogether seems to be a consideration of relatively few, so that tapping variations in commitment within the sample from

which to draw deterministic inferences is rather difficult.

The influence of perceived promotion rate and PCS on the level of Affective Organisational Commitment illustrates the importance of particular "career factors" on the engineer's commitment in this case, those perceiving faster promotion and feeling more successful having a higher commitment. The discussion in Section 4.1 suggested that, for the engineers in general, aspects of their career would have a large influence on their commitments. However, this contention is only partially born out, for despite this result a variety of other factors within the Analytical Framework are related to the commitment variables. In general the origins of commitment appear complex, with no single source having overriding pre-eminance.

The hypothesis that such career factors would be more important the higher the level of work involvement is not substantiated, and in fact, from the Pearson correlations observed in Table 11.6, the opposite appears to be the case. Work effort does have a strong contingent effect on the factors related to the Affective and Necessitative Commitments, consistent with the Commitment Hypothesis, but all variables show a diminished influence, including those relating to the engineers' careers. The reasons for this are not fully apparent, although one possible explanation

might involve the diversity of 'strategies' employed by engineers in pursuing their career goals, some having different ideas than others about the desirability of particular career situs for furthering these goals. For example, while the perceived prospects of future promotion in a given company might be good, an engineer could perhaps feel it was in the best interests of his career to move around and gain a wide experience. In contrast, others might think that specialisation within one company has advantages for their future careers in terms of the 'local' knowledge they could command. This diversity may be further reinforced by differences in the types of career goals pursued (Chapter 8). With the possible exception of a small negative relationship between technical-scientific status and geographical mobility, situs mobility does not influence achievements in career status for the sample as a whole (Figure 9.4). Nevertheless, perceived differences could well arise in the implications of situs mobility for an engineer's career advancement, thus inhibiting a simple relationship in the linear analysis between the commitment variables and attributes of the men's careers. Indeed, it may be that such 'strategies' become more significant for those of "high" work effort, and hence the differences more acute, thus explaining the weak relationships observed in these cases.

In sum then, while the engineers' commitment to these four situs categories appears to be influenced by certain aspects of their careers and the level of work involvement, this influence is weaker than anticipated and more complex, with other factors requiring due consideration in explaining these commitments.

CHAPTER TWELVE

CAREERS, COMMITMENT AND WORK INVOLVEMENT

What we call the begining is often the end
And to make an end is to make a begining.
The end is where we start from...

T.S. Elliot;
Little Gidding.

This thesis set out to try and account for differences in the work involvement of professional engineers. Attention has been focused in particular upon the influence of their careers and in so doing a broader treatment of career development has been undertaken, with work involvement comprising one element in this process. In view of the implications of this development for occupational behaviour, examination of the effects of work involvement and various career factors on the engineers' commitments to four lines of work activity has also been attempted.

With several exceptions, the empirical analysis of Part II supports the hypotheses put forward in Part I of the thesis (Section 4.5), although cross-sectional data restricts the extent to which these may be 'proven' per se. However, most of the null hypotheses (that there is no association between suggested variables) can be rejected and the consistency of the Primary and Secondary Hypotheses thus upheld. In some cases there is also inferential support for the direction

of causal relationships, although in general further longitudinal study is required to fully verify the nature of causality and the processual mechanisms of the Career Development Model.

The division of the work involvement concept into work effort and work centrality components seems to be particularly useful. While most engineers claim a fairly high work effort, there is rather less unanimity about the relative importance of work in their lives. Linear analysis in fact suggests each may arise from very different origins.

Variations in work centrality are not well predicted by elements of the Analytical Framework, a result suggesting that parameters connected with work and the career may have little influence on this factor. Since the two variables significantly related to work centrality in the linear analysis are the engineer's age and type of accommodation, this proposition is further supported, although explanations for these relationships can only be speculative.

In contrast, variations in work effort are strongly related to a number of elements in the Analytical Framework, in particular to the levels of job satisfaction and PCS. As discussed in Chapter 7, the direction of these relationships is problematic, although since job satisfaction appears to be strongly related to feelings of job utilisation - whose origins in turn can be traced to a number of likely determinants - some directionality has been argued for this factor.

The engineers' feelings of job utilisation - or their more familar converse, under-utilisation - appear to arise from both 'structural' characteristics of their work (organisational status, work variety), as well as their personal approach to it (organisational career orientations, degree class). Thus it is argued that job utilisation represents a major determinant of the level of job satisfaction, and hence that job satisfaction has a strong influence over the engineers' expressed work effort. This is an important substantive result, suggesting that complaints of skill under-utilisation by engineers (eg, Ritti,1971; Sofer, 1970) may have important consequences for work-place behaviour.

The strong relationship also found between PCS and work effort is consistent with the Involvement Hypothesis, although only after considering the cycle of PCS/work effort/organisational status relationships across different age-groups may causal inferences be argued. Since the longitudinal assumption is only speculative however, this inference must remain suspect. Whilst recognising this limitation, the result is nonetheless important, suggesting that because some engineers feel more successful than others in their careers they will tend to work harder. This is the critical link within the Career Development Model, relating developments in the engineers' careers to their level of work involvement. Contrary to the original hypothesis however, this relationship does not appear to be mediated by the sense of work-based self-esteem which, it was argued,

would arise from feelings of career success. Possibly this is due to the wider origins of this self-esteem, possibly due to an inability to measure it satisfactorily.

In addition to the strong relationships with job satisfaction and PCS, Figure 7.6 also illustrates that three other variables have significant associations with the level of work effort: the perceived work variety, being a Chartered Engineer, and the engineer's company. Those men who see their work as more varied, tend to have a higher work effort; this result may indicate the influence of job characteristics on work experiences (cf. Hackman & Lawler, 1971), although it is also one which might operate in the contrary direction. Certainly the high work effort shown by Chartered Engineers is liable to this kind of interpretation. Variations in work effort between companies are also significant in the regression analysis after these four parameters have been entered; possibly this reflects normative differences between them, possibly differences in the jobs done in these companies or their current workload; it may be that various 'residual' factors not included in the Analytical Framework also vary between people in these companies and produce this result. Nonetheless, even without these three additional parameters, variations in work effort within the sample are well predicted: job satisfaction and PCS together accounting for 39% of the variance. What precise behavioural significance is involved in this variation cannot be assessed with the data at hand, although the actual

differences in the attitudinal responses of Figure 7.1 and 7.2 suggest this range may not be negligible. Indeed, any inclination to give 'socially acceptable' responses (eg, for persons to claim they do get fairly involved in their work), might perhaps result in the behavioural position actually amplifying the attitudinal variation in work effort.

While causal interpretations have been argued for the relationships of job satisfaction and PCS with the work effort index, it is variations in the index value about the sample mean which is thus explained. The position of this mean however cannot be accounted for in this present study, since it would be necessary to employ a wider inter-occupational perspective and contrast groups whose average work effort was much different in order to achieve this. In practice, certain "occupational factors" might influence the engineers' average work effort; possibly aspects of 'professionalism' or their class position might be involved (cf. Section 2.2).Such effects might be restricted to the engineering occupation, although quite likely they may be characteristic of 'middle class' occupations or 'the professions' in general. Indeed this high work effort might perhaps be a reflection of Weber's "Protestant Ethic" (1965), albeit in a more recent form. Watkins (1975:73) in fact suggests that:

> The work attitude is built into the institutional structure of our society and into our own personalities as well. Not working is something that we feel that we ought to have a bad conscience about. In this fashion it can be seen as a legacy of the 'Protestant Ethic'.

While such normative influences could account for the average level of work effort, variations within the sample seem less likely to be affected in this way. Given that measurement errors of the variables involved are likely to be substantial, residual errors - the unexplained variance - in the regression analyses will probably be large. Thus, with 39% of the variance in work effort accounted for by two parameters, the scope of further explanation may actually be quite small. It is of course possible that differences in work centrality could be better explained by such normative effects.

In general, the results largely confirm the conclusions of Beynon & Blackburn (1972), and the usefulness of the Conceptual Framework (Figure 2.1), with variations in work effort depending on both the 'structure of the work role' and the engineers' 'orientations to that role'. Differences in work effort seem to derive largely from the two separate influences of job satisfaction and PCS. The former, it is argued, depends very much on the engineers' sense of job utilisation: this reflects certain 'structural' characteristics of the work as well as the engineers' approach to it. The same is true of the feelings of career success, which represent a subjective interpretation of 'objective' career achievements.

In fact, as the analysis of Chapter 8 has indicated, this subjectivity in the assessment of career status is facilitated by differences in prior career goals, by the

saliency currently attached to different types of career status, and by its evaluation within selected groups of people. With prior career goals inferred from categories of social and educational background, and the influence of comparative reference groups infered from PCS-career status correlations within selected career situses, the analysis supports each part of the PCS Hypothesis.

Organisational responsibility level seems to be the main criteria used to gauge career success by the engineers as a whole, the level reached by a particular age appearing critical in this regard. This confirms the arguments of Ritti (1971) and Sofer (1970) about the importance of organisational advancement to the engineers in their work. Nevertheless, the analysis in Table 8.4 also shows that other types of career status - salary and 'scientific output' - may have a greater influence over feelings of career success for some engineers, and that it is only for those who attribute above average saliency to organisational advancement that achieved responsibility level influences PCS.

This subjective interpretation of career status has important implications for "cooling out" engineers when career achievements are lacking. By setting lower career goals, assigning saliency to some achievements rather than others, and by making comparisons within selected groups, adaptation may be facilitated. The hierarchical nature of most organisations inevitably

limits an engineer's chances of promotion to the highest levels. However as Figure 10.8 indicates, 64% of the Total Technology sample, 47% of those in the Student Survey and 33% of the engineers under the age of 30 'agreed' (5,6,7 responses) that: "I THINK SOME DAY I'VE A GOOD CHANCE OF BECOMING A PARTNER OR DIRECTOR IN A COMPANY OR FIRM" , although limited opportunities means that few can achieve these ambitions[1]. However the subjective assessment of career status allows actual achievements to be variously interpreted in deriving a sense of career success, thus enabling accommodation to such 'failure'. Indeed, as Figure 8.1 has illustrated, most engineers felt"pretty successful" in their careers, with only about a tenth feeling this was not so.

The Career Development Model of Figure 3.4 further postulates a number of mechanisms by which this adaptation occurs over time, the main suggestion being that success will tend to increase career goals and orientations, and failure reduce them. Clearly cross-sectional data cannot examine this process adequately, although as Section 9.2 indicates, results of the linear analyses are broadly consistent with the postulated relationships: higher organisational and monetary goals are found to be associated with higher PCS, as are higher organisational orientations. There is also some limited evidence of socialisation effects

1. The actual numbers of Chartered Engineers in such top management posts is discussed in Section 5.4; 8.9% of graduates claim to be "Directors, partners or principals" (CEI,1977:15), although the flexibility of this category may make such odds unduly flattering for new graduates. The sharp drop in the percentage agreeing with the statement above the age of 30 (Figure 10.8) is perhaps a better indication of their realistic chances of getting a top job.

on these career attitudes: variations between companies and engineering branches are significant in a number of cases, and relationships with several aspects of social and educational background are observed. The influence of these socialisation effects is strongest where relationships with PCS are weakest, suggesting a complementary influence as postulated in the Career Development Model. The significant relationships between age and each of the measures of career goals and orientations (except monetary orientations) were not specifically hypothesised. For the career goals the result is perhaps understandable in view of the strong age related nature of career status. For the career orientations, however, there is a progressive decline in the importance of organisational advancement and an increase in technical orientations with increasing age of the engineers. This may represent a general adaptation to limited openings higher up the organisational hierarchy in line with Goldner & Ritti's thesis (1967) although the fact that it is age per se and not other specific career parameters which emerge so strongly from the linear analyses, suggests this may only be part of the case: differences in historical experiences or age-group composition might be partly responsible for these results (eg, Roos, 1978), as might more 'inherent personality developments' (eg, Hall & Mansfield, 1975).

Nonetheless, the results do appear to be generally consistent with the suggested Career Development Model

in this regard, positing a combined influence of PCS and socialisation effects on the engineers' career goals and orientations, although these do not themselves provide a complete explanation of such career attitudes. However, this mechanism is important in indicating that the motivation to compete for positions of higher career status derives from both the engineers' social context and their personal career experiences. This latter in particular demonstrates the motivational implications of relationships in the Career Development Model, a motivation that is self-reinforcing as achievements in career status fulfill prior career goals, stimulate PCS, and lead to the pursuit of higher career goals in the future. In this way, it seems that success breeds the desire for further success.

While career goals and orientations may in part thus be influenced by the engineer's social context, it is also argued that such contexts themselves may be selected in line with particular career goals and orientations. This reflects the preferences of the engineers to pursue their careers within particular career situs. Analysis of the intra-occupational job choices of Third Year Imperial College engineering students provides some evidence to support the general Career Choice mechanism suggested in the Career Development Model; namely, that within the constraints of particular labour markets, choice of career situs is influenced by a person's career goals and orientations.

While wider generality clearly cannot be presumed from this one case alone, some illustration of the basic mechanism is thus provided.

Following this, in the analysis of Section 9.4, factors related to the engineers' career status are considered, and a strong 'institutional' determination observed, particularly for organisational and monetary statuses, ie, for the levels of responsibility and salary of the men. Age has a powerful influence on the levels of career status, as too have the categories of career situs - company, engineering branch, and whether or not a person is in a management job. The variance in organisational and monetary status accounted for by these 'institutional' factors is considerable (over 50% in each case), implying that more 'idiosyncratic' differences between the engineers make a relatively limited contribution to their career status. Nonetheless, for the sample as a whole, variations in work effort do have a small influence on the level of organisational status beyond this 'institutional' determination, although in fact this is confined to the three companies Contractor, Northern, and Public, which have few engineers employed in RD & D work.

The relationship between work effort and organisational status indicates some degree of "closure" to the circular mechanism suggested in the Career Development Model. Considering partial correlations between organisational status, PCS and work effort within 5 year age-groups, this circularity is further demonstrated. On the basis

of a speculative longitudinal assumption, changes in the pattern of correlations across the age-groups suggest the cycle may operate in the manner posited. Thus, over the first part of the engineers' careers , differences in organisational status lead to differences in PCS, which in turn influence the level of work effort, and finally lead to variations in organisational status; such developments occuring over a 20 year cycle. Of course the validity of this inference is questionable in view of the dubious longitudinal assumptions involved, although since it is patterns of inter-relationships which are observed over different age-groups rather than the values of parameters themselves, greater reliability might be anticipated. Within this caveat, the result is important, lending support to the Involvement Hypothesis that PCS is a determinant of work effort,(other than simply an associated factor).

The pursuit of long-term career goals, as postulated in the Career Development Model, also seems likely to generate a sense of purpose and temporal continuity in the engineers' working lives (Section 10.3). As such, it is probable that their occupational behaviour may come to reflect a particular career 'strategy' as engineers attempt to pursue their career goals in the manner they think best. This effect has been considered empirically by investigating the engineers' commitments to four lines of work activity and assessing the influence of career factors and the level of work involvement on these commitments.

The engineer's department, company, engineering branch, and the occupation in general are the four lines considered. In accordance with the Commitment Model suggested in Figure 4.2, the Commitment to Stay in these career situses is treated as the sum of Affective and Necessitative Commitments, of the extent to which the engineer 'wants to stay' and 'has to stay'. The value of this distinction is largely confirmed by the different types of factors found to be related to each in the regression analyses presented in Tables 11.1 and 11.2. Affective Commitments are principly related to the engineer's job satisfaction, several job characteristics, and a number of career-related factors. In contrast Necessitative Commitments are related most strongly to company seniority and the class of university degree obtained.

The very strong Commitments to Stay in the branch and occupation, and the slightly less strong Affective Commitments to these lines may have contributed to the fairly poor prediction of their variance in the regression analyses. Indeed, the general impression is that movements between major engineering branches and out of the occupation are rare[1]. It is departmental and organisational mobility which occurs more frequently , and it is the prediction of these commitments in the regression analysis which best illustrates the value of the Affective/Necessitative distinction. Figure 11.4 in particular shows that job satisfaction seems to influence Affective Organisational Commitment, company seniority

1. There seems to be an absence of published data on these issues. Certainly the need for specialist technical knowledge must restrict inter-branch mobility, although boundaries may be imprecise.

Necessitative Organisational Commitment, with the two together exerting a cumulative influence over the Commitment to Stay in the organisation. This distinction seems important in view of the different origins of the two commitment-types, which may not be recognised if only the Commitment to Stay is considered.

In fact the nature of the parameters related to the various types of commitment give some support to the hypothesis that Affective Commitment will arise from an exchange transaction, Necessitative Commitment from an accrual mechanism. However, the results of the regression analysis are not unambiguous, and certainly neither of these mechanisms alone can provide a complete explanation of the two types of commitment.

Relating these commitment variables to the engineer's work involvement, the Commitment Hypothesis postulated that the level of work involvement would have a contingent influence on the commitment variables, an effect arising from the different values assigned to the elements in exchange and accrual mechanisms. The results support this proposition, with correlations between commitments and their determinants being much reduced for engineers of above average work effort. However, contrary to the suggested hypothesis, career factors do not show an increased importance for such engineers, but like all the other elements have a reduced correlation. As such, the results imply rejection of this hypothesis, although the reasons for it's inadequacy are not fully apparent.

The regression analyses of Tables 11.1 and 11.2 indicate that a number of "career factors" are significantly related to the commitment variables: these include the perceived rate of future organisational promotions and PCS with Affective Organisational Commitment;and company seniority with Necessitative Commitment to the department, organisation and occupation. These relationships with the "career factors" however are perhaps not so predominant as anticipated in Chapter 4. For those experiencing "extended careers" in general, Ashton (1974:183-184) has argued that occupational commitment develops as follows:

> For young people who enter this occupational channel (professions, banks, civil service, management) many of the mechanisms that operate to commit the apprentice to his trade also operate: they also become committed to a specific occupation, and they are faced with a lengthy period of training during which they are expected to master relatively complex theoretical and practical skills. Both at work and in their further education they are investing time and energy in acquiring skills that are not transferable in the initial stages of their career. Therefore if they are to maintain their position in the struggle for advancement they must remain in their occupation for to move into another occupation would mean that they would fall behind their fellows and have to start all over again from the bottom of the career ladder. The more time and energy they invest in acquiring their occupational skills, the more committed they are to continuing within their occupation if they are to obtain the future rewards they seek.

While Ashton here clearly emphasises the "investments" entailed by training on what seems to be essentially Necessitative Occupational Commitment, in fact"benefits" connected with the career also seem likely to influence Affective Commitment. For example, a number of studies have found that the perceived rate of future promotions

influences the commitment to particular organisations (Table 4.1), a result confirmed in the Engineer Survey. Wilensky (1961:523) points out such effects in the following terms:

> By holding out the prospect of continuous predictable rewards, careers foster a willingness to train and achieve, to adopt a long time perspective and defer immediate gratifications for the later pay-off.

While the pursuit of career goals may involve some long-term 'strategy', the resultant commitment to particular career situses may in fact differ according to the nature of this'strategy' and its suitability in a particular context. For example, some interview boards, selecting a candidate for promotion, may view a man who has stayed in one company all his working life as a "stick-in-the-mud" or as "unadventurous", while others might consider such "loyalty" to be a virtue. Similarly, a general manager might feel it is in the best interests of his career if he moves around firms and gains a broad experience, while in contrast a design engineer, working in a specialist field, may feel that by concentrating in one company and building up extensive'know-how' in his technical area, he is pursuing his best career 'strategy'. (In fact the low rates of situs mobility shown in Figure 10.4(b) suggest that for this example, the latter may be more relevant than the former, as far as the men in the Engineer Survey are concerned.) It is thus possible that such differences in the way people choose to pursue their career goals prevent a simple relationship arising between an

engineer's commitment to career situs and the "career factors" considered in the Analytical Framework; such might then explain the results observed in Tables 11.1 and 11.2, where the influence of "career factors" on the commitment variables is by no means predominant, and which decreases when the level of work effort is above average.

With several exceptions then, the results of the empirical study are consistent with the hypotheses put forward in Part I of the thesis. The influence of attributes of the engineers' careers on variations in their work involvement has been examined, with their sense of career success having an important effect on this level. The bases of the engineers' commitment to several lines of work activity are in turn affected by the level of work involvement, although the postulated influence of their careers on these commitments is not fully substantiated. While further longitudinal research is needed to completely verify these hypotheses and the causality involved, supporting evidence suggests this verification is likely.

Even so, the validity of the hypotheses can of course only legitimately be maintained within the context of the present study. Presuming the sample of the Engineer Survey to be crudely representative of organisationally-employed professional engineers in the country as a whole (Table 6.2, Section 5.2), then extension to this occupational group in general seems reasonable. Indeed,

the broad formulation of many of the relationships, suggests that results are also likely to be applicable to other groups of 'professional' employees working within comparable 'bureaucratic' environments. In this respect, some general implications drawn from the results may have this wider validity, particularly in terms of the nature of organisational characteristics most suitable for the employment of 'professional' groups.

Central to any suggestions involving organisational design is the relationship between PCS and work effort, taken on the assumption that the causal inferences drawn in the thesis are in fact substantiated. Presuming that a high work effort amongst the employees is desirable for a particular organisation, then it may be suggested that the promotion of a high PCS is one way of facilitating this. (For the engineers studied here, another way is to ensure that the men feel their skills are well utilised in their jobs.) Whether it is preferable to have a large proportion of people with a moderate work effort, or to have a greater variation, with some extremely involved but others much less so, may depend upon particular organisational requirements; as such, some balance may need to be struck accordingly between the variation in PCS and the overall mean. Whatever is most suitable, following the relations of the Career Development Model, particular organisational characteristics are likely to influence the development of PCS within the organisation. Thus, by suitable design of such organisational features, some influence over the level of work effort may be achieved.

The subjective basis of PCS discussed in Chapter 8 suggests a number of factors may need consideration in this regard. For the engineers, organisational status provided the main criterion of success for the group as a whole, but in fact it was only for those men who felt that organisational advancement was important that this was so. For some engineers, other types of career status seemed to have more influence on their PCS. Where different criteria are available in this way, the opportunities for a person to feel successful in their career are accordingly increased. This, of course, is part of the rationale behind the "dual career ladder" used in some organisations for scientists and engineers, involving "managerial" and "technical" paths of promotion. One reason for the apparent failure of many of these schemes seems to be the predominant definition of "success" in terms of "managerial" promotions, whilst alternatives lack sufficient saliency (Goldner & Ritti, 1967). In fact, types of career achievement may indeed take various forms; in the Engineer Survey, organisational responsibility, salary, and 'scientific' output represented three significant types for particular engineers. However, it is only where such forms of career achievement are salient to the people concerned that a sense of PCS is engendered. In general then, it would seem that the greater the number of different types of career achievement available within a given situation, then the more likely a high mean PCS will be developed - provided that these types are salient to particular individuals therein.

Of course, where such career achievements are not forthcoming in a particular context, then the freedom of a person to move from that context may have some influence on the overall PCS developed within it. Although a sample of only six companies does not permit analytical assessment of the influence of inter-organisational mobility rates in this regard (cf. Appendix IV(iv)), and while individual situs mobility per se does not seem to have any influence over PCS (Figure 7.9), it may be argued that freedom of movement between career situses is likely to make a broader range of opportunities available for the achievement of career status, and therefore enhance the level of PCS. For instance, if a man fails to secure higher positions of salient career status within a particular career situs, then if he is relatively free to move into another career situs, he may be able to try his hand at something different - possibly achieve a different type of career status, possibly be more fortunate in achieving the former type - such that, in general, these moves are likely to increase the chance of a person feeling successful in their work career. Within a particular organisation, the freedom to move about between different departments would be one method of providing a range of achievement opportunities to people who find they are not successful within a particular line of work. In practice, of course, such mobility is likely to be limited by the specialised nature of certain jobs, but for the general purposes of stimulating a higher PCS within the organisation, there would appear to be some advantage in promoting free movements between the various departments.

In the Engineer Survey, National was the only company in which this policy seemed to be actively pursued (Appendix IV(iv)), although in Contractor the frequent changes of building site might also serve a similar function.

However, the advantages of such freedom of movement may be limited, since low situs mobility might also promote the operation of narrow comparative reference groups. These may stimulate PCS by confining the evaluation of career status to particular groups, as illustrated in Section 8.4. This is not necessarily disadvantagous if comparative reference groups are focused on a single organisation (eg. due to the long time spent in it), for inter-departmental mobility would not influence comparisons against other organisational members in general. Such narrow comparisons may enhance a high PCS throughout the organisation because of the relative nature of the status evaluations. For instance, a 'tall' organisational hierarchy, with a narrow "span of control" will probably increase an individual's chances of regular promotion, although due to the large number of levels, specific increments in responsibility may not be very great in any'absolute' sense, ie compared to other organisations in general. However, where comparisons of achieved status are restricted to the one organisation, no such wider standards are likely to prevail, and a 'tall' hierarchy, with frequent promotions up a large number of levels, is likely to encourage a high mean PCS (cf. Wilensky, 1960). In fact, it is perhaps no coincidence that the organisational

employment of professionals does appear to be associated with'tall', narrow spanned, hierarchies (Blau, 1968; Meyer, 1968; Pugh et al, 1968).

Neverthless, the influence of particular kinds of organisational structure on the PCS of the employees may be complicated by its additional influence on their motivation. The analysis in Chapter 9 is consistent with the postulated Career Development Model that higher PCS leads to the setting of higher organisational goals and orientations; ie that success breeds the desire for more success. As such, while a 'tall' organisational hierarchy may enhance the overall PCS, the level of organisational status aspired to in the future may become very high, and its attainment correspondingly important to the individuals concerned. However, given the reduction in available posts as the organisational hierarchy is ascended, the opportunities for fulfilling these organisational goals may not be available. Initial promotion at the lower organisational levels may thus foster a motivation to achieve higher, but if these can only be attained by a small fraction of the workforce, a low average PCS may ensue. In fact, this kind of paradox has been classically illustrated by Stouffer et al (1949) in the"American Soldier" study, where men in those branches of the army with the highest promotion rates expressed most dissatisfaction with their promotion chances; apparently, it was argued, because their expectations had been raised but could not be fulfilled.

It is not at all obvious in fact how the balance is best struck between stimulating the motivation to compete for higher career status and coping with that proportion of employees who must accordingly fail to achieve such status positions. Where high organisational turnover is viable, then a promotion system that is highly competitive may be most suitable, with the large proportion of 'failures' able to leave the organisation. Where this is not the case however - perhaps because training is costly or lengthy, or manpower in short supply and not easily replacable - then a less competitive system may prove more effective in coping with the 'failures' who must remain in the organisation.

The basis on which promotions are gained is likely to be a critical factor influencing the degree of competition within a particular organisation. In the Engineer Survey, it is only for those men working in Operations and Services (or what is virtually the same thing, those in Contractor, Northern, and Public) that differences in work effort appear to influence organisational status. Surprisingly however this "closure" or lack of it has little influence on the relationship between PCS and work effort. That is, even in situations where it does not appear to contribute to a higher organisational status, those of higher PCS continue to show a higher work effort. Possibly it is because such people are mistaken in their beliefs about the bases of promotion, a misjudgement which may continue in view of the very strong age component to career status; possibly

it is because of the more inherent influence of PCS on a person's "work-based subidentity" which sustains a high work effort for its own sake, irrespective of the immediate rewards.

In any event, the considerable influence of the engineer's age on organisational and monetary status may have contributed to the absence of very many men feeling that they were 'failures' (Figure 8.1). Table 9.5 and Figure 10.4 suggest that the men generally experience steady increments in organisational and monetary status with age. Certainly, differences in status also occur, dependent partly upon the engineers' career situs and to a small extent their work effort. However while some rise faster than others, all seem to rise; all increase their career status by some degree. And while some feel more successful than others, few feel they are failures. Unfortunately, the significance of this age component in career status to feelings of career success cannot be assessed with the available data. As with the work effort parameter, correlations allow variations in PCS to be accounted for, but explanation of the mean level may only be speculative without broader comparative analysis. It does, in fact, seem likely that steady, age-based advancement will inhibit the experience of 'failure'. However, on the other hand, the competitive nature of the career may thus be emasculated as motivation is stifled : if promotion depends very strongly upon a

person's age, there is no reason why they should work hard to gain such promotions.

While fostering the feelings of career success amongst organisational members may enhance their work effort, implications for work-place commitments are not obvious from the study. The analysis has shown that the bases of commitments are rather complex, and the influence of career factors by no means pre-eminant. Certainly, Affective Organisational Commitment is positively related to the perceived rate of future organisational promotions, and both Affective Commitment and the Commitment to Stay in the organisation are greater, the higher an engineer's PCS (Table 11.1). However paradoxically, and contrary to the hypothesis, these relationships are reduced as the level of work effort increases. In fact it is company seniority - generating Necessitative Commitment - and job satisfaction - generating Affective Commitment - which together seem to have most influence on the Commitment to Stay in the organisation. And as the analysis has indicated, the level of job satisfaction does not seem to be derived directly from attributes of the career. As suggested, perhaps one of the reasons why such attributes do not have a strong impact on the engineers' commitments, is because of the diversity of 'strategies' employed in the pursuit of career goals within different contexts.

The relationships analysed in this thesis thus give rise to a number of possible implications for

the design of organisations employing professional engineers, and - perhaps - of similar 'professional' employees. In particular, it may be suggested that by promoting a high average level of PCS, a high average level of work effort may be enhanced. The subjective basis of PCS analysed here implies several possible ways for sustaining a high PCS amongst the organisational membership: the availability of different types of career status, the freedom of inter-departmental mobility, a 'tall' organisational hierarchy, and a system of promotion which is based partly upon age, yet also rewards work effort with higher career status - these represent a number of possibilities. However, the effects of particular features seem rarely isolated; low situs mobility may promote narrow comparative reference groups, while a 'tall' hierarchy and a competitive promotion system may so influence career goals and orientations that contrary effects on the level of PCS arise. As such, the complexity of this issue thus seems to preclude generalisations without recourse to wider characteristics of the particular organisation involved.

To conclude then, this study of a group of professional engineers has demonstrated the strong influence of the men's careers on differences in their level of work involvement. Those men who feel more successful in their careers have a higher work effort; a relationship that seems to arise as part of a circular, self-reinforcing process of career development. In some ways, it might seem that the picture which thus emerges is a rather sad one. It is of a group

of men caught up in the treadmill of their careers, pursuing through their work a tantalising notion of success, with the odds continually stacked against them. However, in other ways the picture is perhaps more optimistic, for their images are flexible and not unpleasant. Indeed, in the words of Robert Louis Stevenson, it may well be that:

> To travel hopefully is a better thing than to arrive, and the true success is to labour.
>
> R.L. Stevenson;
> El Dorado.

APPENDICES

APPENDIX I

THE QUESTIONNAIRES

I.(a) The Student Survey Questionnaire

QUESTIONNAIRE : For final Year Undergraduate Engineers at Imperial College

INSTRUCTIONS:

Although a few questions do require a written reply, most can be answered by CIRCLING the number next to each printed answer. Certain questions require a choice to be made between one of seven numbers, representing the strength of, eg, your agreement or disagreement with a particular statement. For example, some answers appear in the form :-

Disagree strongly — Agree strongly
1 2 3 4 5 6 7

In this case circling (1) is meant to indicate "strong disagreement" and circling (7) "strong agreement". Circling intermediate numbers represents the shades of agreement between these extremes. (4) is to be taken as an intermediate position, indicating neither agreement nor disagreement.

If on these and any other questions you feel unable to provide an answer please indicate by WRITING "DK" (Don't know) beside the column or row of numbers where this option is not explicitly provided.

All questionnaires will be treated in strictest confidence; please answer as many questions as you can.

Thank You.

1. Name :- .....

2. How old are you :- ..... years

3. Which department are you now in :-

Aeronautics	1
Chemical Engineering	2
Civil Engineering	3
Electrical Engineering	4
Mechanical Engineering	5
Mining or Min. Tech.	6

If you first started at Imperial College in another department please name it below :-

.....

4. Are you :-

Single	1
Engaged	2
Married	3
Divorced	4

5. What is your normal country of residence :- .....

6. What kind of secondary school did you last attend :-

Comprehensive	1
Technical College	2
Grammar	3
Sixth Form College	4
Direct Grant	5
.....Public (please name)	6
.....Outside U.K. (")	7
.....Other (")	8

7. What do you think your overall degree class will probably be :-

1st	1
upper 2nd	2
lower 2nd	3
3rd	4
Pass	5
Fail	6

8. At the age of about 14, were you in the care of :-

Both parents	1
One parent	2
A guardian	3
Other (please specify)	4
.....	

9. What were the normal occupations of your parents (or guardians) when you were about 14 years old. Please give a clear description of their occupations; for example, executive officer in the Civil Service, fitter in a large electrical company, etc.

Father	Mother (include "housewife")
.....	.....
.....	.....

10. Can you give some details of industrial or engineering work you have previously done:-

	No. of Months:	Name of Employer:	Type of work:
(a) before coming to university;	.....	.....	.....
	.....	.....	.....
(b) during 1st Summer Vac.	.....	.....	.....
(c) during 2nd Summer Vac.	.....	.....	.....

11. At the present time have you arranged some kind of full-time position for after graduation :-

Yes, definitely (except for postgraduates; see below)	1
Yes, but conditional upon my degree results (" ")	2
An offer/my acceptance of a job seems likely soon	3
An offer/my acceptance of a job is possible in near future	4
An offer/my acceptance of a job seems unlikely in the near future	5
I hope to be undertaking postgraduate studies	6

If you have answered either (1),(2) or (3) to Question 11 and know who your future employer is likely to be, please continue with Question 12; otherwise skip to 18.

12. What is the name of your anticipated future employer. If this is a small organisation, could you supply some details of the kinds of things they do :-

.....

.....

13. How did you find out about this job :-

You were on a sandwich course with this organisation	1
You were otherwise sponsored by this organisation at college	2
You knew some-one already with this organisation	3
You applied directly to the organisation on the basis of its general reputation	4
Through Imperial College Appointments Board	5
Through another Careers Advisory Service	6
From general careers literature (DOG, GO, etc)	7
From a newspaper or magazine advertisment	8
Other (please specify)	9

14. About how many people work for your future anticipated employer :-

	under 25	25/249	250/999	1000/4999	5000 +	Don't Know
(a) In the site/plant where you will probably work;	1	2	3	4	5	6
(b) In the whole organisation;	1	2	3	4	5	6

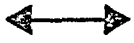
15. Why did you choose to apply to this particular organisation:- .....

.....

16. How likely do you think it is that you will remain in the next 3 years :-

(a) In the same organisation;	very unlikely	1	2	3	4	5	6	7 very likely
(b) Doing similar kind of work;		1	2	3	4	5	6	7

17. Assuming you were to stay with this organisation some time, how rapid do you think your promotion will probably be :-



Slow						Fast
1	2	3	4	5	6	7

CONTINUED FROM QUESTION 11

18. About how many jobs have you applied for in the last 12 months:-

None	1
1	2
2 to 5	3
6 to 15	4
16 or over	5

19. About how many jobs have you been offered in the last 12 months

None	1
1	2
2 to 5	3
6 or over	4

20. When you start full-time employment, do you anticipate working in engineering :-

Yes	1
No	2
Don't know	3

If yes, which field of engineering do you anticipate working in :-

Aeronautical Engineering	1
Chemical Engineering	2
Civil Engineering	3
Electrical Engineering	4
Electronics	5
Mechanical Engineering	6
Mining	7
Production Engineering	8
.....Other (please specify)	9

21. When you start full-time employment, what type of work do you anticipate doing primarily :-

Teaching	1	Management Services (Computing,OR,etc)	9
Research	2	Marketing, sales or purchasing	10
Development	3	Personnel	11
Design	4	Finance	12
Maintenance or servicing	5	Administration	13
Construction or Installation	6	Other (please specify).....	14
Production or Quality Control	7	.....	
Instrumentation or Control	8	Don't know	15

22. FOR CHEMICAL, ELECTRICAL & MECHANICAL ENGINEERS ONLY : Given the choice between working for a manufacturing or a non-manufacturing company, which would you prefer :-

A manufacturing company	1
Either, I don't mind	2
A non-manufacturing company	3
Don't know	4

Why have you made this choice :- .....

.....

23. Given a free choice, which type of employer would you most rather work for; please circle two choices in descending order of preference :-

1st choice	2nd choice	
1	1	Self-employed
2	2	University
3	3	Engineering Consultant
4	4	Small,private-sector organisation
5	5	Large,private-sector organisation
6	6	Public-sector organsiation
7	7	Don't know

Why have you made this choice :- .....

.....

24. Given a free choice, which type of work would you most like to do; please circle three choices in descending order of preference :-

1st choice	2nd choice	3rd choice	
1	1	1	Teaching
2	2	2	Research
3	3	3	Development
4	4	4	Design
5	5	5	Maintenance or Servicing
6	6	6	Construction or Installation
7	7	7	Production or Quality Control
8	8	8	Instrumentation or Control
9	9	9	Management Services (Computing, OR, etc)
10	10	10	Marketing, sales or purchasing
11	11	11	Personnel
12	12	12	Finance
13	13	13	Administration
14	14	14	Management
15	15	15	Other (please specify) .....
16	16	16	Other (please specify) .....
17	17	17	Don't know

Why have you made this choice :- .....

.....

25. In general, how important is it to you :- .....

	Of no importance						Extremely important
(a) To make more money than the average university graduate;	1	2	3	4	5	6	7
(b) To make friends with your colleagues at work;	1	2	3	4	5	6	7
(c) To be free of close supervision in your work;	1	2	3	4	5	6	7
(d) To do the kind of technical work you are particularly interested in;	1	2	3	4	5	6	7
(e) To be able to fix your own work schedule;	1	2	3	4	5	6	7
(f) To have a career line of continuous promotions;	1	2	3	4	5	6	7
(g) To establish your reputation as an authority in your field;	1	2	3	4	5	6	7
(h) To be treated as a professional by your superiors;	1	2	3	4	5	6	7
(i) To do work that is useful to society;	1	2	3	4	5	6	7
(j) To advance to a policy making position in your employing organisation;	1	2	3	4	5	6	7
(k) To be free to make most of the decisions connected with your work;	1	2	3	4	5	6	7
(l) To be highly respected by other engineers;	1	2	3	4	5	6	7

26. What salary do you think you will get when you start work :-

under £2,500	1
£ 2,500 to 3,000	2
£ 3,001 to 4,000	3
£ 4,001 to 5,000	4
over £ 5,000	5
Don't know	6

27. In terms of current price levels, what is the highest annual salary you think you'll earn at the peak of your career :- .....

28. Assuming the pay would be the same, would you prefer a primarily administrative or a primarily technical position :-

Administrative	1
Either, I don't mind	2
Technical	3
Don't know	4

29. Indicate to what extent you agree or disagree with the following statements :-

	Disagree strongly						Agree strongly
(a) Engineers are just as professional as doctors;	1	2	3	4	5	6	7
(b) I get a great sense of personal satisfaction from my work;	1	2	3	4	5	6	7
(c) For me, doing interesting work in the present is more important than the possibility of promotion in the future;	1	2	3	4	5	6	7
(d) I expect that on the whole my work will probably take priority over my social life;	1	2	3	4	5	6	7
(e) I would rather work as part of a team than on my own;	1	2	3	4	5	6	7
(f) Probably the most important things that happen to me involve my career;	1	2	3	4	5	6	7
(g) I think some day I've a good chance of becoming a partner or director in a company;	1	2	3	4	5	6	7
(h) Its only right that an engineer's work be judged by a person of wider competence, even if that person is not an engineer himself;	1	2	3	4	5	6	7
(i) I don't really care about getting on at work, so long as I'm happy outside it;	1	2	3	4	5	6	7
(j) On the whole, I don't get very involved in my work;	1	2	3	4	5	6	7
(k) I used to be more ambitious than I am now;	1	2	3	4	5	6	7
(l) My main interest in work is to get enough money to do other things;	1	2	3	4	5	6	7
(m) If a person has talent he can make it to the top in engineering;	1	2	3	4	5	6	7
(n) One of my ambitions is to be involved with a new technological development in my field;	1	2	3	4	5	6	7
(o) Its not possible for an engineer to belong to a trade union and at the same time maintain the standards of his profession;	1	2	3	4	5	6	7
(p) I try very hard to be successful in my career;	1	2	3	4	5	6	7
(q) I get great enjoyment out of the technical aspects of my work;	1	2	3	4	5	6	7
(r) All things considered, I think I've been pretty successful in my career so far;	1	2	3	4	5	6	7

30. Which of the following do you think have most influence upon your choice of a particular job; please circle three features in descending order of influence;

Most influence	2nd most	3rd most	
1	1	1	There is a good training scheme
2	2	2	Its in the geographical region you want to work
3	3	3	It would give you plenty of time for other things
4	4	4	The organisation has a good reputation
5	5	5	The pay is high
6	6	6	It would let you become professionally qualified
7	7	7	The career prospects are good
8	8	8	It would let you work with interesting people
9	9	9	Don't know

Is there anything else you feel has a strong influence on your choice of a job :-

.....

31. Are you a student member of an engineering institution :-

Yes	1
No	2

If yes, please name it :- .....

32. How likely do you think it is that you will become a corporate member of an engineering institution at some time in the future :-

very unlikely						very likely
1	2	3	4	5	6	7

If you did become a corporate member, what do you think would be your main reasons for joining :- .....

33. Do you anticipate going into a management position eventually, or do you think you will stay on the engineering-side :-

Management	1
Engineering-side	2
Neither'	3
Don't know	4

If management, would you prefer general or technical management :-

General Management	5
Technical Management	6

34. In general, what qualities do you think are necessary for getting promotion in engineering; please circle 3 choices in descending order of importance :-

Most important	2nd most	3rd most	
1	1	1	Having good contacts
2	2	2	Ability and intelligence
3	3	3	Experience
4	4	4	A university degree
5	5	5	A determined ambition
6	6	6	Getting on with people
7	7	7	Hard work and diligence
8	8	8	Luck
9	9	9	A public school education
10	10	10	Don't know

35. How likely do you think it is that within the next 5 years you will :-

		very unlikely						very likely
(a)	Remain in engineering;	1	2	3	4	5	6	7
(b)	Remain in your field of engineering;	1	2	3	4	5	6	7
(c)	Work outside the U.K. for over a year;	1	2	3	4	5	6	7
(d)	Emigrate from the U.K.	1	2	3	4	5	6	7

36. If you could have the choice again, would you choose to :-

		very unlikely						very likely
(a)	Study engineering at university;	1	2	3	4	5	6	7
(b)	Study your branch of engineering;	1	2	3	4	5	6	7
(c)	Enter Imperial College;	1	2	3	4	5	6	7

37. How highly do you think engineers are regarded by the general public in Britian today :-

Very low						Very High
1	2	3	4	5	6	7

Why do you think this:- .....

.....

38. Why did you decide to study engineering at university :- .....

.....

.....

39. In what ways do you think Imperial College might have better prepared you for starting work:- .....

.....

Thank you for participating in this research. Using the pre-adressed envelope, would you please return the completed questionnaire to the Industrial Sociology Unit via the college post.

Thank You.

I.(b) The Engineer Survey Questionnaire

Questionnaire: For professional engineers

INSTRUCTIONS

Although some questions require a written reply, many can be answered by CIRCLING the number next to each printed answer. Certain questions require a choice to be made between one of seven numbers, representing the strength of, eg, your agreement or disagreement with a particular statement. For example, some answers appear in the form :-

Disagree strongly ... agree strongly
1 2 3 4 5 6 7

In this case circling (1) is meant to indicate "strong disagreement" and circling (7) "strong agreement". Circling intermediate numbers represents the shades of agreement or disagreement between these extremes. (4) is to be taken as an intermediate position indicating neither agreement nor disagreement.

If on these and on any other questions you feel unable to provide an answer, please indicate by WRITING "DK" (Don't know) beside the column or row of numbers where this option is not explicitly provided.

The questionnaires can be returned anonymously.

To begin with, I would like to ask you a few questions about the nature of your present job and your feelings towards it.

1(a). What is the title of your present job :- .....

1(b). What is the name of your present department :- .....

2. Whereabouts do you usually work at present :- .....

3. About how many other people are you directly responsible for at present :- .....

4. What is your formal or designated grade of authority within your present organisation :- .....

5. Some people are completely involved in their jobs; they are absorbed in them night and day. For other people, their jobs are only one of several interests. How involved do you feel in your job :-

1 - Very little involved; my other interests are more absorbing.
2 - Slightly involved.
3 - Moderately involved; my job and my other interests are equally absorbing.
4 - Strongly involved.
5 - Very strongly involved; my work is the most absorbing interest in my life.

6. On most days of your present job, how often does the time seem to drag to you :-

About half the day or more	1
About one-third of the day	2
About one-quarter of the day	3
About one-eighth of the day	4
Time never seems to drag	5

7. How much variety would you say there is in your work :-

Very little variety	1	2	3	4	5	6	7	Very much variety

8. How much freedom do you have in your present job; to what extent are you left on your own to work in the way you want :-

Very little freedom	1	2	3	4	5	6	7	Very much freedom

9. Please circle one number in each of the four tables below which best describes the duties, technical responsibilities, supervision received, and authority exercised in your present job :-

(a) Duties: Circle the number which refers most closely to the duties of your job.

1	You receive on the job training, working on simple projects or assisting more senior engineers.
2	You perform responsible and varied assignments within projects.
3	You plan, conduct & co-ordinate projects of some complexity.
4	You undertake long-term & short-term planning & supervision of projects, and decisions on work programme with budgetary control of projects.
5	You have full managerial responsibility for the engineering function with full responsibility for the operation of a budget and long-range planning.

(b) Technical responsibilities:

Circle the number which refers most closely to your present technical responsibilities.

1	You are responsible for minor technical details only. All other matters are checked.
2	You are responsible for technical detail which is generally reviewed.
3	You are responsible for technical matters but are subject to occasional review.
4	You have full technical responsibility for projects.
5	You are responsible for all technical matters, including the delegation of responsibilities.

(c) Supervision received:

Circle the number which refers most closely to the supervision you receive

1	Your work is assigned to you with detailed instructions. Guidance is always available. Results are subject to close scrutiny.
2	Your work is assigned in terms of detailed objectives and priorities and is subject to scrutiny. Guidance is available on problems and unusual features.
3	Your work is assigned in terms of general objectives and priorities; guidance is available on policy or unusually complex problems. Work is reviewed for effectiveness only.
4	You receive executive directions on broad overall objectives. Your work is reviewed only for adherence to policy and general effectiveness.
5	Your work is unsupervised, other than complying with a policy decided with the governing body.

(d) Leadership and authority:

Circle the number which relates most closely to the leadership and authority you excercise.

1	You have no authority, but you may give technical guidance to juniors working on the same project.
2	You have no managerial responsibilities for professional engineers, but you may be assigned graduates, technicians, or other juniors as assistants.
3	You supervise a group of professional engineers, technicians, and staff including assigning and reviewing their work.
4	You are responsible for leaders of groups containing professional engineers, technicians & supporting staff.
5	You have full control over senior engineers who are themselves responsible for groups of professional engineers & their staff

10. To what extent would you say your present work was done in accordance with laid-down or established procedures, or was largely the result of your own initiative in responding to or developing particular situations :-

According to procedure	1	2	3	4	5	6	7	According to initiative

11. To what extent do you work on your own or as part of a team :-

Largely on your own	1	2	3	4	5	6	7	Largely as part of a team

12. To what extent is your work a specialist activity or something more general that could be applied in a number of settings :-

Specialist	1	2	3	4	5	6	7	General

13. On the whole, do you feel that your skills are well used in your normal daily activities at work :-

Yes, very well used	1
Yes, quite well used	2
I don't know	3
No, somewhat under-utilised	4
No, very much under-utilised	5

14. If it were possible in your present job, would you prefer to have more or less demanding work :-

Very much more demanding	1
Somewhat more demanding	2
Its about right at present	3
Somewhat less demanding	4
Very much less demanding	5

15. As an overall assessment, how satisfied or disatisfied do you feel with your present job :-

Completely dissatisfied	1	2	3	4	5	6	7	Completely satisfied

16. What in fact gives you the most satisfaction in your present work :-

.....

.....

17. And what gives you most dissatisfaction in your present work :-

.....

.....

18. Do you get on well with your colleagues at work :-

No, not at all	1	2	3	4	5	6	7	Yes, very well

19. In general, do you think you are highly regarded by :-

	No, not at all						Yes, very highly
(a) Your colleagues at work;	1	2	3	4	5	6	7
(b) Your superiors at work;	1	2	3	4	5	6	7

20. If you were given a free choice of working in any of your organisation's departments, would you choose your present one :-

Very unlikely	1	2	3	4	5	6	7	Very likely

21. To what extent is promotion in your organisation based upon seniority or upon producing good results :-

Based on results	1	2	3	4	5	6	7	Based on seniority

22. Assuming you were to stay with your present organisation for some time, how rapid do you think your future promotion is likely to be :-

Slow	1	2	3	4	5	6	7	Fast

23. If you were to decide you wanted to change your work, how difficult do you think it would be, at the present time, finding a job approximately comparable to your current job in terms of salary, responsibility, etc, but which involved :-

	very easy						very hard
(a) Just changing your employer;	1	2	3	4	5	6	7
(b) Both changing your employer and changing :-							
- the region in which you live (eg, from London to the North West, etc) :-	1	2	3	4	5	6	7
- your type of work; (eg, from construction to design, etc):-	1	2	3	4	5	6	7
- your sphere of industry; (eg, from machine tools to computers, etc) :-	1	2	3	4	5	6	7
- your occupation; ie, taking a job other than as an engineer;-	1	2	3	4	5	6	7
(c) Staying with your present employer, but changing:-							
- your geographical region;-	1	2	3	4	5	6	7
- your type of work: (eg, from construction to design, etc):-	1	2	3	4	5	6	7

24. How likely do you think it is that you will remain, during the next 3 years :-

	Very unlikely						Very likely
(a) With your present employer;	1	2	3	4	5	6	7
(b) In your present department;	1	2	3	4	5	6	7

25. If you were to leave your present employing organisation during this time, what do you think would be the most likely reason for you leaving :-

.....

.....

26. Have you considered taking another job with a different employing organisation during the last 12 months :- (or since joining if less than 12 months.)

No, not at all	1
Yes, but I have taken no steps towards finding one	2
Yes, and I have made a few tentative enquiries	3
Yes, and I have applied for at least one job	4
Yes, and I have been to at least one interview	5
Yes, and I anticipate leaving the organisation soon	6

The following series of questions concern your attitudes towards your career in engineering and your ambitions for the future.

27. Assuming the pay were the same, would you prefer a primarily administrative or a primarily technical job :-

Administrative	1
Either, don't mind	2
Technical	3
Don't know	4

28, Indicate to what extent you agree or disagree with the following statements by circling one of the numbers, 1-7, on the right of the table :-

	Disagree strongly						Agree strongly
(a) Engineers are just as professional as doctors;	1	2	3	4	5	6	7
(b) I get a great sense of personal satisfaction from my work;	1	2	3	4	5	6	7
(c) A man's salary provides a good indication of how successful he has been;	1	2	3	4	5	6	7
(d) For me, doing interesting work in the present is more important than the possibility of promotion in the future;	1	2	3	4	5	6	7
(e) On the whole, work takes priority over my social life;	1	2	3	4	5	6	7
(f) The worries of a senior position are compensated for by more exciting and interesting work;	1	2	3	4	5	6	7
(g) Probably the most important things that happen to me involve my career;	1	2	3	4	5	6	7
(h) A man's career is like a race and naturally he must compete to do well;	1	2	3	4	5	6	7
(i) I think some day I've a good chance of becoming a partner or director in a company or firm.	1	2	3	4	5	6	7
(j) Its in the best interests of professional engineers to join a trade union;	1	2	3	4	5	6	7
(k) Married men should not get too involved with their work as this interferes with a happy married life;	1	2	3	4	5	6	7
(l) One day I hope to be able to work without having to heed some other person's authority;	1	2	3	4	5	6	7
(m) Its only right that an engineer's work be judged by a person of wider competence, even if that person is not an engineer himself;	1	2	3	4	5	6	7
(n) I don't really care about getting on at work, so long as I'm happy outside it;	1	2	3	4	5	6	7
(o) Once a man has got a reasonable salary and a respected position he should spend more time on his family and other interests;	1	2	3	4	5	6	7
(p) On the whole I don't get very involved in my work;	1	2	3	4	5	6	7
(q) My main interest in work is to get enough money for other things;	1	2	3	4	5	6	7
(r) Its not possible for an engineer to belong to a trade union and at the same time maintain the standards of his profession;	1	2	3	4	5	6	7
(s) If a person has talent he can make it to the top in engineering;	1	2	3	4	5	6	7
(t) One of my ambitions is to be involved with a new technological development in my field;	1	2	3	4	5	6	7
(u) A man ought to get the main meaning in his life from his work;	1	2	3	4	5	6	7
(v) I try very hard to be successful in my career;	1	2	3	4	5	6	7
(w) All things considered, I think I've been pretty successful in my career so far;	1	2	3	4	5	6	7
(x) I get great enjoyment out of the technical aspects of my work;	1	2	3	4	5	6	7
(y) I used to be more ambitious than I am now;	1	2	3	4	5	6	7
(z) I feel that I would want to go on advancing higher in any organisation I might happen to work in;	1	2	3	4	5	6	7

29. In your career so far, do you think you have established a good reputation for yourself in your particular line of work :-

No, not particularly 1 2 3 4 5 6 7 Yes, a good reputation

30. Based on current values (ie, neglecting the effects of inflation), what is the highest annual salary you think you will earn at the peak of your career :- £.....

31. Including bonuses, what approximately is your present gross (ie, pre-tax) annual salary :- £.....

32. People have different ideas about what they would like to do in the future. Which of the items in the following list come closest to your own future ambitions. Write a 1 in the box alongside the most important item, a 2 beside the second most important, and so on, ranking all the items from 1st to 9th most important.

[ ]	Keep things just as they are now
[ ]	Get on better with your colleagues at work
[ ]	Advance into higher levels of responsibility
[ ]	Employ your free time more usefully
[ ]	Gain greater control over the way you work
[ ]	Advance into higher salary levels
[ ]	Achieve some important technical accomplishment
[ ]	Have a better time with your family and friends
[ ]	Do more interesting work

33. If you have not already done so, do you anticipate moving into management work later in your career, or do you think you will stay on the engineering-side :-

Management	1
Engineering-side	2
Neither	3
Don't know	4
Currently doing management work	5

If you think you will move into management (or are already doing management work) would you prefer general or technical management :-

General management	1
Technical management	2
Either, don't mind	3

34. In general, how important is it to you to :-

	Of no importance						Extremely important
(a) Make more money than the average university graduate;	1	2	3	4	5	6	7
(b) Make friends with your colleagues at work;	1	2	3	4	5	6	7
(c) Be free of close supervision in your work;	1	2	3	4	5	6	7
(d) Do the kind of work you find particularly interesting;	1	2	3	4	5	6	7
(e) Have a job that is safe from sudden lay-off;	1	2	3	4	5	6	7
(f) Have a career line of continuous promotions;	1	2	3	4	5	6	7
(g) Be treated as a professional by your superiors;	1	2	3	4	5	6	7
(h) Establish your reputation as an authority in your field;	1	2	3	4	5	6	7
(i) Do work that is useful to society;	1	2	3	4	5	6	7
(j) Be free to make most of the decisions connected with your work;	1	2	3	4	5	6	7
(h) Advance to a policy making position in your employing organisation;	1	2	3	4	5	6	7
(i) Be highly respected by other engineers;	1	2	3	4	5	6	7
(j) Receive a steady rise in salary every few years;	1	2	3	4	5	6	7

I would now like to ask you about the nature of your previous career in engineering.

35. What kind of secondary school did you attend:- (If several types attended, circle the type at which you spent most time and place a tick alongside any others.)

Secondary modern	1
Technical college	2
Comprehensive	3
Grammar school	4
Direct Grant	5
.....Public (please name)	6
.....Outside U.K. (")	7
.....Other (")	8

36. What is the highest educational qualification you currently hold :-

Doctorate (Phd, etc)	1
Master's degree (MSc, etc)	2
Postgraduate diploma	3
Bachelor's degree (BSc, etc)	4
HNC/HND	5
ONC/OND	6
GCE A level(s)	7
..... Other (please specify)	8

37. If you hold a bachelor's degree (or higher) what class of degree did you obtain :-

38. Also please write the name of the place at which you obtained this degree below :-

.....

1st	1
upper 2nd	2
lower 2nd	3
3rd	4
Pass	5
Not applicable	6

39. What professional bodies or institutions, if any, do you currently belong to and what type of membership do you hold. Indicate how active you are in each body (involving, eg, attendence at meetings, regular reading of journals, etc) by circling one of the numbers 1-7 on the scale shown :-

	Name of body	Type of membership	Extent of participation Not active Very active 1 2 3 4 5 6 7
(1)			1 2 3 4 5 6 7
(2)			1 2 3 4 5 6 7
(3)			1 2 3 4 5 6 7

40. Since starting full-time work, how often, if at all, have you :-
(a) taken out a patent (yourself, jointly, or through your employing organisation)
(b) published any professional articles, papers or books;
of an engineering, scientific, or technical nature.

	(a) Patents		(b) Publications
	Yourself/Jointly	Through employer	
Never	1	1	1
Once	2	2	2
2 or 3 times	3	3	3
4 or more occasions	4	4	4

41. TURN TO THE END OF THE QUESTIONNAIRE AND UNCLIP THE FINAL YELLOW PAGE, ENTITLED :- "Coding lists for Question 41". (If you need to write on this sheet, please ensure it is returned with the rest of the questionnaire.)

Use this sheet to provide responses in columns labelled (1),(2),(3),(4) overleaf. In this table please write in details of all previous full-time jobs you have had that lasted at least 4 months. Include cases that involved both a change of employer or changes of job within a particular organisation; eg, where you changed the type of work you were doing, or moved to a different part of the country. For all such changes please complete the whole line of the table each time. Start with the first job you had on commencing full-time employment and finish with details of your present job.

41. In the table below please give details of previous jobs which lasted at least 4 months. PULL OUT CODING SHEET FROM END OF QUESTIONNAIRE TO PROVIDE NUMBERS FOR COLUMNS (1), (2), (3), (4).

Job number; from 1st to, and including, present job.	Date of starting (write in) Month (No. 1-12)	Date of starting (write in) Year	Name of Employing Organisation (write in)	Title of Job (write in)	(1) Type of organisation (coding sheet)	(2) Place of Employment (coding sheet)	(3) Type of work: (coding sheet)	(4) Sector of Industry; (coding sheet)
1st job								
2nd								
3rd								
4th								
5th								
6th								
7th								
8th								
9th								
10th								
11th								
12th								
13th								
14th								

I would now like to ask you a few questions about the various institutions which you may come into contact with during your work.

42. Do you belong to a trade union or a company (or other) staff association :-

A trade union	1
A company(or other) staff association	2
Both	3
Neither	4

If you are a member of a trade union, please continue with the next question. Otherwise, skip to QUESTION 46.

43. What are the initials of your trade union :- .....

44. To what extent do you actually participate in your union's activities, eg, by attending meetings, voting in elections, reading their leaflets, etc :-

Not at all	1	2	3	4	5	6	7	To a large extent

45. Do you think joining a trade union has been worthwhile :-

Yes	1
No	2
Don't know	3

Why do you think this :- .....

.....

.....

46. What were your reasons for joining/not joining a trade union :-

.....

.....

47. If you were given a free choice, would you prefer to join :-

A trade union that would strike if necessary over a wage demand	1
A trade union that would represent your interests to an employer, but would consider a strike to be professionally unethical ;	2
A company (or other) staff association;	3
None of the above;	4
Don't know;	5

48. Do you think that professional engineering institutions should play a more active role in bargaining with employers over the salaries and conditions of employment of professional engineers :-

No;	1
Yes, more bargaining over conditions of employment (eg, over qualifications, registration, etc) but not involving salaries;	2
Yes, more bargaining with employers, including bargaining over salaries;	3
Don't know;	4

49. Is it your impression that in order to get on in industry or engineering an engineer must be prepared to accept an increasing amount of administrative responsibility :-

Yes	1
No	2
Don't know	3

If 'Yes', do you approve or disapprove of this state of affairs :-

Disapprove strongly	1	2	3	4	5	6	7	Approve strongly

50. In broad terms, what qualities do you think are necessary for getting promotion in :
(a) Engineering in general;
(b) Your present employing organisation;
Please circle two factors in descending order of importance :-

	(a) Engineering in general		(b) Your present employer	
	Most important	2nd most	Most important	2nd most
Ability & intelligence	1	1	1	1
Having good contacts	2	2	2	2
A wide experience	3	3	3	3
A university degree	4	4	4	4
A determined ambition	5	5	5	5
Getting on with people	6	6	6	6
Hard work & diligence	7	7	7	7
Company seniority	8	8	8	8
Luck	9	9	9	9
Others (please specify)				
.....	10	10	10	10
.....	11	11	11	11

51(a). What is the normal method of actually achieving promotion in your present organisation?

.....

.....

.....

.....

(b). Do you think this is a good way :- .....

.....

52. How likely do you think it is that within the next 5 years you will remain :-

	Very unlikely						very likely
(a) Working in engineering;	1	2	3	4	5	6	7
(b) Working in your branch of engineering; (eg, in civil engineering, etc)	1	2	3	4	5	6	7
(c) Doing similar type of work to the present; (eg, research, production, etc)	1	2	3	4	5	6	7
(d) Working in your present sphere of industry; (eg, computers, machine tools, etc)	1	2	3	4	5	6	7
(e) Working in your present region of the U.K. (eg, London, the North-West, etc)	1	2	3	4	5	6	7
(f) A resident of the U.K. (ie, not emigrate on a permanent basis)	1	2	3	4	5	6	7

53. Knowing what you now know, if you could have the choice again, would you choose to :-

	Very unlikely						Very likely
(a) Become an engineer;	1	2	3	4	5	6	7
(b) Enter your particular branch of engineering;	1	2	3	4	5	6	7
(c) Undertake your present type of work; (eg, research, production, etc)	1	2	3	4	5	6	7
(d) Enter your present sphere of industry; (eg, computers, machine tools, etc)	1	2	3	4	5	6	7
(e) Join your present employing organisation;	1	2	3	4	5	6	7

Finally, in order that certain sociological comparisons can be made between different groups of engineers, I would like to ask you several questions about your background and involvements outside work :-

54. In what year were you born :- .....

55. What is your country of origin :- .....

56. What were the normal occupations of your parents (or guardians) when you were about 14 years old. Please give a clear description of their occupations; for example, headmaster of a primary school, fitter in a large electrical firm, etc. Indicate also if either parent was deceased. (NB, if this period should coincide with the Second World War, please indicate your parent's normal occupations immediately after it.)

Father	Mother (include housewife)
.....	.....
.....	.....

57. What is your present marital status :- .....

If you are at present or have previously been married, please continue with the next question. Otherwise SKIP TO QUESTION 62.

58. In what year were you first married :- .....

59. Please give details of any subsequent changes in your marital status (eg, divorce, wife's death, etc) and the years of their occurence :-

.....

.....

60. How many children, if any, do you have :- .....

61. What are the ages of the eldest and youngest of your children :- (if applicable)

Eldest : ..... years

Youngest : ..... years

62. To what extent do you participate in the following leisure activities ? Indicate approximately how much time you spend on each by circling the most appropriate number on the 1-7 scale, where (1) represents'less than once a year', (7) represents 'at least once a day', and intermediate numbers represent degrees of participation between these extremes; (4) can be taken as representing 'once a week'.

	Less than once a year			:			At least once a day
				Once a week			
(a) Attend a cinema	1	2	3	4	5	6	7
(b) Attend a theatre ,concert or art gallery	1	2	3	4	5	6	7
(c) Go to church	1	2	3	4	5	6	7
(d) Go to a 'pub with friends or work colleagues	1	2	3	4	5	6	7
(e) Watch T.V. for at least 1 hour	1	2	3	4	5	6	7
(f) Attend a sporting event as spectator	1	2	3	4	5	6	7
(g) Actively participate in sports	1	2	3	4	5	6	7
(h) Visit a library	1	2	3	4	5	6	7
(i) Read for entertainment or leisure	1	2	3	4	5	6	7
(j) Read for professional or academic purposes	1	2	3	4	5	6	7
(k) Work in your home or garden	1	2	3	4	5	6	7
(l) Engage in hobbies (other than sport or D.I.Y.)	1	2	3	4	5	6	7
(m) Visit your friends or neighbours	1	2	3	4	5	6	7
(n) Attend meetings of voluntary associations	1	2	3	4	5	6	7
Other major leisure activities not mentioned above (please specify) :-							
(o)	1	2	3	4	5	6	7

63. What kind of accommodation do you presently live in :-

Rented flat/room(s)	1
Rented house	2
Own flat (mortgaged)	3
Own flat (unmortgaged)	4
Own house (mortgaged)	5
Own house (unmortgaged)	6
Other (please specify)	7

64. Which political party did you vote for in the last General Election :-

(please feel free not to answer this question if you don't want to.)

Didn't vote	1
Labour	2
Conservative	3
Liberal	4
Other (please specify)	5

65. How highly do you think professional engineers are regarded by the general public in Britain today :-

Very low 1 2 3 4 5 6 7 Very high

Why do you think this :- .....

.....

.....

.....

66. In what ways do you think the status of professional engineers might be improved :-

.....

.....

.....

67. What do you think originally made you decide to become an engineer :-

.....

.....

.....

.....

68. What do you see as being your main ambitions for the future :-

.....

.....

.....

.....

Thank you for participating in this research and for taking the time to answer the questions. If you have any further comments to add on any of the subjects covered in the questionnaire please express them overleaf.

Using the stamped adressed envelope provided, please return the questionnaire to :-

Mr. R. Taylor,
The Industrial Sociology Unit (Imperial College),
52/53, Prince's Gate,
London, SW 7.

Thank You.

Coding lists for Question 41: Enter numbers in appropriate boxes in table.

(1) Type of organisation:

1	Self-employed (including principal or partner in a firm)
2	Firm of consultants
3	Public corporation (PO,BBC,etc)
4	Nationalised industry
5	Regional authority (Water, etc)
6	Local authority (including polytechnics, colleges, etc)
7	Central Government
8	The Armed Forces
9	University
	Industrial or commercial firm or company (other than above) of :-
10	Less than 500 employees in total;
11	500 or more employees in total;
	Other (please specify)
12	.....
13	Unemployed

(2) Location of employment:

1	Scotland
2	Northern Ireland
3	Republic or Ireland
4	Wales
5	East Midlands
6	Northern England (including North Yorkshire and Cumbria)
7	Humberside, South & West Yorkshire
8	Lancashire and Cheshire
9	South-West England
10	South-East England (including East Anglia & Hampshire but not Greater London)
11	West Midlands
12	Greater London
13	Overseas

(3) Type of work:

1	General Management
2	Research as a manager
3	Research not as a manager
4	Design / Development as a manager
5	Design / Development not as manager
6	Production or quality control
7	Construction or installation
8	Maintenance or servicing
9	Instrumentation or control
10	Marketing, sales or liason work
11	Finance
12	Personnel
13	Management Services (Computing,etc)
14	Consultancy
15	Teaching, lecturing, etc
16	General trainee (job rotation,etc)
17	Armed Services
	Other engineering (please specify)
18	.....
19	.....
	Other non-engineering work (please specify) :-
20	.....
21	.....
22	.....

(If more than one type is applicable, select number for most important type.)

(4) Sector of industry:

1	Mining or quarrying
2	Agriculture
3	Chemical or allied process industry
4	Petroleum or petrochemicals
5	Metal manufacture
6	Machine tools
7	Industrial plant or steelwork manufacture
8	Other mechanical engineering
9	Electrical machinery or equipment
10	Electronics or telecommunications
11	Shipbuilding or marine engineering
12	Aircraft or aero-engine manufacture
13	Vehicle & related component manufacture
14	Other manufacturing industries
15	Construction
16	Consulting firm
17	Gas production, distribution,etc
18	Electricity generation,distribution,etc
19	Water cycle operations
20	Transport (by rail,road,air,water)
21	Docks and harbours
22	Central Government Administration
23	Local Government Administration
24	Postal services, broadcasting, etc
25	Research institution or association
26	University or polytechnic
27	Technical or training college
28	School
29	Armed Forces
30	Computer technology
	Others (please specify)
31	.....
32	.....

(If more than one code is applicable, indicate sector of industry most appropriate to your main line of work.)

APPENDIX II

VARIABLES OF THE ANALYTICAL FRAMEWORK

(a) Work involvement variables:

- FACTOR ANALYSIS OF EIGHT ATTITUDINAL ITEMS:

		Factor Score Coefficients	
		Factor 1	Factor 2
a.	I try very hard to be successful in my career (ESQ:28v)	-.583	.102
b.	On the whole, I don't get very involved in my work (ESQ:28p)	.659	-.135
c.	I get a great sense of personal satisfaction from my work (ESQ:28b)	-.533	.116
d.	Probably the most important things that happen to me involve my career (ESQ: ESQ:28g)	-.228	.757
e.	A man ought to get the main meaning in his life from his work (ESQ:28u)	-.263	.591
f.	On the whole, work takes priority over my social life (ESQ:28e)	-.203	.611
g.	I don't really care about getting on at work so long as I'm happy outside it (ESQ:28n)	.490	-.466
h.	A man's career is like a race and naturally he must compete to do well (ESQ:28h)	-.386	.342

The index of work effort is constructed from items a,b,c and the index of work centrality from items d,e,f.

- FACTOR SCORE COEFFICIENTS FOR ITEMS IN EACH INDEX:

	Work effort		Work centrality
a.	.412	d.	.457
b.	-.374	e.	.374
c.	.224	f.	.209

The factor score coefficients are thus used as weights in the construction of the two indices, using normalised values of each item.

$$\text{Work effort} = \frac{(a - 5.634)}{1.383} \times .412 - \frac{(b - 1.912)}{1.086} \times .374 + \frac{(c - 5.679)}{1.125} \times .224$$

Work centrality =

$$\frac{(c - 4.187)}{1.570} \times .457 + \frac{(d - 3.528)}{1.534} \times .374 + \frac{(e - 3.784)}{1.163} \times .209$$

- VALIDATION:

Correlations between the indices and McKelvey & Sekaran's (1977) two job involvement items (ESQ:5,6), where responses to these are assumed scalar.

	ESQ:5 ("Involvement")	ESQ:6 ("Time dragging")
Work effort index	.461 (.001)	.506 (.001)
Work centrality index	.379 (.001)	.264 (.001)

While MecKelvey & Sekaran's items are not completely comparable with the indices, that refering to the extent to which time drags correlates strongly with work effort and rather less so with work centrality. In contrast the "Involvement" question shows a bigger correlation with work centrality than does the "time dragging" one, even though this does in fact correlate most strongly with work effort, possibly because they do not draw out the effort/centrality distinction explicitly in the question.

- PEARSON CORRELATION BETWEEN WORK EFFORT AND CENTRALITY INDICES:

$r = .253$

$p = .001$

(b) ORGANISATIONAL FACTORS

(i) JOB CHARACTERISTICS:

Based upon responses to 7-point attitude scales with extremities labelled as shown in Engineer Survey Questionnaire (Appendix Ib).

a. VARIETY: How much variety would you say there is in your work ? (ESQ:7)

b. AUTONOMY: How much freedom do you have in your present job; to what extent are you left on your own to work in the way you want ? (ESQ:8)

c. FORMALISATION:

To what extent would you say your present work was done in accordance with laid-down rules or established procedures, or was largely the result of your own initiative in responding to or developing particular situations ? (ESQ:10)

d. TEAMWORK: To what extent do you work on your own or as part of a team ? (ESQ:11)

e. COLLEAGUE SOCIABILITY:

Do you get on well with your colleagues at work ? (ESQ:18)

- INTER-CORRELATION OF JOB CHARACTERISTICS (PEARSON CORRELATIONS): (Significance levels in brackets)

	e.	d.	c.	b.
a.	.287 (.001)	.148 (.020)	.280 (.001)	.299 (.001)
b.	.204 (.002)	-.063 (*)	.388 (.001)	
c.	.128 (.038)	-.093 (*)		
d.	-.059 (*)			

(ii) JOB ATTITUDES

a. JOB SATISFACTION: As an overall assessment, how satisfied do you feel with your present job ? (ESQ: 15)

b. JOB UTILISATION : i. On the whole, do you feel that your skills are well used in your normal daily activities. (ESQ:13)

ii. If it were possible in your present job, would you prefer to have more or less demanding work. (ESQ:14)

- INTER-CORRELATION OF UTILISATION ITEMS: (Pearson correlation)

$r = .424$
$p = .001$

Index of job utilisation :

$$= \frac{(ii. - 2.418)}{.702} \times .05 - \frac{(i. - 2.747)}{1.227} \times .05$$

c. WORK-BASED SELF ESTEEM:

In general, do you think you are highly regarded by:

i. Your colleagues at work
ii. Your superiors at work

- INTER-CORRELATION OF SELF ESTEEM ITEMS (Pearson correlation):

$r = .597$
$p = .001$

Index of work-based self esteem:

$$= \frac{(i. - 5.143)}{.903} \times .50 + \frac{(ii. - 5.122)}{.990} \times .50$$

- INTER-CORRELATION OF JOB ATTITUDES:

	c.	b.
a.	.337 (.001)	.580 (.001)
b.	.214 (.002)	

PRESENT CAREER SITUS:

a. COMPANY (Pseudonyms) :

	Name	No. in sample
1.	Consultant	26
2.	Contractor	38
3.	Northern	23
4.	Southern	23
5.	National	55
6.	Public	29
	All	194

b. BRANCH OF ENGINEERING:

		Number in sample
1.	Civil	67
2.	Mechanical (inc. production)	73
3.	Electrical (inc. electronics)	25
4.	Chemical	13
5.	"Specialist"	10
6.	Metallurgy/materials	6
	ALL	194

c. TYPE OF WORK: (CEI, 1977)

		Number in sample
1.	RD & D (Research, design & development) - including research, design, and/or development in a managerial or non-managerial capacity, civil engineering consultancy.	92
2.	Operations: - including production, quality control, construction, maintenance, servicing, general management.	88
3.	Services: - including marketing, sales, liason work, finance, personnel, management services, computing, teaching, lecturing.	8
4.	General trainee: - including job rotation.	6
	ALL	194

d. MANAGER: If you have not already done so, do you anticipate moving into management work later in your career or do you think you will stay on the engineering-side ? (Gerstl & Hutton, 1966; ESQ:33)

		Number in sample
2.	Currently doing management work	73
1.	Other responses	121
	ALL	194

TRADE UNION MEMBER: Do you belong to a trade union or a company (or other) staff association ? (ESQ:42)

		Number in sample
2.	A trade union	80
1.	Other responses	114
	ALL	194

(c) PERSONAL FACTORS:

AGE: In what year were you born ? (ESQ:54)

	Age-groups (years)	Number in sample
1.	under 26	30
2.	26-30	52
3.	31-35	34
4.	36-40	21
5.	41-45	21
6.	46-50	13
7.	over 50	23
	ALL	194

SOCIAL CLASS OF ORIGIN: What were the normal occupations of your parents (or guardians) when you were 14 years old ?..... (ESQ:56)

Categories based upon General Household Survey (1972) classes of socio-economic group.

		Number in sample
1.	Manual: - skilled, semi-skilled, unskilled, except those in 2.	39
2.	Intermediate: - Intermediate & junior non-manual, supervisors, foremen, farm owners, self employed-small businesses (shopkeepers, artisans, etc.)	57
3.	Professional/executive: Professional, executive, managerial employees, self-employed (except those in 2.)	92
	ALL	194

TYPE OF SCHOOL: What kind of secondary school did you attend ? (ESQ:35)

		Number in sample
1.	Secondary modern, technical college, comprehensive.	38
2.	Grammar school	95
3.	Direct grant, public school	58
	Overseas (not analysed)	3
	ALL	194

LEVEL OF EDUCATION: What is the highest educational qualification you possess ? (ESQ:36)

		Number in sample
1.	Non-graduates	41
2.	Graduates	153
	ALL	194

TYPE OF UNIVERSITY: Name of university (ESQ:38)
Categories from Halsey & Trow, 1970.

		Number in sample
1.	Non-graduates	41
2.	CAT, polytechnique, Open University, overseas	20
3.	Scottish, Irish, Welsh	16
4.	New English Universities; former CAT's.	23
5.	Redbrick	43
6.	London	27
7.	Cambridge, Oxford	13
	No response (not analysed)	11
	ALL	194

CLASS OF DEGREE: If you hold a bachelor's degree or higher what class of degree did you obtain ? (ESQ:37)

		Number in sample
1.	Non-graduate	41
2.	Pass, ordinary degree	21
3.	3rd	14
4.	Lower 2nd	37
5.	Upper (or undivided) 2nd	59
6.	1st	19
	No response (not analysed)	3
	ALL	194

VOTING BEHAVIOUR: Which political party did you vote for in the last (1974) General Election ? (ESQ:64)

		Number in sample
1.	Didn't vote	27
2.	Labour	31
3.	Conservative	93
4.	Liberal	25
5.	Others	4
	No response (not analysed)	14
	ALL	194

FAMILY LIFE-CYCLE POSITION: Based on responses to ESQ: 57,60,61 (Eg, Salvo, 1969)

1.	Single	47
2.	Married, no children	33
3.	Married, at least one child under the age of 21.	101
4.	Married, with children but none under 21.	7
	Missing data (not analysed)	6
	ALL	194

TYPE OF ACCOMMODATION: What type of accommodation do you presently live in ? (ESQ:63)

1.	Rented, or other non-owned accommodation	32
2.	Owned property, mortgaged	138
3.	Owned property, not mortgaged	23
	Missing data (not analysed)	1
	ALL	194

(d) CAREER FACTORS

CAREER STATUS:

a. ORGANISATIONAL : UKAPE job evaluation schedule (ESQ:8)
See, eg, IEE (1978).

Unweighted index of:-

i. Duties
ii. Technical responsibilities
iii. Supervision received
iv. Leadership & authority.

- ITEM INTER-CORRELATION (Pearson, significance levels in brackets):

	iv.	iii.	ii.
i.	.715 (.001)	.569 (.001)	.735 (.001)
ii.	.589 (.001)	.577 (.001)	
iii.	.525 (.001)		

- VALIDATION: Pearson correlations between index and formal level of organisational responsibility in each company, treated as a ranked scale.

Company	r	sig.
Consultant	.829	.001
Contractor	.697	.001
Northern	.867	.001
Southern	.710	.001
National	.804	.001
Public	.733	.001

b. MONETARY: Including bonuses, what approximately is your present gross (ie, pre-tax) annual salary ? (ESQ:31)

c. TECHNICAL-SCIENTIFIC: Based upon response to ESQ:40 on number of patents, and publications produced (eg, Kelly, 1975).

		Index points:
i. Number of patents taken out; (own, jointly or through employer)	None	0
	One	2
	Two or more	4
ii. Number of technical publications;	None	0
	One	1
	Two or more	2
Index of scientific output		....

d. TECHNICAL-PROFESSIONAL: Based upon the type of membership held in one or two professional institutions. (ESQ:40).

		Index points
Two Institutions:	Fellow	3
	Corporate	2
	Associate/Graduate	1

Index of professional qualifications .....

- SAMPLE DISTRIBUTION ON TECHNICAL STATUS INDICES:

Index points	Scientific output	Professional qualifications
0	125	28
1	18	57
2	33	63
3	2	19
4	13	18
5	1	6
6	2	3
ALL	194	194

- INTER-CORRELATION OF STATUS MEASURES (Pearson correlations with significance levels in brackets):

	d.	c.	b.
a.	.295 (.001)	.362 (.001)	.690 (.001)
b.	.194 (.005)	.302 (.001)	
c.	.200 (.003)		

CAREER SITUS MOBILITY:

a. ORGANISATIONAL : Number of different employing organisations worked for.

b. GEOGRAPHICAL: Number of different geographical regions in UK worked in. (12 regions plus 1 for overseas).

c. TYPE OF WORK: Number of different types of work engaged in.

These computed from career history data (ESQ:41)
See Appendix IIb for details of situs categorisation.

- INTER-CORRELATION BETWEEN SITUS MOBILITY MEASURES: (Pearson correlations with significance levels in brackets).

	c.	b.
a.	.354 (.001)	.518 (.001)
b.	.321 (.001)	

- INTER-CORRELATION BETWEEN CAREER STATUS AND SITUS MOBILITY: (Pearson correlations with significance levels in brackets)

	CAREER SITUS MOBILITY		
	Organisational	Geographical	Work-type
STATUS MOBILITY:			
Organisational	.147 (.022)	.094 (*)	.295 (.001)
Monetary	.267 (.001)	.157 (.017)	.354 (.001)
Technical-scientific	.159 (.015)	-.084 (*)	.127 (.041)
Technical-professional	.128 (.041)	.189 (.005)	.174 (.008)

COMPANY SENIORITY: Number of years in present employing organisation. Computed from career history data, ESQ:41.

CHARTERED ENGINEER: Whether or not the respondent holds corporate membership or above in a Chartered Engineering Institution or otherwise fulfills the CEI requirements for a C.Eng. (ESQ: 39).

		Number in sample
1.	Non-chartered engineer	94
2.	Chartered Engineer	100
	ALL	194

CAREER GOALS:

a. ORGANISATIONAL: I think some day I've a good chance of becoming a partner or director in a company or firm. (ESQ:28i) (Extent of agreement; 1-7 scale)

b MONETARY: Based upon current values (ie, neglecting the effects of inflation), what is the highest annual salary you think you will earn at the peak of your career ? (ESQ:31)

c. TECHNICAL: One of my ambitions is to be involved with a new technological development in my field (ESQ:28t) (Extent of agreement; 1-7 scale)

- INTER-CORRELATION OF CAREER GOALS (Pearson correlations with significance levels in brackets):

	c.	b.
a.	.029 (*)	.511 (.001)
b.	-.201 (.004)	

CAREER ORIENTATIONS:

a. ORGANISATIONAL:	Factor Score coefficients
i. Advance into higher levels of responsibility (Rank of this ambition, ESQ:32)	-.302
ii. Have a career line of continuous promotions (Importance, 1-7; ESQ:34f)	.292
iii. Advance to a policy making position in your organisation (Importance, 1-7; ESQ:34k)	.119
iv. For me, doing interesting work in the present is more important than the possibility of promotion in the future (Agreement, 1-7; ESQ:28d)	-.286
v. I feel that I would want to go on advancing higher in any organisation I might happen to work in (Agreement, 1-7; ESQ:28z)	.224

All items inter-correlate beyond the 5% level. Index of organisational orientations is the weighted sum of the normalised responses:

$$= \frac{(i - 2.99)}{2.276} x -.302 + \frac{(ii - 3.63)}{1.095} x .292 + \frac{(iii - 3.86)}{1.288} x .119$$

$$+ \frac{(iv - 4.01)}{1.574} \times -.286 \quad + \quad \frac{(v - 5.76)}{1.233} \times .224$$

- VALIDATION OF INDEX:

Assuming you were to stay with your present organisation for some time, how rapid do you think your future promotion is likely to be (Slow/Fast, 1-7 scale: ESQ:22)

Pearson correlation with indices of career orientations:

	Organisational	Monetary	Technical
r =	.359	.006	-.073
(p =)	(.001)	(*)	(*)

b. MONETARY:

		Factor Score coefficients
i.	Advance into higher salary levels (Rank of this ambition; ESQ:32)	-.479
ii.	My main interest in work is to get enough money for other things (Agreement,1-7; ESQ:28q)	.263
iii.	Make more money than the average university graduate (Importance,1-7;ESQ:34a)	.126
iv.	Receive a steady rise in salary every few years (Importance,1-7;ESQ:34m)	.212

All items inter-correlate beyond the 5% level. The index of monetary career orientations is the weighted sum of the normalised responses:

$$= \frac{(i - 3.37)}{1.96} \times -.479 \quad + \quad \frac{(ii - 3.09)}{1.642} \times .263 \quad + \quad \frac{(iii - 2.66)}{1.722} \times .126$$

$$+ \frac{(iv - 4.40)}{.969} \times .212$$

- VALIDATION OF INDEX:

A man's salary provides a good indication of how successful he has been (Agreement, 1-7; ESQ:28c)

Pearson correlation with indices of career orientations:

	Organisational	Monetary	Technical
r =	-.039	.278	-.110
(p =)	(*)	(.001)	(*)

c. TECHNICAL:

		Factor score coefficients
i.	Achieve some important technical accomplishment (Rank of this ambition; ESQ:32)	-.413
ii.	Establish your reputation as an authority in your field (Importance, 1-7; ESQ:34h)	.172

iii. Be highly respected by other engineers (Importance,1-7; ESQ:34k) .261

iv. I get great enjoyment out of the technical aspects of my work (Agreement,1-7; ESQ:28x) .294

All items inter-correlated beyond the 5% level. The index of technical orientations is the weighted sum of the normalised responses:

$$= \frac{(i - 5.28)}{2.33} \times -.413 + \frac{(ii - 3.70)}{1.224} \times .172 + \frac{(iii - 5.51)}{1.184} \times .261$$

$$+ \frac{(iv - 5.55)}{1.115} \times .294$$

- VALIDATION OF INDEX:

Assuming the pay were the same, would you prefer a primarily administrative or a primarily technical job ? (ESQ:27) (Gerstl & Hutton, 1966)

	Technical Orientation index	
	Number below median	Number above median
Numbers choosing:-		
Administrative	26	4
Technical	32	55

- INTER-CORRELATION OF CAREER ORIENTATION INDICES: (Pearson correlations with significance levels in brackets).

	c.	b.
a.	-.185 (.005)	.257 (.001)
b.	-.274 (.001)	

- CORRELATIONS BETWEEN CAREER GOALS AND ORIENTATIONS: (Pearson correlations with significance levels in brackets)

CAREER ORIENTATIONS:	CAREER GOALS		
	Organisational	Monetary	Technical
Organisational	.336 (.001)	.274 (.001)	-.025 (*)
Monetary	-.022 (*)	-.00& (*)	-.192 (.009)
Technical	-.013 (*)	-.178 (.013)	.540 (.001)

CAREER ORIENTATION TYPES:

Cross-tabulating above & below median values for organisational, monetary, & technical career orientation indices in pairs of 2 x 2 tabulations gives rise to the following X^2 results:

	X^2	Sig.	Degrees of freedom
Organisational v Monetary	5.39	.020	1
Organisational v Technical	1.03	.310	1
Technical v Monetary	7.60	.006	1

The most independent pairing is given by Organisational v Technical orientations. This distinction in career orientations is also drawn by a number of researchers (eg. Schein et al, 1964).It is therefore employed as the basis of the following typology of career orientations:

ORGANISATIONAL ORIENTATIONS	TECHNICAL ORIENTATIONS: Below Median	TECHNICAL ORIENTATIONS: Above Median
Above Median	BUREAUCRATIC (n= 52)	TECHNOCRATIC (n= 43)
Below Median	APATHETIC (n= 44)	SCIENTIFIC (n= 51)

The terms used in the typology generally reflect the differences in these particular approaches to the career (eg, Zaleznick et al, 1970). Some illustration of the APATHETIC category is necessary however since it does not necessarily follow that an engineer low on both orientations is apethetic in career orientations, looking to fulfill ambitions outside work.

- VALIDATION OF APATHETIC CATEGORY:

Values of work centrality index:	Mean	T test
"Apathetics"	-29.55	t = 2.04
Others	4.19	p = .03

ESQ:32 asks engineers to rank a number of different ambitions in order of importance. The % ranking the following ambitions either first, second or third in each orientation type are:

	Apathetic	Scientific	Bureaucratic	Technocratic
i. Employ your free time more usefully;	39	24	17	16
ii. Have a better time with your family & friends	45	33	27	30

PYSCHOLOGICAL CAREER SUCCESS (PCS):

a. All things considered, I think I've been pretty successful in my career so far (Extent of agreement, 1-7; ESQ:28w)

b. In your career so far, do you think you have established a good reputation for yourself in your line of work ?
(No, not particularly/ Yes, a good reputation,1-7; ESQ:29)

- INTER-CORRELATION OF ITEMS (Pearson correlation)

$$r = .354$$
$$p = .001$$

The index of PCS is formed as the sum of the normalised item responses:

$$PCS = \frac{(a - 5.24)}{1.142} \times .50 + \frac{(b - 5.66)}{1.131} \times .50$$

EVALUATIONS OF CAREER MOVES:

a. FUTURE ORGANISATIONAL PROMOTION RATE:

Assuming you were to stay with your present organisation for some time, how rapid do you think your future promotion rate is likely to be ?
(Slow/Fast, 1-7 scale; ESQ:22)

b. ORGANISATIONAL PROMOTION BASIS:

To what extent is promotion in your organisation based upon seniority or upon producing good results ?
(Based upon results/seniority, 1-7 scale; ESQ:21)

c. PERCEIVED OCCUPATIONAL OPENNESS:

If a person has talent he can make it to the top in engineering (Extent of agreement, 1-7 scale; ESQ:28s)

d. DIFFICULTY OF CHANGING JOBS:

If you were to decide you wanted to change your work, how difficult do you think it would be at the present time finding a job approximately comparable to your current job in terms of salary, etc, but which involved: Just changing your employer ?
(Very easy/very hard, 1-7 scale; ESQ:23a)

e. DEGREE OF SPECIALISATION:

To what extent is your work a specialist activity or something that could be applied in a number of settings ?
(Specialist/General, 1-7 scale; ESQ:12)

- INTER-CORRELATION OF CAREER EVALUATIONS & PCS

	e.	d.	c.	b.	a.
PCS	-.014 (*)	-.094 (*)	.104 (*)	.005 (*)	.335 (.001)
a.	.060 (*)	-.124 (.046)	.198 (.004)	-.143 (.024)	
b.	-.098 (*)	.115 (*)	-.058 (*)		
c.	.103 (*)	-.101 (*)			
d.	-.057 (*)				

CHARTERED ENGINEER (ESQ:39)

1.	Not a Chartered Engineer	94
2.	A Chartered Engineer	100
	ALL	194

Variation in the percentage of each age-group who are Chartered Engineers:-

Age-group	% C. Eng.
Under 26	7
26-30	35
31-35	74
36-40	71
41-45	57
46-50	77
Over 50	78
ALL	52

(e) Commitment Variables

COMMITMENT TO STAY:

a. Departmental: How likely do you think it is that you will remain, during the next 3 years.in your present department. (Likelihood, 1-7 scale: ESQ:24b)

b. Organisational: How likely do you think it is that you will remain, during the next 3 years, with your present employer.
(Likelihood,1-7 scale: ESQ:24a)

c. Branch: How likely do you think it is that within the next 5 years you will remain working in your branch of engineering.
(Likelihood,1-7 scale: ESQ:52b)

d. Occupational: How likely do you think it is that within the next 5 years you will remain working in engineering.
(Likelihood,1-7 scale: ESQ:52a)

- INTER-CORRELATION OF "COMMITMENTS TO STAY":
(Pearson correlaticns with significance levels in brackets)

	d.	c.	b.
a.	.146 (.023)	.245 (.001)	.436 (.001)
b.	.231 (.001)	.222 (.001)	
c.	.702 (.001)		

- VALIDATION OF COMMITMENT TO STAY IN ORGANISATION:

Pearson correlation with ESQ:26, "Have you considered another job with a different employing organisation during the last 12 months" ?

r = -.470
p = .001

AFFECTIVE COMMITMENTS:

a. Departmental: If you were given a free choice of working in any of your organisation's departments, would you choose your present one ?
(Likelihood, 1-7 scale. ESQ:20)

Knowing what you now know, if you could have the choice again, would you choose to :-
(Likelihood, 1-7 scale. ESQ:53)

b. Organisational: - Join your present employing organisation (ESQ:53e) ?

c. Branch: - Enter your particular branch of engineering ?
(ESQ:53b)

d. Occupational: - Become an engineer ? (ESQ:53a)

- INTER-CORRELATION OF "AFFECTIVE COMMITMENTS":
(Pearson correlations with significance levels in brackets)

	d.	c.	b.
a.	.016 (*)	.145 (.024)	.159 (.014)
b.	.423 (.001)	.638 (.001)	
c.	.564 (.001)		

NECESSITATIVE COMMITMENT:

Formed as the simple arithmetic difference of responses to "commitment to stay" and "affective commitment" in each situs category, as given above:

Necessitative Commitment = Commitment to stay - Affective Commitment

- INTER-CORRELATION OF "NECESSITATIVE COMMITMENTS":
(Pearson correlations with significance levels in brackets)

	d.	c.	b.
a.	.122 (.048)	.194 (.004)	.193 (.004)
b.	.335 (.001)	.464 (.001)	
c.	.523 (.001)		

- INTER-CORRELATION BETWEEN "NECESSITATIVE" AND"AFFECTIVE" COMMITMENTS:

NECESSITATIVE COMMITMENTS:-	AFFECTIVE COMMITMENTS Department:	Organisation:	Branch	: Occupation
Department:	-.336 (.001)	.074 (*)	-.105 (*)	.117 (*)
Organisation:	.018 (*)	-.593 (.001)	-.509 (.001)	-.381 (.001)
Branch:	.047 (*)	-.430 (.001)	-.804 (.001)	-.430 (.001)
Occupation:	.011 (*)	-.227 (.001)	-.395 (.001)	-.828 (.001)

APPENDIX III

VARIABLES OF THE STUDENT SURVEY[@]

@ (References are given to questions in the Student Survey Questionnaire as, eg, SSQ:22.)

(a) Personal characteristics and background

DEPARTMENT AT IMPERIAL COLLEGE: (SSQ:3)

		N	% response rate
1.	Aeronautics	11	52
2.	Chemical engineering	12	44
3.	Civil engineering	29	63
4.	Electrical engineering	30	56
5.	Mechanical engineering	35	64
6.	Mining & Mineral Technology	11	58
	ALL	128	57 %

TYPE OF SCHOOL ATTENDED: (SSQ:6)

		N
1.	Comprehensive, technical college, 6th Form College;	24
2.	Grammar	66
3.	Public, direct grant;	38
	ALL	128

SOCIAL CLASS OF ORIGIN: (SSQ:9) Socio-economic group of father when student was 14. See Appendix IIc for details of classification.

		N
1.	Manual	20
2.	Intermediate	18
3.	Professional/executive	88
	Deceased (not analysed)	2
	ALL	128

EXPECTED CLASS OF DEGREE: (SSQ:7)

		N
1.	Pass	2
2.	3rd	18
3.	Lower 2nd	47
4.	Upper 2nd	38
5.	1st	23
	ALL	128

(b) Types of jobs chosen

BRANCH OF ENGINEERING EXPECTED:

		N
1.	Aeronautics	8
2.	Chemical	8
3.	Civil	27
4.	Electrical	24
5.	Mechanical	21
6.	Mining/materials	12
7.	Production	6
8.	Computing	3
9.	Nuclear	1
10.	Petroleum	1
11.	Not engineering	12
12.	Don't know	5
	ALL	128

TYPE OF WORK EXPECTED:

1.	Further study (taught course)		1
2.	RD & D:		
	University-based research	9	
	Other R & D	14	
	Design	29	
			52
3.	Operations:		
	Production / Quality control	17	
	Construction/installation	13	
	Maintenance/Servicing	9	
	Production management	5	
	Process engineering	1	
	Instrumentation & control	3	
			48
4.	Trainee		7
5.	Services (Non-engineering):		
	Management Services	6	
	Marketing, sales, purchasing	2	
	Accountancy	6	
	Law	1	
			15
6.	Don't know		5
	ALL		128

TYPE OF COMPANY:

1.	University	10
2.	Consultancy	10
3.	Private-sector: Under 5000 employees	13
4.	Private-sector: over 5000 employees	59
5.	Public sector	18
6.	Job not arranged	16
	ALL	128

SIZE OF COMPANY:

1.	Under 5000	24
2.	Over 5000	72
3.	Don't know/not arranged	16
	ALL	128

(c) Career goals and orientations

CAREER GOALS:

i. ORGANISATIONAL: I think some day I've a good chance of becoming a partner or director in a company: (Agreement,1-7. SSQ:29g)

ii. MONETARY: Based upon current values (ie, neglecting the effects of inflation), what is the highest annual salary you think you will earn at the peak of your career ? (SSQ:27)

iii. TECHNICAL: One of my ambitions is to be involved with a new technological development in my field: (Agreement,1-7: SSQ:29n)

The measures are the same as those used in the Engineer Survey. See Appendix IId.

- INTER-CORRELATION OF CAREER GOALS:
  (Pearson correlations with significance levels in brackets)

	iii.	ii.
i.	-.094 (*)	.488 (.001)
ii.	-.022 (*)	

CAREER ORIENTATIONS:

		Factor Score coefficients
i.	ORGANISATIONAL:	
a.	To have a career line of continuous promotions (Importance,1-7:SSQ:25f)	.405
b.	To advance to a policy making position in your employing organisation. (Importance,1-7.SSQ:25j)	.237
c.	For me, doing interesting work in the present is more important than the possibility of promotion in the future. (Agreement,1-7. SSQ:29c)	-.388

All items inter-correlate beyond the 5% level. Index of organisational orientations is the weighted sum of the normalised responses:

$$= .405.\frac{(a - 5.000)}{1.521} + .237\frac{(b - 5.15)}{1.589} - .388\frac{(c - 4.13)}{1.535}$$

ii. MONETARY:

a. My main interest in work is to get enough money for other things.
(Agreement,1-7. SSQ:291)

b. To make more money than the average university graduate. (Importance,1-7.SSQ:25a)

INTER-CORRELATION BETWEEN ITEMS:
(Pearson correlation with significance level in brackets)

r = .417
p = .001

Index of monetary orientations:

$$= .5\frac{(a - 3.47)}{1.538} + .5\frac{(b - 4.51)}{1.688}$$

iii. TECHNICAL:

		Factor Score coefficients
a.	To establish your reputation as an authority in your field. (Importance,1-7: SSQ:25g)	.485
b.	To be highly respected by other engineers. (Importance,1-7: SSQ:251)	.393
c.	I get great enjoyment out of the technical aspects of my work. (Agreement,1-7:SSQ:29q)	.344

All items inter-correlate beyond the 5% level. Index of technical orientations is constructed from the normalised responses:

$$= .485\frac{(a - 4.55)}{1.760} + .393\frac{(b - 5.11)}{1.508} + .344\frac{(c - 5.20)}{1.320}$$

- INTER-CORRELATION OF CAREER ORIENTATIONS:
(Pearson correlations with significance levels in brackets)

	iii.	ii.
i.	-.288 (.001)	.360 (.001)
ii.	-.247 (.003)	

The measures of career orientations are similar to those used in the Engineer Survey but not identical. (See Appendix IId) Validation of those measures is shown in Appendix IId. Using the Engineer Survey data, correlations between the two types of orientation measures are as follows:

PEARSON CORRELATIONS BETWEEN ORIENTATION MEASURES:
(N = 194)

	r	sig.
Organisational	.866	.001
Monetary	.653	.001
Technical	.712	.001

INTER-CORRELATION BETWEEN CAREER GOALS AND CAREER ORIENTATIONS:

(Pearson correlations with significance levels in brackets)

	GOALS		
ORIENTATIONS:	Organisational:	Monetary :	Technical
Organisational	.424 (.001)	.328 (.001)	-.076 (*)
Monetary	.255 (.002)	.261 (.004)	.056 (*)
Technical	.256 (.002)	-.169 (.045)	.461 (.001)

APPENDIX IV

THE COMPANY CAREER SYSTEMS[@]

(@ Data in this Appendix based primarily upon interviews undertaken with a personnel representative in each company plus a number of engineers. This is supplemented where possible by data from the Engineer Survey Questionnaire. See Section 5.2.3 for details)

COMPANY	Consultant	Contractor	Northern	Southern	National	Public
ORGANISATIONAL STATUS:						
(i) Structure:						
Number of professional engineers in unit:- (a)	750	450	55	39	236	120
Number of promotion levels:	8	7	10	8	9	7
"Hierarchy ratio" (a/b) (b)	9.4	6.4	5.5	4.9	26	17
(ii) Process:						
Promotion procedure:-	Passive Informal	Passive Informal/ formal	Passive/ active Informal/ formal	Active Formal/ informal	Passive Formal	Active Formal
Qualities perceived as being important in getting promotion: ESQ:50b						
% replying 1st or 2nd:-						
'Ability & intelligence';	84	50	44	47	62	41
'Having good contacts' ;	27	18	44	39	11	31
'Hard work & diligence';	42	32	26	13	15	24
Perceived promotion qualities: (from response to ESQ:50b)	Ability; Hard work	Ability; Hard work	Contacts; Ability	Ability; Contacts	Ability; Degree; Ambition	Ability; Getting on with people;
Infered promotion qualities: Section 9.4	Age	Age, Work effort	Age, Manager, Work effort	?	Age, work effort, Education	Age, Work effort
Linking of results to hard work: % in RD & D:	85	0	35	83	76	3

Company	CONSULTANT	CONTRACTOR	NORTHERN	SOUTHERN	NATIONAL	PUBLIC
MONETARY STATUS:						
(i) Structure:						
Salary data: Mean;	£ 6,950	£ 5,358	£ 7,990	£ 4,815	£ 7,744	£ 6,055
Standard deviation;	£ 3,465	£ 1,614	£ 2,747	£ 598	£ 2,214	£ 1,026
Sample max. / sample min.	6.9	3.3	3.6	1.6	4.2	1.9
(ii) Process:						
Negotiating body;	Individual	Individual	Individual	Union; moderate coverage	Union; large coverage	Union; large coverage
Approximate % of salary made up by merit assessment: (estimate)	5%	8%	5%	5%	0%	0%
Individuals role in fixing salary for given job;	Passive	Passive	Passive	Passive	Passive	Passive
Infered qualities for higher salary per se: Table 9.6	Age	Age Work effort Manager	Age	?	Age Education Manager	Age

Company	CONSULTANT	CONTRACTOR	NORTHERN	SOUTHERN	NATIONAL	PUBLIC
TECHNICAL STATUS: Structure:						
% ever taking out patent:	4	3	10	52	20	0
% ever having a technical publication	42	3	24	4	36	48
% C. Eng.	77	36	63	71	58	32
Process:						
Extent of formal technical training programmes:	Very little; mainly learning by experience; Initial 3-4 year period of supervised training for C. Eng.	Very little; mainly by experience. Initial 3-4 year period of supervised training for C. Eng.	Initial 4-5 yr. training scheme up to C. Eng., there after only by experience. Some management training courses externally.	Initial 4-5 yr. training scheme up to C. Eng ,then mostly by experience; a few external courses if person asks.	Extensively planned & regulated training programme up to C. Eng, becoming less later in career. Much in-house technical & management training.	Extensive training progam to fit special needs of Public, which extends throughout much of career. In-house technical & management training.
Extent to which membership of professional institutions encouraged:	Membership encouraged, insofar as almost necessary for promotion.	Some limited encouragement mainly in terms of promotion consequences	No particular encouragement	No particular encouragement but local branch quite active	Membership & participation are encouraged within planned Career Scheme	C. Eng. or equivalent acts as minimum licensing requirement

SITUS MOBILITY: iv. Inter-organisational
v. Intra-organisational

Company	CONSULTANT	CONTRACTOR	NORTHERN	SOUTHERN	NATIONAL	PUBLIC
SITUS MOBILITY:						
iv. INTER-ORGANISATIONAL:						
Structure:						
Annual turnover; (relative estimate)	Medium	High	Low	Medium	Low	Low
Mean seniority of sample engineers (years)	11.1	3.3	13.2	13.5	13.9	8.4
Approx. numbers of graduate engineers recruited in average year:	30	30	8	3	20	5
Process:						
Special contracts:	None; (except 3 year agreement for graduates.)	None; (except 3 year agreement for graduates.)	Senior managers have personal contracts	None	None	None
Initiative for leaving:	Individual	Individual, but some redundencies	Individual	Individual	Individual	Individual
V. INTRA-ORGANISATIONAL:						
Structure:						
Predominant-type:	Work-type + geographical;	Geographical;	Some departmental;	Some work-type;	Work-type + geographical	Geographical
Frequency of moves:	Infrequent	Often, every 2 yrs approx.	Infrequent	Infrequent	Regular ; 3-4 yrs app.	Fairly infrequent
Process:						
Active/passivity of individual in moves:	Passive	Passive	Active	Active	Passive	Active

b. Descriptions of Company Promotion Systems

CONSULTANT

From the engineer's viewpoint there is no formal promotion procedure in Consultant. Promotions just 'happen'; that is, an engineer will receive a letter saying he has been promoted, usually after a recommendation from the partner responsible for that engineer, although this is routed via the personnel department. However there are only several formal grades within the firm, so that in fact engineers will gradually get more and more responsible jobs over time, depending upon how well they are seen to work by their partners, and their salary will reflect this accordingly. Promotion to a different grade thus represents a formal post hoc seal to this process. There is an annual merit assessment undertaken by the partners, but this is not disclosed to the engineers, who - given that their work is typically as part of a design team - may be very unclear about their status in the firm, and appear to have little knowledge of the way promotions come about. Consultant is thus characterised in Appendix IVa.i by a "passive" and "informal" promotion system, where the clarity of performance is indistinct.

CONTRACTOR

In Contractor there is also no formal channel by which individuals may seek promotion. Promotion comes about after notification from the personnel department, usually after recommendation from the site agent responsible for the engineer. Again the nature of the jobs the engineer receives may provide him with a form of advancement on site not directly related to formal grades within the firm, which serve primarily for computing salaries. Regular contact with the site agent and being engaged in a kind of work on the construction site where individual performance is quite clear, means that the site agent plays an important role in assessing the engineer's work results, and there are regular reports made to the personnel department. These form the basis of promotion selection when vacancies occur. Contractor is thus represented as a "passive" and "informal/formal" promotion system, with a fairly distinct clarity of performance.

NORTHERN

In Northern some jobs are advertised on internal notice boards, although the majority are offered, somewhat informally, by the department heads,in conjunction with the personnel department, to the people they think most suitable; these are typically within their own department. More senior jobs are usually advertised internally, some externally, and candidates are interviewed by a selection panel before being appointed. For lower engineering grades there is no formal system of work appraisal, but contact with department heads is quite regular in the fairly small firm. At middle management levels and above there is an annual work review and discussion of performance which, given its managerial nature, may be judged against the performance criteria of the engineer's subordinates/production unit. In Northern then the promotion system involves both "passive and active" and "informal and formal" elements, with a fairly clear if informal clarity of performance.

SOUTHERN

In Southern all jobs are advertised internally when vacant (and externally if necessary to find a suitable candidate) although some engineers might be recommended by their superiors to apply. Selection is undertaken, sometimes after an interview, by the department head in conjunction with the personnel department. This is done on the basis of annual work appraisal reports made by the engineer's two immediate superiors, which are then discussed with the engineer. The promotion procedure thus requires an active role by the engineer and tends to be a largely formal affair, albeit with some patronistic elements. In general the engineers are in little doubt where they stand in the firm at any one time and what their chances of promotion are likely to be.

NATIONAL

Given the large size of National a formal promotion procedure is naturally in evidence, although in fact this tends to be a largely one sided affair. Engineers can complain to their department head if they are dissatisfied, but in general promotions to a higher grade of classification come unsolicited from the personnel department; only a few jobs are advertised and these tend to be the most unpopular. The formal organisation grades are mainly used for computing salary, and engineers may be engaged in a series of jobs all at the same grade; indeed there may be some post hoc upgrading if the engineer finds himself doing a job for which his present grade is too low. Work appraisal is done regularly by the engineer's superiors and department head and, in conjunction with a central Manpower Planning Department, his career progress is discussed, particularly with reference to training requirements. Indeed the competitive aspects of promotion tend to be played down, and such discussions might serve to persuade the engineer to accept the company's definition of his performance and readiness for promotion. On the whole the promotion system in National is thus "formal" and "passive", with engineers being fairly clear of their status in the company, a definition they tend to accept.

PUBLIC

Public, as another large organisation, has a highly formal promotion procedure. All jobs are advertised nationally in company job bulletins and any-one has the right to apply, although minimum current job grades will be specified. Selection is made by formal interview, with members of the personnel department and department head of the job in question sitting on the panel. Work reports are compiled annually by the engineer's superiors to be used in conjunction with the interview as a basis of selection. Many facets of his work are discussed with him in the appraisal, including future training requirements. There are extensive career development schemes, with much in-house technical and management training. The promotion system in Public is thus highly "formal" and depends entirely upon the individual's initiative to compete within this 'bureaucratic' procedure. He in turn knows exactly how he stands within the organisation at any one time.

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