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AN ASSESSMENT OF CONSTRUCTION CRAFT TRAINEE CAREER PRIORITIES THROUGH THE ANALYTICAL HIERARCHY PROCESS

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New Entrant Trainees (NET) to construction trades have a number of concerns, motivations and interests surrounding the nature of their employment. However, it has been suggested that some of these trainees subordinate their consideration of career development in favour of satisfying hygiene factors such as work conditions and pecuniary concerns such as basic pay and bonus incentives. This may not lead to an appropriate career choice, and in the long term may contribute to the industry's high attrition rates. Using the psychometric technique known as the Analytic Hierarchy Process (AHP), the primary career choice motivations and perspectives of 563 trainees were profiled. AHP was used to evaluate and empirically test the relative importance of career development against five other career related stimuli: financial incentives; work conditions; social relations; job content; and job security. The results reveal the central importance of career development in retaining new entrant trainees to the construction industry. Indeed, it suggests a more sophisticated set of career priorities amongst the craft group than was expected. It is therefore recommended that the industry devotes more attention to the career development of these often overlooked employees in order to redress the high attrition rates and skills imbalances throughout the industry.

Keywords: analytical hierarchy process, careers, career development, new entrant trainees, psychometric techniques.

INTRODUCTION

Young people from all environments and occupational settings are faced with important career decisions based on their preferences in relation to a number of work-related factors (Super, 1957; 1984; Holland, 1959; 1997; Jepsen and Prediger, 1981; Jepsen and Grove, 1981; Mau and Jepsen, 1992). These factors may be related to pay, work content, or future work orientation. In the relative chain of career stages - identified as "exploration", "establishment", "maintenance" and "disengagement" (Super, 1957; 1984; Cron (1984) - attitudes and behaviours to these factors are influenced by relative job position, responsibilities or work activities. Accordingly, new entrants to construction trade occupations make decisions based on their own preferences and priority attachments. However, due to the complex nature of construction employment and unique cultural aspects of the sector, priorities may differ from that suggested within current practice and theory. Because these decisions have linkages to employee commitment, productivity, quality of work life and value, the various factors may be measurable in human and economic terms. Understanding how trainees prioritise these factors may enable those managing trainees to better assess their future requirement and implement this within construction management

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practice. Not only will this enable a better transition between employment training and active work engagement, but will also affect individual decisions to remain within the construction sector.

One way of assessing priority attachments is through the Analytical Hierarchy Process (AHP). The Analytical Hierarchy Process (AHP) (Saaty, 1980) is a decision-making framework which helps to structure priorities within decision planning processes. AHP uses Thurstone's (1959) law of comparative judgement to demonstrate that attitudes can be scaled along a "psychological" or one-dimensional continuum (Tsai and Bockenholt, 2002). This enables the relative intensity of factors to be measured directly against its counterparts (Chinyio *et al.*, 1998), rendering an "absolute judgement" (Torgerson, 1967). This provides a means to describe peoples' attitudes towards stimuli and the priorities they attach to them; thus enabling decision makers to accurately account for individual preferences (Annett, 1974; Roberts, 1992; Chinyio *et al.*, 1998; Muya *et al.*).

Building on doctoral research outlined in Kappia *et al.*, (2003; 2004) this paper reports on work which is exploring the high attrition rates amongst trade and craft workers in construction occupations. In Kappia *et al.*, (2003) a theoretical framework was outlined for examining trade and craft careers in relation to development and retention; presenting the rationale and approach of the work in progress, including a research methodological outline. The research presented in this paper builds on Kappia *et al.*, (2004) which developed a model for assessing trade and craft careers. AHP was used to assess the intensity of career development priorities against other relevant factors. The objectives of the present research is thus two-fold: i) to assess the extent to which career development is given a priority by construction craft trainees in relation to a set of competing alternatives; and ii) to assess the relative utility of AHP as a tool for prioritising career development against these alternatives.

THEORETICAL AND CONTEXTUAL PERSPECTIVES

Research into career development comprises systematic attempts to analyse employee abilities, interests, and work roles (Super, 1957; Hall, 1986). This guides various attempts to place individuals to a suitable work role and affects career progression (Gunnigle and Flood, 1990). Career development is achieved over time through assessment, counselling, education and training activities (Young, 1990; Arnold, 1997; Arnold *et al.*, 1998). A lot of attention has been placed on career development in recent years and this attention is steadily increasing within the field of construction management. The Construction Industry Training Board (CITB Construction Skills) has recently emphasised the importance of promoting career development opportunities as a necessary strategy for meeting the industry's skills, recruitment and retention needs (CITB, 2004a; 2004b).

A militating factor threatening the well-rehearsed performance improvement challenges (cf. Latham, 1994; Egan, 1998; 2002; Wouldhuysen and Abley, 2004) concerns the attrition of both new recruits and qualified craft professionals. Current data suggests that 40 per cent of trainees leave education before completion of a professional trade standard (CITB, 2004a; 2004b), with some regions reporting attrition rates as high as 50 per cent (Mackenzie *et al.*, 2000). The office for national statistics reports that 20 per cent of plumbers; 25 per cent of those qualified in wood trades and approximately 50 per cent of electricians work outside the construction industry (Ruiz, 2003). Collectively, these data suggest a vast employee haemorrhage. Taking into account natural wastage through retirement and predicted expansion

across the sector, there are continued questions regarding the industry's ability to meet demand or cope with sustain growth (DTI, 2002; CITB, 2002; 2003). However, the trade and craft career is an under researched field and so what actually contributes to high attrition rates is not understood.

Stages of career development

Underlying many theories of career development are the identification of stages of within the career process. Career stages are clusters of distinctive activities and behaviours, shaped by attitudes and motivations. Super (1953; 1957) posits four stages: (a) exploration - the developmental task of exploring and selecting amongst career alternatives; (b) establishment - developing skills knowledge and professional ability; (c) maintenance - ensuring that previously established rewards and statuses are retained; and (d) disengagement - conserving acceptable levels of performance whilst preparing for retirement or exits from a particular career path. Psychological needs and effective priorities change at various career stages. These are often in line with the changes in roles and job content (Cron, 1984). As the timing of transitions from career stages is not prescribed by chronological age (Super, 1990) a "recycling" process may occur, where individuals return to an exploration stage (or other relevant stage) if attitudes and career goals change (Super *et al.*, 1988). This recycling process often explains why people leave occupations, often in an attempt to find more adequate ways to meet career or life goals.

Work Effect Concept Systems

Decision and choice making within each career stage can be conceptually linked to "Work effect concept systems" (Jepson, 1984), which presuppose three facets of preferences and priority attachments: a) the relative importance of a factor to a deliberating individual; b) the most preferred level of a factor to an individual; c) and the readiness to compromise. While in the field of behavioural psychology and management practice, the causal relationship between career development initiatives and employee retention is considered fairly predictable; attitudes and behaviours are fundamentally influenced by job position, responsibilities or activities (Schein, 1987). An emphasis on career development may change if an individual is in an occupation with fewer promotional opportunities (or mode of achieving promotion). In these cases, individuals are led to a greater orientation towards the present, often manifested as an increased desire for immediate monetary reward (Hall, 1976; Rabinowitz and Hall, 1981; Cron, 1984). However, the majority of empirical evidence related to career development is based on the occupations of professional and managerial workers. Suggestions for this lack of research are anecdotal concerns that non managerial employees' decisions are motivated by financial rewards, and career development is neither expected nor desired (Thomas, 1988; McDonald, 2002). Although money is accepted as a powerful motivator within construction (Olomolaiye *et al.*, 1998), little is known about the cause and effect relationship of career development to retention for trade and craft employees.

The UK construction industry labour market is characterised by a large proportion of self-employment (Harvey, 2001) working for sub-contractor organisations, few of which employ few personnel directly (Agapiou *et al.*, 1995; Cabahug, 2002). For career development to be effective in organisations, line managers need to support the development of their staff and have the necessary skills to coach and counsel them as appropriate (Yarnall, 1998; Harrison, 2000). Due to the fragmented structure and project-based nature of the construction industry, the effect of this is often limited.

Compounding this is the fact that workers are employed for particular construction projects which have a limited duration (Langford *et al.*, 1995; Loosemore *et al.*, 2003). Project based and itinerant working patterns often fundamentally imply the continuous renegotiation of the employment relationship and a subsequent reengagement of a psychological relationship when work is available.

Before the industry introduces career development practices to stave off turnover, it must be understood what factors are given precedence. The research reported in this paper assessed attitudes towards career development of new entrant trainees' (NET's), primarily in the "establishment" phase of their careers. This is to be treated as a benchmark for analysing career objectives of trade and craft employees in subsequent phases of their careers.

RESEARCH DESIGN AND METHODOLOGY

In psychology, marketing research and sensory analysis, paired comparisons constitute a prominent mode of data collection when alternatives, objects, or stimuli have to be judged with respect to a subjective criterion (Graßhoff, 2003). Thurstone (1959) suggests that comparative judgements assume that when an item is evaluated against a counterpart, psychical, neural, chemical or electrical impulses identify and attach varying degrees of excellence, weights or grey values. This is described as the "discriminal process" (Thurstone, 1959 p.39). This is not fixed and fluctuates in intensity depending on an items counterpart. An item may be granted a high rating against one counterpart within a series, but may receive a relatively low rating against another. This provides a simple experimental technique, but one that is supported by an extensive literature (Bradley, 1976).

Although many tests employ Likert scales to rate statements – a technique also utilised in the wider research study – this was not considered suitable for this investigation. Although likert scale responses would allow for a computation of values attached to each stimulus, they often provide little information about individual differences when respondents use extreme ratings to equally judge separately constructed stimuli (Chinyio *et al.*, 1998; Tsai and Bockenholt, 2002). In this study concerns arose in relation to where respondents made judgements based on a belief that certain responses are perceived more socially desirable than others (cf. Dillman, 1978; Saunders *et al.*, 2000). A reliability concern noted by Hofstede (2001) is 'yes man ship' (Schuman & Presser, 1996), or what is commonly referred to as "Acquiescence" (Hofstede, 2001 p. 56). Acquiescence can be defined as the tendency to agree with an item regardless of its content.

The first requirement of this research was to identify work related factors to compare against career development. Factors were identified through the literature and an initial scoping study with senior construction stakeholder (employers, employees and training providers) (Kappia *et al.*, 2003). From this process, five alternate stimuli were identified: 1) career development); 2) Job Security; 3) Work Conditions; 4) Job Content; 5) Financial Incentives; and 6) Social Relations ($n=6$). Factors were arranged in pairs so that every factor was compared against each other. The total numbers of pairs presented were fifteen ($n(n-1)/2 = 15$). While there are several methods for computing values (Torgerson, 1958; Baird and Noma, 1978) descriptive statistics were ascertained using a simple set of matrices and easily discernable computations (Chinyio, 1998).

Sample Population

Data was gathered during fifty-three workshop settings held at five further education institutions across the East Midlands. In total, a broadly stratified sample of 563 new entrant trainees, representing every major construction craft occupation was obtained (see Table 1). As it was assumed that age would not always equate career stage (cf. Super, 1990), NVQ levels were used to identify career stages when there were no other indicators. Students were at various levels of study (Foundation, Intermediate and Advanced Construction Award Schemes; NVQ's Levels 1, 2 and 3). They were either full-time workers/part-time students (79%) or full-time students (21%). The ages of the participants ranged from 16 – 50 years old ($M=19.81$; $SD=5.142$), with an even representation of 16 – 17, 18 – 19 and 19 + age groups (35.5%, 34.2% and 30.0% respectively). Their length of employment within the industry ranged from 4 weeks to 34 years ($M=1.94$; $SD=2.67$). The gender distribution of the sample was 97.5 per cent male and 2.5 per cent female. This is slightly higher than the national average of females engaged in manual construction related employment (CITB, 2002).

Table 1: Table of Participants According to Trade (N=563)

Trade Occupation		Trade Occupation	
Brickwork	15.8%	Site Joining	16.4%
Plumbing	19.1%	Bench Joining	11.0%
Pipe Fitter/Welding	0.5%	Electrical Installation & Maintenance	4.9%
Refrigeration & Air conditioning	1.8%	Plastering	4.1%
Heating & Ventilation	2.9%	Sign Writing	2.2%
Painting & Decorating	18.7%	Wall & Floor Tiling	2.7%

In terms of ethnicity, most were white European Males (92%), with the remainder being from Indian (2.1%), Pakistani (0.5%), Black Caribbean (5%) or Black African (0.2%) heritage. This gives a cumulative figure of 7.8% ethnic minority representation, again higher than the two per cent of all those employed within the industry (CITB, 2002). The relatively high female and ethnic minority representation compared to their relative representation amongst the wider construction workforce may be an implication of the high attrition rates amongst these groups prior to qualified entry into the construction labour market.

RESULTS

Participants were given a basic description of the six factors listed above and instructions for completing the instrument. Against each of the paired items, participants were asked “What do you consider the most important when considering work options?” Following the basic analysis procedures outlined in Chinyio *et al.* (1998), participants’ responses were collated and tabulated to assess the number of times each factor was preferred over its counterpart. A binary solution (Torgerson, 1958) was used where unselected factors were given a value of 0. In incomplete cases where no preference was indicated across a pairing, each factor was assigned a value of 0.5. In total the expected number of responses across all pairs was 8445 (the number of participants multiplied by the number of paired items). Of the returned instruments there were 8415 fully completed, a completion rate of 99.6 per cent. An

initial rank order was achieved by computing the total number of times a factor was selected. These computations resulted in a rank order of: 1) Career Development (CD=1835); 2) Job Security (JS=1641); 3) Financial Incentives (FI= 1580); 4) Work Conditions (WC= 1344); 5) Job Content (JC= 1033; and 6) Social Relations (SR= 1012). Table 2 presents a summary of raw data and basic findings.

Table 2: Summary of Raw Data (N=563)

	CD	FI	WC	JS	JC	SR
Total	1835	1580	1344	1641	1033	1012
Weight (%)	21.73	18.71	15.91	19.43	12.23	11.98
Rank	1	3	4	2	5	6

The matrix in Table 3 displays the tabulated raw data, outlining the number of times participants thought the factor listed in each column was more important than the factor in the intersecting row. In Table 4 the raw data is converted into proportional values (using the formula: $P_{ab} = F_{ab}/N$). This indicates the proportion to which the factor listed in each column is preferred over the factor listed in the intersecting row. These represent the psychological scale values for each compared factor. If the proportion $P_{a>b}$ is greater than .50, this suggests that participants thought generally that factor *a* has a higher priority than *b* and the scale value is considered positive. Conversely, if the proportion $P_{a>b}$ is less than .50, this suggests that participants thought that factor *a* has a lower priority than *b* and the scale value is considered negative (given that *a* are columns and *b* are rows). Table 5 gives the relative intensity of each factor (the difference in proportions). This corresponds with the observed proportion of participants who thought the factor listed in each column was more important than the factor in the intersecting row. This is calculated by subtracting corresponding *ab* proportionate values.

Table: 3 Raw Data Matrix (N=563)

Rank:	1	2	3	4	5	6
	CD	JS	FI	WC	JC	SR
CD		275	214	214	127	150
JS	288		208	269	192	217
FI	349	355		215	133	183
WC	349	294	348		301	179
JC	436	371	430	262		283
SR	413	346	380	384	280	

Table: 4 Matrix Identifying Proportional Values (N=563)

Rank:	1	2	3	4	5	6
	CD	JS	FI	WC	JC	SR
CD		0.488	0.380	0.380	0.226	0.266
JS	0.512		0.369	0.478	0.341	0.385

FI	0.620	0.631		0.382	0.236	0.325
WC	0.620	0.522	0.618		0.535	0.318
JC	0.774	0.659	0.764	0.465		0.503
SR	0.734	0.615	0.675	0.682	0.497	

P_{ab} = Proportion value

F_{ab} = Frequency with which factor j is preferred over i by all participants

N = Number of participants

Based on the findings Table 5, three factors are given a positive intensity value: (Career Development; Job security and Financial incentives), indicating overall 59.87 per cent of respondents rated these as priorities. This suggests that trainees have a preference for career development over the other five factors. A general review of tables and matrices (Tables 2 – 5) will give priority attachments and the intensity to which each factor is desired over its counterpart. For instance, 51.2 per cent of trainees viewed career development as a priority over job security, a positive intensity of 2.4 per cent. Although career development is viewed as a higher priority than job security, in cases where participants prioritised financial incentives, job security is given a higher priority than career development (63.1 per cent and 62 per cent respectively), and while social relations are given the least priority against four of its counterparts, it is considered a higher priority than job content (50.3 per cent and 49.7 per cent respectively).

Table: 5 matrix identifying intensity values amongst factors (N=563)

Rank:	1	2	3	4	5	6
	CD	JS	FI	WC	JC	SR
CD		-0.024	-0.240	-0.240	-0.548	-0.468
JS	0.024		-0.262	-0.044	-0.318	-0.230
FI	0.240	0.262		-0.236	-0.528	-0.350
WC	0.240	0.044	0.236		0.070	-0.364
JC	0.548	0.318	0.528	-0.070		0.006
SR	0.468	0.230	0.350	0.364	-0.006	
Intensity	0.253	0.138	0.102	-0.038	-0.222	-0.234

DISCUSSION

The results support extant theories of career development which reject over reliance on pecuniary rewards. Although much of this literature relates to professional and managerial employees, the results of this study suggest that financial incentives are not always a fundamental priority. They suggest that the ability to motivate an individual draws on an individual's needs with regards to their future orientation and the appraisal of internal and external factors for satisfying them (Trommsdorff, 1983; Nuttin & Lens, 1985), as well as the supporting notions of anticipation, or the expectancy of career development within any work role (Tolman, 1932; Nuttin & Lens, 1985). The results demonstrate that trainees are willing to prioritise progression

related factors. This provides a basis for considering career development as a retention factor and the value of a career focus in stimulating desired behaviour outcomes. By assessing the priorities attached to certain factors, management practitioners may themselves priorities activities to address employee preferences. Career development initiatives are thus seen as a future means of militating against attrition and an effective strategy towards retaining valuable employees.

Although career development is a priority in the “establishment” stage, whether this continues in subsequent stages needs further examination. Viewed in relation to Jepson’s (1984) review of work effect concepts, trade and craft workers may be forced to compromise this priority in later stages, which affects turnover rates in the form of career recycling (Super, 1990). This is plausible due to the complex, work intense and project based nature of the industry. As such other factors may be granted a higher priority in later stages. Current factors are: Job content – despite advances in production, work is still often physical, labour intense and repetitive, often requiring fewer cognitive skills; Job Security - basic employment relationship is dictated by itinerant working patterns and the nature of cascading contractor/sub-contractor employment; and Work conditions - work is often seen as dirty with continued health and safety considerations (Langford *et al*, 1995; Agapiou *et al*, 1995; Loosemore *et al.*, 2003). Social relations are also a prime factor as trade and craft workers enter into the industry through family and friends. This provides the informal membership of the construction community (Gale, 1991) and many individuals are attracted to work environments populated by people of similar social backgrounds. While results point to a greater understanding of attitudes towards career development in the present, they can by no means be conclusive of attitudes in the further, establishment, maintenance stages. Further investigation is necessary of individuals in the subsequent stages to examine issues of compromise in attaching prioritise and whether this affects a recycling process.

Recently, the CITB has begun focusing on career development agendas through its outlining of a Sector Skills Agreement (CITB, 2004a; 2004b), which includes an agenda to investigate career pathway’s of all construction employees including the trades. However it must be understood that career development should not be treated as an additional initiative, but as a primary motivating factor. In the general labour market analysis, there is a wide social and psychological distancing between management and blue-collar workers (Lewin and Mitchell, 1995). However, the construction industry’s labour intensive nature and the subsequent human capital implications that this presents (see Austrin, 1980; Langford *et al.*, 1995; Agapiou *et al.*, 1995; Loosemore *et al.*, 2003), makes trade and craft employees vital to the industry as direct producers of its products and so they should not be discounted from career development initiatives. Career development should be granted equitable status at all levels of the industry.

CONCLUSION

The research sought to establish the priority trainees gave to career development as a precursor to exploring the wider influence of career development on the retention of more experienced craft workers. A paired comparison by way of the analytical hierarchy process provides a simple but powerful investigative technique capable of generating decisive results. Pair wise comparisons provide a reliable and effective method of understanding the career priorities of craft trainees; participants found the instrument easy to complete and thus, the response rate was very high. The results

reveal that career development is given priority amongst trade and craft trainees which contradicts anecdotal suggestions that financial incentives are the main concern of the trade/craft occupational group. However, job security and financial incentives still featured prominently amongst the other influential factors which infer that employers and industry bodies should look towards satisfying all three career priorities if the rates of attrition are to be reduced in the future. Indeed, given the importance of job security to craft trainees, the findings of this work also provide a strong argument for direct employment within the industry, particularly given the problems that the industry faces in attracting the requisite number of new entrants.

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