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WOMEN IN THE CONSTRUCTION INDUSTRY - A DISCUSSION ON THE  
FINDINGS  
OF THE TWO RECENT STUDIES OF THE CONSTRUCTION INDUSTRY SECTOR

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Summary

This paper reports the results of two recent studies concerning the attitudes of women toward the UK construction industry. The major finding from both studies is that females perceive the UK construction industry to have a low level image comparable with a cottage industry, and a recommendation is made for increased publicity and education about the construction industry and its professional occupations.

Sommaire

Cet expose presente les resultats de deux etudes recentes sur l'attitude des femmes envers l'industrie de construction au Royaume Uni. La conclusion la plus importante est que la femme croit que l'image de cette industrie est mauvaise, une image comparable a l'industrie a domicile. On finit par presenter une recommandation d'ameliorer la publicite et l'education sur l'industrie et les professions de construction.

Keywords: Labour Market, Women, Education, Image of Industry

INTRODUCTION

This paper reports on recent two independent studies of the attitudes of women toward the construction industry. Firstly, the multivariate analysis of a postal questionnaire survey of attitudes in the UK and Hungary is examined for gender differences in the UK. Secondly a series of UK student interviews is described and compared with several likely hypotheses relating to expected female attitudes. The major findings of these two studies are described which suggest that females generally see construction as a form of cottage industry. As a result, a recommendation is made for increased publicity and education about the construction industry and its professional occupations.

UK - Hungarian Survey

This was a general exploratory survey of attitudes towards the UK and Hungarian construction industries, its processes, products, and organisation. The intention was to identify empirically the major relevant variables associated with the industry's image, in terms of dependent variables such as respondents' age, gender, education, residence, occupation, and knowledge, experience and interest in the industry, and in terms of independent variables such as the quality, quantity, duration and price of different building types, technology, productivity, discipline, wages, environmental care, factors influencing performance, reliability of contractors, creativity in employment, and work preferences.

Using a multivariate technique, it was possible to separate the effects of each dependent variable, in this case the gender variable, on the independent variables. These were reduced routinely to a group of significant effects which were then considered for the purposes of hypothesis generation.

As a purely empirical study, no formal *a priori* hypotheses were formulated. Instead set of potentially significant variables were generated by the researchers from their own experience in a brain storming session early in the research. One result of this is that a rather large number of variables were created for analysis, hence the form of analysis. It was felt however that the approach was valid due to the lack of prior work in the field, and a necessary precursor to further depth studies in related areas.

### The UK Survey

Very few women are employed in the British construction industry sector. An analysis of 1971 and 1981 Census data using revised Warwick Occupational Categories and the Social Accounting matrix industrial classification of the Cambridge Growth Model shows that, in terms of vertical occupational segregation, 75% of the women employed in the industry carry out clerical or secretarial work compared with less than 2% of the men. In 1988 only 6% of the full time work force were women.

Only 8.12 of applicants and 7.4% of admissions for degree courses in building in polytechnics were female in 1988. For universities the figures were 7.3% and 11.5% respectively (1,2). The figures for membership of construction industry professional bodies are worse: Royal Institution of Chartered Surveyors (Quantity Surveying Division), 3.2%, Institution of Civil Engineers, 2.0% and The Chartered Institute of Building, 1.0% (3). For the purposes of this research the graduate route to professional occupations was identified and the subject of building specifically focused upon.

In terms of actual occupation the term building professional is taken to be a construction manager, site manager, building consultant, contracts administrator, quantity surveyor, construction planner, estimator or similar with a degree, professional qualification (eg Member of The Chartered Institute of Building: MCIOB) or is working at the level which a graduate would normally be employed. The construction industry is defined by Hillebrandt (4) according to the Standard Industrial Classification (5).

Figure 1: Construction Industry Employment Model

The model used to represent the occupations contained by the construction industry is shown in Figure 1. This is needed as the use of job titles such as those mentioned above is misleading when used in a cross-cultural context.

Space does not allow a full definition of all segments in the model (Figure 1). The occupations under investigation are defined in segments 4 and 5. In both segments actors are normally corporate members of a construction industry professional body. In the case of the 4, carrying out primarily production responsibilities at site and/or in an office. Segment 5 includes responsibilities of design and production at site and/or in an office.

The aim of this survey is to establish why there is only a few women occupied as building professionals in the British construction industry. There are two main hypotheses:-

1. The image of the construction industry militates against the entry of women;

2 Knowledge of the construction industry discourages the entry of women.

The pilot survey is not yet complete. However some of the data gathered to date is analysed and interim findings are discussed.

## RESEARCH METHODOLOGIES

### The UK - Hungarian Survey

The methodology developed by the UK/Hungarian research team adopted a postal administered to over 1000 recipients in each country representing a reasonable cross section of the industry's employees and lay public. An early pilot study was conducted to test the questionnaire's ability to generate meaningful data relating to the strength and source of opinion on such matters as construction quality (appearance, function, reliability, comfort, cost, etc.) and process (efficiency, competency, safety, glamour, desirability as a career, etc.) The final version of the questionnaire was issued in early 1988 and a total of 409 responses were received from the UK and 456 from Hungary. The data were analysed by the Statistical Package for Social Scientists (SPSS<sup>x</sup>).

10 dependent variables in addition to gender were identified in the questionnaire - age, education, occupation (managerial/clerical), residence (large/small town), work in construction industry, relatives in construction industry, interest in buildings, Do It Yourself experience, own property, rent property.

A loglinear form of analysis was used to partial out the effects of the other dependent variables and, as most of the variables resulting from the questionnaire were measured on ordinal/categorical type scales, in preference to the more usual regression approach. A lengthy series of bivariate chi-square tests had to be made in advance however in order to reduce the number of independent variables to a manageable size. These were carried out on each dependent variables against each independent variable scored in the questionnaire, a total of over 1800 separate analyses in all. The joint distribution of the pairs of variables was examined via the CROSSTABS procedure under the null hypothesis that the cell proportions were the same. Where the expected cell value was less than 5 the raw data were collapsed into an adjacent category. The chi-square statistic was computed for each analysis and values with a probability of less than 0.05 recorded.

The multivariate LOGLINEAR analysis was conducted for each independent variable against the subset of dependent variables found to be significant in the bivariate analyses, a total of 78 analyses. In order to reduce computational and interpretive problems, it was assumed that the dependent variables were statistically independent, ie. no interaction effects were

considered. The Z values of the resulting parameter estimates were then examined and variables with Z values greater than 1.96 recorded.

The significant independent variables resulting from the loglinear analysis were subjected to a FACTOR analysis for each dependent variable. The factors identified were then interpreted by the researchers resulting in the proposition of basic models for each of the dependent variables.

#### The UK Survey

This survey is the pilot of a larger programme. Table 1 shows sample sizes for both the pilot and main survey. The sample sizes shown are the 'yield' sizes. Detailed methodological are not discussed here. The research design has taken account of current debate on the subject of gender research (7,8,9,10,11,12).

The construction industry is compared with (a) a similar comparator - the engineering industry, and (b) a dissimilar comparator - the banking and finance industry.

There are three groups or levels; two in the home phase and one in the market phase. These phases refer to Human Capital Theory (13) relating to education, training and work in the labour market.

Table 1: Purposive Sample

Phase	Group	Construction		Engineering		Banking	
Home	School student	2 male (25m)	1 female (25f)	1m (25m)	1f (25f)	1m (25m)	1f (25f)
	Under-graduate	2m (25m)	1f (25f)	1m (25m)	1f (25f)	1m (25m)	1f (25f)
Market	Graduate in Industry	1m (25m)	1f (25f)	1m (25m)	1f (25f)	1m (25m)	2f (25f)
	Pilot Main		8f (150f)		6f (150f)		8f (150f)

Note: Structured interview pilot survey numbers shown # thus  
Main questionnaire survey numbers shown (#) thus.

Findings are presented for the first level of the home phase. The respondents were randomly selected in equal proportions male

and female (8 in total). The allocation of respondents to industries in table 1 is notional at this level; arts students being allocated to Banking and finance. Discussion focuses on the similarities and differences between sexes. The school students were sourced from a large sixth form college in the West Midlands (1200 students). They were all studying 3 or 4 A level subjects; 3 arts, 3 sciences and 2 sciences with arts. Their age range was between 16 and 17; all sitting exams in June 1990. Two boys 16, 2 girls 17 and 4 boys 17 years old.

Audio recorded structured interviews were carried out over an approximately 40 minute period. Each interview was designed specifically for each cell in the sample. In the case of school students the interviews were almost identical. Bias may be introduced due to slight wording adjustments made during the data gathering to refine the structured interview for later work.

Questions asked related to the working hypotheses listed below for the school student group. It was not possible to address or test hypotheses number 3 or 4 as the sample did not reveal appropriate respondents for this purpose.

#### **Hypotheses relating to school students (Home Phase)**

1Girls have different knowledge of the construction industry from boys.

2Girls hold a different image of the construction industry from boys.

3Girls considering a degree in building (or related degree) know more about the construction industry than boys considering a degree in building.

4Girls considering a degree in building (or related degree) are motivated by different characteristics of occupations in the construction industry than boys.

5School students hold the same images of the construction industry as do their teachers.

#### **ANALYSIS AND FINDINGS**

This section describes the analytical approaches of both surveys. Findings are presented and discussed. The UK survey is not yet complete and therefore analysis is restricted to the school student group. The Hungarian - UK survey is complete. Analysis for gender effects has been carried out.

#### **Hungarian - UK Survey**

Shortage of space prevents the presentation of a full account of the results in this paper which will be restricted to the gender effects applicable to the data obtained in the UK.

## Results

The loglinear analysis generated a total of 10 independent variables that were significantly associated with the gender variable. After factor analysis these 10 variables were allocated to 5 factors. The major variable loadings contained in each of the factors, together with our interpretation of the factors themselves, is as follows: (NB Note that each factor and variable should be preceded by the words "Females believe more than males that...")

Factor 1. *Smaller contractors give better prices*

Variable 1. Big construction firms seem to charge the highest prices (CSIZ1)

Variable 2. Medium size construction firms seem to charge the lowest prices (CSIZ2)

Factor 2. *Private craftsmen are more reliable as they take longer to do the work*

Variable 1. Private craftsmen are the most reliable contractors of good professional repute (REL4)

Variable 2. Building work nowadays is generally undertaken by contractors for long deadlines (DEAD)

Factor 3. *People in authority are more influential on construction performance*

Variable 1. Local authorities (councils) are in a position to improve the performance of the building industry (POS5)

Variable 2. Quality control (building inspectors) are in a position to improve the performance of the building industry (POS7)

Factor 4. *Creativity is needed by contractors and authority designers*

Variable 1. Creativity is needed by an Architect or Engineer working in a contractor's office (CR2)

Variable 2. Creativity is needed by an Architect or Engineer working in a Building Department of some Local Authority (CR7)

Factor 5. *Component/materials manufacturers are influential on performance*

Variable 1. Material/component manufacturers are in a position to improve the performance of the building industry (POS4)

This seems to suggest four main characteristics distinguishing female from male attitudes - preference for smallness, the influence of authority, the prevalence of creativity, and the



importance of component manufacturers.

Collapsing down to two factors provides interesting additional graphic information concerning the relationships between these variables (Figure 2).

This clearly shows two clusters of variables one of which consists of a preference for small firms both in terms of price and reliability with related long deadlines. The second consists of both the creativity and influencing variables, a common feature of which seems to be the role of authority. The outstanding variable (POS4) is the regard for component manufacturers. This suggests a modified interpretation to that above where authority is seen to be an influencing component.

Figure 2: Results of 2 factor analysis

The general conclusion of this comparative analysis of males and females is that the females in the study (irrespective of age, education, occupation, knowledge of the industry, interest in or experience with buildings) seemed to be of the view that construction is something of a cottage industry, consisting of good small companies relying on their component suppliers and held together by an authoritarian rule.

#### UK Survey

Not all of the hypotheses are tested. Hypotheses number 3 and 4

will not be discussed. Analysis is mainly qualitative although two rank orders were analysed to give significantly positive Spearman's rho correlation coefficients. The differences and similarities between female and male responses to questions are analysed below.

## **Results and Analysis**

Results and analysis relate to the participants knowledge of, attitudes to and images held of the British construction industry. Results are gathered and analysed below under headings of the appropriate hypotheses.

### Girls have different knowledge of the construction industry from boys.

When asked: What sort of careers do you know about in the construction industry?; both males and females seemed vague about the definition of the construction industry. Males assumed the question was concerned with manual trades such as bricklaying. When questioned further about professional careers males mentioned engineering and one respondent had "no idea". Females all mentioned architecture saying that; "architects design and engineers build".

Participants were asked; If you were a careers advisor would you encourage young women to work in the construction industry? Females knew about various initiatives aimed at encouraging women to become engineers such as Women Into Science and Engineering (WISE) (14). They saw financial rewards as "quite good". Professional occupations were seen as much less problematic for women than manual trades. males appeared to know a little about architectural and engineering possibilities. One male thought that women were; "sought after in construction for public relations purposes". He felt architectural work was; "related to the female side of the mind". males did not think manual work appropriate for women because of problems they would face at work.

When asked the same question about encouraging males; females said that males had practical interests which led them to become workers in the construction industry. Males saw no problems for males and would encourage them if they were "practical" and "science minded".

Participants were asked; What do you think is the best education and training for someone wishing to gain a professional position in the construction industry? Also they were asked what course should be studied at polytechnic or university? One male had no idea, one thought that a practical training in industry at technician level was appropriate and the other two thought an engineering degree was required. Female responses mentioned

either architecture degrees (which were seen as "very academic") or surveying which was seen as accessible with any degree. No male or female participants appeared to know about building, quantity surveying or civil engineering as degree subjects. One female thought that; "bright people should read a degree in architecture and others should do a Youth Training Scheme on a building site after leaving school", if they wanted to work in the construction industry.

#### Girls hold a different image of the construction industry

Participants were asked; What do you think about women pursuing a managerial career in the construction industry? One male said that women were; "more considerate than men" and that this would improve management. There was a general view by males and females that men and women were "equally capable". Female responses indicated anxiety about the "male orientation and "male domination" of the construction industry. One female thought that women had better listening skills than men and were better team workers. She saw both these as advantageous in the construction industry. All women saw promotion prospects as a problem for women in the construction industry. One said "you've got to be sure of yourself".

The question was asked: "What (if any) particular aptitudes and/or types of personality are best suited for the construction industry? One male said that it depended on the particular job.

Both thought that; "a willingness and ability to research" was essential. Team working and getting on with people was mentioned by males and females as an important attribute. Also an ability to work hard was cited by males and females.

Females' responses included statements that architects needed to be "creative" and "arty". One said people should be technically minded. Personal experience of friends in the industry led one female to say that they were all outgoing and lively and that they enjoyed a challenge. Also the view was expressed by one female; "It's one of those jobs you cannot do unless you enjoy it"! One male said that he thought; "those in the construction industry were less refined than office workers who were university educated".

Participants were asked to rank a number of professional occupations. These responses give a Spearman's rho of 0.95 for ordinal (ranked) correlation. This would tend to suggest that males rank these professional occupations similarly to females.

Medical doctors came top with Architects ranked high and civil engineers in the upper half of the rankings. The other two construction professions were ranked low. Participants were also asked to rank a number of construction professions/occupations. These responses give a Spearman's rho of + 0.81 for ordinal (rank) correlation. This would tend to

suggest that there is no or very little statistical difference between the way in which males and females rank these occupations. The architect comes top for both sexes. Most participants had difficulty in defining the roles of several of the stated occupations.

Table 2: Words used to characterise the construction industry.

Males		Females	
1	Necessary and manual	1	Useful and destructive
2	Manual	2	Technology
3	Risky	3	Interesting and hard work
4	Practical and manual	4	Physical

The question was asked; "What single word would you use to characterise the construction industry"? (Table 2).

Compare these with responses to the question: "In a newspaper article what would you expect to see put forward as bad aspects of the construction industry"? (Table 3).

Table 3 Bad aspects of the construction industry.

Males		Females	
1	Manual, poor pay, low class, long hours.	1	Poor design.
2	Dirty, hard, energetic, low pay, physical.	2	Poor image compared with doctors.
3	Poor safety, poor architecture, bad development.	3	Poor housing design,
4	Poor pay, bad relationships.	4	Physical, dirty.

These words speak for themselves; a manual, dirty, low level image. The general image is not dissimilar to the industry's bad aspects.

School Students hold the same images of the construction industry as do their parents

According to responses made males appeared to be of the opinion that their parents would support them if they worked in the construction industry in a professional capacity. Females tended to feel that their fathers would be pleased but were not sure about their mothers' attitude.

### School Students hold the same images of the construction industry as do their teachers

Responses indicated that teachers did not inform students about the industry and one female said that in some cases enthusiasm towards non-traditional occupations was "squashed". Some male and all female participants seemed to want teachers to be less biased and to be better informed. Teachers were seen as highly influential and participants thought they needed to encourage men and women in the context of better information about the construction industry.

### CONCLUSIONS

It is evident from both the studies reported here that females perceive the UK construction industry to have a low level image comparable with a cottage industry. As a consequence, school students appear to have very little factual knowledge about the industry, its professions or degree courses available. Females seem to rate the creative opportunities in the industry higher than males (cf 17) which may explain the interest in the architectural side but nothing was really known about that aspect.

A tentative conclusion is that image has some effect on the level of female employment in the construction industry. What is perhaps important is the level of knowledge held by girls, and boys for that matter. Fathers may play a key role in the case of female students (cf. 15, 16).

Several hypotheses have not yet been fully tested but the results obtained to date generally coincide with previous research. The evidence suggests that (a) the relative images held of the industry by females and males should be further investigated, and (b) there is potential for increased publicity and education about the construction industry and its professional occupations.

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