



Contrasts of Socio-cultural Sexual Differentiation or Discrimination within Chinese and Polish Factories In the Context of Environmental Performance

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Abstract

This paper presents elements of case study research carried out in twelve factories involved with heavy industry in China and Poland. The research examined how objective measures of environmental performance, derived from expert assessment of the management systems, compare with the perceptions of that performance throughout the managerial ranks. This current paper examines gender-related differences in the perceptions of environmental aspects and the effects these might have on the control of environmental degradation and, further, gender-related differences between perceptions and empirical realities of selected environmental variables.

The paper initially sketches out the factory locations and a short history of the research and research questions related to the environment and production. It goes on to outline the management expertise levels and presents concepts of environmental performance and the managers' perceptions of this performance. The novel methodology used in the collection and analysis of data is described briefly followed by analyses of the data and a subsequent discussion of the findings. Finally, certain conclusions about the proven gender differentiation are summarized and a proposal for some remediation of deleterious affects of both this differentiation and of the organizational dynamics.

Keywords: Differentiation, Gender, China, Poland.

1. Introduction

1.1Research locations and questions

The corresponding author has been visiting the subject factories in Poland since 1993 as an assessor of their management systems in respect of the standards for quality (ISO9001), environment (ISO14001) and Health and Safety (OHSAS18001). In 1999, the management of each of the factories were asked if they would like to be included in some research into mechanisms of communication, knowledge and decision making, particularly environmental decisions. They agreed to this and, during and after the research activity, workshops were conducted at the factories based on an analysis of the data, on management problems and opportunities.

A second phase of field work started in the Autumn of 2002 in China and Poland to investigate facets not covered in the first phase, mainly relating to differences in national and factory culture as represented though organizational behaviour and the management of environmental degradation.

The main research questions arising out of this work, and addressed by this paper, concern whether there are differences between the sexes in respect to the perception of environmental and production issues and the behaviours relating to those perceptions. This analysis was extended to investigate how these gender differences might vary between the Chinese and Polish factories.

In the environmental arena, and in the context of gender differentiation, it is postulated that the representations of individual perceptions (see Alasuutari, 1995) do and will identify or form the basis of any socio-cultural grouping to which the participants choose to belong. The research will attempt to show how the perceptions of the surveyed managers, with the women distinguished from the men, can represent some general mechanisms at work within culturally differentiated factory groups, and also the empirical mechanisms as represented by environmental degradation on the ground.

1.2Management and expertise

In Poland, the level of expertise within the management ranks has been high with a large number of men and women qualified to degree level and with a long history in the respective companies resulting in extensive tacit knowledge (see Lubit, 2001; Sperber, 1996; Stacey, 1992; Senge, 1990; Cole, 1989). That began to change after the take-over, from the State, by a private owner, with younger people coming in who were new to the industry and the older people being declared redundant. While the number of women in management ranks has not been equal to that of men, there *are* more than token numbers in executive positions.

In China, the breadth of expertise within the management ranks significantly lags that in Poland, however, from detailed assessment of their production systems by the corresponding author, the ability to do specific operational tasks is nearly on a par in most cases and, for optical communication products, on a par.

1.3 Structure of paper

The next section of the paper examines some of the socio-cultural aspects of groups of managers within the organizations and how these might vary in respect of gender. The context of these groups is that of their perceptions of environmental issues as against the evidence of actual environmental performance.

This leads on to a novel methodology for defining those gaps based on the use of an environmental expert to define the empirical realities as a base line against which to measure the strength of feeling of people's perceptions (Likert style questionnaire). The data arising from the implementation of the methodology follows and is discussed item by item under the analysis section.

Specific aspects of proven and ambiguous gender differentiations are discussed in sub-sections and are brought together in the final conclusions.

2. Environmental performance: perceptions and reality

Within a given organizational culture and it's related behaviour (see Schein (1992), a number of papers examine different aspects of the relationship between observation, perception, beliefs, values (Mitchell (1989) and socio-cultural groups, some of which draw out possible differentiations related to gender. For example Fu et al (2004) discuss how gender can influence tactics in making decisions while (Alvesson, 2002), elaborates on inherent characteristics of women, some of which can relate to ethical considerations, and Sonenschein (2007) explores how ethics influence behaviour. In respect to the environment, Gifford (2002) proposes that there are fundamental psychological processes such as perception, cognition and personality which filter and structure each individual's experience of the environment and that this will vary with socio-group dynamics.

Wallace et al (1999) writes on fundamental values and belief systems but these aspects are mediated by Merton (1967) on perceptions and illusions, Chapman ((1979) on how representations of perceptions vary from place to place dependent upon the social and physical environment, de Bono (1993) on perceptions and reality and Morgan (1998) on 'Groupthink' where people are carried along by group illusions and perceptions. These considerations relate directly to the issues of environment and degradation found in the study factories.

Denison et al. (2004) writing on organizational culture lament the fact that very few modern papers exist on the differences that appear within and between management levels in individual factories. These differences can represent misalignments between perceived realities and empirical realities. Where this type of gap exists it can be expected that any decisions (or no-decisions) can lead to misaligned action-outcomes which may exacerbate environmental degradation or, at best, preserve the status quo. This paper is an attempt to help fill some of these deficiencies in workplace research.

One interesting aspect of the creation and existence of these gaps is that pertaining to perceptions which may be gender related. This paper will present an analysis of the gender differences in the socio-cultural groupings of the study factories. Specific reference will be made within the text to authors writing on gender differentiation, e.g. Haidt and Graham (2007) and Gardiner and Tiggemann (1999). Differences arising from sexual differentiation, applying to when and what type of woman may be appointed to a job, affect the socio-cultural make-up and environmental world-view of an organization, is discussed in Cavanagh (2002) and will be covered later.

As a guide to environmental performance, key writers are Cole (1989) who talks of the transition 'From Red to Green' in Poland, Turner et al (1994) on the economics of being 'green', and Gouldson and Murphy (1998) on the realities of

implementing environmental legislation. An organizational and corporate perspective is given in an IOD Guide to Sustainable Development (2001).

3. Methodology

3.1 Methodology and survey data

The methodology adopted incorporated three different data sources as shown in Table 1):

Additional interviews and workshops were undertaken with the managerial and supervisory workforce in each factory but there is inadequate space to present the findings of these in this short paper (see Craig & Lemon, 2005). The interpretation of this work as qualitative follows the Alasuutari (1995) approach in the classification of observed and elicited data. In this paper the Likert survey framework is *not* looking for statistical co-relationships, it is used as a tool for establishing the comparative socio-cultural group patterning in and between organizations (Merton-1967; Frost et al, 1991), see Figures 5 and 6 for examples of such patterns of perception responses.

3.2 The sample data from questionnaires

A twenty item 'strength of feeling' (SOF) questionnaire, contents as shown in Table 4, was deployed to all managers to obtain sets of perceptions related mainly to environmental performance but also to aspects related to production, which were addressed to the whole of the top three levels of management plus a sample of those below. The data from this questionnaire included differentiation of gender.

Due to the importance of interpretations of language used between managers and researchers (Shenghua, 2008; Alvesson, 2002; Holmes, 2001; Cameron & Quinn, 1999; Alasuutari, 1995; Zey, 1992; Frost et al, 1991; Badcock 1991; Brehmer 1986) in this type of research, it was considered that the best way to ensure as truthful responses as possible, was to be present personally while the questionnaire was completed and to stress confidentiality. Due to a fear and punishment culture operated by top management, this confidentiality was essential in order to facilitate a *truthful* answer from the respondents.

3.3 Reality benchmarks

Benchmark figures, based on expert opinion of factory environmental performance, were compared against the respondents' perceptions of environmental performance to see if the empirical realities and the perceptual realities corresponded. The degradation related (inter alia) to the degrees of impact of chlorinated oils on ground and groundwater, the amount of effluent chemicals or suspended solids going direct to river, and to the extent of knowledge about environmental concerns which could affect their actions and decisions. The question topics are presented in Table 6. Questions 5, 7 and 16 are opinion based and therefore have no specific benchmark.

3.4 Obtaining rich data

Data was obtained from the top (plant) manager on each site in a face-to-face, free-format interview centred on his feelings about culture challenges in the factory and sometimes outside (as they affect the workers inside). Table 2 refers to the complete range of managers consulted as well as other sources of data:

4. Study findings

4.1 Sexual distribution

Table 3 exhibits the sexual distribution of the managers in the twelve study factories and it can be seen that women are quite well-represented in China and Poland in the management strata. The ratios of female to male are greater than the 15/85% F/M (female to male) ratio adopted by Gardiner and Tiggemann (1999) in their study of gender differences in leadership style in male and female dominated organizations.

From Figure 1, for the Polish factories I/J/K/M/N, there is no major pattern of difference between the new factories I/M and the older ones, so this is no factor in gender differentiation. Women form a larger relative percentage of the managers in Polish factories K/M/N, while Factory I is the reverse. For Chinese factories C/D, the number of female managers is relatively high, these work in one new factory and one old, so size is no factor. Chinese factories E and S are heavily male dominated throughout the levels of management but the two factories are entirely different; one has a large number of female workers on repetitive jobs (some 400 out of 560) while the other is mainly an old-style machine-based production facility (300 people). There is no apparent pattern in managerial sex distribution, old factories against new.

4.2 Sex by age by country

As can be seen from Figures 2 and 3 there are distinct differences between the two countries. In general the managers in Poland are significantly over 40 years old, whereas in China they are mostly below 40, but the Polish people worked their way *up to* a position whereas the Chinese people were recruited *to* a position. This is due to Poland having had an industrial base for many years and, with the hierarchical ladders of achievement (long service counts), people gain promotion at higher ages. In China, with its newly developing industrial structure, most managers are young.

There is a clear difference with the women in management: Chinese women respondents are predominantly in the 30's decile while, in Poland, the women are more likely to be in their 40's and 50's. This could be due to the fact that, prior to the fall of communism, females generally stayed in one factory for all of their life, but the men were slightly more independent and moved jobs more frequently.

There is a factor here that can affect the comparisons between Poland and China. As the new, young managers in China have not had time to move beyond the competence classification of Flyvbjerg (2001) and into the *expert* classification which comes with the gaining of tacit skills and experience, they are found to be comparatively lacking in a *feel* for production processes and management, especially of the environment – this affects their decisions.

In China and Hong Kong (high) age is respected for experience and wisdom (Lewis-1999), but this is not reflected in the Chinese factories surveyed. Interview data suggests that this may be because the foreign Chinese *high-flyers* at Board level, running the Groups of companies, are wedded to Western management criteria in which the young are often promoted as having more energy and innovation, or it may be due to the shortage of trained and experienced (older) managers in mainland China, itself due to the rapid development of a global business.

This extends into the sexual domain in that female labour is very cheap in China and there is a tendency to de-skill jobs so as to be able to take the (mainly female) labour force from rural communities. Vice versa the males are discriminated against as they demand higher salaries and get relatively fewer jobs. In Poland the situation is rather more complex as both men and women are highly qualified acrosst the managerial levels, an MSc in an engineering or chemical discipline being the norm in the study factories.

The discrimination here is rather at the senior manager level where there were no female managers of individual production units, but (older) female managers predominate in the Human Relations departments. It was found that all the HR departments in the Polish factories had a male director and a female manager, but it was the female manager who was best qualified and who actually formulated the policy and decisions. Perhaps, within the fear and punishment culture deployed in the Polish factories, it may have been thought that a female would not be quite as good at enforcing the quite severe punishments. imposed, for relatively minor transgression, via the HR department.

4.3 Question response comparisons: The two countries overall

In Figures 4 and 5, relating to Q4 on process improvement (as one example), there is a clear difference in the patterns of response between the two countries with the Chinese being less fragmented than the Polish (the term *fragmented* in the tables and figures alludes to a spread of scores for any one question across the 0-10 range). In Poland there is also a clear difference between the male and female responses, with the women peaking at and around score 8 while for the men this happened at score 10 – the women are closer to empirical reality as represented by the benchmarking exercise.

In the Chinese factories, the relatively high incidence of women not answering the question may be due to it being mainly the men who deal with the *technical* aspects of environmental regulations, eg heavy metals in the laboratories and male production managers being responsible for oil spills etc. Perhaps it is also that the women in China are used to rules and welcome them, whereas the catholic women in Poland are well-used to defying (communist) authority (see also Lewis, 1999).

Table 4 shows the relative domination at specific survey score levels between the sexes and it is seen that there are only two occasions when the scoring (and perceptions) are roughly equal (Q1 and Q2) hence the body of the question responses exhibiting definite gender differences in socio-cultural (peer) groupings. However, this is with an accumulation of data across two countries and needs separating out by factory; these latter results are exhibited in Tables 5 and 6.

The scoring regime is 0-10 with 10 indicating perceptions which are strongly in agreement with the question statement, while 0 indicates no agreement at all (Likert strength of feeling survey methodology). Where the females are shown as dominating in certain questions in the right hand column in Table 4, this is an indication of the difference in perspectives between female and male managers for the question topic and, generally, where the females score low, their perceptions are closer to empirical reality (benchmark) – in other words they are more realistic or more knowledgeable.

4.4 Core and fringe perception scoring- female and male

In Tables 5 and 6 the questions are grouped according to the female perception score levels and, in the far right-hand column, details of the sex having the lowest scores are shown. The lower perception scores come from respondees who apparently do not belong to the core socio-cultural group (see Merton, 1967) and, as far as perceptions about the real environment are concerned, form fringe elements. Where these scores are lower, in general these are closer to the reality benchmark.

In both countries, but more dramatically in China, the overall female scoring (full score range of 0-10) is different than for the males. Apparently the Chinese females are less involved in technical knowledge communication, or perhaps

the absence of an ideational culture (Sorokin, 1957) or the equivalent Logically Coherent Culture of Archer (1996) is resulting in a lack of interest in some critical facets of environmental topics because there is no perceived company mission (culture) which covers these.

The main (core) groupings for perceptions as a surrogate for culture (see Craig and Lemon, 2005) lie mainly in the (score) 8/9/10 region and show a profound gender-based difference in the results between the Polish and Chinese factories. Even though the questions in the score-groupings are not totally the same, in respect of the lowest score criterion (far right-hand column), one country is virtually the reverse of the other, China exhibiting totally female results and Poland six out of seven male results. Lower scores are generally more empirically realistic.

Considering the research by Gardiner and Tiggemann (1999), it may be that the much larger percentage of female managers in Poland (41%) gives a near equivalence of male and female managers and hence less disposition to alter inherent management styles. In China, with only 24% of female managers, the females may be indicating a disinclination to alter their leadership styles to match with the males by moving outside the peer groups (and nearer to empirical reality).

Some suggestions for these phenomena are:

- (1) it is more important for both sexes to identify with the company in China so as to keep their jobs, but the females are perhaps not so confident in answering the questions;
- (2) whereas, in Poland, the females are more caring about the environment than the men, and hence score lower and are more biased towards the environment;
- (3) the Polish managers have more experience and are therefore more competent than the Chinese;
- (4) people are less regimented in Poland than in China hence exhibit their individualities more;
- (5) the differing age distributions between countries affect the mind-contexts (but why would this be different for the two sexes?).

So, why should there be better male identification with a factory in Poland than in China? Because of swingeing rationalization coming after the collapse of communism in Poland the managers, even at the senior levels, admitted to feeling a belonging and loyalty to the factory, but not to the board of management – however, this context applies to both sexes. Perhaps this may be cultural lag in Poland wherein the males still see it as an obligation to support their families and hence a necessity to conform in the factory in order to maintain employment.

4.5 Topics of congruence in the core score patterns

Questions Q6/14/Q18 are unique in that they have the lowest female scores between China and Poland, but only in Poland do they form a social sub-grouping of perceptions. Two of the three are certainly knowledge based, but knowledge of a different hue than that perhaps represented by the third, namely Training. Perhaps here the Polish view training as more knowledge-related than personal *identification with the factory*, as training has been vastly reduced in the last five years or so – since the *old days*. This would be a question of mind-contexts and reality.

From conversations with the managers there is a recognized phenomenon in China that the males, as they get more experience, continually look for better jobs – this is not evident so much with the females. Hence the males are less likely to identify themselves with the company – they are thus differentiated from the females who, effectively, differentiate and discriminate themselves from the males.

Even though the patterns of responses may be different, the core-score groupings cluster round the same scoring levels. However, the high scores do not reflect the reality (as benchmarked) of events on the ground such as with high levels of contamination in Poland and low levels of communication in China.

There are three questions which have distinctly different scores between the two countries, these are Q5 (production importance), Q7 (EU legislation) and Q9 (WEEE/RoHS), two of these are related to EU legislation and one to production importance. It is interesting that Q5 on the pre-eminence of production draws opposite male/female scores between the two countries; production is perceived as the most important aspect of the business in both China and Poland (from the interview data) but the females score correctly against the benchmark (of 0) in China whereas the males do the same in Poland – are they more confident in their ability to be able to say this, or are they worried that an obverse score might be reported to the plant manager?

For Q7, the males in China and Poland both score 8 (core) but the females in China score very low. This is a *matter of opinion* question and it may be that they are used to rules and regulations and see no problem in more rules; this legacy could be attributed to the Confucian based philosophy of bureaucracy (Tsui et al, 2004). But then, why do the Chinese males score quite high? Is there a discrimination/ differentiation grounded in male dominance and female subservience?

For Q9, the Chinese were well ahead of the game on a practical (production) level compared to the Polish factories and were making heavy-metal-free products – this was not happening to any extent in Poland, but it will certainly affect them. Hence the Chinese perception scores for Q9 are spot on (0 = it does affect us), whereas the Polish scores are hovering significantly around the no opinion and no response *do not know* region – this indicates a severe lack of

knowledge and/or communication on critical environmental and market issues, or their identification with the factory irrespective of their actions *within* the factory.

4.6 Female/male perceptions with missing responses and score level 5

In Tables 7 the top three scores for missing and score 5 are coded in italics to highlight the question topics with the most ambivalence. It also highlights distinct differences between the Chinese and Polish females where one nuance is clearly of meaning. It would appear that the Chinese females are more likely to score 5 than not to respond, which indicates that they are possibly using this score level as a representation of 'I do not know' rather than 'sitting on the fence'.

Overall, the Polish females are apparently using the score 5 as representing 'sitting on the fence' and, where they do not understand or know the answer to a question, they do not answer. Some other points which emerge are:

- (1) he Polish women are more likely not to answer than score 5;
- (2) both sexes in Poland have problems with Q9 (WEEE & ROHS) and Q12 (environmental protection costs);
- (3) in China only Q12 (environmental protection costs) proves a (fragmented response) problem with both sexes.

Considering the questions with the most scores in the above categories, in Poland for Q9, the ratios of missing answers to score 5 is 7:1 for females and 2:1 for males. As this is a very technical question it may be assumed, because of female/male proclivities (Alvesson, 2002), that males are more inclined to make a *stab at it* than females. There is a clear differentiation here perhaps indicative of very different perceptions or, connections between perceptions, female to male

In China the comparison is rather more uncertain as the highest numbers are for different questions, Q10 for females and Q5 for males. Here, the female ratio for Q10 is an obverse of the Polish Q9 as it is 3:2 score 5 to missing whereas the male ratio is 4:0 - quite different. The highest numbers for males is for Q5 where their ratio is 10:0 and the females 2:1 - again quite different. Q10 is a production issue and production tends to be an area where female managers are under-represented. Q5 is another production oriented question, but this time there is a clear difference between female and male in their responses – the females were more likely to give a substantive perception score.

Overall, on the missing and score 5 responses there is a clear difference between Poland and China with the Polish managers more likely to not respond than to score 5 while, in China, the managers were more likely to score 5 than to not respond. Within the separate countries, Polish females had a higher ratio of missing scores than the males whereas the Chinese females had a lower (reverse) ratio to males. Clear differences in both countries.

There are also the different contexts of the punishment cultures mentioned for the different countries. Because of job insecurity in the Polish factories, people might have been expected to record a positive score to demonstrate their commitment to the factory, so the fact that the *missing* box is preferable to score 5 (females predominate here) may indicate that people have withdrawn from the field or, perhaps, they are trying to send a message to more senior management.

5. Discussion

5.1Socio-cultural groupings

Because there are fewer female managers than male in both countries, it could be postulated that they have less affect in whatever socio-cultural grouping they tacitly choose to members of. However, since the females tend to score lower in the Chinese factories, but have lower numbers relative to Poland, it would have been expected that in Poland, with more females, the same score grouping, eg 8/9/10, would show more female dominance in the lower scoring results. Clearly the Chinese and Polish females do not exhibit the same type of tacit behaviour and have apparently differing roles in their social groupings (see also Parker-2007; Bergami and Bagozzi, 2000; Gardiner and Tiggemann, 1999).

In talking to the people in factories in China, the women are seen as just as bright and perceptive as the men but more constrained by Chinese culture from arguing (Lewis-1999). In this respect, Ng and Siu (2004) intimate that Chinese workers are more likely to listen and comply with what their managers tell them than to initiate change (themselves) in order to maintain harmony in the company. But this depends on whether or not the agencies (workers) understand the meaning of the message from above. In effect this is a contrived representation of a representation Sperber (1996).

But Alvesson (2002) notes that women learn their expected roles in life, which include awareness of patterns, wholes and contexts, perception and intuition in their social contexts, and these attributes can lead to different perceptions of things and situations, thus leading to different responses to questionnaires than men. However, there is also a good discussion on gender stereo-types in Luoh H-F. & Tsaur S-H. (2007) who note that some individuals are more 'sex-typed' and traditionally believe that women are dependent, illogical and ineffective.

The rich data indicated that, within the Chinese factories in particular, the females currently tend to be subservient to the males and are paid less money, but the driver for this is likely to be the ready availability of female labour from the

desperately poor country districts rather than out-right sexual discrimination. But, if the ratio of males to females in a factory were changed, would the females still exhibit the scoring patterns recorded in this survey described above, or would the dynamics of the overall core groupings change with women exerting more dominance? This might in some cases pull women in from any fringes of groups (to the core scoring value), but would it also tend to push the males to the fringes of different *core value* groups?

The question then arises as to why there is such a dramatic difference between the two countries. If females have different beliefs and values why are they sometimes so close to (in scoring) to the males? Is there a mechanism which is causing semi-agreements in the groups, perhaps arising from the Flyvbjerg (2001) proposal that mixed groups exhibit less disagreements but, as Senge (1990) might propose, with underlying disagreements and groupings which are not homogenous (male and female). Here, Merton (1967) quotes Sherif who stated that social factors provide a framework for selective perceptions and later goes on to make a distinction between physical (socio-cultural) groups and (imaginative) reference behaviour (sub-) groups wherein actions may depend on individual (unshared) perceptions rather on socio-cultural group ideologies. As evidence of these complex phenomena, there were strong differences between the countries for female scoring, and between females and males, even with the 'missing' answers and score 5's.

For the Chinese factories, there are three separate core groupings exhibited in the 8 to 10 score ranges, namely 8, 8/9/10 and 9/10, two questions in the first group, eight in the second and six in the third – a definite skew for the Chinese results. For the Polish factories this becomes three, seven and three. Treated as a single score grouping, there are people whose perceptions are drifting towards the fringes of the groups but, in China it is the females drifting to the low (more realistic) end whereas in Poland it is the males.

In Merton (1967) it is postulated that *rules* in a social group will vary with dominance hence, if the males or females were exerting intellectual or leadership dominance in a group they could be coercing the opposite sex further towards the core values (and tighter score groupings), or driving them to the fringes (looser score groupings). Whatever the group drivers, it is obvious that the groups themselves are not homogenous in respect of their sexual make-up with fragmented and differentiated perceptions, and the data provides good evidence of the drift towards the fringes of the groups and also complete fragmentation of beliefs.

For Poland there could be other mechanisms in play in the factories. The most expertise in environmental subjects lies with *lone* (mainly female) environmentalists, most of whom do not communicate environmental matters very well at all, apparently holding on to knowledge as a power base (Craig & Lemon, 2004). It is postulated that the males are all heavily influenced by production imperatives and, while production is the source of most pollution in the factories, they are differentiating production related knowledge of the damage done to the environment, from that of their environmental view of the pollution caused. Or of course, they have two incompatible realities, one is that production is supreme (as it is) and the other is that they should care for the environment (which they do not do very well). As Merton (1967) says, when people are subject to conflicting roles, what takes precedence – 'it represents incompatible social demands on the multi-selved person'.

5.2 Morals and ethics as gender differentiators

In respect of a Moral Foundations Theory, Haidt and Graham (2007) quote Gilligan (1982) who proposed that women have an additional (as opposed to men) 'ethic of care' (also Sonenschein, 2007) which relates to close relationships, that is they are more at home in communities (groups). The corollary of this is that when a group decides on actions which defer to authority, this could be viewed as unethical by the caring group members. Later, they go on to propose that a person proceeds from child to adulthood accumulating morals (Walker, 1984) as part of specific cultural patterns, and that these patterns guide behaviour and, perhaps, the translation of facts into bounded perceptions which are governed by in-bred and recalcitrant behaviour.

However,, there would appear to be another variable in that the Chinese and Polish women score differently, with the Polish women being more attuned to environmental reality, hence more environmentally realistic as well as caring? Sonenschein (2007) goes on to quote Tyersky and Kahneman (1981) who postulate that a lack of (communicated) information about social or business issues may lead to an overlooking of ethical issues such as those related to care for the environment. This appears to apply to the majority of male managers who are actually subordinating the ethical issues surrounding environmental degradation as against the more caring perceptions of the females as evidenced by perception scores nearer to empirical reality.

In the above context, it is interesting that Shaw (1983) proposes that mixed sex groups are more effective than same sex groups, but that this can depend on the behaviour of the group *leader*. All-male groups exhibit disagreement behaviour, while in a mixed group there is no such behaviour hence, does group behaviour (or norms) in factories *determine* or *change* perceptions and mind-contexts, (Gidengil and Dobrzynska, 2003) rather than vice versa? And, are female perceptions less affected by the male perspectives in contextual groupings (eg 'benefit to the environment'), ie

that groupings are independent of behaviour? (see also Alvesson, 2002; Pinker, 1998, 2002; Gardiner and Tiggemann, 1999).

5.3Alignment of the gender perception gaps

It is proposed that, in order to cultivate a better correspondence in perceptions of reality between females and males, and between them both and empirical reality (the benchmarks), it is suggested that a logically coherent ideational culture as proposed by Archer (1996), if composed, communicated and accepted by unconditional agreement with *all* the managers would help to bring the gap between the imagined and empirical realities closer together and thence a better coherence on knowledge and decision acts.

What it might *not* do is bridge the differences in *meaning* cited by Altheide & Johnson (1998) whereby experience is translated into knowledge in relation to existing knowledge. If the existing knowledge is based on different social settings between males and females the meanings of any logically coherent ideas may also be different. Moreover, there could be also an argument that the differences in female and male perceptions, if grounded in a common access to and understanding of production and environmental knowledge, is to be encouraged as it could lead to more and better innovation (Merton, 1967).

6. Conclusions

The methodology proved effective in providing data which threw up several interesting points which help to identify areas for remediation and organizational improvement as well as areas for further research such as:

- (1) more research into the semiotics and symbolism of the answers to get a nearer approximation to the truth;
- (2) more research into the socio-cultural dynamics at each individual factory;
- (3) inter-active factory workshops to determine and close the reality gaps;
- (4) inter-active workshops to determine the reasons behind discriminatory scoring;
- (5) training in management interface communication.

There are also questions of dominance which are still not resolved by this current research. It is not clear if there is sexual dominance, leadership dominance or intellectual dominance which is differentiating main and reference groups in the core scoring patterns. This type of mechanism, however driven, can cause people to become nominal members of groups without subscribing to all its rules, even to leave the group, or act in such a way that the whole ethos of the (socio-cultural) group is under-mined this perhaps leading to aberrant decisions and decision outcomes.

The female scores differed from the males quite consistently in being below the (full-range) male scores in China, but quite the opposite in Poland. In this respect there are indications that the apparent socio-cultural groupings rely not on knowledge or peer group leadership, but rather on individualism within these groups (see also Merton, 1967), with sub-groups being formed reflecting sexual differences. Within the perception score groupings, there are people drifting towards the fringes of the groups but, in China it is the females drifting to the low end and, in Poland it is the males. And, within these phenomena, the Chinese and Polish females do not exhibit the same type of tacit behaviour and have apparently differing roles in their socio-cultural groupings.

This could imply that, while the females might be apparently acquiescing in group norms, their decisions and actions might represent something quite different (Zey, 1992; Denzin, 1998)). In this context, it may be that when females adopt leadership styles that do not suit their temperament, they become mentally stressed (Gardiner and Tiggemann, 1999) and these stresses could affect their judgement and perceptions. Another explanation could be that the results exhibit tacit unexpressed norms and that there is no empirical (physical) group, it is a grouping in an imaginary domain (Albrow, 1990; Locke, 1877). This could pose a severe problem to top management as they would have a *many-headed snake* to bring under some form of understanding and control.

It is also evident that there are (scoring/grouping) effects arising either from the respective national cultures or from the different historical contexts of the industry, eg old industry and well-educated and experienced managers against younger industry with less well-rounded education and less experience in manufacturing environments (see also Tsui et al, 2004). This is another indication of the divergent realities within the scoring groups, perhaps some or all of a group having virtual (imaginative) realities dwelling unrecognized alongside realities based on dubious interpretations of observed *facts*.

In addition, different words, and metaphors (Ramsey, 2004; Pinker, 1998, 2002), have different meanings in different situations within different contexts (eg locational and temporal), hence it can be difficult for managers to communicate across, say, ambiguous sexual, social, economic, political and cultural boundaries. Specialist language (and jargon) not having a cross-cultural *ambidexterity*, even at a theoretical level among learned people, gives a problem that the understanding and reasoning will have a multitude of meanings which can be gender related; this poses some considerable problems to meaningful argument (Holmes, 2001; Stroinska, 2001; Stroinska, 2002) among and within

social groupings.

As the Thomas Theorem quoted in Merton (1967) states: *If men define situations as real, then they are real in their consequence*. The strong evidence for the truth of this theorem is the distinct gap between the perceptions of both males and females and the reality benchmarks in the study factories. The high confidence as represented by the perception scores has led to a situation wherein most production operations and environmental aspects are viewed as in good order, hence no improvement is necessary or implemented, neither from the females, nor from the males.

If it were desired to align the perceptions between females and males, this could well be described as social engineering and would be a good and interesting topic for further research, and could be very important for large organizations.

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Table 1. The three main data sets collected for the study

- sample data was collected from some 164 managers in 12 factories by administered questionnaire (Table 4 details the actual questions);
- reality benchmarks were assessed by a qualified expert against actual or potential environmental degradation in each factory, and matched to selected ISO14001/ISO9001 clauses;
- rich data was collected from discussions with top management, but including comment on performance from visits and workshops at most of the factories.

Table 2. Rich data sources

- interviews with the top manager on site (managing director or plant manager);
- informal discussions with some 60 managers (including female managers);
- informal conversations with managing board directors (including female directors);
- · technical and cultural workshops involving most managers
- observations on production and environment from multiple visits to the sites

Table 3. Numbers of questionnaire responses per country by sex

country	male	female	total	male	Female
	responses	responses		%	%
China	53	17	70	76	24
Poland	55	39	94	59	41

Table 4. Scoring differences between females and males

Q	the questionnaire questions	gender (overall) effect
		females to males - scores
1	the company has a clear environmental statement and/or policy	roughly equal
2	our environmental knowledge is adequate	roughly equal
3	we know the life cycles of all our products	dominate <5 = more realistic
4	we continually innovate for process improvement	dominate <9
5	production is more important than the environment	dominate at 5/6
6	waste and scrap are under control in our factory	dominate at 7/10
7	there are too many environmental rules issued by the European Union	dominate at 2/10 = dichotomy
8	the company has a beneficial affect on the environment	dominate at 1/4/9
9	the WEEE & ROHS directives will have no effect on our	dominate at 2/6/7
	products	high number of missing answers
10	our processes are strictly controlled for spillage, run-off etc	dominate at 5/8
11	all our employees are aware of their environmental responsibilities	dominate at 5/7
12	environmental protection costs us less than 10% of our profit	dominate 1/4/6/7
		high number of missing answers
13	groundwaters are no problem under our site	dominate 3/4/8/10
		high number of missing answers
14	we consider training as essential for performance improvement	dominate at 6/8
15	we have a good relationship with the environmental authorities	dominate at 6
16	environmental decisions are easy to make	dominates 1/3/7/10
17	communication in our factory is very good	dominate at 3 = more realistic
		most missing answers
18	we always use non-toxic solvents	dominate at 3/6/8
19	our decisions on the environment always have good results	dominate at 5/8
20	we keep absolutely up-to-date on environmental legislation	dominate at 4/7

Table 5. Equivalent groupings between Chinese managers

Q	CHINA	core female	core male scores	full range 0-10	
		scores		lowest scores	
1	clear environmental policy	8/9/10	8/9/10	F (female)	
2	adequate knowledge	8/9/10	8/9/10	F	
3	life cycles known	8/9/10	8/9/10	F	
4	process innovation good	8/9/10	8/9/10	F	
14	training essential	8/9/10	10	F	
15	EA relations good	8/9/10	8/9/10	F	
17	communication good	8/9/10	8/9/10	F	
20	legislative knowledge good	8/9/10	9/10	F	
6	Waste under control	10	8/9/10	F	
8	beneficial effect	9/10	10	F	
10	processes controlled	10	9/10	F	
13	groundwaters are no problem	10	8	M (male)	
16	env decisions easy	10	8	M	
18	we do not use toxic chemicals	10	8/9/10	F	
11	awareness of ER	8	8	F	
19	decisions always good	8	8/9/10	F	
10	100/ 6 6	A / 5	C 1		
12	env. prot. costs <10% of profit	4/5	fragmented	M	
7	too many EU rules	2	8	F	
5	production importance	0	5	F	
9	WEEE/RoHS	0	0	M	

Table 6. Equivalent groupings between Polish managers

Q	POLAND	core female core scores		full range 0-10 lowest score
1	clear environmental policy	8/9/10	8/9/10	M (male)
2	adequate knowledge	8/9/10	8/9/10	M
3	life cycles known	8/9/10	8/9/10	M
4	process innovation good	8/9/10	8/9/10	F (female)
7	too many EU rules	8/9/10	8	M
15	EA relations good	8/9/10	8/9/10	M
20	legislative knowledge good	8/9/10	8/9/10	M
6	Waste under control	9/10	8/9/10	F
14	training essential	10	10	F
18	do not use toxic chemicals	9/10	5/6/7	F
8	beneficial effect	8/9	5	M
13	groundwaters no problem	8	5	M
19	decisions always good	9	7/8/9	F
9	WEEE/RoHS	6	5	F
10	processes controlled	6	9/10	F
11	Awareness of ER	7	10	F
16	env decisions easy	7	10	M
12	env. prot. costs <10% of profit	fragmented	fragmented	F
17	communication good	5/6/7	fragmented	F
5	production importance	5	0	M

Table 7. Comparisons of responses missing or score 5

Polish females	5	7	8	9	12	13	15	18	questions
missing resp.	4	6	2	14	12	8	6	5	missing
score 5	9	1	5	2	4	3	2	3	score 5
totals	13	7	7	16	16	11	8	8	
% of females	45			55	55				
Polish males									questions
missing resp.	6	13	0	29	23	15	13	13	missing
score 5	15	13	16	15	12	15	8	15	score 5
totals	21	26	16	44	35	30	21	28	
% of males				69	55	47			

Chinese females	5	7	9	10	11	12	16	18	questions
missing resp.	1	2	2	2	1	1	0	1	missing
score 5	2	2	1	3	2	3	2	1	score 5
totals	3	4	3	5	3	4	2	2	
% of females		25		31		25			
Chinese males									questions
missing resp.	0	1	5	0	1	1	0	1	missing
score 5	10	3	2	4	3	6	4	4	score 5
totals	10	4	7	4	4	7	4	5	
% of males	22		15			15			

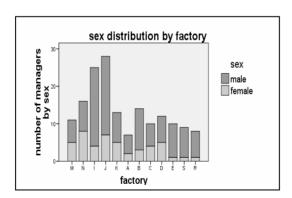
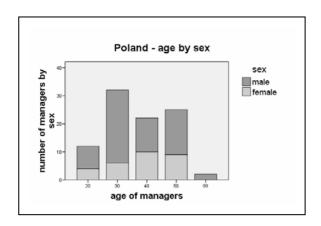


Figure 1. Sex by factory (Factory codes: China A/B/C/D/E/R/S; Poland I/J/K/M/N)



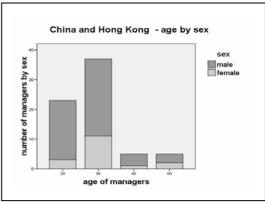


Figure 2. Polish age/sex distribution

Polish responses on process improvement

sex
— male
— female

q4: score levels for process
improvement

Figure 4. Polish patterns of responses

Figure 3. Chinese age/sex distribution

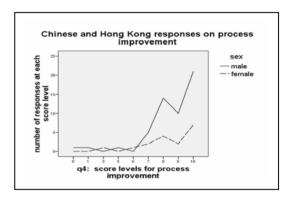


Figure 5. Chinese patterns of responses