Consumer Concerns About Animal Welfare And The Impact On Food Choice

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Consumer Values and Concern about Animal Welfare

COMPARATIVE INTERVIEWS REPORT

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EXECUTIVE SUMMARY

Means-end chain theory

Means-end chain theory (MEC) proposes that consumers are motivated by their core values when making purchasing decisions. This study extrapolates this relation to investigate those values which motivate consumer concern about animals welfare, as a production process characteristic, and, thus, affect food choice.

Method

The laddering technique is used to identify the relations amongst key attributes, consequences and values in the United Kingdom, Ireland, Germany, France and Italy. Consumers who were identified as being concerned about animal welfare ranked eight animal-based food products in order of concern, and compared them to elicit key attributes associated with the production process. The ladders were analysed using Laddermap.

Results

The results indicate that consumers are equally motivated by human health (anthropocentric) concerns as they are about animal welfare (zoocentric) concerns. Indeed, consumers often use animal welfare as an indicator of other product attributes, such as quality and safety, thus supporting the findings of the previous focus groups. There appear to be no significant differences amongst the countries in the types of values consumers use to motivate their concern about animal welfare.

Conclusions

Consumers concern about animal welfare in the production of food is significantly motivated by the perceived relation amongst poor welfare conditions, food safety, and the effects on human health. Consumers generally believe that modern, intensive production is ‘unnatural’ and, consequently, unhealthy. Consumers with children are principally
Concerned about the health and well being of those children. Their concern about animal welfare conditions is propelled by their sense of responsibility to their children and their families, in general.

Implications for the survey

A number of suggestions were made in relation to the design and execution of the representative sample survey: to examine the extent of consumer concern in relation to specific attributes; to relate self-relevant values to these attributes; to examine willingness to pay and consumption changes; to investigate barriers to change; to examine the effects of level of knowledge on consumer concern; to assess product-differentiated differences in concern; to assess the impact of various demographics on consumer concern; and to assess the relative importance of anthropocentric versus zoocentric values in motivating consumer concerns about animal welfare and the impact on food choice.
Section 1
INTRODUCTION

This section describes the background to the study, the aims of the interviews, and the means-end chain theory.

1.1 Background

The focus groups in the United Kingdom, Ireland, France, Germany and Italy (Harper and Henson, 1999) revealed a number of key findings relating to general concerns about food, concern about animal welfare, meanings of animal welfare, sources and reliability of information, responsibility, advantages and disadvantages of higher animal welfare, willingness to pay and attitudes towards farm animal production systems. These findings are briefly presented here.

Harper and Henson

Consumers across the United Kingdom, Ireland, Germany, France and Italy are spontaneously concerned about food safety, health, quality and animal welfare. Consumers are particularly concerned about ‘unnatural’ and ‘unhealthy’ additives, such as antibiotics and hormones. These concerns are magnified if the consumer has children, in which case the parent may prohibit certain types of food (notably beef and genetically modified food) from the children’s diet. The type of food safety concern is dependent on current media campaigns in each country, for example, salmonella in Italy, genetically modified food in the UK.

Consumers do not prioritise animal welfare as a spontaneous concern about food. When asked about animal welfare, consumers use animal welfare as an indicator of other, more important, product attributes. Animal welfare, as a concern, is legitimised through association with human health and safety. Consumers expressed particular concern over battery cages and veal crates. Where consumers did purchase ‘animal-friendly’ products, the purchase was facilitated by perceived motivational alliances to other product attributes, such as taste and quality. Consumers used the concepts of ‘natural’ and ‘humane’ to describe the ways in which farm animals should be treated. Consumers
generally disassociated the product from the animal of origin in order to assuage their conscience.

The participants believed that it was right that people ate animal products. Consumers across the countries believed that farm animals should be treated ‘humanely’. Some consumers, especially in France and the UK, believed that the treatment of animals meant for food was relatively unimportant because of the ultimate use of the animal. Older consumers, especially in the UK and France, believed that intensification of farming had resulted in poor welfare for animals, and, consequently, a poorer product for people. A number of consumers in Italy and the UK associated animal welfare with organic production.

Consumers received most of their information from the media, but also from specific organisations, the Government and their own experiences. Most consumers felt that they were not well informed about animal production systems. Consumers expressed doubt over the validity and credibility of labels on products, especially in the UK and France. Some participants in Ireland and UK expressed a desire for an independent body to accredit the production method as animal-friendly and a standardised label.

Participants tended to assume theoretical responsibility but claimed that, as individuals they were powerless to make any substantial changes. Responsibility was attributed to the producers, retailers and the Government. Many consumers in the UK and France stated that the high premiums on animal-friendly products prevented individual consumers from being responsible.

There was a consensus that consumers would benefit from improved animal welfare through the improved quality, safety and taste of the products. The participants also felt, with the exception of the French, that improved welfare would result in increased costs which would be passed on to the consumer. Premiums on animal-friendly products were thought to benefit the producer; at the same time, increased investment by the producer would bring additional costs. There was some variation amongst the countries as to
whether or not the producer would benefit. There was some recognition that retailers would also benefit from premiums, however, in the UK groups some participants believed that as demand and production increased, prices would fall. Participants in France claimed that improved animal welfare would lead to reduced use of chemicals, and reduced pollution of the environment.

All the groups, with the exception of France, said that they were willing to pay more in principle for improved animal welfare. The amount they were willing to pay depended on the initial cost of the product and the way in which it would be used. The French groups believed that more ‘natural’ production methods should not cost more and, therefore, they would be unwilling to pay more. Invariably, those consumers who said they would pay more also stated that the product would have to have other improved quality characteristics such as taste.

Most of the participants disapproved of the battery cage system for laying hens, stating that it was ‘cruel’ and ‘unnatural’. The barn system, with increased space allowance and access to natural light, was considered a reasonable compromise. Many consumers expressed a preference for free-range production, as long as disease was controlled and prices minimised. The indoor broiler system was generally perceived as ‘crammed’ and ‘cruel’, although some participants said it was similar to the barn system for laying hens. Again, this system, if improved through increased space and access to the outside, was acceptable. However, most of the participants preferred the free-range system.

All the participants disapproved of the tethers and stalls for sows, describing them as ‘unnecessary’, ‘cruel’ and like a ‘prison’. There was also objection to the restriction of the farrowing crate. The loose housing system was perceived to be a good compromise. Again the outdoor rearing was perceived as the most ‘natural’ and, therefore, the ideal system. The indoor finishing did not present any significant problems. There was generally less concern for the beef systems, although there was a general preference for the outdoor system. Most of the concern related to BSE and cattle feed. Many of the participants thought that the veal crates should be banned. There was a great deal of
Concern about the inadequate diet and restricted movement. The grouped housing system was preferred, but a number of participants objected to the production of veal per se.

7.2 Aims of the interviews

• To further investigate the issues identified in the focus groups in task 2.
• To identify differences in beliefs and concerns about animal welfare between consumers within and across the study countries.
• To identify consumer concerns about animal welfare for particular animal-based food products.
• To assess the relationship between concerns about animal welfare, changes in the methods applied in animal production and choice of animal-based food products.
• To guide the development of the questionnaire employed in the representative sample survey in task 4.

1.3 Means-end Chain Theory

Means-end chain theory (MEC) relates the consumer to the product, through analysis of subjective knowledge about product categories stored in associative networks. Laddering links product attributes and consequences for consumers with consumer values. The consequences and values are viewed as determinants of purchasing behaviour. In essence, MECs are semantic maps. There are two main approaches to MEC - motivational and cognitive. The motivational approach posits that MEC provide insights to purchasing (food choice) motives. The cognitive approach states that MECs are a model of consumers' consumption-relevant cognitive structured and describes the way in which knowledge is stored and organised in memory.
MECs consist of attributes, consequences and values. They have been operationalised as follows:

![Diagram of Means-end Chain Model (Olson and Reynolds 1983)]

- **Terminal Values** *(Preferred end states)*
- **Instrumental Values** *(Cognitive representations)*
- **Psychological Consequences** *(Personal and less tangible)*
- **Functional Consequences** *(Direct experience)*
- **Abstract Attributes** *(Intangible and subjective)*
- **Concrete Attributes** *(Tangible and physical)*

The concrete attributes, abstract attributes and functional consequences form the product-knowledge, whilst the psychological consequences, the instrumental values and the terminal values form self-knowledge.

The network of interrelated MECs form the hierarchical value maps, which assist in the segmentation of markets through classification of consumers according to their values. Values are self-relevant consequences, and animal welfare is a process characteristic, defined here as an abstract attribute ‘Animal-friendly’ products are credence goods.
Means-end chain theory accounts for the relation between product characteristics and consumer values. The laddering technique investigates this relation, here in terms of consumer concerns about the production process and the impact of such concerns on purchasing behaviour. The aim of the interviews is to investigate credence product characteristics (i.e., production methods) and relate them to self-relevant consequences and the values they reflect in each participating country. Furthermore, the interviews aim to analyse the similarities and differences in the hierarchies of concerns, in terms of attributes, consequences and values, in order to map associative networks, which define animal welfare and motivate food choice within these EU Member States.
Section II

METHOD

This section briefly describes the design of the study, the laddering technique, the selection of participants, data collection, coding, analysis and the use of Laddermap.

2.1. Design of the study

The recruitment questionnaire and the interview guide were piloted on 5 consumers in each of the participating countries, and revised in light of these findings. Attributes were elicited using eight product cards: beef, chicken, pork, eggs, milk, lamb, veal and a processed product appropriate to each country. A total of 300 interviews were conducted, 60 in each country. Each country conducted the analysis of the data using Laddermap. From the coded data, Laddermap generated the implication matrices. Due to the high number of codes, the triangular matrix file had to be used to identify those concepts that were associated 5 or more times. These concepts were selected to generate the hierarchical value maps for each of the demographic levels.

2.2. The laddering technique

A third laddering approach was deemed most appropriate for comparability amongst the 5 countries. In light of the pilot, this approach was adapted and a list of alternative probe questions was provided. The participants were asked to rank the eight products in order from highest to lowest according to how concerned they were about the welfare of the animals during the production process. The participants were then asked why they were more concerned about product x (highest) than product y (lowest), to elicit the most attributes about the production process. All the attributes were recorded and the participant was asked to rank the attributes according to how concerned they were. Each attribute was fully laddered in order of concern, using versions of the question, ‘why is that important to you?’ The process was repeated for the remaining three pairs of products.
2.3 Selection of participants

Participants were selected using a detailed recruitment questionnaire. They had to consume at least 5 out of 8 animal-based food products. They did not have any food prohibitions due to religious or cultural reasons. The participants were not connected to the agricultural, food or market research industries. Potential participants were scored on a 6-item attitudinal scale to measure concern about animal welfare. Only those consumers who expressed a high enough level of concern were interviewed. There were two age groups (25-39 and 40-60) and two social classes (ABC1 and C2DE) to reflect the focus groups' findings that age and social class have a discriminating effect on consumer concerns about animal welfare.

2.4 Data Collection

The interviews were recorded. Each ladder was written down, and later restructured into a logical attribute-consequence-value order. The ladders were typed up and coded using a common coding frame.

2.5 Coding

Each country was asked to submit a national coding frame based on 30 interviews. The 5 coding frames were integrated and used to recode the interviews. The coding frame was revised in light of this. Reliability tests were conducted on a sample of each country’s interviews.

2.6 Analysis and Laddermap

Laddermap was used to generate implication matrices and lower triangular matrices in each country. The lower.tri file was used to select the most important concept links. These codes were used to generate hierarchical value maps (HVMs) for each level of each demographic.
Section III
RESULTS

This section presents the results of the analysis in terms of the overall picture, age, social class, education, children, pets, consumption, concern and lifestyle.

3.1 Overall

The value of human health was key for each country. In the French case, human health motivated concerns about additives in animal feed, unnatural feed, and the effects of such feed on general product quality. In the Italian data, the value of health also motivated concern about animal feed, in terms of unnatural additives (such as hormones, antibiotics and synthetic chemicals) and regulated control, but it was also linked to mass production in terms of lack of space, natural light and access outside. Indeed, the naturalness of animal production, in terms of both feed and general living conditions, was related to food safety and concerns about human health and well being. In the Irish data, food safety issues relating to the incidence of salmonella, e-coli, CJD and food allergies and were strongly related to concerns about human health and the desire to have long, productive, good quality lives. Moreover, the Irish participants believed that the quality of food, in terms of nutrition, aesthetics, taste, texture and flavour, was affected by the effect of feed additives and lack of space on the health of the animal. The German participants also linked poor animal welfare practices to poor food quality and safety with the human-oriented ladders focused strongly on health. In the UK, the participants also linked food safety to nutritional quality and human health. They were specifically concerned about feed additives and the impact of overcrowding on food safety. Moreover, consumers were significantly motivated by their concern and sense of responsibility for the health and well being of their children.

However, the participants were not solely concerned about human health, animal welfare concerns featured strongly in all countries. The French participants related animal welfare to lack of natural light, access to outside, sufficient space and life span. These attributes were motivated by the values of empathy and ethics. In the Italian data,
welfare issues were also related to lack of space and life span, and, in addition, methods of slaughter and transport. These consumers were concerned about the effects in terms of animal suffering, especially emotional suffering, quality of life and the effects on animal health and such concern was motivated by the values relating to cruelty, as well as to empathy. Lack of space was also an issue for the Irish participants, who were also concerned about animal housing, feed and transport. These concerns were galvanised by the values relating to cruelty and ethics. These consumers believed that modern production practices are unnatural. In the animal-oriented German ladders, concern about animal welfare was motivated by the values of empathy and responsibility. Modern husbandry practices were also linked to poor animal welfare. The UK consumers defined their concerns about animal welfare in terms of the values associated with basic rights for animals, economic exploitation of animals, the desire for natural living conditions and not being cruel.

32. Age difference

The younger French participants express a greater desire to be informed. They were distinctively activated by the values associated with empathy, animals as living creatures and the desire to enjoy their food. The younger Irish participants were more motivated by human health concerns, related to the desire to fulfil their potential and have a good quality of life. The younger German participants were more emotionally involved in animal welfare and were motivated more by ethical concerns related to animal suffering and unnatural behaviour. The younger UK participants were primarily concerned about animal feed and lack of natural light in relation to food safety and human health. They were especially motivated by concerns for their children's health, desire for more information and the freedom of food choice in relation to information about food production methods. There was no age difference for the Italian consumers.

The older French participants were characterised as more rational and emotionally distant from animal welfare concerns, with their values dominated by respect for animals and ethical considerations. The older Irish participants were distinguished by values relating
to care for animals, ethics, empathy and natural living conditions. The older German participants produced more elaborate ladders, relating primarily to health and safety issues, as well as to the value of empathetic understanding of animals. The older UK consumers were relatively fatalistic in terms of concerns about BSE. They were significantly motivated, however, by the maxim of ‘you are what you eat’, and, therefore, were specifically concerned about the natural living conditions of animals. The values relating to empathy and cruelty informed their comparison between their own children and their concern about the life span of veal calves.

3.1 Social Class

The ABC1 French participants were characterised by values relating to enjoyment of food and ethical consideration of animals. Their ladders were also more semantic. The ABC1 Irish participants revealed concern about lack of space and the effect on animals’ health and, consequently, on human health. They were also motivated by their concerns about the perceived cruelty of transport and method of slaughter. Their distress at animal suffering led to a desire for ethical consideration. The ABC1 German participants produced more sophisticated ladders, which were illustrated with concerns about food safety and animal suffering, motivated by values relating to welfare rights for animals, the economic exploitation of animals and human responsibility to animals. The ABC1 UK consumers were specifically influenced by values relating to responsibility for the family, the economic exploitation of animals, treating animals humanely, ethical consideration and the belief that young animals, such as veal calves, should not be killed for food.

The French C2DE participants were more pragmatic than their ABC1 counterparts. They were primarily concerned with food safety, natural living conditions, the fact that animals are living creatures, and the economic exploitation of animals. Their values largely reflected their consumption concerns. The C2DE Irish participants were principally concerned about lack of space, unnatural feed and were motivated by values relating to cruelty, ethics and welfare rights for animals. The C2DE German participants were more
Empathetic than their ABC1 counterparts, and primarily concerned with animal health, motivated by values relating to care for animals and the necessity of certain production methods. The CZDE UK consumers were particularly concerned with product safety and the effect of poor animal welfare on human health. They were stimulated by the belief in freedom of food choice, the right to life for humans, basic welfare rights for animals and their empathetic understanding of animal suffering.

3.4 Education

The higher educated French participants were more concerned about expectations of products than values, except in the case of natural living conditions. The higher educated Italian consumers were concerned by lack of space, method of slaughter and life span, leading to the psychological consequences, mental and physical suffering for the animal and feelings of distress in the consumer, which, in turn, were motivated by terminal values relating to ethical consideration, not being cruel, the fact that animals are living creatures, and the desire for natural living conditions.

The basic level of education Italian participants were concerned about lack of space and feed additives, leading to functional consequence, in terms of the effect on human health, and the instrumental value of the desire to live a healthy life. The basic level education German participants were less involved with the concept of animal welfare and, therefore, less well able to articulate their concerns. In the UK, the basic level of education participants were especially motivated by their concerns about the effects of poor animal welfare on human health. They were roused by the values associated with their family’s health and well being, as well as the economic exploitation of animals and people’s duty of care to animals.

Both Irish social classes were motivated by similar values, specifically to lead healthy lives and ethical consideration of animals.
3.3 Children

Those French participants who had children were generally more concerned about animal welfare issues, especially in relation to the notion of animals having individual needs and the economic exploitation of animals. These concerns were primarily motivated by values relating to empathy, care for animals, ethical consideration, and respect for animals. The UK consumers with children at home were defined by their concern for the health and well being of those children. Consequently, they were particularly concerned about food safety and the effects on human health. The short life span of veal calves was also a concern. The UK consumers without children at home did not have family as a core value, but were motivated by the value associated with utility and the instrumental use of animals. There was no discernible difference between those participants who had children living at home and those who did not for the Irish, German or Italian participants.

3.4 Pets

Those French participants with pets were more involved with the concept of animal welfare and motivated by values relating to empathy, animals as living creatures and ethical considerations. Italian pet owners were also more concerned about animal welfare, especially in relation to animal suffering and method of slaughter. In the UK, consumers with pets were significantly motivated by concerns about the ethical consideration of animals and the instrumental use of animals, as well as concern about the health of their families.

The French participants without pets were primarily motivated by values relating to human health and enjoyment of food. The Italian participants without pets were motivated by the instrumental value of human health, and the more general value of ethical consideration of animals. In the UK, consumers without pets were not significantly motivated by concerns about animal cruelty but were mobilised, interestingly, by empathy.
There were few significant differences between owners and non-owners for the Irish and German participants.

### Consumption

For those French consumers with higher levels of consumption of animal-based products, the primary values were related to treating animals as individual and general ethical considerations.

In the UK, consumers with medium levels of consumption were motivated by values associated with the utility of animals and desire for good human health. The lower consumption consumers were motivated more by concern about basic animal rights.

For those French consumers with lower levels of consumption of animal-based food products, there was more concern about food quality and safety in relation to human health and a desire for more information. These concerns were motivated by the values associated with care for animals and natural living conditions.

### Concerns

The French consumers with higher levels of concern were characterised as being more effective than those with lower levels of concern about animal welfare, and were motivated by a desire for more information and ethical consideration of animals. The UK consumers with high scores for concern about animal welfare were motivated by values relating to basic animal rights and their empathetic understanding of animal suffering.

The French consumer with lower levels of concern were distinguished as more pragmatic, being concerned primarily with human health, and the idea of animals being treated as individual and living creatures. In the UK, consumers with low animal welfare concern were characterised by values associated with humane treatment of animals, the
instrumental use of animals, the belief that young animals should not be killed for food, and concerns about human health.

3.9 Lifestyle

Those French consumers who always bought free-range eggs were more involved in the concept of animal welfare than those who usually or sometimes bought them. They were characterised as rationalising their behaviour through a desire for more information, and values related to ethical consideration of animals, respect for animals, as well as enjoyment of their food. The Irish consumers who always bought free-range eggs were primarily concerned about methods of slaughter, and motivated by values of care for animals and ethical considerations. The UK consumers who always bought free-range eggs were motivated by concerns about animal cruelty and basic animal rights.

French consumers who usually or sometimes bought free-range eggs were primarily concerned about food safety. The Irish consumers who usually or sometimes bought free-range eggs were concerned about feed additives and access to outside, concerns which were motivated by values relating to human health and the desire to fulfil one's potential. The UK consumers who usually or sometimes bought free-range eggs were defined in terms of human health concerns.
Section IV
DISCUSSION

This section discusses the key consumer values in relation to concern about animal welfare, the main conclusions of the research, and the implications for the representative survey sample of each country.

4.1 Consumer values and concern for animal welfare

For the French participants, most differences occurred at the consequence and value levels, and all the demographics had an effect. Except for education. Concern about animal welfare was motivated primarily in terms of the values relating to natural living conditions, quality of life, and economic exploitation of animals, food safety and the desire for more information. Factory farming was perceived as unnatural and, consequently, detrimental to food quality and safety. Consumers also felt a sense of powerlessness to make change, due to the lack of information about production processes.

Italian concerns about animal welfare were primarily motivated by values associated with ethical consideration, economic exploitation of animals, cruelty, especially in relation to slaughter and transport, and lack of knowledge. They, too, were suspicious of modern, intensive farming methods and believed it has a deleterious effect on animal welfare and product quality. Lack of natural light, space, access to outside and mass production were all viewed as unnatural. There was particular concern about the slaughter of young animals, especially veal calves and lamb, motivated, in part, by consumers’ maternal feelings and the association of children with infant animals. Italian consumer concern was significantly mobilised by values associated with empathy, respect for animals, desire for natural living conditions and a good quality of life for animals. They were also galvanised by concerns about human health in relation to product quality and safety.
Irish consumer concerns about animal welfare were strongly roused by issues relating to lack of space, outdoor access, appropriateness and naturalness of animal feed, methods of slaughter and transport. The lack of information about these issues was believed to affect human health. Consumers reacted to production practices with distress and sadness, which ultimately affected their consumption patterns. The key values were related to ethical consideration of animals, in terms of not being cruel, and the desire to have healthy lives, in terms of reaching their potential and being responsible for their families.

In the UK, consumers were significantly concerned about the impact of poor animal welfare on human health. In terms of animal welfare, they were mostly concerned about real calves. They tended to disassociate the product from the animal of origin. The key axiom was "natural". There was tension between the desire to know more and the comfort of ignorance. They distrusted producers and the government, in the wake of the BSE crisis. Most of the consumer purchased free-range eggs regularly. Their values were either anthropocentric or zoocentric, or a symbiotic combination of both.

Conclusions

The results of the laddering interviews support a number of findings from the focus groups, specifically:

- Consumers concern about animal welfare in the production of food is significantly motivated by the perceived relation amongst poor welfare conditions, food safety, and the effects on human health.

- Consumers generally believe that modern, intensive production is 'unnatural' and, consequently, unhealthy. The value 'natural' again is axiomatic and relates specifically to animal feed and access to outside and natural light.
Consumers with children are principally concerned about the health and well being of those children. Their concern about animal welfare conditions is propelled by their sense of responsibility to their children and their families, in general.

Consumers use animal welfare as an indicator of other product attributes such as quality and safety.

Concern about animal welfare varies with age and social class.

Consumers believe that animals deserve basic rights, which conforms to the welfare position that animals are legitimate sources of food, but their intrinsic needs must be satisfied whilst they are alive.

4.3 Implications for the survey

A number of suggestions were made in relation to the design and execution of the representative sample survey:

- To examine the extent of consumer concern in relation to specific attributes, such as space, outdoors, feed additives, slaughter and transport.

- To relate self-relevant values, for example, healthy lives, to these attributes.

- To examine willingness to pay and consumption changes.

- To investigate barriers to change.

- To examine the effects of level of knowledge on consumer concern.

- To product-differentiated differences in concern.
To assess the impact of various demographics on consumer concern.

To assess the relative importance of anthropocentric versus zoocentric values in motivating consumer concerns about animal welfare and the impact on food choice.
Section IV
PROBLEMS and LIMITATIONS

The theory of means-end chains has some limitations. The main problem is related to the assumption of rational consumers. It is for this reason, that this research has favoured the motivational rather than the cognitive approach. The laddering technique does not allow for further investigation into the genesis and rationalisation of value systems, thus losing valuable context.

There were some recruitment issues relating to the use of the attitudinal scale to measure concerns about animal welfare, specifically in Italy where 'animal-friendly' products are rare. There was also an over-representation of women, based partly on their role as responsible for food shopping and also on the assumption that women are more concerned about animal welfare than men.

The coding issues centred on identification of each concept as an attribute, consequence of value, and loss of data due to categorisation. This loss is typical of all analytical procedures, yet the highly structured nature of laddering increases this loss substantially.

There were a number of issues surrounding the use of Laddermap, including its DOS-based system and the inability to handle a large data set.
Section V
REFERENCES