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Silsoe

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Wallace Man Shek Yee

**Food Safety, Consumer Trust in Livestock
Farmers and Purchase Likelihood**

Supervised by Prof. Joe Morris

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ABSTRACT

**FOOD SAFETY, CONSUMER TRUST IN LIVESTOCK FARMERS
AND PURCHASE LIKELIHOOD**

Food safety is an important issue facing consumers, the food industry and the government. Since consumers cannot themselves easily assess food safety risks, their perception of food safety is in part a matter of trust in the food chain. This study focuses on livestock farmers and investigates the causal relationship between the factors which determine consumer trust regarding food safety and in turn their purchase likelihood. The main research questions are: 1) What are the key factors which build consumer trust in this context? 2) What are the contributions of these factors to building consumer trust? 3) Is there any relationship between consumer trust and purchase likelihood? By integrating theories developed in several disciplines, six factors, namely: providing information, competence, integrity, benevolence, credibility and reliability were identified to have a strong influence on consumer trust in livestock farmers. An exploratory study in the form of face-to-face interviews was carried out to clarify the main concerns of livestock husbandry practices, and to identify the items to measure the causal factors of consumer trust in livestock farmers regarding food safety.

Because the objectives set out in this study could not be achieved by using multiple regression, which could not handle latent variables, the conceptual model was tested with a quota sample of 194 individuals in the form of a Structural Equation Model using LISREL 8.30. It was proved successful in identifying the effects of the causal factors of trust to build consumer trust and in turn to affect purchase likelihood. The factor 'providing information' was identified to be a key factor by which trust is built and the features that lead to trust, namely: 'competence', 'integrity', 'credibility', 'reliability', and 'benevolence' were identified to be factors to build trust in livestock farmers. Representatives of the livestock industry were approached to confirm the relevance of the study and facilitate the interpretation of the findings. Though there is

a limitation of its generalisation due to the sampling method, there is evidence that these factors are important to building consumer trust in livestock farmers regarding food safety. The evidence also suggests that there is a strong relationship between trust and consumer purchase likelihood.

The research confirms that livestock farmers could draw benefit from strategies to increase their trustworthiness and in turn positively influence consumers' purchasing decision. This study recommends further research to apply this model in other industries where the suppliers have little contact with consumers. The differences in trust building between cultures and the communication channels that livestock farmers representatives should used are also suggested for further study. Future research on how the food industry should respond to the change in consumer trust during periods of concern about food safety is also recommended. These are valid topics for future research and will provide potential benefits for consumers and food industry as a whole.

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Those who TRUST in the Lord are like Mount Zion, which cannot be shaken but endures forever. As the mountains surround Jerusalem, so the Lord surrounds His people both now and forevermore. (Psalms 125:1,2)

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List of Symbols and Abbreviations

B	BETA (BE)	matrix of regression coefficients
δ	DELTA	error for x
ε	EPSILON	error for y
η	ETA	exogenous latent variables
Γ	GAMMA (GA)	matrix of regression coefficient between η and ξ
ξ	KSI	endogenous latent variables
Φ	PHI (PH)	variance-covariance matrix of ξ
Ψ	PSI (PS)	variance-covariance matrix of ζ
R^2		Coefficient of determination
ζ	ZETA	structural error
Θ_{δ}	THETA DELTA (TD)	variance-covariance matrix among measurement errors of x
Θ_{ε}	THETA EPSILON (TE)	variance-covariance matrix among measurement errors of y
$\Theta_{\delta,\varepsilon}$	THETA (TH)	variance-covariance matrix among measurement errors of x and y
Λ_x	LAMBDA-X (LX)	factor loading between x and ξ
Λ_y	LAMBDA-Y (LY)	factor loading between y and η
x		observed independent variables
y		observed dependent variables
AGFI	Adjusted goodness of fit index	
BSE	<i>Bovine Spongiform Encephalopathy</i>	
BPC	British Poultry Council	
CDC	Centers for Disease Control and Prevention	
CFI	Comparative fit index	
CVPH	The Scientific Committee on Veterinary Measures relating to Public Health	
DEFRA	Department of Environment, Food and Rural Affairs	
d.f.	Degree of freedom	

E Coli	<i>Escherichia Coli</i>
ECVI	Expected cross-validation index
FAWC	Farm Animal Welfare Council
FDA	The Department of Health and Human Service's Food and Drug Administration
FMD	Food and Mouth Disease
FSA	Food Standards Agency
FAWC	Farm Animal Welfare Council
GFI	Goodness of fit index
GM	Genetic modification
HACCP	Hazard Analysis and Critical Control Point
IGD	Institute of Grocery Distribution
IFI	Incremental fit index
IMP	Industrial Marketing and Purchasing Group
KMO	Kaiser-Mayer-Olkin Measure of Sampling Adequacy
MAFF	Ministry of Agriculture, Fisheries and Food
MBM	Meat and bone meal
mi	Modification index
MLC	Meat and Livestock Commission
NBA	National Beef Association
NCBA	National Cattlemen's Beef Association in America
NFI	Normed fit index
NFU	National Farmers' Union
NPA	National Pig Association
nvCJD	New variant <i>Creutzfeldt-Jakob Disease</i>
PCA	Principal Components Analysis
PGFI	Parsimonious goodness of fit index
PNFI	Parsimonious normed fit index
RFI	Relative fit index
RMSEA	Root-mean-square error of approximation
RASE	Royal Agricultural Society of England

RSPCA	Royal Society for the Prevention of Cruelty to Animals
s.d.	Standard deviation
SEM	Structural Equation Modelling
TLI	Tucker-Lewis index
UK	United Kingdom
WLS	Weighted Least Square

Chapter One

1 INTRODUCTION

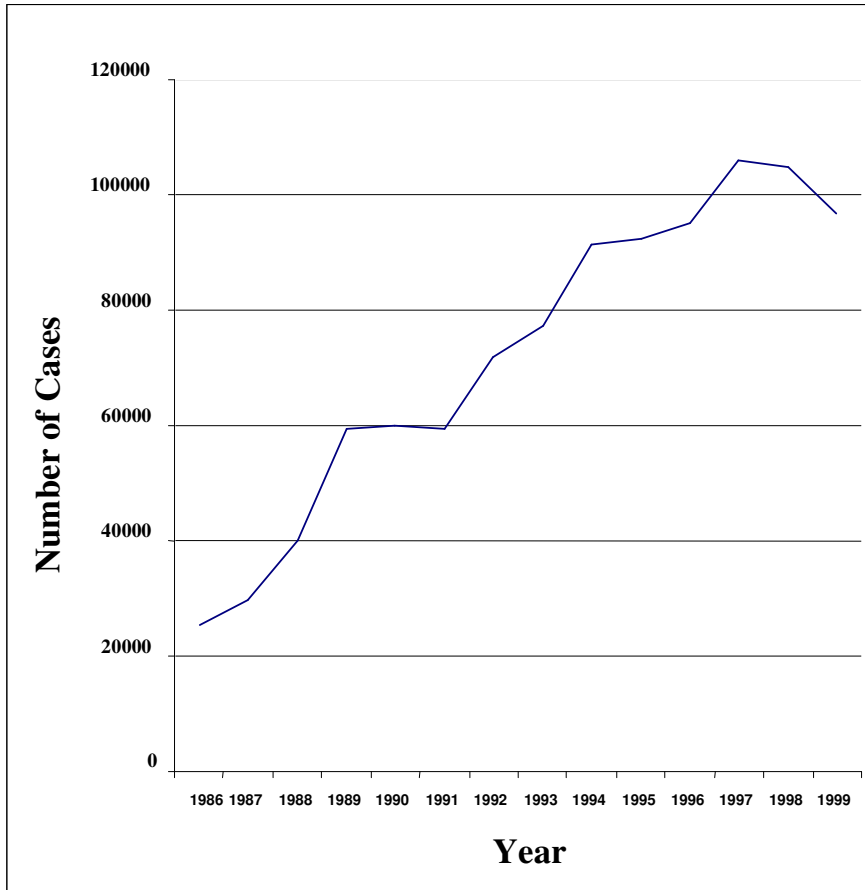
This chapter presents the background, aim and objectives of the study. The structure of the study and the outline of this thesis are also included.

1.1 Background

Notified food poisoning in the United Kingdom has increased significantly in the past decade, with total notifications almost trebling between 1986 and 1999 (Figure 1-1). Though the number of notified food poisoning incidents have declined since 1999, the incidents have adversely affected consumers' confidence in the wholesomeness of food (Grocer, 1997a; Collins and Oddy, 1998). Indeed, food safety has emerged as one of the most potent causes for concern amongst consumers following a series of highly publicised food scares such as *Salmonella* and *bovine spongiform encephalopathy* (BSE) (Pretty, 1998; Jones, Williams and Buckley, 1999; Lawton, 2000; Yeung and Yee, 2002). Food safety implies that there should be no adverse consequence to health, such as food poisoning, after consuming a food product.

It appears that consumers' concern about the safety of a food product affects their confidence and in turn affects their decision whether to purchase (Intel, 1997a; Euromonitor, 2000). A Eurobarometer survey conducted in 1998 revealed that 68% of consumers were worried about the safety of their food consumption (cited in Reichenbach, 1999). Similarly, the Food Standards Agency found that the vast majority of those questioned reported that they reduced their meat consumption because of a high level of concern about the food safety in consuming raw meat (FSA, 2000c; TNS, 2001).

Figure 1-1 Notifications of Food Poisoning and Laboratory Reports in the United Kingdom



(Source: FSA, 2000b)

Consumers cannot themselves easily assess food risks, so an important element of confidence in food is a matter of trust in all parties in the food supply chain (Kennedy, 1988; Smith, 2000). In other words, there is a need for consumers to rely with confidence on the food supply chain to supply wholesome food (Yee, 2001a). Otherwise, consumers perceive an increased risk and their intention to purchase offending foods will be affected (Yeung and Morris, 2001a; Yeung and Yee, 2002). Indeed, the aftermath of BSE continued to affect the purchase behaviour of consumers for many years (MLC, 2001). Trust is important for all forms of human social

interaction (Slovic, 1998) and building trust is a critical factor underlying risk management (e.g. Rayner and Cantor, 1987; Laird, 1989; Mitchell, 1992).

Of course, supplying safe food to consumers is the responsibility of the entire food supply chain. Thus, consumers must rely on the integrity of the food industry to protect them from harm (Grocer, 1997b; Smith and Riethmuller, 1999). In the United Kingdom, the major actors in the meat supply chain are livestock farmers, abattoirs, food handlers/processors, wholesalers, retailers and consumers. Each actor has a responsibility to provide safe food, and assure consumers that their role is taken seriously (Smith, 2000). For their part, consumers are responsible for storing, preparing and cooking food products in ways which will preserve their safety.

In the late 1980s, quality assurance schemes were introduced to respond to consumers' concern about food safety as well as animal health, welfare and husbandry (Walley, Parsons and Bland, 1999). This can help to provide information with which consumers can make informed choices (Farmers' World, 1999). Livestock farmers have to accept a part of the responsibility for national food safety crises. They, together with the rest of the supply chain must try to ensure that the meat are free from pathogens and other health hazards (Stark, 2000). However, Reed (1995) resolutely declares that food safety begins on the farm. The behaviour of livestock farmers is likely outside the purview of consumers and, therefore hard to monitor. For this reason, Pratt and Wynne (1995) of the Meat and Livestock Commission (MLC) point out that livestock farmers need to raise their trustworthiness, and develop a mutual understanding with consumers. The same view is shared by other organisations such as the Royal Agricultural Society of England (RASE), the National Farmers' Union (NFU), the National Pig Association (NPA) and the National Cattlemen's Beef Association in America (NCBA) (RASE, 1997; NFU, 2000; Scott, 2001; NCBA, 2001). These goals can only be fulfilled through gaining a thorough understanding of consumers' needs, and in turn building consumer trust (Arnstein, 1994).

Consumers have little direct contact with livestock farmers compared to their contacts with retailers. Because of this, consumers are likely to rely on retailers, such as

supermarkets to provide them with quality and safe food. But retailers usually dominate the food supply chain and their ideal is to have the world's best products on their shelves. They have become adept at global sourcing (Green, 1996; Whitworth and Simpson, 1997; RASE, 1999). When there was an epidemic of BSE in the United Kingdom, retailers switched to promote imported beef and veal in order to satisfy consumers and in turn, the imported volume increased even though total consumption decreased. Apart from the great loss to British livestock farmers, abattoirs and food processors/handlers also suffered a loss in the form of reduced sales volumes, prices and revenues. In view of this problem, organisations representing livestock farmers such as MLC and NFU tried to restore consumers' confidence in British meat via advertisements, quality assurance schemes and in-store promotion through supermarkets. More recently livestock farmers have tried to contact consumers directly through farmers' markets. Unfortunately, livestock farmers have not managed to restore complete consumer trust in them. For instance, the Institute of Grocery Distribution's (IGD's) Consumer Watch survey revealed that a very low level - around 10% of the respondents into put their trust in farmers compared to 20% and 37% of the respondents trusted food manufacturers and major supermarkets respectively, and no respondents expressed distrust in abattoirs and food processors/handlers (Grocer, 2000).

The Government of the United Kingdom has expressed its commitment to pursue a strategy of sustainability of the farming and food sectors (Curry, 2002). In turn, the Department of Environment, Food and Rural Affairs (DEFRA) suggests that the parties of the food chain should collaborate to reconnect consumers, through relationships based on trust (Backwell, 2002; DEFRA, 2002). As part of this, a premise of the research reported here is that there is an urgent need for livestock farmers to know how trust could be built in order to develop a sustainable and competitive industry.

This thesis focuses on how livestock farmers can build consumer trust in them where they have little direct contact with consumers. Despite a considerable amount of attention given to the subject of trust (e.g. Moorman, Deshpandes and Zaltman, 1993;

Ganesan, 1994; Morgan and Hunt, 1994; Doney and Cannon, 1997; Moore, 1998), researchers have not paid any attention to trust in the kind of relationships where the exchange partners have little direct contact. Indeed, the research premise here is that livestock farmers must build consumer trust in them as an important element of restoring consumers' confidence in meat. Hence, consumers are willing to purchase because the uncertainty is reduced, in turn the meat market will be restored and the whole supply chain will benefit (Yee and Yeung, 2002).

1.2 AIM AND OBJECTIVES

In view of consumers' concerns about food safety that may affect their trust in livestock farmers and in turn affect their purchase behaviour, livestock farmers potentially draw benefit from understanding how trust could be built from the consumers' perspective and the relationship between consumer trust and purchase behaviour. If there is evidence of a link between consumer trust in livestock farmers and purchase behaviour, it may be possible to develop strategies to restore consumer trust and regain sales. This study explores the link between the factors which build trust, consumer trust and consumer purchase likelihood in the context of meat products.

The above aim will be accomplished through the achievement of the following objectives:

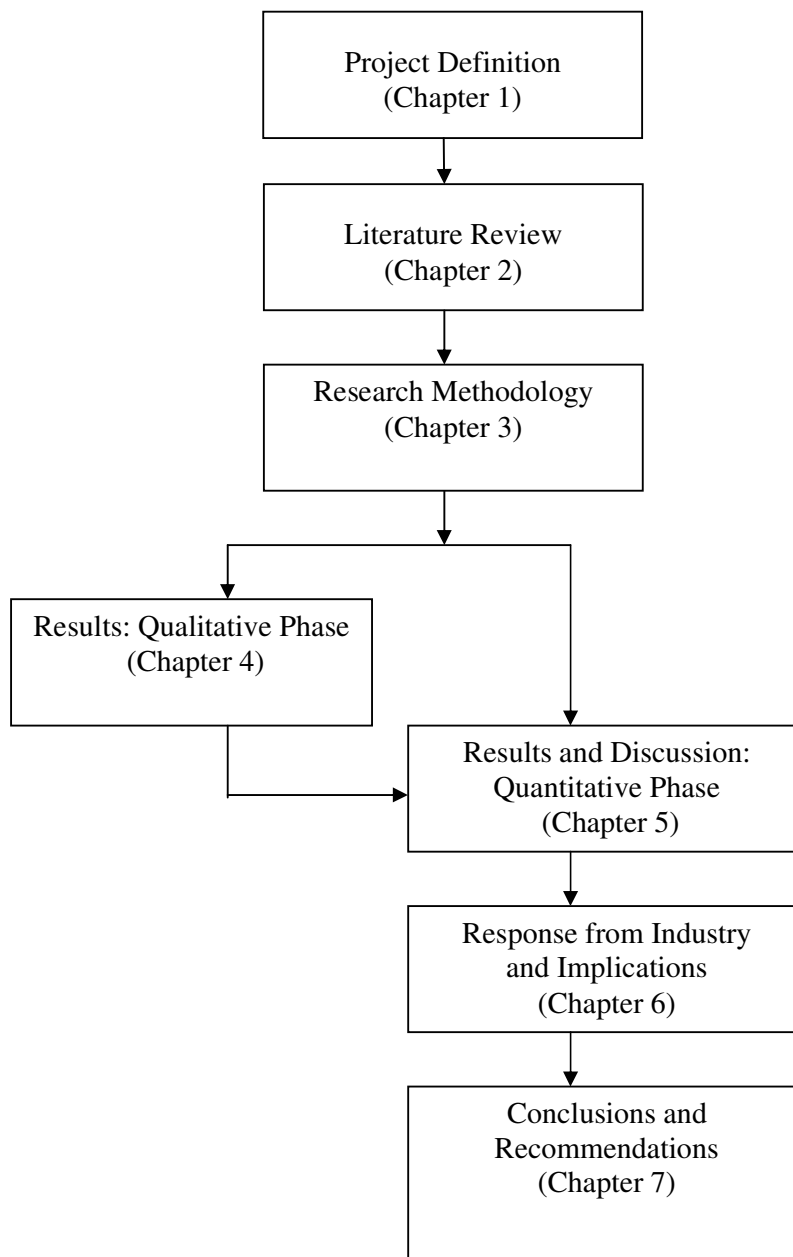
- To identify the factors which build consumer trust in livestock farmers regarding food safety.
- To determine whether consumer trust in livestock farmers positively affects consumer purchase likelihood in meat.

- To determine the causal effect of each of these factors on building consumer trust in livestock farmers, in turn to affect purchase likelihood if there is a positive relationship between trust and purchase likelihood.

This study sets out to provide empirical evidence of the role of trust when the exchange partners have little direct contact. A consumer trust model is proposed to link up the causal factors of trust and purchase likelihood. The assessment of trust from the consumers' perspective will enable livestock farmers to have an insight into how consumer trust is built and subsequently to develop strategies to restore consumers' confidence in British meat.

1.3 STRUCTURE OF THE THESIS

The structure and the sequence of the research and the thesis document are described in Figure 1-2.

Figure 1-2 Structure of the Research and Thesis

This thesis is divided into seven chapters. In Chapter 1, the background to the research is introduced followed by the aim and objectives, and a statement of the thesis structure. Chapter 2 defines the study topic and the boundary of the research.

The definition, causal factors and consequence of trust are reviewed and discussed. In addition, the processes of developing trust are examined. Hypotheses are also presented.

The research methodology is discussed in Chapter 3 after the review of literature. The research was divided into three phases: qualitative phase, quantitative phase and industrial consultation with representatives of the livestock industry to obtain their response to the findings. The qualitative phase was conducted in the form of face to face interviews to elicit the measurement items of the causal factors of trust in this context. Twenty respondents were interviewed with semi-structured, open-ended questions. Answers to these questions were coded and categorised to check for the measurement items of the factors that build trust. The quantitative phase was carried out to determine the contribution of these causal factors to building trust as well as to explore if there was a link between consumer trust and purchase likelihood. A cross-sectional study of 194 respondents was carried out following the findings in the qualitative phase. Exploratory factor analysis in the form of Principal Components Analysis (PCA) was performed to determine the number of factors underlying the questionnaire items. The resultant model was then analysed in the form of Structural Equation Modelling (SEM) using a specialised statistical package, LISREL 8.30.

In order to confirm the relevance of the study as well as to facilitate the interpretation of the results of the modelling exercise from the viewpoint of the livestock sector, meetings were held with senior officers of three organisations representing livestock farmers and open-ended questionnaires were sent to selected livestock farmers.

The results and analysis of the qualitative phase are presented in Chapter 4 and the quantitative phase are presented in Chapter 5. Chapter 6 presents the responses from the livestock industry together with the implications for the food industry as a whole. Finally, Chapter 7 summarises and concludes the findings of this study and suggests recommendations for future research.

Chapter Two

2. CONCERN AND TRUST IN LIVESTOCK FARMERS

This chapter defines the research issues and the scope of the study. The concerns of consumers in the practices of livestock farmers are examined, together with consumer purchasing decision for meat. The current actions carried out and communication channels for trust building used by the livestock industry are reviewed. The existing definitions of trust from various disciplinary perspectives together with trust building processes are reviewed and identified. The causal factors and the consequence of trust are determined and discussed. Seven research hypotheses are developed and presented. A summary is included at the end of the chapter.

2.1 THE UK MEAT SUPPLY CHAIN AND FOOD SAFETY

The safety of food is of growing importance to consumers in the United Kingdom. Reported cases of food poisoning were increasing until 1998. Significantly, more cases occur in the community than are reported – for *Salmonella* it is estimated that three cases occur for every one reported (BPEX, 2002). Indeed, the whole supply chain is responsible for providing safe food to consumers.

2.1.1 The UK Meat Supply Chain

The farming and food industries are important to the UK (DEFRA, 2002). In the United Kingdom, farmers and growers occupy more than 75% of the land surface and supply more than two-thirds of the total food needs, worth in excess of £15 billion a year (NFU, 2001b). In addition, more than half a million people are directly employed in UK agriculture and farming together with the food and drink industry accounts for 14% of the British workforce (NFU, 2001). The UK meat supply chain consists of livestock farmers, food manufacturing including abattoirs and food processors, wholesalers, non residential caterers, retailers and consumers (Figure 2-1).

Livestock farmers are the commercial producers of cattle, sheep and pig. There are more than 150 thousand but most of these farms are relatively small in size and work individually without collaboration (RASE, 1999). Livestock are either sold through the live-ring auction system or through dead-weight marketing (Fearne, 1998). Carcasses and cuts of meat are then sold to caterers or retailers via wholesalers after processing/packing. The food manufacturing, wholesaling and retailing sector bridge the gap between the thousands of farmers and the million of consumers.

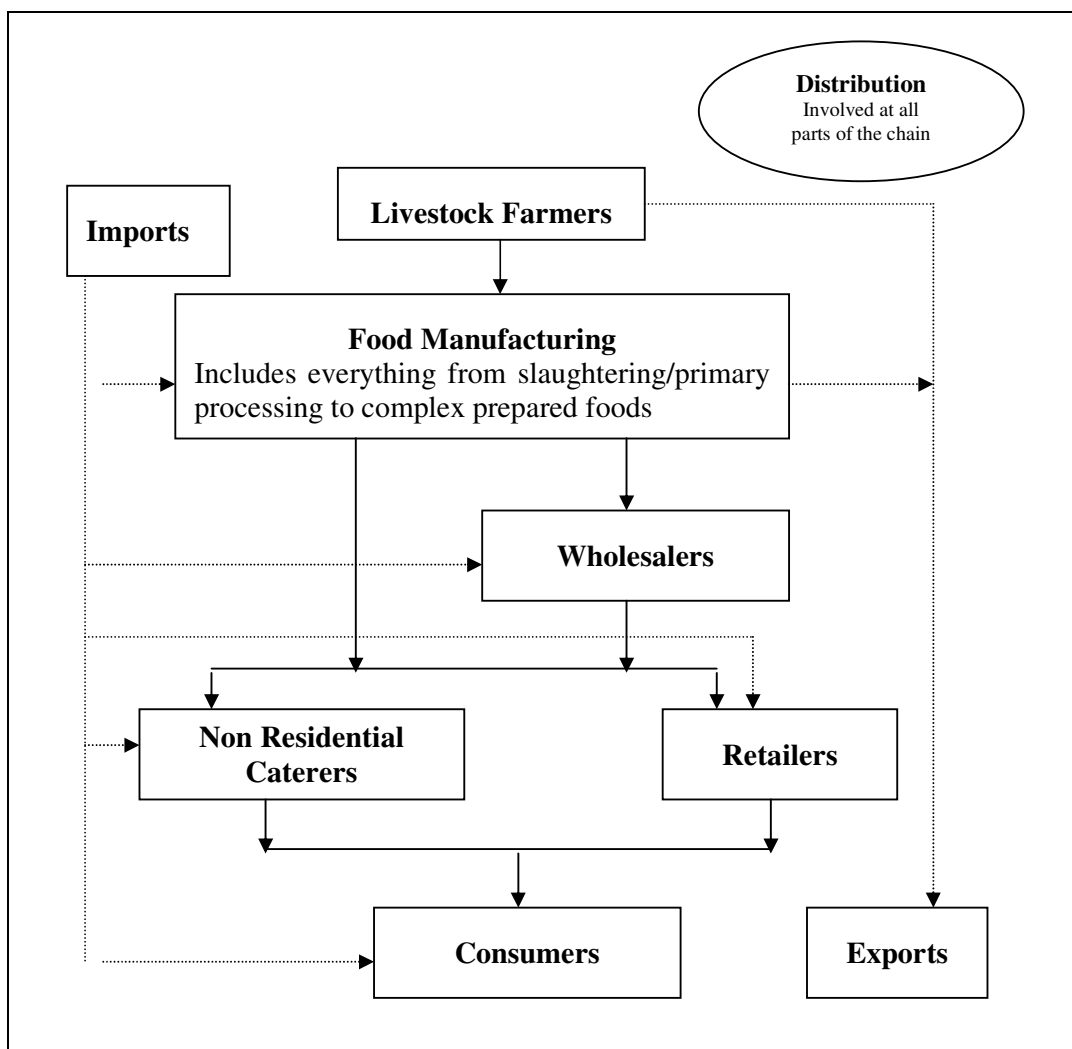
In recent years, there have been recommendations to restructure the meat supply chain in order to develop a competitive meat industry. After the NFU's Conference in February 2000, the NFU suggested forming partnerships among farmers to sustain Britain's farms and asked farmers to work closely with their customers in the food chain (NFU, 2001c, d). The aim is to move away from a situation where farmers are just producers of bulk commodities at the beginning of the food chain, but to move down the supply chain to add value and to meet consumer demands more efficiently.

The British Pig Executive (BPEX) suggested that in order for the British pig industry to have sustainable growth, the industry must be information driven by identifying and responding to the changing needs of consumers (MLC, 2002a, b). The Policy Commission on the future of Farming and Food as well as DEFRA has recommended farmers to reconnect with consumers through co-operation and collaboration to meet the requirements of consumers (Curry, 2002; DEFRA, 2002).

Furthermore, it is expected to have benefits namely: improved market access, improved communications, high profit margins, greater discipline and high barriers to entry from a partnership arrangement along the supply chain (Fearne and Dedman, 2000). In order to achieve the physical collaboration of all parties in the food supply chain; there is a need for a better flow of information within the food chain to build trust and mutual respect (Heaton-Jones, Howson, Sidebotham, and Tweddle, 1999). This improvement of communication and co-operation in the supply chain is likely to remove barriers to reconnect farmers with consumers (Backwell, 2002). Certainly,

livestock farmers need to understand and respond to consumer concerns – these aspects are important to guide the information requirements; food safety, convenience and quality to achieve a sustainable livestock production sector and to build consumer trust (RASE, 1997; Backwell, 2002). So, there is good reason to review the responsibility of livestock farmers regarding food safety and the concerns of consumers about food safety relating to livestock farmers.

Figure 2-1 The UK Meat Chain



(Source: DEFRA, 2002)

2.1.2 Livestock Farmers and Food Safety

As discussed above, livestock farmers lie at the beginning of the supply chain and indeed they are critical to the delivery of pathogen-free livestock. However, the origin of the BSE crisis is the animal feed problem on farms. Of course the animal feed industry is the origin of BSE, but this manifests itself on farms through intensive feeding regimes. An MLC research study in 2000 showed that 23% of pigs arriving at abattoirs carried *Salmonella* and thus there was a risk of contamination of meat (BPEX, 2002). Similarly, E. Coli O157 and other harmful bacteria such as *Campylobacter* are excreted in the dung of infected animals. If the fleece is contaminated with dirt or dung at the time of slaughter, there is a risk of the meat becoming contaminated with these harmful bacteria. Even the highest standards of abattoir hygiene cannot be guaranteed to prevent contamination of the carcass and cross contamination of nearby carcasses (MAFF, 2000). Of course, all the other parties in the supply chain cannot deny their obligation to maintain a high hygiene standard and avoid any cross contamination; however, livestock farmers are responsible for the production of livestock which are free from pathogens.

2.2 CONCERN AND FOOD SAFETY

Over the past years, concern has arisen over food safety. Amongst these, BSE, *Salmonella*, antibiotics and hormones fed to livestock are the greatest concerns in the United Kingdom (Henson and Northen, 2000). Correspondingly, the Food Standards Agency (FSA) commissioned a qualitative study and reported that consumers are losing confidence in the wholesomeness of food and are concerned about food safety (FSA, 2000c). With respect to raw meat, the concerns of customers over the practices of livestock farmers include the following:

2.2.1 Concern over Animal Feed

Feeding waste materials, including uneaten food, to livestock has a long tradition (Onstad, 1999). Some of the recent alarming food safety incidents are feed

contaminated with cancer inducing dioxin in Belgian, feed mixed with sewage sludge in France, and feed combined with manure and wood shavings in the United States (Barlow, 1999; Henley, 1999; Meikle, 1999; Radford, 1999; FSA, 1999). It was not until the report on the BSE crisis that most consumers became aware of or concerned about the connection between such practice and food hazards. For the BSE epidemic, the Phillips Report discloses that BSE was a result of feeding contaminated meat and bone meal (MBM) to cattle (MAFF, 2000).

Animal feed is also a source of *Salmonella*, one of the most serious foodborne pathogens around the world (Tietjen and Fung, 1995). Because animal feed is frequently contaminated with *Salmonella*, it gives rise to livestock carrying *Salmonella* in their intestines (Oosterom, 1991; Trickett, 1997) which is in turn passed to humans through meat consumption (Muhlenberg, 1992).

2.2.2 Concern over Overusing Antibiotics

Antibiotics are substances produced by micro-organisms that kill (bactericidal) or inhibit (bacterio-static) other micro-organisms” (Todar, 1995; CDC, 2000). However, there exists an increasing concern over the widespread use of antibiotics in agriculture for therapeutic, prophylactic and growth promotion treatment of intensively reared animals (McKellar, 1999, DEFRA, 2001). Recent reports indicate that about 80% of antibiotics used in livestock farming are not used to treat sick animals but to increase growth rates and to prevent disease (Wenzel and Edmond, 2000; EMS, 2000a). An overuse of antibiotics may lead to transference of antibiotic resistance to organisms causing disease in humans and thus loss of effective available treatments for humans (Khachatourians, 1998; Gottlieb, 2000; DEFRA, 2002). In view of these chain effects, consumers’ concern of the use of antibiotics in livestock has increased.

2.2.3 Concern over Intensive Farming Practice

Intensive farming refers to ‘conditions where livestock are reared in large herds which tend to be kept inside for most of the year’ (NFU, 2001a, b). In this way, farmers

believe that animal health, hygiene and other welfare standards can be maintained (NFU, 2001). Nevertheless, farm animals which are confined in a small space are susceptible to illness and epidemics, and intensive farming practices have been linked with the rise in foodborne illness in humans, such as food poisoning increased by *Salmonella* (Johnston, 2000). Thus, livestock farmers use antibiotics in a preventative manner, as opposed to treating individual sick animals (Khachatourians, 1998). There is evidence of multi-drug resistance in the United Kingdom due to such rearing methods of farm animals (Mintel, 1997a). The intensification of rearing livestock, combined with the use of drugs which may encourage bacteria to mutate into new forms, posts an unquantified risk to consumers (Curry, 2002). A survey commissioned by FSA points out that 41% of the respondents were concerned about the conditions in which food animals are raised (TNS, 2001). Indeed, consumers perceive that intensive farming is linked with the overuse of drugs in livestock (Trickett, 1997).

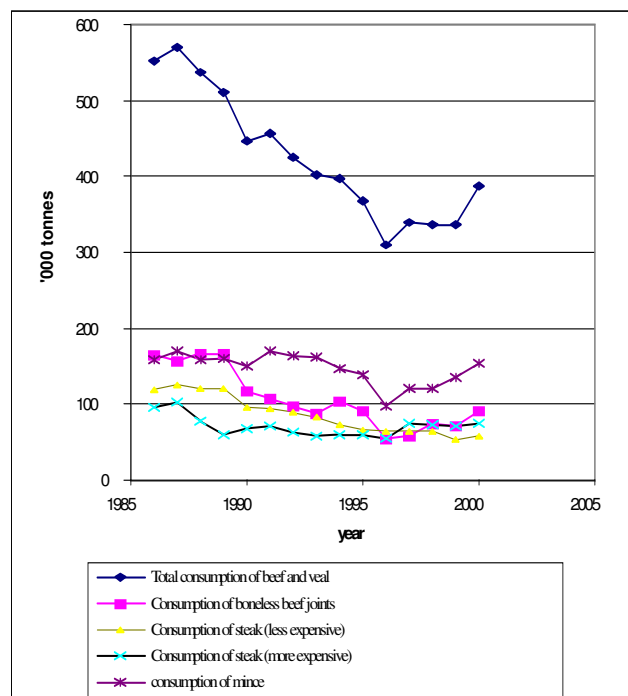
2.3 CONCERN AND PURCHASE BEHAVIOUR

There are claims that food safety scares now affect consumers' purchasing decisions because a scare about a particular food adversely affects the perception and consumption of that food. (e.g. Huang, 1993; Eom, 1994; MLC, 2001a; Yeung and Morris, 2001a). Though there are other factors affecting the declining popularity of red meats in the British diet, for example, health, price and convenience, the decline of the conventional family meal and the growth of vegetarianism (NACNE, 1983; COMA, 1984; Spencer, 1991; RASE, 1997; Pretty, 1998), the decline in beef market after the BSE crisis shows a loss of consumers confidence in beef.

Tilston, Sear, Neale, and Gregson (1992) empirically examined the perceptions of consumers towards beef and beef products following the BSE outbreak and the changes in their purchase decision. . Their report shows that 6% of the interviewees stopped eating beef altogether and 25% selected to decrease beef consumption. The decline in volume sales accelerated as BSE strongly affected the public's consciousness during the 1990's. As shown in Figure 2-2, a sharp fall of 44% in total

household consumption of various cuts of beef and veal in UK when comparing with the sales in 1986, when the Department of Health announced the possible link between BSE in cattle and new variant *Creutzfeldt-Jakob Disease* (nvCJD) in humans in March 1996. A RASE (1997) report points out that the risk of BSE severely damaged the whole UK beef industry. The BSE crisis caused a downward trend in the UK market for fresh and frozen beef fell by 27% in 1996 when compared with 1995. For red meat products sector such as beef-burgers and grills, sales of these products dropped by 24% between 1980 and 1995. In 1996, the market of red meat products dropped a further of 23%, losing as much in a few months as it had in the previous 15 years. In addition, the share of beef in the meat market across the European Union fell from 24% in 1995 to 21% in 1996, an equivalent of 1 million tonnes of beef consumption (RASE, 1997). The UK beef sector has been severely suffered by the BSE crisis partly because of the dwindling of consumer confidence (Bansback, 1995; Hobbs, 1996; Fearn 1998).

Figure 2-2 Household Consumption of Beef and Veal in the UK



(MLC, 1996a, 1998b, 2001a)

However, empirical studies show that not only food safety scares have the effect on consumer purchase behaviour, consumers concern about a particular meat product or livestock husbandry practices also affect their purchase behaviour (e.g. TNS, 2001). A survey of over 3,000 people commissioned by the Food Standards Agency showed that 69% of the respondents expressed concern about the safety of raw meat consumption, compared to 13% for processed meat, 8% for cooked meat, and 14% for fish (TNS, 2001). TNS further showed that 62% were concerned about BSE, and 43% changed their eating habits by either stopping eating or cutting down on eating beef because of BSE (Table 2-1).

Table 2-1 The Relationship Between Concern about Food Issues and Eating Habits

	No. of respondents expressed concerns (% of total respondents)	% of total respondents claimed affects eating habits
BSE	1,924 (62%)	43%
Growth hormones/ promoters	1,472 (47%)	29%
Feed given to livestock	1,463 (46%)	31%
Conditions animals raised in	1,297 (41%)	30%
Total number of respondents: 3,153		

(Source: TNS, 2001)

2.4 CURRENT STRATEGIES USED BY THE LIVESTOCK INDUSTRY TO RESTORE CONSUMER CONFIDENCE

In response to food scares, notably relating to BSE, the livestock industry has implemented several marketing programs aimed at restoring consumer confidence. These are:

- Advertisement – Each year, the Meat and Livestock Commission spends more than 75% of its budget on marketing (MLC, 2000a), of which a large proportion is spent on advertising. For instance, a £4.6 million press advertising campaign was launched in May 2000 to promote the pig welfare practices behind the British Meat Quality Standard Mark for pork, bacon, and ham, focusing on the fact that some overseas producers are still permitted to feed meat and bone meal to pigs (MLC, 2000b, c).
- Assurance Schemes – Because of public concerns about food safety and the environment, assurance schemes were promoted by various organisations involved in the food chain, including the retailers, MLC and NFU to set high livestock husbandry standards including food safety and hygiene, animal welfare and environment regulations (NFU, 2001; FAWC, 2001). For example, the Farm Assured British and Lamb Scheme, the Minced Beef Quality Mark, and the British Farm Standard Mark were introduced in 1992, 1996 and 2000 respectively. These schemes, serve as a communication channel, aim to guarantee to the consumer the quality and traceability of meat and meat products from source to consumers (Turner and Taylor, 1998). However, there are many assurance schemes for farm products such as those mentioned above, plus Farm Assured Welsh Lamb, Northern Ireland Farm Quality Assurance Scheme, Assured Chicken Production, Assured British Pigs, and so forth. Such proliferation of assurance schemes is viewed as a potential source of confusion for consumers because some are independently audited; others are not (RASE, 1997, Curry, 2002). As a result the quality assurance schemes at present have failed to achieve the mission to rebuild consumer trust.
- In-store promotions of British farm food – The retailers, namely the supermarkets promote heavily in-store with slogans saying “buy British” and posters featuring a smiling British farmer with his products. However, these promotions only deliver the message of “buy British” but fail to tell “why British” (ASKHAR, 2000). Furthermore, the effect is difficult to measure.

- Farmers' markets - It was considered important by the NFU to have a sustainable future for farmers, improved communication and the removal of barriers to reconnect farmers with consumers (ASKHAR, 2000; Curry, 2002; Backwell, 2002). Currently, the supermarkets have access to the consumers information but fail to share it with their suppliers, namely the farmers. So, some farmers try to construct a direct link with consumers by dealing directly through farmers' markets (Turner and Taylor, 1998; Toyne, 2002a, b).

Although the livestock industry has tried, past research shows that it has not managed to maintain/restore consumer trust in livestock farmers. For instance, in an IGD survey that asked about a thousand respondents to name their top three for food safety, 37% reported they trust major supermarkets the most but only 10% named farmers (cited in Grocer, 2000). In this context, there is good reason to explore the factors which build consumer trust together with they affect the building of trust and in turn to purchase behaviour. The results would help the livestock industry to develop the consumer trust building strategies and thereby increase consumers' intention to purchase meat.

2.5 DEFINITION OF TRUST

The Oxford English Dictionary defines trust as:

“Confidence in or reliance on some quality or attribute of a person or thing, or the truth of a statement.”

This definition is ambiguous since it fails to explain the word quality or attribute which apparently is the key for having confidence in or reliance on the trustee. Over many years, scholars have studied trust from several disciplinary perspectives - such as psychology, sociology, and economics. They have different approaches with different methods, and have different opinions over the fundamental nature of trust. However, attempts to describe trust and suggestions to engender trust are incomplete (Bhattacharya, Devinney and Pillutla, 1998). Thus there is a need to review the

definitions of trust from different disciplines before settling on an operational definition for this study.

Some researchers suggest that the study of trust may be based on how trust is viewed. To have a glance of their suggestions, personality psychologists conventionally judge trust as the characteristic of an individual or a group of individuals (e.g. Mellinger, 1956; Deutsch, 1960; Rotter, 1971, 1980). Social psychologists define trust as an expectation about the behaviour of other actors in a transaction, emphasising the contextual factors affecting trust (e.g. Lewicki and Bunker, 1995b), and economists and sociologists focus on how institutions and incentives are created to reduce anxiety in processes of exchange or interaction (e.g. Zucker, 1986).

Among the personality psychologists, Mellinger defines trust as:

“An individual’s confidence in the exchange partner’s understanding and motives, and the sincerity of his or her word”. (Mellinger, 1956)

This definition was not applied in the context of this study, because it emphasises the characteristics of the exchange partner. Indeed, it is difficult for consumers to understand the motives and sincerity of livestock farmers because of little contact between these two parties. Read (1962) builds on Mellinger’s definition and adds that people trust others by expecting their interests to be protected and promoted by those they trust. This definition of trust also cannot be applied to the context since consumers are likely to have no idea about their interests being protected by livestock farmers due to little direct contact.

Similarly, Rotter, by adding to Deutsch’s (1960) definition, defines trust as:

“A generalised expectancy held by an individual or group that the word, promise, verbal, or written statement of another individual or group [of individuals] can be relied on.” (Rotter, 1971)

This definition is similar to that found in the Oxford English Dictionary but it defines trust as a personal trait of one who relies on the intention and behaviour of the

exchange partner implicitly. Though there are differences within the psychology discipline, the definition of trust follows the dictionary definition by emphasising the characteristics of the trustee.

In contrast to personality psychologists, social psychologists define trust as an expectation about others' behaviour in transactions as well as the transactions themselves (e.g. Mayer, Davis and Schoorman, 1995; Lewicki, McAllister and Bies, 1998). For instance, Mayer, Davis and Schoorman define trust as:

“The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to it, irrespective of the ability to monitor or control the party”. (Mayer, Davis and Schoorman, 1995)

Obviously, this definition of trust focuses on the transaction together with the willingness to accept vulnerability. In the context of consumer trust in livestock farmers, consumers indeed put themselves in a vulnerable position because consumers cannot easily assess food safety directly. However, this definition fails to address the need to rely on livestock farmers to produce safe food.

Social psychologists suggest that trust is a result of the exchange partner's conduct. They point out that the exchange partner will perform in a co-operative or benevolent way simply because of external incentives or because of instruction or formal responsibility cannot be counted as trust, though the result may meet the expectations (Bhattacharya, Devinney and Pillutla, 1998). In relation to the study topic, the willingness of consumers to be vulnerable through exposure to potential food safety risk is not enough to be counted as trust in livestock farmers since the former cannot easily assess food safety. An important question is whether consumers are willing to rely on livestock farmers to guard against this vulnerability on their behalf, through, for example, the application of quality assurance schemes.

Economists view trust as the product being generated from the contract between the actors in an exchange and are more concerned with the costs and benefits of specific

behaviours governed by the contract (Bhattacharya, Devinney and Pillutla, 1998). However, Bigley and Pearce (1998) point out that sociologists and economists are interested in the effect of organisational and institutional arrangements on trust rather than in trust itself (e.g. Zucker, 1986).

The remarkable diversity in viewing trust seems to be disconcerting for many scholars (Bigley and Pearce, 1998). For instance, Shapiro (1987) points out that scholastic study of trust has resulted in a confusion of definitions. Hosmer (1995) supports such a view and states that there appears to be an agreement on the importance of trust but a lack of agreement on a suitable definition. So there have been some attempts to integrate different schools of thought in trust. For instance, Bhattacharya, Devinney and Pillutla (1998) attempt to formally and rigorously model trust in the perspective of social interactions by integrating several themes and discrepancies from literature, particularly those relating to the notions of trust (such as uncertainty, predictability and mutuality) and trust as a positive outcome. Certainly, the need for consumer trust in livestock farmers regarding food safety implies the presence of uncertainty because consumers cannot easily measure the safety of the food product.

Not only the psychologists, social psychologists and economists define trust differently according to their disciplinary perspectives, Cowles (1997) points out that there is no unique definition of trust in marketing thought and practice, and neither scholars nor practitioners agree on a single model of trust that applies to all marketing contexts. For instance, Moorman, Zaltman and Deshpandes define trust as:

“A willingness to rely on an exchange partner in whom one has confidence”. (Moorman, Zaltman and Deshpandes, 1992)

Ganesan (1994) points out that an important aspect brought forward in this definition is “the notion of trust as a belief, a sentiment, or an expectation about an exchange partner that results from the partner’s expertise, reliability and intentionality”. Morgan and Hunt extend Moorman et al.’s definition and define trust as:

“The perception of confidence in the exchange partner’s reliability and integrity”. (Morgan and Hunt, 1994)

Evidently, the definitions of trust in the marketing context emphasise the importance of confidence and reliability in the conception of trust. This is true in the context of this study, if consumers have trust in livestock farmers regarding food safety, the former should be willing to rely on livestock farmers with confidence regarding food safety. Some other marketing researchers identify the aspects of credibility, benevolence, honesty, integrity and non-opportunism when defining trust. For instance Doney and Cannon define trust as:

“The perceived credibility and benevolence of a target of trust...and credibility is an expectancy that the partner’s word or written statement can be relied on”. (Doney and Cannon, 1997)

These definitions of trust manage to elaborate the definition of Mooreman et al. (1992) by adding the grounds/reasons of confidence. When considering consumer trust in livestock farmers, the reasons for having consumer confidence are important because consumers cannot easily assess the safety of food product. Similar to Doney and Cannon’s definition, Smeltzer defines trust in a buyer/seller perspective that a trustworthy buyer or supplier is one that does not act in a purely self-serving manner, not to take advantage of other parties, accurately discloses relevant information when requested and generally acts according to normally accepted standards (Smeltzer, 1997).

Following from the above, trust can be seen as a multidimensional construct and cannot be predicted by single items or psychological constructs (Butler, 1991; Frewer, Howard, Hedderley and Shepherd, 1996; Bhattacharya et al., 1998). In view of the position of livestock farmers in the food supply chain (Section 2.1) and the distance between livestock farmers and consumers, the production of safe food from livestock farmers is uncertain to consumers. Though it is more efficient for consumers to trust retailers to sell safe food, the MLC pointed out that livestock farmers need to raise their trustworthiness and DEFRA suggested that farmers should reconnect consumers which is based on trust.

So consumer trust in livestock farmers is then defined and applied in this study as:

A consumer's willingness to rely on livestock farmers with confidence in an uncertain food safety situation.

2.6 TRUST BUILDING PROCESS

Since trust building is a complex process and based on the understanding of the actions and outcomes of the exchange partner (Doney, Cannon and Mullen, 1998), it is necessary to understand the process used by consumers either consciously or unconsciously in order to identify the causal factors to building trust.

Doney, Cannon and Mullen, (1998) suggest that a person who is willing to build trust in his/her exchange partner goes through a pattern of cognitive analysis and summarise the pattern into five cognitive trust-building processes. This study adopts these five trust-building processes to provide a theoretical framework in identifying the causal factors to build trust.

2.6.1 Calculative Process

Economics literature (e.g. Williamson, 1985; Dasgupta, 1988) suggests that trust building involves a calculative process. Trust is developed through a calculative process whereby one party, such as the consumer, calculates the cost/benefit of the exchange partner, such as the livestock farmer, of cheating in an exchange (Shapiro, Sheppard and Cheraskin, 1992; Doney and Cannon, 1997). Consumers would perceive that livestock farmers could be trusted if the benefit of cheating does not exceed the cost of being caught, because it would be contrary to the best interest of the latter to cheat.

To build trust through a calculative process, the person will establish that a trustee is trustworthy based on the assumption that, given the opportunity, most people act opportunistically and in their own self benefit (Williamson, 1985). Thus, integrity is essential at this initial stage of the relationship. When a trustee adheres to a set of principles that is acceptable to his/her exchange partner, integrity is presumed by the latter (Mayer, Davis and Schoorman, 1995). If livestock farmers want to reconnect

with consumers in order to pursue the economic sustainability of the livestock industry, they have to demonstrate that they are willing to provide safe food for the interest of consumers. Thereby, consumers are willing to pay a price for pathogen free meat and expect that livestock farmers would not act untrustworthily and in turn lose their future business.

2.6.2 Prediction Process

To build trust through a prediction process, trust is established depending on one party's ability to predict the exchange partner's behaviour (Doney and Cannon, 1997, Coutu, 1998)). Under this process, consumers develop their trust from the knowledge of livestock farmers' past actions such as their fulfilment of promises and obligations to predict the latter's future action. Indeed, fulfilment of past promises could sustain the relationship and facilitate predictability (Rempel, Holmes and Zanna, 1985; Butler, 1991; Jones and George, 1998). In addition, openness, honesty, consistency and fairness in a transaction can lead to a positive prediction (Anderson and Weitz, 1989; Butler, 1991; Renn and Levine, 1991; Kasperon, Golding and Tuler, 1992; Covello, 1992; Peters, Covello and McCallum, 1997; Selnes, 1998; Sheppard and Sherman, 1998; Jones and George, 1998; Argandona, 1999). Certainly, predictability generally rises with increased levels of trust (Michell, Reast and Lynch, 1998). For instance, in the case of a food scare related to raw meat, consumer trust in livestock farmers will be built if the latter shows their sincerity by a consistent follow up action to eradicate the problem as predicted by consumers.

Trust building through a prediction process requires information about the past actions of livestock farmers. Nevertheless, any record of giving erroneous information could lead to distrust (Frewer, Howard, Hedderly and Shepherd, 1996) and jeopardise the prediction process. Therefore, correct and trustful information is crucial to building trust (Sheppard and Sherman, 1998). In the context of food safety, providing accurate and reliable information is important to building consumer trust (Reichenbach, 1999). If livestock farmers understand consumers' needs and make the fulfilment of these

needs as their goals to consumers, consumer trust building using prediction process will be facilitated.

2.6.3 Intentionality Process

Trust building through an intentionality process depends on one party's perception of the motives of the exchange partner (Doney and Cannon, 1997; Mayer, Davis and Schoorman, 1995). Using this process to build trust, consumers interpret the words and behaviour of livestock farmers and attempt to determine their intention in the latter's actions. Through open, responsible and reliable information, the objectives and goals of livestock farmers can be better understood and interpreted by consumers, thus trust will be built if consumers find the intention of livestock farmers is good. For instance, if livestock farmers adopt good husbandry practices and care for the environment and the welfare of their animals and consumers, consumer trust will be built through an intentionality process. If livestock farmers are perceived to be self-interest seeking, opportunistic and unfair, trust is unlikely to be built. Thus, opportunistic behaviour has a negative effect on trust (John, 1984; Hill, 1990; Morgan and Hunt, 1994; Moore, 1998, Das and Teng, 1998).

Doubtless, benevolence is important for giving an image of good intention and forms a basis for trust (Mayer, Davis and Schoorman, 1995). Trust would emerge if the trustee is perceived to be caring and helpful (Selnes, 1998). Indeed, consumer trust in livestock farmers would be gained if the latter acts in the interest of consumers and shows genuine intention and care for the welfare of consumers. Consumers need to feel the intentions of livestock farmers are benevolent to them in order to establish trust through the intentionality process.

2.6.4 Capability Process

Trust building through a capability process is based on the assessment of the competence of the trustee to meet his/her obligations (Doney and Cannon, 1997). Expertise and competence have been found to be a factor affecting trust in previous research (e.g. Moorman, Deshpandes and Zaltman, 1993; Smith and Barclay, 1997).

By elaborating the suggestion of Frewer, Howard, Hedderley and Shepherd (1996), and Miles (1999), competence is likely to be shown by the ability to provide accurate advice regarding food safety, thereby consumers would build their trust in livestock farmers.

2.6.5 Transference Process

Trust may be established through a transference process, during which “the trustor transfers trust from a known entity to an unknown one” (Palmer and Bejou, 1994; Doney and Cannon, 1997). In other words, trust is transferred from a trusted source to another individual or group of individuals with which he/she has no or little previous direct encounter. Livestock farmers can be assessed by consumers through the approval of an independent trusted party such as FSA or MLC or assurance schemes. As long as the information sources are perceived to be unbiased and reliable, trust would be built (Shamos, 1991).

This framework of trust-building processes is likely to be interrelated in practice (Doney, Cannon and Mullen, 1998). For instance, a person who frequently encounters the trustee is in a better position to predict the trustee’s behaviour (prediction process) and future intention (intentionality process), and such frequent encounters help him/her to assess the trustee’s capabilities (capability process). In any given situation, he/she relies on more than one, and perhaps all processes to trust the exchange partner. Clearly, some causal factors invoke these trust-building processes. For instance, information on the competence or the motive of livestock farmers can invoke the capability process or the intentionality process. In the following section, the causal factors of trust are discussed to show how they affect the building of trust.

2.7 FACTORS WHICH BUILD TRUST

The literature yields a comprehensive list of factors which build trust, in other words, the causal factors of trust. They form the conceptual framework for this study (Table 2-2).

Table 2-2 Postulated Causal Factors of Trust

Causal factors	Researchers
Competence	Crosby et al., 1990; Shamdasani & Sheth, 1995; Smith & Barclay, 1997; Sheppard et al., 1998; Argandona, 1999; Das & Teng, 2001
Expertise	Moorman et al., 1993; Doney & Cannon, 1997
Credibility	Doney & Cannon, 1997
Reputation	Barclay & Smith, 1997; Johnson et al., 1998; Das & Teng, 2001
Size	Doney & Cannon, 1997
Reliability	Cowles, 1997; Smith & Barclay, 1997; Sheppard & Sherman, 1998
Fulfil promise	Butler, 1991
Dependability	Ring & Van de Ven, 1992; Kumar, 1996; Michell, Reast, & Lynch, 1998
Integrity	Ali & Birley, 1998; Sheppard & Sherman, 1998; Das & Teng, 2001
Honesty	Butler, 1991; Ambler, 1997; Jones et al., 1998; Selnes, 1998
Consistency	
Fair	Jones, 1998; Sheppard & Sherman, 1998 Jones, 1998; Butler, 1991
Equity	Moore, 1998; Das et al., 1998; Michell et al. 1998
Non-opportunism	Morgan & Hunt, 1994; Das et al., 1998; Das & Teng, 2001
Truthfulness	Michell et al. 1998
Benevolence	Jones et al., 1998; Bigley et al., 1998; Ali & Birley, 1998; Argandona, 1999
Concern	Sheppard & Sherman, 1998
Empathy	Sheppard & Sherman, 1998
Helpfulness	Jones et al., 1998
Providing Information	Frewer et al., 1996; Brandt, 1997; Smith & Barclay, 1997; Johnson & Grayson, 1998; Selnes, 1998; Das & Teng, 1998
Share Information	Anderson & Narus, 1990; Morgan & Hunt, 1994

For instance, Michell et al. (1998) suggest that fairness, truthfulness, personal experience, confidence, dependability, quality and predictability are the causal factors of trust. According to Smith and Barclay (1997), the causal factors are reliability, dependability, honesty, motive, intentions, competence, judgement, communication, investment, and reputation. Selnes (1998) empirically shows the causal factors of trust are satisfaction, honesty and timely communications but Moore (1998) concludes that

only fairness appears to be significant for building trust. However, many causal factors were judged to be subsumed within other more general ones. For instance, expertise (Moorman et al., 1993) and competence (Smith and Barclay, 1997), and concern (Sheppard and Sherman 1998) and benevolence (Ali and Birley, 1998; Jones and George, 1998) are similar in meaning.

These causal factors were grouped into features that lead to trust, namely: competence, credibility, reliability, integrity and benevolence, and processed by which trust is built, namely: providing information, and appeared to be relevant to measuring and building consumer trust in livestock farmers. They also formed the underlying principles of the research hypotheses that will be tested at a later stage.

2.7.1 Competence

Crosby, Evans and Cowles (1990) and Das and Tang (2001) reveal that perceived competence is a significant predictor of trust and Butler (1991) points out that perceived competence is one of the most importance “bases” of trust in the manager-subordinate relationship. Furthermore, Sitkin and Roth (1993) state that trust is “a belief in a person’s competence to perform a specific task under specific circumstances”. Indeed, trust is likely to occur when one party is assured of the trustee’s ability to deliver his/her obligation (Ratnasingham, 1998; Rankin, 1998; Yee, 2001b). In the context of market research relationships, Moorman et al. (1993) find that the perception of a researcher’s competence is an important foundation for trust because a user’s reliance is highly dependent on his or her perceived competence of the trustee.

Firstly, perceived competence is likely to induce persuasive effects to reduce uncertainty. Secondly, it could lead to a more positive attitude towards the trustee and thus lead to more trust. Following the same line, a buyer’s trust could build on the seller’s ability to meet his or her obligations (Doney et al., 1998; Yee, 2001b). Indeed for the capability process, his/her trust would be enhanced if the trustee is perceived to be competent to fulfil his or her promise. Wicks, et al. (1999) also point

out that if the potential trustee is perceived to have the requisite competence to perform the tasks they are entrusted with, trust will be more likely to occur.

Of course, if consumers perceive that livestock farmers have the capability to supply safe and clean food, take care of consumers' concern with health, environment and animal welfare, and provide accurate information and advice regarding food safety, trust is likely to be built. . This leads to the following hypothesis:

H₁: There is a positive causal relationship between perceived competence and consumer trust.

2.7.2 Credibility

According to Doney and Cannon (1997), trust is “the perceived credibility and benevolence of a target of trust”. That is, credibility is important for developing trust. It is the expectancy that the trustee can be relied on before the actual fulfilment of promise and obligation. They further point out that credibility includes reputation and size of an organisation.

Reputation is “the extent to which firms and people in the industry believe a supplier is honest and concerned about its customers” (Doney and Cannon, 1997). Certainly, a favourable reputation enhances credibility and in turn builds trust (Ganesan, 1994; Blois, 1999; Das and Teng, 2001). Smith and Barclay (1997) suggest that reputation helps a person to assess the other party's dependability and reliability, in turn the perceived trustworthiness of the trustee. Ganesan (1994), and Doney and Cannon (1997) empirically show that there is a positive link between reputation and trust. If a consumer assumes the supplier's reputation is well deserved, trust will be granted on the basis of the supplier's history in relationship with consumers. Frewer et al. (1996) support this finding by saying that any record of giving erroneous information could lead to distrust. In other words, consumer trust could be built if livestock farmers have a good reputation to provide wholesome food.

Doney and Cannon (1997) suggest that scale of operation or size in terms of turnover and/or number of employees of an organisation helps a person to assess the

trustworthiness of the organisation. They argue that an organisation with a large turnover is one that is well established, and is likely to gain trust. Thereby, this organisation will continue to grow if more and more people trust it and transact with it. Young and Wilkinson (1989) evidence this argument in a study of Australian firms. In relation to livestock farmers, there is a question whether consumers trust farms with larger turnover or large size of herd because consumers do not know whether such large farms would have greater capability to produce safe food when comparing to small farms. This leads to the following hypothesis:

H₂: There is a positive causal relationship between credibility and consumer trust.

2.7.3 Reliability

A trustee has to fulfil his/her promise in order to sustain the relationship (Butler, 1991). Moorman et al. (1992) agree with Butler and suggest that confidence in the exchange partner is a result of the trustee's reliability. Furthermore, Jones et al. (1998) show that fulfilment of promise facilitates the predictability and Michell et al. (1998) state that predictability generally rises with increasing levels of trust if the trustee is reliable. This supports the view of Doney and Cannon (1997) that trust focuses "an expectancy that the partner's word or written statement can be relied on".

In an uncertain situation, the trustee would be expected to be highly relied on in order to reduce the uncertainty and perceived reliability plays an important role in such a situation. Trust increases with reliability as a person comes to rely on the predictability and consistency of the trustee's behaviour (Moorman, Desphande and Zaltman, 1993). When consumers perceive evidence of reliability in livestock farmers, trust is likely to be built. This leads to the following hypothesis:

H₃: There is a positive causal relationship between reliability and consumer trust.

2.7.4 Integrity

Integrity is a person's perception that the trustee adheres to a set of principles the former finds acceptable (Mayer, Davis and Schoorman, 1995). Similarly, Wicks,

Berman and Jones (1999) point out that if a person believes that the trustee has a high level of integrity, trust is likely to develop. Thus, self-interest, in the form of opportunism, cheating or abusing cannot be present in trust. In the food supply chain, though there is little contact between consumers and the livestock farmers, consumers still expect the actions of livestock farmers are not purely driven by self-interest, or exploitative of other parties in the chain.

Several researchers believe there is a linkage between opportunism and trust (e.g. John, 1984; Hill, 1990; Chiles and McMackin, 1996; Nooteboom, 1996). Since trust is a willingness to rely on the exchange partner with confidence to fulfil his or her obligations, the one who trusts his/her exchange partner will likely view the risk of the exchange partner's opportunism as minimal (Moore, 1998). Moreover, knowing that future expectations would be fulfilled through past experience, the one who trusts his/her exchange partner would believe the relationship is worth maintaining. On the contrary, a trustee who did not fulfil his/her promise with corresponding deeds would soon be distrusted (Moorman, Deshpande and Zaltman, 1993).

Butler (1991) finds that integrity in terms of honesty and truthfulness is one of the most important "bases" of trust. A lack of honesty in transactions involves "subtle form of deceit and is manifested in such acts as withholding or distorting information with the intent to mislead and shirking or failing to fulfil promises or obligations" (Moore, 1998). Peters, Covello and McCallum (1997) empirically show that openness and honesty are important for the perception of trust in the chemical industry. This finding supports the review of the trust literature (e.g. Renn and Levine, 1991; Kasperson, Golding and Tuler, 1992; Covello, 1992). Indeed, consumer trust is likely to be strengthened if livestock farmers fulfil their obligation by producing safe food.

Moore (1998) and Das and Tang (1998) suggest that fairness is important for trust, and Michell et al. (1998) empirically show that fair-mindedness, and truthfulness have a high correlation with trust. Indeed, Wicks, Berman and Jones (1999) suggest that those who are more likely to be trusted will shun opportunism and act with decency,

and fairness. A trustee must be honest, consistent and fair to induce a positive effect on his or her perceived trustworthiness (Anderson and Weitz, 1989; Butler, 1991; Rankin, 1998; Selnes, 1998; Sheppard and Sherman, 1998; Jones et al., 1998; Argandona, 1999).

Thus, trust requires the exchange partner to have the quality of integrity, that is, against cheating, abusing, and opportunistic behaviour (Butler, 1991; Smith and Barclay, 1997; Sheppard and Sherman, 1998; Ali and Birley, 1998; Doney et al., 1998; Das and Tang, 1998; 2001). For instance, the essence of food safety is the supply of safe food to consumers. If the meat is safe to eat, consumers will continue to consume, otherwise, the meat market will be adversely affected. In an extreme case, if consumers find out that livestock farmers only act with self-interest at the expense of consumers, the consumers would no longer have confidence in livestock farmers (Yee and Yeung, 2002). That is, if livestock farmers take all the benefits from the transaction and leave their consumers with the costs, consumer trust in livestock farmers will disappear.

Integrity, in terms of equity, honesty, and non-opportunism, appears to be an important construct in the context of consumer trust in livestock farmers. Consumers perceive evidence of integrity in the form of honesty and past experience of being treated fairly as meaningful predictors of future unselfish behaviour. Then trust is likely to be built. This leads to the following hypothesis:

H₄: There is a positive causal relationship between integrity and consumer trust.

2.7.5 Benevolence

Benevolence is the extent to which a trustee is believed to care for the exchange partner beyond any egocentric motive (Mayer, Davis and Schoorman, 1995). It can be seen as a basis of trust (McKnight, Cummings and Chervany, 1998; Sheppard and Sherman, 1998, Das and Teng, 2001). It focuses on the motives and intentions of the trustee (Ganesan, 1994). Johnson and Grayson (1998) suggest that a benevolent

supplier is one who is perceived “to be positively disposed toward the buyer and willing to make short term sacrifices”. In other words, sellers who are concerned about the outcomes of the buyers along with their own will be trusted to a greater extent than those who only show interest in their own welfare because they do not act in a purely self-serving manner (Smeltzer, 1997).

The perception of trust in the trustee is highly depended on how the trustee shows his/her cares and concerns (Peters et al., 1997). Such cares and concerns would lead the trustee to be willing to share the need and expectation of the ones who trust him/her and subsequently act accordingly to satisfy them. Wicks, Berman and Jones (1999) support this view and contend that if the trustee is perceived as benevolent, trust is likely to occur. By so doing, he/she will not act opportunistically to fulfil his/her goal at the cost of the exchange partner and reneges on promises made.

When a consumer experiences the care and empathy of the supplier, trust would be built. It might even grow deeper and stronger and may become habit forming or part of normal procedure. As Hirschman (1984) suggests that trust is different from physical communities, grows rather than diminishes through use. So, habitualisation becomes part of the invisible asset and this particular consumer to display a strong tendency to persist in purchasing from this supplier. Nooteboom et al. (1997) say that trust is associated with past experience, that is positive experience will lead to increase trust. In contrast, negative experience is likely to have a bigger impact, when trust is betrayed. And it is very difficult to build trust again.

Trust could emerge if the one who trusts his/her exchange partner perceives that the trustee is caring, helpful and acts in the interest of him/her (Yee, 2001b). For instance, if livestock farmers could ensure the consumers that they take care of the latter's welfare and interest, consumers are likely to develop enough confidence in livestock farmers' motives and be willing to rely on them in the future (Yee and Yeung, 2002). Thus, trust is likely to be built. This leads to the following hypothesis:

H₅: There is a positive causal relationship between benevolence and consumer trust.

2.7.6 Providing Information

Anderson and Narus (1990) contend that the provision of information is a strong determinant of trust. By sharing accurate and reliable information, perceived trust could be built and perceived risk could in principle be reduced (Sheppard and Sherman, 1998; Selnes, 1998). Of course, a trustee who provides somewhat sensitive information to their exchange partner is showing both goodwill and intimacy (Das and Teng, 1998). So, providing information is one of the features in a relationship that allows easy interpretation of the exchange partner's behaviour, thereby enhancing the prediction of the future intention of the exchange partner.

Many empirical studies on inter-organisational exchange relationship have shown that providing information is the process by which trust is built (e.g. Anderson and Narus, 1990; Anderson and Weitz, 1992; Morgan and Hunt, 1994). It could also be true in business to customer relationships. For instance, Reichenbach (1999) states that the provision of information is important to regain consumer confidence in the context of food safety. Completeness and openness could convey the goals of livestock farmers to their customers and assure the goals of both parties are synchronised. So, openness in speeches, transparency in goal setting as well as decision making from livestock farmers could improve the synchronisation. By so doing, the conflict between the two parties in a relationship can be reduced, the uncertainty can be decreased and this enhances trust (Moore, 1998). Williamson (1985) even suggests that opportunistic behaviour would disappear if a trustee is more open and honest.

Trust is not static in a relationship and it needs to be developed in a conscious and gradual manner (Bhide and Stevenson, 1992). There are several reasons why provision of information plays an important role in building trust. First, the provision of information is believed to be an indispensable characteristic of trusting relationship (Kanter, 1994; Larson, 1992). Second, consumers need to collect evidence about all the underlying factors that define trust of livestock farmers, and information facilitates

this process (Yee and Yeung, 2002). So any hidden facts or motives will create suspicions (Covello, 1992).

Conflict is an overall disagreement in a relationship (Moore, 1998) and it is characterised by one party perceived it has suffered because of the unfairness in the exchange. For instance, if consumers view suppliers attempting to extract benefits from the exchange at their expense, consumers will likely perceive suppliers as being less trustworthy (Moore, 1998). However, Moore points that by sharing of factual and reliable information relating to the exchange, conflict will be lessened between the parties and in turn trust is built.

Frewer et al. (1996) state that the provision of unbiased, knowledgeable, responsible and reliable information is a vehicle of gaining trust. On the other hand, any information that is amplified, biased, not factual, proven wrong and perceived to reflect vested interest leads to distrust (Frewer et al., 1996). Hence, clarity and accuracy of information are the crucial elements to a successful risk communication (National Research Council, 1989). It appears that consumers rely on the information provided and compare with the facts if available to establish the trust. So, providing information is a construct in the conceptual model and seen as the process to establish trust. The more the openness, timeliness and accuracy of the information, the higher the perception of trust in livestock farmers. This is supported by Sabel (1993) who contends that openness is necessary to develop and preserve a shared understanding and thus preserve trust. By so doing, livestock farmers can reconnect with consumers and pursue the sustainability of the livestock industry.

Trust is a dynamic and continuous variable, rather than a static phenomenon (Flores and Solomon, 1998), and trust and distrust can both exist at the same time (Lewicki, McAllister and Bies, 1998). So Wicks, Berman, and Jones (1999) contend that “individuals continually update their information base and their decisions to trust”. In other words, information about the underlying factors that define trust plays an important part in the process of building or diminishing trust. Frewer et al. (1996) show that information which can be “proven right” tops the list for gaining trust but

information “proven wrong” is top for losing trust. These findings were supported by Martin (1997) who conducted a similar survey and found that health professionals top the list.

When there is a food scare, consumers’ confidence can be restored sometimes by downplaying the problem in short term, yet distrust and a feeling of being cheated will rapidly develop if further worse news break out (Powell, 1996; Langdon, 2000). Such comment supports the findings of Frewer et al. (1996) about the determinant of gaining or losing trust through information. Indeed, the element of integrity in information suggests that it is important not to hide or downplay the risk or uncertainty if distrust is to be avoided. It appears that providing reliable, accurate and unbiased information is likely to strengthen trust but any biased, untrue information is likely to destroy trust. This leads to the following hypothesis:

H₆: There is a causal relationship between providing information and consumer trust.

2.8 CONSUMERS PURCHASING BEHAVIOUR

Recent outbreaks of food poisoning incidences have raised concerns about the adequacy of protection measures designed to ensure food safety. Incentives for food producers to undertake protective measures can be provided either through private (e.g. self-regulation and third party certification) or public (e.g. direct regulation) quality control systems (Caswell and Henson, 1997). The private quality control systems are set-up to respond to consumers demand, and the aims of these quality control systems are to build up the food producers’ trustworthiness, to reduce consumers perceived risk and to strengthen consumers’ confidence in food consumption (Walley, Parsons and Bland, 1999).

Concern about food safety leads to increased demand for wholesome foods. In order for livestock farmers to respond to this challenge, they must know how consumers make their purchase decisions. Ajzen and Fishbein (1980) state that consumer behaviour can be accurately predicted from his/her corresponding attitudes and the subjective norms with respect to this behaviour. However, Hoyer (1984) argues that

social attitudes may not be that important for consumer decision making for a common repeat purchase product. Furthermore, consumers cannot have complete and perfect knowledge of all products but operate on the “product image” (Beharrell and Denison, 1991). Henson and Traill (1993) point out that there are problems in the provision of information on food safety by the producers, namely: the nature of food-borne risks themselves and the asymmetric nature of information. Indeed consumers do not have full and perfect information about the quality attributes of products no matter how the consumer try to acquire it through passive search such as the result of watching television or through active search such as inquiring of consumer organisations (Nelson, 1970; Mitchell and Boustani, 1994). So, consumer purchase decisions involve developing purchase goals and heuristic statements about product attributes (Hoyer, 1984; Whan-Park and Smith, 1989).

As discussed in the following sections, consumers cannot predict food safety in fresh meat as a quality attribute from any visual cues. They may be assured by the information provided on the package such as that provided by a quality assurance mark (Northen, 2000). By so doing, consumers can have the informed food choice. Consumers’ perception of the quality positively affects their perception of value, and in turn affects their willingness to buy (Dodds, Monroe and Grewal, 1991). Consumers can also build their trust in livestock farmers through the transference trust building process (Section 2.6.5) by having confidence in these quality assurance schemes. However, this gives rise whether consumers would develop a habitual purchasing behaviour because of trusting livestock farmers.

2.8.1 Food Product Quality Attributes

There have been many different conceptual approaches to product quality over time, ranging from quality as conforming to technical specification to being objective and measurable (Zeithaml, 1998). However, the “perceived quality” approach analyses product quality from the perspective of consumers, making quality a subjective assessment dependent on perceptions, needs and goals of individuals (Northen, 2000). So perceived quality is the consumer’s perception of the overall quality of a product with respect to its intended purpose, relative to alternatives (Aaker, 1991).

Product quality could be described as a bundle of attributes that determine a product's performance (Berharrell and Denison, 1991, Mojduszka and Caswell, 2000) and product attributes can be categorised as search, experience and credence attributes (Nelson, 1970, 1974; Darby and Kami, 1973). For search attributes, consumers can determine a product's quality before they buy it by examining the product. In other words, search attributes can be ascertained prior to purchase. In food product markets, most of these attributes are not related to food safety because the consequence of consumers being misled does not adversely affect their health. Any informational provision programs are less likely to be instituted for search attributes because the market functions relatively well with respect to them (Caswell and Mojduszka, (1996).

For experience attributes, consumers cannot determine a product's quality until they buy and use it (Caswell et al., 1997). In other words, experience attributes cannot be ascertained prior to purchase, but can be detected during consumption. So the most important issue is information and how consumers can learn about product quality. Many food quality attributes are experience attributes. For example, attributes such as taste and cooking properties can be readily evaluated by consumers during use. It may appear that food safety and nutritional characteristics are experience attributes in some respects. For example, if a consumer eats a particular food product and experiences a food-borne disease as a result, he/she has gained direct knowledge of the quality of that product. However, in many cases consumers may not be able to link accurately an incidence of illness to a particular product. The inability to pinpoint the cause makes it difficult to evaluate food safety as a quality attribute. This is particularly true if the time between the illness effects and the consumption becomes longer (Caswell et al., 1997). Similarly, the ill effect of a nutritionally poor diet does not readily emerge and makes the link between ill effects and specific products difficult. So, experience attributes do not apply well to food safety and nutritional characteristics because of the consumer's problem in forming a quality judgement. Especially for food safety, even if cause and effect linkages are known,

the probability of a product being contaminated may not be known. Thus it is uncertain how well one's former experience predicts future experience.

In the case of credence attributes, consumers have significant difficulty or cannot determine a product's quality even after repeated consumption of the product because it cannot be checked visually or through experience (Caswell et al., 1997). Food safety is treated as credence attribute because consumers have problems to judgement the wholesomeness prior or after purchasing. Furthermore, the probability of a product being contaminated may not be well known until results in illness after eating. In this aspect, food safety information about a food product is important because consumers cannot detect the quality characteristics of a given sample of this product. For example, consumers cannot detect the presence of bovine growth hormone residues in milk but reduce purchase after having the information about their presence in milk (Grobe and Houthitt, 1995).

Indeed, information plays an important part in experience attributes and particularly in credence attributes. However, the market for food products is not perfect. The most significant imperfections are that food producers are better informed about quality attributes than consumers and consumers may have misperceptions of the risks of consuming particular food products. One of the remedial methods for this informational imbalance can be direct government regulation to provide information to consumers, but such regulation is often criticised as economically irrational and costly. The other one is voluntarily provided information from the food industry to consumers to ensure the latter have sufficient information to make a rational decision. By providing information for food safety, the credence attributes could be transformed into search attributes. The information can change consumers' levels of understanding about quality attributes and alter their consumption behaviour.

Having discussed the product quality attributes, the following section talks about consumers' quality cues to predict these quality attributes.

2.8.2 Consumers Quality Cues

Bredahl, Grunert, and Fertin (1998) point out that consumers' perceptions of quality prior to purchase are based on quality cues. They further show that consumers demand attributes such as tenderness, taste and juiciness for fresh meat consumption and the same consumers use quality cues such as colour, fat levels, cut, trim and meat juice to predict these attributes. In other words, when deciding to buy a product, consumers use quality cues to predict the attributes they desire in a product. Olson and Jacoby (1972) further split quality cues into intrinsic cues which are part of the physical product such as colour, leanness, juiciness, and extrinsic cues which are related to the product, but are physically not part of it such as packaging materials, labels provided on the product. Northen (2000) has empirically shown that consumers in the UK use intrinsic cues, namely colour, marbling and leanness, and extrinsic cues namely brand/quality assurance labels, place of purchase, and country of origin in predicting eating quality attributes when purchasing fresh beef and pork. Through the transference trust building process, consumers can build their trust in livestock farmers (Section 2.6.5) by having confidence in these quality assurance labels.

In order to facilitate consumers to form their quality cues to predict the experience and credence attributes, effective communication to consumers is necessary (Northen, 2000). However, the elements necessary to effectively communicate the two types of quality cue to consumers are different. Effective communication of intrinsic cues to consumers requires suitable presentation of the physical product in the shop and it can only be used to predict experience attributes such as flavour and tenderness. Since extrinsic cues are not part of the physical product, rather they take the form of information provided about the product, and are able to communicate credence attributes. Among the information provided with the meat products for extrinsic cues, Nelson (1975) suggests that price and quality are positively related but Northen (2000) points out that price is not a good cue for perceived quality. Northen further states that quality assurance schemes can provide an extrinsic cue to assure consumers of meat quality and safety. This argument was evidenced by Walley, Parsons and Bland (1999) that in the purchase of mince beef, quality assurance schemes are valued

directly by consumers. Indeed, quality assurance schemes are used widely in the UK to provide information for the extrinsic cues and to improve consumer confidence.

2.8.3 Quality Assurance

During the past decade, concern about food safety as well as animal welfare and husbandry has driven various organisations involved in the food industry to introduce quality assurance schemes (Bansback, 1995; Eastwood, 1995). The aim of the quality assurance schemes is to guarantee standards of food safety, animal welfare and production by demonstrating compliance with legislation and codes of practice as well as providing traceability (Austin, 1997). For example, the quality assurance schemes in the red meat industry began to develop in the late 1980s (MLC, 1996b) and were originally introduced to reassure the consumers in the wake of the BSE scare (Intel, 1997b). The rate of development of quality assurance schemes was accelerated by the introduction of Food Safety Act 1990 requiring the livestock industry to be able to demonstrate “due diligence” in respect of their livestock.

Walley et al. (1999) have empirically showed that quality assurance schemes have a relative importance in the purchase of mince beef and such schemes are valued directly by consumers. They further state that quality assurance schemes appear to operate by improving consumer confidence, which in the case of mince beef has been seriously damaged by the BSE crisis. In the matter of source of origin, product traceability is a proof to identify and determine the credentials of the farm as a group (Whitworth and Simpson, 1997). Yet, Hughes (1995) argues that the quality assurance schemes are fragmented with so many schemes in existence which is likely to confuse the consumers and slow their acceptance. So, there is a need to combine the quality assurance schemes currently in operation under a national “umbrella” scheme to reduce consumers perceived risk in meat consumption.

2.8.4 Consumers Perceived Risk

Consumers perceived risk of food safety is not so much determined by the hazard itself but more by the social and psychological characteristics of a food hazard. Each

characteristic of food risk may have its own distinctive impact on consumers perceived risk (Kasper, 1980; Slovic, 1993) which is a function of uncertainty and the consequences. It can be broken down into six components, namely: physical loss, performance loss, financial loss, time loss, social loss and psychological loss, is an important variable in consumer decision making (Cunningham, 1967; Dowling and Staelin, 1994; Sparks and Shephard, 1994). Cox (1967) suggested that perceived risk is an important variable in consumer decision making and Mitchell and Kiral (1999) support such view and point out that consumers perceived risk is an integral part of purchasing decision.

When consumers perceive the level of risk exceeds their tolerant level, they often attempt to reduce the risk aiming at reducing both the uncertainty component of perceived risk and the adverse consequences that could arise, be they physical, financial, performance, social, psychological or time risks (Roselius, 1971; Mitchell and McGoldrick, 1996). So that they can act with relative confidence and ease in situations when the outcomes and consequences cannot be anticipated (Roselius, 1971, Dowling, 1986). Cox (1967) concludes that the most common risk reducing strategy is to reduce uncertainty and suggests that consumers have a large of assortment of strategies from which to choose in order to reduce uncertainty. These strategies include reliance on past experience and on the experience of others, seeking information and taking precautionary measures.

The common food safety risk reducing strategies adopted by consumers are: to purchase products with quality assurance, to shop in high in-store hygiene standard shops and to seek reliable information when food scares occur (Pugh, 1990; Mitchell, 1998). From a recent study of food safety risk, three categories of risk reduction concerning poultry products, namely product quality, product price and product information were identified (Yeung and Morris, 2001b). In general, consumers attempts to reduce perceived risk by reliance on some “trusted source” for guidance (Bauer, 1967) such as asking for reputable brand in particular from those producers with a favourable track record (Curlo, 1999). So, they feel confident if the product

carries a quality assurance mark, especially if the assurance scheme is approved by a trusted third party independent of food companies.

Though price is always a factor for purchase decision, it seems not so important in the purchase of fresh meat (Beharrel and Denison, 1993; Yeung and Morris, 2001b). Consumers usually want the proof of assurance for a product presumably with high quality before paying a premium for it (Loehman, Park and Boldt, 1994). In some cases, a discounted price or special offer may encourage purchase to trade-off risk during the period of food concern if consumers believe they can control the risk by themselves (Yeung and Morris, 2001b).

Consumers seek information if there are uncertain outcomes of a purchase (Taylor, 1974). With respect to food safety, the information required would be in the form of labelling and instruction for storage or cooking. This information may help to reduce the perceived food risks because consumers perceive that they can control the risk by themselves (Douthitt, 1995). On the whole, the need to seek information will depend on the nature and magnitude of the risk that consumers perceive. If perceived risk exceeds the consumer's maximum threshold, extra information search is undertaken as a risk reduction strategy (Dowling, 1986).

In addition to the aforesaid strategies, perceived risk is also related to trust which is important under conditions of uncertainty or when the public believes that accurate estimates of risk are unavailable (Mitchell, 1999). As discussed in Section 2.5, trusting parties is vulnerable to some extent for trust to become operational and the outcome is uncertain (Moorman, Zaltman and Deshpandes, 1992; Doney and Cannon, 1997). Doney and Cannon (1997) empirical show that supplier's reputation and size can affect the amount of risk in a buyer-supplier relationship. Indeed, information from credible sources is more likely to influence consumers perceived risk than is information from sources that lack this attribute (Frewer, Howard, Hedderley and Shepherd, 1996). Mitchell (1999) further suggests that an outcome of building trust is a reduction in the perceived risk and concludes that as trust develops, perceived risk will decrease.

2.8.5 Trust and Purchase Likelihood

In a food purchase situation, concern about food safety is also found to be a major factor in consumer purchase decisions (MLC, 2001a). Since consumers' trust in livestock farmers is defined as a willingness to rely with confidence on livestock farmers in an uncertain situation, there is good reason to review the relationship between trust and purchase behaviour.

Trust is credited with lower transaction costs in uncertain environment and provision of competitive advantages in business context (Dore, 1983; Noordewier, John and Nevin, 1990; Ganesan, 1994; Barney and Hansen, 1994). These advantages can also be applied to the context of consumer trust in livestock farmers (Loader and Hobbs, 1996). Despite numerous definitions of the term trust, many of them contend that trust occurs when a person is willing to rely on another in an uncertain situation (Cowles, 1997). Doney and Cannon (1997) propose that trust of the supplier is central to buyer's intention for future purchase. Morgan and Hunt (1994) have shown that trust in a partnership has an effect on the propensity to leave that relationship. So in this context, if consumers are found to trust livestock farmers, their subsequent behaviour is treated as an act or consequence of trust.

Cowles (1997) suggests that when trust occurs, it implies that a consumer would otherwise be facing a high level risk or need to rely on the supplier. If the consumer perceives a very low level of reliance with confidence that the supplier could meet his/her needs and wants, trust may not be part of the decision. In contrast, if there is risk of vulnerability such as food risk and the consumer depends on the supplier to fulfil his/her obligation and meet the expectation of the consumer, the consumer exercises trust to form the decision.

In contrary, Williamson (1993) says that institutional safeguards could act as means to minimise or eliminate vulnerability or risk and hence reduce reliance. An example

would be the sale of petrol with a certain octane level. Cowles (1997) cites that in Williamson's terms, consumers of this kind would not be considered to have trust, but rather relies on the institutional safeguards of regulations. However, not all sectors have such kind of safeguards, but depend on their willingness to act voluntarily for the interest and equity of consumers. For instance, there is no regulations requiring livestock farmers to put down what animal feed they use on the product label. It is likely that trust is one of the major influential factors for deciding future purchase.

The farming and food sectors have a significant influence on the health of the nation of United Kingdom (DEFRA, 2002). The food choices consumers make are shaped at every stage of the food chain. The quality of food produced and the availability of safe food to consumers have a powerful effect on their health. However, it is difficult for consumers to assess the wholesomeness and safety of food, in the context of raw meat, it requires consumers to trust the food chain of providing raw meat (Section 2.1). This leads to the following hypothesis:

H₇: There is a positive causal relationship between consumer trust and future purchase likelihood.

2.8.6 Other Factors Affecting Purchase Likelihood

Other than the factors discussed in the previous section, consumer purchase behaviour such as repeat purchase, reduce purchase, stop purchase for a certain time and resume afterwards or stop purchase totally is also shaped by a number of personal factors such as physical, social and physiological factors (Conner, 1993; Eom, 1994). Inwardly, consumers vary according to their personalities, values, belief and experiences, which in turn affect their purchase behaviour (Kuznesof, Tregear and Moxey, 1997). For instance, different ethnic groups have different perceived values and norms associated with the food choice (Jamal, 1998). Externally, many factors may affect the decision to purchase one food product over another and the decision to select or not select the focal product might influence consumers' long-term intentions. For instance, the healthy message of eating five portions of fruit and vegetable per day and eating less meat influences some consumers' purchase decision (IGD, 1998). In

general, these factors could be grouped into four categories that may influence consumer purchase decision (Conner, 1993):

- Psychological factors such as values, belief and satisfaction.
- Physical factors include geography, season, economics, and food technology.
- Social factors include religion, social class, nutrition education, and advertising.
- Physiological factors include allergy, therapeutic diets, and nutritional needs.

Burton, Tomlinson and Young (1993) have empirically shown that some of these factors are significant factors associated with a reduced probability of consuming meat. However, all these factors were kept constant in the investigation of purchasing likelihood in this study in order that the causal effect of trust to purchase likelihood could be investigated.

2.9 SUMMARY OF THE CHAPTER

The Government of the United Kingdom is determined to achieve a sustainable and competitive farming and food sector and suggests that building relationships in the food chain is an important aspect of this process. In other words, the parties of the food chain need to work together and reconnect with consumers. DEFRA further points out that sustainable relationships are based on trust. Regarding food safety, consumers are unable to assess food risks directly and having little contact with livestock farmers, and it is a premise of this research that consumers must have trust in livestock farmers to provide clean and safe food. In addition, livestock farmers as key players in the food supply chain, do not appear to have fully restored consumer trust, so this thesis looks into the factors that build trust, and how livestock farmers can restore consumer trust in them.

The five trust building processes provide a useful framework for assessing trust building in livestock farmers with respect to food safety. If livestock farmers develop the features of trust and go through the process by which to develop trust, it may lead the consumers to trust them and have confidence in the meat they purchase.

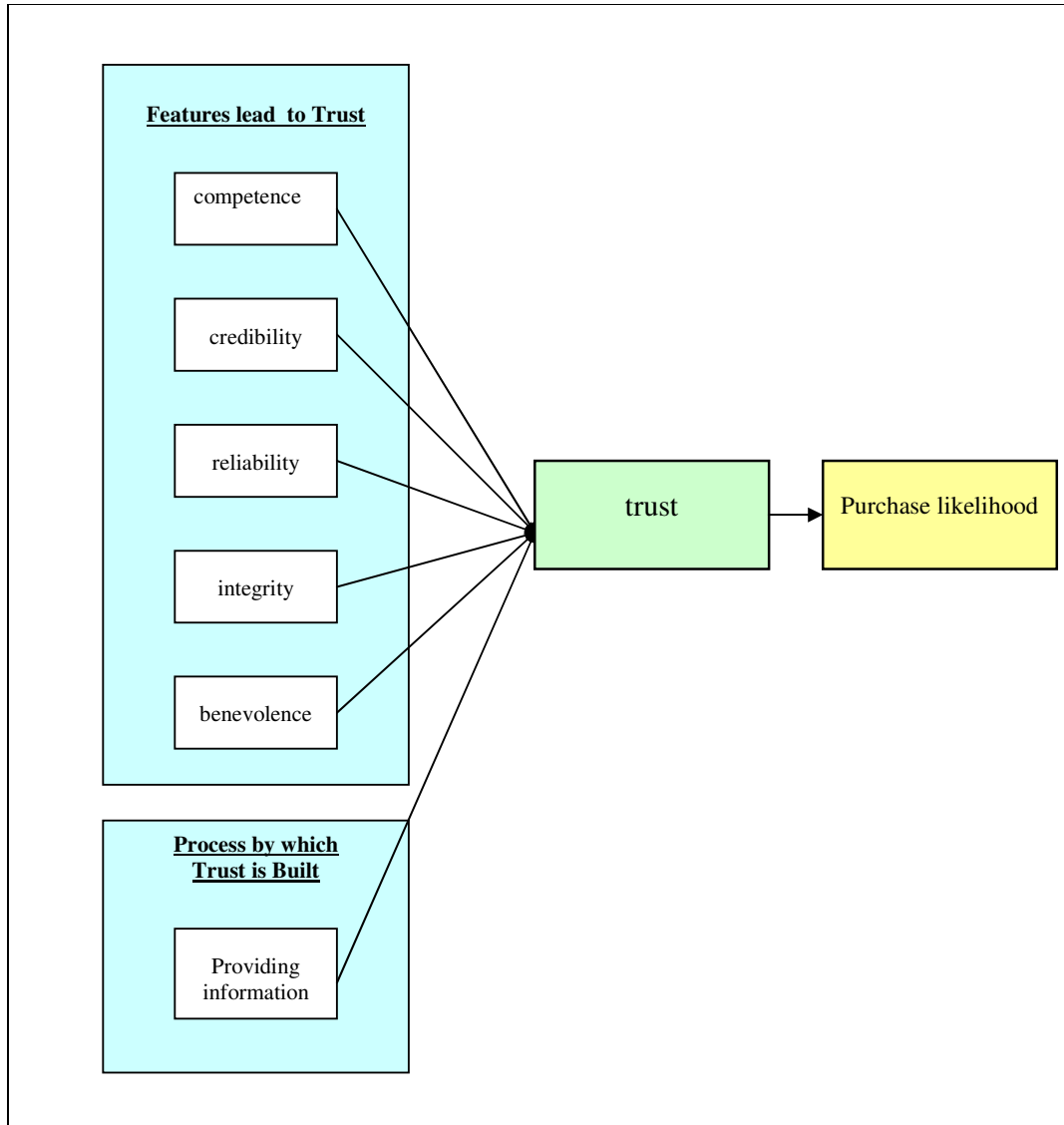
This chapter has identified the following features of livestock farmers that lead to trust and a conceptual model to capture trust building is illustrated in Figure 2-3.

- Competence. The capability to supply livestock free from health hazard to the parties up the supply chain, able to meet the concerns of consumers regarding consumer welfare, environment and animal welfare.
- Credibility. The reputation and the scale of business activity.
- Reliability. Take follow-up actions after concern about food safety sincerely.
- Integrity. Treat consumers fairly and disclose all relevant essential information with equity and honesty.
- Benevolence. Care for and act in the interest of consumer welfare.
- Providing information. Willing to provide consumers with unbiased, accurate and reliable information and advice regarding food safety.

Consumers' perceptions of quality attributes of a food product are based on quality cues, namely: intrinsic and extrinsic cues prior to purchase. Since food safety cannot be observed or experienced before consumption, information has an important influence on consumer purchase decisions. Quality assurance schemes were found able to provide an extrinsic cue to assure consumers of meat quality and safety by reducing consumers perceived risk. Though there are several factors affecting consumers to make a purchase decision, such as psychological, physical, social and physiological factors, this chapter has kept these factors constant and focused on the purchase likelihood as the consequence of trust in livestock farmers with respect to food safety.

This chapter confirms the significance of the study topic and justifies the conducting of the study. The next chapter focuses on the selection of methods to progress the research.

Figure 2-3 Conceptual Model of Trust in Livestock Farmers Regarding Food Safety

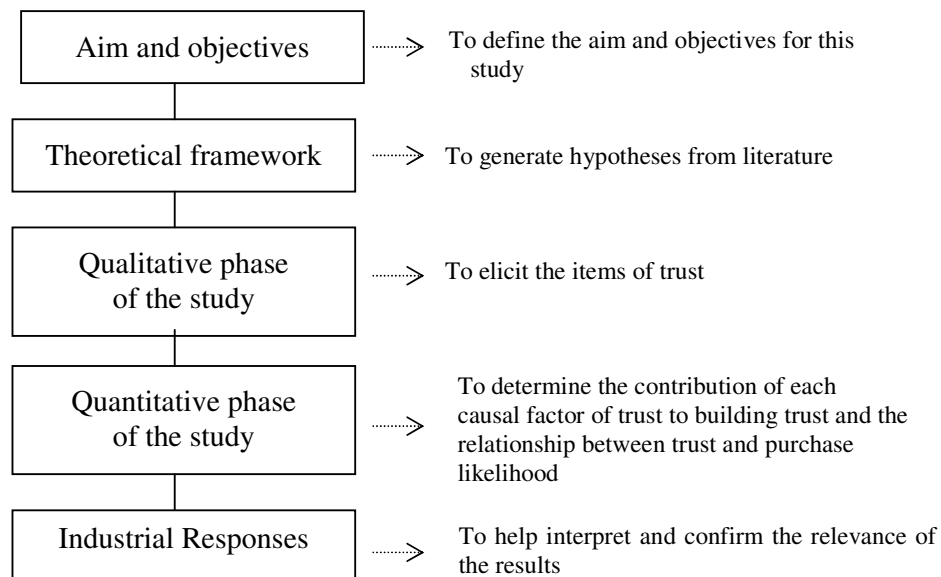


Chapter Three

3. RESEARCH DESIGN AND METHODOLOGY

This chapter explains the choice of research design and the methods used to meet the aim and objectives of the study and to test the proposed hypotheses. The overall design consists of three phases; the first phase of this study was qualitative in nature. Its purpose was to elicit the items of trust. The second phase of the study took the form of quantitative research. Its aim was to determine the effect of these causal factors towards developing trust as well as to determine the link between consumer trust in livestock farmers and purchase likelihood. The third phase of this study collected the responses to the findings of this study from representatives of the livestock industry. A schematic diagram of the overall design is shown in Figure 3-1.

Figure 3-1 Schematic Diagram of the Overall Design



3.1 AIM AND OBJECTIVE REVISIT

Following on from the objectives of this research to identify the factors which build consumer trust and their causal effect, and the relationship between consumer trust and consumers' purchase behaviour, (Section 1.2), seven hypotheses were generated from the literature to achieve the aim of this research. The underlying principles of these hypotheses are:

- Integrity, perceived competence, credibility, reliability and benevolence are the features that lead to consumer trust in livestock farmers.
- Providing information is the process by which consumer trust in livestock farmers is built.
- Trust is a determinant of consumer purchase likelihood, keeping other factors constant.

As an outcome, an empirical consumer trust model in livestock farmers was generated which allowed the testing of the hypotheses. It included the significant factors which maintain/restore consumer trust in livestock farmers and showed the effect of trust in livestock farmers on purchase likelihood.

3.2 THEORETICAL FRAMEWORK

Building on the framework from the literature, the approach to develop a model making trust as a mediator between its causal factors and consumer purchase likelihood was systematically designed (Cooper and Emory, 1985). Consequently, this research was conducted in three phases. The first phase was conducted in the form of a qualitative approach to elicit the items of trust in order to lay the foundation for the subsequent questionnaire design. The second phase was conducted using a quantitative survey to determine the effect of each of these causal factors on building trust and the relationship between trust and purchase likelihood (Section 1.2). Due to resource constraints, both phases adopted a cross sectional survey aiming to take a snapshot at a point in time (Lo, 1998). The third phase was to collect responses from

the livestock industry by sending an open-ended questionnaire to livestock farmers, and by holding meetings with representatives from the livestock industry in the United Kingdom.

3.3 QUALITATIVE PHASE OF THE STUDY

Qualitative study generally involves small numbers of respondents who provide descriptive information about their feelings and beliefs (Dillon, 1994). The most common methods are:

- Focus group interview in which the respondents discuss a given topic in a fairly informal fashion in the presence of an objective moderator,
- Face-to-face interview in which the feelings and beliefs of the interviewee are discussed through unstructured or semi-structured questions,
- Observational methods in which the behaviour of the respondents is observed directly or indirectly, and
- Projective methods in which the respondents are reluctant to communicate their feelings and beliefs directly. So structured questions are asked and the respondents can respond indirectly by projecting their feelings and beliefs.

In this study, the latter two methods were not used because the researcher wished to communicate directly with the interviewees about their perception of trust in livestock farmers which cannot be easily observed nor projected. The focus group interview method was also not adopted because of time and financial constraints. However, this method may be used in future study if such constraints are relaxed. So, the face-to-face method was used though the researcher was aware that this method depends on the willingness of the interviewees to provide information and there might be a potential danger of interpreting the interviewees' response subjectively. In order to minimise such bias, the analysis was verified by a second researcher.

3.3.1 Data Collection

Informal face-to-face interviews with 20 interviewees who consume meat on a regular basis were carried out in March and April 2000 in coffee shops and parks in Bedfordshire and Northamptonshire using a convenience-sampling method to take the advantage of a more relaxed environment. Each interview lasted about 30 minutes and descriptive information about perception of interviewees was gathered for analysis. Though such information was not supposed to be projected to the whole population, this qualitative phase helped to facilitate the design of the questionnaire for the succeeding quantitative phase of study (Kerlinger, 1986; McDaniel and Gates, 1993; Dillon, Madden and Firtle, 1994).

The researcher first introduced himself and briefly explained the purpose of the interview before carrying out the actual interview. It was emphasised that the interview was a part of a personal academic project. Such emphasis was put forward each time before the interview in order to ensure the respondents that the project was not done for any private organisations and that any comments or suggestions were valued.

The researcher explained verbally the meaning of livestock farmers as the commercial producers of cattle, sheep and pig, food processors such as slaughter houses and retailers such as super markets and food hazards such as food contaminated with pathogens if necessary to ensure the interviewees understood the meaning of these terms. Then the following leading question was asked:

Among livestock farmers, food processors and retailers, which party(ies) is/are responsible for food hazards associated with fresh meat?

After the researcher obtained the answer for this leading question from the interviewees and was satisfied with the exploration of their concerns about livestock farmers regarding food safety, which implies that there should be no adverse

consequence to health after consuming the food product, he used flash cards to explain the meaning of trust as a willingness to rely on livestock farmers with confidence in an uncertain food safety situation, and asked the second leading question.

What factors lead you to trust livestock farmers?

At this point, the researcher tried to control the direction of the interview but not to impose any influence to the respondents such as changing the tone of voice, or to show any agreement/disagreement verbally or through body language. In addition to the usage of flash cards with definitions, the researcher also used the following probes to overcome the weakness of interviews mentioned above:

- Echo - by repeating the last thing the interviewee had said to show to the interviewee that the information given has been understood.
- Phased assertion - the researcher acted as if he knew something in order to get the interviewee to expand the response.
- Clarification - the researcher tried to clarify what the interviewee had said by asking questions.

Written notes were taken down during the interview in preference to the use of a tape recorder because past experience of the researcher showed that interviewees were reluctant to participate if tape recorder is used.

3.3.2 Data Analysis and Reporting Findings

After the data had been collected via interviews, the next step was data analysis. Since data analysis is the process of bringing order, structure, and interpretation to the mass of collected data, it is a search for general statements about relationships among categories of data (Marshall and Rossman, 1999). Because of the small scale of this qualitative study, computer software package for qualitative data analysis was not used. Before the actual data analysis, a list of determined categories for data coding based on literature review was prepared (Appendix 2). This helped to retrieve and

code the data initially, but these pre-determined categories were flexible and subject to be modified during focused analysis. The interpretation was solidified when major modification occurred less often and concepts fell into established categories. Eventually, the analysis was complete when the critical categories were defined, and the relationships between these categories were established.

The data analysis procedures were broken down into the following steps:

- Organising the data - The scripts noted down during the data collection were read through several times in order to become familiar with the data and edits were made to them if necessary to make the field notes “retrievable” (Appendix 9).
- Coding the data - The next step for data analysis was applying a coding scheme, in the form of abbreviations of the categories which was selected based on the finding from literature (Creswell, 1994). The meaning of each phrase from the interviewees was checked against the categories and marked with the code accordingly. In other words, codes were put down alongside the phrase. For example, an interviewee said, “They [farmers] cannot pretend everything is OK but in fact it is not”, and a code ‘honesty’ was placed alongside this phrase. However, coding and generating/modifying categories (discussed below) were carried out hand in hand when a new pattern emerged.
- Generating and modifying categories - As discussed before, categories were created based on literature, but they were subject to be changed and/or modified at this focused analysis stage. This step of generating and modifying categories involved noting patterns expressed by interviewees and tried to fit to the pre-set categories, modified the existing categories or created new ones as categories of meaning emerged. For example the new code ‘ethical’ was placed alongside the phrase “They are unethical in their practice” because ‘ethical’ was not in the original list. The aim of this step was not to search for any exhaustive and mutually exclusive categories but instead, to identify the salient categories of meaning given by the interviewees.

- Testing emergent meanings and alternative explanations - As categories were developed and coding of data was in progress, the meaning of the data was explored and evaluated to check for any plausible meanings and linkage among them. For example, the new code 'ethical' was eventually grouped into 'integrity'. The objective of this step was to determine how useful the data was in explaining the interviewees' perception about the factors that led them to trust livestock farmers.

In order to ensure the interpretation of this study was correct, the analysis was verified by a second researcher (Leininger, 1994). Moreover, the results were presented to four of the interviewees to ensure the findings of the study made sense. These findings formed part of the input for the questionnaire design process in the subsequent quantitative study of this research.

3.3.3 Limitation of the Qualitative Study

Owing to the small sample size and sampling method because of restricted resources, the findings have limited generalisation. In addition, face-to-face interviews might introduce misunderstanding between the interviewer and the interviewees. For instance, the interviewees might misunderstand the questions asked and the interviewer might mis-interpret the answers from the interviewees. Attempts were taken to minimise this source of error by repeating what the interviewees had said to ensure the answer was interpreted correctly, asking further questions to clarify the answer, asking the interviewee to elaborate his/her answer or write down the answer. As mentioned in the above section, this qualitative study did not attempt to draw theoretical conclusions, but only to elicit items to facilitate the questionnaire design in the subsequent quantitative study. So the items that emerged from the data analysis were considered to be acceptable in this study.

3.4 QUANTITATIVE PHASE OF THE STUDY

This quantitative phase of study intended to determine the strength of the effect from the causal factors of trust to purchase likelihood with trust acting as a mediator. Such

strength was best shown by using numerical values rather than description and the precision and reliability obtained could be estimated numerically, which was not the case with qualitative methods (Thomas, 1996).

The quantitative phase was carried out in the form of a survey administrated through a structured questionnaire. The purpose of this phase was to measure how the respondents perceived the importance of those causal factors confirmed in phase one and to build a framework linking together the causal factors of trust, consumer trust and consumer purchase likelihood. It involved numerical data and statistical techniques.

3.4.1 Questionnaire Design

For this quantitative survey, a self-administered questionnaire was used to measure the respondents' response on the measurement items for the causal factors of trust, consumer trust and consumer purchase likelihood (Appendix 1). The measurement items (also called observed items) were derived from past literature together with the results obtained from the qualitative study. In addition, multi-items with seven points on Likert-like scales were used for each factor to increase the scale sensitivity (Churchill, 1979).

The measurement items for the causal factors of trust were modified from Bruner et al. (1992 a ,b), Ganesan (1994), Frewer et al. (1996), Smith et al. (1997), Doney and Cannon (1997), Selnes (1998) and Morgan (1999) by excluding those items unrelated to the context of consumer trust in supplier. These scales were phrased as statements on a seven-point Likert-like scale, anchored at the ends with the term 'strongly agree' to 'strongly disagree'. Twenty-nine measurement items are presented in Table 3-1.

Table 3-1 Measurement Items^a for the Causal Factors of Trust

Item	Explanation (Anchors: Strongly agree/Strongly disagree)
INFORM	Livestock farmers keep the public informed of the safety in consuming meat
TRUINFO	Livestock farmers provides information that can be trusted
FACT	Livestock farmers provide factual information
CORRECT	Livestock farmers provide correct information
UNBIASE	Livestock farmers provide unbiased information
KNOWHOW	Livestock farmers are very knowledgeable to produce safe meat
EXPERT	Livestock farmers are not experts in food safety related issues ^b
ADVICE	Livestock farmers are able to give advice regarding food safety related issues
ABILITY	I have confidence in livestock farmers' ability in producing safe meat
COUNTON	I can count on livestock farmers for consuming safe meat
SIZE	I only trust large livestock farms
FULFIL	Livestock farmers fulfil their duties to produce safe meat
STRAIGHT	Livestock farmers do not take advantage of their customers
CONCERN	Livestock farmers are concerned about the interest of consumers
REPUTA	Livestock farmers have a bad reputation with regard to food safety ^b
DEPEND	Livestock farmers are dependable with regard to food safety
ACCURATE	Livestock farmers do not cover up any wrongdoings for their own benefit
SINCERE	Livestock farmers are sincere to follow up after an outbreak of food scare
FAIR	Livestock farmers treat the public fairly
ETHICAL	Livestock farmers are ethical
TREAT	Livestock farmers treat consumers right
HONEST	Livestock farmers alter the fact to fulfil their own purpose ^b
PROMISE	Livestock farmers fail to keep promises ^b
SUPPORT	Livestock farmers fail to provide the support they are obligated to ^b
CARE	Livestock farmers care for consumers
CUSTOMER	Livestock farmers are concerned about the welfare of consumers
ATTENT	Livestock farmers follow government regulations ²
AWARE	Livestock farmers do not know what the public's needs are ^b
INTEREST	Livestock farmers do not listen to consumers ^b

^a All measures employ 7-points Likert-like scale

^b Item is reversed score

Trust was measured by four items which were modified from the studies of Doney and Cannon (1997) and Morgan (1999). They were phrased as statements on a seven-point Likert-like scale, anchored at the ends with the term ‘strongly agree’ to ‘strongly disagree’. These four measurement items are presented in Table 3-2.

Table 3-2 Measurement Items^a for Consumer Trust

Item	Explanation (Anchors: Strongly agree/Strongly disagree)
TRUTHFUL	Livestock farmers are truthful
CONFIDEN	I have confidence in livestock farmers
COMPLETE	I rely on livestock farmers completely to provide safe meat
TRUSTWOR	Livestock farmers are trustworthy

Following the recommendation of Morgan and Hunt (1994), a single item was used for measure of self-reported intention to perform a specific action. Consumer purchase likelihood was measured by a weighted average of continue to purchase, presumably stop purchase and then re- purchase after 1 month and 3 months on the seven-point Likert-like scale. It was anchored at the ends with the terms ‘strongly agree’ and ‘strongly disagree’. The measurement item for consumer purchase is presented in Table 3-3.

These measurement items were assessed in the context of concern about meat quality. On the one hand, the respondents would score 7 for the three sub-questions if they stopped purchasing immediately and did not resume purchasing within 3 months because of the concern of meat quality. On the other hand, the respondents would score 1 for the three sub-questions if they did not have any concern about meat quality. The respondents would score otherwise if the concern were lessened over time.

^a All measures employ 7-points Likert-like scale

Table 3-3 Measurement Items^a for Consumer Purchase Likelihood

Item	Explanation (Anchors: Strongly agree/Strongly disagree)
PURCHASE	Purchase likelihood ^c
	a) Continue to purchase after the food scare
	b) Resume purchasing 1 months after the food scare
	c) Resume purchasing 3 months after the food scare

A preliminary version of the questionnaire was tested and the data collected from this pre-test were discarded afterwards. Respondents were required to complete the questionnaire in the presence of the researcher. The purpose was to ensure that the questionnaire could work from a practical standpoint (Dennis and Valacich, 2001). The respondents were asked to give comments and to explain each statement in their own words to ensure the meaning of all statements was clear. Any ambiguity was noted and subsequently changed or refined accordingly. For example the statement “Livestock farmers provide true information” was changed to “Livestock farmers provide factual information” because one respondent said that ‘true’ is difficult to define and suggested the use of ‘factual’. The whole process was repeated until the last two respondents did not recommend any significant changes (Sethi and King, 1994). The questionnaire was then finalised for the quantitative survey.

3.4.2 Sampling Design and Data Collection

The second step involves selecting an appropriate sampling method. The two main types of sampling methods used are probability sampling method and non-probability sampling method. Probability sampling is an objective procedure in which the probability of selection is known in advance for each population unit and non-probability is an subjective procedure in which the probability of selection is unknown in advance for each population unit (Parasuraman, 1991). In general, probability sampling methods are more time-consuming and expensive than non-

^a All measures employ 7-points Likert like scale

^c The final score is a weighted average of the three items. Item (a) is weighted four times. Item (b) is weighted twice. Item (c) is simply the score.

probability sampling method because probability sampling requires an accurate specification of the population and an enumeration of the units within it. The selection of sampling units must also precisely follow an objective scheme that is pre-specified (Parasuraman, 1991). Between these two main sampling methods, the non-probability sampling was adopted due to the limited financial resources of the researcher. However, the potential limitation of such method was minimised by conducting the survey in different locations and different times of the day. From the two commonly used non-probability sampling methods, namely: convenience sampling and quota sampling, this study adopted quota sampling technique, so that the profile of the respondents reflected that of the population of interest (Chisnall, 1992). In other words, the proportion of the sample elements, which possesses a certain characteristic to the total sample, equalled the proportion of population, which bears that characteristic to the total population of interest (Dillon, et al., 1994). So the population was divided into cells on the basis of certain characteristic called quota control; a quota of sample unit was established for each cell; and the quotas assigned to the various cells were then filled (Parasuraman, 1991).

From past research, age plays a crucial role in meat purchase decision (e.g. Burton, Tomlinson and Young, 1993; Mainland, 1998). However, there are other variables such as gender and education background which affect purchase decision. Interrelated quota control such as age and gender could be used to accommodate the joint effect of age and gender, but the number of cells would be doubled and this required a large sample size if the minimum number of sampling elements per cell was kept unchanged. Due to restricted resources for this study, age was chosen as the independent quota control and the effect of gender, education background and income was kept constant though there could be a potential bias towards a particular gender and so forth as a consequence.

Individuals with age between 16 and 70 were recruited by taking into consideration of their comprehension of the questionnaire and their responsibility for food purchase (Casley and Kumar, 1992; Mitchell and Boustani, 1994). This age group was first divided into mutually exclusive and collectively exhaustive sub-groups, called cells to

ensure the homogeneity of the sampling elements within the quota was maximised (Dillon et al., 1994).

3.4.2.1 Number of Cells

The number of cells was set to three for this study due to the constraint of resources. The grouping of the cells was age 16 to 34; age 35 to 54 and age 55 to 70, to match the categories in the Annual Abstract of Statistics, 2000. A total of 250 respondents were targeted because the sample size had to be greater than 150 in order to have meaningful parameter estimates (Nielson, 1998). By adopting the proportional allocation, the sample size for each quota is illustrated in Table 3-4.

Table 3-4 Characteristics and Size of Cells

Cell number	Cell characteristics	Cell size (%)
1	age 16-34	95 (38%)
2	age 35-54	100 (40%)
3	age 55-70	55 (22%)

Total number of respondents: 250

3.4.2.2 Data Collection

After deciding the number of cells and the quota per cell, an intercept survey was conducted for each cell because of its cost effectiveness (Parasuraman, 1991). This quantitative survey was carried out between July and August 2000 on one-on-one basis on beaches and in canteens to take the advantage of a relaxed environment and because the people were more willing to fill the questionnaire, and door to door interviews in a holiday park in Ayr. The survey was conducted in different locations and different times of the day to overcome the problem of interviewing only a particular type of consumers such as office workers taking their lunch in a canteen (Dillon et al., 1994). A record of the survey is shown in Appendix 3.

3.4.3 Data Analysis Using Multiple Regression

Multiple regression analysis was used to identify the contribution of the factors which build consumer trust in livestock farmers and the possible relationship between these factors and purchase likelihood (Section 1.2). Drawing on the literature (Section 2.7) and the results of the qualitative study (Section 4.2), 29 observed variables were grouped into six factors, namely: providing information, competence, integrity, benevolence, credibility and reliability. These were identified as independent factors likely to build consumer trust in livestock farmers. However, these 29 observed variables were interrelated (Appendix 12), thereby the regression coefficients could carry redundant or misleading information (Tabachnick and Fidell, 1996). In order to obtain a meaningful result, the first step was to screen and remove from the data analysis process any observed variables having high correlation with other variables (Tabachnick and Fidell, 1996). As a result, six observed variables for the factors to build consumer trust in livestock farmers were retained as independent variables for this study (Table 3-5). The four observed variables associated with trust and the one variable associated with purchase likelihood were chosen as dependent variables (Table 3-6). The mean of the four observed variables associated with trust was calculated and called [MEANTRUST].

Table 3-5 Independent Observed Variables

Factor	Observed Variable	Explanation
Providing information	[TRUINFO]	Livestock farmers provide information that can be trusted
Competence	[KNOWHOW]	Livestock farmers are very knowledgeable to produce safe meat
Integrity	[HONEST]	Livestock farmers alter the fact to fulfil their own purpose
Benevolence	[AWARE]	Livestock farmers do not know what the public's needs are
Credibility	[SIZE]	I only trust large livestock farms
Reliability	[SINCERE]	Livestock farmers are sincere to follow up after an outbreak of food scare

Table 3-6 Dependent Observed Variables

Factor	Observed Variable	Explanation
Trust	[TRUTHFUL]	Livestock farmers are truthful
	[CONFIDEN]	I have confidence in livestock farmers
	[COMPLETE]	I rely on livestock farmers completely to provide safe meat
	[TRUSTWOR]	Livestock farmers are trustworthy
	[MEANTRUST]	Mean of the four variables associated with trust
Purchase likelihood	[PURCHASE]	Purchase likelihood

The second step was to analyse the skewness of these observed variables (Appendix 8), and transformation was performed to reduce their skewness. When the distribution of any observed variables had moderate skewness, square root transformation was performed, and for serious skewness, logarithm transformation was performed (Tabachnick and Fidell, 1996). So [SIZE], [HONEST], [TRUTHFUL] AND [CONFIDEN] were taken the square root and transformed into [SQSIZE], [SQHONEST], [SQTRUTHFUL] AND [SQCONFIDEN]. Similarly, [COMPLETE] and [PURCHASE] were logarithmic transformed into [LGCOMPLETE] and [LGPURCHASE].

The regression equation took the form of a general linear model:

$$y = a + b_1x_1 + b_2x_2 + \dots + b_kx_k + e \quad (3.1)$$

Where y is the predicted value on the dependent variable

a is a constant representing the Y intercept

b_i is the regression coefficient assigned to the i^{th} independent variable by the regression solution

x_i represents the i^{th} independent variable

e is the residual of the regression solution

The data analysis process using multiple regression was separated into five stages. The first stage was to determine the contribution of the independent observed

variables on each of the observed variables associated with trust. Each of the four associated observed variables of trust was treated as dependent variable and regressed on the observed variables of the factors which build consumer trust in livestock farmers. A stepwise regression was employed due to the exploratory nature of this study (Tabacnick and Fidell, 1996). At each step the variable that added most to the regression equation, in terms of increasing the coefficient of determination was entered. The process continued until no more improvement of the coefficient of determination could be obtained.

The second stage was to determine the contribution of the independent observed variables to the mean score of trust. The mean of the four variables associated with trust was chosen as the dependent variable and the observed variables of the factors which build trust were chosen as independent variables. As with the first stage, a stepwise regression was carried out.

The third stage was to determine the contribution of the observed variables which build trust to purchase likelihood. The observed variable purchase likelihood was chosen as the dependent variable and the observed variables of the factors which build trust were chosen as independent variables. As with the first stage, a stepwise regression was carried out.

The fourth stage was to investigate the relationship between consumer trust in livestock farmers and consumer purchase likelihood. The observed variable purchase likelihood was chosen as the dependent variable and the observed variables of trust were chosen as independent variables though they were chosen as dependent variables at the first stage. Similarly, a stepwise regression was carried out.

The fifth stage was to also investigate the relationship between consumer trust in livestock farmers and consumer purchase likelihood. The observed variable purchase likelihood was chosen as the dependent variable and the mean of the four observed variables of trust was chosen as independent variables. Similarly, a stepwise regression was carried out.

3.4.3.1 Limitation of Multiple Regression in this Study

The multiple regression identified the predictors of consumer trust in livestock farmers and consumer purchase likelihood. However, a number of shortcomings were noticed. First, the results obtained were inconclusive because the regression solutions showed that different observed variables of the factors which build trust were included to predict different measures of the dependent variables. Second, the regression equation of purchase likelihood had relatively low prediction power which may be caused by ignoring the indirect effect of the observed variables of the factors which build trust.

In order to determine the effect of the factors which build trust on consumer purchase likelihood through consumer trust in livestock farmers and to develop a complete model linking the factors which build trust, consumer trust in livestock farmers and consumer purchase likelihood, an alternative data analytical method was explored. Structural Equation Modelling method (SEM) which could help to achieve the objectives of this study was identified.

3.4.4 Data Purification by Principal Components Analysis (PCA)

Before SEM could be carried out, the data was first purified into factors using Principal Components Analysis (PCA). Its aim was to purify and summarise the data by grouping together measurement items that are correlated. In other words, PCA was used to reduce the number of items to a fewer number of factors for further study while maintaining as much of the original information as possible.

Data screening was performed to ensure the absence of multicollinearity (i.e. items which were very highly correlated) and singularity (i.e. items were perfectly correlated) which give rise to unreliable factors (Field, 2000; Tabachnick and Fidell, 1996). So the eigenvalues, which represent the amount of variation explained by the factors derived from the correlation among observed items, were checked. If there were any negative, or nearly zero eigenvalues with several decimal places, the presence of multicollinearity and singularity was suspected (Tabachnick and Fidell,

1996). Moreover, the magnitude of the correlation among the observed items was checked to ensure there were correlations greater than 0.30 so that PCA can be used (Tabachnick and Fidell 1996).

After data screening, the items were summarised to a small number of factors (or constructs) using SPSS 8.0. The number of factors bears a linkage with the fit between observed and reproduced correlation matrices. The greater the number of factors, the better the fit and the greater the percentage of variance in the data explained. However, the more the factors extracted, the less parsimonious the solution (Tabachnick and Fidell, 1996).

Among the two common methods to determine the number of factors, namely:

- Kaiser's criterion (Kaiser, 1960) — to retain factors with eigenvalues greater than one to ensure that the factor extracts at least as much as the equivalent of one original item.
- Scree test (Cattell, 1966) — the number of factors to retain is the number before the change of slope in the eigenvalues curve because the eigenvalues before the changing of slope or the turning point represent “real” factors and those after the changing of slope tend to represent random fluctuations (Iacobucci, 1994).

This study followed the suggestion of Tabachnick and Fidell (1996) to adopted Kaiser's criteria since the number of items was smaller than 40 and the number of observations greater than 150.

Due to the exploratory nature, Varimax orthogonal rotation, which maximises the dispersion of loadings within factors was performed to improve the interpretability after the number of factors has been determined (Kerlinger, 1986; Tabachnick and Fidell, 1996; Field, 2000). So, factor loading that was high became higher after rotation and factor loading that was low became lower. Items were selected based on the factor loadings which were used to determined whether the item contributed significantly to their joint factor (Nooteboom, Berger, and Noorderhaven, 1997).

There was a trade-off between the sensitivity of the factor to be measured by more items and factor discriminant validity to include only those with high factor loading and low cross loading (Mitchell and Boustani, 1994). In other words, the amount of variation explained by the factor will be more by including more measurement items but there is a danger that that this reduces the ability of the items to measure unique factors. In this study, any low loading items (factor loading < 0.63) and cross-loading items (have loading > 0.32 with other factor) after rotation were excluded^a from the subsequent data analysis to guarantee the factor discriminant validity.

3.4.4.1 Limitation of PCA in this Study

Although PCA identified the factors which build trust, there was a limitation of PCA in this study namely, it was not able to achieve the objective of determining the effect of the factors for developing trust. In other words, PCA managed to summarise the items into factors but it was unable to show the causal effect of each factor on the development of trust and in turn on purchase likelihood. Further analysis of data was required using Structural Equation Modelling (SEM) in order to achieve the second and third objectives of this study (Section 1.2). So, the factors concluded from PCA were then analysed in the form of a structural equation model using LISREL 8.30, a specific statistical software combining multivariate regression and path analysis to estimate the contribution of the factors which build trust.

3.4.5 Justification of Structural Equation Modelling (SEM)

In order to determine the contribution of the causal factors of trust as well as exploring the relationship between trust and purchase likelihood (Section 1.2), a statistical technique was needed for this purpose. Though multiple regression is commonly used to identify the relationship between dependent variable and independent variables (Maruyama, 1997), it cannot achieve the objectives of this study for the following reasons.

- Multiple regression is designed for predicting the value of a single dependent observing variable by knowing the score of other independent observing variables.
- Multiple regression cannot be used if there exists a mediating variable between the dependent variable and the independent variable(s).
- Multiple regression cannot be carried out if the dependent variable is not an observed variable.

From the result of multiple regression (Section 5.3), it was confirmed as an inappropriate method for analysing the data in the context of linking causal factors of trust, consumer trust and consumer purchase likelihood. As an alternative, Structural Equation Modelling (SEM) was selected for data analysis and the development of the proposed model of consumer trust in livestock farmers.

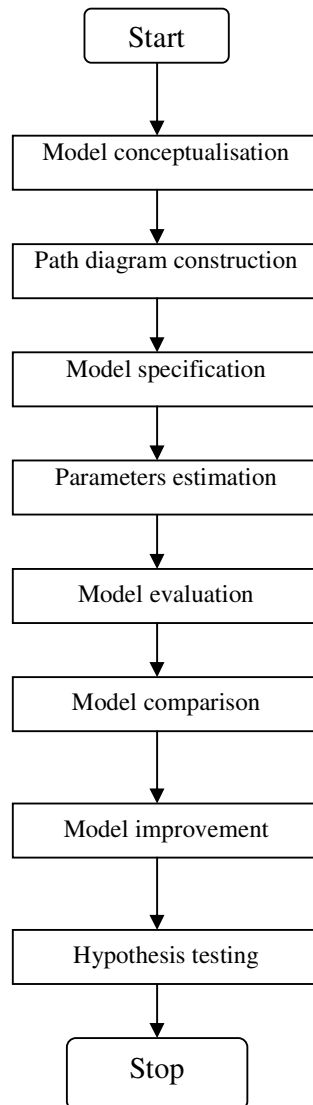
SEM has been widely used in marketing (e.g. Morgan and Hunt, 1994; Doney and Cannon, 1997; Selnes, 1998; Garbarino and Johnson, 1999; Tracey and Tan, 2001), consumer behaviour (e.g. Haubl, 1996; Laroche, Kim and Tomiuk, 1999; Follows and Jobber, 2000) human resources (e.g. Elangovan, 2001), strategic marketing (e.g. Chae and Hill, 2000), managerial psychology (e.g. Marongiu and Ekehammar, 1999; Dierendonck, Le Blanc and Breukelen, 2002). Researchers have often used SEM to examine the possible relationships among factors simultaneously and to address complicated managerial and behavioural issues (Cheng, 2001).

SEM merges the logic of multiple regression and path analysis with a single data analytical framework and therefore can cater for the presence of a mediating variable in between exogenous (independent) variables and endogenous (dependent) variables (Bentler, 1980; Cheng, 2001). Furthermore, the causal effects of individual exogenous variables can be determined. This includes a combination of direct and indirect effects: the direct effect from the exogenous variables onto the endogenous variable, such as direct effect of causal factors of trust on consumer trust and the

^a For any loadings in excess of 0.71 (50% variance) are considered excellent, 0.63 (40%) very good, 0.55 (30%) good, 0.45 (20%) fair, and 0.32 (10%) poor (Tabachnick and Fidell, 1996).

indirect effect from the exogenous variables onto the endogenous variable through mediating variable(s), such as the indirect effects of causal factors of trust on consumer purchase likelihood operating through consumer trust (Hoyle, 1995).

The procedures for carrying out SEM are shown in Figure 3.2, involved the conceptualisation of the causal relationship, the construction of the path diagram, the model specification and identification, the evaluation of model, the comparison of models and model improvement.

Figure 3-2 SEM – Procedures Flow Diagram

3.4.6 Model Conceptualisation

Drawing on the literature review (Section 2.7) and the results from the qualitative phase (Section 4.2), the hypothesised relationships among the factors were generated. At this stage, the causal relationships were specified to indicate which specific independent factors influenced which dependent factors in which way.

Having developed the theoretical framework of the model, the next step was to illustrate the conceptual model through a path diagram.

3.4.7 Path Diagram Construction

The relationships among the factors and items were graphically represented by a path diagram (Hoyle, 1995). The results from the PCA together with the measurement items of trust and purchase likelihood were used to construct the path diagram following the template illustrated in Appendix 4.

3.4.8 Model Specification

The relationships illustrated in the path diagram were translated into a system of linear equations, categorised into a measurement submodel and a structural submodel based on the generic equations listed in Appendix 5.

- Measurement submodel

The measurement submodel was a series of linear equations linking items to factors to represent which item was responsible to measure which factor.

- Structural submodel

The structural submodel represented the causal relationships between the factors. The model was checked to see whether the number of parameters to be estimated (called free parameters) was less than half of the number of variances and covariances amongst the measurement items (Diamantopoulos and Siguaw, 2000). This checking

assures that a single, unique value for each and every free parameter could be obtained from the observed data (Maruyama, 1997).

3.4.9 Parameter Estimation

After the submodels have been correctly specified, the next task was to obtain the estimate of the free parameters from the observed data using LISREL 8.30. This study adopted the Generally Weighted Least Squares method (WLS) (Joreskog and Sorbom, 1998). The advantage of this iterative method was to obtain the parameter estimates regardless of the distribution pattern underlying the measurement items. When the estimation procedure failed to converge on a solution due to model misspecification relating to observed items, in other words, the model included measurement item(s) which did not meet the stringent selection criteria, the model was re-specified by eliminating these ‘offending items’ and the analysis was rerun (Bagozzi and Baumgartner, 1994).

3.4.10 Model Evaluation

This study adopted a two-step approach to evaluate the measurement and structural submodel in turn (Anderson and Gerbing, 1988). By specifying the relationships among measurement items and the underlying factors based on theory, the measurement submodel provided an assessment of factor reliability and validity. The structural submodel specified the relationships among factors and provided an assessment of the nomological validity.

3.4.10.1 Item Reliability

Item reliability was assessed to ensure the measurement items were reliable, in other words, the items reflected mostly the true scores rather than the error. Item reliability was assessed following the equations in Appendix 6. The guideline to guarantee an adequate item reliability is that the index $\rho > 0.4$ (Bagozzi and Baumgartner, 1994).

3.4.10.2 *Factor Reliability*

Factor reliability is a measure to ensure the variance captured by the factor is more than that by the error component (Hair, Anderson, Tatham and Black, 1992). Since most factors employed in this study were measured by multi-items, the assessment of factor reliability was based on the correlation between individual items that made up the factor, relative to the variances of the items. Before performing any formal testing for reliability, the sign and size of the item loading, their standard deviation and statistical significance were checked. The minimum requirements for an adequate factor reliability are that they are positive, have a sufficiently large item loading and are statistically significant, with very small standard deviation (Bagozzi and Baumgartner, 1994). Cronbach alpha was checked for the factor reliability (Appendix 6) and the guideline is that Cronbach alpha should be greater than 0.70 for acceptable reliability.

Dillon and Goldstein (1994) further recommend a check for factor reliability for SEM to check that each factor is adequately measured by all measurement items which jointly make up the factor (Appendix 6). This ensures that the variance captured by the factor was more than that captured by the error component. The guideline is that acceptable factor reliability is greater than 0.5 (Hair, Anderson, Tatham and Black, 1992).

3.4.10.3 *Factor Validity*

Factor validity was tested to ensure that the factor adequately measures the concept it is supposed to measure (Bagozzi, 1994). Without assessing the factor validity, the hypotheses might be accepted or rejected when there is excessive error in factor measurement. In this study, two types of validity, namely convergent validity and discriminant validity were tested.

Convergent validity was tested to ensure the extent to which measurement scales designed to measure the same factor are related (Dillon et al., 1994). The convergent

validity was assessed by two methods. Firstly, the paths from individual observed variables to factors were evaluated to check whether they were statistically significant (i.e. $p < 0.01$), with the magnitude of the parameters being 10 to 20 times as large as the standard errors (Doney and Cannon, 1997). Secondly, it was required that each item was loaded highly on its hypothesised factor, with no high cross-loadings in the Principal Components Analysis (PCA).

Discriminant validity was tested to ensure the degree to which measures of different factors are unique (Sethi and King, 1994). Again it was assessed by two methods. Firstly, the factor loading was high on the hypothesised factors but having low cross-loadings with other factors in PCA. Secondly, it was addressed by testing if correlation between pairs of factors significantly differed from the value of unity. In other words, each factor was tested against each other factor one by one in the model in the following way. The two factors to be tested were set-up as a model with the correlation between them set to one (called constrained model) and then compared with the model without fixing the correlation (called unconstrained model) (McAllister, 1995). The fit of the unconstrained model should be significantly better than the constrained one in order to satisfy the discriminant validity criterion (Sethi and King, 1994). By accepting 5% chance of being wrong (significant probability $p = 0.05$), the criterion for satisfying discriminant validity was that the difference in chi-square (χ^2) should be greater than 3.84 with one degree of freedom (d.f. = 1).

Furthermore, Dillon and Goldstein (1984) introduce an 'average variance extracted' to measure the amount of variance captured by the factor in relation to that due to measurement error (Appendix 6). If the average variance extracted was less than 0.5, that is the variance due to measurement error was greater than that captured by the factor, the validity of the factor was questionable (Fornell and Larcker, 1981).

3.4.10.4 Nomological Validity

Nomological validity checks on the predictive power of the structural submodel. It was assessed by using the total coefficient of determination, which is a measure of the strength of all the relationships in the model jointly (Joreskog and Sorbom, 1998)

(Appendix 6). The total coefficient of determination lies between 0 and 1, and large value is associated with good nomological validity (Dillon and Goldstein, 1984).

3.4.10.5 *Overall Goodness of Model Fit*

The overall goodness of model fit was assessed to ensure that it adequately represented the entire set of causal relationships. So the difference between the covariance matrix predicted by the model (called implied covariance matrix) and the sample covariance matrix derived from the observed data (called observed covariance matrix) was tested. This study used three ways to assessing model fit, namely the absolute fit, the comparative fit and the parsimonious fit (Kelloway, 1998). Their formulae are listed in Appendix 7. After calculating these indices, the results were checked against the guidelines summarised in Table 3-7.

- Absolute fit

This study assessed the absolute fit to check for the ability of the model to reproduce the actual covariance matrix. The most common absolute fit index is χ^2 goodness of fit. However, χ^2 test is of limited usefulness because the value of χ^2 is sensitive to sample size and thus possibly gives a false indication and it is highly unlikely to obtain a non-significant test statistic with large sample size (Fornell and Larcker, 1981, Kelloway, 1995). So, this study turned to alternative measures of fit for judging the overall model fit by considering several fit indices because false indication might be obtained if the assessment of overall fit relied on a single measure exclusively (Bollen and Long, 1992; Bagozzi and Baumgartner, 1994). In this study, Root Mean Squared Error of Approximation (RMSEA), Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) were calculated to assess the absolute fit of the models.

- Comparative Fit

After checking the absolute fit, tests of comparative fit were performed to provide a basis when comparing two or more rival models to assess which model provided a better fit to the data. The greater the comparative index, the better the fit among the

competing models. Normed Fit Index (NFI), Non-normed Fit Index (NNFI), Incremental Fit Index (IFI), Comparative Fit Index (CFI), and Relative fit Index (RFI) were calculated to assess the comparative fit.

- Parsimonious Fit

Parsimonious fit indices are concerned primarily with the trade-off between the model fit and the degrees of freedom. That is, the absolute fit may be improved with a sacrifice of the degree of freedom. It is used to check for the number of estimated coefficients required achieving a specific level of fit (Schumacker and Lomax, 1996). So, unlike the other fit indices, there is no standard for how “high” or “low” the indices should be to indicate parsimonious fit. A comparatively higher value indicates a better parsimonious fit. In this study, Parsimonious Normed Fit Index (PNFI) and Parsimonious Goodness of Fit Index (PGFI) were calculated and used for the comparison of models.

Table 3-7 Goodness of Fit (GOF) Criteria and Acceptable Fit Interpretation

GOF Criterion	Acceptable Level	Interpretation
<u>Absolute Fit</u>		
Chi-square (χ^2)	Tabled χ^2 value	Compares obtained χ^2 value with tabled value for given d.f.
Goodness of Fit (GFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 reflects a good fit
Adjusted GFI (AGFI)	0 (no fit) to 1 (perfect fit)	Value adjusted for d.f., with 0.90 a good model fit
Root-Mean-Square Error of Approximation (RMSEA)	<0.10	<0.10 reflects good fit; <0.05 reflects very good fit; <0.01 reflects outstanding fit
Normed Fit Index (NFI)	0 (no fit) to > 1 (perfect fit)	Value above 0.90 reflects a good fit
Non-Normed Fit Index (NNFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 reflects a good fit
<u>Comparative Fit</u>		
Comparative Fit Index (CFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 reflects a good fit
Incremental Fit Index (IFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 reflects a good fit
Relative Fit Index (RFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 reflects a good fit
<u>Parsimonious Fit</u>		
Parsimonious Goodness of Fit Index (PGFI)	0 (no fit) to 1 (perfect fit)	Compares values in alternative models
Parsimonious Normed Fit Index (PNFI)	0 (no fit) to 1 (perfect fit)	Compares values in alternative models

(Source: Schumacker and Lomax , 1996)

3.4.10.6 Power Test of Close Fit

The statistical power associated with the model is a function of the degrees of freedom in the model and the number of observations (Diamantopoulos and Sigauw, 2000). As a rule of thumb, the power is good if it is greater than 0.80 because there is

80% chance that an incorrect model is rejected. This study calculated the power of close fit using the table in Appendix 7 to ensure that an incorrect model was correctly rejected.

3.4.11 Rival Model Comparison

There may be alternative relationships among the factors which are reflected in the structural submodel. Bollen and Long (1992) point out that all plausible models which act as an alternative model to the proposed model have to be examined. In other words, although the fit indices associated with the proposed model indicated that the data fitted the model well, it is possible that some alternative models (called rival models) were equivalent and fully account for the relationships among factors (Breckler, 1990); so rival model comparison has to be conducted.

In this study, the proposed model linked ‘providing information’, ‘competence’, ‘credibility’, ‘integrity’, ‘benevolence’, and ‘reliability’ directly to ‘trust’. However, previous researches suggest that trust could be built by sharing information which is knowledgeable, honest and reliable, unbiased, not proven wrong and free of vested interest (e.g. Sheppard and Sherman, 1998; Frewer, Howard, Hedderley and Shepherd, 1996; Selnes, 1998; Moore, 1998). The underlying principles of sharing information could be care, honesty, sincerity, and a sense of obligation. So a rival model allowing ‘competence’, ‘reliability’, ‘integrity’, ‘benevolence’, and ‘credibility’ going through ‘providing information’ to ‘trust’, and in turn to ‘purchase likelihood’ was specified. The procedures for SEM (Figure 3-2) was rerun and compared with the proposed model.

The decision of accepting the proposed model or the rival model depended on the value of the fit indices, namely the absolute fit, comparative fit, and the parsimonious fit indices. Apart from RMR and RMSEA, the higher is the fit index; the better is the model able to fit the data. In addition to fit indices, the number of significant path among the models was also compared before making the decision. However, after

comparing the models, there was still room for improving the fit of the accepted model by model modification and residual analysis.

3.4.12 Model Improvement

The best model obtained after model comparison could be improved by either freeing parameters (to be estimated) that formerly were fixed ($= 0$) or fixed parameters that formerly were free in order to improve the model fit.

3.4.12.1 Model Modification

Model modification was based on the modification indices provided by LISREL 8.30, which indicated the amount of χ^2 changed if the model was modified. The model was re-specified accordingly and the procedures of SEM (Figure 3-2) were rerun for the new model. However, caution was exercised because all model modification indices (m.i.) provided were purely statistically in nature, without any support from theory.

After obtaining the parameter estimates, the model was evaluated as before (Section 3.4.10) and followed by model comparison. The goodness of fit indices and number of significant paths were compared to assess whether the model was improved.

3.4.12.2 Residual Analysis

The second method to improve a model is residual analysis. The difference between the observed and the implied covariance matrices (Section 3.4.10.5) was calculated and any standardised residuals exceeding the threshold value of ± 2.58 were termed as potentially significant residuals. Any observed items that produced a potentially significant residual were eliminated from the model in turn and the procedures of SEM were rerun for the new model (Figure 3-2). As above, the models were compared based on the absolute fit, the comparative fit, the parsimonious fit indices, and the number of significant paths and the best model was finalised as the empirical model for this study.

3.4.13 Test of Hypothesised Causal Effects of Trust

After accepting the best model as the empirical model, the following hypotheses regarding food safety were tested (Section 2.7).

H₁: There is a positive causal effect from competence to trust.

H₂: There is a positive causal effect from credibility to trust.

H₃: There is a positive causal effect from reliability to trust.

H₄: There is a positive causal effect from integrity to trust.

H₅: There is a positive causal effect from benevolence to trust.

H₆: There is a causal effect from providing information to trust.

H₇: There is a positive causal effect from trust to purchase likelihood

In order to test these hypotheses, individual estimate of direct effects (γ 's and β 's) was evaluated to check if they were significantly different from zero. The ratio of each estimate to its standard error was treated as a z statistic, which was considered as reliably different from zero if greater than 1.96 (for 5% confidence). So, a significant effect from the causal factor was evidenced if the z statistic exceeded 1.96.

3.4.14 Critique of SEM

Because the structural submodel of SEM has no degree of freedom, a researcher has the freedom to develop models with alternative relationships among the factors. However, there is a danger that a model is chosen among these plausible models based on the statistical results rather than grounded on theory.

Well-designed research is needed for SEM as this statistical analysis places a stringent requirement on the quality of the data (Cheng, 2001). So PCA was performed to purify the data to eliminate those items that should not be included in the model.

The Generalised Weighted Least Square estimation method together with asymptotic covariance matrix is appropriate for ordinal data, as is the case in this study.

However, the number of samples required is associated with the number of measurement items in the model and the former increases exponentially with respect to the number of measurement items (e.g. more than 180 samples for 20 items and more than 1,200 samples for 50 items). So testing a large model with many measurement items requires a large sample size which can be difficult with limited resources.

Since SEM is so data intensive and requires quality data such as every measurement items to measure a single factor uniquely, so any items not passing the stringent selecting criteria may cause the non-convergent problem. In addition, the criterion of choosing the “best” model is based on the results of comparison of over model fit. In other words, it is very easy to choose a statistical driven best model. In order to overcome this problem, all models built using SEM must be grounded in theory.

3.5 STUDY APPRAISAL

The research findings were checked with livestock farmers in the form of open-ended questions and discussed in detail with senior officers of the farmers’ organisations to confirm the relevance of the results. In addition, the results were disseminated in conference and workshop.

3.5.1 Industrial Consultation

Questionnaire with open-ended questions (Appendix 10) was mailed to 7 livestock farmers selected by using convenience-sampling method. In addition, meetings were held with the chief executives of British Poultry Council and National Beef Association and senior officer of the Meat and Livestock Commission. The purpose was to confirm the importance of this research, to review how the livestock industry tries to maintain/restore consumer trust, and to help interpret and confirm the relevance of the results. The topics included:

- The importance of trust in livestock farmers.

- Communication strategies adopted by livestock industry.
- The factors that affect consumers to build their trust in livestock farmers.
- The communication channels that the livestock industry uses to reach consumers regarding food safety.
- Assurance schemes.
- The relevance of the research results.

3.5.2 Results Dissemination

The outcome obtained from this research was presented in the Second Postgraduate Research Conference, Cranfield University and was well accepted by the attendees. The empirical model was disseminated to the senior officers of MLC, UK who showed interest in the consumer trust model.

3.6 SUMMARY OF THE CHAPTER

This study adopted a three-phase approach. The first phase was a qualitative approach followed by a quantitative one. For both phases, cross-sectional study was used. The objective of the first phase was to elicit the items of trust. The second phase was aimed to determine the effect of these causal factors on building consumer trust in livestock farmers. In addition, the latter approach was also used to investigate whether there was the relationship between consumer trust in livestock farmers and purchase likelihood. The third phase was consultation with industrial representatives.

The qualitative phase adopted a semi-structure, open-ended interview method administrated on 20 informants. The data collected were categories for making comparisons and contrasts and the findings laid the foundation for the subsequent survey.

The quantitative approach involved a survey of 250 respondents with quota sampling strategy and intercept method. The data collected was firstly summarised into factors through Principal Components Analysis (PCA). The results from PCA was analysed

in the form of structural equation model and analysed using LISREL 8.30. The model evaluation - reliability, validity and overall model fit - was performed.

Since it was free to impose any relationship between the factors which were grounded on theory in the structural submodel, models comparison were conducted. Furthermore, attempts to improve the goodness of model fit in the form of model modification and residual analysis were also conducted before the testing of hypotheses.

In addition, industrial responses to the results, in the form of sending open-ended questions to farmers and meeting with representatives of the livestock industry were collected. This helped to confirm the importance of this research as well as to interpret the implications of the study for the food industry.

The results obtained by following the procedures described in this chapter are presented in the following chapters.

Chapter Four

4. QUALITATIVE STUDY – RESULTS AND DISCUSSION

This chapter reports on the use of qualitative approach and the results of face-to face interviews. The intention of this qualitative study was to help the development of the questionnaire for the subsequent quantitative survey, and confirm the relevance of and sharpen the hypotheses for the study. A summary is given at the end of this chapter.

4.1 PURPOSE AND APPROACH

Using the research method described in Section 3.3, face-to-face interviews were conducted in April 2000 in Northamptonshire and Bedfordshire in the United Kingdom. The purpose of this informal enquiry was to elicit the items of causal factors of trust to facilitate the subsequent questionnaire design. The interviewees were asked the following leading question:

Among livestock farmers, food processors and retailers, which party(ies) is/are responsible for food hazards associated with fresh meat?

After obtaining their views, the interviewees were asked about their concerns on livestock husbandry practices and whether they would trust livestock farmers. Following from this, their views on how to maintain or restore their trust in livestock farmers were obtained by asking the following question:

What factors lead you to trust livestock farmers?

The researcher used flash cards to provide the definition of trust, explained the terms such as the parties in the food chain verbally to the interviewees and encouraged the

interviewees to expand on their responses. Their responses were written down for further analysis.

4.2 RESULTS AND DISCUSSION

There were a total of 20 interviewees, 9 were males and 11 were females and all of them consumed meat. The data collected from the interviewees were organised and coded in order to generate categories (Section 3.3.2) which were arranged under the following groups:

- Perception of who in the food chain is responsible for national food scares, such as BSE and *Salmonella* and the reasons
- Factors leading to trust in livestock farmers from the perspective of consumers

4.2.1 Livestock Farmers and Food Safety

Supplying safe food to consumers is the responsibility of the entire food supply chain. When the interviewees were asked which parties is most responsible for food hazards associated with fresh meat, some interviewees said that if livestock product becomes contaminated early in the chain, namely on the farm, many people could become infected across very dispersed geographic areas. For example, one interviewee expressed the view that the delivery of bacterially infected livestock to abattoirs increases the chance of food poisoning to a widespread area by saying, “It would contaminate the other animals” .

When the researcher mentioned about government regulations when discussing about whose responsibility for providing safe food, some interviewees said that the government is responsible to enforce the food regulations rigorously along the supply chain, linking animal feeding stuffs, production, transport, abattoirs, processors and retailers. However, six interviewees suggested that both the farmers and the government did not fulfil their job properly and thought that the farmers did not

produce wholesome food and the government did not have enough regulations and the enforcement is not carried out rigorously.

“ I don’t think there are enough regulations and inspections ”

Female, pensioner

On the contrary, three interviewees said that supermarkets are responsible for food scares because the supermarkets have the control from which farms they buy the products. They should in their view, maintain the quality of the products such as ensuring the products are stored in an appropriate temperature. But two interviewees said that it is hard to blame any party before investigation has been taken place into a food safety incident.

“An investigation should be carried out to pinpoint the source”

Female, pensioner

Evidence from literature suggests that livestock farmers are strongly associated with national food scares such as BSE and *Salmonella* outbreaks (e.g. Trickett, 1997; MAFF, 2000) and the findings from this study supported this suggestion. So, there was good reason to investigate what the interviewees were concerned about the livestock husbandry practices of livestock farmers. The responses from the interviewees seemed to fall into three main categories, namely: concern with animal feed, overuse of antibiotics and intensive farming.

4.2.1.1 Animal Feed

Animal feed was found as a source of food hazard such as BSE and *Salmonella*. BSE is a result of contaminated meat and bone meal being fed to cattle. For *Salmonella*, animal feed has been found to be contaminated with *Salmonella* giving rise to livestock carrying *Salmonella* in their intestines which in turn is passed to humans through meat consumption. Some interviewees said that they became aware about the connection between food hazards and animal feed after the BSE epidemic and mentioned that there are reports suggesting that human sewage was being allowed into animal food. Though the way the feed is produced makes the bacteria contained

in sewage harmless, the use of human sewage as an ingredient in animal food is running an unnecessary risk.

“Food hazard is caused by feeding animals with waste food containing infected material” *Male, middle age*

4.2.1.2 *Overuse of Antibiotics*

Antibiotics are used to treat sick animals, to protect individual healthy animals against a risk of infection, and to protect entire herds or flocks against diseases. However, the overuse of antibiotics has resulted in the emergence of multi-drug resistant strains of pathogenic bacteria. There was considerable concern among the interviewees in the overuse of antibiotics because they were worried about the effects this could have on the health of consumers. More than half of the interviewees perceived that the routine use of antibiotics on farm animals risks creating drug resistant superbugs that can be passed to humans through the food chain. One interviewee added that this issue is likely to present a bigger food safety risk than the outbreak of BSE.

“The overuse of drugs has produced superbugs” *Female, middle age*

4.2.1.3 *Intensive Farming Practice*

Intensive farming refers to the conditions where livestock are reared in large herds which tend to be kept in-house for most of the year. However, livestock that are confined in small spaces are susceptible to illness and epidemics. Most of the interviewees (14 interviewees) perceived that organisms that cause food poisoning in humans often do little harm to the animals, but intensification of farming has helped spread the bacteria. Some interviewees linked intensive farming practices with overuse of antibiotics and said that such practice ignores the welfare of animals. This belief supported the finding from the literature which suggests that livestock farmers use antibiotics in a preventative manner to facilitate intensive livestock production. Several interviewees commented that farmers were not concerned about the living environment and the welfare of livestock.

“The animals kept together in house for a long time makes the food problem worse”
Female, young age

4.2.1.4 Food Scare and Purchase Behaviour

Past research suggests that food scares affect the purchase behaviour of consumers because a scare about a particular food adversely affects the perception and consumption of that food (e.g. Eom, 1994). This finding from the literature was partially supported because most of the interviewees said that they continue to consume chicken meat but cook the meat well because of the fear of possible contamination of *Salmonella* in chicken meat. However, two interviewees said that they reduce the consumption of beef because of BSE. One interviewee reported that she no longer gave her children beef because of BSE. Eight interviewees said that they want to have some assurances that the foods they buy are free from antibiotics. A proportion of the interviewees (4 interviewees) reported that they are happy to pay a premium to buy organic foods - bearing the assurance that what they are eating has not been touched by chemicals. It appears that the highly publicised food scare incidents such as BSE and *Salmonella* are likely to change consumer perceptions about food safety and the food purchasing patterns in meat, especially beef.

“I won’t give my kids beef because of BSE”
Female, young family

4.2.1.5 Conclusion

These findings appear to be consistent with those evident in the research literature that consumers were concerned about animal feed to livestock, overuse of antibiotics and the intensive farming practice. In turn, consumers are likely to lose confidence in food safety and have little trust in livestock farmers.

4.2.2 Factors that Lead to Consumer Trust in Livestock Farmers

After enquiring which party is responsible for food scares together with their concerns, the interviewees were asked which factors lead them to trust livestock farmers after being told that trust in livestock farmers regarding food safety means a willingness to rely on livestock farmers with confidence regarding food safety. Drawing on the literature, six factors namely: providing information, integrity, competence, benevolence, credibility and reliability were identified (Section 2.7). The interviewees were enquired about their views on these factors whose meaning was written on a flash card and their answers were recorded for further analysis in order to elicit the items for each factor.

4.2.2.1 Providing Information

Past research suggests that providing information is a strong determinant of trust (e.g. Anderson and Narus, 1990) because consumers need to gather information and evidence about the practice and trustworthiness of farmers to build trust. The literature also suggests that newspaper, television, magazine, government and food industry are some of the major sources of food safety information (e.g. Frewer et al., 1996). Interviewees were asked about where they got information regarding food safety. Some interviewees reported that they got the information on farming and food safety from the coverage by newspapers, magazines, and television/radio. Some interviewees added that they sought information including safe handling information for meat supplied by the government press and food safety messages from store brochures.

When the interviewees were asked about the effect of the information obtained from the media, five interviewees mentioned that the coverage of foodborne illness outbreaks by the media stimulated their awareness of the risk of foodborne illness. Some interviewees reported that the coverage of bacteria in food and foodborne illness respectively affected their purchase behaviour such as reduced consumption.

“I would not eat that kind of food after hearing the news [linking it to a food poisoning]”
Female, older age

Interviewees were asked about the trustworthiness of the source of information. Their responses matched past research that some viewed the information received from the media about food safety as inaccurate, confusing and incomplete. Three interviewees said that the media coverage was sensational and biased against farmers. In addition, some interviewees said that MAFF has been too close to the food industry, at the expense of consumers, and added that this has undermined their confidence. This finding was in line with previous research (e.g. Frewer et al., 1996).

“They [the government departments] use the word confidential if they do not want to answer your question”
Male, older age

Although the development of assurance schemes in the livestock sector aims to restore consumer confidence in meat, more than half of the interviewees felt that they do not have sufficient information about the schemes. Their comments included that the assurance logos are unhelpful because they are unclear about why they had been awarded, what standards they met, and how they differed from foods without the mark. One interviewee said that none of the products provided any information on how to contact the awarding organisation or how to get more information about their schemes.

Farmers’ markets, at which consumers can have direct contact with farmers, were welcome by the interviewees. Some interviewees reported that they shop at farmers’ markets and they were happy to continue shopping there because they could have direct contact with the producers themselves. They also mentioned that they could ask questions and really get to know about the production processes involved. They believed that this helps them to know the farmers better and trust the latter and become more aware of healthy eating issues.

4.2.2.2 Integrity

Integrity of livestock farmers is the perception of consumers that livestock farmers follow acceptable business practices. However, when the interviewees were asked about their view on farmers regarding integrity, some interviewees were sceptical about the integrity of farmers and mentioned the media coverage on the conditions of farm animals in modern production methods. They said that such coverage had evoked strong reactions among them and expressed discomfort concerning industrial animal husbandry. Some interviewees even reported that they decided to reduce eating meat or other animal products because farmers were not ethical in feeding livestock with human/animal waste.

Interviewees were asked views on animal feed. Some interviewees said that the farmers fed their animals rubbish to keep the price down because the supermarkets looked for cheaper and cheaper meat. They believed that supermarkets made a substantial amount of profit and should charge the consumer less and farmers were equally having a huge profit by feeding waste to animals. Since self-interest, in the form of opportunism, cheating or abusing could not be present in trust, the overuse of antibiotics or feeding animals with growth promoter are likely to cause distrust. Indeed, consumers perceive that farmers are responsible for the production of wholesome and quality food for consumers and any food hazards resulting from the greed of farmers are unfair to consumers. But some interviewees believed that some farmers might still use growth hormones though they have been banned by the government and hide this by changing their records. The usage of banned drugs and changing of records are likely to seriously damage the trustworthiness of livestock farmers because integrity in terms of honesty and truthfulness is one of the most important “bases” of trust (Butler, 1991).

“The farmers should follow the regulations voluntarily” Male, middle age

4.2.2.3 Competence

Competence is an important foundation for trust (Moorman et al., 1993) and consumers rely highly on their perception of livestock farmers' ability to produce safe food. Unfortunately, when asking the interviewees about their perceived level of farmers' competence, 14 interviewees believed that the farmers did not have the knowledge to produce safe food. Some interviewees said that there was evidence of the existence of scrapie in sheep for many years but nobody worried about the potential for this disease to cross into other animals. They believed that farmers did not properly understand that the feeding of ground-up sheep to cattle could cause problems.

"BSE is a good example ... they know nothing about what they have done"

Male, middle age

Interviewees were asked about their views on battery farming practices. Some interviewees blamed farmers for not understanding the consequence of battery farming. They considered that animals should be kept outdoors, on the grassland, free to move and free of discomfort. They further believed that farmers use of antibiotics to prevent disease in battery reared chickens in addition to the treatment of sick animals caused the problem of superbugs. One interviewee said that he wondered whether farmers are capable of producing safe food.

When the interviewees were asked whether they want to have advice on meat safety from livestock farmers, some interviewees reported that they obtained leaflets from supermarkets and government, but none from farmers. Some interviewees believed that livestock farmers are incompetent to produce safe food in view of the highly publicised food safety incidents such as BSE and *Salmonella* and are incapable of advising consumers about food safety.

4.2.2.4 Benevolence

Benevolence is a basis of trust (Sheppard et al., 1998) and is perceived as a caring of the exchange partner's welfare apart from an egocentric motive. So, trustworthy livestock farmers are expected to be positively disposed toward consumers. When the interviewees were asked about their views on livestock farmers regarding benevolence, twelve interviewees did not believe livestock farmers care about the welfare of consumers, evidenced by the food scares of BSE and *Salmonella*. They considered that the livestock husbandry practices adopted by farmers nowadays were driven by profit-seeking farmers. The use of problematic animal feed, the overuse of antibiotics and the intensive farming practice were the result of cutting cost at the expenses of the welfare of consumers and animals.

"The farmers cannot cut cost and ignore our welfare"

Female, young age

Some interviewees thought that livestock farmers did not understand that the meat market is a consumer driven market and would collapse if consumers reduced meat purchases as a result of loss of confidence in meat. The interviewees believed that farmers only aim to maintain or increase their profit margin and ignore the concerns of consumers regarding food safety.

4.2.2.5 Credibility

When the interviewees were asked whether the size of farm can influence trust, there was mixed views. Six interviewees worried about small farms which do not have enough resources to follow the regulations. These interviewees perceived that large farms would have the turnover and resources to follow the regulations of food safety and hygiene in rearing livestock and the workers would be well trained and supervised. One interviewee said that he once visited a small farm and concluded that he would not trust this farm because it did not in his view, meet the necessary standards to produce safe food. The perception of direct relationship between size of farm and its trustworthiness matched the suggestion of Doney et al., (1997) that the

size of a firm helps a person to assess the trustworthiness of this firm. On the contrary, four interviewees were concerned about large farms that care less about consumers but more about their business. Among these four interviewees, one even continued to say that large farms are likely to pay minimum wages to casual workers without providing any training to them to carry out the tasks to the required standards.

“I once visited a small farm ... the condition there’s horrible”

Male, pensioner

Though credibility in terms of reputation was viewed by past researcher as an important factor to build trust (e.g. Smith et al., 1997), reputation was not mentioned by the interviewees. However, when asked by the researcher, only 3 interviewees mentioned about local farm/farmers’ market and said that they shop with them on a regular basis.

Interviewees were asked about their views on assurance schemes after explaining that by having a mark on the package, consumers can expect the product is produced to standards covering both food safety and others such as animal welfare and due regard to the environment. However, some interviewees considered that the logos only represent a very slight improvement on standard practice, just above the legal minimum. One interviewee said that some assurance marks on food might persuade people to believe one product is better than another, but it is not always true. On the contrary, half of the interviewees said that assurance schemes can provide consumers with logos they can trust and these logos can be viewed as an indicator of safe food.

4.2.2.6 Reliability

Interviewees were asked about their views regarding reliability of livestock farmers, some interviewees said that it is the role of the government instead of farmers to check out the cause of food hazard. They thought that farmers can provide information but the actual investigation is not their responsibility and it might take a

long time and involved scientific methods. However, they believed that livestock farmers should take remedial actions once the cause has been found.

“Some farmers are not reliable ... they do not follow the regulations”

Female, middle age

Regarding food safety, consumers would rely on livestock farmers in order to reduce the uncertainty, so perceived reliability plays an important role in such uncertain situations and leads to trust (Moorman et al., 1993). However, some interviewees said that livestock farmers did not act fast enough to eradicate problems and allowed the situation to deteriorate. One interviewee mentioned that farmers did not stop using growth hormones voluntarily even after the suspicion that there was a link with growth hormone in livestock and cancer in human.

4.2.2.7 Conclusion

The interviews explored perceptions of the factors that can lead to trust, confirming the importance of providing information, integrity, competence, benevolence, credibility and reliability. From the responses of the interviewees, key words were elicited and grouped under six factors (Table 4-1). The next step was to determine the contribution of these factors to the building of consumer trust in livestock farmers regarding food safety.

Table 4-1 Results of the Qualitative Study

Factors	Frequency	Associated key words
Provide information	18	Unbiased information, information from media, openness, correct information, give advice on food safety, untrue and incorrect information, direct dialogue, sensational, confused information.
Integrity	17	Honesty, tell the truth, ethical, keep promise, follow regulations, fair to consumers.
Competence	14	Able to give advice on food safety, capable to produce safe food, have the knowledge, aware of the cause and consequence of food scares.
Benevolence	12	Care about consumers' welfare, care about animals' welfare, listen to consumers, know what consumers need.
Credibility	10	Good reputation, large farms, reputable source, assurance of the quality of food, have the resources.
Reliability	8	Check out the cause of food risk, eradicate problems, sincere to take remedial actions.

4.3 SUMMARY OF THE CHAPTER

This chapter illustrated the quality study which was used to explore which party in the food chain is responsible for food scares and the factors which build consumer trust in livestock farmers. The findings of face-to-face interviews with 20 interviewees were presented and discussed. The following conclusions were drawn at this stage of the enquiry.

- The face-to-face interviewing method with brief questioning proved to be successful in obtaining information of attitudes of the interviewees.
- This study confirmed that livestock farmers were perceived to be strongly associated with food scares. Following from this finding, this study also confirmed that consumers were concerned about animal feed to livestock, overuse of antibiotics and intensive farming practice. This study also confirmed that consumer concerns have implications for consumer purchase behaviour. These results were consistent with the findings from the literature.
- This study confirmed that providing information, integrity, competence, benevolence, credibility and reliability are factors that lead to consumer trust. These findings were in line with past research.
- This study suggested a list of key words that can be used to measure the factors which build consumer trust in livestock farmers.

As a precursor to more formal methods of investigation, the list of key words elicited in this qualitative study contributed to the questionnaire design in the subsequent quantitative survey presented in the following chapter.

Chapter Five

5. QUANTITATIVE STUDY – RESULTS AND DISCUSSION

This chapter reports on use of quantitative techniques, as discussed in Chapter 3 to determine the link between consumer trust and purchase likelihood. This chapter starts by characterising the quota samples and showing the descriptive statistics of consumer purchase behaviour. The effects of the factors on purchase behaviour through trust are discussed. A consumer trust model is proposed and adopted as a basis for explaining factors affecting consumer trust in livestock farmers regarding food safety and in turn consumer purchase behaviour.

5.1 CHARACTERISTICS OF THE RESPONDENTS AND TEST OF PERSONAL CHARACTERISTICS ON PURCHASE LIKELIHOOD

A quota of 250 consumers was interviewed to reflect the characteristic in the population of interest with respect to age. However, due to missing data problem, a total of 194 usable questionnaires, which met the sample size requirement of more than 150 was used for this study. The relatively high rate of missing data was because some respondents treated the question for purchase likelihood, which has three sub-questions as a multiple choice question and scored only one instead of scoring all three sub-questions. This question was placed on the last page together with the questions on personal data. The researcher turned his face away when the respondents scored this page to respect their privacy which gave rise to the failure to spot the omission of answering all the sub-questions. The characteristics of the respondents are shown in Table 5-1.

Table 5-1 Personal Characteristics of the Respondents

Characteristics		Number of Respondents (%)
Age group	16-34	72 (37%)
	35-54	79 (41%)
	55-70	43 (22%)
Gender	Male	90 (46%)
	Female	104 (54%)
Marital status	Single	45 (23%)
	Married	127 (65%)
	Widower/Widow	22 (12%)
Education	HND/Degree Holder	50 (26%)
	Non-degree Holder	144 (74%)
Income group	Below £15,000 p.a.	74 (38%)
	£15,000-19,999 p.a.	39 (20%)
	£20,000-29,999 p.a.	33 (17%)
	£30,000-49,999 p.a.	38 (20%)
	£50,000 p.a. or over	10 (5%)

Total number of respondents: 194 respondents

Though there were only 194 usable questionnaires used for this study, there was not much change in the ratios (37:41:22 as shown in Table 5-1 verses the original ratio of 38:40:22 for 250 respondents in Table 3-7). So, these 194 questionnaires were used to create a data file for further analysis. Tests of difference in purchase likelihood with respect to personal characteristics were carried out before an attempt was made to build the consumer trust model.

Since quota samples were used to reflect the national demographic pattern in age, the whole sample was tested to check whether there was any difference in purchase likelihood due to gender, age, marital status, education background and income group. Due to the non-parametric nature of the data, a Mann-Witney test was conducted to check for the difference in purchase likelihood because of gender and education background and Kruskal-Wallis test was used for the age, marital and income group.

- As shown in Table 5-2, there was no evidence showing that there was a significant difference at 0.05 level among samples in terms of gender, age, education

background and income group on purchase likelihood (all $p > 0.05$). The non-significant difference between age groups with respect to purchase likelihood was inconsistent with previous research showing that age plays a crucial role in meat purchase decision (e.g. Mainland, 1998). Previous research has found that older people were more conscious about food safety, however, the non-significant difference found in this study may be due to the relatively small sample size and sampling technique.

Table 5-2 Test of Personal Characteristics on Purchase Likelihood

Personal Characteristics	Test Statistic	Significant Probability¹
age	1.327**	0.268
gender	-0.629*	0.530
marital status	0.301**	0.740
income	0.999**	0.410
education	0.988*	0.324

* t-statistic value

** F-statistic value

¹ the difference is not significant at 0.05 level

5.2 CHARACTERISTICS OF THE MEASUREMENT ITEMS

In this study, there were 34 items of which 29 items were used to measure the causal factors of trust, 4 items for measuring trust itself and 1 item for measuring purchase likelihood (the measures anchor 1 = strongly agree and 7 = strongly disagree) (Table 3-1). As shown in Table 5-3, 18 out of the 34 items^a have median greater than 4, for example, “Livestock farmers keep the public informed of the safety in consuming meat” [INFORM], and “I have confidence in livestock farmers’ ability in producing safe meat” [ABILITY]. On the contrary, only one item has a median less than 4 (i.e. “Livestock farmers are sincere to follow up after an outbreak of food scare” [SINCERE]). In addition, there were only six items with mode less than 3, for example “Livestock farmers are very knowledgeable to produce safe meat”

^a Those measurement items with reverse score have been adjusted before the analysis.

[KNOWHOW]. The median scores on their perceived trust in livestock farmers were all greater than 4 (e.g. “I have confidence in livestock farmers” [CONFIDEN]). The median score for the purchase likelihood was 6, which was the highest score among the observed items and the mode for this item was 7. These findings showed that the respondents had low trust in livestock farmers together with low intention for future purchase in the event of a food safety incident, which justified the continuation of the study.

Table 5-3 Mode, Median and Interquartile Range of the Measurement Items

	Mode	Median	Interquartile Range
INFORM	5	5	3.00
TRUINFO	5	5	2.00
FACT	4	4	2.00
CORRECT	4	4	2.25
UNBIASE	7	5	2.25
KNOWHOW	3	4	3.00
EXPERT	3	4	2.00
ADVICE	3	4	2.00
ABILITY	5	5	2.00
COUNTON	5	5	2.00
SIZE	6	5	3.00
FULFIL	4	5	2.00
STRAIGHT	4	5	2.00
CONCERN	4	4	3.00
REPUTA	4	4	2.00
DEPEND	3	4	2.00
ACCURATE	4	4	1.00
SINCERE	3	3	3.00
FAIR	5	4	2.00
ETHICAL	4	4	2.00
TREAT	5	4	3.00
HONEST	7	5	3.00
PROMISE	7	5	2.00
SUPPORT	4	4	2.00
CARE	4	4	2.25
CUSTOMER	5	5	2.00
ATTENT	4	5	2.00
AWARE	3	4	2.00
INTEREST	7	5	3.00
TRUTHFUL	7	5	2.00
CONFIDEN	6	5	2.00
COMPLETE	7	6	3.00
TRUSTWOR	4	5	2.00
PURCHASE	7	6	3.00

5.3 MULTIPLE REGRESSION

By following the procedures reported in Section 3.4.3, the dependent variables were the four observed variables associated with trust at the first stage, and purchase likelihood at the second and third stage. The results are reported in Appendix 11 and summarised in Table 5-4.

Table 5-4 Results of Data Analysis using Multiple Regression

Dependent variable	Independent variables	adjusted R²
<u>Variables associated with trust</u>		
SQTRUTHFUL	TRUINFO (0.37), AWARE (0.21), SQSIZE (0.15)	0.23
SQCONFIDEN	TRUINFO (0.38), SINCERE (0.23), SQHONEST (0.18)	0.30
LGCOMPLETE	TRUINFO (0.41), SQHONEST (0.31), SINCERE (0.13),	0.36
TRUSTWOR	TRUINFO (0.44), SQHONEST (0.33)	0.35
MEANTRUST	TRUINFO (0.44), SQHONEST (0.22), AWARE (0.15), SINCERE (0.12), SQSIZE (0.12)	0.41
<u>Purchase likelihood</u>		
LGPURCHASE	TRUINFO (0.27), SINCERE (0.15)	0.10
LGPURCHASE	LGCOMPLETE (0.38)	0.14
LGPURCHASE	MEANTRUST (0.35)	0.12

Note: The value of beta is in bracket

‘Livestock farmers are truthful’ could be predicted from three possible independent variables namely: ‘providing information that can be trusted’, ‘knowing the needs of the public’ and ‘size of farm’. These three observed variables associated with the factors of providing information, benevolence and credibility. However, only 23% (adjusted) of the variability in ‘livestock farmers are truthful’ could be predicted from these three independent variables.

‘I have confidence in livestock farmers’ could be predicted from ‘providing information that can be trusted’, ‘sincere to follow up after an outbreak’ and ‘being

honest'. These three observed variables associated with the factors of providing information, reliability and integrity. However, only 30% (adjusted) of the variability in 'I have confidence in livestock farmers' could be predicted from these three independent variables.

'I rely on livestock farmers completely to provide safe meat' could be predicted from 'providing information that can be trusted', 'being honest' and 'sincere to follow up after an outbreak'. These three observed variables associated with the factors of providing information, integrity and reliability. A moderate 35% (adjusted) of the variability in 'I rely on livestock farmers completely to provide safe meat' could be predicted by knowing scores on these three independent variables.

'Livestock farmers are trustworthy' could be predicted from 'providing information that can be trusted' and 'being honest'. These two observed variables associated with the factors of providing information and integrity. However, only 35% (adjusted) of the variability in 'livestock farmers are truthful' could be predicted from these two independent variables.

The mean of the four variables associated with trust could be predicted from 'providing information that can be trusted', 'being honest' and 'sincere to follow up after an outbreak', 'and knowing the needs of the public' and 'size of farm'. These five observed variables associated with the factors of providing information, integrity and reliability, benevolence and credibility. A moderate 41% (adjusted) of the variability in this mean score of trust could be predicted by knowing scores on these five independent variables.

There is evidence of a relationship between the factors which build trust and trust but the predictive power was low. Though these five regression solutions made sense, it is difficult to draw conclusive results from them. For example, providing information appeared in all five regression equations but credibility only appeared in the regression equation for 'livestock farmers are truthful' and the mean of variables associated with trust. In addition, the observed variable, 'livestock farmers are very

knowledgeable to produce safe meat', associated with competence was not included in the five regression equations which was inconsistent with previous research that competence is a significant predictor of trust (e.g. Crosby et al., 1990; Bigley et al., 1998; Argandona, 1999).

When the observed variable purchase likelihood was regressed on the six observed variables which build trust, two independent variables – 'providing information that can be trusted' and 'sincere to follow up after an outbreak of food scare associated with providing information and reliability' were included in the regression equation. However, a very low 10% (adjusted) of the variability in purchase likelihood could be predicted from these two independent variables.

When the observed variable purchase likelihood was regressed on the four observed variables of trust, only one independent variable – 'I rely on livestock farmers completely to provide safe meat' was included in the regression equation. However, a very low 14% (adjusted) of the variability in purchase likelihood could be predicted from this independent variable.

When the observed variable purchase likelihood was regressed on the mean score of trust, a very low 12% (adjusted) of the variability in purchase likelihood could be predicted from this independent variable.

These findings suggested that the observed variables of the factors to build trust and those of trust had very low predictive power for purchase likelihood separately. Because there is no previous study of the contribution of these variables to purchase behaviour, no comparison could be made with previous research.

Though these findings confirmed that multiple regression provided the contribution of the independent observed variables on the dependent variables, no complete model could be developed to achieve the objectives of this study (Section 1.2). This supports the use of alternative data analysis for model building/testing.

5.4 PURIFICATION OF ITEMS USING PRINCIPAL COMPONENTS ANALYSIS (PCA)

As the first step, Principal Components Analysis was conducted to purify and group these 29 items into factors to facilitate the subsequent analysis using Structural Equation Modelling (SEM). However, data screening was performed beforehand to ensure the data complied with the requirements for using PCA. So the following checking were performed:

- There was no correlation in the correlation matrix with magnitude around 0.99 (Appendix 12), so there was no evidence of the presence of multicollinearity and singularity (Tabachnick and Fidell, 1996).
- There were 89 correlations with magnitude greater than 0.30 among the 435 correlations of the 29 items (Appendix 11). In other words, there were 20% of the entries in the correlation matrix with values greater than 0.30, so it was feasible to obtain factors from these 29 items (Tabachnick and Fidell, 1996).

After analysing the correlation among these 29 items, the Kaiser criterion was used to retain only factors with eigenvalue equalled or greater than 1. A six-factor solution accounting for 68% of the variance was obtained (Table 5-5).

Table 5-5 Total Variance Explained by the Factors

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	11.299	38.962	38.962
2	2.862	9.868	48.831
3	1.799	6.204	55.034
4	1.438	4.957	59.992
5	1.254	4.325	64.316
6	1.062	3.662	67.978
7	.882	3.043	71.021
8	.846	2.916	73.937
9	.751	2.589	76.526
10	.720	2.483	79.009
11	.631	2.177	81.186
12	.609	2.100	83.286
13	.538	1.856	85.142
14	.454	1.567	86.709
15	.432	1.489	88.198
16	.412	1.422	89.620
17	.376	1.296	90.916
18	.346	1.193	92.109
19	.318	1.098	93.207
20	.306	1.055	94.262
21	.259	.894	95.156
22	.247	.851	96.007
23	.226	.779	96.786
24	.207	.715	97.501
25	.177	.609	98.110
26	.169	.583	98.693
27	.153	.526	99.219
28	.126	.436	99.654
29	.100	.346	100.000

Thereafter, the factor loading matrix was rotated orthogonally using the Varimax rotation method which helped to maximise the dispersion of loading within factors. Any items with factor loading greater than 0.63 and cross loading smaller than 0.32 after the factor loading rotation were selected for further study to guarantee the discriminant validity of the factors. However, there were two items which marginally failed to meet the selection criterion, namely: [FACT] (has factor loading of 0.696 and cross loading of 0.324) and [FAIR] (factor loading of 0.629 and cross loading of

0.447) present in the factor loading matrix. Attempts were made to include these two items in the model building using Structural Equation Modelling but were later omitted because the model did not converge. This lack of convergence indicates that the model building process was sensitive to the requirement that each measurement item should only measure a single factor uniquely.

As shown in Table 5-6, the observed items which loaded heavily on the first factor were “Livestock farmers keep public informed of the safety in consuming meat” [INFORM], “Livestock farmers provide information that can be trusted” [TRUINFO], “Livestock farmers provide accurate information” [CORRECT], and “Livestock farmers provide unbiased information” [UNBIASE] with loading of 0.833, 0.862, 0.740 and 0.679 respectively. This factor was labelled ‘providing information’, accounting for 39% of variance.

Observed items with substantial loading of 0.780, 0.844, 0.764, 0.725 and 0.662 on second factor were “Livestock farmers alter the fact to fulfil their own purpose” [HONEST], “Livestock farmers fail to keep promise” [PROMISE], “Livestock farmers fail to provide the support they are obligated to” [SUPPORT], “Livestock farmers follow government regulations” [ATTENT], and “Livestock farmers do not listen to consumers” [INTEREST] respectively. This factor was labelled ‘integrity’, accounting for 10% variance.

Observed items with substantial loading of 0.737 and 0.808 were “Livestock farmers care for consumers” [CARE], and “Livestock farmers are concerned about the consumers’ welfare” [CUSTOMER] respectively. This factor was labelled ‘benevolence’, accounting for 6% variance.

A single observed item with substantial loading of 0.812 was “Livestock farmers are sincere to follow up after an outbreak of food scare” [SINCERE]. This factor was labelled ‘reliability’, accounting for 5% variance.

Observed items with substantial loading of 0.728, 0.766, and 0.658 were “Livestock farmers are very knowledgeable to produce safe meat” [KNOWHOW], “Livestock farmers are not experts in food safety related issues” [EXPERT], and “Livestock farmers are able to give advice regarding food safety related issues” [ADVICE] respectively. This factor was labelled ‘competence’, accounting for 4% variance.

A single observed item with substantial loading of 0.805 was “I only trust large livestock farms” [SIZE]. This factor was labelled ‘credibility’, accounting for 4% variance.

Table 5-6 Factor Loading Matrix of the Observed Items

	Factor					
	Providing Information	Integrity	Benevolence	Reliability	Competence	Credibility
INFORM	.833	5.335E-02	7.912E-02	7.760E-02	.107	-6.79E-02
TRUINFO	.862	.146	.182	7.269E-02	7.130E-02	-7.98E-02
FACT	.696	8.558E-02	-2.371E-02	.303	.324	.109
CORRECT	.740	.135	8.901E-02	.311	.216	3.385E-02
UNBIASE	.679	.135	.235	-3.63E-02	.176	.130
KNOWHOW	.252	-.203	.196	.186	.728	-5.23E-02
EXPERT	.132	.301	-2.902E-03	1.704E-03	.766	-8.26E-02
ADVICE	.235	1.331E-02	.177	.308	.658	.278
ABILITY	.612	.125	.342	.209	.379	7.230E-02
COUNTON	.657	.172	.460	.103	.157	.139
SIZE	.116	-1.88E-02	5.220E-02	4.602E-03	5.342E-02	.805
FULFIL	.524	.250	.414	5.888E-02	-6.424E-02	.435
STRAIGHT	.552	.240	.434	.149	3.665E-02	.258
CONCERN	.615	.235	.363	.334	-6.494E-02	3.692E-02
REPUTA	.193	.298	.271	.103	.386	-.409
DEPEND	.327	5.760E-02	.329	.481	.147	-3.18E-03
ACCURATE	.517	.145	.111	.616	3.441E-02	-6.58E-02
SINCERE	8.506E-03	.142	.138	.812	.140	1.072E-02
FAIR	.447	.120	.301	.629	.234	4.273E-02
ETHICAL	.522	.188	.475	.299	.205	1.646E-02
TREAT	.319	.146	.581	.436	.188	-.115
HONEST	3.338E-02	.780	.171	-4.41E-02	.159	-7.53E-02
PROMISE	5.150E-02	.844	.152	-8.41E-02	.197	9.365E-02
SUPPORT	.245	.764	4.374E-02	.168	-6.718E-02	-3.13E-03
CARE	.239	.130	.737	.301	.102	4.630E-03
CUSTOMER	.204	.224	.808	6.597E-02	.128	2.233E-02
ATTENT	.140	.725	-1.089E-03	.130	-3.867E-02	.177
AWARE	6.824E-02	.601	.188	.272	3.119E-02	-.309
INTEREST	.303	.662	.213	.212	-1.912E-02	-.118

Note: loading greater than 0.63 with cross loading less than 0.32 were highlighted

5.5 DEVELOPMENT OF THE PROPOSED CONSUMER TRUST MODEL USING STRUCTURAL EQUATION MODELLING METHOD (SEM)

Following from the results of PCA, six factors labelled as ‘integrity’, ‘competence’, ‘credibility’, ‘reliability’, ‘benevolence’ and ‘providing information’ were selected and measured by 16 items. However, 4 measurement items were eliminated from the model development process using SEM due to non-convergence problems. This was because presumably there is too much variation or co-variance of these items to make sense of the data reducing that the observed variation allows the model to converge.

The resultant list of factors and items are shown in Table 5-7. The remaining 12 items, together with 4 items to measure ‘trust’ and 1 item to measure ‘purchase likelihood’ were presented in the form of SEM and LISREL 8.30 were used to estimate the effects of the causal factors of trust to purchase likelihood through trust.

Table 5-7 Causal Factors of Trust

Factors	Items
Integrity [integ]	Livestock farmers alter the fact to fulfil their own purpose ^a [HONEST] Livestock farmers fail to keep promises ^a [PROMISE]
Competence [compe]	Livestock farmers follow government regulations [ATTENT] Livestock farmers are very knowledgeable to produce safe meat [KNOWHOW] Livestock farmers are not experts in food safety related issues ^a [EXPERT] Livestock farmers are able to give advice with regard food safety related issues [ADVICE]
Credibility [credi] Reliability [relia]	I only trust large livestock farms [SIZE] Livestock farmers are sincere to follow up after an outbreak of food scare [SINCERE]
Benevolence [benev]	Livestock farmers are concerned about the welfare of consumers [CUSTOMER]
Providing information [infor]	Livestock farmers keep the public informed of the safety in consuming meat [INFORM] Livestock farmers provide information that can be trusted [TRUINFO] Livestock farmers provide correct information [CORRECT]

5.5.1 Model Specification of the Proposed Model

The parameter estimation for the proposed model was performed based on the model specification, which represented the relationships between the factors and the observed items (Appendix 13) and was expressed in the following mathematical equations.

^a Item is reversed score

5.5.1.1 *Structural Submodel Equations of the Proposed Model*

The structural submodel equations, which expressed the relationships between the factors in the proposed model, are shown below. For example, ‘trust’ is affected by ‘providing information’ (infor), ‘competence’ (compe), ‘reliability’ (relia), ‘integrity’ (integ), ‘credibility’ (credi) and ‘benevolence’ (benev). Similarly, ‘purchase likelihood’ is affected by ‘trust’.

$$\text{trust} = \gamma_{11} \text{ infor} + \gamma_{12} \text{ compe} + \gamma_{13} \text{ relia} + \gamma_{14} \text{ integ} + \gamma_{15} \text{ credi} + \gamma_{16} \text{ benev} + \zeta_1 \quad (5.1)$$

$$\text{purli} = \beta_{21} \text{ trust} + \zeta_2 \quad (5.2)$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous variable and the j^{th} exogenous variable

β_{ij} is the regression coefficient between the i^{th} endogenous variable and the j^{th} endogenous variable

ζ_i is the structural error of the i^{th} endogenous variable

5.5.1.2 *Measurement Submodel Equations of the Proposed Model*

Similar to the structural model equations, the following measurement model equations, which expressed the relationships between the observed items and factors, were used to express their relationships. For example, the factor, ‘providing information’ (infor) is measured by “Livestock farmers keep the public informed of the safety in consuming meat” [INFORM], “Livestock farmers provide information that can be trusted” [TRUINFO] and “Livestock farmers provide correct information” [CORRECT].

$$\text{INFORM} = \lambda_{11}^x \text{ infor} + \delta_1 \quad (5.3)$$

$$\text{TRUINFO} = \lambda_{21}^x \text{ infor} + \delta_2 \quad (5.4)$$

$$\text{CORRECT} = \lambda_{31}^x \text{ infor} + \delta_3 \quad (5.5)$$

$$\text{KNOWHOW} = \lambda_{42}^x \text{ compe} + \delta_4 \quad (5.6)$$

$$\text{EXPERT} = \lambda_{52}^x \text{ compe} + \delta_5 \quad (5.7)$$

$$\text{ADVICE} = \lambda_{62}^x \text{ compe} + \delta_6 \quad (5.8)$$

$$\text{SIZE} = \lambda_{73}^x \text{ credi} + \delta_7 \quad (5.9)$$

$$\text{SINCERE} = \lambda_{84}^x \text{ relia} + \delta_8 \quad (5.10)$$

$$\text{HONEST} = \lambda_{95}^x \text{ integ} + \delta_9 \quad (5.11)$$

$$\text{PROMISE} = \lambda_{105}^x \text{ integ} + \delta_{10} \quad (5.12)$$

$$\text{ATTENT} = \lambda_{115}^x \text{ integ} + \delta_{11} \quad (5.13)$$

$$\text{CUSTOMER} = \lambda_{126}^x \text{ benev} + \delta_{12} \quad (5.14)$$

$$\text{TRUTHFUL} = \lambda_{11}^y \text{ trust} + \varepsilon_1 \quad (5.15)$$

$$\text{CONFIDENT} = \lambda_{21}^y \text{ trust} + \varepsilon_2 \quad (5.16)$$

$$\text{COMPLETE} = \lambda_{31}^y \text{ trust} + \varepsilon_3 \quad (5.17)$$

$$\text{TRUSTWOR} = \lambda_{41}^y \text{ trust} + \varepsilon_4 \quad (5.18)$$

$$\text{PURCHASE} = \lambda_{52}^y \text{ purli} + \varepsilon_5 \quad (5.19)$$

Where λ_{ij}^x is the factor loading between the i^{th} observed item for the exogenous variable and the j^{th} exogenous variable

λ_{ij}^y is the factor loading between the i^{th} observed item for the endogenous variable and the j^{th} endogenous variable

δ_i is the error for the i^{th} observed item for the exogenous variable

ε_j is the error for the j^{th} observed item for the endogenous variable

5.5.2 Parameters Estimation of the Proposed Consumer Trust Model

A total of 52 parameters were estimated using the Generalised Weighted Least Square Method on the correlation matrix of the observed items due to the non-parametric nature of the data (Appendix 14). As a result of this process, a model showing the relationship among the causal factors of trust, consumer trust and consumer purchase likelihood was constructed called the proposed model as shown in Figure 5-1.

In the path diagram, the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading which was the variance explained by the factor for each observed item. For instance, the factor 'infor' explained 0.80, 0.90 and 0.72 of the variance of the items [INFORM], [TRUINFO] and [CORRECT] respectively. It is represented mathematically as follow:

$$\text{INFORM} = 0.80 \times \text{'infor'} + \text{measurement error} \quad (5.20)$$

$$\text{TRUINFO} = 0.90 \times \text{'infor'} + \text{measurement error} \quad (5.21)$$

$$\text{CORRECT} = 0.72 \times \text{'infor'} + \text{measurement error} \quad (5.22)$$

The arrow between two factors represented the causal effect from the factor at the arrow end to that at the arrowhead. In other words, it represented the regression coefficient between the two factors. For instance, the causal effect from the causal factor 'infor' to 'trust' was 0.39, and the causal effect from 'trust' to 'purchase likelihood' was 0.45. That is, 'trust' could be predicted from the six causal factors namely: 'infor', 'compe', 'relia', 'integ', 'credi' and 'benev', and is represented mathematically as follow:

$$\begin{aligned} \text{'trust'} = & 0.39 \times \text{'infor'} + 0.10 \times \text{'compe'} + 0.09 \times \text{'relia'} + 0.25 \times \text{'integ'} + 0.11 \\ & \times \text{'credi'} + 0.26 \times \text{'benev'} + \text{structural error} \end{aligned} \quad (5.23)$$

Similarly, 'purli' could be predicted from 'trust'. The relationship is represented as

$$\text{'purli'} = 0.45 \times \text{'trust'} + \text{structural error} \quad (5.24)$$

or

$$\begin{aligned} \text{'purli'} = & 0.45 \times = 0.39 \times \text{'infor'} + 0.10 \times \text{'compe'} + 0.09 \times \text{'relia'} + 0.25 \times \\ & \text{'integ'} + 0.11 \times \text{'credi'} + 0.26 \times \text{'benev'} + \text{structural error} \end{aligned} \quad (5.25)$$

In addition, item loading, standard deviation and t-value are tabulated in Table 5-8 to show whether the items were significantly different from zero. For instance, the factor 'integrity' explained 0.90, 0.86 and 0.63 of variance of the items [HONEST], [PROMISE], and [ATTENT] respectively. These items were considered as a reliable measure for the factor 'integrity' because the standard deviation of these items was small (maximum standard deviation - [SIZE], [SINCERE] and [CUSTOMER] - equalled to 0.04) and all the t-values were larger than 18.14 (>1.96 for 5% significant

level). Though these items were significantly different from zero and had very small standard deviations, the model was formally evaluated to assess its reliability and validity.

Figure 5-1 Path Diagram of the Proposed Model

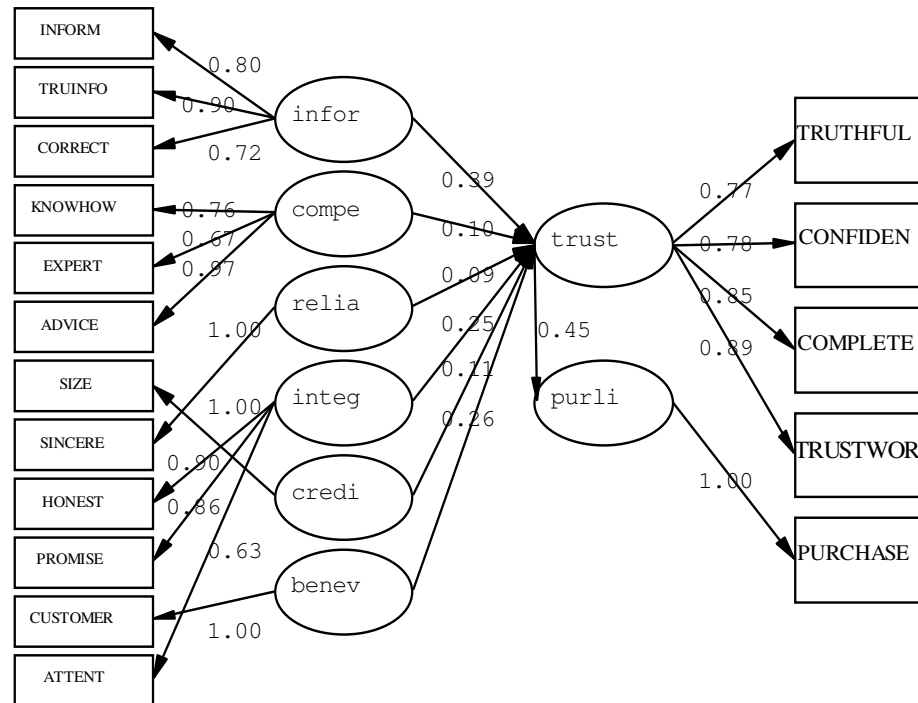


Table 5-8 Factors with Item Loading - Proposed Model

Factors/Items	Item loading	S. D.	t-value ^a
Integrity [integ]			
honest [HONEST]	0.90	0.02	44.67
keep promise [PROMISE]	0.86	0.02	47.73
follow regulations [ATTENT]	0.63	0.03	18.14
Competence [compe]			
knowledgeable in food safety [KNOWHOW]	0.76	0.02	42.72
expert in food safety [EXPERT]	0.67	0.03	23.94
able to give good advice [ADVICE]	0.97	0.03	28.46
Credibility [credi]			
Size of farms[SIZE]	1.00	0.04	27.78
Reliability [relia]			
sincere to follow up after an outbreak of food scare[SINCERE]	1.00	0.04	27.78
Providing information [infor]			
keep public informed [INFORM]	0.80	0.02	41.74
provide information that can be trusted[TRUINFO]	0.90	0.01	68.88
provide correct information [CORRECT]	0.72	0.02	38.52
Benevolence [benev]			
Concern about consumers' welfare [CUSTOMER]	1.00	0.04	27.78
Trust [trust]			
truthful [TRUTHFUL]	0.77	-	-
have confidence [CONFIDEN]	0.78	0.02	33.74
rely on completely [COMPLETE]	0.85	0.02	37.97
trustworthy [TRUSTWOR]	0.89	0.02	38.82
Purchasing likelihood [purli]			
future purchase [PURCHASE]	1.00	-	-

^a all corresponding p values were less than 0.001

5.5.3 Evaluation of the Proposed Model

By adopting the two step approach, that is to evaluate the measurement submodel followed by the evaluation of the structural submodel, the following results were obtained using the equations listed in Appendix 5.

5.5.3.1 *Items and Factors Reliability of the Proposed Model*

Since the reliability for single-item factor is always unity, there is no need to check for ‘credibility’, ‘reliability’, ‘benevolence’ and ‘purchase likelihood’ because the variance is totally captured by the factor. As shown in Table 5-9, apart from “Livestock farmers follow government regulations” [ATTENT], of which the reliability was 0.39, all values met or exceeded the recommended guidelines to ensure the variance captured by the item or factor was more than by the error component. In other words the factors were reliably measured by the items. So both item and factor reliability were assumed. For instance,

- The minimum value of Cronbach alpha was 0.73 for ‘competence’ which was measured by [KNOWHOW], [EXPERT] and [ADVICE] and was greater than the suggested guideline of 0.70. So ‘competence’ was reliably measured by [KNOWHOW], [EXPERT] and [ADVICE].
- The minimum value of factor reliability was 0.84 for ‘integrity’ which was measured by [HONEST], [PROMISE] and [ATTENT] and was greater than the guideline of 0.50 (Hair et al., 1992). So ‘integrity’ was reliably measured by [HONEST], [PROMISE] and [ATTENT].
- The minimum value of item reliability was 0.39 for [ATTENT], which was marginally below the guideline of 0.4 (Bagozzi and Baumgartner, 1994). However,

due to the small deviation from the guideline, the item reliability was accepted but with caution.

Table 5-9 Reliability of Factors and Items - Proposed Model

Factors/ items	Cronbach alpha	Factor reliability	Item reliability
integrity	0.81	0.84	-
HONEST	-	-	0.82
PROMISE	-	-	0.74
ATTENT	-	-	0.39
competence	0.73	0.85	-
KNOWHOW	-	-	0.57
EXPERT	-	-	0.45
ADVICE	-	-	0.94
credibility	-	1.00	-
SIZE	-	-	1.00
reliability	-	1.00	-
SINCERE	-	-	1.00
benevolence	-	1.00	-
CUSTOMER	-	-	1.00
providing information	0.88	0.85	-
INFORM	-	-	0.64
TRUINFO	-	-	0.82
CORRECT	-	-	0.52
trust	0.88	0.90	-
TRUTHFUL	-	-	0.60
CONFIDEN	-	-	0.61
COMPLETE	-	-	0.73
TRUSTWOR	-	-	0.80
purchase likelihood	-	1.00	-
PURCHASE	-	-	1.00

5.5.3.2 *Factors Validity of the Proposed Model*

The convergent validity was guaranteed because first, only those items with factor loading greater than 0.63 and cross loading less than 0.32 were included for the model development (Section 5.4). Second, all paths in the measurement submodel were statistically significant (as shown in Table 5-8, all p-values were less than 0.001). Third, the minimum value of the proportion between the item loading and its standard deviation was 21 times which exceeded the requirement of 10 to 20 times (i.e. the value of the item loading of “Livestock farmers follow government regulations” [ATTENT] was 0.63 and its standard deviation was 0.03). So measurement items designed to measure the same factor were related.

The requirement of ensuring discriminant validity is that all chi-square (χ^2) differences between the constrained model and the unconstrained model are greater than the threshold of 10.83 for one degree of freedom at 1% level. As shown in Table 5-10, the discriminant validity was guaranteed because the minimum χ^2 difference from the pair-wise tests among the 8 factors in the proposed model equalled 30.03 (i.e. between ‘providing information’ and ‘benevolence’), which was greater than the threshold of 3.84. The results show that the correlation among all factors was significantly different from unity which means that the items which measured different factors were unique.

Table 5-10 Assessment of Discriminant Validity of the Proposed Model

Factor	χ^2 (d.f.)		χ^2 (d.f.=1)
	Constrained model ^a	Unconstrained model	Difference
providing information			
competence	51.87 (9)	12.07 (8)	39.80
integrity	69.85 (9)	12.26 (8)	57.59
credibility	67.84 (3)	0.71 (2)	67.13
reliability	68.13 (3)	11.62 (2)	56.51
benevolence	37.84 (3)	7.81 (2)	30.03
trust	41.75 (14)	6.86 (13)	34.89
purchase likelihood	68.07 (3)	1.59 (2)	66.48
competence			
integrity	86.14 (9)	35.26 (8)	50.88
credibility	82.18 (3)	12.07 (2)	70.26
reliability	49.74 (3)	3.96 (2)	45.78
benevolence	38.87 (3)	3.12 (2)	35.75
trust	73.75 (14)	25.44 (13)	48.31
purchase likelihood	77.68 (3)	1.60 (2)	76.08
integrity			
credibility	108.57 (3)	5.10 (2)	103.30
reliability	76.48 (3)	0.14 (2)	76.34
benevolence	34.40 (3)	0.19 (2)	34.21
trust	59.28 (14)	19.44 (13)	39.84
purchase likelihood	71.43 (3)	1.59 (2)	69.84
credibility			
reliability	101.52 (1)	-	101.52
benevolence	74.30 (1)	-	74.30
trust	83.00 (6)	3.37 (5)	79.63
purchase likelihood	130.74 (1)	-	130.74
reliability			
benevolence	49.25 (1)	-	49.25
trust	57.78 (6)	6.89 (5)	50.89
purchase likelihood	73.17 (1)	-	73.17
benevolence			
trust	23.33 (6)	3.35 (5)	19.98
purchase likelihood	65.56 (1)	-	65.56
trust			
purchase likelihood	53.43 (6)	1.37 (5)	52.06

All χ^2 difference are significant (1 degree of freedom) at the 0.001 level.

^a Constrained model is a Structural Equation Model with the correlation between the factor in bold and the factor listed beneath it set to one. Unconstrained model is a Structural Equation Model without such constraint.

5.5.3.3 *Average Variance Extracted*

Average variance extracted for multi-items factors was calculated to ensure the variance due to measurement error is smaller than that captured by the factor (Appendix 6). For single item factors the variance is totally captured by the factor. As shown in Table 5-11 all measures met or exceeded the recommended threshold of 0.50. For instance, the minimum value of average variance extracted was 0.65 for both factors ‘competence’ and ‘integrity’. These results show that all factors were valid because the variance due to measurement error was smaller than that captured by the factor for all factors.

Table 5-11 Factor Validity of the Proposed Model

Factors	Average variance extracted
Integrity	0.65
Competence	0.65
Credibility	1.00
Reliability	1.00
Benevolence	1.00
Providing information	0.66
Trust	0.68
Purchase likelihood	1.00

5.5.3.4 *Nomological Validity of the Structural Submodel*

Following the evaluation of the measurement submodel, the validity of the structural submodel of the proposed model was evaluated by the total coefficient of determination to assess the relationship among the causal factors of trust, consumer trust and consumer purchase likelihood. Using the equation A6.8 in Appendix 6, the value of 0.75 for the total coefficient of determination suggested that the joint relationship among the factors was acceptable. This means that the proposed model has an acceptable predictive power for purchase likelihood from the causal factors of trust through consumer trust.

5.5.3.5 *The Overall Goodness of Model Fit*

As shown in Table 5-12, all absolute fit indices fell above the threshold of 0.90 which reflected a good fit (Table 3-7). For instance, NFI = 0.98, NNFI = 0.99, GFI = 0.99, AGFI = 0.98. So the proposed model was adequately representing the entire set of causal relationships. Because of the acceptable nomological validity and overall goodness of model fit, the causal factors of trust in this model could adequately predict consumer purchasing likelihood through consumer trust.

Table 5-12 Proposed Model - Overall Goodness of Model Fit

Goodness of Model Fit Statistics	
Absolute fit	
	Minimum Fit Function Chi-Square = 310.78 (P = 0.0)
	Degrees of Freedom = 101
	Root Mean Square Error of Approximation (RMSEA) = 0.10
	Normed Fit Index (NFI) = 0.98
	Non-Normed Fit Index (NNFI) = 0.99
	Goodness of Fit Index (GFI) = 0.99
	Adjusted Goodness of Fit Index (AGFI) = 0.98
Comparative fit	
	Comparative Fit Index (CFI) = 0.99
	Incremental Fit Index (IFI) = 0.99
	Relative Fit Index (RFI) = 0.98
Parsimonious fit	
	Parsimony Goodness of Fit Index (PGFI) = 0.65
	Parsimony Normed Fit Index (PNFI) = 0.73

5.5.3.6 *Power for Testing the Close Fit*

In order to ensure that any incorrect models are likely to be rejected, the statistical power associated with the model was calculated (Appendix 7). The result of the power estimate for the test of close fit of the proposed model was 0.95 which was sufficiently powerful to reject an incorrect model (Section 3.4.10.6). This result shows that it is incorrect to reject the model with causal factors, namely: 'providing

information', 'integrity', 'competence', 'credibility', 'reliability', and 'benevolence' having effect on 'trust' and in turn on 'purchase likelihood'.

Indeed, the proposed model was likely to represent the relationships between the items and factors, that is, consumer purchase likelihood could be predicted by the causal factors of trust through trust. However, an alternative model having 'providing information' acting as an mediator between the other five causal factors and trust was examined (Section 3.4.11).

5.6 RIVAL MODEL

As described in Section 3.4.11, a rival model comprised of factors 'competence', 'reliability', 'integrity', 'benevolence', and 'credibility' passing through 'providing information' to 'trust', and subsequently to 'purchase likelihood' was developed. The model specification and the mathematical presentation of the structural and measurement submodels are shown in Appendix 15 and Appendix 16 respectively. The estimates of parameters are shown in Appendix 17. The path diagram showing the relationship among the factors and items of the rival model is shown in Figure 5-2.

In the path diagram, the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading which was the variance explained by the factor for each observed item. For instance, the factor 'compe' explained 0.80, 0.74 and 0.96 of variance of the items [KNOWHOW], [EXPERT] and [ADVICE] respectively. It is represented mathematically as follow:

$$\text{KNOWHOW} = 0.80 \times \text{'compe'} + \text{measurement error} \quad (5.26)$$

$$\text{EXPERT} = 0.74 \times \text{'compe'} + \text{measurement error} \quad (5.27)$$

$$\text{ADVICE} = 0.96 \times \text{'compe'} + \text{measurement error} \quad (5.28)$$

The arrow between two factors represented the causal effect from the factor at the arrow end to that at the arrowhead. In other words, it represented the regression coefficient between the two factors. For instance, The effect from factors ‘compe’ and ‘relia’ to factor ‘infor’ was 0.31 and 0.22 respectively. That is, ‘trust’ could be predicted from the five causal factors namely: ‘compe’, ‘relia’, ‘integ’ ‘credi’ and ‘benev’ operating through ‘infor’ and is represented mathematically as follow:

$$\text{‘infor’} = 0.31 \times \text{‘compe’} + 0.22 \times \text{‘relia’} + 0.32 \times \text{‘integ’} + 0.03 \times \text{‘credi’} + 0.28 \times \text{‘benev’} + \text{structural error} \quad (5.29)$$

Similarly, ‘purli’ could be predicted from ‘trust’. The relationship is represented as

$$\text{‘purli’} = 0.42 \times \text{‘trust’} + \text{structural error} \quad (5.30)$$

In addition, item loading, standard deviation and t-value are tabulated in Table 5-13 showing that the items were significantly different from zero. For instance, the factor ‘integrity’ explained 0.89, 0.84 and 0.65 of variance of the items [HONEST], [PROMISE], and [ATTENT] respectively. These items were considered as a reliable measure for the factor ‘integrity’ because the standard deviation of these items was small (maximum standard deviation - [SIZE], [SINCERE] and [CUSTOMER] - equalled to 0.04) and all the t-values were larger than 19.48 (>1.96 for 5% significant level).

Figure 5-2 Path Diagram of the Rival Model

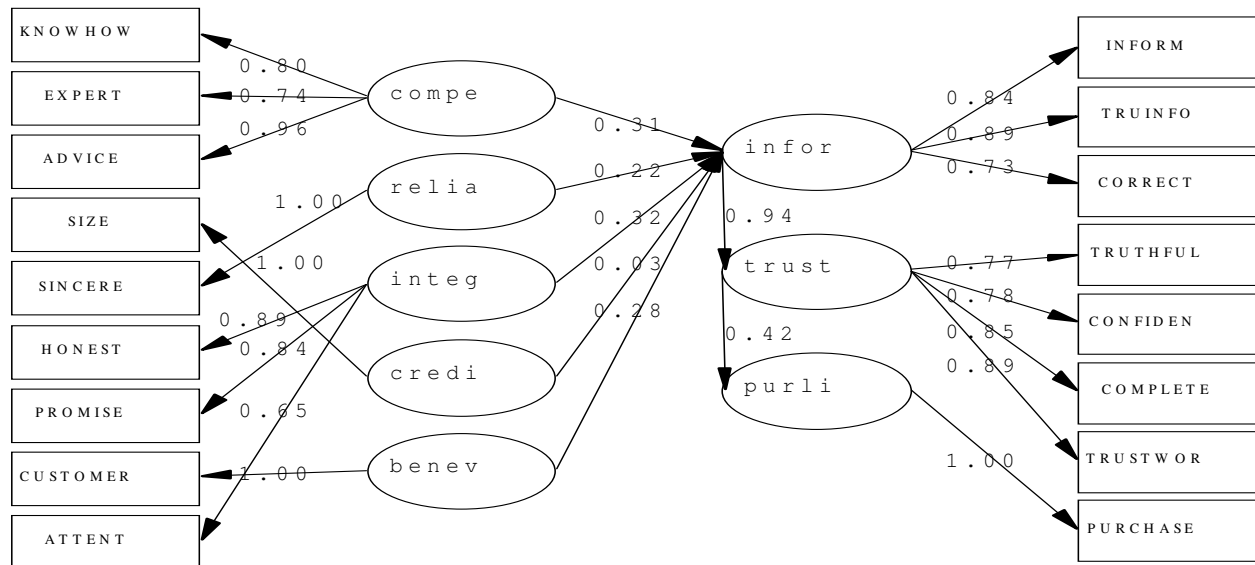


Table 5-13 Rival Model – Factors with Item Loading

Factors/Items	Item loading	S. D.	t-value ^a
Integrity [integ]			
honest [HONEST]	0.89	0.02	51.58
keep promise [PROMISE]	0.84	0.02	50.48
follow regulations [ATTENT]	0.65	0.03	19.48
Competence [compe]			
knowledgeable in food safety [KNOWHOW]	0.80	0.02	41.34
expert in food safety [EXPERT]	0.74	0.02	33.48
able to give good advice [ADVICE]	0.96	0.03	34.00
Credibility [credi]			
size of farms [SIZE]	1.00	0.04	27.78
Reliability [relia]			
sincere to follow up after an outbreak of food scare [SINCERE]	1.00	0.04	27.78
Providing information [infor]			
keep public informed [INFORM]	0.84	-	-
provide information that can be trusted [TRUINFO]	0.89	0.03	34.97
provide correct information [CORRECT]	0.73	0.02	36.85
Benevolence [benev]			
Concern about consumers' welfare [CUSTOMER]	1.00	0.04	27.78
Trust [trust]			
truthful [TRUTHFUL]	0.77	-	-
have confidence [CONFIDEN]	0.78	0.02	38.03
rely on completely [COMPLETE]	0.85	0.02	42.86
trustworthy [TRUSTWOR]	0.89	0.02	44.17
Purchasing likelihood [purli]			
future purchase [PURCHASE]	1.00	-	-

^a all corresponding p values were less than 0.001

5.6.1 Evaluation of the Rival Model

The reliability and validity of the items were guaranteed since the rival model was estimated by the same items as those in the proposed model. So the factors were reliably measured by the items.

Because of changing of the relationship from the causal factors of trust to ‘trust’ through ‘providing information’, the total coefficient of determination was recalculated. By applying the equation A6.8 in Appendix 6, a value of 0.73 for the total coefficient of determination suggested that the rival model has an acceptable predictive power for the relationship as represented in the model.

The absolute fit indices of the overall model fit lay above 0.90 suggesting that the rival model with the five causal factors of trust passing through ‘providing information’ adequately represented the entire set of causal relationships. The power for the test of close fit was greater than 0.95, which was sufficiently powerful to reject an incorrect model. The results of the overall model fit show that purchase likelihood could be predicted from trust, where the latter was strongly influenced by information provided to consumers. So the next step was to select a better “fitted” model between these two models by comparing their overall model fit and number of significant paths.

5.6.2 Comparison of the Proposal Model and the Rival Model

The comparisons of overall goodness of fit between the proposal model and rival model were shown in Table 5-14.

Table 5-14 Comparison of Models Fit Indices Between the Proposed Model and the Rival Model

	Proposed model	Rival Model
Absolute fit indices		
χ^2 (d.f.)	310.78 (101)	401.71 (106)
RMSEA	0.10	0.12
NFI	0.98	0.98
NNFI	0.99	0.98
GFI	0.99	0.98
AGFI	0.98	0.97
Comparative fit indices		
CFI	0.99	0.98
IFI	0.99	0.98
RFI	0.98	0.97
Parsimonious fit indices		
PGFI	0.65	0.68
PNFI	0.73	0.76
Number of significant paths	7/7	6/7

When comparing the absolute fit indices, the Normed Fit Index (NFI) was the same for both models whereas the other indices of the proposed model were better than those of the rival model. For instance, the Non-Normed Fit Index (NNFI) equalled 0.99 for the proposed model compared with 0.98 for the rival model. In addition, the Root Mean Square Error of Approximation (RMSEA) of the rival model was greater than the proposed model (0.12 verses 0.10). So, under this category, the proposed model appeared to be better than the rival model.

When comparing the comparative fit indices, all the indices for the proposed model were better than the rival model. For instance, the Comparative Fit Index (CFI) was 0.99 for the proposed model compared with 0.98 for the rival model. This finding implied that the proposed model would provide a better fit to the data than the rival model.

Contrary to the absolute and comparative indices, the parsimonious indices were better for the rival model. For instance, both the Parsimony Goodness of Fit Index (PGFI) and the Parsimony Normed fit Index (PNFI) for the proposed model were 0.65 and 0.73 respectively, whereas those for the rival model were 0.68 and 0.76 respectively. However, the parsimonious fit indices were concerned primarily with the choice of choosing a model with possibly higher overall model fit but with more parameters to be estimated or possibly lower model fit with less parameters to be estimated. In this analysis, there were 52 free parameters to be estimated in the proposed model while only 47 free parameters in the rival model.

When comparing the number of significant paths, all seven paths in the structural model of the proposed model were statistically significant (γ 's and β 's in Appendix 14) whereas only six out of seven in the rival model were statistically significant (the path from 'credibility' to 'providing information' [γ_{14}] was insignificant, Appendix 17). It implies that the proposed model was better than the rival model in term of number of significant causal effects.

In view of the above comparison, the proposed model was chosen because it gave a better absolute fit together with a better fit to the data, as well as having more statistical significant paths with only a sacrifice of 0.03 in parsimony. So, the proposed model with the relationships between the six causal factors namely, 'providing information', 'integrity', 'benevolence', 'competence', 'credibility' and 'reliability', and 'purchase likelihood' operating through the factor 'trust' was accepted as the best "fitted" model. The proposed model was then checked for any further improvement by model modification and residual analysis.

5.7 MODEL MODIFICATION

Modification index (m.i.), which provided by LISREL 8.30 was used to improve the absolute model fit (Section 3.4.10.5), in the form of a decrease in χ^2 of the model by adding a relationship between selected factors (Table 5-15).

Table 5-15 Modification Indices for the Proposed Model

From To	infor	compe	relia	integ	credi	benev
trust	--	--	--	--	--	--
purli	2.93	0.41	1.43	0.06	2.42	30.81

The salient model modification indices for the proposed model were:

- adding a path from ‘providing information’ to ‘purchase likelihood’ (m.i. = 2.93), called Model M1
- adding a path from ‘credibility’ to ‘purchase likelihood’ (m.i. = 2.42), called Model M2
- adding a path from ‘benevolence’ to ‘purchase likelihood’ (m.i. = 30.81), called Model M3

Structural equation modelling analysis was carried out for these three models in turn to check for any improvement on the overall model fit.

5.7.1 Model M1

Model M1 was constructed by adding a path from ‘providing information’ to ‘purchase likelihood’ to the proposed model. The model specification and the mathematical presentation of the model are shown in Appendix 19 and Appendix 20 respectively. The parameter estimations of Model M1 are shown in Appendix 21.

In the path diagram (Figure 5-3), the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading. For instance, the factor ‘infor’ explained 0.81, 0.90 and 0.73 of the variance of the items [INFORM], [TRUINFO] and [CORRECT] respectively. So it is represented mathematically as follow:

$$\text{INFORM} = 0.81 \times \text{‘infor’} + \text{measurement error} \quad (5.31)$$

$$\text{TRUINFO} = 0.90 \times \text{‘infor’} + \text{measurement error} \quad (5.32)$$

$$\text{CORRECT} = 0.73 \times \text{‘infor’} + \text{measurement error} \quad (5.33)$$

The arrow between two factors represented the causal effect or the regression coefficient from the factor at the arrow end to that at the arrowhead. For instance, the causal effect from the causal_factor ‘infor’ to ‘trust’ was 0.39, and the causal effect from ‘trust’ to ‘purchase likelihood’ was 0.30. That is, ‘trust’ could be predicted from the six causal factors namely: ‘infor’, ‘compe’, ‘relia’, ‘integ’ ‘credi’ and ‘benev’, and is represented mathematically as follow:

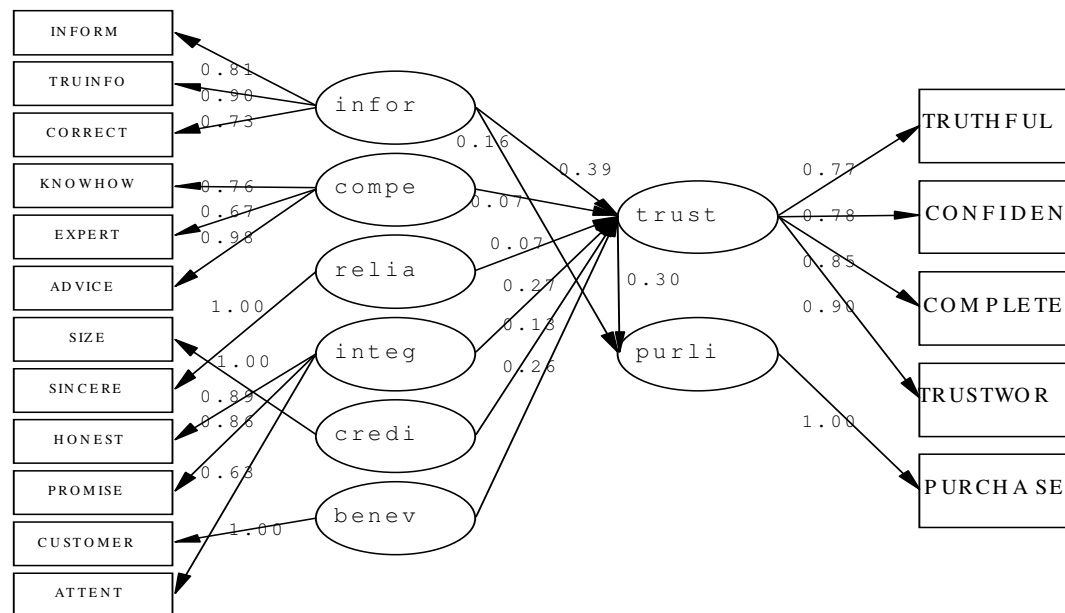
$$\begin{aligned} \text{‘trust’} = & 0.39 \times \text{‘infor’} + 0.07 \times \text{‘compe’} + 0.07 \times \text{‘relia’} + 0.27 \times \text{‘integ’} \\ & + 0.13 \times \text{‘credi’} + 0.26 \times \text{‘benev’} + \text{structural error} \end{aligned} \quad (5.34)$$

Similarly, ‘purli’ could be predicted from ‘trust’ and ‘infor’. The relationship is represented as:

$$\text{'purli'} = 0.16 \times \text{'infor'} + 0.30 \times \text{'trust'} + \text{structural error} \quad (5.35)$$

The reliability and validity of the items were guaranteed since Model M1 was estimated by the same items as those in the proposed model. Using the equation A6.8 in Appendix 6, the total coefficient of determination equalled 0.73, suggesting the model has an acceptable predictive power for 'purchase likelihood' from the relationships as stated in the model. The overall goodness of model fit was acceptable because all absolute fit indices fell above the threshold (Appendix 22). For instance, NFI = 0.98, NNFI = 0.99, GFI = 0.99, AGFI = 0.98. The power estimate for testing the close fit of the model was greater than 0.90 indicating that the analysis was sufficiently powerful to reject an incorrect model. So Model M1, represents the relationship between the six causal factors of trust and purchase likelihood through trust and an additional relationship from 'providing information' to 'purchase likelihood'. This was viewed as a valid model for future model comparison.

Figure 5-3 Path Diagram of Model M1



5.7.2 Model M2

Model M2 was constructed by adding a path from ‘credibility’ to ‘purchase likelihood’ to the proposed model. The model specification and the mathematical presentation of the model are shown in Appendix 23 and Appendix 24 respectively. The parameter estimations of Model M2 are shown in Appendix 25.

In the path diagram (Figure 5-4), the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading. For instance, the factor ‘infor’ explained 0.80, 0.91 and 0.72 of the variance of the items [INFORM], [TRUINFO] and [CORRECT] respectively. So it is represented mathematically as follow:

$$\text{INFORM} = 0.80 \times \text{‘infor’} + \text{measurement error} \quad (5.36)$$

$$\text{TRUINFO} = 0.91 \times \text{‘infor’} + \text{measurement error} \quad (5.37)$$

$$\text{CORRECT} = 0.72 \times \text{‘infor’} + \text{measurement error} \quad (5.38)$$

The arrow between two factors represented the causal effect or the regression coefficient from the factor at the arrow end to that at the arrowhead. For instance, the causal effect from the causal_factor ‘infor’ to ‘trust’ was 0.41, and the causal effect from ‘trust’ to ‘purchase likelihood’ was 0.46. That is, ‘trust’ could be predicted from the six causal factors namely: ‘infor’, ‘compe’, ‘relia’, ‘integ’ ‘credi’ and ‘benev’, and is represented mathematically as follow:

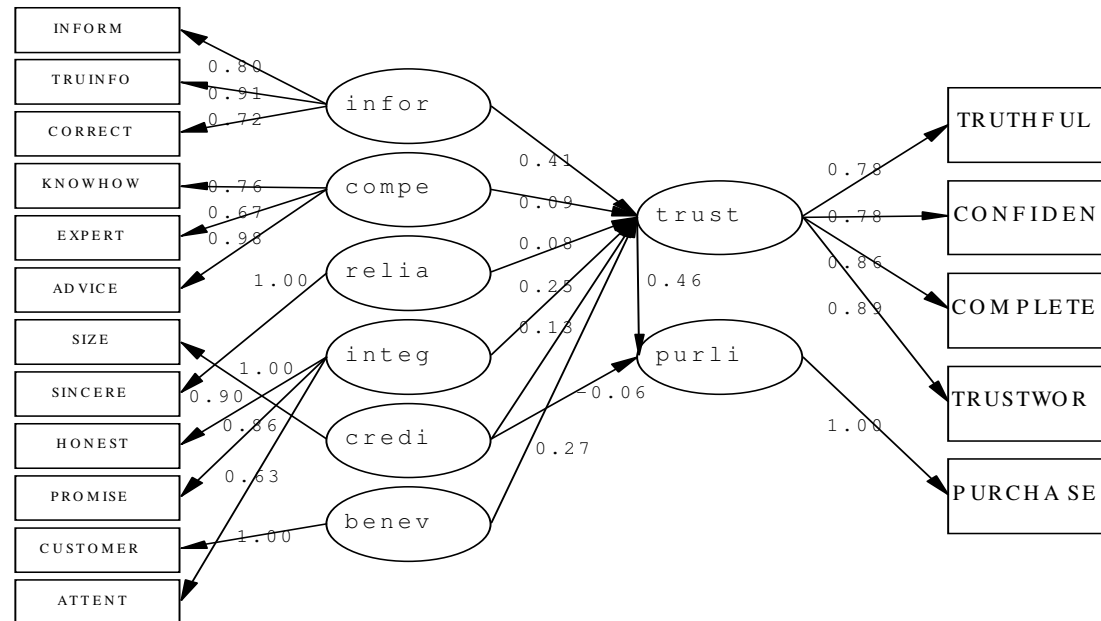
$$\begin{aligned} \text{‘trust’} = & 0.41 \times \text{‘infor’} + 0.09 \times \text{‘compe’} + 0.08 \times \text{‘relia’} + 0.25 \times \text{‘integ’} \\ & + 0.13 \times \text{‘credi’} + 0.27 \times \text{‘benev’} + \text{structural error} \end{aligned} \quad (5.39)$$

Similarly, ‘purli’ could be predicted from ‘trust’ and ‘credi’. The relationship is represented as:

$$\text{‘purli’} = - 0.06 \times \text{‘credi’} + 0.46 \times \text{‘trust’} + \text{structural error} \quad (5.40)$$

The reliability and validity of the items were guaranteed since Model M2 was estimated by the same items as those in the proposed model. Using the equation A6.8 in Appendix 6, the total coefficient of determination was recalculated and equalled 0.76, suggesting the model has an acceptable predictive power for ‘purchase likelihood’ from the relationships as stated in the model. The overall goodness of model fit was acceptable because all absolute fit indices fell above the threshold (Appendix 26). For instance, NFI = 0.98, NNFI = 0.99, GFI = 0.99, AGFI = 0.98. The power estimate for testing the close fit of the model was greater than 0.90 indicating that the analysis was sufficiently powerful to reject an incorrect model. So model M2 was also treated as a valid model for model comparison with the proposed model.

Figure 5-4 Path Diagram of Model M2



5.7.3 Model M3

Model M3 was constructed by adding a path from ‘benevolence to ‘purchase likelihood’ to the proposed model. The model specification and the mathematical presentation of the model are shown in Appendix 27 and Appendix 28 respectively. The parameter estimations of Model M2 are shown in Appendix 29.

In the path diagram (Figure 5-5), the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading. For instance, the factor ‘infor’ explained 0.81, 0.91 and 0.77 of the variance of the items [INFORM], [TRUINFO] and [CORRECT] respectively. So it is represented mathematically as follow:

$$\text{INFORM} = 0.81 \times \text{‘infor’} + \text{measurement error} \quad (5.41)$$

$$\text{TRUINFO} = 0.91 \times \text{‘infor’} + \text{measurement error} \quad (5.42)$$

$$\text{CORRECT} = 0.77 \times \text{‘infor’} + \text{measurement error} \quad (5.43)$$

The arrow between two factors represented the causal effect or the regression coefficient from the factor at the arrow end to that at the arrowhead. For instance, the causal effect from the causal_factor ‘infor’ to ‘trust’ was 0.33, and the causal effect from ‘trust’ to ‘purchase likelihood’ was 0.27. That is, ‘trust’ could be predicted from the six causal factors namely: ‘infor’, ‘compe’, ‘relia’, ‘integ’ ‘credi’ and ‘benev’, and is represented mathematically as follow:

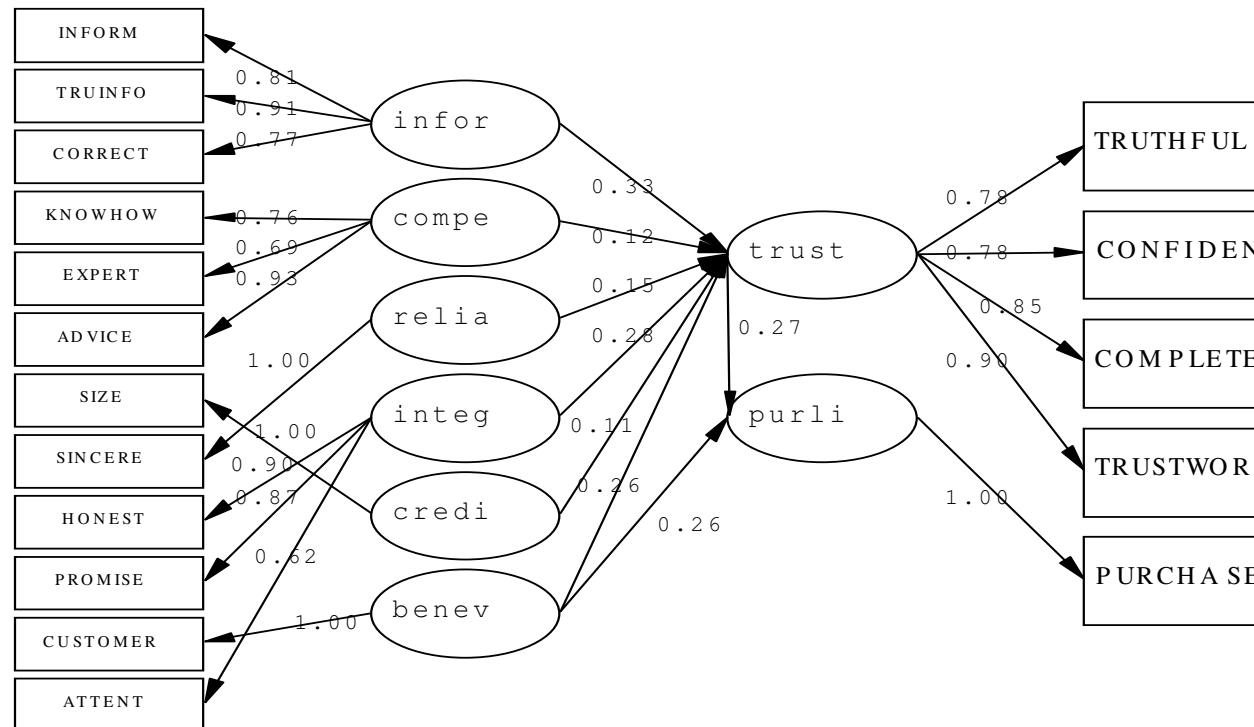
$$\begin{aligned} \text{‘trust’} = & 0.33 \times \text{‘infor’} + 0.12 \times \text{‘compe’} + 0.15 \times \text{‘relia’} + 0.28 \times \text{‘integ’} \\ & + 0.11 \times \text{‘credi’} + 0.26 \times \text{‘benev’} + \text{structural error} \end{aligned} \quad (5.44)$$

Similarly, ‘purli’ could be predicted from ‘trust’ and ‘benev’. The relationship is represented as:

$$\text{‘purli’} = 0.26 \times \text{‘benev’} + 0.27 \times \text{‘trust’} + \text{structural error} \quad (5.45)$$

The reliability and validity of the items were guaranteed since Model M3 was estimated by same items as those in the proposed model. Using the equation A6.8 in Appendix 6, the total coefficient of determination equalled 0.76, suggesting the model has an acceptable predictive power for purchase likelihood from the relationships as stated in the model. The overall goodness of model fit was acceptable because all absolute fit indices fell above the threshold (Appendix 30). For instance, NFI = 0.99, NNFI = 0.99, GFI = 0.99, AGFI = 0.98. The power estimate for test the close fit of the model was greater than 0.90 indicating that the analysis was sufficiently powerful to reject an incorrect model. This model was also treated as a valid model for the comparison with the proposed model.

Figure 5-5 Path Diagram of Model M3



5.7.4 Comparison of the Proposed Model with Models M1, M2 and M3

The results obtained by comparing the four models based on the absolute fit indices, comparative indices, parsimonious fit indices, and number of significant paths are listed in Table 5-16.

Table 5-16 Comparison of the Overall Goodness of Model Fit

	Proposed Model	Model M1	Model M2	Model M3
Absolute fit indices				
χ^2 (d.f.)	310.78 (101)	307.10 (100)	308.27 (100)	279.00 (100)
RMSEA	0.10	0.10	0.10	0.10
NFI	0.98	0.98	0.98	0.99
NNFI	0.99	0.99	0.99	0.99
GFI	0.99	0.99	0.99	0.99
AGFI	0.98	0.98	0.98	0.98
Comparative fit indices				
CFI	0.99	0.99	0.99	0.99
IFI	0.99	0.99	0.99	0.99
RFI	0.98	0.98	0.98	0.98
Parsimonious fit indices				
PGFI	0.65	0.64	0.64	0.65
PNFI	0.73	0.72	0.72	0.72
Number of significant paths				
	7/7	6/8	7/8	8/8

When comparing the absolute fit indices, apart from the Normed Fit Index (NFI), (0.99 for Model M3 compared with 0.98 for others), the other indices were the same for all models. For instance, the Non-Normed Fit Index (NNFI) equalled 0.99 across the board. So, it appears that the four models were equivalent to reproduce the actual covariance matrix.

There were no differences across the four models for the comparative fit indices. For instance, the Comparative Fit Index (CFI) was 0.99 for all models. This finding implied that there was no difference in providing a better fit to the data.

When comparing both the Parsimony Goodness of Fit Index (PGFI) and the Parsimony Normed fit Index (PNFI), the proposed model was slightly better than Model M3 (0.65 and 0.73 against 0.65 and 0.72), and much better than Models M1 and M2.

All paths in the structural submodel of the proposed model and Model M3 were statistically significant (γ 's and β 's in Appendices 17 and 29) whereas only six out of eight in Model M1 and seven out of eight in Model M2 were statistically significant (Appendices 21 and 25). This implied that both the proposed model and Model M3 were better than the rest in terms of number of significant causal effects.

In view of the above comparison, the proposed model was chosen because first, all causal paths of the proposed model were significant while Models M1 and M2 were not. Second, the proposed model was parsimoniously better than Models M1, M2 and M3. So the proposed model showing the relationships between the six causal factors of trust and purchase likelihood through trust was accepted as the “best” model after model modification. However, a further attempt trying to improve the overall model fit by analysing the residual was carried out.

5.8 RESIDUAL ANALYSIS

Residual analysis was another area that could improve the model. Any standardised residuals exceeding the threshold of ± 2.58 were termed as potentially significant residuals and were removed from the model before rerunning it. As shown in Appendix 31, the items that caused most potential significant residuals in the proposed model were:

- “Livestock farmers are not experts in food safety related issues” [EXPERT]
- “Livestock farmers keep the public informed of the safety in consuming meat” [INFORM]

So these items were eliminated in turn and gave rise to the following models.

- Model M4 - item [EXPERT] was deleted from the factor ‘competence’
- Model M5 - item [INFORM] was deleted from the factor ‘providing information’

5.8.1 Model M4

Model M4 was constructed by deleting the item [EXPERT] from the factor ‘competence’. The model specification and the mathematical presentation of the model are shown in Appendices 32 and 33 respectively. The parameter estimations and factor loading of Model M4 are shown in Appendices 34 and 35 respectively.

In the path diagram (Figure 5-6), the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading. For instance, the factor ‘infor’ explained 0.82, 0.92 and 0.76 of the variance of the items [INFORM], [TRUINFO] and [CORRECT] respectively. So it is represented mathematically as follow:

$$\text{INFORM} = 0.82 \times \text{‘infor’} + \text{measurement error} \quad (5.46)$$

$$\text{TRUINFO} = 0.92 \times \text{‘infor’} + \text{measurement error} \quad (5.47)$$

$$\text{CORRECT} = 0.76 \times \text{‘infor’} + \text{measurement error} \quad (5.48)$$

The arrow between two factors represented the causal effect or the regression coefficient from the factor at the arrow end to that at the arrowhead. For instance, the causal effect from the causal_factor ‘infor’ to ‘trust’ was 0.39, and the causal effect from ‘trust’ to ‘purchase likelihood’ was 0.45. That is, ‘trust’ could be predicted from the six causal factors namely: ‘infor’, ‘compe’, ‘relia’, ‘integ’, ‘credi’ and ‘benev’, and is represented mathematically as follow:

$$\begin{aligned} \text{‘trust’} = & 0.39 \times \text{‘infor’} + 0.13 \times \text{‘compe’} + 0.06 \times \text{‘relia’} + 0.19 \times \text{‘integ’} \\ & + 0.12 \times \text{‘credi’} + 0.34 \times \text{‘benev’} + \text{structural error} \end{aligned} \quad (5.49)$$

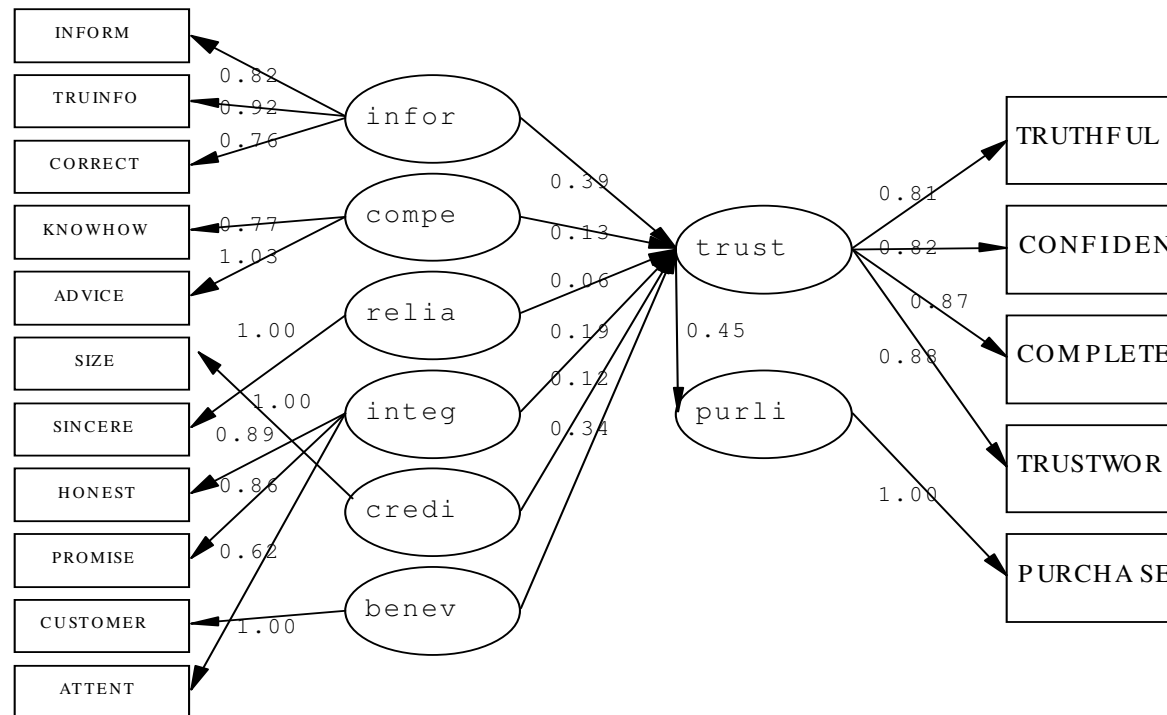
Similarly, 'purli' could be predicted from 'trust'. The relationship is represented as:

$$\text{'purli'} = 0.45 \times \text{'trust'} + \text{structural error} \quad (5.50)$$

As shown in Appendix 36, the reliability of the model were guaranteed because the minimum value of Cronbach alpha (= 0.73) and factor reliability (= 0.84) were greater than the suggested threshold and the item reliability (= 0.39) was marginally equalled to the threshold. The validity was satisfied because the minimum χ^2 difference was 19.98, which was greater than 3.84 with one degree of freedom (Appendix 37) and the minimum factor validity was 0.64 (Appendix 38). This shows that the factors were reliably measured by the items.

By using the equation A6.8 in Appendix 6, the total coefficient of determination equalled 0.77, suggesting the model has an acceptable predictive power for purchase likelihood from the relationships as stated in the model. The overall goodness of model fit was acceptable because all absolute fit indices fell above the threshold (Appendix 39). For instance, NFI = 0.98, NNFI = 0.98, GFI = 0.99, AGFI = 0.98. The power estimate for testing the close fit of the model was greater than 0.90 indicating that the analysis was sufficiently powerful to reject an incorrect model. This shows that Model M4, of which the item [EXPERT] was deleted from the factor 'competence', was a valid model and would be included in the comparison with the proposed model.

Figure 5-6 Path Diagram of Model M4



5.8.2 Model M5

Model M5 was constructed by deleting the item [INFORM] from the factor ‘providing information’. The model specification and the mathematical presentation of the model are shown in Appendices 40 and 41 respectively. The parameter estimations and factor loading of Model M5 are shown in Appendices 42 and 43 respectively.

In the path diagram (Figure 5-7), the observed items represented by rectangles were used to measure the factors represented by ovals and the arrow between them representing the item loading. For instance, the factor ‘infor’ explained 0.80 of variance of both items [TRUINFO] and [CORRECT]. So it is represented mathematically as follow:

$$\text{TRUINFO} = 0.80 \times \text{‘infor’} + \text{measurement error} \quad (5.51)$$

$$\text{CORRECT} = 0.807 \times \text{‘infor’} + \text{measurement error} \quad (5.52)$$

The arrow between two factors represented the causal effect or the regression coefficient from the factor at the arrow end to that at the arrowhead. For instance, the causal effect from the causal_factor ‘infor’ to ‘trust’ was 0.26, and the causal effect from ‘trust’ to ‘purchase likelihood’ was 0.41. That is, ‘trust’ could be predicted from the six causal factors namely: ‘infor’, ‘compe’, ‘relia’, ‘integ’ ‘credi’ and ‘benev’, and is represented mathematically as follow:

$$\begin{aligned} \text{‘trust’} &= 0.26 \times \text{‘infor’} + 0.11 \times \text{‘compe’} + 0.18 \times \text{‘relia’} + 0.30 \times \text{‘integ’} \\ &\quad + 0.06 \times \text{‘credi’} + 0.25 \times \text{‘benev’} + \text{structural error} \end{aligned} \quad (5.53)$$

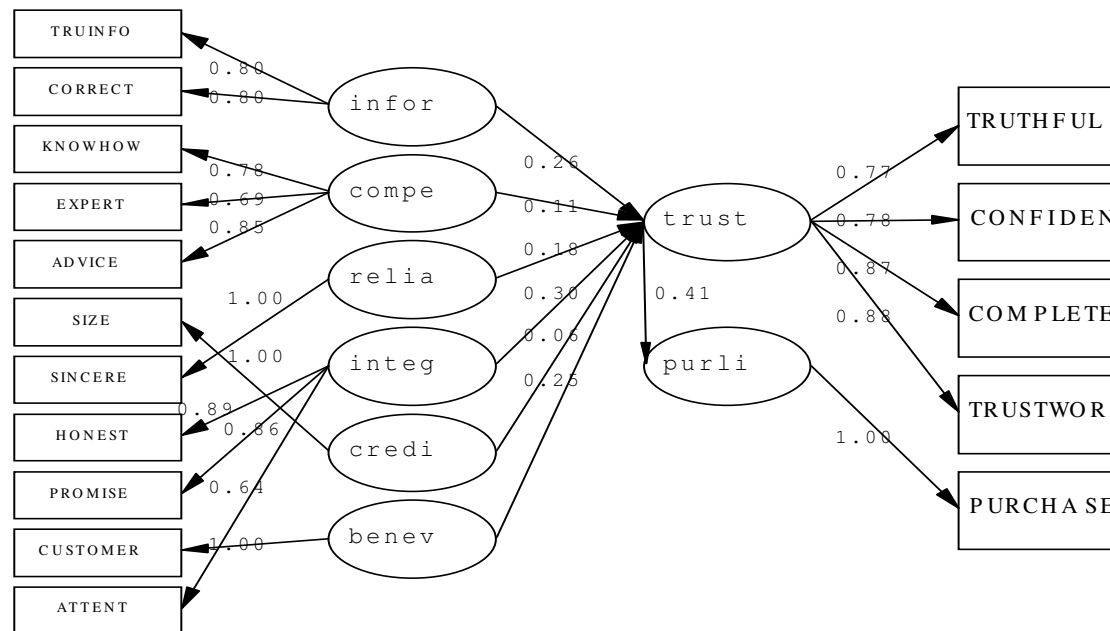
Similarly, ‘purli’ could be predicted from ‘trust’. The relationship is represented as:

$$\text{‘purli’} = 0.41 \times \text{‘trust’} + \text{structural error} \quad (5.54)$$

As shown in Appendix 44, the reliability of the model were guaranteed because the minimum value of Cronbach alpha (= 0.73) and factor reliability (= 0.78) and the item reliability (= 0.41) were greater than the suggested threshold. The validity was satisfied because the minimum χ^2 difference was 19.98, which was greater than 3.84 with one degree of freedom (Appendix 45) and the minimum factor validity was 0.64 (Appendix 46).

The total coefficient of determination was recalculated and equalled 0.69, suggesting the model has an acceptable predictive power for purchase likelihood from the relationships as stated in the model. The overall goodness of model fit was acceptable because all absolute fit indices fell above the threshold (Appendix 39). For instance, NFI = 0.98, NNFI = 0.98, GFI = 0.98, AGFI = 0.97. The power estimate for testing the close fit of the model was greater than 0.90 indicating that the analysis was sufficiently powerful to reject an incorrect model. So Model M5 was a valid model and would be included for the model comparison.

Figure 5-7 Path Diagram of Model M5



5.8.3 Comparison of the Proposed Model with Model M4 and Model M5

The results obtained by comparing the three models based on the absolute fit index, comparative index, parsimonious fit index, and number of significant path are summarised in Table 5-17.

Table 5-17 Comparison of the Model Fit Indices

	Proposed Model	Model M4	Model M5
Absolute fit indices			
χ^2 (d.f.)	310.78 (101)	212.67 (86)	308.27 (100)
RMSEA	0.10	0.09	0.09
NFI	0.98	0.98	0.98
NNFI	0.99	0.98	0.98
GFI	0.99	0.99	0.98
AGFI	0.98	0.98	0.97
Comparative fit indices			
CFI	0.99	0.99	0.99
IFI	0.99	0.99	0.99
RFI	0.98	0.98	0.98
Parsimonious fit indices			
PGFI	0.65	0.62	0.62
PNFI	0.73	0.70	0.70
Number of significant paths			
	7/7	6/7	5/7

When comparing the absolute fit indices, the result was mixed. For instance, the Root Mean Square Error of Approximation (RMSEA) of the proposed model was the worst whereas Model M5 was the worst in Adjusted Goodness of Fit Index (AGFI). Model M4 was worse than the proposed model in Non-normed Fit Index (NNFI) and Adjusted Goodness of Fit Index (AGFI). So, it appeared that these three models were equivalent to reproduce the actual covariance matrix.

When comparing the comparative indices, the proposed model was the best among the three models. For instance, the Comparative Fit Index (CFI) was 0.99 compared with 0.98 for others. This finding implied that the proposed model was the best in providing a better fit to the data.

When considered both the Parsimony Goodness of Fit Index (PGFI) (0.65 for the proposed model and 0.62 for the Model M4 and M5) and the Parsimony Normed fit Index (PNFI) (0.73 for the proposed model and 0.70 for the Models M4 and M5). The proposed model was the best because its parsimonious fit indices were larger than those of Models M4 and M5.

When comparing the number of significant paths, all paths in the structural model of the proposed model were statistically significant. Whereas only six out of seven in Model M4 (the path from ‘reliability’ to ‘trust’ was not significant) and five out of seven in Model M5 (the path from ‘competence’ to ‘trust’ and the path from ‘credibility’ to ‘trust’ were not significant) were statistically significant. It implied that the proposed model was better than the rest in terms of significant causal effects.

In view of the above comparisons, the proposed model was chosen as the empirical model because it was comparatively and parsimoniously better, and with more significant paths than Models M4 and M5. So the empirical model consisted of the six causal factors namely: ‘providing information’, ‘integrity’, ‘benevolence’, ‘competence’, ‘credibility’ and ‘reliability’, having effects on ‘purchase likelihood’ through the factor ‘trust’.

5.9 TEST OF THE HYPOTHESISED RELATIONSHIPS BETWEEN THE FACTORS

The proposed model was adopted as the empirical model (Figure 5-8) and the relationships with respect to the seven hypotheses were tested. The estimated coefficients representing the effects from the causal factors, namely: 'providing information', 'competence', 'integrity', 'benevolence', 'credibility' and 'reliability' to 'trust' and in turn to 'purchase likelihood' were tabulated in Table 5-18. For instance, the direct effect from 'providing information' to 'trust' was 0.39 and the indirect effect to 'purchase likelihood' was 0.11. The relationships between these factors were supported at 0.01 significance level except 'competence' which was significant at 0.05 level (t-value = 2.31).

Figure 5-8 Diagram of the Empirical Model of Trust

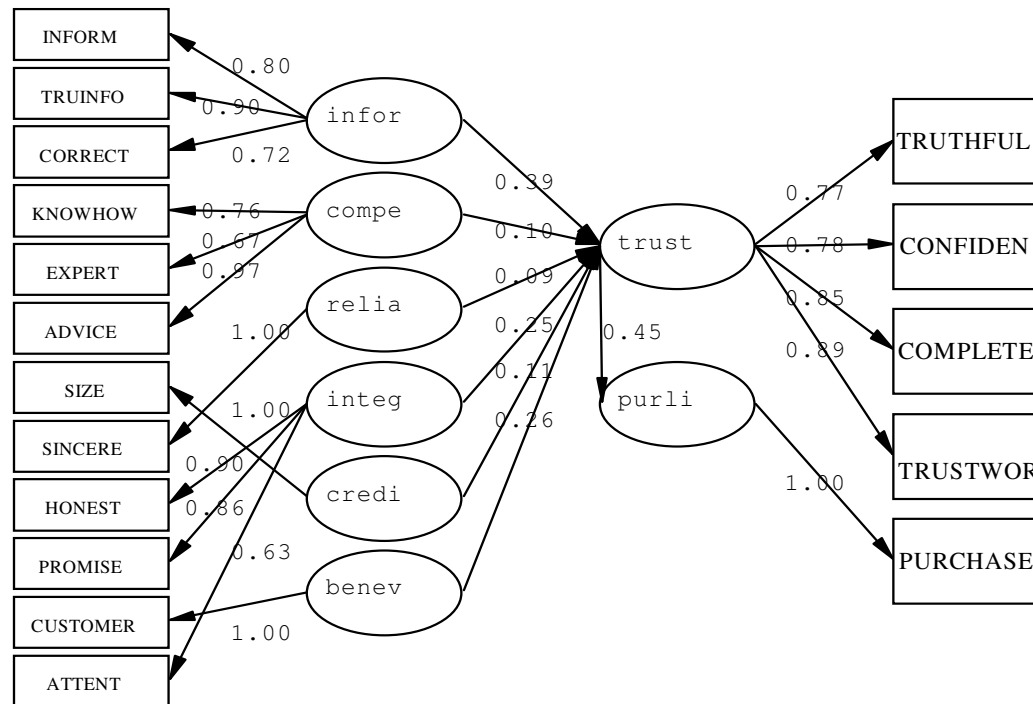


Table 5-18 Effects of the Causal Factors of Trust

To From	Trust (A)	Purchase Likelihood (B*)
providing information (H ₁)	0.39 (6.59) ^a	0.18 (6.03) ^a
benevolence (H ₆)	0.26 (5.68) ^a	0.12 (5.13) ^a
integrity (H ₄)	0.25 (6.26) ^a	0.11 (5.56) ^a
credibility (H ₅)	0.11 (3.80) ^a	0.05 (3.69) ^a
competence (H ₂)	0.10 (2.32) ^b	0.04 (2.31) ^b
reliability (H ₃)	0.09 (2.97) ^a	0.04 (2.89) ^a
trust (H ₇)	-	0.45 (12.13) ^a

Note: * the indirect effect B equalled A x 0.45 where 0.45 was the effect from 'trust' to purchase likelihood
t value is in bracket
^a significant at 0.01 level
^b significant at 0.05 level

5.10 DISCUSSION

The results of the quantitative study indicate that the factors which build trust, which were identified from the literature and the qualitative study have a direct causal effect to trust, and in turn to purchase likelihood.

5.10.1 Providing Information

From the result, ‘providing information’ was the most important factor to build trust. This factor was measured by “Livestock farmers keep the public informed of the safety in consuming meat”, “Livestock farmers provide information that can be trusted” and “Livestock farmers provide correct information”. Such a finding is in line with past research that information is positively related to trust (e.g. Anderson and Weitz, 1989; Anderson and Narus, 1990).

Some consumers build trust on the predictability of the future behaviour of livestock farmers after gaining some knowledge of them, that is the prediction process for developing trust (Doney, Cannon and Mullen, 1998). So reliable and accurate information plays a vital part. Doubtless, any information about the past action of livestock farmers is important for developing or destroying trust. Consumers would gain confidence in their ability to predict livestock farmers’ future behaviour with accuracy, if information obtained matches up with the truth. In turn trust will emerged and be strengthened.

Through the intentionality and capability processes, consumers could draw on an awareness of the culture of livestock farmers, and in turn to make assumptions about livestock farmers’ competence and intentions in order to build trust. One way to make known to consumers the farmers culture is through the access to information about livestock farmers. Keeping consumers informed is essential in trust building process (Byrne, 2001).

During periods of food safety concern, it is important to provide information on the nature of risks and how these are being managed. Trust can be destroyed if the information provided is perceived to be amplified, biased, and not factual or proven wrong. In addition, trust is hard to restore after being destroyed. Indeed, information is important for building consumer trust. However, there are other features that lead

to consumer trust as indicated in the results. Livestock farmers can not simply rely on the factor of providing information and ignore the other factors that lead to build consumer trust.

5.10.2 Benevolence

Benevolence was the second important factor to build trust. It was measured by “Livestock farmers are concerned about the welfare of consumers”. If consumers experience livestock farmers sharing their concerns and worries, consequently trust can be established (Peters et al., 1997). Indeed, consumers are more likely to remain confident in livestock farmers as long as the latter’s motives are benevolent.

For instance, livestock farmers in Sweden check for *Salmonella* in poultry starting with checks on imported breeding animals, during rearing and in feed, and samples are taken from every flock of broilers for testing. If *Salmonella* is found, the whole flock will be destroyed (Brooks, 1999). The purpose of taking this trouble is on the one hand to decrease food hazard; on the other hand, to promote consumer trust in livestock farmers to provide safe food.

5.10.3 Integrity

The third important factor to build trust was integrity. It was measured by “Livestock farmers alter the fact to fulfil their own purpose”, “Livestock farmers fail to keep promises”, and “Livestock farmers follow government regulations”. This finding is in line with previous research (e.g. Morgan and Hunt, 1994; Michell, Reast and Lynch, 1998).

Trust is a willingness to be vulnerable. Consumers’ dependence on livestock farmers to produce safe raw meat reflect a willingness to be vulnerable because consumers do not know exactly what they purchase with respect to food safety. They purchase the

meat *per se*. From this perspective, consumers place trust in livestock farmers to produce safe food and the rest of the supply chain to maintain the safety of the food. Consumers must develop enough confidence in livestock farmers' motives and future behaviour to be willing to trust them in produce safe and wholesome meat. Thus, consumers must expect that livestock farmers are honest, keep promise and follow government regulations. In contrast, if livestock farmers act opportunistically, which is exemplified by cheating, shirking, distorting information, misleading consumers, and providing substandard products, consumer distrust would be created.

Consumers may build their trust by calculating livestock farmers' benefits against the cost for opportunism (Shapiro, Sheppard and Cheraskin, 1992). In the case of BSE, one may say that the feeding of cattle with meat and bone meal is an opportunistic behaviour to cut the cost of production. A recent qualitative study of public attitudes to food safety conducted by Food Standard Agency (FSA, 2000a) has shown that some people blamed livestock farmers' pursuit of profits which overwhelmed common sense by feeding meat to grass eaters. Hence trust was lost.

On the other hand, consumers can develop their trust in livestock farmers by feeling confidence that livestock farmers intend to meet a certain standard of production and product integrity. That is, trust is built through an intentional process (Doney and Cannon, 1997). The three items which measure integrity namely, "honest", "keep promise", and "follow government regulations" are vital in this respect, though the item reliability of 'follow government regulations' was marginally below the guideline in the data analysis (0.39 against the guideline of 0.40).

5.10.4 Credibility

Credibility was the fourth important factor to build trust. It was measured by the single item; "I only trust large livestock farms". Size refers to the organisation's overall scale of operation, size or its market share position (Doney and Cannon, 1997). Since opportunistic suppliers operate as casual organisations, they would not

be able to build sales volumes or market share (Hill, 1990). In this context, size could be used to measure the trustworthiness of that organisation.

The great majority of the interviewees in the qualitative study shop with major supermarkets for fresh meat and have no direct contact with livestock farmers. They perceived that supermarkets source their products from large livestock farms and believed that large farms are well managed, hygienic efficient, and technologically up to date. These comments are in line with Richard (1999). They further said that large farms readily meet the stringent standards required by the assurance schemes.

In June 2000, British farmers launched the British Farm Standard - a logo in the shape of a distinctive red tractor. It aims to turn the food that carries the logo into something that people trust (NFU, 2000). This logo is controlled through a license scheme and administrated by Assured Food Standards in order to ensure the product meets the hygiene standards and regulations. It is designed to build trust in the logo and in turn trust the farmer who produces the certified products through the transference process of building trust.

5.10.5 Competence

Competence was the fifth important factor to build trust. It was measured by “Livestock farmers are very knowledgeable to produce safe meat”, “Livestock farmers are not experts in food safety related issues” and “Livestock farmers are able to give advice regarding food safety related issues”. If livestock farmers have more knowledge in food safety and provide advice on food safety issues to consumers, it could reduce food scare outbreaks. In turn, the uncertainty of food safety may decrease and the willingness to trust farmers may increase. Of course, consumer trust would be established by confirming that livestock farmers have the capability to fulfil their obligation as well as to meet consumers’ expectation.

Though consumers can build trust in livestock farmers through the latter demonstrating competence, the factor ‘competence’ was scored as the fifth important factor to build trust. It is likely that the respondents have mixed feelings on the level of competence of livestock farmers. During the face-to-face interviews, interviewees varied in their views whether livestock farmers have adequate understanding about food safety. For instance, some felt that farmers did not understand the consequences of feeding cattle with meat bone meal in the case of BSE. But some defended them and argued that even the scientists were not able to understand the contamination pathways for BSE until a later date, let alone livestock farmers.

Though the respondents perceived that competence is important to build consumer trust, they were not sure livestock farmers really possess such competence and how the latter could acquire such competence. They doubted whether they could build their trust in livestock farmers based on the competence of livestock farmers in food safety, that is through the capability process of building trust. This explains why competence is significant but relatively less strong than other factors such as providing information, benevolence and integrity.

5.10.6 Reliability

Reliability was the sixth important factor to build trust with the least direct effect. It was measured by the single item, “Livestock farmers are sincere to follow up after an outbreak of food scare”. This finding is consistent with previous research showing that reliability bears a positive relationship with trust (e.g. Michell, Reast and Lynch, 1998). If there was food safety scare and livestock farmers were seen to trace the source and take remedial actions, consumers would build their trust as a consequence of their sincerity to eradicate the problem.

The results revealed the relatively weak effect of reliability, suggesting that consumers have no idea if livestock farmers have taken any actions to eradicate the hazard. It was the role of government legislation to ban meat and bone meal in cattle

feed which stopped farmers using potentially contaminated feed rather than farmers voluntarily stopping the use of such feed in the case of the BSE epidemic. It appears that consumers did not see that livestock farmers have done much to eradicate food hazards.

5.10.7 Purchase Likelihood

The results indicate that there was a positive relationship between consumer trust and consumer purchase likelihood. It is in line with previous research that trust guides consumers' decision-making (e.g. Garbarino and Johnson, 1999). Such finding is also consistent with other researchers who incorporate trust in their study in predicting future intention (e.g. Moorman, Deshpandes and Zaltman, 1993; Morgan and Hunt, 1994). If consumers hold a positive attitude toward livestock farmers in a risky situation, perceived uncertainty will be reduced and positive expectations will be gained. Hence consumers might have confidence in future transactions. In contrast, if consumers have low level of trust, this might not only discourage the decision of purchase at the present time but also lead consumers to have deleterious effects on their decision of future purchase.

As shown in Table 5-18, there exists a significant and positive causal relationship between trust and consumer purchase likelihood. However, further study involving psychological, physical, social and physiological factors (Section 2.5.1) is recommended to establish a more complete estimator of the relationship between trust and future purchase.

5.11 SUMMARY OF THE CHAPTER

This chapter illustrated the method to determine the link among the causal factors which build consumer trust as well as determining the relationship between consumer trust and consumer purchase likelihood. The results from the assessment of the

linkage were also discussed. From the analysis of the data, the following conclusion can be drawn.

- For the sample, there was no difference in the problem of purchase likelihood between personal characteristics, such as age, gender, marital, education and income with respect to trust in livestock farmers, but this is probably a reflection of small sample size and sampling technique.
- The use of multiple regression failed to achieve the objectives set out for this study because a complete model could not be developed with the present of a mediator. However, the findings provided a preliminary result that providing information is important for building consumer trust in livestock farmers.
- The Structural Equation Modelling method proved successful in identifying the effects of the causal factors to trust and in turn to purchase likelihood.
- The factor ‘providing information’ was identified to be a key factor by which trust is built.
- The features that lead to trust, namely: ‘providing information’, ‘competence’, ‘integrity’, ‘credibility’, ‘reliability’, and ‘benevolence’ were shown to be factors which build trust in livestock farmers.
- There was evidence of a positive relationship between consumer trust and consumer purchase likelihood.
- A consumer trust model was built to assess the causal effects of factors determining trust and consumer trust on consumer purchase likelihood. The model provides a framework to measure how consumer’s propensity to purchase was influenced by consumer trust in the context of food safety concerns.

The analysis suggests that trust is built by a number of trust building factors. In its turn, trust influences purchasing behaviour. The analysis also suggests that livestock farmers could draw benefit from actions to build consumer trust in livestock framers and the livestock industry. The next chapter presents the responses from representatives of the livestock industry on this model and the implications for livestock industry.

Chapter Six

6. INDUSTRIAL RESPONSES AND IMPLICATIONS

This chapter presents the findings from the industrial representatives and livestock farmers taking part in the industrial consultation followed by the implication of the consumer trust model and suggestion of actions for the livestock industry.

6.1 INDUSTRIAL RESPONSES

In order to provide a valid reference point for the consumer survey, open-ended questions were sent to seven livestock farmers, using a convenience-sampling method, and meetings were held with representatives from livestock industry to review how they perceived the mechanism to building consumer trust in livestock farmers. This helps to interpret the implications of the study for the food industry.

Three completed questionnaires were received from livestock farmers representing a response rate of 43%. Follow-up mail was sent to the non-respondents but no reply was received. In addition, representative from three organisations agreed to have meeting with the researcher. Their answers to the questions and discussion issues were summarised under the following four headings, namely: consumer trust in livestock farmers, importance of providing information to consumers, importance of integrity, reliability and competence, importance of benevolence and importance of credibility.

6.1.1 Importance of Consumer Trust in Livestock Farmers

There was a unanimous consensus that trust in the food supply chain regarding food safety is important to the food industry. Since consumers hold the key to the future success of British meat, if the food industry fails to satisfy consumers, and build consumer confidence in its products, there will be no future for the British meat supply chain. The industrial representatives reported that though there is little contact between consumers and livestock farmers, consumers have to trust livestock farmers to produce safe food. An industrial representative said that supermarkets are interested in all products on their shelves and raw meat is only a small line of their products. Thereby, supermarkets' goals and interests do not necessarily synchronise with those of livestock farmers, for instance, supermarkets want to improve customer services while farmers want to increase their financial returns. Consumer trust in supermarkets does not necessarily benefit livestock farmers because supermarkets may import meat to satisfy consumers.

On the other hand, consumers are interested in quality products and service from reliable sources. The industrial representatives argued that consumers must trust livestock farmers because these are the original producers rather than the sellers of food. After the agricultural revolution, consumers have become disconnected from food producers such as farmers but now there is a trend to link back consumers to farmers and a growing concern about the rural environment. So, by linking consumers to livestock farmers, raw meat is not simply a product but part of an animal and livestock farmers must satisfy the concern of consumers about livestock husbandry practices. In this way, consumers must have greater trust in livestock farmers and have confidence in the raw meat they consume. One industrial representative pointed out that if consumers distrust British livestock farmers, there would be a danger of consumers turning to imported meat and the whole market could collapse. Such a view was shared by one of the farmers who mentioned that

consumers would shun British meat for low price foreign meat if they do not trust British farmers.

However, all the industrial respondents and industrial representatives agreed that consumer trust in livestock farmers is lower than consumer trust in supermarkets and that something must be done to build consumer trust in livestock farmers. They suggested that the reason is consumers do not have much knowledge about farming. One farmer said that consumers trust supermarkets because supermarkets have a clean shiny image, the meat they sell is in clean convenient packets, and well presented and labelled, which is what the consumers like. In contrast, consumers do not trust farmers because of the negative and over sensationalised media coverage. For instance, consumer trust was dented by strong images of the foot and mouth crisis. Consumers see a farmer as someone who neglects their animals and claim huge subsidies from the government. Lack of correct information given to consumers was considered to play an important role in distrust in livestock farmers.

These findings supported the importance of this research to explore what livestock farmers could do to build consumer trust.

6.1.2 Importance of Providing Information

As discussed above, the lack of correct and trusted information was blamed for leading to distrust in livestock farmers. In addition, all industrial representatives agreed that most media coverage is negative. One farmer commented on the confusion and contradiction in the content of the coverage and suggested that farmers should do the talking, in a language consumers understand, and not leave the way open for media sensationalisation and distortion. An industrial representative agreed that direct communication between livestock farmers and consumers is important because consumers believe that they have been exposed to risk and denied access to full and open information about the safety of British beef throughout the BSE crisis.

In this context, a livestock organisation used the following strategies for communicating to consumers (MLC, 2001a),

- Advertise in mass media such as TV and national papers
- Work close to the government and activist groups such as Greenpeace to present a balanced viewpoint of the industry
- Meet consumers' representatives and invite Consumers Association to take part in its policy making process on meat related issues
- Provide online information through the Internet

Two industrial representatives shared this view that the effect of communicating between individual farmers and individual consumers is limited. They always try to involve consumers' representatives and activist groups for policy planning/decision making. All industrial representatives considered that it is important to establish a direct link between farmers and consumers so that the ideas of consumers could be fed directly to farmers. For instance, a farmer said that two-way direct communication is essential. An industrial representative further suggested that livestock farmers could sell online and through the farmers' markets in order to have contact with consumers. For example, some farmers in Cumbria set up farm shops to sell directly to consumers and some even sell beef online via Internet for local distribution.

Apart from farmers' markets, it was suggested that farm visits could provide consumers with an opportunity to learn about farming. Such schemes would educate the public about the origin of some foods, would help to allay their fears about food safety and would foster links with local farms. However, an industrial representative warned that such a scheme must be implemented with care. In other words, the farms taking part in such scheme must have very high welfare and husbandry standards in order to ensure success.

One industrial representative also mentioned that the information about the potential nutritional values of low fat red meat did not manage to reach the public especially

women and children. He further stressed the importance of providing information not only on food safety but the nutritional benefits as well.

Indeed, consumer trust can only be built when consumers feel they have access to the full facts, and are involved in decision-making processes affecting the safety and quality of their food.

6.1.3 Importance of Integrity, Reliability and Competence

All industrial representatives and farmers responding to this study believed that in order for any livestock farmers to meet the stringent standards of a quality assurance scheme and be able to put a quality mark on his products, farmers must demonstrate production and product integrity, follow government regulations, show concern about the environment, and care about animals and consumers. Since a huge amount of raw meat is sold in the United Kingdom everyday, livestock farmers have an enormous responsibility to consumers. This responsibility includes not just a direct role to produce safe food, but to give assurances to consumers that this role is taken seriously. The quality mark can tell the consumers that those farmers who participate in the quality assurance schemes follow the standards laid down by these schemes.

By putting a quality mark on the package of the raw meat, the food industry can assure consumers that the product is produced to a certain standard. Thus, consumers are likely to believe that possible precautions are being taken to reducing contamination and to prevent other potential safety problems with this food product. In turn consumers can have confidence about the safety of this food product. In other words, quality marks give assurances about farm quality - the quality of the farm environment, the quality of the production methods used, the quality of care for animals, and the quality of concern for the consumers in producing meat. Products which carry a quality mark, such as the Red Tractor logo, are required to produce to the standards set out by the relevant assurance scheme. The farms are independently checked to ensure they meet the standards. In this regard, the industrial

representatives reported that the farms must be able to demonstrate that they have exercised 'due diligence' and have been measured against the stringent standards of production set out by the scheme.

An industrial representative supported the assurance scheme and commented that it shows that farmers have the competence to produce safe food, meeting a certain standard of production and product integrity. He further suggested a licensing scheme regulated by the government is needed.

6.1.4 Importance of Benevolence

An industrial representative suggested that groups/representatives of livestock farmers can make use of Internet and through farmers' markets to contact consumers. By having websites on the Internet, livestock farmers' organisations can provide information to consumers as well as letting consumers voice their concerns about livestock farming issues. In addition, a forum could be set up on the Internet so that consumers can "chat" with livestock farmers.

Apart from using up-to-date technology, livestock farmers can establish farmers' markets. Farmers would be able to sell produce locally with the benefit of knowing what consumers want and are concerned about. Customers would be provided with a wide range of produce from local farmers who would be on hand to answer their questions. One farmer mentioned that one of his customers was attracted by the friendly and more personal atmosphere than buying from a big supermarket, in addition to the quality and value of the food sold in the farmers' market.

6.1.5 Importance of Credibility

Some industrial representatives suggested that credibility could be enhanced by organisational change in the industry. An industrial representative suggested that the livestock industry needs to re-structure the supply chain and to reform farm practices. He suggested that farmers should group together and create a brand of their own.

One industrial representative acknowledged that consumers need excitement and innovation in food consumption, and the industry has responded by providing an even-wider choice of products, packaged and marketed in ever more interesting ways, at prices which now seem to be falling in real terms. Another industrial representative agreed with this and mentioned that consolidation could enable this to happen. He further pointed out that the current meat supply chain is made up of a large number of farmers, a few processors and powerful retailers. Small farmers would have to join together, which in turn would strengthen their position, bring them closer to consumers and could restore consumer trust.

An industrial representative commented that following from consolidation of farms, regional branding could be used for their products, sold at a premium price with the help of assurance scheme. He further pointed out that consumers could then trust the excellence of that branded British product in terms of the high standards met during production and quality of the end product. He believed that consumers readily trust large farms offering branded products rather than unknown, small individual farms with no clear product identity.

6.2 IMPLICATIONS FOR THE FOOD INDUSTRY

After noting that the livestock industry has not managed to build or maintain consumer trust (Section 2.4), potential actions were recommended to livestock farmers to build consumer trust.

Consumer trust in livestock farmers and its effect on purchasing behaviour are seen to be important to the food industry as mentioned by the industrial representatives and the farmers who responded to this study. Consumer trust in livestock farmers needs to be built during and after periods of food scares. Without this, the welfare of farmers and consumers is likely to suffer.

Consumers hold the key to the future success of the British meat industry. If the industry fails to satisfy consumers, and build consumer trust, the meat market runs the risk of collapse. Throughout the BSE crisis, consumers believed they had been exposed to risk and denied access to full and open information about the safety of British beef. As consumers have little understanding of farming practice, many simply perceive that there is a risk to consuming beef in the wake of BSE. So communication is needed between livestock farmers and consumers to help informed consumer decision making.

Information provision is especially important to both consumers and the food industry during periods of concern about food safety. The goal of providing information cannot be merely the transmission of factual information, nor can it be the narrow aim of enlightenment or the promotion of behavioural change (Kasperson, Golding and Tuler, 1992). Responses by livestock farmers could include a direct communication which is a missing ingredient in the current low trust relationship between livestock farmers and consumers. Accurate and reliable information is important to remove uncertainty and to restore consumers' confidence during and after food scares. Livestock farmers need to determine more specifically what consumers want and should try to construct direct links with consumers, including setting up websites,

dealing directly with consumers through farmer's markets, farm shops and farm assurance schemes.

In order to overcome the lack of knowledge about livestock farmers amongst consumers, livestock farmers could look into effective risk communication channels in the forms of workshops, roadshows, telephone hotlines, websites, information leaflets and talks in schools to provide information about the quality, versatility and nutritional benefits of meat as an integral part of a healthy diet. Farm visits by consumers could educate consumers about the origin of some foods, helping to foster links with local farmers and in turn building trust in farmers. Since consumers might build their trust through the transference process, livestock farmers could place leaflets in places such as libraries and Citizen Advice Bureau in which consumers have trust.

Media/press coverage sometimes has a negative effect, and an industrial representative commented that media is often anti-farmer. In addition, the coverage sometimes is confused and contradictory. For instance, the legacy of BSE is huge for consumers. While providing information might help to lessen consumer perceived risk, biased or over-assured information may have adverse effect. So the livestock industry must ensure that consumers' hysteria is not primarily generated by media coverage and take action to communicate that livestock farmers have demonstrably followed the regulations and guidelines to manage perceived risk.

The respondents from the qualitative study spoke of the greed of livestock farmers and how standards are perceived to have been steadily eroded over their lifetimes. Consumers reported that though farmers frequently said that they did not make enough profit, this was probably untrue and they assumed profits were made by not following government regulations. There is much objectively verified data from MAFF to suggest that profit margins in the UK livestock sector have been low and variable for the last ten years or so. This reinforces the need for co-ordinated efforts across the supply chain to inform consumers on how food is produced, how costs are incorporated and how profits are made and used to offer more benefits to consumers.

This will prevent consumers filling the gaps in their knowledge with negative conclusions which lead to develop distrust in the food industry.

Integrity, competence and reliability in the form of farm assurance were found to be relevant to build trust. Doubtless livestock farmers have the responsibility not only of producing safe meat, but assuring consumers that the meat being produced is safe. Quality assurance schemes show that livestock farmers are competent, and dedicated to producing wholesome food for consumers. Such schemes require livestock farmers to increase awareness of husbandry practices that can positively influence the perception of the safety, quality and wholesomeness of meat.

Having demonstrated that livestock farmers have competence, integrity and reliability, care can be shown via carelines set-up by livestock farmers or their representatives to give advice on any concerns about food safety related risk. This also provides benefit for livestock farmers to listen directly of what concern consumers have in order to develop remedy strategies accordingly.

Indeed, farm practices must be improved, and be seen to improve through universal assurance. A quality mark provides the best possible assurances of uncompromising quality, safety and character for consumers. In addition, it provides a straightforward code for the industry to have an identifiable, quality product, and which consumers can clearly understand and trust. However, the schemes are fragmented at present. This situation is likely to confuse consumers and obstruct the acceptance of quality assurance by some consumers. Such comment has been agreed by the senior officers of the National Farmers Union, the Royal Society for the Prevention of Cruelty to Animals and the Farm Animal Welfare Council. A single, credible and independently audited quality assurance scheme for the livestock industry is needed.

Past research showed that size of organisation and branding are factors leading consumers to trust. During periods of concern about food safety, farmers can assure consumers and allow the latter to have wider food choice by having identities such as Welsh lamb or Aberdeen Angus steak. In this respect, livestock farmers can

position themselves by using brands in conjunction with assurance schemes. Farms of small size could beneficially consolidate and promote themselves under the regional brand and/or own brand. In turn their market position as well as trustworthiness would be strengthened.

6.2.1 Suggested Actions to Livestock Farmers

During and after a food scare occurs, livestock farmers should be aware what information consumers want. This is likely to be achieved through direct communication between the two parties. Livestock farmers can have direct contact with consumers through farm visits by consumers, farm shops, farmers' markets and Internet. The concerns raised by consumers should be addressed in the message given to consumers.

Information provided to consumers can be communicated through different channels, for example the official channels such as government departments or the unofficial channels such as media. However, different channels may hold different perspectives of the situation and may introduce confusion. So organisations representing livestock farmers have to consider which channel(s) is most effective to provide information to consumers. These channels could be DEFRA, MLC, TV or national newspaper. However, the livestock industry must ensure the information provided goes through a "trusted" channel(s) such as national newspaper and does not have the likelihood of misconceptions or misinterpretations.

In addition, livestock industry has to decide when to provide information. Reactive strategies allow consumers to vent about the issue but the information may be less relevant when issues become highly emotionally charged. Proactive strategies call attention to a food scare before consumers are aware of it but controversy could be created if not well managed.

The promotion of assurance scheme can address consumers concern about livestock husbandry practices. Assurance scheme must be certified by a trusted third party and basic requirements of such scheme must be care about the welfare of consumers and animals. By putting the logo on the package, the farmer who produces the certified produce can show his integrity, competence and benevolence. However, there is a need to unify the assurance schemes and certified by a single trusted organisation to eliminate the confusion.

The collaboration of small farmers for marketing and joint accreditation should be promoted with an existing or a new regional brand. This action could improve the credibility of small farms since credibility was seen to be associated with farm size.

A list of suggested actions for livestock farmers associating with the consumer trust model and industrial responses are summarised in Table 6-1. Obviously, most of these actions cannot be done by individual farmers but on a corporate level carried out by the representing organisations of farmers such as NFU or MLC with the approval of the other parties in the meat supply chain. It is likely trustworthiness of livestock farmers could be improved by carrying out these actions.

Table 6-1 Suggested Action Plan for Livestock Farmers Representatives

Consumer Trust Model	Industrial Responses	Suggested Actions
Providing information - reliable information - accurate information	Provide correct and trusted information Avoid confusing and contradicting information Avoid negative media coverage Direct communication Advertisement Online information Through farmers' market and farm shops Trusted third party endorsement	Provide reliable and full information regarding food safety TV and/national newspaper advertisement Promote farm visits by the public Farmers' market and farm shop Leaflets distributed in clinics, library or Citizen Advice Bureau Single assurance scheme Promote assurance scheme
Benevolence - concern about the welfare of consumers	Listen to consumers Know what consumers want Care about the welfare of consumers	Make use of farmers' market and farm shops Follow guidelines to care for the welfare of consumers and animals Set up carelines Set up website on Internet
Integrity - keep promises - follow regulations - tell the truth	Product integrity Production integrity Follow regulations	Participate in assurance scheme and put on the logo on the products
Credibility - large farm size	Re-structure the supply chain Consolidation of small farms for marketing Branding	Group together to form co-operatives Establish and promote regional brand and/or own brand
Competence - knowledgeable about food safety related issues - expert in food safety related issues - able to give advice	Able to reduce contamination to meat Able to prevent potential safety problems	Participate in assurance scheme showing; - able to produce quality meat - able to meet standards set out by the scheme
Reliability sincere to take follow up actions after an outbreak	Reliable to eradicate the problems	Participate in assurance scheme

6.3 SUMMARY OF THE CHAPTER

This chapter presented the responses of the respondents from the livestock industry regarding the findings of this study. Implications and suggested actions for the food industry were also given. The following conclusions were drawn from this chapter:

- The factors to build trust were valid in the context of consumer trusting livestock farmers regarding food safety.
- From the livestock industry's perspective, consumer trust in livestock farmers was confirmed to be important to the food industry.
- Information provision is especially important to both consumers and food industry during periods of concern about food safety.
- Providing correct and trusted information is important to consumers. A quality mark representing integrity, competence, reliability and benevolence, and consolidation and branding representing credibility could help to build consumer trust in livestock farmers.
- The industry has to develop effective communication channels to provide information about the quality, versatility and nutritional benefits of meat.
- Livestock industry should be aware that media/press coverage sometimes has negative effect, so the former should have strategies to provide accurate and reliable information to consumers.
- Small size farms would benefit from joining together for the purpose of achieving economies of credibility to build trust.

Having completed the results of the present study, the following chapter focuses on the conclusions and recommendations emerging from this research.

Chapter Seven

7. CONCLUSIONS AND RECOMMENDATIONS

Following an overview of the aim and objectives of the present study, this chapter presents the conclusions. This chapter also discusses the limitations of the study and makes recommendations for future research.

7.1 SUMMARY AND CONCLUSION

Based on the results of this study, a number of conclusions can be drawn. From the qualitative study, the need to build consumer trust in livestock farmers was supported. This is consistent with the literature. A consumer trust model was developed showing how a number of factors were responsible for building trust namely: providing information, integrity, benevolence, competence, credibility and reliability. It showed how trust then influenced purchase likelihood. This model was shown to industrial representatives to help to interpret the findings as well as to discuss the implications for livestock farmers. Because of the limitations of the study, the application of this model should be used with caution.

7.1.1 Consumer Trust in Livestock Farmers

The high profile of BSE incidence has raised concerns about the practice of livestock farmers in people's mind. These concerns include animal feed, overuse of antibiotics and intensive farming practice. Correspondingly, this growing concern has affected consumers' confidence in food and in turn influenced their purchase behaviour. Consumers cannot themselves easily assess food risk, so supplying safe clean food is the responsibility of all parties through the whole food supply chain. The

responsibility of providing safe food begins on farm. Doubtless, farmers have to accept part of the responsibilities for food safety and ensure that their products are free from health risks.

Consumers usually have little direct contact with livestock farmers. As a matter of fact, the former trusts retailers such as supermarkets to provide them with wholesome food and the latter relies on retailers to promote and sell their products. However, raw meat is only one of many products on retailer shelves and retailers aim to sell the world's best products, adopting global sourcing for quality and safe food. So, if there is a concern in the safety of consuming domestic meat, as reported by an industrial representative, it is likely that retailers will forsake the domestic meat instead of trying to restore consumers' confidence in it. As a result, the British food industry could suffer.

Unfortunately, livestock farmers have not managed to build their own trustworthiness in the eyes of consumers. In this context, the present study explored the link between the factors which build trust, trust and consumer purchase likelihood.

7.1.2 Consumer Surveys

Following an extensive literature review, seven hypotheses linking the causal factors of trust with trust and purchase likelihood were used to guide this research namely: there is a positive causal effect from providing information, competence, credibility, reliability, integrity and benevolence to trust, and there is a positive causal effect from consumer trust to purchase likelihood.

The measurement items for the causal factors of trust were elicited through face-to-face interviews with 20 respondents. The findings were used to design the measurement scales for the subsequent survey with 250 respondents. The survey, using a questionnaire with structured questions, provided data for testing the above hypotheses.

Using data from 194 valid questionnaires, analysis was firstly carried out using multiple regression but the objectives set out for this study were not achieved because a complete integrated model of trust could not be developed. Various observed variables associated with trust were predicted by different variables associated with the factors to build trust. However, the findings gave a preliminary result showing that providing information is important to build consumer trust in livestock farmers. An alternative data analysis technique namely, Structural Equation Modelling method using the LISREL 8.30 statistical package was used to analysed the data. Following from the hypotheses, a consumer trust model was proposed. This model has the potential to guide livestock farmers how to build consumer trust which can have a positive effect on consumer purchase likelihood.

The direct effect, that is the regression coefficient from the causal factors on trust and that from trust on purchase likelihood was tested for statistical significance at 5% level (Table 5-18). It was showed that all hypotheses were supported. In other words, the factor 'providing information' was identified to be a key factor by which trust is built and the features that lead to trust, namely: 'providing information', 'competence', 'integrity', 'credibility', 'reliability', and 'benevolence' were shown to be factors to build trust in livestock farmers.

By keeping the other factors constant, namely: psychological, physical, social and physiological factors, this research confirmed that consumer meat purchase was positively affected if consumers have trust in livestock farmers. In other words, trust building in livestock farmers may maintain/restore consumers' confidence in purchasing meat.

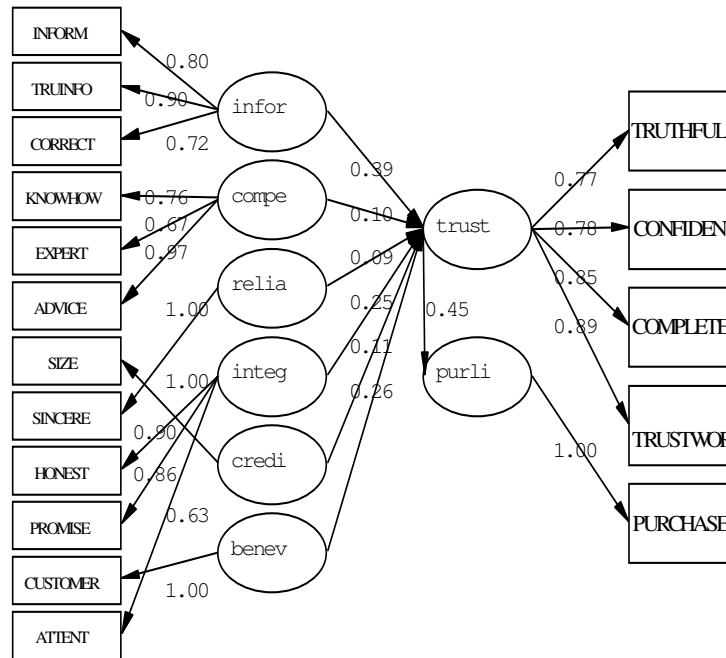
7.1.3 Consumer Trust Model

This research showed that the complexity of consumer trust in livestock farmers depends on the process by which trust is built (i.e. providing information) as well as the features leading to trust (i.e. competence, integrity, reliability, benevolence and

credibility). It also showed that it is possible to assess the links between the causal factors of trust, trust and purchase behaviour. The qualitative and quantitative approach proved to be useful for the purposes of this study. The former elicited the items of trust and the latter quantified the effects of these factors on trust and in turn to purchase likelihood.

The model generated from this research (Figure 7-1) was able to identify the important factors that build consumer trust in livestock farmers and in turn to maintain/enhance consumer purchase likelihood. Previous research has given little attention to trust in the kind of relationship where the exchange partners have little direct contact. This research set a framework towards building trust in exchange partners with little direct contact and subsequent behaviour.

Figure 7-1 The Consumer Trust Model



Note: The measurement items were represented by rectangles

The factors were represented by ovals

The arrow between a rectangle and an oval represent the item loading which is the variance explained by the factor for each observed item. For instance, $\text{INFORM} = 0.80 \times \text{'infor'} + \text{measurement error}$

The arrow between two factors represents the causal effect or the regression coefficient from the factor at the arrow end to that at the arrowhead. For instance, That is, 'trust' could be predicted from the six causal factors and represented by: $\text{'trust'} = 0.39 \times \text{'infor'} + 0.10 \times \text{'compe'} + 0.09 \times \text{'relia'} + 0.25 \times \text{'integ'} + 0.11 \times \text{'credi'} + 0.26 \times \text{'benev'} + \text{structural error}$

7.1.4 Responses from the Livestock Industry

From the response of the livestock farmers and the representatives of the livestock organisations, this research confirmed that trust in livestock farmers is important to the food industry. Industrial representatives and the farmers responding to this study agreed that provision of correct and trusted information to consumers is essential to building consumer trust and warned that media/press coverage often produces a negative effect. Most of the features that lead to trust, namely: competence, integrity, reliability and care can be represented by a quality mark, which not only provides quality assurance but also indicates the producer possesses these qualities. Credibility was shown to be associated with farm size – bigger farms being perceived as more credible suppliers of quality products than smaller ones. However, small farms can overcome this disadvantage by qualifying for the assurance certification. They may find it helpful to join together to seek joint accreditation and thereby some economies of credibility, with an existing or new ‘small farmer’ brand.

7.1.5 Implications for the Food Industry

Consumer trust in livestock farmers and its effect on purchasing behaviour are seen to be important. Not only does consumer trust in livestock farmers that need to be built during and immediately after periods of food scares but also maintained during other periods. Since providing information is important to build consumer trust regarding food safety, livestock farmers need to know what consumers want and in turn satisfy the latter.

The livestock industry could adopt methods to provide information to consumers such as workshops, roadshows, carelines, websites and information leaflets placed in clinics and libraries. However, livestock farmers have to demonstrably follow appropriate regulations or even voluntary codes. Integrity, competence and reliability in the form of farm assurance were found to be relevant to build trust. Indeed, the assurance schemes show that livestock farmers are competent, and dedicated to

producing wholesome food for consumers. But consumers welcome a single, credible and independently audited quality assurance scheme for the livestock industry instead of several different schemes.

During periods of concern about food safety, size of organisation and branding are factors leading to consumers' trust. By consolidating farmers and establishing regional brands with the help of an assurance scheme, consumer trust would be built.

Trust building would have to be an ongoing process to maintain consumer trust. By providing correct and trusted information to consumers, participating in assurance schemes and forming co-operatives of small farms, livestock farmers' market position as well as trustworthiness would be strengthened.

7.1.6 Limitations of The Study

Given the exploratory nature of this study, there are a number of limitations. These limitations mainly relate to the scope of the study and the research design.

7.1.6.1 Relating to The Scope of The Study

This study focused on livestock farmers to the exclusion of other parties in the meat supply chain that might have effects on consumer trust in livestock farmers and in livestock products including the messages and channels they use. For instance, consumer trust in livestock farmers may be increased if supermarkets promote quality assurance marks, promote British produce or even promote local British farmers. It is recommended to include these parties in the future study to explore the collective effect of each party in the supply chain to build consumer trust in livestock farmers.

When exploring the causal effect of consumer purchasing behaviour, this study keeps other factors such as psychological and physiological factors constant in order to investigate the effect of trust on purchase likelihood. It is recommended to take into

consideration how these factors affect purchase behaviour individually and collectively.

Culture shapes people's value and in turn has an effect on trust. Berg (2000) reports that country of residence affects the dimension of trust/distrust based on a study in 15 European countries. For reasons of limited resources, this study of livestock farmers did not include the effects of culture on develop the consumer trust model.

7.1.6.2 *Limitations Relate to Research Design*

This study adopted a cross-sectional approach and ignored how trust is developed over time. In addition, the non-probabilistic sampling method posed a limitation for this study since it limited the generalisation of the results of this study to the population as a whole. Though the quota sampling method adopted in this study reflected the demographic pattern of the national population, it by no means truly represented the profile of the population. So the results must be interpreted with care.

Though the sample size of this study meets the guidelines for testing the proposed model using Structural Equation Modelling method, it is possible that there is bias in the data with respect to certain demographic characteristics due to relatively small sample size. Again caution is required to interpret the findings.

Principal Components Analysis was run to purify the data and the results was fed into Structural Equation Modelling to build the consumer trust model, however, some of the potential important measurement items were not included because SEM was sensitive to the quality of data. So the model must be interpreted with care.

In view of the limitations of this study especially those related to design and method due to limited resources, recommendations for future research are given in the next section.

7.1.7 Contributions of The Study

The study helps to identify the causal factors to build trust whereas the two parties have little direct contact. Provision of information to the trustee was found to be the most significant factor and the features leading to trust, namely: competence, integrity, benevolence, reliability and credibility were also significant.

The study showed that Structural Equation Modelling method helps to develop an empirical framework to link the attitude of consumers to their behaviour regarding food safety. This framework helps to understand how to build consumer trust in livestock farmers and how trust in livestock farmers influence consumers' purchase behaviour. In addition, this framework helps livestock farmers to understand how consumer trust is built and in turn to develop plans to maintain/restore consumers' confidence in meat consumption.

7.2 RECOMMENDATIONS FOR FUTURE RESEARCH

Following the findings from this study, it is possible to summarise the recommendations for future research into the following three groups namely: research enhancement to address the shortcomings of this study, research extension to other applications and new relevant areas in academics and industry.

7.2.1 Research Enhancement

Because of the limited resource to carrying out this research, the quantitative survey adopted a non-probabilistic sampling method with relatively small samples. Though the sample size meets the requirement for the methods used in this study and is considered likely to reflect the demographic pattern of people in the United Kingdom, the respondents can neither be considered a random sample of the population in the United Kingdom nor necessarily representing the attitudes/behaviour in the country as

a whole. Such limitation restricts the inference of the results to the population as a whole. A probabilistic sampling method together with large sample size is recommended for future study.

This study adopted a cross-sectional approach to provide a snapshot of consumers' attitude and behaviour. Such approach is acceptable for this study to explore the relationship of trust and purchase behaviour. However, a longitudinal approach is recommended to give a clearer picture of how trust is developed over time. Moreover, one might have an interest to compare consumer trust in livestock farmers and their purchase behaviour before and after a food scare. It is recommended to extend the study and carry out on a regular basis, especially right after a food scare to check the after effect of a food scare on the building of trust and changes in purchase behaviour.

The preliminary investigation of the data revealed that there is no significant difference in purchase behaviour with respect to age, gender, marital, education and income group. Such finding is not in line with past research in meat purchase behaviour (e.g. Mainland, 1998). A probabilistic sampling method together with large sample size is recommended for future study to confirm the findings regarding food safety.

Although trust could influence consumers' decision on future purchase, there are other factors affecting their purchase decision. In deed, purchase choice, a decision to select or not select the focal meat product might influence the consumer's intention. For instance, a consumer might switch from red meat to white meat, so he/she might consume poultry instead of beef. He/she might even change to become a vegetarian and stop consuming meat totally. There might also be other factors such as health, value, price and so forth. In this study, all these variables were not included and assumed to be constant because the objective was to explore the possible link between consumer trust and consumer purchase likelihood. It shows that consumer trust positively influences consumers purchase likelihood by concentrating on trust and purchase likelihood only. For future research, it is recommended to include factors

other than consumer trust and test the outcome of trust on purchase likelihood in this broader context.

In this study, the respondents were asked to score their perception about the important factors causing them to build trust in livestock farmers and their perceived purchase behaviour using a structured questionnaire. The decline of perceived purchase likelihood after a food scare found in this study is in line with the statistics showing a drop of beef sales after the announcement of the linking between nvCJD and BSE. However, the effect of other parties in the supply chain including their actions, communication messages and channels were not explored. So future research is recommended to investigate the influence of each party of the supply chain.

There are research reports that there is inconsistency between perceived behaviour and actual behaviour. In other words, the respondents may score differently from their actual behaviour. This issue warrants further investigation if the actual behaviour are of interest to the researcher.

7.2.2 Research Extension

This research was conducted in the UK and country of origin/ethnic origin of the respondents was not included in the study. Trust however may be heavily dependent upon the culture of a society. Different cultural norms and values may facilitate or inhibit the formation of trust in livestock farmers and their purchase behaviour. In other words a cross-culture research conducted in several countries simultaneously is recommended. Such cross-culture research will enable a comparison of any cultural differences in building trust and also can test the applicability of the consumer food purchase model among other cultures.

This study focused on the causal factors of building trust in livestock farmers using Structural Equation Modelling method. Such developed methodology is not restricted for building consumer trust in livestock farmers only but can be applied to other types

of food where the suppliers have little contact with their customers. These can be crop farmers, food manufacturers or food processors. It is recommended to develop a similar model for these parties using SEM methodology developed in this study.

Similarly, this methodology is not restricted for the food industry only. It can be applied to industries where little contact with their customers is a norm of their business, such as catalogue companies and online companies mentioned above or car manufacturers. Doubtless, trust in the supplier of any type of merchandise is essential in any industries and future research to extend the developed methodology to other types of industry is recommended.

7.2.3 Other Academic and Industrial Research

In this study, quality mark was viewed as an effective tool to build consumer trust. However, from the consumer survey, respondents seemed to be confused about the quality marks supported by different independent organisations. Future research is required to help to determine the best strategy to unify these quality marks if possible and to put through the message of these quality marks to consumers.

Providing information was found important in trust building in this study. Future research is recommended for designing an effective risk management strategy during and after periods of food scares.

Similarly, consolidation and branding were suggested in this study as ways to build consumer trust. However, future research is suggested to determine how to consolidate farms of small size in an efficient and effective way and the strategies to develop branding effectively for the purpose of trust building.

The model generated in this study provides an estimate of the causal effect of the factors on trust and a total effect on purchase likelihood. This model can help the food industry to evaluate the effectiveness of trust building strategies by comparing

the effects on purchase likelihood during and post-periods of concern about food safety. Future research on how the food industry should respond to the challenge of maintaining consumer trust during period of concern about food safety is recommended.

7.3 CLOSING STATEMENT

This exploratory study has fulfilled the aim set out in Section 1.2 by achieving the three objectives. The research showed that:

- Consumer trust in livestock farmers is positively caused by providing information, benevolence, integrity, competence, credibility and reliability.
- There is a positive link between consumer trust in livestock farmers and consumer purchase likelihood.
- By understanding how consumers build their trust in livestock farmers, the latter can develop action plans to build their trustworthiness.

It concludes that this study provides potential benefits for the food industry and consumers as a whole. Consumer trust regarding food safety is a valid topic for further research.

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Appendix 1 Questionnaire for the Quantitative Survey

PhD Research Project: Trust in Livestock Farmers in Food Safety

How far do you agree with the following statements? Please circle the answer on a scale of 1 to 7, where 1 = strongly agree, 4 = no comment, and 7 = strongly disagree.

Section A: Information provided by livestock farmers

	Strongly Agree	No Comment	Strongly Disagree
1. Livestock farmers keep the public informed of the safety in consuming meat.	1	2 3 4 5 6	7 _(C1)
2. Livestock farmers provide information that can be trusted	1	2 3 4 5 6	7 _(C3)
3. Livestock farmers provide factual information.	1	2 3 4 5 6	7 _(C5)
4. Livestock farmers provide correct information.	1	2 3 4 5 6	7 _(C7)
5. Livestock farmers provide unbiased information.	1	2 3 4 5 6	7 _(C9)

Section B: Characteristics of livestock farmers

6. Livestock farmers are very knowledgeable to produce safe meat.	1	2 3 4 5 6	7 _(C11)
7. Livestock farmers are not expert in food safety related issues.	1	2 3 4 5 6	7 _(C13)
8. Livestock farmers are able to give good advice regarding food safety related issues.	1	2 3 4 5 6	7 _(C15)
9. I have complete confidence in livestock farmers' ability in producing safe meat.	1	2 3 4 5 6	7 _(C17)
10. I can count on livestock farmers for consuming safe meat.	1	2 3 4 5 6	7 _(C19)
11. I only trust large livestock farms.	1	2 3 4 5 6	7 _(C21)
12. Livestock farmers always fulfil their duties to produce safe meat.	1	2 3 4 5 6	7 _(C23)
13. Livestock farmers do not take advantages of customers.	1	2 3 4 5 6	7 _(C25)
14. Livestock farmers are concerned about the public's interest.	1	2 3 4 5 6	7 _(C27)

	Strongly Agree	No Comment	Strongly Disagree
15. Livestock farmers have a bad reputation with regard to food safety.	1	2	3 4 5 6 7 _(C29)
16. Livestock farmers are dependable with regard to food safety.	1	2	3 4 5 6 7 _(C31)
17. Livestock farmers do not cover up any wrong doings for their own benefit.	1	2	3 4 5 6 7 _(C33)
18. Livestock farmers are sincere to follow up after an outbreak of food scare.	1	2	3 4 5 6 7 _(C35)
19. Livestock farmers treat the public fairly.	1	2	3 4 5 6 7 _(C37)
20. Livestock farmers are ethical.	1	2	3 4 5 6 7 _(C39)
21. Livestock farmers treat consumers right.	1	2	3 4 5 6 7 _(C41)
22. Livestock farmers alter the fact to accomplish their own purpose.	1	2	3 4 5 6 7 _(C43)
23. Livestock farmers fail to keep promises.	1	2	3 4 5 6 7 _(C45)
24. Livestock farmers fail to provide the support they are obligated to.	1	2	3 4 5 6 7 _(C47)
25. Livestock farmers care for consumers.	1	2	3 4 5 6 7 _(C49)
26. Livestock farmers concern about the welfare of consumers.	1	2	3 4 5 6 7 _(C51)
27. Livestock farmers follow government regulations.	1	2	3 4 5 6 7 _(C53)
28. Livestock farmers do not know what the public's needs are.	1	2	3 4 5 6 7 _(C55)
29. Livestock farmers do not listen to consumers.	1	2	3 4 5 6 7 _(C57)

Section C: Trustworthiness of livestock farmers

30. Livestock farmers are truthful.	1	2	3 4 5 6 7 _(C59)
31. I have confidence in livestock farmers.	1	2	3 4 5 6 7 _(C61)
32. I rely on livestock farmers completely for safe meat.	1	2	3 4 5 6 7 _(C63)
33. Livestock farmers are trustworthy.	1	2	3 4 5 6 7 _(C65)

Section D: Intention for future purchases

34. After an outbreak of food scare,

a. I will continue to purchase that product.

Strongly Agree
No Comment
Strongly Disagree

1 2 3 4 5 6 7_(C67)

b. I will purchase that product after 1 month.

1 2 3 4 5 6 7_(C69)

c. I will purchase that product after 3 months.

1 2 3 4 5 6 7_(C71)

Section E: Personal data

Please tick the appropriate box for the following items.

Gender: Male ☐ Female ☐_(C73)

Age Range: 16-24 ☐ 25-34 ☐ 35-44 ☐
45-54 ☐ 55-64 ☐ Over 65 ☐_(C75)

Marital Status: Single ☐ Married ☐ Others ☐_(C77)

Education Background:

A Level ☐ HND/Degree ☐ Higher Degree ☐
Professional Qualification ☐ Others ☐_(C79)

Total Household Income:

Below £15,000 p.a. ☐ £15,000-19,999 p.a. ☐ £20,000-29,999 p.a. ☐
£30,000-49,999 p.a. ☐ £50,000 or over p.a. ☐_(C81)

Thank you for completing this questionnaire!

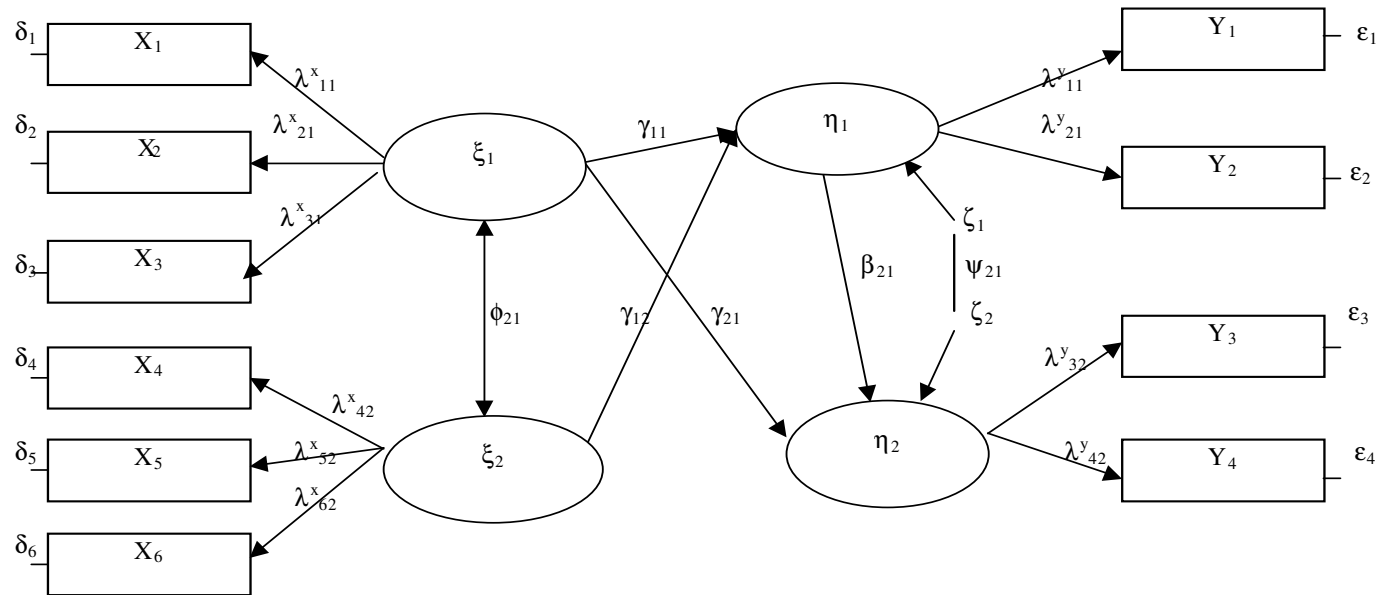
Appendix 2 List of Pre-determined Categories

Category	Possible candidates
Inform	inform consumers, share information, give advice
Trust information	information that is: true, exaggerate, amplified,
Tell the fact	information that is: factual, not to deny the fact, openness, transparent, not to hide the fact
Correct information	information that is: correct, proven wrong, accurate, proven right, incorrect, erroneous
Unbiased information	information that is: unbiased, complete picture, vested interest
Knowhow	knowledgeable, aware of the cause
Expert	experts, competence, capable
Ability	able to: produce safe meat, give advice, meet obligation, keep promise, meet expectation
Count on	count on, dependable
Size	large farms, small farms, number of employees, number of cattle, turnover, resources
Fulfil obligation	fulfil their obligation
Concern	concern about the interest of consumers,
Reputation	good/bad reputation, history, recommendation, past experience
Sincere	sincere to follow up, sincere to take remedial action, eradicate problems
Fair	self-objectives, opportunistic behaviour, self-interest, egocentric intention, abuse, equity, benefit, burden, unselfish
Honest	honest, cheating, decency, misleading, consistent
Promise	keep promise, fail to keep promise
Support	provide support, helpful
Care	care, consumer welfare, animal welfare, benevolence, empathy
Principle	government regulations, standards, code of practice
Aware	aware the need of consumers
Listen	listen to consumers
Truthful	truthful
Confidence	confidence
Trustworthy	trustworthy, reliable

Appendix 3 Record of Conducting Quantitative Survey

<u>Date (day of the week)</u>	<u>Time of the day</u>	<u>Place</u>
June 5 (Monday)	morning	Girvan
6 (Tuesday)	morning	Ayr
6 (Tuesday)	afternoon	Ayr
6 (Tuesday)	evening	Ayr
7 (Wednesday)	afternoon	Cameron
8 (Thursday)	morning	Ayr
8 (Thursday)	afternoon	Ayr
8 (Thursday)	evening	Ayr
9 (Friday)	afternoon	Ayr
10 (Saturday)	afternoon	Blackpool
18 (Sunday)	afternoon	Flitwick
21 (Wednesday)	evening	Flitwick
23 (Friday)	morning	Sharnbrook
26 (Monday)	afternoon	Sharnbrook
29 (Thursday)	morning	Silsoe
30 (Friday)	afternoon	Flitwick
July 13 (Thursday)	afternoon	Archway
15 (Saturday)	afternoon	Newbury Park
16 (Sunday)	morning	Newbury Park
17 (Monday)	morning	Ilford
18 (Tuesday)	afternoon	Ilford
24 (Monday)	morning	Gospel Oak
25 (Tuesday)	afternoon	East Finchley
Aug 1 (Tuesday)	afternoon	Highgate
5 (Saturday)	morning	Central Bedford
15 (Tuesday)	evening	South Bedford
16 (Wednesday)	morning	South Bedford
17 (Thursday)	afternoon	South Bedford
19 (Saturday)	afternoon	Central Bedford
28 (Monday)	morning	North Bedford
28 (Monday)	afternoon	Central Bedford

Appendix 4 Template of Path Diagram Used in the Structural Equation Modelling (SEM)



Appendix 4 Template of Path Diagram used in the Structural Equation Modelling (SEM) (Cont.)

Where x - observable item for the exogenous variable

y - observable item for the endogenous variable

ξ (ksi) - exogenous variable

η (eta) - endogenous variable

β (beta) coefficients - the effect of endogenous variable on endogenous variable

γ (gamma) coefficients - the effect of exogenous factor on endogenous variable

ϕ (phi) - correlations between variables

ζ (zeta) - the structural error term

λ (lambda) - the regression coefficient relating each observed items to its factor

δ (delta) - errors in the measurement of x

ϵ (epsilon) - errors in the measurement of y

Appendix 5 The Generic Equations of SEM

- Measurement submodel

$$Y = \Lambda_Y \eta + \varepsilon \quad \text{for the endogenous variables} \quad (\text{A5.1})$$

$$X = \Lambda_X \xi + \delta \quad \text{for the exogenous variables} \quad (\text{A5.2})$$

Where X and Y are vectors of observed items,
 η is the vector of endogenous variables,
 ξ is the vector of exogenous variables,
 ε and δ are the residuals for the observed items.

- Structural submodel

$$\eta = B \eta + \Gamma \xi + \zeta \quad (\text{A5.3})$$

Where B is the matrix of regression weights interrelating endogenous variables (η),
 Γ is the matrix of regression weights relating exogenous variables (ξ) to endogenous factors (η), and
 ζ is the vector of residuals for the endogenous variables (η).

The covariance structure (Σ) between Y and X is

$$\Sigma = (Y, X)(Y, X)' \quad (\text{A5.4})$$

$$= \begin{bmatrix} \Lambda_Y (I - B)^{-1} (\Gamma \Phi \Gamma' + \Psi) (I - B)^{-1} \Lambda_Y' + \Theta_\varepsilon & \Lambda_Y (I - B)^{-1} \Gamma \Phi \Lambda_X' + \Theta_{\delta, \varepsilon} \\ \Lambda_X \Phi \Gamma' (I - B')^{-1} \Lambda_Y' + \Theta_{\delta, \varepsilon} & \Lambda_X \Phi \Lambda_X' + \Theta_\delta \end{bmatrix} \quad (\text{A5.5})$$

With p being the number of y observed items, q the number of x observed items, m endogenous variables η , and n exogenous variables ξ , the parameter matrices are:

Λ_Y = a matrix of factor loading between y and η ($p \times m$)

Λ_X = a matrix of factor loading between x and ξ ($q \times n$)

Θ_ε = a variance-covariance matrix among the measurement errors of y ($p \times p$)

Θ_δ = a variance-covariance matrix among the measurement errors of x ($q \times q$)

$\Theta_{\delta\varepsilon}$ = matrix of covariance between the measurement errors of x and the measurement errors of y

B = a matrix of regression coefficients among the η ($m \times m$)

Γ = a matrix of regression coefficients between η and ξ ($m \times n$)

Φ = a variance-covariance matrix of the ξ ($n \times n$)

Ψ = a variance-covariance matrix of the structural errors (ζ) of the η ($m \times m$)

I = an identity matrix

Appendix 6 Equations for Reliability and Validity

- **Item reliability**

Item reliability of a single measurement x_i or y_i , denoted by ρ_{x_i} or ρ_{y_i} respectively is:

$$\rho_{x_i} = 1 - \text{var}(\delta_{x_i}) / \text{var}(x_i) \quad (\text{A6.1})$$

$$\rho_{y_i} = 1 - \text{var}(\epsilon_{y_i}) / \text{var}(y_i) \quad (\text{A6.2})$$

Where δ_{x_i} denotes the error of variable x_i

ϵ_{y_i} denotes the error of variable y_i

- **Cronbach alpha**

$$\alpha = [N / (N - 1)] [1 - \Sigma \sigma_i^2 / \sigma_T^2] \quad (\text{A6.3})$$

where α = Cronbach alpha

N = number of items

σ_T^2 = variance of the total of all items

$\Sigma \sigma_i^2$ = sum of item variances

- **Factor Reliability**

$$\rho_\xi = [(\Sigma \lambda_{x_i})^2 \text{var}(\xi)] / [(\Sigma \lambda_{x_i})^2 \text{var}(\xi) + \Sigma \text{var}(\delta_{x_i})] \quad (\text{A6.4})$$

$$\rho_\eta = [(\Sigma \lambda_{y_j})^2 \text{var}(\eta)] / [(\Sigma \lambda_{y_j})^2 \text{var}(\eta) + \Sigma \text{var}(\epsilon_{y_j})] \quad (\text{A6.5})$$

Where ρ_ξ and ρ_η are factor reliability of ξ and η respectively

λ_{x_i} is the regression weight of x_i

$\text{var}(\xi)$ is the variance of the factors ξ

δ_{x_i} is the error of measurement associated with x_i

λ_{y_j} is the regression weight of y_j

$\text{var}(\eta)$ is the variance of the factors η

ϵ_{y_j} is the error of measurement associated with y_j

- **Average variance extracted**

$$\rho_{vc(\xi)} = [\sum \lambda_{xi}^2 \text{var}(\xi)] / [\sum \lambda_{xi}^2 \text{var}(\xi) + \sum \text{var}(\delta_{xi})] \quad (\text{A6.6})$$

$$\rho_{vc(\eta)} = [\sum \lambda_{yi}^2 \text{var}(\eta)] / [\sum \lambda_{yi}^2 \text{var}(\eta) + \sum \text{var}(\epsilon_{yi})] \quad (\text{A6.7})$$

Where $\rho_{vc(\xi)}$ and $\rho_{vc(\eta)}$ are the average variance extracted of ξ and η respectively

λ_{xi}^2 is the unstandardised regression weight for x_i

$\text{var}(\xi)$ is the variance of the factors ξ

δ_{xi} is the error of measurement associated with x_i

λ_{yi}^2 is the unstandardised regression weight for y_i

$\text{var}(\eta)$ is the variance of the factors η

ϵ_{yi} is the error of measurement associated with y_i

- **Normallogical validity**

The coefficient of determination was measured by

$$1 - | \Psi | / | \text{cov}(\eta) | \quad (\text{A6.8})$$

Where Ψ is the variance-covariance matrix of the structure errors of η

$\text{cov}(\eta)$ is the covariance matrix of η

Appendix 7 Equations for Overall Goodness of Model Fit and Power Test

Absolute Fit

- χ^2 goodness of fit test

$$F = (s - \sigma)' W^{-1} (s - \sigma) \quad (A7.1)$$

Where F is the χ^2 goodness of fit test

s' is a vector of the elements in the lower half, including the diagonal, of the covariance matrix S used to fit the model to the data

σ' is the vector of corresponding elements of the covariance structure Σ reproduced from the model

W is the weight matrix

- **Root mean squared error of approximation (RMSEA)**

The root mean squared error of approximation was calculated as the square root of the mean of the squared differences between the implied and observed covariance matrices. The result indicated a good fit if the index has a value of less than 0.05.

- **Goodness-of-fit index (GFI)**

The goodness-of-fit index was calculated as the sum of the squared differences between the implied and observed covariance matrices. If the result obtained was greater than 0.90, a good fit was guaranteed.

- **Adjusted goodness-of-fit index (AGFI)**

The adjusted goodness-of-fit index was calculated by adjusting the GFI for the degree of freedom in the model. If the result obtained was greater than 0.90, a good fit was guaranteed.

Comparative Fit

- **Normed fit index (NFI)**

Normed fit index was calculated by comparing the testing model with an independence model using the following equation. A value exceeded 0.90 indicated a good fit.

$$(\chi^2_{\text{indep}} - \chi^2_{\text{model}}) / \chi^2_{\text{indep}} \quad (\text{A7.2})$$

Where χ^2_{indep} is the χ^2 of the independence model, which is a model that specifies no relationships between the variables making up the model.
 χ^2_{model} is the χ^2 of the testing model

- **Non-normed fit index (NNFI)**

The non-normed fit index was calculated by adjusting NFI for the number of degrees of freedom (Equation A7.3). If the value obtained exceeded 0.90, a good fit was guaranteed.

$$\{\chi^2_{\text{indep}} - \chi^2_{\text{model}} (df_{\text{indep}} / df_{\text{model}})\} / (\chi^2_{\text{indep}} - df_{\text{model}}) \quad (\text{A7.3})$$

Where χ^2_{indep} is the χ^2 of the independence model
 χ^2_{model} is the χ^2 of the testing model
df is the degree of freedom

- **Incremental fit index (IFI)**

The incremental fit index was calculated using the following equation to check for the incremental improvement in goodness of model fit. The result obtained ranged between 0 and 1, and a higher value indicated a better fit.

$$(\chi^2_{\text{indep}} - \chi^2_{\text{model}}) / (\chi^2_{\text{indep}} - df_{\text{model}}) \quad (\text{A7.4})$$

Where χ^2_{indep} is the χ^2 of the independence model
 χ^2_{model} is the χ^2 of the testing model
df is the degree of freedom

- **Comparative fit index (CFI)**

The comparative fit index was calculated using the following equation to measure the improvement in non-centrality of χ^2 between the test model and the independence model. If the result obtained exceeded 0.90, a good fit was indicated.

$$1 - [(\chi^2_{\text{model}} - df_{\text{model}}) / (\chi^2_{\text{indep}} - df_{\text{indep}})] \quad (\text{A7.5})$$

Where χ^2_{indep} is the χ^2 of the independence model

χ^2_{model} is the χ^2 of the testing model

- **Relative fit index (RFI)**

The relative fit index was calculated using equation A7.6 to measure the relative improvement in goodness of model fit with adjusted degrees of freedom. If the result obtained was greater than 0.90, a good fit was indicated.

$$\{(\chi^2_{\text{indep}} - \chi^2_{\text{model}}) - [\text{df}_{\text{indep}} - (\text{df}_{\text{model}} / n)]\} / \{\chi^2_{\text{indep}} - (\text{df}_{\text{indep}} / n)\} \quad (\text{A7.6})$$

Where χ^2_{indep} is the χ^2 of the independence model
 χ^2_{model} is the χ^2 of the testing model
 n is the number of observations

Parsimonious Fit

- **Parsimonious normed fit index (PNFI)**

The parsimonious normed index was calculated by adjusting the NFI with the degrees of freedom using the following equation.

$$(\text{df}_{\text{model}} / \text{df}_{\text{indep}}) \times \text{NFI} \quad (\text{A7.7})$$

Where df_{model} is the degree of freedom of the testing model
 df_{indep} is the degree of freedom of the independence model

- **Parsimonious goodness-of-fit index (PGFI)**

The parsimonious goodness-of-fit index was calculated by adjusting the GFI with the ratio of the number of free parameters and the number of observations.

$$1 - (P/N) \times \text{GFI} \quad (\text{A7.8})$$

Where P = the number of estimated parameters in the model, and
 N = the number of observations

Appendix 7 Equations for Overall Goodness of Model Fit and Power Test (Cont.)

Power Estimates of Close of Fit

Degree of freedom	Sample Size		
	100	200	300
60	0.477	0.831	0.960
70	0.525	0.877	0.978
80	0.570	0.911	0.988
90	0.612	0.937	0.994
100	0.650	0.955	0.997

Source: MacCallum, Browne and Sugawara (1996).

Appendix 8 Skewness of Observed Items

	Minimum	Maximum	Skewness	
	Statistic	Statistic	Statistic	Std. error
INFORM	1.00	7.00	-.402	.175
TRUINFO	1.00	7.00	-.416	.175
FACT	1.00	7.00	-.167	.175
CORRECT	1.00	7.00	-.105	.175
UNBIASE	1.00	7.00	-.498	.175
KNOWHOW	1.00	7.00	.093	.175
EXPERT	1.00	7.00	.059	.175
ADVICE	1.00	7.00	-.055	.175
ABILITY	1.00	7.00	-.533	.175
COUNTON	1.00	7.00	-.553	.175
INCAUTIO	1.00	7.00	-.585	.175
SIZE	1.00	7.00	-.356	.175
FULFIL	1.00	7.00	-.337	.175
STRAIGHT	1.00	7.00	-.378	.175
CONCERN	1.00	7.00	-.142	.175
REPUTA	1.00	7.00	-.111	.175
DEPEND	1.00	7.00	-.049	.175
ACCURATE	1.00	7.00	-.061	.175
SINCERE	1.00	7.00	.326	.175
FAIR	1.00	7.00	.021	.175
ETHICAL	1.00	7.00	-.238	.175
TREAT	1.00	7.00	-.064	.175
HONEST	1.00	7.00	-.571	.175
PROMISE	1.00	7.00	-.389	.175
SUPPORT	1.00	7.00	-.236	.175
CARE	1.00	7.00	-.067	.175
CUSTOMER	1.00	7.00	-.491	.175
ATTENT	1.00	7.00	-.436	.175
AWARE	1.00	7.00	.169	.175
INTEREST	1.00	7.00	-.254	.175
TRUTHFUL	1.00	7.00	-.566	.175
CONFIDEN	1.00	7.00	-.527	.175
COMPLETE	1.00	7.00	-.709	.175
TRUSTWOR	1.00	7.00	-.405	.175
PURCHASE	1.00	7.00	-.678	.175

Appendix 9 Sample of Qualitative Study Notes

Report – Qualitative Study

Respondent:

Female <30, after tea, Northamptonshire

The party(ies) responsible for food scare of fresh meat:

I believe the farmer should have a strict control over what they produce. Quality control is essential at this level.
 The supermarkets should have a control group when they buy the fresh meat.

Factors that lead to the development of trust in livestock farmers:

what farms feed to animals is unknown to us, I look at the problem of BSE & Salmonella. (BSE, Salmonella, NDI)
 I don't know any farmers, my view of them is formed by what I see in the media & hear on the radio. (media, NDI)
 But sometimes it over exaggerates the facts. Usually in honesty and good husbandry practices to provide top quality, safe meat. But sometimes farms are prepared to use cheap animal feed for cattle. I would say it is the cause of BSE. (BSE, media, NDI)
 BSE is a matter of animal feed, meat to cattle. If they really care about their animal. (BSE, media, NDI)
 It is a common theme would not do it. I don't have any reputation about farms, but large farms are better, they have the manpower to eradicate any problems and follow the rules. (reput, media, NDI)
 They can't cut cost in an immoral way & ignore the welfare of their consumers.

Appendix 10 Questionnaire for the Industrial Respondents

1. To what extent do you think consumers trust the supermarkets and livestock farmers related to food safety in raw meat? (where -2 is not very much, 0 is neutral, and +2 is very much)

Supermarkets	-2	-1	0	1	2
--------------	----	----	---	---	---

Livestock Farmers	-2	-1	0	1	2
-------------------	----	----	---	---	---

2. In your view, is consumer trust in supermarkets and livestock farmers important to the food industry? (where -2 is not very important, 0 is neutral, and +2 is very important)

Supermarkets	-2	-1	0	1	2
--------------	----	----	---	---	---

Livestock Farmers	-2	-1	0	1	2
-------------------	----	----	---	---	---

Please briefly explain your answer.

3. In your view, what are the main factors that influence consumers to build their trust in livestock farmers regarding food safety issues?

4. How does your organisation maintain/restore consumers' confidence in consuming meat after a food scare?

5. Do you think a direct communication with consumers is important regarding food safety related issues? Please briefly explain your answer?

6. What communication channels does your organisation use to reach consumers regarding food safety related issues? What is their effectiveness?

Thank you for taking the trouble to answer these questions

Appendix 11 Results of Multiple Regression

The observed variable [SQTRUTHFUL] was chosen as the dependent variable and five independent observed variables associated with the factors which build trust entered the regression equation with regression coefficient which were significantly different from zero (Table 1). For instant, [TRUINFO] had the highest beta (0.37 with t-value = 5.54). The regression equation had a relatively low predictive power with regard to these five independent variables with an adjusted R^2 of 0.23 ($F = 19.66$, $p = 0.00$).

Table 1 Results of Multiple Regression of [SQTRUTHFUL] on the Independent Observed Variables

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
TRUINFO	information	0.11	0.02	0.37	5.54	0.00
AWARE	benevolence	5E-2	0.02	0.21	3.12	0.00
SQSIZE	credibility	0.15	0.06	0.15	2.34	0.02
Multiple R	0.48					
R^2	0.24					
Adjusted R^2	0.23					
Std. Error	0.43					
R^2 change	0.02					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			3	11.14	3.71	
Residual			190	35.88	0.19	
F = 14.32	Sig. F = 0.00					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [SQCONFID] was chosen as the dependent variable and three independent observed variables associated with the factors which build trust entered the regression equation with regression coefficient which were significantly different from zero (Table 2). For instant, [TRUINFO] had the highest beta (0.38 with t-value = 6.17). The regression equation had a relatively low predictive power with regard to these four independent variables and had an adjusted R^2 of 0.31 ($F = 27.74$, $p = 0.00$).

Table 2 Results of Multiple Regression of [SQCONFIDEN] on the Independent Observed Variables

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
TRUINFO	information	0.11	0.02	0.38	6.17	0.00
SINCERE	reliability	6E-2	0.02	0.23	3.79	0.00
SQHONEST	integrity	0.18	0.06	0.18	2.96	0.00
Multiple R	0.55					
R^2	0.31					
Adjusted R^2	0.30					
Std. Error	0.41					
R^2 change	0.01					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			3	13.93	4.64	
Residual			190	31.38	0.17	
$F = 27.74$	Sig. $F = 0.00$					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [LGCOMPLETE] was chosen as the dependent variable and four independent observed variables associated with the factors which build trust entered the regression equation with regression coefficient which were significantly different from zero (Table 3). For instant, [TRUINFO] had the highest beta (0.41 with t-value = 6.87). The regression equation had a relatively low power with regard to these four independent variables and had an adjusted R^2 of 0.35 ($F = 35.50$, $p = 0.00$).

Table 3 Results of Multiple Regression of [LGCOMPLETE] on the Independent Observed Variables

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
TRUINFO	information	6E-2	0.01	0.41	6.87	0.00
SQHONEST	integrity	0.17	0.03	0.31	5.24	0.00
SINCERE	reliability	2E-2	0.01	0.13	2.22	0.01
Multiple R	0.60					
R^2	0.36					
Adjusted R^2	0.35					
Std. Error	0.22					
R^2 change	0.01					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			3	5.05	1.68	
Residual			190	9.00	4E-2	
F = 28.07	Sig. F = 0.00					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [TRUSTWOR] was chosen as the dependent variable and two independent observed variables associated with the factors which build trust entered the regression equation with regression coefficient which were significantly different from zero (Table 4). For instant, [TRUINFO] had the highest beta (0.44 with t-value = 7.37). The regression equation had a relatively low predictive power with regard to these four independent variables and had an adjusted R^2 of 0.35 ($F = 51.99$, $p = 0.00$).

Table 4 Results of Multiple Regression of [TRUSTWOR] on the Independent Observed Variables

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
TRUINFO	information	0.44	0.06	0.44	7.37	0.00
SQHONEST	integrity	1.07	0.19	0.33	5.57	0.00
Multiple R		0.59				
R^2		0.35				
Adjusted R^2		0.35				
Std. Error		1.33				
R^2 change		0.00				
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			2	182.59	91.29	
Residual			191	335.46	1.76	
F = 51.99	Sig. F = 0.00					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [MEANTRUST] was chosen as the dependent variable and five independent observed variables associated with the factors which build trust entered the regression equation with regression coefficient which were significantly different from zero (Table 5). For instant, [TRUINFO] had the highest beta (0.44 with t-value = 7.56). The regression equation had a relatively low power with regard to these five independent variables and had an adjusted R^2 of 0.41 ($F = 27.93$, $p = 0.00$).

Table 5 Results of Multiple Regression of [MEANTRUST] on the Independent Observed Variables of Trust

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
TRUINFO	information	0.39	0.05	0.44	7.56	0.00
SQHONEST	integrity	0.62	0.17	0.22	3.63	0.00
SINCERE	reliability	0.10	0.05	0.12	2.10	0.04
AWARE	benevolence	0.12	0.05	0.15	2.36	0.02
SQSIZE	credibility	0.34	0.16	0.12	2.10	0.04
Multiple R	0.65					
R^2	0.43					
Adjusted R^2	0.41					
Std. Error	1.11					
R^2 change	0.02					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			5	170.65	34.13	
Residual			188	229.71	1.2	
F = 27.93	Sig. F = 0.00					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [LGPURCHASE] was chosen as the dependent variable and two independent observed variables associated with the factors which build entered the regression equation with regression coefficient which were significantly different from zero (Table 6). For instant, [TRUINFO] had the highest beta (0.27 with t-value = 3.86). The regression equation had a very low predictive power with regard to these four independent variables and had an adjusted R^2 of 0.11 ($F = 11.67$, $p = 0.00$).

Table 6 Results of Multiple Regression of [LGPURCHASE] on the Independent Observed Variables

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
TRUINFO	information	4E-2	0.01	0.27	3.86	0.00
SINCERE	reliability	2E-2	0.01	0.15	2.17	0.03
Multiple R	0.33					
R^2	0.11					
Adjusted R^2	0.10					
Std. Error	0.28					
R^2 change	0.01					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			2	1.83	0.92	
Residual			191	15.00	7E-2	
F = 11.67	Sig. F = 0.00					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [LGPURCHASE] was chosen as the dependent variable and one observed variables associated with trust entered the regression equation with regression coefficient which were significantly different from zero (beta = 0.38 with t-value = 5.65) (Table 7). The regression equation had a very low predictive power with regard to these four independent variables and had an adjusted R^2 of 0.14 ($F = 31.90$, $p = 0.00$).

Table 7 Results of Multiple Regression of [LGPURCHASE] on Observed Variables of Trust

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
LGCOMPLETE	trust	0.42	0.07	0.38	5.65	0.00
Multiple R	0.38					
R^2	0.14					
Adjusted R^2	0.14					
Std. Error	0.27					
R^2 change	0.00					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			1	2.40	2.40	
Residual			192	14.44	7E-2	
F = 31.90	Sig. F = 0.00					

Appendix 11 Results of Multiple Regression (Cont.)

The observed variable [LGPURCHASE] was chosen as the dependent variable and the mean score of trust entered the regression equation with regression coefficient which were significantly different from zero (beta = 0.35 with t-value = 5.24) (Table 8). The regression equation had a very low predictive power with regard to these four independent variables and had an adjusted R^2 of 0.12 ($F = 27.48$, $p = 0.00$).

Table 8 Results of Multiple Regression of [LGPURCHASE] on Mean Score of Trust

Variable	Ass. Factor	B	Std. Error	Beta	t-value	Sig. t
MEANTRUST	trust	7E-2	0.14	0.35	5.24	0.00
Multiple R	0.35					
R^2	0.13					
Adjusted R^2	0.12					
Std. Error	0.28					
R^2 change	0.01					
			<u>D F</u>	<u>Sum of Square</u>	<u>Mean Square</u>	
Regression			1	2.11	2.10	
Residual			192	14.73	7E-2	
F = 27.48	Sig. F = 0.00					

Appendix 12 Correlation Matrix of the Observed Items

	INFORM	TRUINFO	FACT	CORRECT	UNBIASE	KNOWHOW	EXPERT	ADVICE	ABILITY
INFORM	1.000	.783	.557	.630	.463	.327	.198	.292	.559
TRUINFO	.783	1.000	.644	.695	.613	.303	.228	.290	.567
FACT	.557	.644	1.000	.744	.558	.368	.320	.446	.591
CORRECT	.630	.695	.744	1.000	.590	.328	.266	.407	.615
UNBIASE	.463	.613	.558	.590	1.000	.238	.249	.358	.530
KNOWHOW	.327	.303	.368	.328	.238	1.000	.485	.574	.451
EXPERT	.198	.228	.320	.266	.249	.485	1.000	.371	.399
ADVICE	.292	.290	.446	.407	.358	.574	.371	1.000	.497
ABILITY	.559	.567	.591	.615	.530	.451	.399	.497	1.000
COUNTON	.590	.646	.482	.547	.601	.331	.276	.465	.712
SIZE	.118	.100	.187	.149	.152	.002	-.007	.202	.123
FULFIL	.405	.522	.398	.434	.504	.159	.104	.278	.522
STRAIGHT	.472	.528	.440	.487	.488	.270	.182	.361	.594
CONCERN	.559	.593	.506	.564	.445	.261	.152	.328	.541
REPUTA	.282	.306	.254	.281	.225	.301	.298	.302	.374
DEPEND	.314	.418	.385	.430	.328	.287	.165	.405	.515
ACCURATE	.472	.487	.504	.545	.381	.265	.191	.375	.493
SINCERE	.149	.178	.325	.326	.169	.205	.215	.308	.256
FAIR	.501	.499	.578	.624	.390	.465	.186	.493	.664
ETHICAL	.518	.570	.499	.606	.512	.373	.294	.389	.657
TREAT	.400	.480	.421	.522	.347	.335	.271	.304	.560
HONEST	.184	.173	.188	.234	.109	-.057	.312	.106	.227
PROMISE	.129	.206	.198	.240	.250	-.043	.342	.177	.222
SUPPORT	.240	.343	.191	.245	.243	.006	.218	.096	.287
CARE	.399	.410	.351	.438	.281	.325	.171	.334	.470
CUSTOMER	.236	.416	.286	.344	.489	.240	.180	.320	.438
ATTENT	.187	.228	.155	.222	.188	-.045	.141	.119	.218
AWARE	.078	.248	.169	.238	.185	.025	.272	.115	.206
INTEREST	.299	.411	.274	.341	.327	.057	.253	.152	.376

Appendix 12 Correlation Matrix of the Observed Items (Cont.)

	COUNTON	SIZE	FULFIL	STRAIGHT	CONCERN	REPUTA	DEPEND	ACCURATE	SINCERE	FAIR
INFORM	.590	.118	.405	.472	.559	.282	.314	.472	.149	.501
TRUINFO	.646	.100	.522	.528	.593	.306	.418	.487	.178	.499
FACT	.482	.187	.398	.440	.506	.254	.385	.504	.325	.578
CORRECT	.547	.149	.434	.487	.564	.281	.430	.545	.326	.624
UNBIASE	.601	.152	.504	.488	.445	.225	.328	.381	.169	.390
KNOWHOW	.331	.002	.159	.270	.261	.301	.287	.265	.205	.465
EXPERT	.276	-.007	.104	.182	.152	.298	.165	.191	.215	.186
ADVICE	.465	.202	.278	.361	.328	.302	.405	.375	.308	.493
ABILITY	.712	.123	.522	.594	.541	.374	.515	.493	.256	.664
COUNTON	1.000	.178	.620	.639	.651	.290	.453	.539	.220	.513
SIZE	.178	1.000	.313	.201	.099	-.095	-.001	.040	.000	.084
FULFIL	.620	.313	1.000	.700	.570	.136	.342	.364	.189	.418
STRAIGHT	.639	.201	.700	1.000	.619	.251	.352	.473	.250	.500
CONCERN	.651	.099	.570	.619	1.000	.258	.442	.601	.290	.582
REPUTA	.290	-.095	.136	.251	.258	1.000	.249	.298	.200	.366
DEPEND	.453	-.001	.342	.352	.442	.249	1.000	.472	.345	.544
ACCURATE	.539	.040	.364	.473	.601	.298	.472	1.000	.471	.594
SINCERE	.220	.000	.189	.250	.290	.200	.345	.471	1.000	.538
FAIR	.513	.084	.418	.500	.582	.366	.544	.594	.538	1.000
ETHICAL	.622	.151	.482	.592	.554	.356	.495	.519	.334	.617
TREAT	.515	.081	.366	.471	.543	.428	.523	.474	.455	.660
HONEST	.185	-.062	.193	.249	.248	.333	.142	.145	.117	.208
PROMISE	.269	.038	.324	.264	.224	.288	.142	.099	.130	.193
SUPPORT	.304	-.058	.409	.440	.407	.277	.198	.330	.231	.353
CARE	.518	.085	.438	.455	.576	.281	.407	.377	.379	.573
CUSTOMER	.539	.078	.429	.472	.429	.317	.375	.322	.279	.418
ATTENT	.267	.076	.270	.250	.298	.170	.210	.195	.128	.271
AWARE	.260	-.142	.200	.246	.321	.382	.147	.347	.341	.216
INTEREST	.455	.050	.301	.378	.512	.386	.325	.425	.248	.377

Appendix 12 Correlation Matrix of the Observed Items (Cont.)

	ETHICAL	TREAT	HONEST	PROMISE	SUPPORT	CARE	CUSTOMER	ATTENT	AWARE	INTEREST
INFORM	.518	.400	.184	.129	.240	.399	.236	.187	.078	.299
TRUINFO	.570	.480	.173	.206	.343	.410	.416	.228	.248	.411
FACT	.499	.421	.188	.198	.191	.351	.286	.155	.169	.274
CORRECT	.606	.522	.234	.240	.245	.438	.344	.222	.238	.341
UNBIASE	.512	.347	.109	.250	.243	.281	.489	.188	.185	.327
KNOWHOW	.373	.335	-.057	-.043	.006	.325	.240	-.045	.025	.057
EXPERT	.294	.271	.312	.342	.218	.171	.180	.141	.272	.253
ADVICE	.389	.304	.106	.177	.096	.334	.320	.119	.115	.152
ABILITY	.657	.560	.227	.222	.287	.470	.438	.218	.206	.376
COUNTON	.622	.515	.185	.269	.304	.518	.539	.267	.260	.455
SIZE	.151	.081	-.062	.038	-.058	.085	.078	.076	-.142	.050
FULFIL	.482	.366	.193	.324	.409	.438	.429	.270	.200	.301
STRAIGHT	.592	.471	.249	.264	.440	.455	.472	.250	.246	.378
CONCERN	.554	.543	.248	.224	.407	.576	.429	.298	.321	.512
REPUTA	.356	.428	.333	.288	.277	.281	.317	.170	.382	.386
DEPEND	.495	.523	.142	.142	.198	.407	.375	.210	.147	.325
ACCURATE	.519	.474	.145	.099	.330	.377	.322	.195	.347	.425
SINCERE	.334	.455	.117	.130	.231	.379	.279	.128	.341	.248
FAIR	.617	.660	.208	.193	.353	.573	.418	.271	.216	.377
ETHICAL	1.000	.698	.217	.283	.315	.543	.522	.267	.351	.451
TREAT	.698	1.000	.270	.270	.243	.618	.541	.182	.347	.365
HONEST	.217	.270	1.000	.734	.502	.325	.319	.485	.365	.488
PROMISE	.283	.270	.734	1.000	.594	.214	.355	.540	.454	.477
SUPPORT	.315	.243	.502	.594	1.000	.212	.256	.548	.468	.563
CARE	.543	.618	.325	.214	.212	1.000	.677	.213	.278	.354
CUSTOMER	.522	.541	.319	.355	.256	.677	1.000	.209	.306	.397
ATTENT	.267	.182	.485	.540	.548	.213	.209	1.000	.328	.505
AWARE	.351	.347	.365	.454	.468	.278	.306	.328	1.000	.557
INTEREST	.451	.365	.488	.477	.563	.354	.397	.505	.557	1.000

Appendix 13 Model Specification of the Proposed Model

LAMBDA-Y

	trust	purli
TRUTHFUL	0	0
CONFIDEN	1	0
COMPLETE	2	0
TRUSTWOR	3	0
PURCHASE	0	0

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	4	0	0	0	0	0
TRUINFO	5	0	0	0	0	0
CORRECT	6	0	0	0	0	0
KNOWHOW	0	7	0	0	0	0
EXPERT	0	8	0	0	0	0
ADVICE	0	9	0	0	0	0
SINCERE	0	0	10	0	0	0
HONEST	0	0	0	11	0	0
PROMISE	0	0	0	12	0	0
ATTENT	0	0	0	13	0	0
SIZE	0	0	0	0	14	0
CUSTOMER	0	0	0	0	0	15

BETA

	trust	purli
trust	0	0
purli	16	0

GAMMA

	infor	compe	relia	integ	credi	benev
trust	17	18	19	20	21	22
purli	0	0	0	0	0	0

Appendix 13 Model Specification of the Proposed Model (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	0					
compe	23	0				
relia	24	25	0			
integ	26	27	28	0		
credi	29	30	31	32	0	
benev	33	34	35	36	37	0

PSI

	trust	purli
	38	39

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
40	41	42	43	0

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
44	45	46	47	48	49

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
0	50	51	52	0	0

Appendix 14 Parameter Estimates of the Proposed Model

LAMBDA-Y

	trust	purli
TRUTHFUL	0.77	--
CONFIDEN	0.78	--
	(0.02)	
	33.74	
COMPLETE	0.85	--
	(0.02)	
	37.97	
TRUSTWOR	0.89	--
	(0.02)	
	38.82	
PURCHASE	--	1.00

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	0.80	--	--	--	--	--
	(0.02)					
	41.74					
TRUINFO	0.90	--	--	--	--	--
	(0.01)					
	68.88					
CORRECT	0.72	--	--	--	--	--
	(0.02)					
	38.52					
KNOWHOW	--	0.76	--	--	--	--
		(0.02)				
		34.25				
EXPERT	--	0.67	--	--	--	--
		(0.03)				
		23.94				
ADVICE	--	0.97	--	--	--	--
		(0.03)				
		28.46				
SINCERE	--	--	1.00	--	--	--
			(0.04)			
			27.78			
HONEST	--	--	--	0.90	--	--
				(0.02)		
				44.67		

Appendix 14 Parameter Estimates of the Proposed Model (Cont.)

	infor	compe	relia	integ	credi	benev
PROMISE	--	--	--	0.86 (0.02) 47.73	--	--
ATTENT	--	--	--	0.63 (0.03) 18.14	--	--
SIZE	--	--	--	--	1.00 (0.04) 27.78	--
CUSTOMER	--	--	--	--	--	1.00 (0.04) 27.78

BETA

	trust	purli
trust	--	--
purli	0.45 (0.04) 12.13	--

GAMMA

	infor	compe	relia	integ	credi	benev
trust	0.39 (0.06) 6.59	0.10 (0.04) 2.32	0.09 (0.03) 2.97	0.25 (0.04) 6.26	0.11 (0.03) 3.80	0.26 (0.05) 5.68

PHI

	infor	compe	relia	integ	credi	benev
infor	1.00					
compe	0.58 (0.03) 17.99	1.00				
relia	0.50 (0.04) 13.53	0.44 (0.04) 11.60	1.00			
integ	0.46 (0.04) 11.58	0.34 (0.04) 8.69	0.27 (0.04) 7.68	1.00		

Appendix 14 Parameter Estimates of the Proposed Model (Cont.)

	infor	compe	relia	integ	credi	benev
credi	0.07 (0.05)	0.15 (0.03)	0.23 (0.03)	-0.17 (0.04)	1.00	
	1.65	4.62	7.05	-4.55		
benev	0.57 (0.04)	0.46 (0.04)	0.40 (0.04)	0.50 (0.04)	0.06 (0.04)	1.00
	15.16	11.58	9.02	12.46	1.61	

PSI

	trust	purli
	0.25 (0.03)	0.80 (0.08)
	7.93	10.16

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
0.40 (0.08)	0.39 (0.08)	0.27 (0.07)	0.20 (0.07)	--
5.11	5.11	3.68	2.70	

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
0.36 (0.08)	0.18 (0.08)	0.48 (0.08)	0.43 (0.08)	0.55 (0.08)	0.06 (0.10)
4.67	2.41	6.18	5.37	6.78	0.61

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
--	0.18 (0.08)	0.26 (0.08)	0.61 (0.08)	--	--
	2.26	3.25	7.19		

Appendix 15 Model Specification of the Rival Model

LAMBDA-Y

	infor	trust	purli
INFORM	0	0	0
TRUINFO	1	0	0
CORRECT	2	0	0
TRUTHFUL	0	0	0
CONFIDEN	0	3	0
COMPLETE	0	4	0
TRUSTWOR	0	5	0
PURCHASE	0	0	0

LAMBDA-X

	compe	relia	integ	credi	benev
KNOWHOW	6	0	0	0	0
EXPERT	7	0	0	0	0
ADVICE	8	0	0	0	0
SINCERE	0	9	0	0	0
HONEST	0	0	10	0	0
PROMISE	0	0	11	0	0
ATTENT	0	0	12	0	0
SIZE	0	0	0	13	0
CUSTOMER	0	0	0	0	14

BETA

	infor	trust	purli
infor	0	0	0
trust	15	0	0
purli	0	16	0

GAMMA

	compe	relia	integ	credi	benev
infor	17	18	19	20	21
trust	0	0	0	0	0
purli	0	0	0	0	0

Appendix 15 Model Specification of the Rival Model (Cont.)

PHI

	compe	relia	integ	credi	benev
compe	0				
relia	22	0			
integ	23	24	0		
credi	25	26	27	0	
benev	28	29	30	31	0

PSI

	infor	trust	purli
	32	33	34

THETA-EPS

INFORM	TRUINFO	CORRECT	TRUTHFUL	CONFIDEN	COMPLETE
35	36	37	38	39	40

THETA-EPS

TRUSTWOR	PURCHASE
41	0

THETA-DELTA

KNOWHOW	EXPERT	ADVICE	SINCERE	HONEST	PROMISE
42	43	44	0	45	46

THETA-DELTA

ATTENT	SIZE	CUSTOMER
47	0	0

Appendix 16 Mathematical Presentation of the Rival Model

• Structural Submodel Equations of the Rival Model

The structural model, which expressed the relationship among factors, is listed below.

$$\text{infor} = \gamma_{11} \text{compe} + \gamma_{12} \text{relia} + \gamma_{13} \text{integ} + \gamma_{14} \text{credi} + \gamma_{15} \text{benev} + \zeta_1 \quad (\text{A16.1})$$

$$\text{trust} = \beta_{21} \text{infor} + \zeta_2 \quad (\text{A16.2})$$

$$\text{purli} = \beta_{32} \text{trust} + \zeta_3 \quad (\text{A16.3})$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} exogenous factor
 β_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} endogenous factor
 ζ_i is the structural error of the i^{th} endogenous factor

• Measurement Submodel Equations of the Rival Model

The measurement model, which expressed the relationship of observed variables and factors, is listed below:

$$\text{INFORM} = \lambda^x_{11} \text{infor} + \delta_1 \quad (\text{A16.4})$$

$$\text{TRUINFO} = \lambda^x_{21} \text{infor} + \delta_2 \quad (\text{A16.5})$$

$$\text{CORRECT} = \lambda^x_{31} \text{infor} + \delta_3 \quad (\text{A16.6})$$

$$\text{KNOWHOW} = \lambda^x_{42} \text{compe} + \delta_4 \quad (\text{A16.7})$$

$$\text{EXPERT} = \lambda^x_{52} \text{compe} + \delta_5 \quad (\text{A16.8})$$

$$\text{ADVICE} = \lambda^x_{62} \text{compe} + \delta_6 \quad (\text{A16.9})$$

$$\text{SIZE} = \lambda^x_{73} \text{credi} + \delta_7 \quad (\text{A16.10})$$

$$\text{SINCERE} = \lambda^x_{84} \text{relia} + \delta_8 \quad (\text{A16.11})$$

$$\text{HONEST} = \lambda^x_{95} \text{integ} + \delta_9 \quad (\text{A16.12})$$

Appendix 16 Mathematical Presentation of the Rival Model (Cont.)

$$\text{PROMISE} = \lambda^x_{105} \text{ integ} + \delta_{10} \quad (\text{A16.13})$$

$$\text{ATTENT} = \lambda^x_{115} \text{ integ} + \delta_{11} \quad (\text{A16.14})$$

$$\text{CUSTOMER} = \lambda^x_{126} \text{ benev} + \delta_{12} \quad (\text{A16.15})$$

$$\text{TRUTHFUL} = \lambda^y_{11} \text{ trust} + \varepsilon_1 \quad (\text{A16.16})$$

$$\text{CONFIDENT} = \lambda^y_{21} \text{ trust} + \varepsilon_2 \quad (\text{A16.17})$$

$$\text{COMPLETE} = \lambda^y_{31} \text{ trust} + \varepsilon_3 \quad (\text{A16.18})$$

$$\text{TRUSTWOR} = \lambda^y_{41} \text{ trust} + \varepsilon_4 \quad (\text{A16.19})$$

$$\text{PURCHASE} = \lambda^y_{52} \text{ purli} + \varepsilon_5 \quad (\text{A16.20})$$

Where λ^x_{ij} is the factor loading between the i^{th} observed variable for the exogenous factors and the j^{th} exogenous factor
 λ^y_{ij} is the factor loading between the i^{th} observed variable for the endogenous factors and the j^{th} endogenous factor
 δ_i is the error for the i^{th} observed variable for the exogenous factors
 ε_j is the error for the j^{th} observed variable for the endogenous factors

Appendix 17 Parameter Estimates of the Rival Model

LAMBDA-Y

	infor	trust	purli
INFORM	0.84	--	--
TRUINFO	0.89 (0.03) 34.97	--	--
CORRECT	0.73 (0.02) 36.85	--	--
TRUTHFUL	--	0.77	--
CONFIDEN	--	0.78 (0.02) 38.03	--
COMPLETE	--	0.85 (0.02) 42.86	--
TRUSTWOR	--	0.89 (0.02) 44.17	--
PURCHASE	--	--	1.00

LAMBDA-X

	compe	relia	integ	credi	benev
KNOWHOW	0.80 (0.02) 41.34	--	--	--	--
EXPERT	0.74 (0.02) 33.48	--	--	--	--
ADVICE	0.96 (0.03) 34.00	--	--	--	--
SINCERE	--	1.00 (0.04) 27.78	--	--	--
HONEST	--	--	0.89 (0.02) 51.58	--	--
PROMISE	--	--	0.84 (0.02) 50.48	--	--

Appendix 17 Parameter Estimates of the Rival Model (Cont.)

	compe	relia	integ	credi	benev
ATTENT	--	--	0.65 (0.03) 19.48	--	--
SIZE	--	--	--	1.00 (0.04) 27.78	--
CUSTOMER	--	--	--	--	1.00 (0.04) 27.78

BETA

	infor	trust	purli
infor	--	--	--
trust	0.94 (0.03) 30.97	--	--
purli	--	0.42 (0.03) 12.82	--

GAMMA

	compe	relia	integ	credi	benev
infor	0.31 (0.03) 8.85	0.22 (0.03) 7.03	0.32 (0.04) 7.61	0.03 (0.03) 0.90	0.28 (0.04) 8.06

PHI

	compe	relia	integ	credi	benev
compe	1.00				
relia	0.50 (0.04) 13.98	1.00			
integ	0.49 (0.03) 17.13	0.31 (0.04) 8.81	1.00		

Appendix 17 Parameter Estimates of the Rival Model (Cont.)

	compe	relia	integ	credi	benev
credi	0.13 (0.03) 4.41	0.23 (0.03) 6.86	-0.24 (0.04) -6.41	1.00	
benev	0.43 (0.03) 12.86	0.33 (0.04) 8.33	0.51 (0.04) 13.19	0.02 (0.03) 0.51	1.00

PSI

	infor	trust	purli
	0.26 (0.03) 7.59	0.12 (0.02) 4.99	0.83 (0.08) 10.77

THETA-EPS

INFORM	TRUINFO	CORRECT	TRUTHFUL	CONFIDE	COMPLETE
0.29 (0.08) 3.73	0.21 (0.07) 2.83	0.47 (0.08) 6.21	0.41 (0.08) 5.25	0.39 (0.08) 5.13	0.27 (0.07) 3.68

THETA-EPS

TRUSTWOR	PURCHASE
0.20 (0.07) 2.70	- -

THETA-DELTA

KNOWHOW	EXPERT	ADVICE	SINCERE	HONEST	PROMISE
0.36 (0.08) 4.62	0.45 (0.08) 5.73	0.07 (0.09) 0.80	- -	0.21 (0.08) 2.68	0.29 (0.08) 3.78

THETA-DELTA

ATTENT	SIZE	CUSTOMER
0.58 (0.08) 6.85	- -	- -

Appendix 18 Overall Goodness of Model Fit of the Rival Model

Goodness of Model Fit Statistics

Absolute fit

Minimum Fit Function Chi-Square = 401.71 (P = 0.0)

Degrees of Freedom = 106

Root Mean Square Error of Approximation (RMSEA) = 0.12

Normed Fit Index (NFI) = 0.98

Non-Normed Fit Index (NNFI) = 0.98

Goodness of Fit Index (GFI) = 0.98

Adjusted Goodness of Fit Index (AGFI) = 0.97

Comparative fit

Comparative Fit Index (CFI) = 0.98

Incremental Fit Index (IFI) = 0.98

Relative Fit Index (RFI) = 0.97

Parsimonious fit

Parsimony Goodness of Fit Index (PGFI) = 0.68

Parsimony Normed Fit Index (PNFI) = 0.76

Appendix 19 Model Specification of Model M1

LAMBDA-Y

	trust	purli
TRUTHFUL	0	0
CONFIDEN	1	0
COMPLETE	2	0
TRUSTWOR	3	0
PURCHASE	0	0

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	4	0	0	0	0	0
TRUINFO	5	0	0	0	0	0
CORRECT	6	0	0	0	0	0
KNOWHOW	0	7	0	0	0	0
EXPERT	0	8	0	0	0	0
ADVICE	0	9	0	0	0	0
SINCERE	0	0	10	0	0	0
HONEST	0	0	0	11	0	0
PROMISE	0	0	0	12	0	0
ATTENT	0	0	0	13	0	0
SIZE	0	0	0	0	14	0
CUSTOMER	0	0	0	0	0	15

BETA

	trust	purli
trust	0	0
purli	16	0

GAMMA

	infor	compe	relia	integ	credi	benev
trust	17	18	19	20	21	22
purli	23	0	0	0	0	0

Appendix 19 Model Specification of Model M1 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	0					
compe	24	0				
relia	25	26	0			
integ	27	28	29	0		
credi	30	31	32	33	0	
benev	34	35	36	37	38	0

PSI

	trust	purli
	39	40

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
41	42	43	44	0

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
45	46	47	48	49	50

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
0	51	52	53	0	0

Appendix 20 Mathematical Presentation of Model M1

• Structural Model Equations of Model M1

The structural model equations, which expressed the relationship among the factors, are shown below:

$$\text{trust} = \gamma_{11} \text{infor} + \gamma_{12} \text{compe} + \gamma_{13} \text{relia} + \gamma_{14} \text{integ} + \gamma_{15} \text{credi} + \gamma_{16} \text{benev} + \zeta_1 \quad (\text{A20.1})$$

$$\text{purli} = \gamma_{21} \text{infor} + \beta_{21} \text{trust} + \zeta_2 \quad (\text{A20.2})$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} exogenous factor
 β_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} endogenous factor
 ζ_i is the structural error of the i^{th} endogenous factor

• Measurement Model Equations of Model M1

The measurement model equations, which expressed the relationship of observed variables and factors, are shown below:

$$\text{INFORM} = \lambda^x_{11} \text{infor} + \delta_1 \quad (\text{A20.3})$$

$$\text{TRUINFO} = \lambda^x_{21} \text{infor} + \delta_2 \quad (\text{A20.4})$$

$$\text{CORRECT} = \lambda^x_{31} \text{infor} + \delta_3 \quad (\text{A20.5})$$

$$\text{KNOWHOW} = \lambda^x_{42} \text{compe} + \delta_4 \quad (\text{A20.6})$$

$$\text{EXPERT} = \lambda^x_{52} \text{compe} + \delta_5 \quad (\text{A20.7})$$

$$\text{ADVICE} = \lambda^x_{62} \text{compe} + \delta_6 \quad (\text{A20.8})$$

$$\text{SIZE} = \lambda^x_{73} \text{credi} + \delta_7 \quad (\text{A20.9})$$

$$\text{SINCERE} = \lambda^x_{84} \text{relia} + \delta_8 \quad (\text{A20.10})$$

$$\text{HONEST} = \lambda^x_{95} \text{integ} + \delta_9 \quad (\text{A20.11})$$

$$\text{PROMISE} = \lambda^x_{105} \text{integ} + \delta_{10} \quad (\text{A20.12})$$

Appendix 20 Mathematical Presentation of Model M1 (Cont.)

$$\text{ATTENT} = \lambda^x_{115} \text{integ} + \delta_{11} \quad (\text{A20.13})$$

$$\text{CUSTOMER} = \lambda^x_{126} \text{benev} + \delta_{12} \quad (\text{A20.14})$$

$$\text{TRUTHFUL} = \lambda^y_{11} \text{trust} + \varepsilon_1 \quad (\text{A20.15})$$

$$\text{CONFIDENT} = \lambda^y_{21} \text{trust} + \varepsilon_2 \quad (\text{A20.16})$$

$$\text{COMPLETE} = \lambda^y_{31} \text{trust} + \varepsilon_3 \quad (\text{A20.17})$$

$$\text{TRUSTWOR} = \lambda^y_{41} \text{trust} + \varepsilon_4 \quad (\text{A20.18})$$

$$\text{PURCHASE} = \lambda^y_{52} \text{purli} + \varepsilon_5 \quad (\text{A20.19})$$

Where λ^x_{ij} is the factor loading between the i^{th} observed variable for the exogenous factors and the j^{th} exogenous factor
 λ^y_{ij} is the factor loading between the i^{th} observed variable for the endogenous factors and the j^{th} endogenous factor
 δ_i is the error for the i^{th} observed variable for the exogenous factors
 ε_j is the error for the j^{th} observed variable for the endogenous factors

Appendix 21 Parameter Estimates of Model M1

LAMBDA-Y

	trust	purli
TRUTHFUL	0.77	--
CONFIDEN	0.78	--
	(0.02)	
	33.24	
COMPLETE	0.85	--
	(0.02)	
	37.22	
TRUSTWOR	0.90	--
	(0.02)	
	38.62	
PURCHASE	--	1.00

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	0.81	--	--	--	--	--
	(0.02)					
	41.19					
TRUINFO	0.90	--	--	--	--	--
	(0.01)					
	70.93					
CORRECT	0.73	--	--	--	--	--
	(0.02)					
	39.05					
KNOWHOW	--	0.76	--	--	--	--
		(0.02)				
		33.79				
EXPERT	--	0.67	--	--	--	--
		(0.03)				
		23.38				
ADVICE	--	0.98	--	--	--	--
		(0.04)				
		27.55				
SINCERE	--	--	1.00	--	--	--
			(0.04)			
			27.78			
HONEST	--	--	--	0.89	--	--
				(0.02)		
				42.10		

Appendix 21 Parameter Estimates of Model M1(Cont.)

	infor	compe	relia	integ	credi	benev
PROMISE	--	--	--	0.86 (0.02) 47.25	--	--
ATTENT	--	--	--	0.63 (0.03) 18.38	--	--
SIZE	--	--	--	--	1.00 (0.04) 27.78	--
CUSTOMER	--	--	--	--	--	1.00 (0.04) 27.78

BETA

	trust	purli
trust	--	--
purli	0.30 (0.08) 3.89	--

GAMMA

	infor	compe	relia	integ	credi	benev
trust	0.39 (0.06) 6.42	0.07 (0.04) 1.83	0.07 (0.04) 1.89	0.27 (0.04) 6.69	0.13 (0.03) 4.11	0.26 (0.05) 5.33
purli	0.16 (0.08) 2.19	--	--	--	--	--

PHI

	infor	compe	relia	integ	credi	benev
infor	1.00					
compe	0.58 (0.03) 17.69	1.00				
relia	0.51 (0.04) 13.57	0.44 (0.04) 11.70	1.00			

Appendix 21 Parameter Estimates of Model M1(Cont.)

PHI

	infor	compe	relia	integ	credi	benev
integ	0.44 (0.04) 10.52	0.33 (0.04) 8.40	0.27 (0.04) 7.47	1.00		
credi	0.05 (0.05) 1.16	0.13 (0.03) 3.77	0.22 (0.03) 6.80	-0.18 (0.04) -4.80	1.00	
benev	0.59 (0.04) 15.63	0.47 (0.04) 12.07	0.40 (0.04) 9.09	0.50 (0.04) 12.36	0.06 (0.04) 1.72	1.00

PSI

	trust	purli
	0.27 (0.03) 8.34	0.81 (0.08) 10.29

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
0.41 (0.08) 5.17	0.39 (0.08) 5.02	0.28 (0.07) 3.80	0.20 (0.07) 2.67	--

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
0.35 (0.08) 4.45	0.19 (0.08) 2.47	0.47 (0.08) 6.12	0.43 (0.08) 5.38	0.55 (0.08) 6.73	0.05 (0.10) 0.46

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
--	0.21 (0.08) 2.55	0.26 (0.08) 3.26	0.60 (0.08) 7.09	--	--

Appendix 22 Model M1 - Overall Goodness of Model Fit

Goodness of Model Fit Statistics

Absolute fit

Minimum Fit Function Chi-Square = 307.10 (P = 0.0)

Degrees of Freedom = 100

Root Mean Square Error of Approximation (RMSEA) = 0.10

Normed Fit Index (NFI) = 0.98

Non-Normed Fit Index (NNFI) = 0.99

Goodness of Fit Index (GFI) = 0.99

Adjusted Goodness of Fit Index (AGFI) = 0.98

Comparative fit

Comparative Fit Index (CFI) = 0.99

Incremental Fit Index (IFI) = 0.99

Relative Fit Index (RFI) = 0.98

Parsimonious fit

Parsimony Goodness of Fit Index (PGFI) = 0.64

Parsimony Normed Fit Index (PNFI) = 0.72

Appendix 23 Model Specification of Model M2

LAMBDA-Y

	trust	purli
TRUTHFUL	0	0
CONFIDEN	1	0
COMPLETE	2	0
TRUSTWOR	3	0
PURCHASE	0	0

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	4	0	0	0	0	0
TRUINFO	5	0	0	0	0	0
CORRECT	6	0	0	0	0	0
KNOWHOW	0	7	0	0	0	0
EXPERT	0	8	0	0	0	0
ADVICE	0	9	0	0	0	0
SINCERE	0	0	10	0	0	0
HONEST	0	0	0	11	0	0
PROMISE	0	0	0	12	0	0
ATTENT	0	0	0	13	0	0
SIZE	0	0	0	0	14	0
CUSTOMER	0	0	0	0	0	15

BETA

	trust	purli
trust	0	0
purli	16	0

GAMMA

	infor	compe	relia	integ	credi	benev
trust	17	18	19	20	21	22
purli	0	0	0	0	23	0

Appendix 23 Model Specification of Model M2 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	0					
compe	24	0				
relia	25	26	0			
integ	27	28	29	0		
credi	30	31	32	33	0	
benev	34	35	36	37	38	0

PSI

	trust	purli
	39	40

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
41	42	43	44	0

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
45	46	47	48	49	50

HETA-DELTA (Cont.)

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
0	51	52	53	0	0

Appendix 24 Mathematical Presentation of Model M2

- **Structural Model Equations of Model M2**

The structural model equations expressed the relationship among factors as below:

$$\text{trust} = \gamma_{11} \text{ infor} + \gamma_{12} \text{ compe} + \gamma_{13} \text{ relia} + \gamma_{14} \text{ integ} + \gamma_{15} \text{ credi} + \gamma_{16} \text{ benev} + \zeta_1 \quad (\text{A24.1})$$

$$\text{purli} = \gamma_{25} \text{ credi} + \beta_{21} \text{ trust} + \zeta_2 \quad (\text{A24.2})$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} exogenous factor
 β_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} endogenous factor
 ζ_i is the structural error of the i^{th} endogenous factor

- **Measurement Model Equations of Model M2**

The measurement model equations expressed the relationship of observed variables and factors as below:

$$\text{INFORM} = \lambda^x_{11} \text{ infor} + \delta_1 \quad (\text{A24.3})$$

$$\text{TRUINFO} = \lambda^x_{21} \text{ infor} + \delta_2 \quad (\text{A24.4})$$

$$\text{CORRECT} = \lambda^x_{31} \text{ infor} + \delta_3 \quad (\text{A24.5})$$

$$\text{KNOWHOW} = \lambda^x_{42} \text{ compe} + \delta_4 \quad (\text{A24.6})$$

$$\text{EXPERT} = \lambda^x_{52} \text{ compe} + \delta_5 \quad (\text{A24.7})$$

$$\text{ADVICE} = \lambda^x_{62} \text{ compe} + \delta_6 \quad (\text{A24.8})$$

$$\text{SIZE} = \lambda^x_{73} \text{ credi} + \delta_7 \quad (\text{A24.9})$$

$$\text{SINCERE} = \lambda^x_{84} \text{ relia} + \delta_8 \quad (\text{A24.10})$$

$$\text{HONEST} = \lambda^x_{95} \text{ integ} + \delta_9 \quad (\text{A24.11})$$

$$\text{PROMISE} = \lambda^x_{105} \text{ integ} + \delta_{10} \quad (\text{A24.12})$$

Appendix 24 Mathematical Presentation of Model M2 (Cont.)

$$\text{ATTENT} = \lambda^x_{115} \text{integ} + \delta_{11} \quad (\text{A24.13})$$

$$\text{CUSTOMER} = \lambda^x_{126} \text{benev} + \delta_{12} \quad (\text{A24.14})$$

$$\text{TRUTHFUL} = \lambda^y_{11} \text{trust} + \varepsilon_1 \quad (\text{A24.15})$$

$$\text{CONFIDENT} = \lambda^y_{21} \text{trust} + \varepsilon_2 \quad (\text{A24.16})$$

$$\text{COMPLETE} = \lambda^y_{31} \text{trust} + \varepsilon_3 \quad (\text{A24.17})$$

$$\text{TRUSTWOR} = \lambda^y_{41} \text{trust} + \varepsilon_4 \quad (\text{A24.18})$$

$$\text{PURCHASE} = \lambda^y_{52} \text{purli} + \varepsilon_5 \quad (\text{A24.19})$$

Where λ^x_{ij} is the factor loading between the i^{th} observed variable for the exogenous factors and the j^{th} exogenous factor
 λ^y_{ij} is the factor loading between the i^{th} observed variable for the endogenous factors and the j^{th} endogenous factor
 δ_i is the error for the i^{th} observed variable for the exogenous factors
 ε_j is the error for the j^{th} observed variable for the endogenous factors

Appendix 25 Parameter Estimates of Model M2

LAMBDA-Y

	trust	purli
TRUTHFUL	0.78	--
CONFIDEN	0.78	--
	(0.02)	
	33.84	
COMPLETE	0.86	--
	(0.02)	
	38.19	
TRUSTWOR	0.89	--
	(0.02)	
	38.30	
PURCHASE	--	1.00

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	0.80	--	--	--	--	--
	(0.02)					
	41.68					
TRUINFO	0.91	--	--	--	--	--
	(0.01)					
	66.71					
CORRECT	0.72	--	--	--	--	--
	(0.02)					
	38.67					

LAMBDA-X

	infor	compe	relia	integ	credi	benev
KNOWHOW	--	0.76	--	--	--	--
		(0.02)				
		34.47				
EXPERT	--	0.67	--	--	--	--
		(0.03)				
		24.30				
ADVICE	--	0.98	--	--	--	--
		(0.03)				
		28.41				
SINCERE	--	--	1.00	--	--	--
			(0.04)			
			27.78			

Appendix 25 Parameter Estimates of Model M2 (Cont.)

	infor	compe	relia	integ	credi	benev
HONEST	--	--	--	0.90 (0.02) 44.88	--	--
PROMISE	--	--	--	0.86 (0.02) 47.87	--	--
ATTENT	--	--	--	0.63 (0.04) 17.90	--	--
SIZE	--	--	--	--	1.00 (0.04) 27.79	--
CUSTOMER	--	--	--	--	--	1.00 (0.04) 27.78

BETA

	trust	purli
trust	--	--
purli	0.46 (0.04) 12.34	--

GAMMA

	infor	compe	relia	integ	credi	benev
trust	0.41 (0.06) 6.75	0.09 (0.04) 2.19	0.08 (0.03) 2.34	0.25 (0.04) 6.11	0.13 (0.03) 4.13	0.27 (0.05) 5.92
purli	--	--	--	--	-0.06 (0.03) -1.60	--

PHI

	infor	compe	relia	integ	credi	benev
infor	1.00					
compe	0.57 (0.03) 17.84	1.00				
relia	0.50 (0.04) 13.52	0.43 (0.04) 11.30	1.00			

Appendix 25 Parameter Estimates of Model M2 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
integ	0.47 (0.04) 11.72	0.34 (0.04) 8.75	0.28 (0.04) 7.83	1.00		
credi	0.08 (0.05) 1.76	0.16 (0.03) 4.78	0.24 (0.03) 7.16	-0.15 (0.04) -3.88	1.00	
benev	0.56 (0.04) 14.57	0.45 (0.04) 11.23	0.39 (0.04) 8.77	0.50 (0.04) 12.38	0.07 (0.04) 1.83	1.00

PSI

	trust	purli
	0.24 (0.03) 7.52	0.80 (0.08) 10.06

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
0.39 (0.08) 4.97	0.39 (0.08) 5.07	0.27 (0.07) 3.60	0.20 (0.07) 2.73	--

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
0.36 (0.08) 4.64	0.18 (0.08) 2.32	0.48 (0.08) 6.22	0.42 (0.08) 5.30	0.55 (0.08) 6.73	0.04 (0.10) 0.45

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
--	0.19 (0.08) 2.31	0.26 (0.08) 3.33	0.60 (0.08) 7.04	--	--

Appendix 26 Model M2 - Overall Goodness of Model Fit

Goodness of Model Fit Statistics

Absolute fit

Minimum Fit Function Chi-Square = 308.27 (P = 0.0)

Degrees of Freedom = 100

Root Mean Square Error of Approximation (RMSEA) = 0.10

Normed Fit Index (NFI) = 0.98

Non-Normed Fit Index (NNFI) = 0.99

Goodness of Fit Index (GFI) = 0.99

Adjusted Goodness of Fit Index (AGFI) = 0.98

Comparative fit

Comparative Fit Index (CFI) = 0.99

Incremental Fit Index (IFI) = 0.99

Relative Fit Index (RFI) = 0.98

Parsimonious fit

Parsimony Goodness of Fit Index (PGFI) = 0.64

Parsimony Normed Fit Index (PNFI) = 0.72

Appendix 27 Model Specification of Model M3

LAMBDA-Y

	trust	purli
TRUTHFUL	0	0
CONFIDEN	1	0
COMPLETE	2	0
TRUSTWOR	3	0
PURCHASE	0	0

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	4	0	0	0	0	0
TRUINFO	5	0	0	0	0	0
CORRECT	6	0	0	0	0	0
KNOWHOW	0	7	0	0	0	0
EXPERT	0	8	0	0	0	0
ADVICE	0	9	0	0	0	0
SINCERE	0	0	10	0	0	0
HONEST	0	0	0	11	0	0
PROMISE	0	0	0	12	0	0
ATTENT	0	0	0	13	0	0
SIZE	0	0	0	0	14	0
CUSTOMER	0	0	0	0	0	15

BETA

	trust	purli
trust	0	0
purli	16	0

GAMMA

	infor	compe	relia	integ	credi	benev
trust	17	18	19	20	21	22
purli	0	0	0	0	0	23

Appendix 27 Model Specification of Model M3 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	0					
compe	24	0				
relia	25	26	0			
integ	27	28	29	0		
credi	30	31	32	33	0	
benev	34	35	36	37	38	0

PSI

	trust	purli
	39	40

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
41	42	43	44	0

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
45	46	47	48	49	50

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
0	51	52	53	0	0

Appendix 28 Mathematical Presentation of Model M3

• Structural Model Equations of Model M3

The structural model equations, which expressed the relationship among the factors, are shown below:

$$\text{trust} = \gamma_{11} \text{infor} + \gamma_{12} \text{compe} + \gamma_{13} \text{relia} + \gamma_{14} \text{integ} + \gamma_{15} \text{credi} + \gamma_{16} \text{benev} + \zeta_1 \quad (\text{A28.1})$$

$$\text{purli} = \gamma_{26} \text{benev} + \beta_{21} \text{trust} + \zeta_2 \quad (\text{A28.2})$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} exogenous factor
 β_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} endogenous factor
 ζ_i is the structural error of the i^{th} endogenous factor

• Measurement Model Equations of Model M3

The measurement model equations expressed the relationship of observed variables and factors as below:

$$\text{INFORM} = \lambda^x_{11} \text{infor} + \delta_1 \quad (\text{A28.3})$$

$$\text{TRUEINFO} = \lambda^x_{21} \text{infor} + \delta_2 \quad (\text{A28.4})$$

$$\text{CORRECT} = \lambda^x_{31} \text{infor} + \delta_3 \quad (\text{A28.5})$$

$$\text{KNOWHOW} = \lambda^x_{42} \text{compe} + \delta_4 \quad (\text{A28.6})$$

$$\text{EXPERT} = \lambda^x_{52} \text{compe} + \delta_5 \quad (\text{A28.7})$$

$$\text{ADVICE} = \lambda^x_{62} \text{compe} + \delta_6 \quad (\text{A28.8})$$

$$\text{SIZE} = \lambda^x_{73} \text{credi} + \delta_7 \quad (\text{A28.9})$$

$$\text{SINCERE} = \lambda^x_{84} \text{relia} + \delta_8 \quad (\text{A28.10})$$

$$\text{HONEST} = \lambda^x_{95} \text{integ} + \delta_9 \quad (\text{A28.11})$$

$$\text{PROMISE} = \lambda^x_{105} \text{integ} + \delta_{10} \quad (\text{A28.12})$$

Appendix 28 Mathematical Presentation of Model M3 (Cont.)

$$\text{ATTENT} = \lambda^x_{115} \text{integ} + \delta_{11} \quad (\text{A28.13})$$

$$\text{CUSTOMER} = \lambda^x_{126} \text{benev} + \delta_{12} \quad (\text{A28.14})$$

$$\text{TRUTHFUL} = \lambda^y_{11} \text{trust} + \varepsilon_1 \quad (\text{A28.15})$$

$$\text{CONFIDENT} = \lambda^y_{21} \text{trust} + \varepsilon_2 \quad (\text{A28.16})$$

$$\text{COMPLETE} = \lambda^y_{31} \text{trust} + \varepsilon_3 \quad (\text{A28.17})$$

$$\text{TRUSTWOR} = \lambda^y_{41} \text{trust} + \varepsilon_4 \quad (\text{A28.18})$$

$$\text{PURCHASE} = \lambda^y_{52} \text{purli} + \varepsilon_5 \quad (\text{A28.19})$$

Where λ^x_{ij} is the factor loading between the i^{th} observed variable for the exogenous factors and the j^{th} exogenous factor
 λ^y_{ij} is the factor loading between the i^{th} observed variable for the endogenous factors and the j^{th} endogenous factor
 δ_i is the error for the i^{th} observed variable for the exogenous factors
 ε_j is the error for the j^{th} observed variable for the endogenous factors

Appendix 29 Parameter Estimates of Model M3

LAMBDA-Y

	trust	purli
TRUTHFUL	0.78	--
CONFIDEN	0.78	--
	(0.02)	
	35.54	
COMPLETE	0.85	--
	(0.02)	
	38.89	
TRUSTWOR	0.90	--
	(0.02)	
	39.73	
PURCHASE	--	1.00

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	0.81	--	--	--	--	--
	(0.02)					
	43.36					
TRUINFO	0.91	--	--	--	--	--
	(0.01)					
	70.21					
CORRECT	0.77	--	--	--	--	--
	(0.02)					
	40.00					

LAMBDA-X (Cont.)

	infor	compe	relia	integ	credi	benev
KNOWHOW	--	0.76	--	--	--	--
		(0.02)				
		36.06				
EXPERT	--	0.69	--	--	--	--
		(0.03)				
		25.47				
ADVICE	--	0.93	--	--	--	--
		(0.03)				
		28.14				
SINCERE	--	--	1.00	--	--	--
			(0.04)			
			27.78			

Appendix 29 Parameter Estimates of Model M3 (Cont.)

	infor	compe	relia	integ	credi	benev
HONEST	--	--	--	0.90 (0.02) 45.25	--	--
PROMISE	--	--	--	0.87 (0.02) 49.12	--	--
ATTENT	--	--	--	0.62 (0.04) 17.38	--	--
SIZE	--	--	--	--	1.00 (0.04) 27.78	--
CUSTOMER	--	--	--	--	--	1.00 (0.04) 27.76

BETA

	trust	purli
purli	0.27 (0.04) 6.18	--

GAMMA

	infor	compe	relia	integ	credi	benev
trust	0.33 (0.06) 5.54	0.12 (0.05) 2.59	0.15 (0.04) 4.26	0.28 (0.04) 7.45	0.11 (0.03) 3.55	0.26 (0.04) 6.96
purli	--	--	--	--	--	0.26 (0.05) 5.58

PHI

	infor	compe	relia	integ	credi	benev
infor	1.00					
compe	0.62 (0.03) 20.08	1.00				
relia	0.52 (0.04) 14.25	0.47 (0.04) 12.21	1.00			

Appendix 29 Parameter Estimates of Model M3 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
integ	0.47 (0.04) 12.36	0.35 (0.04) 8.70	0.28 (0.04) 7.77	1.00		
credi	0.06 (0.05) 1.37	0.15 (0.03) 4.52	0.22 (0.03) 6.31	-0.13 (0.04) -3.36	1.00	
benev	0.52 (0.04) 13.50	0.39 (0.04) 8.79	0.32 (0.04) 7.21	0.42 (0.04) 9.38	0.02 (0.04) 0.70	1.00

PSI

	trust	purli
	0.25 (0.03) 7.37	0.77 (0.08) 9.63

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
0.39 (0.08) 4.93	0.39 (0.08) 5.06	0.27 (0.07) 3.70	0.20 (0.07) 2.63	--

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE
0.35 (0.08) 4.45	0.16 (0.08) 2.15	0.41 (0.08) 5.34	0.42 (0.08) 5.28	0.52 (0.08) 6.42	0.14 (0.09) 1.44

THETA-DELTA

SINCERE	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
--	0.19 (0.08) 2.42	0.24 (0.08) 3.01	0.61 (0.08) 7.24	--	--

Appendix 30 Model M3 - Overall Goodness of Model Fit

Goodness of Model Fit Statistics

Absolute fit

Minimum Fit Function Chi-Square = 279.00 (P = 0.0)

Degrees of Freedom = 100

Root Mean Square Error of Approximation (RMSEA) = 0.10

Normed Fit Index (NFI) = 0.99

Non-Normed Fit Index (NNFI) = 0.99

Goodness of Fit Index (GFI) = 0.99

Adjusted Goodness of Fit Index (AGFI) = 0.98

Comparative fit

Comparative Fit Index (CFI) = 0.99

Incremental Fit Index (IFI) = 0.99

Relative Fit Index (RFI) = 0.98

Parsimonious fit

Parsimony Goodness of Fit Index (PGFI) = 0.65

Parsimony Normed Fit Index (PNFI) = 0.72

Appendix 31 Standardised Residuals of the Proposed Model

	INFORM	TRUINFO	CORRECT	TRUTHFUL	CONFIDEN	COMPLETE
INFORM	--					
TRUINFO	2.38	--				
CORRECT	1.36	2.24	--			
TRUTHFUL	-2.58	-2.02	-1.29	--		
CONFIDEN	-1.87	-1.72	-0.96	-0.02	--	
COMPLETE	-2.77	-2.20	-1.39	1.23	1.72	--
TRUSTWOR	-3.13	-2.77	-1.72	0.35	0.03	2.23
PURCHASE	-0.62	-0.25	0.85	-0.14	0.37	0.68
KNOWHOW	-1.16	-2.17	-0.58	-2.76	-1.72	-2.52
EXPERT	-2.49	-2.82	-1.08	-4.76	-3.41	-3.70
ADVICE	-3.14	-3.52	-0.63	-2.36	-4.10	-3.15
SINCERE	-3.71	-4.08	-0.82	-2.13	-0.66	-2.37
HONEST	-3.20	-3.72	-2.03	-1.98	-1.40	-0.61
PROMISE	-3.74	-3.18	-1.84	-1.29	-2.26	-1.56
ATTENT	-1.60	-1.31	-0.70	1.57	-0.56	0.09
SIZE	1.08	1.01	1.44	1.88	0.64	0.88
CUSTOMER	-2.93	-1.29	-0.94	0.98	-0.19	1.62

Appendix 31 Standardised Residuals of the Proposed Model (Cont.)

	TRUSTWOR	PURCH ASE	KNOWHOW	EXPERT	ADVICE	SINCERE
TRUSTWOR	--					
PURCHASE	0.13	--				
KNOWHOW	-1.74	-0.92	--			
EXPERT	-3.40	-0.42	-1.03	--		
ADVICE	-2.83	-2.50	-2.30	-3.45	--	
SINCERE	-2.81	-0.32	-2.13	-1.87	-1.79	--
HONEST	-0.66	-0.82	-4.76	0.07	-3.68	-1.67
PROMISE	-1.19	0.25	-4.31	0.74	-2.53	-1.43
ATTENT	-0.11	0.54	-3.17	-0.87	-1.89	-0.72
SIZE	1.46	-1.27	-1.35	-1.68	1.48	-2.98
CUSTOMER	0.45	0.09	-0.73	-1.34	-0.52	-0.26

	HONEST	PROMISE	ATTENT	SIZE	CUSTOMER
HONEST	--				
PROMISE	0.69	--			
ATTENT	-0.13	0.95	--		
SIZE	1.99	3.13	3.30	--	
CUSTOMER	-0.77	-0.08	-0.60	0.98	-

Appendix 32 Model Specification of Model M4

LAMBDA-Y

	trust	purli
TRUTHFUL	0	0
CONFIDEN	1	0
COMPLETE	2	0
TRUSTWOR	3	0
PURCHASE	0	0

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	4	0	0	0	0	0
TRUINFO	5	0	0	0	0	0
CORRECT	6	0	0	0	0	0
KNOWHOW	0	7	0	0	0	0
ADVICE	0	8	0	0	0	0
SINCERE	0	0	9	0	0	0
HONEST	0	0	0	10	0	0
PROMISE	0	0	0	11	0	0
ATTENT	0	0	0	12	0	0
CUSTOMER	0	0	0	0	0	13
SIZE	0	0	0	0	14	0

BETA

	trust	purli
trust	0	0
purli	15	0

GAMMA

	infor	compe	relia	integ	credi	benev
trust	16	17	18	19	20	21
purli	0	0	0	0	0	0

Appendix 32 Model Specification of Model M4 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	0					
compe	22	0				
relia	23	24	0			
integ	25	26	27	0		
credi	28	29	30	31	0	
benev	32	33	34	35	36	0

PSI

trust	purli
37	38

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
39	40	41	42	0

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	ADVICE	SINCERE
43	44	45	46	47	0

THETA-DELTA

HONEST	PROMISE	ATTENT	CUSTOMER	SIZE
48	49	50	0	0

Appendix 33 Mathematical Presentation of Model M4

- **Structural Submodel Equations of Model M4**

The structural submodel equations, which expressed the relationship among the factors, are shown below:

$$\text{trust} = \gamma_{11} \text{ infor} + \gamma_{12} \text{ compe} + \gamma_{13} \text{ relia} + \gamma_{14} \text{ integ} + \gamma_{15} \text{ credi} + \gamma_{16} \text{ benev} + \zeta_1 \quad (\text{A33.1})$$

$$\text{purli} = \beta_{21} \text{ trust} + \zeta_2 \quad (\text{A33.2})$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} exogenous factor
 β_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} endogenous factor
 ζ_i is the structural error of the i^{th} endogenous factor

- **Measurement Submodel Equations of Model M4**

The measurement submodel equations, which expressed the relationship of observed variables and factors, are shown below:

$$\text{INFORM} = \lambda_{11}^x \text{ infor} + \delta_1 \quad (\text{A33.3})$$

$$\text{TRUINFO} = \lambda_{21}^x \text{ infor} + \delta_2 \quad (\text{A33.4})$$

$$\text{CORRECT} = \lambda_{31}^x \text{ infor} + \delta_3 \quad (\text{A33.5})$$

$$\text{KNOWHOW} = \lambda_{42}^x \text{ compe} + \delta_4 \quad (\text{A33.6})$$

$$\text{ADVICE} = \lambda_{52}^x \text{ compe} + \delta_5 \quad (\text{A33.7})$$

$$\text{SIZE} = \lambda_{63}^x \text{ credi} + \delta_6 \quad (\text{A33.8})$$

$$\text{SINCERE} = \lambda_{74}^x \text{ relia} + \delta_7 \quad (\text{A33.9})$$

$$\text{HONEST} = \lambda_{85}^x \text{ integ} + \delta_8 \quad (\text{A33.10})$$

$$\text{PROMISE} = \lambda_{95}^x \text{ integ} + \delta_9 \quad (\text{A33.11})$$

$$\text{ATTENT} = \lambda_{105}^x \text{ integ} + \delta_{10} \quad (\text{A33.12})$$

$$\text{CUSTOMER} = \lambda_{116}^x \text{ benev} + \delta_{11} \quad (\text{A33.13})$$

Appendix 33 Mathematical Presentation of Model M4 (Cont.)

$$\text{TRUTHFUL} = \lambda_{11}^y \text{trust} + \varepsilon_1 \quad (\text{A33.14})$$

$$\text{CONFIDENT} = \lambda_{21}^y \text{trust} + \varepsilon_2 \quad (\text{A33.15})$$

$$\text{COMPLETE} = \lambda_{31}^y \text{trust} + \varepsilon_3 \quad (\text{A33.16})$$

$$\text{TRUSTWOR} = \lambda_{41}^y \text{trust} + \varepsilon_4 \quad (\text{A33.17})$$

$$\text{PURCHASE} = \lambda_{52}^y \text{purli} + \varepsilon_5 \quad (\text{A33.18})$$

Where λ_{ij}^x is the factor loading between the i^{th} observed variable for the exogenous factors and the j^{th} exogenous factor
 λ_{ij}^y is the factor loading between the i^{th} observed variable for the endogenous factors and the j^{th} endogenous factor
 δ_i is the error for the i^{th} observed variable for the exogenous factors
 ε_j is the error for the j^{th} observed variable for the endogenous factors

Appendix 34 Parameter Estimates of Model M4

LAMBDA-Y

	trust	purli
TRUTHFUL	0.81	--
CONFIDEN	0.82	--
	(0.03)	
	28.42	
COMPLETE	0.87	--
	(0.03)	
	31.44	
TRUSTWOR	0.88	--
	(0.03)	
	32.62	
PURCHASE	--	1.00

LAMBDA-X

	infor	compe	relia	integ	credi	benev
INFORM	0.82	--	--	--	--	--
	(0.02)					
	41.32					
TRUINFO	0.92	--	--	--	--	--
	(0.01)					
	61.89					
CORRECT	0.76	--	--	--	--	--
	(0.02)					
	34.03					
KNOWHOW	--	0.77	--	--	--	--
		(0.03)				
		22.87				
ADVICE	--	1.03	--	--	--	--
		(0.05)				
		20.75				
SINCERE	--	--	1.00	--	--	--
			(0.04)			
			27.78			
HONEST	--	--	--	0.89	--	--
				(0.02)		
				39.33		
PROMISE	--	--	--	0.86	--	--
				(0.02)		
				46.63		

Appendix 34 Parameter Estimates of Model M4 (Cont.)

	infor	compe	relia	integ	credi	benev
ATTENT	--	--	--	0.62 (0.04) 14.44	--	--
CUSTOMER	--	--	--	--	--	1.00 (0.04) 27.78
SIZE	--	--	--	--	1.00 (0.04) 27.78	--

BETA

	trust	purli
trust	--	--
purli	0.45 (0.04) 11.55	--

GAMMA

	infor	compe	relia	integ	credi	benev
trust	0.39 (0.07) 5.84	0.13 (0.04) 3.23	0.06 (0.04) 1.61	0.19 (0.05) 4.12	0.12 (0.04) 3.18	0.34 (0.05) 6.37
purli	--	--	--	--	--	--

PHI

	infor	compe	relia	integ	credi	benev
infor	1.00					
compe	0.58 (0.04) 13.27	1.00				
relia	0.53 (0.04) 12.95	0.41 (0.04) 9.68	1.00			
integ	0.40 (0.05) 7.90	0.21 (0.04) 4.97	0.37 (0.04) 8.32	1.00		
credi	0.06 (0.05) 1.16	0.14 (0.04) 3.44	0.12 (0.04) 2.85	-0.30 (0.05) -6.51	1.00	

Appendix 34 Parameter Estimates of Model M4 (Cont.)

	infor	compe	relia	integ	credi	benev
benev	0.59 (0.04) 14.97	0.46 (0.04) 10.78	0.41 (0.05) 8.44	0.37 (0.05) 7.63	0.00 (0.05) 0.03	1.00

PSI

	trust	purli
	0.23 (0.04) 6.28	0.80 (0.08) 10.13

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
0.34 (0.08) 4.08	0.33 (0.08) 4.19	0.25 (0.07) 3.29	0.23 (0.08) 3.03	- -

THETA-DELTA

INFORM	TRUINFO	CORRECT	KNOWHOW	ADVICE	SINCERE
0.33 (0.08) 4.19	0.15 (0.08) 1.93	0.43 (0.08) 5.41	0.41 (0.09) 4.62	-0.06 (0.12) -0.48	- -

THETA-DELTA

HONEST	PROMISE	ATTENT	CUSTOMER	SIZE
0.21 (0.08) 2.53	0.25 (0.08) 3.22	0.61 (0.09) 6.80	- -	- -

Appendix 35 Model M4 - Factors with Item Loading

Factors/Items	Item loading	S. D.	t-value
Integrity [integ]			
honest [HONEST]	0.89	0.02	39.33
keep promise [PROMISE]	0.86	0.02	46.63
follow regulations [ATTENT]	0.62	0.04	14.44
Competence [compe]			
knowledgeable in food safety [KNOWHOW]	0.77	0.03	22.87
able to give good advice [ADVICE]	1.00	0.05	20.75
Credibility [credi]			
size of farms[SIZE]	1.00	0.04	27.78
Reliability [relia]			
sincere to take follow up actions after an outbreak of food scare [SINCERE]	1.00	0.04	27.78
Provide information [infor]			
keep public informed [INFORM]	0.82	0.02	41.32
provide trusted information [TRUINFO]	0.92	0.01	61.89
provide correct information [CORRECT]	0.76	0.02	34.03
Benevolence [benev]			
Concern about consumers' welfare [CUSTOMER]	1.00	0.04	27.78
Trust [trust]			
truthful [TRUTHFUL]	0.81	-	-
have confidence [CONFIDEN]	0.82	0.02	28.42
rely on completely [COMPLETE]	0.87	0.03	31.44
trustworthy [TRUSTWOR]	0.88	0.03	32.62
Purchasing likelihood [purli]			
future purchase [PURCHASE]	1.00	-	-

Appendix 36 Model M4 - Reliability of Factors and Items

Factors/ items	Cronbach alpha	Factor reliability	Item reliability
integrity	0.81	0.84	-
HONEST	-	-	0.79
PROMISE	-	-	0.75
ATTENT	-	-	0.39
competence	0.73	0.85	-
KNOWHOW	-	-	0.59
ADVICE	-	-	-
credibility	-	1.00	-
SIZE	-	-	1.00
reliability	-	1.00	-
SINCERE	-	-	1.00
benevolence	-	1.00	-
CUSTOMER	-	-	1.00
providing information	0.88	0.87	-
INFORM	-	-	0.67
TRUINFO	-	-	0.85
CORRECT	-	-	0.57
trust	0.88	0.91	-
TRUTHFUL	-	-	0.66
CONFIDEN	-	-	0.67
COMPLETE	-	-	0.75
TRUSTWOR	-	-	0.77
purchase likelihood	-	1.00	-
PURCHASE	-	-	1.00

Appendix 37 Assessment of the Discriminant Validity of Model M4

Factor	χ^2 (d.f.)		χ^2 (d.f.=1)
	Constrained model ^a	Unconstrained model	Difference
providing information			
competence	40.19 (5)	9.82(4)	30.37
integrity	69.85 (9)	12.26 (8)	57.59
credibility	67.84 (3)	0.71 (2)	67.13
reliability	68.13 (3)	11.62 (2)	56.51
benevolence	37.84 (3)	7.81 (2)	30.03
trust	41.75 (14)	6.86 (13)	34.89
purchase likelihood	68.07 (3)	1.59 (2)	66.48
competence			
integrity	60.40 (5)	13.54 (4)	46.86
credibility	60.50 (1)	-	60.50
reliability	37.03 (1)	-	37.03
benevolence	31.13 (1)	-	31.13
trust	69.77 (9)	17.54 (8)	52.23
purchase likelihood	70.39 (1)	-	70.39
integrity			
credibility	108.57 (3)	5.10 (2)	103.30
reliability	76.48 (3)	0.14 (2)	76.34
benevolence	34.40 (3)	0.19 (2)	34.21
trust	59.28 (14)	19.44 (13)	39.84
purchase likelihood	71.43 (3)	1.59 (2)	69.84
credibility			
reliability	101.52 (1)	-	101.52
benevolence	74.30 (1)	-	74.30
trust	83.00 (6)	3.37 (5)	79.63
purchase likelihood	130.74 (1)	-	130.74

^a Constrained model is a Structural Equation Model with the correlation between the factor in bold and the factor listed beneath it set to one. Unconstrained model is a Structural Equation Model without such constraint.

Appendix 37 Assessment of the Discriminant Validity of Model M4 (Cont.)

Factor	χ^2 (d.f.)		χ^2 (d.f.=1) Difference
	Constrained model ^a	Unconstrained model	
reliability			
benevolence	49.25 (1)	-	49.25
trust	57.78 (6)	6.89 (5)	50.89
purchase likelihood	73.17 (1)	-	73.17
benevolence			
trust	23.33 (6)	3.35 (5)	19.98
purchase likelihood	65.56 (1)	-	65.56
trust			
purchase likelihood	53.43 (6)	1.37 (5)	52.06

All χ^2 difference are significant (for 1 degree of freedom) at the 0.01 level.

^a Constrained model is a Structural Equation Model with the correlation between the factor in bold and the factor listed beneath it set to one. Unconstrained model is a Structural Equation Model without such constraint.

Appendix 38 Factors Validity of Model M4

Factors	Average variance extracted
Integrity	0.64
Competence	0.74
Credibility	1.00
Reliability	1.00
Benevolence	1.00
Providing information	0.70
Trust	0.71
Purchase likelihood	1.00

Appendix 39 Model M4 - Overall Goodness of Model Fit

Goodness of Model Fit Statistics

Absolute fit

Minimum Fit Function Chi-Square = 212.67 (P = 0.0)

Degrees of Freedom = 86

Root Mean Square Error of Approximation (RMSEA) = 0.09

Normed Fit Index (NFI) = 0.98

Non-Normed Fit Index (NNFI) = 0.98

Goodness of Fit Index (GFI) = 0.99

Adjusted Goodness of Fit Index (AGFI) = 0.98

Comparative fit

Comparative Fit Index (CFI) = 0.99

Incremental Fit Index (IFI) = 0.99

Relative Fit Index (RFI) = 0.98

Parsimonious fit

Parsimony Goodness of Fit Index (PGFI) = 0.62

Parsimony Normed Fit Index (PNFI) = 0.70

Appendix 40 Model Specification of Model M5

LAMBDA-Y

	trust	purli
TRUTHFUL	0	0
CONFIDEN	1	0
COMPLETE	2	0
TRUSTWOR	3	0
PURCHASE	0	0

LAMBDA-X

	infor	compe	relia	integ	credi	benev
TRUINFO	4	0	0	0	0	0
CORRECT	5	0	0	0	0	0
KNOWHOW	0	6	0	0	0	0
EXPERT	0	7	0	0	0	0
ADVICE	0	8	0	0	0	0
SINCERE	0	0	9	0	0	0
HONEST	0	0	0	10	0	0
PROMISE	0	0	0	11	0	0
ATTENT	0	0	0	12	0	0
CUSTOMER	0	0	0	0	0	13
SIZE	0	0	0	0	14	0

BETA

	trust	purli
trust	0	0
purli	15	0

GAMMA

	infor	compe	relia	integ	credi	benev
trust	16	17	18	19	20	21
purli	0	0	0	0	0	0

Appendix 40 Model Specification of Model M5 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	0					
compe	22	0				
relia	23	24	0			
integ	25	26	27	0		
credi	28	29	30	31	0	
benev	32	33	34	35	36	0

PSI

trust	purli
37	38

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
39	40	41	42	0

THETA-DELTA

TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE	SINCERE
43	44	45	46	47	0

THETA-DELTA

HONEST	PROMISE	ATTENT	CUSTOMER	SIZE
48	49	50	0	0

Appendix 41 Mathematical Presentation of Model M5

• Structural Submodel Equations of Model M5

The structural submodel equations expressed the relationship among factors as below:

$$\text{trust} = \gamma_{11} \text{ infor} + \gamma_{12} \text{ compe} + \gamma_{13} \text{ relia} + \gamma_{14} \text{ integ} + \gamma_{15} \text{ credi} + \gamma_{16} \text{ benev} + \zeta_1 \quad (\text{A40.1})$$

$$\text{purli} = \beta_{21} \text{trust} + \zeta_2 \quad (\text{A40.2})$$

Where γ_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} exogenous factor
 β_{ij} is the regression coefficient between the i^{th} endogenous factor and the j^{th} endogenous factor
 ζ_i is the structural error of the i^{th} endogenous factor

• Measurement Submodel Equations of Model M5

The measurement submodel equations expressed the relationship of observed variables and factors as below:

$$\text{TRUINFO} = \lambda^x_{11} \text{ infor} + \delta_1 \quad (\text{A40.3})$$

$$\text{CORRECT} = \lambda^x_{21} \text{ infor} + \delta_2 \quad (\text{A40.4})$$

$$\text{KNOWHOW} = \lambda^x_{32} \text{ compe} + \delta_3 \quad (\text{A40.5})$$

$$\text{EXPERT} = \lambda^x_{42} \text{ compe} + \delta_4 \quad (\text{A40.6})$$

$$\text{ADVICE} = \lambda^x_{52} \text{ compe} + \delta_5 \quad (\text{A40.7})$$

$$\text{SIZE} = \lambda^x_{63} \text{ credi} + \delta_6 \quad (\text{A40.8})$$

$$\text{SINCERE} = \lambda^x_{74} \text{ relia} + \delta_7 \quad (\text{A40.9})$$

$$\text{HONEST} = \lambda^x_{85} \text{ integ} + \delta_8 \quad (\text{A40.10})$$

$$\text{PROMISE} = \lambda^x_{95} \text{ integ} + \delta_9 \quad (\text{A40.11})$$

$$\text{ATTENT} = \lambda^x_{105} \text{ integ} + \delta_{10} \quad (\text{A40.12})$$

Appendix 41 Mathematical Presentation of Model M5 (Cont.)

$$\text{CUSTOMER} = \lambda_{116}^x \text{benev} + \delta_{11} \quad (\text{A40.13})$$

$$\text{TRUTHFUL} = \lambda_{11}^y \text{trust} + \varepsilon_1 \quad (\text{A40.14})$$

$$\text{CONFIDENT} = \lambda_{21}^y \text{trust} + \varepsilon_2 \quad (\text{A40.15})$$

$$\text{COMPLETE} = \lambda_{31}^y \text{trust} + \varepsilon_3 \quad (\text{A40.16})$$

$$\text{TRUSTWOR} = \lambda_{41}^y \text{trust} + \varepsilon_4 \quad (\text{A40.17})$$

$$\text{PURCHASE} = \lambda_{52}^y \text{purli} + \varepsilon_5 \quad (\text{A40.18})$$

Where λ_{ij}^x is the factor loading between the i^{th} observed variable for the exogenous factors and the j^{th} exogenous factor
 λ_{ij}^y is the factor loading between the i^{th} observed variable for the endogenous factors and the j^{th} endogenous factor
 δ_i is the error for the i^{th} observed variable for the exogenous factors
 ε_j is the error for the j^{th} observed variable for the endogenous factors

Appendix 42 Parameter Estimates of Model M5

LAMBDA-Y

	trust	purli
TRUTHFUL	0.77	--
CONFIDEN	0.78	--
	(0.03)	
	30.97	
COMPLETE	0.87	--
	(0.03)	
	34.07	
TRUSTWOR	0.88	--
	(0.03)	
	34.00	
PURCHASE	--	1.00

LAMBDA-X

	infor	compe	relia	integ	credi	benev
TRUINFO	0.80	--	--	--	--	--
	(0.03)					
	28.29					
CORRECT	0.80	--	--	--	--	--
	(0.02)					
	33.17					
KNOWHOW	--	0.78	--	--	--	--
		(0.02)				
		32.27				
EXPERT	--	0.69	--	--	--	--
		(0.03)				
		22.02				

LAMBDA-X

	infor	compe	relia	integ	credi	benev
ADVICE	--	0.85	--	--	--	--
		(0.04)				
		21.90				
SINCERE	--	--	1.00	--	--	--
			(0.04)			
			27.78			

Appendix 42 Parameter Estimates of Model M5 (Cont.)

	infor	compe	relia	integ	credi	benev
HONEST	--	--	--	0.89 (0.02) 41.33	--	--
PROMISE	--	--	--	0.86 (0.02) 43.47	--	--
ATTENT	--	--	--	0.64 (0.04) 17.13	--	--
CUSTOMER	--	--	--	--	--	1.00 (0.04) 27.78
SIZE	--	--	--	--	1.00 (0.04) 27.78	--

BETA

	trust	purli
trust	--	--
purli	0.41 (0.04) 9.58	--

GAMMA

	infor	compe	relia	integ	credi	benev
trust	0.26 (0.06) 4.20	0.11 (0.06) 1.79	0.18 (0.04) 4.73	0.30 (0.06) 5.41	0.06 (0.03) 1.82	0.25 (0.04) 5.99
purli	--	--	--	--	--	--

Appendix 42 Parameter Estimates of Model M5 (Cont.)

PHI

	infor	compe	relia	integ	credi	benev
infor	1.00					
compe	0.61 (0.04) 16.31	1.00				
relia	0.45 (0.04) 11.20	0.49 (0.04) 11.08	1.00			
integ	0.44 (0.05) 8.77	0.45 (0.05) 8.61	0.38 (0.04) 9.07	1.00		

PHI (Cont.)

	infor	compe	relia	integ	credi	benev
credi	0.00 (0.05) 0.06	0.04 (0.04) 1.00	0.11 (0.04) 2.62	-0.17 (0.04) -3.91	1.00	
benev	0.49 (0.04) 11.54	0.45 (0.05) 9.58	0.38 (0.05) 8.09	0.48 (0.05) 10.41	-0.01 (0.05) -0.25	1.00

PSI

	trust	purli
	0.31 (0.04) 8.42	0.83 (0.08) 10.54

THETA-EPS

TRUTHFUL	CONFIDEN	COMPLETE	TRUSTWOR	PURCHASE
(0.08) 5.00	(0.08) 4.98	(0.07) 3.24	(0.08) 3.11	

Appendix 42 Parameter Estimates of Model M5 (Cont.)

THETA-DELTA

TRUINFO	CORRECT	KNOWHOW	EXPERT	ADVICE	SINCERE
0.37	0.36	0.38	0.53	0.27	--
(0.08)	(0.08)	(0.08)	(0.08)	(0.10)	
4.32	4.41	4.72	6.32	2.76	

THETA-DELTA

HONEST	PROMISE	ATTENT	CUSTOMER	SIZE
0.22	0.27	0.59	--	--
(0.08)	(0.08)	(0.09)		
2.66	3.35	6.82		

Appendix 43 Model M5 - Factors with Item Loading

Factors/Items	Item loading	S. D.	t-value
Integrity [integ]			
honest [HONEST]	0.89	0.02	41.33
keep promise [PROMISE]	0.86	0.02	43.47
follow regulations [ATTENT]	0.64	0.04	17.13
Competence [compe]			
knowledgeable in food safety [KNOWHOW]	0.78	0.02	32.27
able to give good advice [ADVICE]	0.85	0.04	21.90
expert in food safety [EXPERT]	0.69	0.03	22.02
Credibility [credi]			
size of farms [SIZE]	1.00	0.04	27.78
Reliability [relia]			
sincere to take follow up action after an outbreak of food scare [SINCERE]	1.00	0.04	27.78
Provide information [infor]			
provide trusted information [TRUINFO]	0.80	0.03	28.29
provide correct information [CORRECT]	0.80	0.02	33.17
Benevolence [benev]			
Concern about consumers' welfare [CUSTOMER]	1.00	0.04	27.78
Trust [trust]			
truthful [TRUTHFUL]	0.77	-	-
have confidence [CONFIDEN]	0.78	0.03	30.97
rely on completely [COMPLETE]	0.87	0.03	34.07
trustworthy [TRUSTWOR]	0.88	0.03	34.00
Purchasing likelihood [purli]			
future purchase [PURCHASE]	1.00	-	-

Appendix 44 Model M5 - Reliability of Factors and Items

Factors/ items	Cronbach alpha	Factor reliability	Item reliability
integrity	0.81	0.84	-
HONEST	-	-	0.77
PROMISE	-	-	0.73
ATTENT	-	-	0.41
competence	0.73	0.82	-
KNOWHOW	-	-	0.62
ADVICE	-	-	0.73
EXPERT	-	-	0.47
credibility	-	1.00	-
SIZE	-	-	1.00
reliability	-	1.00	-
SINCERE	-	-	1.00
benevolence	-	1.00	-
CUSTOMER	-	-	1.00
providing information	0.82	0.78	-
TRUINFO	-	-	0.63
CORRECT	-	-	0.64
trust	0.88	0.90	-
TRUTHFUL	-	-	0.60
CONFIDEN	-	-	0.61
COMPLETE	-	-	0.76
TRUSTWOR	-	-	0.71
purchase likelihood	-	1.00	-
PURCHASE	-	-	1.00

Appendix 45 Assessment of the Discriminant Validity of Model M5

Factor	χ^2 (d.f.)		χ^2 (d.f.=1)
	Constrained model ^a	Unconstrained model	Difference
providing information			
competence	43.18 (5)	5.65 (4)	37.53
integrity	52.97 (5)	3.04 (4)	49.93
credibility	58.91 (1)	-	58.91
reliability	48.34 (1)	-	48.34
benevolence	26.99 (1)	-	26.99
trust	38.31 (9)	3.52 (8)	34.79
purchase likelihood	57.54 (1)	-	57.54
competence			
integrity	86.14 (9)	35.26 (8)	50.88
credibility	82.18 (3)	12.07 (2)	70.26
reliability	49.74 (3)	3.96 (2)	45.78
benevolence	38.87 (3)	3.12 (2)	35.75
trust	73.75 (14)	25.44 (13)	48.31
purchase likelihood	77.68 (3)	1.60 (2)	76.08
integrity			
credibility	108.57 (3)	5.10 (2)	103.30
reliability	76.48 (3)	0.14 (2)	76.34
benevolence	34.40 (3)	0.19 (2)	34.21
trust	59.28 (14)	19.44 (13)	39.84
purchase likelihood	71.43 (3)	1.59 (2)	69.84

^a Constrained model is a Structural Equation Model with the correlation between the factor in bold and the factor listed beneath it set to one. Unconstrained model is a Structural Equation Model without such constraint.

Appendix 45 Assessment of the Discriminant Validity of Model M5 (Cont.)

Factor	χ^2 (d.f.)		χ^2 (d.f.=1) Difference
	Constrained model ^a	Unconstrained model	
credibility			
reliability	101.52 (1)	-	101.52
benevolence	74.30 (1)	-	74.30
trust	83.00 (6)	3.37 (5)	79.63
purchase likelihood	130.74 (1)	-	130.74
reliability			
benevolence	49.25 (1)	-	49.25
trust	57.78 (6)	6.89 (5)	50.89
purchase likelihood	73.17 (1)	-	73.17
benevolence			
trust	23.33 (6)	3.35 (5)	19.98
purchase likelihood	65.56 (1)	-	65.56
trust			
purchase likelihood	53.43 (6)	1.37 (5)	52.06

All χ^2 difference are significant (for 1 degree of freedom) at the 0.01 level.

^a Constrained model is a Structural Equation Model with the correlation between the factor in bold and the factor listed beneath it set to one. Unconstrained model is a Structural Equation Model without such constraint.

Appendix 46 Factors Validity of Model M5

Factors	Average variance extracted
Integrity	0.64
Competence	0.60
Credibility	1.00
Reliability	1.00
Benevolence	1.00
Providing information	0.64
Trust	0.68
Purchase likelihood	1.00

Appendix 47 Model M5 -Overall Goodness of Model Fit

Goodness of Model Fit Statistics

Absolute fit

Minimum Fit Function Chi-Square = 203.90 (P = 0.0)

Degrees of Freedom = 86

Root Mean Square Error of Approximation (RMSEA) = 0.09

Normed Fit Index (NFI) = 0.98

Non-Normed Fit Index (NNFI) = 0.98

Goodness of Fit Index (GFI) = 0.98

Adjusted Goodness of Fit Index (AGFI) = 0.97

Comparative fit

Comparative Fit Index (CFI) = 0.99

Incremental Fit Index (IFI) = 0.99

Relative Fit Index (RFI) = 0.97

Parsimonious fit

Parsimony Goodness of Fit Index (PGFI) = 0.62

Parsimony Normed Fit Index (PNFI) = 0.70
