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**HUMAN INTERACTION IN SERVICE DELIVERY
AND ITS RELATIONSHIP TO DISENCHANTMENT
DISCONTINUANCE IN THE DIFFUSION OF
SELF-SERVICE TECHNOLOGIES :**

A CASE STUDY IN RETAIL BANKING

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1992**

**Human Interaction in Service Delivery and its
Relationship to Disenchantment Discontinuance in the
Diffusion of Self-Service Technologies:**

A Case Study in Retail Banking

**A Thesis presented in partial fulfilment
of the requirements**

for the degree

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Gerard Paul Joseph Prendergast

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NOTE TO THE READER

This thesis has been divided into two volumes. Volume I contains the table of contents, glossary of terms, statement of the research problem, and a review of the literature of relevance to this study. Volume II relates strictly to the field work. The volume begins with a description of the methodology used, and then discusses the results of the study and its conclusions. To simplify the reading of this thesis, a set of references is contained at the end of both volumes.

ABSTRACT

The concept of self-service in the consumer goods industry is not new. For instance, consider the food vending machines found in most countries.

When applied to the services industry, however, the concept of self-service is more innovative. The traditional concept of channels of distribution as described in consumer goods marketing is of very little value when deciding how to distribute services, since services have unique characteristics. One such characteristic is inseparability. Services are typically produced and consumed at the same time. Since the client is also present as the service is produced, provider-client interaction is a special feature of services marketing.

In the 1990s this provider-client interaction is being challenged due to self-service technology. Not all consumers, however, are satisfied with receiving a service through a machine, and prefer human interaction. Some consumers, after adopting self-service technologies, have abandoned them and reverted back to obtaining the service from a human. In other words, there appears to be a form of diffusion regression.

According to Rogers (1962) when an innovation has been rejected after it has been adopted, it is called a 'discontinuance'. *Supersedence* discontinuance occurs when consumers cease using an idea in order to adopt a better idea which supersedes it. This has been found in many studies.

Disenchantment discontinuance is a decision to cease an idea as a result of growing dissatisfaction with its performance. A literature search found that no study had set out with the objective of measuring the existence, or non-existence, of this phenomenon.

This thesis used a case study approach by examining the retail banking industry. From a theoretical point of view, the main hypothesis of this thesis was that the trend towards the increased use of self-service technology in retail banking is reversing, and

will continue to reverse, due to a growing consumer preference for dealing with people in banking. In other words, disenchantment discontinuance is occurring. To test this hypothesis, a survey was conducted of consumers, in conjunction with a three round Delphi study of New Zealand's leading banking technology experts.

The consumer survey indicated that there were less than significant levels of disenchantment discontinuance for the three technologies under examination: Automated telling machines (ATMs), Electronic Funds Transfer at the Point of Sale (EFTPOS), and automated telephone banking. The Delphi study indicated that the experts did not believe disenchantment discontinuance is occurring, or will occur. This is not to say that human bank staff do not have a future. With more and more transaction type work moving to self-service technology, staff time will be freed up so that they will be in a position to become sales representatives and cross-sellers. In this context, the bank branch of the future can be expected to reflect more of a retail image.

From a methodological point of view, the Delphi technique has long suffered high rates of attrition. Typically, large numbers of the chosen respondents fail to return the first questionnaire, and succeeding smaller numbers of respondents return questionnaires at each iteration. No reported study has considered the problem of attrition by analysing the character of individuals who do and do not respond, or even by eliciting reasons for non response. Therefore, during the course of this research, systematic sampling effects and response patterns were identified and recorded. The results indicated that Delphi responses tend to be returned quicker in the second and third rounds than the first round, suggesting the presence of the experience effect. The main reason for withdrawing from the research before completing the requirements was that the expert had other priorities. The main reason for completing the requirements of the research was that the experts felt obliged to since they agreed to do so initially when sent the letter inviting them to take part in the research.

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TABLE OF CONTENTS

VOLUME I

	Page
ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF APPENDICES	ix
LIST OF FIGURES	x
LIST OF TABLES	x
GLOSSARY OF TERMS	xiii
I - INTRODUCTION	18
1.1 Introduction	18
1.2 Background	20
1.3 Characteristics of the Services Industry	22
1.4 Diffusion Theory and Technological Innovation	28
1.5 The New Zealand Financial Sector	29
1.6 Self-Service Technologies in New Zealand Retail Banking	34
1.7 Research Objectives	42
1.8 Research Hypotheses	44
1.9 Thesis Outline	44
1.10 Summary	45

II -	THE DIFFUSION OF INNOVATION	47
2.1	Introduction	47
2.2	The Diffusion of Innovation	49
	2.2.1 The Nature of the Innovation and the Consumer	50
	2.2.2 History of Diffusion Theory	52
	2.2.3 Relationship Between Diffusion and Adoption	57
2.3	The Discontinuance of Diffusion	61
	2.3.1 Customer Satisfaction, Dissatisfaction and Complaining Behaviour	64
2.4	Diffusion as a Forecasting Tool	68
2.5	The Application of Diffusion Theory to Banking Services	71
2.6	Summary	72
III -	EMPIRICAL STUDIES RELATING TO CONSUMER ADOPTION OF SELF-SERVICE TECHNOLOGIES	74
3.1	Introduction	74
3.2	Studies Outside the Banking Industry	74
3.3	Adoption of Self-Service Technologies in Banking	83
	3.3.1 Adoption of Human Tellers	83
	3.3.2 Adoption of ATMs	91
	3.3.3 Adoption of EFTPOS	105
	3.3.4 Adoption of Home Banking	118
	3.3.5 Adoption of Smartcards	128
	3.3.6 Adoption of Lasercards	133
3.4	Summary	134
IV -	EMPIRICAL STUDIES RELATING TO THE FUTURE OF RETAIL BANKING	136
4.1	Introduction	136
4.2	Empirical Studies Relating to the Future of Retail Banking	136
4.3	Summary	159

V -	THE DELPHI TECHNIQUE	163
5.1	Introduction	163
5.2	Features and Historical Development	163
5.3	Disadvantages of the Delphi Technique	171
5.4	Advantages of the Delphi Technique	182
5.5	Alternative Approaches to Delphi	186
5.6	Positivism, Humanism, and Validity	191
5.7	Summary	194
	REFERENCES	198

VOLUME II

VI -	RESEARCH METHODOLOGY	218
6.1	Introduction	218
6.2	Description of the Methodology Used	218
	6.2.1 Consumer Research	218
	6.2.2 Delphi Research	219
6.3	Relationship Between Theory, Hypotheses, and Methodology	235
6.4	Summary	241
VII -	RESULTS	242
7.1	Introduction	242
7.2	Results of Consumer Research	242
	7.2.1 Introduction	242
	7.2.2 Current and Future Use of Technologies	242
	7.2.3 Discussion	255

7.2.4	Positive and Negative Views on Technology Replacing Humans	257
7.2.5	Discussion	263
7.2.6	Sample Demographics	264
7.2.7	Summary	267
7.3	Results of Delphi Research	269
7.3.1	Introduction	269
7.3.2	Technological Diffusion	272
7.3.3	Discussion	313
7.3.4	Factors Shaping Technological Change	320
7.3.5	Discussion	336
7.3.6	Human Staff and the Branch Network	340
7.3.7	Discussion	353
7.3.8	Sample Demographics	357
7.3.9	Delphi Attrition Rates and Response Patterns	361
7.3.10	Validity of the Delphi Results	367
7.3.11	Summary	369
7.4	Consumers' Views versus Experts' Views	371
VIII -	CONCLUSIONS	373
8.1	Introduction	373
8.2	Limitations of the Research	374
8.2.1	Limitations of the Consumer Research	374
8.2.2	Limitations of the Delphi Research	374
8.3	Research Hypotheses	374
8.4	Conclusions	377
8.4.1	Methodological Conclusions	377
8.4.2	Theoretical Conclusions	380
8.4.3	Banking Specific Conclusions	381
8.5	Recommendations for Further Research	385
8.6	Summary	386
REFERENCES		389

APPENDICES	409
Appendix A Key words used in electronic literature search	410
Appendix B Invitation to brainstorming sessions	412
Appendix C Letter thanking experts for participation in brainstorm	416
Appendix D Letter to large banks asking for names of experts	418
Appendix E Letter to small banks asking for names of experts	423
Appendix F Letter to technology suppliers asking for names of experts	427
Appendix G Letter to experts inviting them to take part in Delphi	431
Appendix H Letter thanking experts for agreeing to take part in Delphi	436
Appendix I Covering letter for pretesting Delphi questionnaire	438
Appendix J Covering letter for first Delphi questionnaire	441
Appendix K First Delphi questionnaire	444
Appendix L Letter thanking experts for returning first Delphi questionnaire	474
Appendix M Covering letter for second Delphi questionnaire	476
Appendix N Example of second round results feedback	479
Appendix O Example of second Delphi questionnaire	483
Appendix P Letter thanking experts for returning second Delphi questionnaire	510
Appendix Q Letter asking experts why they did not return second Delphi questionnaire	512
Appendix R Covering letter for third Delphi questionnaire	515
Appendix S Letter asking experts why they did not return third Delphi questionnaire	518
Appendix T Covering letter sent to experts at completion of study	521
Appendix U Consumer questionnaire	526

Appendix V	SPSSPC command file and frequency tables	535
Appendix W	SPSSPC correlation and Chi ² calculations	547
Appendix X	Poisson approximation to the binomial calculations	578

LIST OF FIGURES

Figure 2.1	The Adoption Process	60
Figure 4.1	The Metamorphic Triangle	161
Figure 5.1	The Delphi Process	165
Figure 6.1	Methodology	234
Figure 6.2	Relationship Between Theory, Hypothesis, and Methodology	240
Figure 7.1	Respondents' Reason for not using ATMs in the Past	244
Figure 7.2	Respondents' Reason for not using Telephone Banking in the Past	245
Figure 7.3	Respondents' Reason for not using EFTPOS in the Past	246
Figure 7.4	Respondents' Reason for not using ATMs in the Future	248
Figure 7.5	Respondents' Reason for using ATMs in the Future	249
Figure 7.6	Respondents' Reason for not using Telephone Banking in the Future	250
Figure 7.7	Respondents' Reason for using Telephone Banking in the Future	251
Figure 7.8	Respondents' Reason for not using EFTPOS in the Future	252
Figure 7.9	Respondents' Reason for using EFTPOS in the Future	253
Figure 7.10	Respondents' Sex	267
Figure 7.11	Pattern of Responses for each Delphi Round	367

LIST OF TABLES

Table 1.1	Delivery Mechanism Scenario	35
Table 2.1	Innovation Types	59
Table 2.2	Adopter Categories	60
Table 3.1	Acceptance of Participative Alternative	80
Table 3.2	Questionnaire A: Participator Group	81
Table 3.3	Questionnaire B: Participator Group	81
Table 3.4	Comparison of Branch Numbers	86

Table 3.5	Importance of Branch Environment to Customers	89
Table 3.6	Importance of Branch Factors	90
Table 3.7	ATM Use: "Have you ever used an ATM/cash dispenser?"	98
Table 3.8	ATM Use: "Do you use an ATM once a week or more?"	98
Table 3.9	Branch Visits and ATMs	99
Table 3.10	Expectations of EFTPOS Systems	110
Table 3.11	'I'd like to pay without writing cheques'	114
Table 3.12	Advantages and Disadvantages of EFTPOS	117
Table 3.13	Preferred Delivery System: Home Banking	124
Table 3.14	Preference if Electronic Banking was Cheaper	124
Table 3.15	Interest in Home Banking	126
Table 3.16	Agreement with Statement: "I am interested in Home Banking"	127
Table 3.17	Services of Interest from a Smartcard	133
Table 4.1	Management Perceptions of the Importance of Selected Issues in 1978 vs 1985 (%)	137
Table 4.2	Terminal Activity by 2000	140
Table 4.3	Factors Affecting Change	143
Table 4.4	Payment Systems/EFTS	146
Table 4.5	Expected Marketing Innovations	147
Table 4.6	Reasons for Investing in Technology	150
Table 5.1	Estimated Number of Bombs	169
Table 6.1	Number of Organisations and Experts	229
Table 7.1	Current Use of Self-Service Technologies	243
Table 7.2	Future Use of Self-Service Technologies	247
Table 7.3	Poisson Probabilities of Achieving a Level of Discontinuance Greater than 10%	255
Table 7.4	Respondents' Preferences: Human Versus Machine	262
Table 7.5	Respondents' Age	264
Table 7.6	Respondents' Household Annual Income Before Tax	265
Table 7.7	Respondents' Personal Annual Income Before Tax	265
Table 7.8	Respondents' Occupation	266
Table 7.9	Delphi Responses	269
Table 7.10	Factors Encouraging Consumer Acceptance of Technologies	272
Table 7.11	Factors Discouraging Consumer Acceptance of Technologies	276
Table 7.12	The Cashless Society	280
Table 7.13	Estimated Rates of Diffusion for Self-Service Technologies	283
Table 7.14	Diffusion Regression	298
Table 7.15	Reduction in ATM Numbers	301
Table 7.16	Credit Card Use	303
Table 7.17	Technology/Human Mix	305
Table 7.18	Loan Facilities on ATMs	308
Table 7.19	Bills Payment Facility on ATM	310
Table 7.20	Loan Application via Home Banking	312

Table 7.21	Factors Promoting Technological Advancement	320
Table 7.22	Factors Retarding Technological Advancement	325
Table 7.23	Groups Concerned with Consumer Welfare	330
Table 7.24	Government Involvement	332
Table 7.25	Pricing Strategies	334
Table 7.26	Staffless Branches	340
Table 7.27	Platform Automation	342
Table 7.28	In-Branch Technology	344
Table 7.29	Branch Numbers	346
Table 7.30	Customer Loyalty	348
Table 7.31	Value of Personal Relationships	350
Table 7.32	Number of Years Expert has had in Current Organisation	358
Table 7.33	Number of Years Expert has had in Current Industry	359
Table 7.34	Age of Expert	359
Table 7.35	Level of Education Completed by Expert	360
Table 7.36	Experts' Reasons for Delphi Withdrawal	362
Table 7.37	Experts' Reasons for Completing Requirements of Delphi Study	364

GLOSSARY OF TERMS

ADOPTION

Adoption of an innovation has occurred when the consumer has used the innovation at least twice.

ATM (Automated Telling Machine)

This is a machine for distributing cash and providing information services to customers on presentation of computer-readable card, and keying of PIN (personal identification number).

AVERAGE COMPETENCE

For each question in the Delphi study, the experts were asked to estimate their competence or the amount of confidence they placed in their response, on a scale of nought to five. Nought meant that the expert considered him or herself to have very little competence in answering that particular question, and five meant the expert considered him or herself to have much competence in answering that particular question. The average was then calculated for each panel on each question.

BANK

Refers specifically to retail banks ie those who service private customers and small businesses.

DIFFERENTIAL PRICING

May be used when a bank has two alternative product delivery modes eg ATMs and human tellers. The bank can encourage the use of one mode and discourage the use of the other mode by charging higher fees for one of the modes of delivery.

DISCONTINUANCE

Rejection of an innovation can occur after adoption as well as before adoption (ie at the awareness or trial stage). When the innovation is rejected after adoption, this behaviour is called a "discontinuance". A discontinuance is a decision to cease use of an innovation after previously adopting it.

There are two types of discontinuance: disenchantment and supercedence. A *disenchantment* discontinuance is a decision to cease an idea as a result of dissatisfaction with its performance. The dissatisfaction may come about because the innovation is inappropriate for the individual and does not result in a perceived relative advantage over alternative practice. Or the dissatisfaction may result from misuse of an innovation that could have functioned advantageously for the individual.

A supercedence or replacement discontinuance is a decision to cease using an idea in order to adopt a better idea ('better' in the sense that the individual perceives it as better) which supersedes it. In a rapidly changing culture there are constant waves of innovations. Each new idea replaces an existing one which in its day was an innovation too.

EFTPOS (Electronic Funds Transfer at Point of Sale)

This involves making payments electronic at the point of sale by entering a computer readable card into an EFTPOS terminal.

HOME BANKING

Is a service which enables customers to perform banking transactions from their own home. This may be achieved via a home computer or television.

INTERQUARTILE RANGE (IQR)

This refers to the range of the middle 50% of responses, when all the responses are ranked from smallest to largest. For example, suppose there were eight experts in a panel and their response to the question 'in what year will the cashless society occur?' was: 1999, 2003, 2006, 2007, 2007, 2008, 2008, and 2009. The interquartile range, therefore, is 2006-2008.

MAIN CITY CENTRES

Refers to those cities with a population of 60,000 or more. There are approximately 10 such cities in New Zealand.

PANEL A

Involved experts from the departments of marketing and strategic planning in large banks ('large' in this case refers to a bank which is represented by 150 or more branches in New Zealand).

To qualify for this research, the experts had to have:

- been in a senior management position or above
- been in the industry for at least five years
- at some stage in their careers been directly involved in the research and development of banking technology, or the marketing of such applications to final customers.

PANEL B

Involved experts from the department of information technology in large banks.

To qualify for this research, the experts had to have:

- been in a management position or above
- been in the industry for at least five years
- at some stage in their careers been directly involved in the research and development of banking technology, or the marketing of such applications to final customers.

PANEL C

Involved experts from the marketing, strategic planning, and information technology departments in medium to small (ie less than 150 branches in New Zealand) financial institutions. 'Financial institutions' refers not only to banks, but also experts from finance companies, and building societies.

To qualify for this research, the experts had to have:

- been in a management position or above
- been in the industry for at least five years
- at some stage in their careers been directly involved in the research and development of banking technology, or the marketing of such applications to final customers.

PANEL D

Involved experts from technology supplying companies who:

- were in a management position or above
- had been in the industry for at least five years
- at some stage in their careers been directly involved in the research and development of banking technology, or the marketing of such applications to financial institutions.

PANEL E

This involved a constituent group of experts. This panel involved those people who were not directly involved in the marketing of technology to customers, but had an influence.

These experts did not have to meet any special criteria. Rather, they were deemed appropriate after discussion with bankers and the individuals themselves.

PIN

Represents 'personal identification number. This identifies the user (the customer) to the machine.

PLATFORM AUTOMATION

Refers to automation at the teller's cubicle. Typically it involves screen access to product profiles, which assists tellers in cross-selling.

PRODUCT PROFILE MACHINES

These machines, which are currently being piloted in some branches, allow customers to obtain profiles of the various bank products available.

REJECTION

An innovation may be rejected at any stage in the adoption process. Rejection is the decision by an individual not to adopt an innovation. This rejection may occur at any stage of the adoption process. For instance, the individual may decide at the evaluation stage that the innovation will not comply to his or her situation and mentally reject the idea. Or the innovation may be rejected at the trial stage.

SMALL BUSINESSES

Refers to organisations which employ fewer than 20 people and/or have an annual turnover of less than \$1 million before tax.

SMARTCARD

This is a card with on-board processing power. Supersmart cards are an advancement of the Smartcard, and have enhanced memory and processing power, and a miniature keyboard and display.

TELEPHONE BANKING

Is an automated telephone service (which involves the telephone being answered by a computer of some description, rather than a human bank officer) which enables customers to perform banking transactions.

WHEEL OF RETAILING HYPOTHESIS

This hypothesis suggests that new retailing institutions start on a price appeal basis and evolve as high cost, high service operations vulnerable to new types.

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

"A program for the diagnosis of peptic ulcers has been used on patients, who often claim they prefer this diagnostic method. Ironically, they describe the machine (with which they communicate by teletype) as more friendly, polite, relaxing, and comprehensible than the average physician.

These chastening observations about the superiority of the personal habits of programs over those of human doctors can doubtless be expected also with regard to automatic lawyers, bureaucrats, and teachers. While perhaps appreciated in isolated interactions of a tedious, technical, or embarrassing nature, this imperturbable mode might come to be consciously spurned in human relations in general, with a consequent increased emphasis on emotional spontaneity.

In general, one has to consider the dehumanizing effects of people's becoming decreasingly dependent upon human contact for satisfaction of their needs."

A.E Cawkell (1987)

For many people, automation is a terrifying word. It conjures up visions of advanced machines reducing people to the status of a mere button pusher. Science and technology have come to invade every aspect of peoples lives and, as a result, society

is changing at unprecedented rates. Automation and technological diffusion are not restricted solely to manufacturing industries. The opening quotation illustrates that service industries can also be effected.

Although this thesis is concerned with self-service *technologies*, it is interesting to note the development of the self-service concept in general. According to Henksmeier (1960) self-service is where 'the customer has free access to the goods, and chooses and collects what he/she wants to buy'. Properly organised self-service implies bringing the customer into the selling process, and calls for prepacking and 'self-selling' presentation and display of goods.

The concept of self-service is by no means new. For example, consider self-service petrol stations, vending machines, and 'bagging your own' groceries in supermarkets. The most famous proponent of self-service food retailing was Clarence Saunders, the founder of the Piggly Wiggly stores in the U.S.A. (Leed and German, 1979). Saunders opened his first store in Memphis, Tennessee, in 1916. The real significance of this first breakthrough in self-service retailing is that Piggly Wiggly stores were designed and built specifically for self-service. The floor plan of the store was based on a continuous line of shelving. The customers entered through the lobby area, went through the turnstile, proceeded to each aisle and then had purchases totalled at the checkout counter. By the early 1900s, food chains and independents had begun to experiment with the self-service concept, but it was not until the growth of the supermarket (beginning in 1930) that self-service was adopted on a widespread scale. By the end of 1958 self-service accounted for some 95% of food sales. In that same year, Sweden and Norway had the highest figures with one self-service shop per 1,831 and 2,377 inhabitants respectively. Switzerland came third with one self-service shop per 4,102 inhabitants (Henksmeir, 1960).

Self-service is no longer limited to the food sector, and can now be seen in household goods, electrical appliances, textiles, glassware, china, toys, furniture, and of course finance.

It seems to be the case that for many service retailers the switching of consumers from the more traditional forms of service to the self-service option is a problem. Such options are often assumed to be unattractive and are therefore offered at a discount. Alternatively they are used to provide service at a time of day when traditional types of service are not available, for example, automatic teller machines or hotel beverage machines.

There is little doubt that the 1980s was the decade of change in retail banking in both New Zealand and overseas. The new bank marketing world is full of electronic gadgetry - home banking on computer and Automated Telling Machines (ATMs) to name just two. It is also a world of plastic cards with magnetic stripes and embedded chip memories that combine with intelligent payment and banking terminals, located at the place of shopping, the place of living or the place of working, to extend the reach of retail banking much beyond the narrow confines of bank branches.

Many questions arise relating to the future. Are payment services likely to be dominated by electronic transfers? What will be the role of humans be in banking? What will the level of diffusion be for technological innovations? There is no doubt that banking in the future will look different from banking today, especially in the area of product delivery. What is in doubt, however, is what it will look like.

1.2 BACKGROUND

This thesis originated from the researcher's employment in a New Zealand Trading Bank's Marketing Department in 1986. It was during this time that the researcher's interest in both bank marketing and the diffusion of self-service technologies was founded. A study on an in-branch Automatic Telling Machine (hereafter referred to as ATMs) during this period of employment indicated that some customers perceived greater benefits from electronic banking, while other customers perceived greater benefits from personal (human) banking. This uncovered an area meriting further investigation.

In 1987 a pilot study was conducted in the Otago region of New Zealand. The aim of the pilot study was to lay a platform for a national study in 1988. This national survey attempted to ascertain consumer usage rates of alternative delivery mechanism technologies, reasons for usage, and areas for improvements (Marr and Prendergast, 1991).

It was the foregoing studies which provided the first indications that a customer antagonism was building up towards technology in banking, giving rise to the possibility that a form of disenchantment discontinuance in diffusion may occur (ie customers, after adopting successive waves of technology, begin to reject it and revert back to 'people based banking'). This may indeed be indicative of a trend in the services industry in general, where contact with humans makes up a major component of the service process.

In addition to it being the researcher's area of interest, there are four other reasons why the diffusion of self-service technology, and in particular the diffusion of self-service technology in banking, is an important area of study. Firstly, changes in self-service technologies have the potential to affect everyone in New Zealand, from all walks of life. Also, a study of such a dynamic area might illustrate issues emerging from a situation of this kind and contribute to the better management not only of change in general, but technological change in particular. Thirdly, if it is found that disenchantment discontinuance in diffusion does, in fact, exist, or will exist, this has obvious implications for service based organisations which are examining the possibility of replacing service personnel with self-service technology. Fourthly, and perhaps most importantly from a marketing perspective, technologies such as EFTPOS have a significant impact on point-of-sale activities, not least of which is the enhanced customer service associated with reducing queuing time in retail outlets.

The cornerstone to this area was provided by Bateson (1985) in his exploratory study on the self-service consumer. This study is described in detail in Chapter III. According to the results of this study, knowing that an individual is the user of a self-service option in a particular service retailing situation seems to offer some predictive ability in terms of his or her behaviour with other services.

1.3 CHARACTERISTICS OF THE SERVICES INDUSTRY

It is the very nature of the services industry which led to the development of the thesis of disenchantment discontinuance in diffusion. In service organisations labour is the important resource that determines the effectiveness of the organisation. Not unlike manufacturing, services have a problem of technological obsolescence. However, it is the skills of the labour force that age as new knowledge makes current skills obsolete. In an expanding organisation, recruitment of new personnel provides some of the benefits of the new knowledge. However, in a slow-growth or stable organisation in which seniority is important, the only successful strategy may be retraining.

Service employees in service retailing have a critical role. With service retailing there is a change in the sequence of events that occur - the sale must be made before production and consumption take place (George 1977). Thus, the truism that all customer contact employees are engaged in personal selling is much more real for the service firm than for the goods firm. With goods, the physical object can carry some of the selling burden. With services, contact personnel *are* the service. Customers, in effect, perceive them to be "the product". They become the physical representation of the offering. One of the major customer criticisms of services is the perceived impersonal and disinterested attitudes of service sellers towards their customers. Clearly issues such as these have implications for the diffusion of self-service technologies.

The interaction between consumer and employee in services creates the possibility of a more complete human work experience. The personal nature of services is in stark contrast to the depersonalisation of work found in manufacturing. In services work activity is people (rather than thing) orientated. However, personal attention creates opportunities for variability in the service provided. This is not inherently bad unless consumers perceive significant quality variation. A consumer expects to be treated fairly and given the same service others receive.

The direct consumer-employee contact has other implications as well. A disgruntled service employee can do irreparable harm to the organisation because the employee is the firm's sole contact with consumers. The concern, therefore, is with employees' attitude as well as performance.

Besides being labour intensive, the services industry has other characteristics which distinguish it from the product industry.

Consumer as a Participant in the Service Production Process

The presence of the consumer as a participant in the service production process usually requires an attention to facility design that is not found in manufacturing. The fact that cars are made in a hot, dirty, noisy factory is of no concern to the eventual buyers. Contrast, however, the pleasant surroundings of a typical bank branch. The presence of the consumer requires attention to the physical surroundings of the service facility. For the consumer, service is an experience conducted in the environment of the service facility. The quality of service is enhanced if the service facility is designed from the consumer's perspective. Attention to decor, furnishings, lay out, noise and even colour can influence the consumer's perception of the service.

An important consideration in providing a service is the realisation that the consumer can play an active role in the process. Examples illustrate that the knowledge, experience, motivation, and even honesty of the consumer directly affect the performance of the service system:

- 1) The popularity of supermarkets is predicted on the fact that consumers are willing to assume an active role in the retailing process.
- 2) The accuracy of a patient's medical record can greatly influence the effectiveness of the attending doctor.
- 3) The education of a student is determined largely by the student's own efforts and contributions.

This strategy is best illustrated by the fast-food restaurants like McDonalds that have largely eliminated serving and clearing-up personnel. The customer not only places the order directly from a limited menu, but is also expected to clear the table after a meal. Naturally the customer expects faster service and less expensive meals to compensate for these inputs. However, the service provider benefits in many subtle ways. First of all there are fewer personnel to supervise and pay. But more importantly, the customer provides the input just at the moment it is required; thus capacity to serve varies more directly with demand rather than being fixed. Therefore, the service provider can employ customer labour to achieve utilisation of capacity. In an educated society such as New Zealand where self-reliance is valued, this strategy seems to have received acceptance.

The Industrialisation of Services

Manufacturing firms often increase efficiency through standardisation and mass production. Application of these two techniques to service production is difficult because both the service employee *and* the customer become involved: both must accept the techniques before economies of scale can be achieved. That is, the simultaneity of production and consumption of services and the intimate participation of the buyer in the performance of many services have often resulted in low productivity levels in the service industries. Fuchs (1968) gives a number of reasons for the relatively low productivity of service firms in comparison with goods producers: a slower increase in the quality of labour, fewer opportunities for labour saving devices, less rapid technological change, and fewer opportunities for economies of scale. Levitt (1976) suggests that the attitudes of service managers explain their inability to increase productivity. While manufacturers think technocratically and look for solutions inside the very tasks to be done, service managers think humanistically and look for solutions in the performance of the task. Thus the industrialisation of services has not been implemented in many service firms.

Regan (1963) suggested nearly thirty years ago that the service revolution would be based on a mass production approach to develop service technologies. These service systems routinize service operations so that services can be provided faster, more

frequently, and at lower costs for mass markets. The most relevant examples of the industrialisation of services are supermarkets and mass merchandising stores which provide wide selection and fast efficient self-service in contrast to the narrow selection and incompetent sales clerk service of the past. According to Levitt (1976) they represent the industrialisation of an ancient retail service much as the assembly line represents the industrialisation of ancient craftsmanship. Other examples include automatic telling machines, credit cards, health group plans, prepackaged vacation tours, and fast food restaurants.

However, such intrinsic improvements in the production of services through greater specialisation are usually offset by a reduction in the extrinsic qualities of the services. Regan (1963) raises a very important point which relates to the increased convenience versus loss of personal touch in banking: service retailers have a significant role to play in maintaining the extrinsic qualities of the service offering. Negative consequences of service specialisation (such as impersonalisation of services, complete uniformity of the service offering) should be met by a proactive response at the point of customer interaction with the service system. Even though the intrinsic aspects of the service may improve more than the decline in extrinsic qualities, customers tend to equate the value of the entire service solely with the extrinsic element, and thus condemn the entire systemization of services. To them (the customers) the service has lost some of its ego-satisfying properties.

Production and Consumption Occur Simultaneously

Many services are consumed and created simultaneously, and thus cannot be stored. This is a critical feature in the management of service operations, and one of the key factors promoting the push for self-service technology.

The inability to inventory services precludes the traditional manufacturing strategy of relying on inventory as a buffer to absorb fluctuations in demand. Inventory for a manufacturer serves as a convenient system boundary, separating internal operations of planning and control from the external environment. Thus the manufacturing facility can be operated at a constant level of output that is most efficient. The

factory is operated as a closed system with inventory decoupling the productive system and consumer demand. Services operate as open systems, with the full impact of demand variations transmitted into the system.

Inventory can also be used to decouple the stages in a manufacturing process. For services the decoupling is achieved through customer waiting. Inventory control is a major issue in manufacturing operations: in service operations the corresponding problem is customer waiting or queuing. The problems of selecting service capacity, facility utilisation, and use of idle times are all balanced against customer waiting time.

The simultaneous production and consumption also eliminate many opportunities for quality control intervention. Unlike manufacturing, where the product is inspected before delivery, services must rely upon other measures to ensure the consistency of output. Limiting the discretion of service employees through the use of standard procedures is one possibility.

The Perishable Capacity

A service is a perishable commodity. Consider an empty airline seat, a hospital bed not being used, or an hour without a patient in the day of a dentist. In each case an opportunity loss has occurred, since a service cannot be stored. The utilisation of service capacity would not be a problem, if only demand was constant. This is seldom the case. The demand for services is just as or more variable than that for products.

Consumer demand for service typically exhibits cyclic behaviour with considerable variations between the peaks and troughs. The custom of eating lunch between noon and 1:00 pm places a real burden on restaurants to accommodate the noon rush. The practice of end of the day mailing by business means that a disproportionate number of all letters are received at the Post Office in the afternoon. Wide peak-to-trough variances are also true for ambulance, fire and similar services.

For recreational and transportation services, seasonal variation in demand creates surges in demand. Generally speaking two basic options are available:

1) Smooth demand by:

- using reservations or appointments
- using price incentives eg discounts for after hours telephone calls
- demarketing peak times (avoid the lunch-time queue)

2) Adjust service capacity by:

- using part-time staff during peak hours
- scheduling work shifts to vary workforce needs to demand (eg emergency doctors)
- increasing the consumer self-reliant content of the service
- allow customers to wait

This last option may be viewed as a passive consumer contribution to the utilisation of service capacity. For example, the airlines explicitly recognise this by charging standby passengers a reduced price for their tickets.

Location Dictated by Location of Consumers

There are no distribution channels in the traditional sense for services. The consumer and provider are brought together for a service to be performed. Either the consumer comes to the service facility (restaurant), or the service provider goes to the consumer (ambulance service). Of course, there are exceptions; for example university courses by correspondence.

The time and cost of travel is reflected in the economies of selecting a location. The result is many small service centres located close to prospective consumers. Of course the trade off is between the fixed cost of the facility and travel costs of the consumers. The more expensive the facility, the larger or more densely populated must be the market area. The resulting small size of operation and the multi-site locations of services create several problems. For instance, sizing a service operation to its immediate geographical market area removes the opportunity to gain economies

of scale found in manufacturing. Secondly, services are performed in the field, not in the controlled environment of a factory. For fast-food restaurants control can be achieved by limiting the discretion of employees. Discretion is limited by prepacking the servings, designing special equipment (eg a french-fry scoop that measures the portion), and serving only a few items. More sophisticated services, such as health care, must rely on extensive training, registration, and peer review.

Intangibility

Services are ideas and concepts: products are things. To secure the benefits of a novel service concept, the firm must often expand extremely rapidly and preempt competitors. The intangible nature of services also presents a problem for consumers. When buying a product the consumer is able to see, feel, and often test its performance before purchase. For a service, the consumer must rely upon the reputation of the service firm. In many service areas, the government can assure consumers that the training and performance of some service providers meets certain standards. There is, of course, an argument which says that in its efforts to protect the consumer, the government may be stifling innovation, raising barriers to entry, and generally reducing competition.

1.4 DIFFUSION THEORY AND TECHNOLOGICAL INNOVATION

The advancement of technology in banking and elsewhere is measured by the rate of diffusion. The rate of diffusion of an innovation depends on consumers' perceptions of the innovation with regard to five characteristics: relative advantage, compatibility, communicability, divisibility, and complexity (Rogers, 1983). A product which has a relative advantage over existing or competing products, that is compatible with existing norms, values, and behaviours, that is communicable, and that is divisible (ie can be tried or tested on a limited basis) is thought to diffuse more quickly than others. A product which is complex, ie, difficult to understand or use, diffuses more slowly than others.

Considered as a group, services are probably less communicable, less divisible, more complex, and probably less compatible than goods. They are less communicable because they are intangible (eg their features cannot be displayed, illustrated, or compared), and because they are often unique to each buyer (as in a medical diagnosis or dental care). Services are less divisible because they are usually more difficult to sample. Services are frequently more complex than goods because they are composed of a bundle of different attributes, not all of which can be offered to every buyer on each purchase. Finally, services may be incompatible with existing values and behaviours.

According to Rogers (1962) when an innovation has been rejected after it has been adopted, it is called a 'discontinuance'. *Supersedence* discontinuance occurs when consumers cease using an idea in order to adopt a better idea which supersedes it. This has been found in many studies.

Disenchantment discontinuance is a decision to cease an idea as a result of growing dissatisfaction with its performance. A literature search found that no study had set out with the objective of measuring the existence, or non-existence, of this phenomenon.

1.5 THE NEW ZEALAND FINANCIAL SECTOR

The New Zealand financial sector is an ideal location for a study of this nature because:

- New Zealand is small and therefore it is possible to obtain the views of the industry as a whole.
- There is a degree of co-operation between the main banks, making the sharing of technological investments feasible.
- The self-reliant nature of the New Zealand population means that they are thought to be more receptive to new technology and, in particular,

self-service technology.

- Deregulation has produced a competitive environment which stimulates technological innovation. As a result.....
- Many international bankers have suggested that New Zealand is at the "state of the art" in terms of self-service technology.

The New Zealand financial sector is considered by commentators to be in turmoil. Rapid deregulation of all parts of the finance, foreign exchange and capital markets, the addition of new banking institutions, major changes in technology and basic economic restructuring, have driven banks and other financial institutions into a re-assessment of their roles and market positioning.

Despite deregulation, banking still tends to be dominated by the four main trading banks: Bank of New Zealand, the Australian owned Westpac and ANZ Banks (the latter having recently acquired PostBank) and National Bank of New Zealand, associated with Lloyds. Prior to deregulation, they were the only organisations which were entitled under legislation to operate a full retail, wholesale, commercial and corporate banking service, including the right to issue cheques.

At the next level are regional non-profit trustee savings banks. Each of the trading banks also runs a savings bank subsidiary. Beyond that, finance companies and merchant banks have operated mostly at the wholesale level. In addition, there are several building societies, although their numbers are gradually reducing as some of them change to being registered banks.

As a result of this increased competition, the whole area of banking technology is coming to the fore. Electronic Funds Transfer at the Point of Sale (EFTPOS) is reasonably well established, despite an uncertain beginning. ATM networks have been well established by the trading banks. Two trading banks are providing Videotex terminals in offices and homes.

Marketing of Retail Banking in New Zealand

Before looking at banking technology in general and service delivery in particular, it is first necessary to consider it in the wider context of the bank marketing mix. Changes in service delivery can have quite a profound impact on the marketing mix. For example the type of service delivery:

- impacts upon cost structures and ultimately pricing strategies.
- has obvious implications on distribution and the branch network (as in the instance of ATMs making human tellers, and in some cases bank branches, redundant).
- may determine the bank's overall image in the market place.
- determines the form and mix of products to be delivered and to whom.
- if technology frees up human tellers, human tellers may concentrate on the selling function.

Marketing is 'an integrated business activity directed at identifying, creating, and servicing demand' (Arndt, 1967). There are several aspects of this definition which merit closer examination. First, marketing is an integrated business activity. All sections of a bank should practice marketing and marketing activities must be integrated throughout the entire planning process, and should permeate every facet of a bank's activities, from receiving deposits to corporate planning. Marketing focuses on the customer. This means that all banking activities (accounting, research and development, finance etc) are undertaken with the customer's wants and needs in mind.

The second aspect of the definition relates to identifying and creating a demand. The demand is in response to a need. Identifying the opportunity to satisfy a customer need is the first step in successfully marketing a product or service. Identifying a

potential demand presents the strategic marketing planner with the opportunity to develop and successfully market a need-satisfying product or service.

In so doing, he/she must understand the nature of the need. Once the need is understood the strategic marketing planner can then develop a mix of price, product, promotion and distribution that will create a demand-satisfying product or service offering.

A final aspect of the definition by Arndt (1967) involves the servicing of the demand. This is an important aspect of marketing that many marketers of consumer goods have failed to grasp. Once the demand has been identified and a market developed, that market must be served. This service may mean different things to different markets.

In this rather long-winded definition of marketing in banking, no distinction has been drawn between the retail side of banking and the wholesale side. Wholesale banking is exactly what the name implies - large corporations deposit and borrow money in large volumes and are thereby given special interest rates by the banks.

The personal sector of banking is the retail arm of banking, and the same pressures which impact upon other consumer product markets can be seen to be having an effect. Retail banking is thus concerned with marketing to the individual, and meeting his/her needs and wants.

The literature review in Chapter IV examines in detail studies relating to the future of banking. However it is worthwhile at this stage to summarise the opinions of Vittas, Frazer and Metaxas - Vittas (1988), who have been well documented in futuristic literature on banking. Their views are summarised in the next few paragraphs:

What is clear from their comments is that the risks of bank marketing have been increased by service delivery technology. The cost of failure is high - giving large banks an advantage over smaller ones. The last few years have proven that established bank marketing organisations have enormous advantages over competitors attempting

to break into their markets. They have branch networks, systems, credibility, and the irreplaceable bond of trust with their customers that is an essential part of all banking. Apart from foreign banks, other challenges in New Zealand's bank market may come from domestic non-banks with the resources and patience to make a long-term commitment to entering the market. Insurance companies, stockbrokers, major retail chains, oil companies, public utilities, and computer manufacturers and telecommunications companies, all have skills which would give them certain advantages in the retail area of banking.

Banks in New Zealand tend to offer much the same products as each other. Differences, where they exist, tend to be mostly in the nature of image, service level, and philosophy. Some banks have already started to court the high-net-worth customer with higher levels of service. In contrast to self-service technology, some overseas banks offer these customers special branches. This development will reinforce a trend which is beginning to appear in New Zealand: As the barriers between different categories of institutions break down, greater differences are beginning to appear between institutions in the same category.

Although technology can be harnessed to give fresh life to apparently out-of-date procedures, it does not necessarily provide by itself the driving force in banking developments. It is a mistake to assume that what is technologically feasible will necessarily be successfully implemented. One has only to look at the misplaced early enthusiasm for the concept of the cashless society to realise that considerations of cost and social acceptability are far more important than mere technological feasibility. In the future, customers will still need to make payments to a spectrum of different payees, ranging from individual persons to companies and Government. To make a payment it is necessary to transfer wealth from the payer to the payee. The payment systems of the future are those which can achieve this transfer of wealth in the most efficient way. For simple transactions it will still be difficult to improve on the physical hand-to-hand transfer of portable wealth - payment by token money, such as notes and coins.

Almost all other transactions, however, could feasibly be electronic. Just as the telephone is today unrivalled for its speed and convenience in sending voice messages, so electronic networks will in future be unrivalled for sending funds transfer messages. Just as people can use telephones in their home or in public places, so in future people will have access to the electronic payment network at home or through machines in public places and at their banks.

1.6 SELF-SERVICE TECHNOLOGIES IN NEW ZEALAND RETAIL BANKING

Self-service technologies in banking are focused in one particular area: service delivery. Service delivery is the process of delivering the total product offering to customers so as to satisfy their needs and wants. Self-service technologies can be split into two groups: service delivery technologies and 'support' technologies. Service delivery technologies allow customers to perform actual financial transactions (ie deposits, withdrawals, payments) whereas support technologies are nothing more than self-service terminals which literally support the main operating functions of a bank product (eg in-branch statement printers), PIN select machines. It is possible in some cases that the service delivery technologies are combined with support technologies. For example, an ATM allows cash withdrawals, but it also provides support services by enabling customers to perform activities such as ordering a cheque book or obtaining an account balance.

The delivery process is the vital link between the bank's offering and ultimate customer satisfaction. In a highly competitive and deregulated environment, the critical factor in attracting and retaining depositors is the quality of service. In New Zealand, banks can no longer operate independently. Before the Lange Government the banks marketing mix was tightly regulated. When the Labour party came into power in 1984 banks saw the onset of a highly competitive and deregulated environment.

A deregulated environment such as New Zealand's means that action taken by one bank results in retaliatory action by another bank, bringing waves of new technology. Table 1.1 describes a possible service delivery mechanism scenario.

Table 1.1 Delivery Mechanism Scenario

Past	Present	Future
-Human Tellers	-Automatic Telling Machines (outside branch, in lobby, drive up) -Electronic Funds Transfer at the Point of Sale (EFTPOS) -Telephone Banking -Home Banking -Product Profile Machines -Platform Automation -Smart Card -Deposit machines -Balance Enquiry Machines -Loan Enquiry Machines -Travel Enquiry Machines -Insurance Enquiry Machines -Human Tellers?	-ATMs -EFTPOS -Personal Computers -Smart Card -Telephone Banking -Home Banking -Product Profile Machines -Platform Automation -Smart Card -Deposit machines -Balance Enquiry Machines -Loan Enquiry Machines -Travel Enquiry Machines -Insurance Enquiry Machines -Human Tellers?

Throughout this thesis, reference is made to 'self-service technologies'. The phrase 'customer interface technologies' (as opposed to back office technologies) can be used interchangeably with 'self-service technologies'. This is because the customer interface technologies in banking are comprised predominantly of self-service technologies eg Automatic Teller Machines (ATMs) or Electronic Funds Transfer at the Point of Sale (EFTPOS). This also explains why this thesis makes little reference to credit cards. Credit cards, while they have been used to make a growing number of payments, do not in fact involve the use of (electronic) technology (although increasingly they are being developed with a magnetic stripe incorporated on the back of the card - in which case they essentially become ATM cards, through which credit can be obtained). In this writer's view, credit cards are more of a 'product' than a delivery mechanism. While the transaction processing side of credit cards can be highly computerised, the data input is still mainly a clerical keying task.

Authorization is carried out by the retailer over the telephone, and all the customer sees at the 'interface' is the retailer filling out the flimsy. However it is necessary to make some reference to credit cards, simply because they can affect customer adoption of the true self-service technologies. For example consider EFTPOS and the instantaneous consumer debit which occurs under this system: this may be resisted by those customers who are conditioned to receiving a certain number of days free credit.

ATMs

Banks want to encourage greater use of ATM's in order to reduce teller operating costs, and to sell the idea of electronic/remote banking, since this is in accordance with the banks' strategy. The banks' objective is to increase the use of electronics and plastic cards. The rationale is that profitability can be increased in the longer term by reducing paper based transactions. ATM's also offer other benefits:

- * Greater time and place utility for customers.
- * Acclimatising customers to electronic banking.

- * Building a cardholder base for point-of-sale systems.

- * Developing an innovative image.

However, perhaps the most competitive service a bank can offer is what banks' call a "relationship". This means that the customer is able to deal with a human being, preferably one who is knowledgeable and courteous, and who will get to learn his/her name and history. ATMs, and most self-service technologies for that matter, run against this notion. But, they are introduced on the basis that increased customer convenience will compensate for any reduction in personal service.

Empirical evidence suggests that this lack of personalisation is the major reason why people are resistant to banking technologies. Many banks are looking for innovative ways to evade this problem. For instance, Landis (1990) stated that Citibank in the U.S.A is experimenting with video interfaces between customers and remote service representatives: the agent's face will be transmitted to the ATM's service telephone. The system also includes a video camera to transmit images back to the service representative to complete the transaction. Citibank believes that by providing this human capability with its ATM systems, which already support the highest transaction volume in the U.S.A, it will be able to move the majority of its customers from tellers to ATMs.

This new banking technology has required a change in customers' habits. Customers have not yet, overall, adopted the first generation technologies (ATMs) although the industry is prepared to (and has) launched new and better delivery systems and technology linked product lines. Changing attitudes represents fundamentally the most difficult task in marketing, since they change over an extended period and not overnight.

EFTPOS

Electronic Funds Transfer at Point of Sale (EFTPOS) has not been as successful as anticipated, and for that reason could be called a failure. The marketing of EFTPOS

was disappointing. The researcher postulates that EFTPOS could and should have been one of the greatest technological advancements to occur in the financial sector in New Zealand.

EFTPOS can have a significant impact on retail operations. Retailers stand to gain from EFTPOS not only in terms of improved sales, but also in terms of improved inventory control, consumer marketing, and security. EFTPOS terminals will increasingly authorise payments, verify accounts, and extend credit. They will also decrease the amount of time needed to culminate a transaction, and they will monitor inventory surpluses and scarcities. Retailers will be able to keep abreast of changing consumer trends. Further, traditional crime - a costly problem for many retailers, may decrease with increasing use of EFTPOS since their would be less cash. Retailers will also be able to improve their collection procedures; with funds transferred automatically from a consumer's account to that of the retailers. In addition, retailers will be able to assess a consumer's credit standing within a brief period of time.

Human Tellers and the Branch Network

Human Tellers play the major role in the delivery of bank products. It is questionable whether or not they will be eliminated completely in the future.

There are three possible scenarios:

1. The movement of banking functions from human tellers to electronics will reverse and human tellers will retain their former status (the hypothesis of this thesis).
2. The human tellers will become obsolete and all functions will be performed on electronics. This scenario is not the ideal. Bricks and mortar representation are still required for cross-selling and for services needing that 'personal touch' such as lending. This strategy would require maximum investment in new technology as banks strive to get a competitive edge.

3. The movement of traditional functions from human tellers to electronics and human tellers will take on the role of sale representatives of bank technology. Print and television advertising explaining new technology may get customer interest, and may even get them into the branch, but they do not sell. People do, and this selling task will be performed by tellers.

Banks could well gain from increasing usage of human tellers due to the potential to cross-sell other services. However, this does not mean that electronic delivery mechanisms cannot be used for cross-selling purposes (eg ATMs and on-screen advertising).

Smith (1987) has provided a useful overview of counter activities in several countries. In the U.S.A (and to a lesser extent Canada) customers expect a quick service for routine transactions. When matters are more complex or personal customers expect more senior staff members to take time to discuss the products/options.

According to Smith (1987) Germany has the 'laziest' customers because they literally expect staff to fill out all the necessary forms, and all they have to do is add their signature as authorization. A quick rate of service is not demanded in Germany to the same extent as it is in the U.S.A and Canada.

Some branches have areas where customers can prepare all their own vouchers, but these are not heavily used. In the U.S.A and Canada where more senior staff deal with complex/personal matters and more time is taken - typically the customer will be seated when conducting a transaction with the teller.

Customer service expectations in the U.K can be apportioned roughly to those from savings banks and those from commercial banks. Commercial bank customers expect a faster service, while the service rate in the savings bank branch is slowed by the higher number of passbook transactions which take place (this applies more to the savings bank in Scotland than that in England).

All of these countries have experienced a reduction in the number of young people who visit the branch because these customers have adopted self-service facilities as the way in which they like to conduct their finances. To a certain extent this younger generation of customers is more independent and private about financial matters.

Telephone Banking

With telephone banking customers use a numeric password on a push-button telephone to access banking services. It typically involves 'non-cash' transactions ie:

- * order an account balance
- * order a bank statement
- * order a cheque book
- * transfer funds between accounts
- * obtain basic bank and investment information
obtain an exchange rate
- * obtain foreign exchange calculations
- * listing of recent transactions

The key advantage of telephone banking is that customers can conduct banking within the comfort of their home. Possible obstacles to telephone banking's success are:

-customers' concern with security.

-possible resistance to voice synthesizers.

Smart Card

The primary objective of this technology was to replace the magnetic stripe card with its limited memory of a few hundred 'bits' of information and complete absence of intelligence.

The Smart Card (chip card, integrated circuit card) incorporates intelligence in the card, and hence many of the processes currently carried out via the leased lines to the host can be handled at the remote terminal.

Thus, the advantages of Smart Card (over and above EFTPOS) appear to lie with the issuer, since less communication with a host computer is required. However, some communication with the host is still required (eg periodic update and card refreshment).

Home Banking

While telephone banking is sometimes referred to as home banking, home banking in the true sense refers to a delivery mechanism which can only be utilised at home and is not mobile. In this context, home banking may take one of two forms:

-Videotex systems which run on a normal television set. This tends to provide more general financial information, rather than account specific information.

-Personal computer systems which allow customers to access their specific accounts. For obvious reasons, security measures are much more stringent when home banking is conducted by personal computer. Like telephone banking, transactions are typically 'non-cash' transactions.

A detailed review of studies relating to customer adoption of various service delivery mechanisms can be found in Chapter III.

1.7 RESEARCH OBJECTIVES

The key objective of this study is to examine Roger's (1962) concept of disenchantment discontinuance by profiling the current and future use of self-service technologies and the branch network in banking to the year 2010. The specific objectives relate to both the literature review and the primary research.

Objectives of the Extant Literature Review

- * To perform an in-depth review of the literature relating to the Delphi forecasting technique; its strengths and weaknesses.
- * To critically examine those studies relating to the future of banking, including the appropriateness of their conclusions and methodologies.
- * To ascertain those factors that have led to the consumers' adoption and non-adoption of self-service technologies.
- * To examine the historical development of Diffusion Theory, and its application to self-service technology.

Objectives of the Primary Research

- * To examine Roger's (1962) concept of disenchantment discontinuance in the diffusion of self-service technologies. More specifically, to illustrate that disenchantment discontinuance in diffusion is occurring and will continue to occur for self-service technologies in banking due to consumer antagonism towards increasing depersonalisation of services.

This will be ascertained by identifying:

- what the suppliers predict
- what the customers have done, and would like to see

* To identify those variables which have influenced/will influence the present and future diffusion of self-service technologies in retail banking.

This includes:

- those variables, based on inputs from the literature, experts, and consumers, which have influenced/will influence consumer adoption of self-service technologies in retail banking.

- those variables, based on inputs from the literature and experts which have influenced/will influence the development of self-service technologies in retail banking.

* To draw a comparison between what the banking experts and technology experts envisage as being the future of self-service technologies, and what the customers envisage as being the ideal future of self-service technologies.

* To draw a comparison between this Delphi study and similar studies conducted overseas.

* To implement modifications to the Delphi technique, as recommended by the literature.

* To examine the pattern of response for Delphi, and identify why experts withdraw before completing the requirements.

1.8 RESEARCH HYPOTHESES

Basic Hypothesis

That the increasing provision of self-service technologies in the banking industry results in disenchantment discontinuance in diffusion due to consumer antagonism towards depersonalisation of services.

Sub - Hypotheses

- H1 That customer demand is not the main factor driving change in self-service technologies.
- H2 That there will be a significant number of consumers who have adopted self-services technologies in the past, but do not intend using them in the future, due to a preference for dealing with humans in banking.
- H3 That more than 50% of experts show decreasing estimates for the adoption of self-service technologies up to the year 2010.
- H4 That the majority of the experts think that there is a greater than 50% chance that the trend towards increasing use of self-service technology will begin to reverse.

1.9 THESIS OUTLINE

The remainder of this thesis is organised as follows:

- a) Chapter II outlines the main theory relating to customer adoption of new product innovations.
- b) A review of the reasons why customers do/do not use self-service technologies in banking and elsewhere is provided in Chapter III.

- c) Chapter IV provides a critical examination of the extant literature relating to forecasting studies in banking.
- d) Chapter V examines the extant literature relating to the strengths and weaknesses of the Delphi technique (the principal methodology used in this research).
- e) Chapter VI presents the research method, data analysis, and research problems.
- f) Chapter VII presents and discusses the results of the primary research.
- g) Chapter VIII examines the research findings in terms of the research hypotheses; looks at the methodological, theoretical and practical conclusions; examines the limitations of the study and discusses some areas for further research.

1.10 SUMMARY

Technology is clearly one of the dominant features of the modern world. Quite apart from offering the potential for service marketers to more effectively meet the needs of its customers, it offers cost benefits to organisations. In this chapter the focus of the thesis has been developed, beginning with the broader services industry, and then examining the banking industry in particular. The unique characteristics of the services industry, and in particular the banking industry, make the introduction of self-service technology a challenging exercise in customer adoption.

The objectives and hypotheses of this research are of theoretical, methodological, and practical importance. Disenchantment discontinuance represents a major shift from conventional diffusion theory. Delphi suffers from high attrition rates, and it is important to identify why this is the case so that future users of the technique can take steps towards securing a more adequate response. Leaders in the finance industry are curious as to the position of self-service technology versus humans.

Given that this thesis is of theoretical, methodological and practical interest, the thesis outline demonstrates that it is necessary to review the literature relating to diffusion theory, the Delphi technique and previous studies in the banking industry, before embarking upon the primary research.

CHAPTER II

THE DIFFUSION OF INNOVATION

2.1 INTRODUCTION

The following four chapters have been developed so as to fulfil the provisions as discussed by Fox (1969). That is, it is the aim of these chapters to provide:

- A frame of reference for the understanding of the concepts relevant to this study.
- An awareness and understanding of the status of research related to the problem area.
- Knowledge of the principal form of research methodology used in the area.

This literature enables the reader to evaluate the contributions of others and their areas of theoretical and empirical weakness.

The literature review involved:

- * A review of extant literature on self-service technologies in retail banking in New Zealand and overseas: past and future. Particular attention was paid to the reasons why customers do or do not use alternative service delivery mechanisms. This provided the necessary background to understanding the underlying market forces effecting the rate of diffusion.
- * A review of extant literature on the Delphi technique - this concentrated on the strengths and weaknesses of Delphi.
- * A review of extant literature on the theory of Diffusion of Innovation, its historical development and application to banking.

- * A review of extant literature relating to forecasting studies in the banking industry.

The literature came from two main sources:

1) An electronic on-line search was conducted, using a number of key words (see Appendix A). The main databases accessed were:

- FINIS (Financial Industry Information Service) database. FINIS provides a 20 year coverage of English language literature on the financial services industry, with a particular emphasis on marketing. FINIS focuses on information on the many types of organisations that comprise today's financial services industry, on the products and services that they offer to their corporate and retail customers, and on the management of the marketing function in financial institutions.

Editorial coverage includes news reports, feature articles, company information, case histories, major industry appointments, and discussions of management and marketing techniques as they apply to financial services. FINIS contains abstracts from over two hundred periodicals, newspapers, and newsletters of the financial services industry, as well as from the unique case histories of marketing programs gathered by the Bank Marketing Association through its annual Golden Coin awards competition and its School of Bank Marketing.

- the Social Sciences database: The Social Science database is an international, multidisciplinary index to the literature of the social, behavioural, and related sciences, produced by the Institute for Scientific Information (ISI). The file is updated every two weeks and corresponds to the printed Social Science Citation Index.

- the PTS Prompt database. This database provides an overview of markets and technology. It is a multiple industry database that provides broad, international coverage of companies, products, markets, and applied technologies for all industries. Produced by Predicasts, Inc., PTS Prompt is comprised of abstracts and full-text records

from the world's important trade and business journals, local newspapers and regional business publications, national and international newspapers, industry newsletters, research studies, investment analysts reports, corporate news releases, and corporate annual reports.

- the Dissertation Abstracts database. This is a database consisting of virtually every American and Canadian dissertation accepted at an accredited institution since 1861, when academic doctoral degrees were first granted in the U.S.A and Canada, and over 200 institutions elsewhere. This corresponds to coverage in Dissertation Abstracts International (DAI), American Doctoral Dissertations, and Comprehensive Dissertation Index. The database also contains masters' theses corresponding to the coverage in Masters Abstracts International (MAI).

2) Not all databases can be accessed electronically and therefore several manual searches of abstracts had to be conducted. This included the U.K and Australian thesis abstracts, the Business periodicals, the Marketing Research Abstracts, and the World Banking Abstracts. Also, after the initial search, periodic manual searches were made of all the relevant databases in order to keep abreast of the most recent publications.

2.2 THE DIFFUSION OF INNOVATION

The literature search revealed a vast amount of published material relating to the broad area of diffusion itself. For practical reasons, therefore, discussion in the first sections of this chapter is limited to covering only definitions of the key concepts and a description of the historical development of the theory. This provides the necessary background knowledge to the theory.

Within the broad diffusion area, however, the literature search revealed much less information relating to the specific areas of direct relevance to this thesis: disenchantment discontinuance, and the application of diffusion theory to forecasting and banking. These areas are covered in the final sections of this chapter.

The diffusion of an innovation traditionally has been defined as the process by which innovation "is communicated through certain channels over time among the members of a social system" (Rogers 1983). As such, the diffusion process consists of four key elements: innovation, communication channels, time, and the social system. An innovation is an idea perceived to be new by an individual. The issue is not whether or not an idea is objectively new. It is the newness of the idea to the individual that determines his/her reaction to it. The essence of innovation is human interaction in which one person communicates an idea to another person.

A social system refers to a population of individuals who are functionally differentiated and engaged in collective problem solving behaviour. The social system under analysis in a diffusion study may be, for instance, all farmers in one country. The spread of a diffusion is not instantaneous. Individual A must tell individual B about the innovation. Before adopting the innovation individual B must go through the adoption process of awareness, interest, evaluation, trial, and adoption.

2.2.1 The Nature of the Innovation and the Consumer

The literature makes it clear that home banking (and other bank technologies) has had varying rates of success around the world. The diffusion of innovation theory (Rogers, 1962) provides a powerful concept for understanding these differences.

Dover (1988) suggests that the diffusion process is influenced by two basic criteria - the nature of the innovation and the nature of the consumer adopting the innovation.

1) The Innovation

It is useful to use home banking as an example of an innovation. "Relative advantage" is the extent to which an innovation is superior to ideas it supersedes. Home banking, for instance, allows customers to bank from home.

Perhaps the most discouraging factor for adoption of home banking is the cost - not only bank charges, but possible outlay for a computer. This points to why the French have succeeded: the Government reduced the initial cost by offering cheap, no-frills terminals. Also, the terminal is extremely easy to use.

"Compatibility" is the extent to which an innovation is consistent with existing values and experiences. Home banking is more of an innovation in distribution than product. Customers carry out transactions that are already familiar to them, from the comfort of their home. As the literature shows in Chapter III, consumers who have already used ATMs and personal computers are more likely to adopt home banking since this is compatible with their past experiences. Dover suggests that technological compatibility is also important. For instance, the French will have greater success than the Americans with home banking because they only have one system - compared with the fragmented U.S.A system where many different home banking offerings confuse customers.

"Complexity" is the extent to which the results of an innovation may be diffused to others. Home banking is a complex service and therefore, when it comes to promotion, personal selling would be more appropriate than mass advertising.

2) The Consumer

Adoption theory makes it quite clear that innovators and early adopters are critical groups of consumers in the adoption process, since these groups tend to contain the opinion leaders. The opinion leaders are able to influence others through advice and information on an innovation. If this theory is correct, banks should target these groups first. However in the literature to date, banks appear to have striven for early broad market penetration.

2.2.2 History of Diffusion Theory

Rogers (1983) suggested that there are six research 'traditions' which have contributed to the development of research in the diffusion area. These are discussed in turn as they give a useful perspective of the historical development of diffusion theory.:

a) Anthropology: The anthropology research tradition is the oldest of the research traditions. The major argument in early anthropology was whether diffusion or parallel invention was more important. That is, the question of whether ideas were independently invented in two cultures, or whether an idea was invented in one culture and diffused to the other.

As the field of anthropology developed, a great number of anthropological studies were concerned with investigating the adoption of Western modern ideas by primitive societies. Kroeber (1923) and Wissler (1923) published anthropological works that directly influenced many later diffusion studies, both in anthropology and other traditions. For example, Wissler (1923) traced the diffusion of horses from the Spanish explorers to American Indian tribes. Linton (1936) also made an important contribution to the development of diffusion theory. He was probably the first academic to recognise that the characteristics of an innovation affect the rate of adoption.

b) Early Sociology: One of the first empirical investigations by an early sociologist was Chapin's (1928) analysis of the diffusion of the city manager plan of government. He showed that the adopter distribution for the city manager idea in the U.S.A followed an S-shaped "growth curve". The motivating interest for the early sociologists was mainly in the diffusion of innovations which promised to contribute to major social changes (Katz and Levin, 1959). Their research tended to be based on secondary data, and the unit of adoption was most often a state, city, or organisation, rather than a single individual.

c) Rural Sociology: It is this area which has produced the greatest number of publications and studies of diffusion. Most of these studies deal with the diffusion of

farm innovations from agricultural scientists to farmers. The background of the tradition dates back to the 1920s. However the 1943 investigation by Ryan and Gross into the diffusion of hybrid seed corn, more than any other study, influenced the methods, findings, and interpretations of later students in the rural sociology tradition. A total of 345 farmers were interviewed in two small Iowa communities. The innovation was the result of years of intensive research by agricultural scientists. The major findings from the research were:

1. The use of hybrid seed followed a bell-shaped distribution overtime (Ryan and Gross, 1943). Gross classified four adopter categories on the basis of their first use of hybrid seed. The social characteristics, such as age, social status, and cosmopolitaness, of both the earliest and the latest adopters were then determined.
2. Three stages were recognised in the adoption process: awareness, trial, and use.
3. The typical farmer first heard of hybrid seed from a salesperson, but neighbours were the most influential source in leading to adoption. Salespeople were more important for earlier adopters, and neighbours were more important for later adopters.

Despite the methodological problems with this study, the research formed a platform from which subsequent diffusion studies have been launched.

After a relatively slow development in the 1930s and 1940s, the number of studies in the rural sociology tradition rapidly increased in the 1950s and early 1960s.

d) Education: According to Rogers (1983) the education diffusion tradition is one in which the largest number of studies have been conducted, but this tradition is probably one of lesser significance in terms of its contributions to understandings of the diffusion of ideas.

Most of the education diffusion studies have been done at one institution, Columbia University's Teachers College, under the sponsorship of one researcher, Paul Mort. He was described as the "guiding force" in all the education studies (Ross, 1958).

Rogers (1983) has listed a number of central findings which have emerged from the education diffusion studies:

- Among the great variety of factors related to innovativeness (or adaptability) among schools, the best single predictor of this dimension is educational cost per pupil ie wealthier schools are more innovative.
 - A considerable "time lag" is required for the widespread adoption of new educational ideas. "The average school in America lags 25 years behind the best practice" (Mort, 1946). This is much slower than with rural innovations, possibly due to the lack of an economic incentive to adopt.
 - The pattern of adoption of an educational idea over time approaches an S-shaped curve.
- e) Industrial: The industrial tradition of diffusion research includes researchers with a wider range of disciplinary backgrounds than in the case of other traditions. Economic historians, industrial economists, and industrial engineers are represented among those investigating the adoption of new industrial ideas.

Danhof (1949) described four adopter categories that he felt could be observed among industrial firms:

1. Innovators - the first firms to adopt a new idea.
2. Initiators - the firms who adopted the idea soon after the innovators.

3. Fabians - the firms who adopted the idea only after its utility was widely acknowledged in a particular industry.

4. Drones - the last firms to adopt new ideas.

Since Danhof's study was published, several researchers have attempted to determine empirically the characteristics of industrial firms associated with innovativeness. The Carter and Williams (1959) study of the innovativeness of 50 English industrial firms is perhaps somewhat typical of the industrial diffusion tradition. Each firm was rated as to "technical progressiveness" on a ten-point scale. The researchers then proceeded to determine the characteristics of the most and least innovative firms. Factors found to be related to innovativeness included:

- A favourable attitude toward science as evidenced by the status given to scientists in the firm.
- Cosmopolitanism as indicated by the worldwide travel of executives, and lack of secretiveness with plant visitors.
- Adequate information sources as measured by subscriptions to scientific journals and degree of contact with universities.
- A high growth rate for the firm.
- Lack of "shop-floor resistance to innovation" as evidenced by the conservatism of foremen and union resistance.

f) Medical Sociology: This tradition was somewhat slower to get started than the other traditions. One of the first studies of the diffusion of a medical drug was by Caplow (1952) and Caplow and Raymond (1954). They sought to determine the degree of influence of opinion leaders in the diffusion of drugs among medical doctors. Their results were somewhat inconclusive.

According to Rogers (1983) the classic study in the medical sociology tradition is that by three sociologists, Elihu Katz, Herbert Menzel, and James Coleman, who were in Columbia University's Bureau of Applied Social Research. The drug study analysed the diffusion of a new antibiotic (gammanyn) that appeared in late 1953. The researchers interviewed 125 general practitioners and each doctor was asked to name:

- His three best friends among physicians

- The three or four physicians with whom he most often discussed cases or therapy; and

- The colleagues whom he most frequently called when in need of special information or special advice on questions of drug therapy.

Three major findings emerged:

1. The detailed data secured from the physicians allowed an analysis in depth of the patterns of influence through which the drug spread in the medical community. The relationship between opinion leadership' and innovativeness was established.

2. The drug study also established the correlates of innovativeness for a type of respondent that had not previously been studied in this regard. Most of the variables related to innovativeness (such as cosmopolitaness, social status, opinion leadership, size of operation, and communication behaviour) had already been investigated for samples of farmers and public schools. It was also important to learn that these same relationships of innovativeness with other concepts held for physicians.

3. The third major contribution of the drug study was the methodological technique of determining the date of doctors' first use of the drug from prescription records rather than from recall.

g) Marketing: Marketing has only become strong as a research tradition in the 1960s (Rogers and Shoemaker, 1971). Marketing managers have become interested in diffusion research mainly due to the large number of new product failures. While much research has been conducted in relation to diffusion, the vast majority of it has remained confidential to the company. It was not until the early 1960s that diffusion research began to receive attention from university faculty members in graduate schools of marketing. It was a result of this that access to diffusion studies in marketing became more publicly available. Most of the studies took the form of field experiments, with financial support coming from a sponsoring company. For example Arndt (1967) conducted a study of new food products. He sent a letter about the innovation enclosing a coupon allowing its purchase at one-third its normal price to 495 housewives living in a married student apartment complex. Personal interviews were then conducted with these consumers after sixteen days of the diffusion campaign. Arndt found that interpersonal communication about the innovation frequently led to its purchase, especially if the interpersonal messages about the new product were favourable. Housewives who perceived the innovation as risky were more likely to seek the advice of opinion leaders about it.

According to Rogers and Shoemaker (1971) the marketing tradition has borrowed heavily from the older diffusion traditions, especially rural sociology.

2.2.3 Relationship Between Diffusion and Adoption

The diffusion process is often confused with the adoption process. The adoption process is the development of the consumers' awareness of a product - ranging from the point when they first become aware of a new product's existence to the point when they actually use or adopt the product on a regular basis. Hence the diffusion process is the aggregate of all individual adoptions over time. Therefore it is necessary to first gain an understanding of adoption. From the time when an individual first hears of an innovation to the time when adoption occurs has been recognised as consisting of several stages. The Ryan and Gross (1943) study was probably the first to recognise that the adoption of a new idea consisted of stages. They distinguished between "awareness" of

hybrid seed corn, "conviction" of its usefulness, trial "acceptance", and "complete adoption" of the innovation. In more modern times, adoption has been divided into five similar stages:

- 1) Awareness stage: The individual is exposed to the innovation but lacks complete information about it, or the individual is aware of the innovation but is not yet motivated to seek further information.
- 2) Interest stage: The individual becomes interested in the new idea and seeks additional information about it. The innovation is favoured in a general way, but is not yet judged in terms of its utility to a specific situation.
- 3) Evaluation stage: The individual mentally applies the innovation to his or her present and anticipated future situation and then decides whether to try it.
- 4) Trial stage: The individual uses the innovation on a small scale in order to determine its utility in his or her own situation.
- 5) Adoption stage: The individual decides to continue the full use of the innovation. This implies continued use of the innovation in the future.

It should be noted that Rogers (1983) states that there is very little evidence as to exactly how many stages there are in the adoption process. Nevertheless, until more evidence is available, it seems conceptually clear and practically sound to utilise the five-stage adoption process.

As a theory of communications, diffusion theory's main focus is on communication channels, which are the means by which information about an innovation is transmitted to or within the social system (Mahajan, Muller, and Bass 1990). These means consist of both the mass media and interpersonal communications. Members of a social system have different propensities for relying on mass media or interpersonal channels when seeking information about an innovation. Interpersonal communications, including

nonverbal observations, are important influences in determining the speed and shape of the diffusion process in a social system.

Different types of innovations require different degrees of change or adaption in the behaviour, attitudes and beliefs of the target group. Table 2.1 shows different types of innovation based on required changes in behaviour (Rogers, 1983).

Table 2.1 Innovation Types

Innovation Type	Required Behaviour For Adoption
Continuous Innovation	Adoption requires minor changes in behaviour, e.g liquid soap, canned wines.
Dynamically Continuous Innovation	Adoption requires a major change in an area of behaviour unimportant to the individual.
Discontinuous Innovation	Adoption requires major changes in behaviour in an area of relative importance to the individual or group, e.g waterbeds, microwave ovens, solar heating.

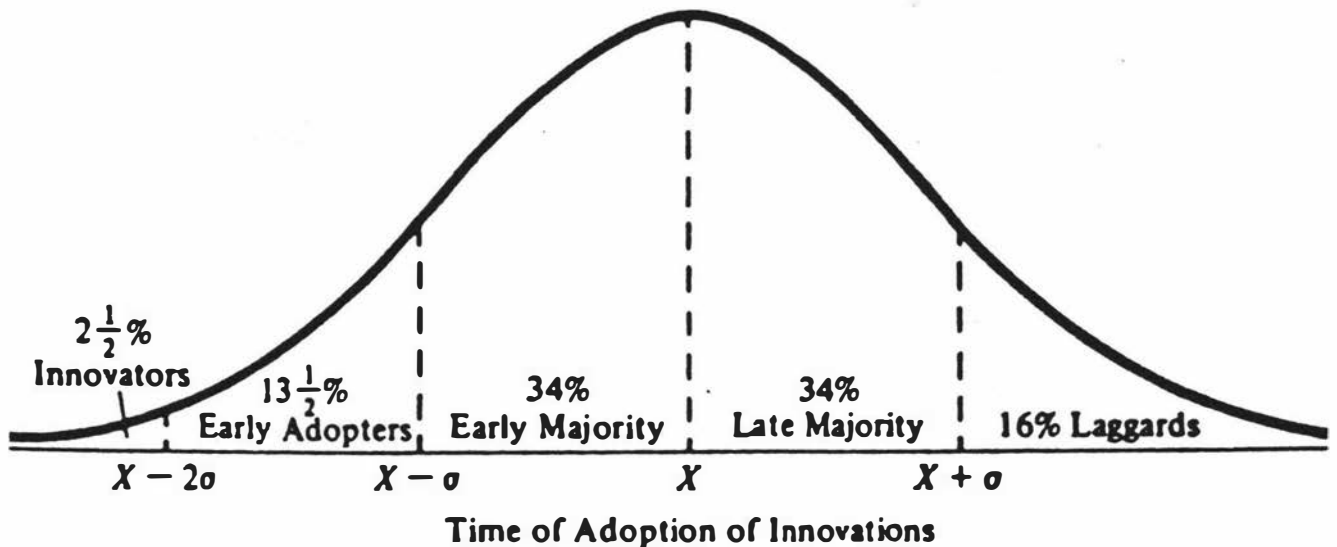
Diffusion, as a group process, gives rise to different categories of adopters. Research has shown the adoption behaviour of those different categories exhibits a typical bell-shape distribution over time (Hawkins et al 1983). The adopter categories are shown in Table 2.2

Table 2.2 Adopter Categories

Categories	Percentage Adoption
Innovators	The first 2.5% to adopt innovation
Early Adopters	The next 13.5% to adopt innovation
Early Majority	The next 34% to adopt innovation
Late Majority	The next 34% to adopt innovation
Laggards	The last 16% to adopt innovation

The pattern in Table 2.2 is illustrated in Figure 2.1 below.

Figure 2.1 The Adoption Process



Source: Rogers, E.M. *Diffusion of Innovations*. Free Press of Glencoe, New York, 1962, p162.

People in different categories are likely to exhibit certain characteristics (Rogers and Shoemaker, 1971). Earlier adopters are typically more : cosmopolitan, venturesome, possessed of relative status in reference groups, commercial, professional, and better communicators. Later adopters tend to exhibit more dogmatism, fatalism and rely more on interpersonal communications.

Why should the adopter distribution be normal? Rogers (1983) suggests two reasons:

1. **Learning Curves:** Research has shown that individuals learn a new skill or set of facts through a learning process that, when plotted overtime, follows a normal curve (Hilgard, 1956). When an individual is confronted with a new situation, he/she makes errors at the beginning, but after a series of trials, the errors decrease until learning capacity is reached. When plotted, this learning curve follows a normal pattern. If one substitutes a social system for the individual in the learning curve, it seems reasonable that experience with the innovation is gained as each successive member in the social system adopts it. Each adoption in the social system is, in a sense, equivalent to a learning trial by an individual.

2. **Interaction Effect:** This is the process through which individuals in a social system who have adopted an innovation influence those who have not yet adopted. This would logically explain the normal pattern. If the first adopter of the innovation discusses it with two other members of the social system, and these two adopters each pass the new idea along to two peers, the resulting distribution follows a binomial expansion which produces a normal shape when plotted.

2.3 THE DISCONTINUANCE OF DIFFUSION

According to Rogers (1962) an innovation may be rejected at any stage in the adoption process. Rejection is the decision by an individual not to adopt an innovation. For instance, the individual may decide at the evaluation stage that the innovation will not comply to his situation and mentally reject the idea. Or the innovation may be rejected at the trial stage. Rejection can also occur after adoption. This behaviour is called a

"discontinuance". A discontinuance is a decision to cease use of an innovation after previously adopting it.

Although a number of studies have identified discontinuances, many of them did so by accident. Few of the investigations were specifically designed to study discontinuances. While Chapin (1928) did not use the specific term "discontinuance", he found that a number of U.S cities "abandoned" the commission form of Government from 1912 to 1923.

The following studies show the diversity of behaviour in which discontinuances have been found:

1. An investigation of North Carolina farmers found over 20% had discontinued the use of hybrid corn (Wilkening, 1952).
2. Adler (1955) found discontinuances in the case of 16 of the 33 educational innovations he investigated among 170 public schools.
3. A study of 4,326 families in India (Indian Planning Commission Programme Evaluation Organisation, 1958) disclosed discontinuance ranging from 97% for a Japanese method of rice cultivation to less than one percent for compost fertilizer..
4. Eichholz (1961) found that discontinuances were more common than 11 other types of rejection in his study of rejected audio-visual innovations by 45 elementary teachers in five public schools.
5. Silverman and Baily (1959) found about half as many discontinuances as adoptions over a three-year period by 107 Mississippi farmers.

A very comprehensive investigation of discontinuances was completed by Johnson and van der Ban (1959). They partly eliminated one of the major problems involved in studying discontinuances, that of inaccurate respondent recall, by gathering data from

176 Wisconsin farmers both in 1952 and again in 1957. During the five year period, the 176 respondents made 266 adoptions of 17 innovations studied and 255 discontinuances. The Wisconsin data indicated that an unexpected number of discontinuances occur over a relatively short time period. Few of the Wisconsin discontinuances were caused by supersedence of a superior innovation replacing a previously adopted idea.

One of the most significant findings by Johnson and van der Ban (1959) was that the relatively later adopters had twice as many discontinuances as the earlier adopters. Previous researchers had assumed that later adopters were relatively less innovative because they did not adopt or were slow to adopt innovations. The Johnson and van der Ban evidence suggests the later adopters may adopt, but then discontinue at a later point in time.

Findings by Adler (1955), Johnson and van der Ban (1959), and Silverman and Bailey (1959) tend to support the generalisation that relatively later adopters are more likely to discontinue innovations than are earlier adopters. Later adopters have lower incomes: their lack of resources may either prevent adoption of ideas or cause discontinuances because the ideas do not fit their limited financial position.

According to Rogers and Shoemaker (1971) there are at least two types of discontinuances: Replacement and disenchantment. A replacement discontinuance is a decision to cease using an idea in order to adopt a better idea ('better' in the sense that the individual perceives it as better) which supersedes it. In a rapidly changing culture there are constant waves of innovations. Each new idea replaces an existing one which in its day was an innovation too.

A 'disenchantment discontinuance' is a decision to cease an idea as a result of dissatisfaction with its performance. While a number of studies have identified discontinuances, none have specifically examined a *disenchantment* discontinuance - and have tended to look at replacement or supersedence discontinuance (which is where an individual ceases using an idea in order to adopt a better idea that replaces it). The dissatisfaction involved with disenchantment discontinuance may come about because

the innovation is inappropriate for the individual and does not result in a perceived relative advantage over alternative practice. Alternatively, the dissatisfaction may result from misuse of an innovation that could have functioned advantageously for the individual. This latter type of disenchantment seems to be more likely among later adopters than among early adopters. Laggards have less education and more traditional values which might be expected to lead to discontinuance. Laggards also seem to be more submissive to authority in their attitudes toward change agents; they may adopt as the direct result of influence from change agents. When this coercive influence is removed, the innovation is likely to be discontinued.

The discontinuance of an innovation is one indication that the idea was not integrated into the practices and way of life of the receivers. Rogers and Shoemaker (1971) suggest that 'integration' of an innovation occurs when it has been incorporated into the operations and way of life of a social system. Such integration is, of course, less likely (and discontinuance more frequent) when the innovation is less compatible with the receivers' beliefs and past experiences.

2.3.1 Customer Satisfaction, Dissatisfaction and Complaining Behaviour

Despite customer satisfaction, dissatisfaction and complaining behaviour being an important and rich branch of the consumer behaviour literature, only a brief synopsis of the recent literature in the area is given here. This is because the focus of this research is not on customer satisfaction or dissatisfaction with self-service technologies in banking. The focus is on the continuance or discontinuance of a technology which eliminates the human element. In other words, does taking the human element out of service delivery impede its diffusion? The literature relating to customer satisfaction, dissatisfaction and complaining behaviour may help to explain *why* continuance or discontinuance is or is not occurring. This thesis, however, gives a descriptor of what is happening. Of greater interest therefore is the literature relating to diffusion theory which explains *what* is happening, rather than *why*.

The term 'customer satisfaction' is not always well defined in the literature. Landon (1977) suggests that satisfaction involves answering one question: are customers pleased or displeased with products in the marketplace? Handy (1977) views consumer satisfaction as the extent to which some product/service attribute combination available in the marketplace matches the consumer's 'ideal' attribute combination.

According to Thirkell (1981), research relating to customer satisfaction, dissatisfaction and complaining behaviour has followed five main areas:

- 1) Broad base studies which focus upon a broad range of product categories, utilising large national samples.
- 2) Proprietary studies which have tended to be highly descriptive and relatively unsophisticated.
- 3) Complaining behaviour studies which suggest that the notion of consumer dissatisfaction can be inferred from customer complaining behaviour. Usually, this research takes the form of examining customer complaint data.
- 4) Studies relating to utility theory make up the fourth area of research. A number of theories have been developed which are based on the presupposition that consumers strive to maximise their total utility or satisfaction.
- 5) The majority of consumer satisfaction/dissatisfaction researchers subscribe to the expectations-performance view of consumer satisfaction. These studies define consumer satisfaction or dissatisfaction as the extent to which prior expectations concerning the product or service are met by its perceived performance.

A number of papers have been published in relation to customer satisfaction and dissatisfaction with services in general, and banking in particular. Singh (1991) examined the relationship between industry characteristics and customer dissatisfaction. Several different hypotheses were developed and tested using three different service sectors.

The results suggested that industry characteristics appear to influence consumers' choice of dissatisfaction response. In another study in the same year, Singh and Pandya (1991) examined the possibility of a linear relationship between consumer dissatisfaction and consumer complaining behaviour. Two possibilities for consumer dissatisfaction's role in consumer complaining behaviour were proposed: 1) consumer dissatisfaction has a non-linear relationship with consumer complaining behaviour. 2) consumer dissatisfaction moderates the relationship between attitude toward complaining and consumer complaining behaviour. Questionnaires were mailed to a random sample of households, asking the sample to preselect themselves based on whether or not they could recall a recent dissatisfying experience. A total of 172 responses were obtained. The results provided partial support for both hypotheses.

Crane (1991) examined customer satisfaction and dissatisfaction in the area of professional services. A telephone survey conducted with 232 respondents in a large metropolitan city in Eastern Canada suggested that the overall level of satisfaction for the entire range of professional services was definitely skewed toward satisfaction, not dissatisfaction. The level of dissatisfaction with individual professional services varied to some degree, with only 1% of respondents dissatisfied with pharmacists but nearly 15% dissatisfied with accountants. Those dissatisfied with the services cited both technical quality problems, such as waiting time and overcharging, as well as functional quality problems, such as discourteous or rude personnel, as the main causes of dissatisfaction. Over one third of respondents indicated that, if dissatisfied with professional services, they would not complain directly about their dissatisfaction.

Bitner (1990) tested a model to assess the effects of physical surroundings and employee responses on attributions and satisfaction in a service failure context. The subjects were 145 travellers at an international airport who read a story involving a travel agency and responded to measures of disconfirmation, attributions, attitude, satisfaction, and intended behaviours. The results of this experiment indicated that:

- It is important to manage and control every individual service encounter to increase overall perceptions of service quality.
- When the experience is not what the customer expects, there may be a chance to turn the encounter into a more satisfying one by understanding the customer's attribution processes.
- Providing customers with logical explanations for service failures and compensating them in some way can mitigate dissatisfaction.

If customers become dissatisfied with a service, they may take one or more of many possible actions. For instance, they may complain to the company, use negative word-of-mouth, or decide not to use the service again. For service firms trying to build a strong national identity, some customer responses are more harmful than others. To study the issue of customer dissatisfaction, Boling (1989) sent questionnaires to guests at four national hotel-motel chains one week after their stay. One chain had a low-budget image, two inns were mid-level service orientated groups, and the last chain had a luxury, high-service -orientation image. The results indicated that customers will complain to management if the problem is severe enough and if they are encouraged to take an active role in service management. Customers will turn to more harmful negative word-of-mouth if service firms set up barriers within the complaint handling process and develop luxury orientated but aloof service images. However, marketers that create effective complaint-handling processes can alter perceptions and actually convince customers to try the service again.

From a banking perspective, Donnelly (1991) suggests that preventing dissatisfaction among customers is a prerequisite to achieving satisfaction. The traditional definitions of quality service assume that there is a continuum of customer satisfaction that ranges from dissatisfaction to satisfaction. A different way to view customer satisfaction-dissatisfaction is to understand that there are actually two separate continuums, one with customer dissatisfiers and one with customer satisfiers. Donnelly (1991) suggests that it is wise for a bank to determine the specific components of customer satisfaction

and dissatisfaction before investing resources to improve service quality.

Howcroft (1991) examined the rationale behind the emergence of customer satisfaction as an explicit corporate objective in retail banking. It was postulated that if customer satisfaction is to be attained, wide-ranging cultural change on an unprecedented scale will be necessary. This change will witness the emergence of retail banks as highly cost-sensitive, marketing orientated organisations, which recognise the importance of responding to customer needs with regards to product delivery. According to Howcroft (1991) a prerequisite to a customer service strategy is an environment conducive to customer satisfaction.

2.4 DIFFUSION AS A FORECASTING TOOL

A leading drug company asked sociologists to chart the probable pattern of adoption of a new beef-cattle hormone feed they were about to release. The company's advertisers made no special appeal to the self-starters who seek new products from scientists, directed their first farm magazine to the middle-of-the-roaders, and after a year's delay, aimed a local farm paper campaign at the bulk of the prospects. Five years after release, use of the hormone by beef farmers has come within 2 per cent of predicted sales.

Adapted from *Business Week*, March 21, 1959

This thesis is examining Roger's (1962) concept of disenchantment discontinuance in the diffusion of self-service technologies by profiling the current and future use of self-service technologies and the branch network in banking to the year 2010. According to Rogers (1983) when research reaches the point where it may predict "when" or "who" will adopt new ideas in a social system, valuable theoretical and practical consequences emerge.

Rogers (1983) states that social scientists have completed diffusion studies to predict:

- Academic success in high school or college
- Success in Air Force pilot training
- Chronicity of welfare cases
- Parole and probation success
- Marriage success

In these studies the basic approach has been to derive probability statements indicating the likelihood of certain individuals behaving in a certain manner.

Chambers, Mullick and Smith (1971) described three groups of forecasting techniques which can be related to diffusion theory: qualitative methods such as the Delphi method, time-series analysis and projection methods such as Box-Jenkins method, and causal methods such as econometric models.

Most of the empirical studies in marketing in the diffusion area have primarily been concerned with fitting or describing annual time-series data by using a particular diffusion model. Wind (1982) makes the point that forecasting is not the only use for diffusion models. Perhaps the most productive uses of diffusion models are for descriptive and normative purposes. Diffusion models provide an analytical approach to describe the spread of a diffusion phenomena. As such they can be used in an explanatory mode to test specific diffusion hypotheses.

Since the diffusion models are designed to capture the product life cycle of a new product, for normative purposes, they can be used as the basis of how a new product should be marketed. Examples include the works of Horsky and Simon (1983) who derived an advertising strategy via the Bass model for a new product, Jeuland (1981) and Kalish (1983) who have derived propositions concerning the pricing and advertising strategies in the presence of uncertainty about the product offerings.

The Bass Model

This thesis makes use of the diffusion *concept*, rather than any one specific diffusion model. Consideration had been given to making a specific application of this thesis to the Bass model. The main impetus underlying diffusion research in marketing is the Bass model, which is an extension of the basic diffusion model. In the product innovation context, the basic diffusion model focuses on the development of a life-cycle curve and serves the purpose of forecasting first-purchase sales innovations. That is, in this first-purchase diffusion model one assumes that, in the product planning horizon being considered, there are no repeat buyers and purchase volume per buyer is one unit. The Bass model assumes that potential adopters of an innovation are influenced by two means of communication - mass media and word of mouth (Mahajan, Muller, and Bass 1990). In its development, it further assumes that the adopters of an innovation comprise two groups. One group is influenced only by mass-media communication (external influence) and the other group is influenced only by word of mouth communications (internal influence). Bass termed the first group 'Innovators' and the second group 'Imitators'. The Bass model conceptually assumes that 'Innovators' or buyers who adopt exclusively because of the mass-media communication or the external influence are present at any stage of the diffusion process.

In short, if one wishes to develop a diffusion curve based on the Bass model, four key information inputs are required:

- The potential number of ultimate adopters.
- The coefficient of innovation ie those consumers who adopt innovations independent of consumers who have or have not already adopted it.
- The coefficient of imitation ie those consumers who adopt an innovation due to being influenced by previous adopters.

- The time of the peak of the non-cumulative adoption curve (n), and the adoption level at the peak time.

The researcher carried out conversations with several bankers. These conversations confirmed the researchers own beliefs that, while it would be relatively easy to develop an estimation of the potential number of adopters, very little validity could be attached to the estimates in the remaining three areas when considering the exploratory and futuristic nature of this thesis.

2.5 THE APPLICATION OF DIFFUSION THEORY TO BANKING SERVICES

As previously mentioned, considered as a group, services are less communicable, less divisible, more complex and probably less compatible than goods. They are less communicable because they are intangible (eg their features cannot be displayed, illustrated, or compared) and because they are often unique to each buyer (as in a medical diagnosis or dental care). Services are less divisible because they are usually impossible to sample. Services are frequently more complex than goods because they are composed of a bundle of different attributes, not all of which can be offered to every buyer on each purchase. Finally, services may be incompatible with existing values and behaviours. These factors have important implications for their diffusion.

Despite an exhaustive electronic and manual search of a wide range of journals and thesis abstracts, only one diffusion study relating to banking and banking technology was identified. This demonstrates the paucity of information in this area. The study was by Horsky and Simon (1983), and the researchers hypothesised that advertising serves to inform innovators of the existence and value of an innovation, and hence its effect should be incorporated into the coefficient of external influence in the diffusion model.

To illustrate the application of their model, Horsky and Simon (1983) analyzed the diffusion of a telephone based banking service in five Standard Metropolitan Statistical Areas (SMSAs) ranging from the east coast to the midwest in the United States. The service, which was introduced by mutual savings banks between October 1974 and April

1975, permits consumers to pay bills via telephone by first opening a chequeing or savings account and then providing the institution with the names and personal account numbers of all the merchants to whom they wish to pay bills. The number of adoptions was measured by the number of newly opened accounts: advertising outlays represented the total expenditures on advertising in media, direct mail, and point-of-sale material.

The main purpose of the research was to develop a means of determining the underlying factors effecting the shape of the diffusion curve. The application illustrated that marketing mix variables can be explicitly incorporated into a diffusion model so that their influence on model parameters and, ultimately, the diffusion pattern can be directly examined and evaluated.

2.6 SUMMARY

Several problems emerge when examining the research by Rogers and other authors:

- None of the studies have set out with the specific objective of examining disenchantment discontinuance.
- The research has tended to pay a great deal of attention to industrial innovations (especially in agriculture), rather than the rate of diffusion of goods or services amongst general consumers.
- The research tends to focus purely on the product industry rather than the services industry.
- The last known investigation into discontinuances was some 20 years ago - a time when technology was not as prominent as it is in the 1990s.

Would the concept of disenchantment discontinuance relate to the technology industry? Is it possible, especially in the area of technological advancement and the fact that services have traditionally involved some form of human interaction, that the services industry is prone to disenchantment discontinuance diffusion? These are the questions which remain to be answered.

CHAPTER III

EMPIRICAL STUDIES RELATING TO CONSUMER ADOPTION OF SELF-SERVICE TECHNOLOGIES

3.1 INTRODUCTION

This thesis is aimed at examining Roger's (1962) concept of disenchantment discontinuance in the diffusion of self-service technologies by profiling the current and future use of self-service technologies and the branch network in banking to the year 2010. It is therefore necessary to examine studies relating to the adoption of self-service and self-service technologies in the banking industry and elsewhere. This chapter contains a review of empirical consumer studies relating to factors encouraging/discouraging the adoption of existing self-service technologies, including the perceived advantages and disadvantages of the technologies and the demographics of consumers using/not using them. The review of this literature is necessary in order to understand the underlying consumer factors effecting the rate of diffusion.

3.2 STUDIES OUTSIDE THE BANKING INDUSTRY

The forerunner to self-service technology was of course the concept of *self-service* itself. Surveys on the attitude of consumers towards self-service were first conducted in the 1950s, when self-service first became prominent in food retailing. These were reported by Henksmeier (1960). Unfortunately the number of studies conducted in this area were few. The consumer's attitude towards self-service was first investigated on an international basis in 1956 in connection with The European Productivity Agency (Henksmeir, 1960). In five European countries - Austria, Germany, Italy, the Netherlands and Norway - housewives were asked what they thought about self-service compared to normal service.

What the housewives appreciated most was the time-saving in self-service shops. The fact that the customer looked for and took goods herself was also highly appreciated,

which confirms that consumers readily accept this division of labour. The third main advantage indicated was the possibility of inspecting goods at leisure before buying. Prices and quality, on the other hand, were considered by the majority to be the same in both kinds of shop.

Two of the disadvantages of self-service indicated during the enquiry were 'no personal contact with staff' and 'too suggestive'. All the other disadvantages were mentioned by such a small percentage of respondents that Henksmeir (1960) considered they need not be discussed. More than 70% of those asked were unable to mention any disadvantage of self-service.

A sample survey on the consumer's attitude towards self-service was made by an Austrian market research institute in 1959. 31% of those interviewed had bought in a self-service shop, 48% had not, and 21% did not know anything about self-service. Younger people used self-service extensively, while the older people were somewhat more reserved.

The results of a survey by the Paris Chamber of Commerce on 'the Paris housewife's food-buying habits and preferences' were published in January 1960. Among other things, housewives living near a supermarket or shopping centre in the vicinity of Paris were asked what they thought about the supermarket. Results showed that the supermarket was generally favoured, especially with regard to prices, quality of service and appearance of the store.

Self-Service Technology

McClurg and Andrews (1974) interviewed fifty drivers at self-service gasoline stations and another fifty drivers were interviewed at nearby conventional service stations.

Three hypotheses about possible differences between self-service and conventional service gasoline station customers were derived. The first hypothesis stated that, because the self-service station featured lower price and minimised contact with station

personnel, the customers at these stations would be more like Stone's (1954) price sensitive economic shopper and less like his relationship orientated personalizing shopper. It was also hypothesised that customers at the self-service stations would tend to possess the characteristics associated with innovative product use. According to Rogers and Stanfield (1968) new product users tend to be better educated, more literate, have higher incomes and higher standards of living, have higher achievement aspirations for their children and are more knowledgeable about world and local events. The third hypothesis was that self-service customers would be less dogmatic in their thought processes than customers who patronise conventional gasoline stations.

The results showed that the economic shopper orientation was verified by several pieces of data. For example, when the customers were asked why they decided to buy gas at the station where they were interviewed, 28 of the self-service patrons mentioned price, while only 8 mentioned good service. By contrast, none of the conventional station patrons mentioned price and 21 mentioned good service.

When the self-service customers were asked to pick the 5 most important reasons out of a list of 12 possible reasons for buying gas at a particular service station, 23 of the self-service patrons assigned the number one rank to price, and 11 more gave price a rank of two. Among the conventional station customers, pleasant staff received 16 first place rankings and 9 second place rankings.

The hypothesised tendency for greater product innovativeness among the self-service customers was examined with two semantic-differential type questions as well as with demographic data. The first question asked respondents to imagine the kind of person who would be apt to buy gas at the particular station. In their projected self-image the self-service customers imagined themselves as younger, bolder, more lively, and more modern. The second semantic-differential type question - attitudes toward new products - produced significant group mean differences on five out of seven scales. The self-service patrons were more apt to be early adopters, were more interested in new products, more carefree, more influential, and more excited by new products.

When the two samples were compared on demographic items, the conventional service customers were more apt to own two cars and to drive a luxury car or a sports car. And they had a slightly higher income. The self-service patrons were younger, more apt to be students and somewhat better educated. The tendency for greater education in the innovative group was consistent with data reported by Rogers and Stanfield (1968) but the difference in income and standard of living was not.

The first major study into self-service was conducted by Bateson (1985). This research is interesting because it specifically examined self-service technology as it relates to the service industry. The first part of this research was exploratory and used focus groups to look for characteristics which transcended any one particular service. The research indicated that across the three services examined, (banks, restaurants, and hotels) there were a series of dimensions used by consumers that transcended any of the specific services discussed. These were:

-Time: the respondents saw services as time consuming in a budgeting sense.

-Control: The respondents expressed the need to feel in control while receiving the service.

-Effort: There was a general consensus that the more participative services required effort. This was especially obvious where the effort involved was physical, e.g pumping gas, but many respondents perceived more effort to be needed in the more intellectual tasks, e.g using an automatic telling machine.

-Dependence: There was quite a large reaction against the need to depend on other people to receive the service. Comments included:

'machines make us more independent'

'I like to depend on myself'

'I don't need that other person'

-Efficiency: A large number of the respondents articulated their reaction to services in terms of how efficient it was for them.

-Human contact: Different respondents had different reactions to the need for human contact when receiving a service, but all perceived differences between services along this dimension:

'The people, courtesy, human contact...I enjoy that'

-Risk: There was little talk of financial risk but much of psycho-social and performance risk.

This qualitative research was followed by the quantitative research. In developing the research instrument two key problems arose. First, since the researcher wanted to test whether there existed consumers who would use the self-service option without the usual incentives, it was necessary to be able to control these factors. An interrelated problem was the situation specificity of many of the decisions. The exploratory research had very clearly shown that the decision could be situation driven - for example, using an ATM at night when the bank is closed. Therefore scenarios were developed which negated these factors. Six scenarios were developed:

1. At a service station - pump your own gas versus having an attendant do it for you. Price was controlled to be equal for the two systems as was the length of lines.
2. At a bank - using an automatic teller machine versus using the service of a human teller.
3. At a fast food restaurant - getting your own food at the counter versus receiving table service from a waiter or waitress. The menus, lines and prices were standardised.

4. At an airport - carry your own bags on to an aircraft with special storage facilities versus checking your own bags. The scenario controlled for the number and size of bags and the type of flight.
5. At a hotel - using a self-service food and drink dispenser versus obtaining the same food and drink from room service. Menu and price were standardised across systems.
6. At a travel agent - purchasing traveller's cheques from an automatic telling machine versus buying them from a clerk. Both systems were placed in a branch during office hours and the length of lines standardised.

Based on each scenario each respondent was asked to indicate the following information:

-an intention measure (what percentage of occasions they would use the two alternatives)

-their perception of the two alternative systems along the seven dimensions listed earlier

-how important was each dimension in their choice between the alternatives

Two mail questionnaires were used. Questionnaire A used the banking, gas station, and restaurant scenarios, and was sent to a random sample of 1500 customers from three financial institutions. Questionnaire B was sent to a random sample of 1000 customers of a nationwide financial institution. The travel agent scenario, airline, and hotel scenarios were used. An overall response of 57.5% was received.

The results identified several groups of respondents as shown in Table 3.1. To check the validity of the 'intended behaviour' measure, a comparison was made between the respondents' intended behaviour and actual behaviour (as provided by bank statistics) for the ATM scenario. It was found that the overlap between actual and intended behaviour was very high in each case.

Table 3.1 Acceptance of Participative Alternative

Group	Would Accept the more Participative Alternative
Non-Participators	In 0% of occasions
Low Participators	In 1 to 39% of occasions
Medium Participators	In 40 to 60% of occasions
High Participators	In 61 to 99% of occasions
Full Participators	In 100% of all occasions

Tables 3.2 and 3.3 show the size of the participator group for each of the scenarios. For each scenario there was a sizable group that *would* choose the participative approach on all occasions for a particular service, even though the scenario actually controlled away many of the benefits of that approach. Thus the gas station scenario specified equal prices and waiting lines of equal length, the bank scenario specified a transaction during banking hours; and the food service scenario specified equal prices and lines.

For three of the selected services, the group of non-participants is much larger than the group of full participators. The opposite is true of other services. In every case the number of medium and high participators is quite large, ranging from 34 percent to 55 percent of all respondents. They are not totally enthusiastic about the participative alternative offered to them, but neither are they against it (Bateson emphasised that because of the stratified nature of the sample these are not estimates of the true size of the groups in the population).

Table 3.2 Questionnaire A: Participator Group

Groups	Percentage of Occasions would use Self-Service	Gas Station	Bank	Quick Service Restaurant
Non-participator	0%	31%	22%	13%
Low participator	1-39%	24%	23%	32%
Medium participator	40-60%	15%	20%	27%
High participator	61-99%	24%	24%	21%
Full participator	100%	6%	11%	7%
n	659	731	735	735

Table 3.3 Questionnaire B: Participator Group

Groups	Percentage of Occasions would use Self-Service	Gas Station	Airline	Hotel	Traveller Cheques
Non-participator	0%	32%	11%	8%	8%
Low participator	1-39%	29%	18%	20%	13%
Medium participator	40-60%	15%	12%	21%	28%
High participator	61-99%	19%	33%	31%	27%
Full participator	100%	5%	29%	20%	24%
n	659	533	522	538	439

Tables 3.2 and 3.3 adapted from: Bateson, J.E.G Self-Service Consumer: An Exploratory Study. *Journal of Retailing*, Vol 61, No 3. 1985, p61.

Bateson then asked an important question: Is a consumer's propensity to act in a non-participative manner in one service situation an indication of how that person will behave in other situations? In other words, is participativeness a general personal characteristic or simply a situation-specific one? In an attempt to answer this question, respondents' membership in different participative groups across scenarios was examined. To identify this the participation groups were collapsed with 'full' and 'high' participators in one group and the rest in a second, and a simple cross-tabulation was conducted between (say) membership in the particular group for gas stations against membership in the particular group for quick service restaurants. The resulting tests indicated that, despite the situation-specific nature of the scenarios, there was considerable overlap from one scenario to the other. In other words, there appears to be a *generic* self-service consumer.

For each scenario the intention groups were analysed in terms of both their perceptions along the dimensions and the importance they attached to the dimensions in making their choice. The general pattern across dimensions is that those respondents who are less inclined to use the participative alternative perceive little difference between the alternative self-service systems. For the banking scenario, the importance attached to time, control, efficiency, human contact, and risk all discriminate between the groups. The more participative groups rate time and efficiency more highly. Although there are differences along the human contact dimension, the general level of importance attached to this dimension is low. The participation groups perceive self-service options to demand less time, offer more control, to make them less dependent on others, involve less human contact, and to be more efficient than their non-participating counterparts. The medium, high and full participators rate time, control and efficiency as important in all seven scenarios. Apart from that, it appears that the non and low participants rate risk as important slightly more than their participative counterparts.

Of the three dimensions perceived as important by the more participative groups (time, control, and efficiency), differences are seen between the alternatives only on time and control. Only the full participative group perceives efficiency as different (ie higher). The other groups see little difference.

The results suggested that the predominant barrier to change for the non and low participator groups may be inertia. These groups rate risk as most important and to lesser extent efficiency, effort, and possibly time. However they perceive no differences between the alternatives on the risk, efficiency and time dimensions.

The 'control' dimension was the single most important variable in five cases. In only one case, the traveller's cheques scenario, did the control variable fail to enter the equation. The 'need to depend on others' dimension was the least important variable, failing to enter the equation in many cases, followed by the 'amount of human contact' dimension. The risk dimension made a significant contribution in every case but was the most important dimension in only two cases.

3.3 ADOPTION OF SELF-SERVICE IN BANKING

3.3.1 ADOPTION OF HUMAN TELLERS

The main alternative to self-service in banking is the use of human tellers. It is therefore worthwhile to examine the adoption of human tellers, and the nature of the customer interface. In her research Smith (1986) gave a useful overview of the nature of the customer interface in several countries.

In the U.S.A the cash counter is very much a quick service area. Customers wait in a single queue for service from one of a group of tellers. Larger branches divide the counter area into three sections: routine, foreign, and enquiries such as bankers draft and statements. In this way the quick service area is upheld and more complex transactions are dealt with in a different area by staff who are more qualified and better understand the bank products.

The commercial banks have a series of teller terminals which supply limited information about the customer accounts as at the close of the previous business day. The terminals also contain interest and exchange rates, and warnings about stolen cheques or bad accounts. Information typed in during the day is sent to the central computer and

processed overnight.

The savings banks have an on-line teller terminal network which allows information to be processed as it is typed in. This means that the bank has the most recent information about a customer's account and transactions. As with the off-line system there are interest and exchange rates available to the teller.

In Canada there is variety in the way in which the branch counter is presented to the customer. In the commercial bank there is a long counter manned by customer service representatives (CSR) who deal with cash-orientated transactions and general enquiries.

The quick-service area does not exist *per se*, but there is a large number of CSRs to ensure that average queue time does not become intolerable for customers. Staff are more highly qualified than their American equivalents because of the more complex counter tasks, and greater service expectations from customers.

The smaller branches in the savings institutions follow the American counter arrangement more closely. There is a quick service counter, and a second area for more complex transactions and enquiries. Counter staff in the quick service area are junior staff members who have a wide product understanding, as well as knowledge of internal clerical procedures. Cash dispensing staff use teller terminals and teller assist machines, while the other staff members use work stations or enquiry terminals to help them in their work.

In Germany the counter area is divided into two areas. Unlike the other countries this reflects the initiation of a transaction and the completion of that same transaction. Such an arrangement stems from the manner in which statements were issued until about six years ago. Customers always collected their most recent statement page before conducting a transaction. Making statement collection a self-service function has not changed this habit, but it has quickened the actual service time. The German branch organisation also lets a customer deal with cash and non-cash transactions with one member of staff: cash collection is from a cash box manned by a cashier.

In the U.K the traditional counter, complete with bandit screen, is more commonplace in many branches. It is the focal point during customer branch visits where both routine and non-routine transactions are handled. Many branches encourage customers to deal with non-telling staff when making enquiries, and to this end have introduced enquiry positions. In terms of counter technology the savings banks are more advanced. They use on-line teller terminals which give them up-to-date information on customer accounts. The commercial banks have varying degrees of counter automation. Both on-line and off-line teller terminal systems can be seen in a number of banks. Some branches still have no automation at counter level. Often the branch processor (work station) is used to get information needed to deal with a customer enquiry. This can be cumbersome and time-consuming for the staff: teller staff sometimes have to leave their positions while data processing staff have their work interrupted. The telling position in the U.K forms one of the training areas for new staff members because while working there they can also learn about the bank products and some of the back-office processing which follows a counter transaction. As a result of this approach many counter staff are young. Older counter staff usually belong to a pool of staff who do not get far in the branch hierarchy, and telling is one of the functions through which they rotate.

The New Zealand banks tend to be a combination of what can be viewed in other countries when it comes to the branch. The bench tellers tend to have disappeared in recent years, in favour of individual teller cubicles. Most of these cubicles are supplied with terminals which give the staff on-line access to customer information. Generally the tellers handle only routine transactions, with the more complicated customer enquiries being referred to customer service representatives.

Recently there have been moves to introduce what is known as 'platform automation': tellers use their terminals to gain information/descriptions on the banks products, to assist them in selling. Also, many banks are now beginning to locate the telling area at the rear of the office. This has the effect of improving security, discouraging reconnaissance of bandits, and enables the bank to locate marketing/sales staff and brochures in a more high profile position. New branches are being piloted, and these

have several unique features:

- Tellers have been located to one side in a U-shape to improve customer privacy and surveillance by all tellers of the length of the customer queue.
- A reception desk is provided near the branch entrance to ensure customers are guided to the right place when necessary.
- Glazed screens ensure back office functions are hidden from customer view.

It is interesting to compare the branch numbers between countries, as shown in Table 3.4. The number of inhabitants per office may have a relationship with the degree of the queuing problem.

Table 3.4 Comparison of Branch Numbers

Country	Number of Deposit Taking Institutions	Number of Branch Offices of Deposit Taking Institutions	Customers per Branch
Canada	3,504	12,938	1,934
Germany	4,848	39,836	1,541
U.K	805	24,574	2,283
U.S.A	38,280	102,000	2,310

Adapted from: Smith, A. *The Products and Branch Delivery Systems in Canada, Germany, the U.K and the U.S.A - A Comparative Discussion with reference to the differences in Counter and Branch Activities and the Implications for Future Developments*. Master of Science Thesis, Stirling University (Scotland), 1986.

Despite the fact that human tellers and bank branches are still the primary means of product delivery, there is little empirical data explaining why so many consumers make use of this mechanism. What little data is available tends to be out of date.

The reason for this lack of research may be that human tellers are the benchmark. In recent years, human tellers have become the standard against which other delivery mechanisms (ATMs, EFTPOS, etc) are evaluated.

The following sections summarise studies relating to human teller and bank branch acceptance, and have been classified into chronological order so that developments in the area can be evaluated and contributions of authors contrasted over time.

Survey Research (1985) conducted a survey which, in contrast to other studies, concentrated solely on those factors which discourage the use of human tellers in New Zealand. The biggest factor detracting from human teller use and acceptance was queues.

Boland (1986) conducted a survey of 4,500 retail accounts in Southern California. The results showed that more than 85% of retail customers wanted banking service that was more personal. Personal service ranked well above the rate of interest paid on deposits, and the customers showed no interest in any new non-banking products or services offered by the bank. Again this finding would appear to be consistent with the hypothesis of this thesis that disenchantment discontinuance is occurring due to the importance of human interaction in service delivery.

Marr and Prendergast's (1990 A) 1988 New Zealand study was targeted directly at the human tellers. The aim of the study was to ascertain why customers do/do not use human tellers ahead of alternative delivery mechanisms. An attempt was also made to determine what improvements could be made to the human teller system, which would encourage greater usage. 1840 mail questionnaires were distributed to randomly selected bank customers. 804 valid returns were received.

More than 90% of respondents had used a human teller in the past month, indicating that they are still the primary means of product delivery. There was a statistically significant positive relationship ($\text{Chi}^2 = 0.0053$ with 12 degrees of freedom) between respondents' age and frequency of human teller use. Human tellers were used mainly for depositing (76%) and withdrawals (77%).

Respondents were asked why they used the human teller ahead of alternative delivery mechanisms. The main reason was that they preferred to deal with humans in banking (33%). This finding would appear to be consistent with the argument of this thesis that the unique nature of a service makes it a people based (rather than technology based) business. In other words, while the self-service technology offered a relative advantage in terms of time and place utility, it was not consistent with their existing norms, values and beliefs. The customer's desire for more personal service is similar to Boland's (1986) finding that customers want banking service which is more personal. This factor may be more prevalent in the U.S than New Zealand and other countries because the U.S tends to concentrate its new technology ventures on self-service (ie at the customer interface) as opposed to automation of back office functions such as the information system (which tends to be the case in the U.K) (Smith, 1984).

32% of respondents in Marr and Prendergast's study stated that the bank branch was closer in location than an ATM. The third main reason was that respondents preferred the more pleasant environment of the banking chamber, as opposed to being outside.

28% of respondents suggested that changes could be made to the human teller system that would encourage them to use human tellers more often. 97% of these suggested improvements related to two areas: queuing difficulties and impolite/inefficient tellers. Queuing difficulties can be seen to be consistent with findings by Survey Research (1985).

Rather than focus directly on the human tellers, the study by Baker, Berry, and Parasuraman (1988) aimed at identifying how important the branch environment is to customers. This is an important study because it realises that customers do not use

tellers in isolation; the branch environment is a critical component of the overall human teller product delivery process. In effect, the branch is the tellers' 'packaging'. In this study, 652 valid responses were received from a mail survey of 3000 randomly selected retail customers in the U.S. Respondents had to consider several aspects of the branch environment and then allocate points according to importance. These aspects and their associated importance ratings are shown in Table 3.5.

Table 3.5 Importance of Branch Environment to Customers

Overall importance of the physical environment (1)	5.14
Importance of environmental dimensions (2)	
- Ambient	17.24
- Aesthetics	19.12
- Privacy	20.28
- Efficiency/convenience	27.22
- Social	16.23
<p>1) Numbers are means on a scale ranging from one to seven, on which the higher the value the higher the relative importance of the environment.</p> <p>2) Numbers are mean values derived from a constant sum scale in which respondents were asked to divide a total of 100 points among the five dimensions so that the more important a dimension was perceived to be, the more points it received.</p>	

Adapted from: Baker .J., Berry, .L., and Parasuraman, .A. The Marketing Impact of Branch Facility Design. *Journal of Retail Banking*, Vol X, Summer 1988, p36.

This table shows the most important factor was efficiency/convenience. Customers who were older and had lower education and occupational levels were more likely to rate the environment as being important.

Respondents were then asked to rate the importance of those factors they expected within the efficiency/convenience attribute. These factors are shown in Table 3.6, with their associated ratings (where 7 = most important).

Table 3.6 Importance of Branch Factors

Branch Factor	Rating
Teller stations should be easy to see when a customer first enters the bank	6.30
The building should be large enough to accommodate many customers	6.04
There should be enough teller stations so that the bank can make more tellers available on a busy day	6.69
Banks should have easily visible signs inside to direct customers to different transaction areas	6.25
A desk or counter for customers writing cheques or deposit slips should be available near the teller area	6.21
Signs or posters should be used in the bank to provide information to customers about bank services	5.80
An interactive video system should be available for customers who want information on bank services	4.60

Adapted from: Baker .J., Berry, .L., and Parasuraman, .A. The Marketing Impact of Branch Facility Design. *Journal of Retail Banking*, Vol X, Summer 1988, p36.

Availability of tellers emerged as the most important factor (6.69), followed by the ease with which customers can see teller stations when they first enter the bank.

3.3.2 ADOPTION OF ATMs

Automatic Telling Machines (ATMs) are in fact self-contained computers connected via telephone lines to central banking computers and operated by using a magnetic stripe card. They can be placed in lobbies of banks, mounted on the outside wall of a bank, or be completely individual by being placed at some other location like an airport.

ATMs have several characteristics including:

- Two slots: One for inserting a plastic card and the other for removing cash and receipts.
- A keyboard which allows the customer to enter their identification number and to select services.
- A visual display screen to provide prompts and confirmation of transactions.

The first ATMs to appear were limited function ATMs which provided cash withdrawals only. The earliest version of this machine was seen on trial in the U.S in the late 1960s.

De La Rue, a British company, introduced a cash dispenser in 1968. However this was not the ideal introduction to self-service technology, since the machine was difficult to operate - from both the banks' and customers' viewpoint. Since that time ATMs have made significant developments - in both a physical and functional sense.

The first ATMs in New Zealand were introduced by the Northern Building Society and were called "Money Machine". Later, with the amalgamation with the Western Building Society, it became known as the "United Money Machine". In 1979 the ANZ Bank unveiled their ATM in the lobby of its Lambton Quay branch in Wellington (Munniappan,

1983). In the same year Trustee Savings Banks introduced their ATMs called "Cashflow". In 1982, the ANZ/BNZ combined to introduce an ATM system known as "Autobank". Since this time the Building Societies and remaining trading banks in New Zealand have all introduced ATMs. By the end of 1990 the Nilson report (1991) stated that a total of 325,404 ATMs had been installed worldwide.

A study in America by Little (1975) represents one of the earliest studies into consumer adoption of bank technology. He found that resistance to ATMs occurs for two main reasons:

- *Individuals are obtaining adequate satisfaction from the present system, partly because they are familiar with it and partly because it meets their perceived needs at a perceived very low cost.

- *There are additional risks associated with ATMs such as threats to individuals' privacy and lack of adequate security measures.

Pugh and Ingram (1978) conducted a panel survey of more than 800 households in Southern Carolina in 1976. In spite of their convenience and accessibility, only 8% of the panel reported ever having used automated teller machines. These users were primarily under thirty-one years old, had at least a college education, had an income of over \$20,000 a year and, generally, were married with children. Of those who did take advantage of the service, 70% used it at least once a month, and it was most often used on weekends or holidays, or during the week after regular banking hours.

Non-users tended to be older members of the sample, with low incomes. When asked why they did not use ATMs, 42.3 percent reported that present banking facilities were adequate for their purposes. Unavailability of ATMs was the reason 38.9 percent gave, and 12.4 percent answered that they were suspicious of the new system and the possibility of its malfunctioning. Others preferred human contact.

Lewin (1978) reported on a study by the Bank Administration Institute in the U.S.A. The sample chosen was 258 customers with cards and 165 without. Of the customers with cards, 138 were identified as users and 120 as nonusers. 63% of those interviewed felt it essential to visit the bank personally each month. However, they reduced their visit frequency once machine usage became regular. The users averaged just 1.4 visits per month to the bank while nonusers were at 3.6 and those without cards were 4.3. Most significantly, 96% of branch users perceived branches as being valuable. Moreover, they stated unequivocally that they would be quite disappointed if the service was withdrawn.

Stanley, Berry, and Danko (1979) conducted a study of affluent customers in the Atlanta area (United States) in 1978. Questionnaires were mailed to 943 residents, with 456 usable returns. This was an interesting study because most research tends to find that affluent customers are amongst the highest users of banking technology. However, personal service, as opposed to technology, emerged as being the most important factor. Moreover, 65.1% of respondents agreed and 17.1% slightly agreed that it made them feel better if tellers knew their names. 41.6 % of respondents indicated that they would probably never use an ATM. Similarly, 45.8% disagreed that they would use an ATM if one was located near work or home. The researchers concluded that in highly competitive markets, the personal service factors, rather than convenience, may well provide the key differential advantage.

Stanley and Moschis (1983) conducted a mail survey of 1500 households in the United States in an attempt to identify the profile of the ATM-prone consumer. Several characteristics of ATM users emerged, some of which had not been identified by other studies:

* The ATM-prone respondent was convenience orientated (especially time convenience - as opposed to location convenience).

* The ATM-prone respondent was transaction-innovativeness orientated. They showed more willingness to use innovative technology.

* The ATM-prone respondent was financial-service, bargain-shopping orientated. The ATM-prone group is more price sensitive than is the non-ATM-prone group. They also have greater aspirations to be wealthy in the future.

No significant differences separated the ATM-prone and non-ATM-prone groups in terms of attitudes towards personal service.

Lafferty (1985) published a study which is the only study identified in the literature relating specifically to Australia. It seems people will queue outside an almost empty bank at an ATM, rather than go inside. There were a number of reasons for this:

- Customers preferred not to be confronted by counter staff. This is because no conversation with a stranger is required.
- ATM transactions are private; only the customer knows what his or her account balance is.
- Customers do not have to be embarrassed at withdrawing small amounts of cash.

{Marr and Prendergast (1991) examined all three of these factors in 1988 and found that they were not major reasons for not using human tellers}.

Despite these advantages, some disadvantages were perceived. Older groups tended to view the ATMs with mistrust and confusion. A major concern felt by women over 45 was the lack of security (ie the risk of robbery).

Stevens, Martin, Carter, and Cogshell (1986) examined non adopters of ATMs. The sample consisted of a 1500 member panel from an American University (therefore the sample was not representative of the general population - indeed, University students are amongst the highest users of ATMs).

This study had two major findings, which subsequent authors have neglected to re-examine:

- Strength of habit and strength of resistance to ATMs were significantly and positively correlated (ie customers perceived ATMs as being a big change from human tellers).

- Strength of resistance and strength of perceived risk are positively and significantly correlated (ie customers perceive that there is a greater risk of something going wrong with an ATM).

A unique finding of this study was that a particularly strong correlation was found between the psychological/social risk perception that using an ATM is "degrading and/or embarrassing" and resistance to the use of ATMs.

A study by Marshall and Heslop in Canada (1987) differed from previous studies by taking a theoretical approach, namely the innovation diffusion theory, to understand the motives for use and non-use of ATMs.

In order to obtain the 250 interviewees desired, two banks in two different cities were selected. The sample was selected by approaching bank customers after they had left a human teller or ATM.

Overall, 41% of respondents had never used an ATM. Convenience (the "convenience shopping orientation"), personal contact (the "social shopping orientation"), attitudes toward ATM technology, familiarity with other technology, and education of the user, are the most useful predictors of ATM use. Consumers with a convenience shopping orientation, in contrast to consumers with a social shopping orientation, saw a relative advantage in using ATMs. Those who were familiar with ATMs and new technology in general saw ATMs as being very compatible with attitudes and previous experiences.

Victoria University (1987) conducted a mail survey aimed at ascertaining reasons for ATM usage/non-usage. 49% of non-cardholders considered human tellers to be quicker

than ATMs. 30% had never been offered a card. 36% of ATM cardholders did not use their card because they had other transactions to perform at the branch.

Zeithmal and Gilly (1987) distributed 2500 mail questionnaires to respondents aged 65+ and 2500 to respondents between the ages of 18 and 64, in the U.S. Their aim was to draw a comparison between the adoption of retailing technologies by elderly and non-elderly customers. Apart from not having an ATM card, the main reason that both elderly and non-elderly customers did not use ATMs was because they preferred to use the conventional method ie human tellers.

Philips Business Systems in the U.K (1987) carried out personal interviews with 1003 holders of bank accounts. 27% of respondents did not have a card while 16% of those who did claimed they never used it.

Respondents were asked to note the importance of a number of ATM benefits. Unlike other studies, the main benefit perceived was place utility. This was closely followed by confidential transaction and 24 hour operation.

ATM users were asked what problems were associated with ATMs. Over 80% of respondents rated "not working when needed" as very or fairly important.

"Running out of money" was the second main complaint (58%) closely followed by "lack of security" at 52%.

Age emerged as a crucial factor in determining card ownership and card usage. Penetration was highest amongst the under 35s and lowest in the 60+ age group. Similar findings have been found by Stevens et al (1987), Zeithmal and Gilly (1987), Stevens et al (1986), and Stanley and Moschis, (1983).

In comparison with other studies, Shortall's 1987 New Zealand study distributed 400 mail surveys to customers of a building society (rather than a bank). This difference in customer type appeared to have effected results because the main reason for not using

an ATM was not due to a preference for dealing with humans in banking (as has been found in studies with bank customers). Rather the main reason for not using an ATM was because customers were "serious savers", and did not like frequently accessing their funds (43%). However, preference for humans emerged as the second main reason (24%).

A study by Lafferty Business Research in Europe (1987) managed to fill an important gap in the ATM literature by looking at ATMs on an international basis and drawing comparisons between countries, in particular, European countries. The research was aimed at measuring Europeans' attitudes towards and use of delivery mechanisms, especially electronic mechanisms such as ATMs.

6230 individuals were interviewed in total. This large sample represents an extensive study, made complex by the need to work simultaneously in several different countries and languages.

This study indicated that nowhere is the variation in use of delivery mechanisms shown more than in ATM usage. Tables 3.7 and 3.8 illustrate that around half of those trying an ATM became regular users (presumably the other half found it incompatible with their existing norms, values, and behaviour) and that some countries now have a relatively large number of regular users.

53% of U.K respondents appear to make regular use of their cards. In the U.S.A, Stevens *et al* (1987) found usage rates of more than 80% (their sample of 350 included non-cardholders).

According to this study by Lafferty Business Research, the introduction of ATMs appears to have had an effect on bank branch visits. Interviewees were asked how often they visited their branch and whether or not they were now going more or less often than they used to. Results are shown in Table 3.9.

Table 3.7 ATM Use: "Have you ever used an ATM/cash dispenser?"

Response	All	French	German	British	Dutch	Spanish	Swiss
Yes	36%	55%	23%	45%	5%	23%	52%
No	62%	45%	76%	54%	69%	77%	47%
No opinion	2%	-	1%	1%	26%	-	1%
BASE	6230	1018	1131	1051	1034	1000	996

Table 3.8 ATM Use: "Do you use an ATM once a week or more?""*

Response	All	French	German	British	Dutch	Spanish	Swiss
Yes	44%	52%	17%	53%	11%	39%	50%
No	55%	48%	82%	46%	87%	60%	49%
No opinion	1%	-	1%	1%	2%	1%	1%
BASE	2371	624	310	570	56	298	513

* This question was only asked of those respondents who had used an ATM.

Source: Lafferty Business Research, *People and Payments: A Study of Attitudes and Behaviour in Europe*. Lafferty Publications Ltd (London), 1987.

Table 3.9 Branch Visits and ATMs

Country	Average branch visits/year	Trend	ATM density	Base
French	30	Decrease	High	901
German	33	No change	Low/medium	1045
British	30	Decrease	High	868
Dutch	35	Increase	Low	794
Spanish	30	Increase	Medium	496
Swiss	22	Decrease	High	487

Source: Lafferty Business Research. *People and Payments: A Study of Attitudes and Behaviour in Europe*. Lafferty Publications Ltd (London), 1987.

Those countries with a high ATM density show a lower than average number of branch visits per year, suggesting that ATM adoption is greater when more ATMs are available. Indeed, the studies discussed thus far indicate that place utility is of great importance. In her thesis, Smith (1986) found that reducing queue length at human tellers, and increasing the numbers of staff free to speak to customers when they enter the branch, are two very positive points for self-service technology.

European consumers who used ATMs appreciated their time and place utility, and ease of operation. There was, however, concern over machines which had broken down, that they lack security and are frequently out of cash.

Almost one quarter of ATM users did not dislike anything about them. This contrasts favourably with the 3% who could not find anything to say in favour of ATMs after trying them.

Gendall and Hoek (1987) contrasted with the rest of the literature on ATM's by researching a female sample only. The 389 responses indicated that age was a more important factor than income in determining ATM use, and this is consistent with the idea that older women are generally more resistant to bank technology than younger women. However, within each age group, more affluent women are more frequent ATM card users than less affluent women.

Generally the women had positive reactions to ATM's. The main advantage perceived was the convenience of having access to money after hours. However, there was more than 50% agreement with the statement that ATM locations are not always convenient and, perhaps more importantly, a fairly widespread unease about the possibility of mistakes for which the machine might be responsible.

Like Murdock and Franz (1983), a study by Stevens, Martin, and Warren (1987) in the United States focused on non-ATM adopters only. 350 people were interviewed by telephone. In the sample, 14% of the respondents were non-adopters (non-cardholders or inactive cardholders). The demographic profile of the non-adopter group indicated that these individuals are 1) less likely to have children living at home (62%), 2) older (median age = 51.2), and 3) reside in households in which the female is less likely to have outside employment. These results confirmed earlier studies by Stevens *et al* (1986) and the Bank Marketing Association (1986).

Most of the 2000 respondents in this study by Stevens *et al* had at least heard of ATMs. Card ownership in 1973 was 3%, but had risen to 43% by the time of this study. Most of these respondents used their cards. For example, when ATM card non holders need cash they go to a financial institution 75% of the time and use a store the rest of the time. The ATM cardholder uses a machine 68% of the time and uses a human teller at their financial institution only about 24% of the time.

Consumers' reasons for not having a card generally related to the "ease" of other methods. Other objections included a dislike of machines, lack of an ATM at their institution, and security/safety issues.

ATM users saw them differently. They liked them most for their 24 hour operation. This finding is consistent with other studies on ATMs already discussed. The second main benefit of ATMs cited was that they provided place utility by being available in many locations. Very few users thought ATMs were difficult to operate (one of the biggest fears among non-users).

One study suggests that Australia has a high usage of ATMs. The Australian Bankers Association indicates that in 1988 banks processed 870 million paper transactions and 350 million electronic transfers. The sources were principally ATM and EFTPOS terminals. The Australian market has one of the highest ratios of automatic card to bank customers, and is one of the leading performers in terms of active cards per head of population. It is estimated that over 66% of the Australian population over the age of 14 have electronic banking cards suitable for use in ATMs or EFTPOS. Of these 49 per cent use the facilities at least on a weekly basis, while 20 per cent make no use of the card at all (Takac, 1991).

A United States study by Taube (1988) identified several characteristics of ATM users which had not been identified by other authors. 3967 questionnaires were mailed to members of a mail panel in 1986, with 2953 returns. In addition to confirming the results of other studies that ATM users tended to be younger in age with higher incomes and education levels, Taube also discovered that ATM users were more likely to use bank charge cards or have a bank loan.

The section on ATMs in Marr and Prendergast's (1991) New Zealand study was part of an overall examination into customer adoption of delivery mechanisms. 59% of respondents had used their card within the past month, which is high in comparison with other studies. For instance, a study by Pfleiderer (1986) found that over two thirds of the 4000 ATM cardholders interviewed had never obtained cash from an ATM.

The demographic profile of ATM users tended to equate with findings by other authors (Taube, 1988; Philips Business Systems, 1987; Prendergast, 1987; Stevens, Martin, and Warren, 1987; Stevens, Martin, Carter, and Cogshell, 1986, Stanley and Moschis, 1983).

There tended to be a negative relationship between ATM usage and age. ATM users tended to be white collar workers on higher than average incomes. There was no significant relationship between ATM usage and sex, despite overseas studies suggesting that there is a higher usage rate amongst males (Taube, 1988; Stevens, Martin, Carter, and Cogshell, 1986). An unexpected finding was that 35% of respondents were not aware of the possible transactions that could be conducted on an ATM - a revelation which is yet to be examined in studies overseas.

Respondents were asked why they would use an ATM ahead of a human teller (and vice versa), for transactions which could be conducted by either method. The main reason for using an ATM was convenience of hours (85%). This has also been the finding in overseas studies. For instance, Lafferty Business Research (1987) found that customers value time utility of ATMs most, and in this sense they have a relative advantage over human tellers. A PACE (1986) study found that nearly two thirds of ATM users cited convenience of hours as the main advantage of ATMs.

The next most frequent reason for using an ATM was that respondents considered them to be quicker (47%). This may imply that customers have to spend less time travelling to an ATM, and therefore be related to the third main reason for using an ATM which was, "ATM's are more conveniently located than bank branches" (33%). This finding confirms that of Kutler (1982) who found that usage of ATMs can be increased by opening more locations. Victoria University (1987), however, found that 49% of non-cardholders considered human tellers to be quicker than ATMs.

The main reason for using a human teller ahead of an ATM was a preference for dealing with humans in banking (33%). Again this is similar to overseas findings. Moutinho and Prendergast (1987) found that non-ATM users preferred personal contact. In Shortall's 1987 study the second main reason for not using an ATM was that respondents preferred personal service. Murdock and Franz (1983) identified a large class of customers who found it "embarrassing and/or degrading" using ATMs - implying that they preferred more personal service. Victoria University, New Zealand, (1987) found that 49% of non-cardholders preferred contact with human tellers. All of these findings would suggest

that the unique nature of the services industry make it a people based business. Interestingly, industry sources in the U.S.A (Howe, 1990) suggest that although more and more people are using ATMs, there has not been a reduction in the use of human tellers. Apparently the average non-ATM bank customer uses a human teller three times a month. So does the average ATM user, who also uses his or her ATM card about seven times a month. 32% of respondents stated that the bank branch was closer in location than an ATM and therefore they used a human teller because there was less distance to travel.

The third main reason for not using an ATM was that respondents preferred the more pleasant environment of the banking chamber (25%). 18% of cardholders did not use their card because they had other transactions to perform at the branch. Victoria University (1987) found that twice as many respondents gave this reason for not using an ATM.

In contrast to previous studies, Marr and Prendergast (1991) took their ATM investigation one step further by asking respondents if changes could be made to the ATM system that would encourage them to use ATMs more often. 37% of respondents suggested changes. In order of those most frequently mentioned these suggestions were:

- * More machines available (this accounted for more than 50% of suggestions).
- * Machines should have less breakdowns.
- * Change the maximum/minimum withdrawal amounts and note denomination.
- * Improve security.
- * Improve instructions on how to use ATMs.
- * Simpler deposit system.

In contrast, the study by Philips Business Systems (1987) found that machine breakdowns, rather than greater availability, was the most frequently mentioned suggested improvement.

One of the aims of a study by Moutinho and Meidan (1989) in the U.K was to evaluate customers perceptions of new technology. A stratified sample was used involving 200 interviewees who were established bank customers. Using factor analysis, four groups of customers were identified. This was the first study to try to segment the ATM market to such an extent.

Group 1: "On-the-move customers": These are convenience orientated customers who are usually considered to be 'heavy users' of ATMs. They also show a considerable amount of concern about the number and location of ATMs.

Group 2: "Hi-tech,value/cost orientated": They perceive the use of ATMs as being safe and would like to see ATMs providing extended services such as paying off credit cards.

Group 3: "Better-of-the-same" customers: These customers place a great deal of importance on the 'human factor' in the delivery of bank services. Although they like new services such as ATMs, these services must be an extension of current services, rather than a replacement.

Group 4: "Price sensitive" customers: Are concerned mainly with the interest rates charged and paid by the bank.

Kwan (1991) conducted a study to examine the characteristics of the elderly market segment in their use of ATMs. He surveyed 165 elderly individuals who were aged 55 years and above and were resident in the Perth Metropolitan area. 35.1 percent of respondents surveyed reported owning an ATM card, while 64.9 percent did not own one.

Among cardholders 46.6 percent use their cards at least once a week, 24.1 percent use their cards three times a week, and 10.3 percent indicated they use their card more than four times a week. On the other hand, 19 percent had never used their cards. Two psychographic characteristics appear to differentiate users and non-users of ATM cards: 1) the feeling of safety when conducting business at an ATM and 2) the enjoyment received from personally going to their financial institution to conduct business. Non-

users perceive ATMs as being less safe, and preferred to conduct their banking in a traditional manner, ie with people. The demographic profile of ATM users, when compared to non-users, showed that users are more likely to be married, had previous occupations in white collar professional jobs, better educated, tend to be in the higher income brackets, younger, and more likely to be male.

3.3.3 ADOPTION OF EFTPOS

Electronic Funds Transfer at the Point of Sale (EFTPOS) rests on the availability of EFTPOS to convey, process, and store information.

A broad definition suggested by RMDP (1987) defines EFTPOS systems as meeting the following criteria:

- 1) The electronic transfer of funds between the consumer's account and the retailer's account
- 2) The customer's authorisation of funds between the consumer's account and the retailer's account
- 3) The system must process debit cards.

The main application of EFTPOS is that shoppers can pay for goods directly through a system which transfers funds from their account to the retailers by use of a magnetic stripe card and a terminal located at the point of sale. In other words the consumer, through using the card, takes over part of the processing role which was formally performed by the bank.

Recent developments have seen a new version of card which has a memory chip "charged" with a certain amount of credit which is gradually reduced electronically with each purchase. These cards, known as "Smartcards," are discussed in section 3.3.5.

International Developments

EFTPOS developments have been so varied worldwide in terms of structure and timing that it is useful to document major events in various countries. Over the years the U.S.A has been a leader in many areas of banking innovations. This has not been the case with EFTPOS, however, largely due to the fragmented nature of the banking system (Kirkman, 1987). Therefore, it is difficult to achieve economies with many separate systems. Lucky stores operating in California and Nevada in 1984 pioneered the most successful example of EFTPOS implementation to date. Lucky stores' 350 supermarkets generated 1.6 million monthly EFTPOS transactions (Takac, 1991).

In Europe, France has led EFTPOS developments with pilot schemes being established from 1979 onwards. The Government gave considerable support to the system until 1983, when it was decided that memory cards would be trialed. At the end of the trials the Government decided that this new card (which incorporated a magnetic stripe on the back of a memory card) should be used in their national system.

The first on-line EFTPOS system in the U.K was called "Counterplus", and was introduced by the Clydesdale Bank in Aberdeen in 1982 (Sparks, 1984). Until 1986 EFTPOS was comprised mainly of localised experimental schemes. However, in 1986 EFTPOS U.K Ltd was established jointly by the banks to coordinate the movement towards a national system and standardisation. In February 1990, however, EFTPOS U.K was dissolved in the face of the individual success of its individual member institutions, the U.K clearers, in getting EFTPOS established.

In Scandinavia there have been considerable developments. On the basis of success with ATMs, the Swedish savings banks in the late 1970s launched a major EFTPOS pilot in the city of Karlskrona. This was in fact reported to be the first EFTPOS pilot in the world (Omdal, 1988). However, this early enthusiasm has not resulted in a major EFTPOS scheme in Sweden, mainly due to a lack of cooperation between the parties involved.

Finland has progressed through very similar phases as Sweden. Again there has been a lack of cooperation between the parties involved. Although EFTPOS development has made progress, it will take time for it to become an established nationwide system.

Denmark was the first country in which there was agreement between all the financial institutions to introduce EFTPOS on a joint basis. The first Dancard terminals went into operation in 1984 in two pilot areas. Interest, however, was low. 1986 saw an increase in interest mainly due to the marketing efforts of retailers (Omdal, 1988).

In Norway, the first EFTPOS operation started in 1982 in a cooperative move between the savings banks and Shell oil company. Other banks and oil companies soon followed suit. While the oil companies prospered from EFTPOS use, other retailers did not have access to a full scale EFTPOS. Thus in 1984-85 a Smartcard project was carried out in Norway (the first of its kind outside France). In late 1985 the bankers association announced that an agreement had been signed with the major retail associations covering the future development of electronic payments in banking. This agreement stated that any new system should be a combination on-line/off-line system based on the use of a combined magnetic stripe/Smartcard (Omdal, 1988).

Asia has been lagging behind in EFTPOS developments. Japan was expected to be the first country to introduce EFTPOS in Asia, but Government restrictions slowed down developments. The first major EFTPOS scheme was launched in Thailand in May 1985. Experimental EFTPOS schemes were set up in Hong Kong and Singapore in June/July 1985, and these have since become fully operational (Kirkman, 1987).

In Australia the first EFTPOS trial was set up in 1982 by the Whyalla Credit Union and G.J Coles. By 1983 almost all bank branches in Australia had on-line capabilities with a computer centre. In the same year Telecom established a packet-switching network called AUSTPAC which dealt with EFTPOS transactions. Further agreements had been reached between banks, non-banks, and large retailers which enabled EFTPOS trials to be established on a limited basis. Therefore several EFTPOS systems were developing with no standardisation. However, between July, 1984 and March, 1985 retailers were

provided with a larger card base when a number of institutions combined networks. June, 1985 marked the end of the trial stages when Westpac signed up fee-paying retailers for commercial EFTPOS services (ASTEC, 1986). The cost in monetary terms of establishing a viable EFTPOS system in Australia has been high. It has been estimated that the banks collectively had spent up to US\$80 million by July 1989 (Eddington, 1989).

EFTPOS developments in New Zealand have been well documented. In late 1983, the four trading banks and Databank Systems Ltd (the central clearing house) brought together an electronic banking project team charged with the task of researching and developing a trading bank EFTPOS pilot scheme. This pilot scheme went nationwide under the name "Quicksmart". In July 1984 a rival system, Cashline, was set up by the trustee banks with processing being carried out by the Auckland Savings Bank (Doesburg, 1989).

By the end of 1987 the four trading banks alone had invested a total of NZ\$15 million in EFTPOS. By this time there was a running rate of 1.8 million transactions per annum, at an operating cost of \$7.16 per transaction. It was suggested that at least 70 to 80 million transactions per annum would be required to reach the threshold of economic viability (\$0.70 per transaction) (Booze, Allen, and Hamilton, 1987).

In 1988 two major trading banks (ANZ and BNZ) withdrew from the EFTPOS system. The remaining two trading banks, National and Westpac, kept the system going under the new name "Handy-point".

In September 1989, the Commerce Commission approved the formation of ETS (Electronic Transaction Services Ltd); a partnership of all the parties involved with Cashline and Handy-point.

The EFTPOS Debate

One of the purposes of outlining the EFTPOS developments in several countries is to provide a background to discussion on the debate between the various parties involved with EFTPOS. The very fact that EFTPOS developments have been so varied, and that there is an absence of a "proven model" of how EFTPOS should be implemented, has fuelled the debate.

Basically, there is one core problem and two sub-problems relating to EFTPOS which can be applied to most countries (Market Research (NZ) Ltd, 1985):

1) Banks are yet to agree on the nature of the system to be used, how it should be managed, and how the costs and benefits should be distributed among participants. This is the core problem and leads to the following sub-problems:

- The retailers have to be persuaded that they will benefit from such a scheme. The marketing and pricing of EFTPOS is crucial, as is the level of consultation with retailer groups. The retailer/bank domain has been an area of great debate, since it has not been made clear by banks who benefits - the retailers, the banks, the customers, or all of them.

- The customer needs to be consulted and educated. The disadvantage of PIN security and instantaneous debiting make the system less attractive, certainly to older customers, although the educative impact of ATM cards probably reduces this problem.

As a means of attempting to clarify what benefits the various parties expect from EFTPOS, ASTEC - the Australian Technological Change Committee (1986) developed a table (as illustrated in Table 3.10):

Table 3.10 Expectations of EFTPOS Systems

Expectation of:	Banks	Retailers	Customers
High reliability	*	*	*
Low cost	*	*	
Security against fraud	*	*	*
Confidentiality	*		
Simplicity and convenience		*	*
Ability to be mixed with other systems	*	*	*
Easy tracking of information contained			
Open system		*	
Quick response		*	
Pre-authorisation of cards possible			
Costs known			
Time of debit known			*

Source: ASTEC: Technological Change Committee. *Towards a Cashless Society?* Australian Government Publishing Service, Australia, 1986.

Realisation is dawning that the retailer has an important role to play in promoting EFTPOS to customers. Gendall (1985) reported on a study conducted in 1985 by ICL aimed at determining retailers' attitudes to EFTPOS. It involved a survey of senior managers in 97 major companies. Results showed that 48% disagree that EFTPOS only benefits the banks, and most respondents considered EFTPOS to be an inevitable development with which they should be involved.

Unfortunately, more than 50% did not think there was a consumer demand for EFTPOS. This is unfortunate because retailers have a key role to play in promoting EFTPOS to customers.

Adoption of EFTPOS

The earliest published study relating to EFTPOS was by Pugh and Ingram (1978), who conducted a panel survey of more than 800 households in Southern California in 1976. When asked how they felt about the EFTPOS concept, 'dislike very much' and 'neutral' each captured 30 percent of the panel responses. 18 percent 'disliked the idea somewhat', 16 percent 'liked it somewhat', and only 6 percent 'liked it very much'. Those who liked it at least somewhat showed a higher concentration in the following groups: under thirty years old, college graduates, and income of over \$20,000. Those demographic characteristics that most often showed dislike for the idea were the over-sixty age group, post-college educational group, \$11,000 to \$15,999 income group, and the older married with no children group. The most common reason (35.8 percent) given for disliking the system was the fear of loss of control of transactions and overspending. Distrust of the system and the chance of computer error was the answer given by 31.2 percent of the panel. Other reasons included: preference for cheques (6.4 percent), present facilities adequate (4.4 percent), preference for human contact (2.9 percent), loss of advantages of 'float' (2.4 percent), and miscellaneous reasons (4.6 percent).

Arthur Anderson and Co (1985) took a more qualitative approach to the EFTPOS research. Focus groups were conducted with consumers from the major population centres in Australia and a range of demographic backgrounds. This study represented the last time focus groups were used in a published study of EFTPOS. Since this time, surveys have been quantitative in nature.

Within the younger age groups the idea of a cashless society was well received - this was especially so with the 18-35 year old female shoppers. In fact, the majority of all age groups suggested that, while cash was still needed to a certain degree, the concept of doing the majority of their shopping with plastic cards was acceptable.

Gendall (1985) reported on a study by ICL in the U.K. This study represented feedback from more than 1000 adults. Respondents were given a description of the EFTPOS concept and then questioned on various aspects of the system. It is a study of interest because it proposes to respondents not an environment where EFTPOS is used simultaneously with cash/cheques, but rather a total EFTPOS "takeover" (ie a cashless society).

Only 25% of the sample liked the idea of paying without cash or cheque. One third of respondents in the professional and managerial occupations "very much like" or "like" the idea of cashless shopping. However, only two out of ten people in the non-manual, skilled manual and unskilled manual categories were in favour.

Over half of the sample did not like the immediate debit aspect of EFTPOS. However, there was still 63% of respondents who would welcome any saving in time at the point of sale. A large 81% were in favour of EFTPOS if it meant they could get interest on their current account.

20% of those who had heard of EFTPOS did not know what it was, 6% thought it meant ATMs outside banks, while more than 50% thought it was a "mysterious technology for spending money by computer". Only one in six of those who claimed to have heard of EFTPOS associated it with the "cashless society".

A study by Market Research (NZ) Ltd (1985), like the previous study, was exploratory in nature in that it was conducted with respondents who had never been exposed to EFTPOS. The study found the following attitudes to EFTPOS usage:

Would probably use it	25%
Might use it	25%
Would not use it	50%

This is comparable to a study by ICL (1985) which found that 60% of respondents would not use EFTPOS after they had been given a description of the concept.

In contrast to other studies, this survey examined the potential for charging consumers for the EFTPOS service. After some discussion most indicated that they would accept a transaction charge providing that it was not more than what they were currently charged for cheques. Also, consumers perceived retailers and banks as benefitting most through their patronage of the service.

Gendall and Hoek's 1987 survey of 389 women found that of those who had an EFTPOS card, regular use was very low (less than 15% used their EFTPOS card once a week or more often). The heaviest users of EFTPOS were women aged less than 40. Unexpectedly, this was particularly so with women in this age group earning less than \$20,000 pa. The research indicated that women had a poor understanding of EFTPOS,

with more than a third suggesting that they did not know how EFTPOS worked. The younger and higher income earning women had a more positive image of EFTPOS and a better knowledge of EFTPOS than those in the other groups.

A study by Lafferty Business Research (1987), which was part of a wider study on product delivery, interviewed more than 6000 Europeans. There were several major findings. The main benefit of EFTPOS to the customer was thought to be safety and convenience (of not using cash or cheque). Unfortunately several disadvantages were perceived; the immediate debiting of the account, the possibility of being embarrassed if the money is not available, the possible security risks involved, and the risk of ones privacy being invaded as their shopping habits could be monitored by computer.

The authors indirectly gauged the level of support for EFTPOS by asking respondents the level to which they agreed with the statement "I'd like to have purchases charged to my account without writing a cheque". The results are shown in Table 3.11.

As the table shows, 36% supported the idea. The Spaniards were firmly in favour of the concept. This is interesting because cheques have never been used extensively in Spain so customers have moved from cash to EFTPOS without the intervening cheque writing phase (Evans, 1987). In contrast, the British and Swedish show less support for the idea.

This study found that the upper-income group and frequent business travellers were not favourable towards the idea of paying without cheques. However there was some support for paying without cheque, mainly from those aged 25 to 44, those who go frequently to their bank branch, and those who had used an ATM.

Table 3.11 "I'd like to pay without writing cheques"

	All	French	German	British	Dutch	Spanish	Swiss
Response							
Strongly agree	17	16	20	8	29	30	14
Tend to agree	19	20	17	19	11	27	15
Neutral	17	13	27	11	7	13	7
Tend to disagree	22	23	18	26	27	13	14
Strongly disagree	22	24	15	32	19	10	44
Don't know/no opinion	4	4	3	3	7	8	7
Base*	4,591	901	1045	868	794	496	487

*All with a current account

Adapted from Evans, S. A European Study of Consumer Payments. *Journal of Retail Banking*, Vol 9, No 3, Fall 1987, p11.

Marr and Prendergast's (1990 B) New Zealand study is a particularly interesting study because its results influenced one of the trading banks to withdraw from the four-bank EFTPOS system a matter of months later. This study, which was part of a larger study relating to product delivery, was aimed at identifying present and future usage rates of EFTPOS, and reasons for usage.

Results found that a high 91% (n=726/801) of respondents were aware of EFTPOS. However only 35% of aware respondents had used EFTPOS. Respondents who had used EFTPOS were asked if they would use it again in the future. 82% said they would use EFTPOS again, and 18% said they would not - mainly because they had had a bad experience with EFTPOS. Of the respondents who had not used EFTPOS, only 22% said they intended using it in the future.

Respondents who had not used EFTPOS and did not intend using it in the future and respondents who had used EFTPOS but did not intend using it again, were asked why. The main reason for not using EFTPOS was that respondents considered cheque or cash to be more convenient (58%). The immediate debit aspect of EFTPOS was of particular concern (30%), whilst 24% of respondents did not use EFTPOS because although they owned an ATM card, they did not usually use it. This suggests that if customers were accustomed to ATMs, they may be prepared to advance to EFTPOS. 21% of respondents claimed that EFTPOS confused them. 22% of responses fell into the "other" category. These comments can be grouped into two areas. First was a concern with overspending. Respondents claimed that EFTPOS is less tangible (than cash) and it is easy to overspend. The second group was interesting, and shed light on an area which Marr and Prendergast (1990 B) did not expect, respondents were concerned with the ethics behind EFTPOS. Consider the following comments:

"By accepting all these fancy cards I would be encouraging the cashless society, causing unemployment."

"There is the danger that if such systems become widely used they may replace cash. Cash is the last guarantee of individual freedom. Without it we could easily be manipulated and controlled."

When considering demographics, respondents on higher incomes were more concerned with the immediate debit to their account than those on lower incomes, and respondents on lower incomes considered cheques or cash to be more convenient (than EFTPOS) than did those on higher incomes. This finding is similar to that of Lafferty Business Research (1987) which found that the upper-income group and frequent business travellers were not favourable towards the idea of paying without cheques.

A study by Ironfield and McGoldrick (1988), which was conducted in collaboration with the Retail Management Development Programme Ltd, had the primary objective of

examining the major determinants of EFTPOS adoption in the U.K. This represented the most comprehensive EFTPOS study conducted, and therefore warrants considerable documentation.

3000 people were interviewed using the "mall intercept" approach. There were 1000 in each of three areas where EFTPOS experiments were being held: Northhampton, Milton Keynes, and Aberdeen. The sample included both ATM cardholders and non-cardholders.

Results showed that 53% of respondents were aware of EFTPOS - considerably lower than the 1988 finding by Marr and Prendergast (1990 B). The "aware" respondents tended to be younger, male, and in full-time employment.

Respondents who were aware of EFTPOS were asked to indicate what they considered to be the main advantages and disadvantages of EFTPOS. This, in contrast to other studies, is the only study which tried to find out the disadvantages and advantages of EFTPOS. For instance, Marr and Prendergast (1990 B) only questioned respondents on reasons for non-usage, rather than reasons for usage. The results are shown in Table 3.12.

The most frequently mentioned advantage was "less use of cash" (24.5%). This is consistent with the results of the study by Lafferty Business Research in 1987. According to the authors, this response was associated with the higher occupation class, as were "greater security", "time saving", and "convenient". This is interesting when one considers that 58% of Marr and Prendergast's (1990 B) respondents in their 1988 study did not use EFTPOS because they considered cash or cheque to be more convenient (although this only related to respondents who had never used EFTPOS).

The major disadvantage perceived was "too easy to overspend", which was related to higher social class, but not to age. This finding may be related to Marr and Prendergast's (1990 B) 1988 observation that some people incorrectly perceived EFTPOS as being a credit card facility, and therefore they thought they were spending money they did not have. Only 6.4% of respondents were concerned with the immediate debit of EFTPOS (compared with 30% found by Marr and Prendergast in 1988).

Table 3.12 Advantages and Disadvantages of EFTPOS

Advantages	% of "Awares"(n=1,607)
*Less use of cash	24.5
*Greater security	14.8
*Time saving	10.4
*Convenient	8.4
*Wider choice of payment mode	7.2
*Know cashflow better	11.8
Disadvantages	
*Too easy to overspend	20.0
*Instant debiting	6.4
*Possible technical error	5.4
*Loss or fraud	5.3
*Possible loss of other payment modes	2.8
*Not universal	2.7

Source: Ironfield, C and McGoldrick, P. EFTPOS Systems - Determinants of Shoppers Awareness and Usage. *International Journal of Retailing*, Vol 3, No 4, 1988.

This study also differentiated itself from other studies by asking respondents why they thought EFTPOS was introduced. 18% suggested it was designed to save time for shoppers. 9% said it avoids the need to carry cash, and 6.1% felt that EFTPOS prevented fraud. On a negative side, 5.8% felt that EFTPOS was introduced to induce shoppers to spend more.

Only 4.4% of the total sample had used EFTPOS. The main demographic variable significantly related to usage was age - being lower for users of EFTPOS. It is interesting to note at this point that a study by Zeithmal and Gilly (1987) contradicted much of the research in this area by finding that the elderly sample had more enthusiastically adopted EFTPOS relative to the non-elderly sample, their main reasons being safety and convenience.

3.3.4 ADOPTION OF HOME BANKING

Home banking is the term used to describe the technology of linking the dial telephone network or cable system to a home television set or personal computer, thereby providing the customer with a connection to a bank's computer. When a television set is utilised, this is called home banking by "videotex", as opposed to home banking by personal computer. Both the bank's computer and the customer's computer/television require a "modem" adapter which allows both systems to communicate over telephone lines. Another form of technology enabling home banking is the telephone. The telephone is not a new technology for customers. Digital exchange networks allow signals to be sent from a customer's phone pad directly to a bank's computer.

In all cases, home banking involves "non-cash" transactions. In other words, cash cannot be physically withdrawn or deposited via home banking.

Home banking is essentially home shopping (for banking 'goods' at least). May (1989) makes some interesting comments on home shopping. Home shopping (by computer, telephone, or catalogue) is now growing at twice the rate of total retailing (of comparable merchandise). Why has this growth occurred? In the eighteenth and early nineteenth centuries, consumers *bought* primarily to acquire merchandise that would satisfy limited needs, while *shopping* was in part to satisfy social needs. Due to limited variety, the time required for shopping was minimal, and was a welcome break from the day's activities. Consumer demand for variety, however, resulted in a proliferation of merchandise. The time required for shopping increased substantially. However the time required to make purchases from home, either by catalogue or electronically (unless a shopper spends an extended time perusing the catalogues or the computer screen - behaviour that is completely optional) is significantly less than the time needed to travel to and return from stores, find the desired merchandise, and have the sale record. With many factors competing for consumers' time, no in-store effort can provide consumers with time-efficient shopping as does from-home shopping.

The types of operations that can be performed by home *banking* can be put into two major categories (Snyder and Veneziano, 1984). The first category is the exchange of information between the bank and the customer. There are two types of information: information specific to the particular bank's operations, including a description of account types, charges, and interest rates, and information relating to a specific customer's accounts, account balances, transaction dates, etc.

The second category of operations which can be performed by home banking is banking transactions in which the customers initiate transfers among their various accounts. For example if interest paid on deposits rise, a customer may wish to move funds from his/her cheque account to a savings account.

International Developments

Contrary to popular belief, home banking has, in fact, been in existence for many years. For example, since the beginnings of banking bank managers have gone out to the residences of very wealthy individuals and conducted the banking in the customers' homes. Individuals, regardless of their wealth, receive bank statements at home, and often despatch cheques from the same address.

There is also the telephone. In the U.S.A telephone banking has been in existence for a long time. Typically, customers who are very well known to the staff or who hold large deposit accounts have been permitted to transfer funds and obtain account balances over the telephone.

However, as mentioned at the outset of this review, the focus of this thesis is on self-service technologies. Therefore, of prime importance are *computerised* telephone banking and home banking via personal computer/videotex.

In 1973, Seattle First National Bank introduced the first telephone bill paying service in the U.S.A (Westergren, 1982). For a minimal fee the customer could use the touch tone service on the telephone to dial up the bank's computer to access any of the following services: chequeless bill paying, family budgeting, arithmetic calculations, personal calendar, or income tax calculations.

Several experiments marked the first signs of home banking via terminals in the U.S.A. In 1979 Bank One of Columbus began a videotext project called "Channel 2000" that allowed customers to see their bank balances and pay bills on the screen of their television. Unfortunately, this technology was ahead of its time, and the project was abandoned (Fisher, 1988). In ranking the usefulness of the services provided, the video catalogue and the public information services were ranked ahead of home banking, which was third. Also, home banking ranked third behind the video encyclopedia and the video catalogue for services that they would be most likely to pay for.

Banking World (1989) reported on a study by Payment Systems Inc who surveyed 1600 respondents. It found that 22 services offered in the survey were clustered by response into five categories: household management, travel and social information, shopping information, education and library services, and investments. Within the household management portion, record keeping was described as a service for keeping track of bank deposits, purchases and budgets, all geared towards income tax purposes. Bill paying was described as a means for the customer to instruct the bank to pay bills from his account immediately. The PSI study further indicated that there are five groups of customers who will be in various stages of acceptance of the systems: innovators, early adopters, early majority, late majority, and laggards.

Westergren, in his 1982 thesis, concluded that the banking industry will not be the driving force behind home banking, but the financial transaction part of any system will play a major and necessary role in its ultimate design and adoption. In-home banking as a separate entity will not be adopted or paid for by the consumer. However, a home information system without in-home banking will likewise be rejected.

One of the apparently most successful home banking projects was set up by Chemical Bank of New York in September 1983. This service was called "Pronto", and was the first commercial personal computer based system in the U.S.A (Kirkman, 1987). The monthly charge for individuals in 1986 was US\$12. A modem could be provided for US\$75. By June 1986 the number of users had reached 25,000, made up of 22,000 household users and 3,000 small business users (Banking World, June 1986).

Since this time many other home banking projects have been initiated. However, with the exception of the Bank of America scheme, most had less than 2000 subscribers.

There are many strong differences of opinion in the U.S.A over whether home banking is a viable proposition on its own, or whether it should be part of a broader information service.

In January 1989 Chemical Bank shocked the financial world by withdrawing its home banking service from the market after spending an estimated US\$100 million on the system. Their reason for this move was that demand did not reach expectations (Retail Banker International, July 1989).

Three financial institutions were the pioneers of home banking in the U.K. All three systems made use of, in one way or another, British Telecom's Prestel Videotex (Tait and Davis, 1989).

In September 1982 the Nottingham Building Society launched its home banking offer (Homelink) on a restricted basis, and then went national in 1983. To obtain the service, depositors needed at least 100 pounds sterling with the Society. Customers were then provided with a Prestal adaptor for their television set.

In late 1983 the Bank of Scotland joined the system and shared forces. This shared system allowed customers to perform several functions including obtaining balances, transferring funds, and paying bills (Tait and Davis, 1989). The Homelink project cost the Nottingham Building Society between four and five million pounds to develop, but these costs had been almost entirely recovered by the beginning of 1985 (King, 1985).

In 1985 the Bank of Scotland announced the introduction of its own home banking system (Home and Office Banking System - HOBS). At the same time, Barclays set up an experiment in home banking among its staff, and the Midland Bank was operating a pilot home banking scheme. The Midland system operated on a personal computer rather than a television set.

In 1987 Lloyds bank introduced the first mass market home banking system (rather than being aimed at high net worth individuals only) (Banking World, 1987). Their system has a separate "Taltek" unit (in effect a card authorisation terminal) which sits along side of a customer's telephone. This terminal has a "card swipe" facility and a one line display screen. The talkback vocabulary is initially recorded on tape from scripts covering all the possible replies needed. The system was introduced based on the findings of a "Mori" survey which found that 93% of respondents believed that a voice response system would save time "wasted" in visiting bank branches - while 78% said they had no fear of using an automated service (Banking World, November 1987).

The system used by Lloyds, which has been adopted by other U.K banks, uses the technology produced by the Swiss based Autophon company. Autophon conducted a survey of consumer attitudes to voice response in the U.K and found that over 80% said they would use such a system and would prefer automation to people. The survey found that peoples' preferences were balance enquiry, bill payment, transfer between current account and deposit account, and ordering foreign exchange (Kanji, 1988). The

autophone system has had its greatest success at the Banco de Santander in Spain where there were 80,000 subscribers in 1987.

Westpac, Australia's largest bank according to assets, introduced Australia's first telephone banking system in 1986. Of Westpac's 4.3 million customers, 74,000 used "Handyline" in 1989. The system uses a small voice response unit which can be attached to a bank's existing computer facilities. Using a touch tone phone, or a miniature inquiry terminal (MIT) on any phone, a registered bank customer can dial in and perform a number of functions.

An interesting recent development in telephone banking has been voice recognition. Such a system is being piloted by the Royal Bank of Scotland. The service allows a recognition of 30-40 pre-chosen words relevant to home banking. The user is allowed to speak words from a list of service options presented in a menu structure (Costello, 1990).

On the (personal computer) side of home banking, small pilot programs are currently in progress in most developed countries (Retail Banker International, July 1989). French banks have essentially been world leaders in terms of home banking developments. In a Government sponsored venture, more than two million Minitel terminals have been distributed by the French telecommunications organisation to replace telephone directories. As a result, video banking has been offered by a growing number of banks. With the offer of free equipment and low or non-existent home banking charges, there is little to stop customers using the home banking services provided by banks. Thus, per head of population, there are more home banking customers in France than in any other country (Kirkman, 1989).

In New Zealand telephone banking was first seen when the National bank began a pilot scheme in 1987. However, it was not until October 1988 that the first "live" telephone banking system was introduced by the Auckland Savings Bank.

Home banking by computer is very much at the pilot stage in New Zealand. While a limited number of corporations utilise this untested service, the prohibitively expensive fees put it beyond the retail customer.

Adoption of Home Banking

There are only a small number of published studies relating to home banking. This is not only because many systems are in the pilot stage but, given the lack of market information, any studies which are conducted tend to be highly confidential. Given this limited number of studies, it is very difficult to compare the works of different authors because their objectives and scope tend to be so different.

Snyder and Veneziano (1984) concentrated their United States study solely on that market segment which, according to the literature, is most prone to adopting bank technologies - owners of personal computers. 210 responses were received from a mail survey in Bolder, Colorado. The aim of the study was to determine the market potential for home banking by projecting ownership of personal computers by professionals and to identify the percentage of this group that felt that banking by computer was of sufficient value to cause them to switch banks.

Given the restricted sample, one would expect higher support for home banking in this study. Of the 210 respondents, 49 currently owned a personal computer and 161 did not. Respondents were given four responses to the statement that they would switch to a bank offering banking by computer. 8% "strongly agreed" and 24% "agreed" (giving a total of 32% agreement).

De Cotlls and De Marco (1985) reported on a study conducted by Payment Systems Inc in the U.S.A aimed at ascertaining how financial service elements match with delivery mechanisms. This approach differed from other authors by isolating those particular services people prefer through home banking (rather than looking at support for home banking in general).

1200 representative households were interviewed on a nationwide basis. Table 3.13 shows the percentage of respondents who preferred home banking (as opposed to other delivery mechanisms), for various bank services.

Table 3.13 Preferred Delivery System: Home Banking

Service	Home Banking Preferred
Obtain information about rates, terms etc	11.4%
Open account	4.5%
Make deposits	10.0%
Withdraw cash	7.5%
Transfer funds	14.1%
Pay for purchases at stores	7.2%
Pay bills	13.3%
Obtain information about account status	15.0%

Respondents were also asked what delivery system they would use if electronic money cost less than others, the results are shown in Table 3.14.

Table 3.14 Preference if Electronic Banking was Cheaper

Service	Face to Face	By Phone	By Mail	By Home Banking	By ATM	By POS Card
Transaction accounts	-32.3	+00.4	-05.4	+13.7	+10.1	+04.2
Credit card/lines of credit	-04.2	-02.6	-23.7	+13.2	+13.8	+06.4
Loans	-11.6	-01.0	-05.7	+11.1	+10.8	+04.2

Both tables adapted from De Cottls, A and De Marco, J. Integration and Pricing: The Next Hurdle For Delivery Network Marketing. *Bank Marketing*, March, 1985, p14.

As Table 3.14 shows, home banking appears to gain the most support. Human teller use tends to fall severely in the area of transaction accounts.

Gendall and Hoek's 1987 survey of 389 women found that 56% of all respondents were in favour of homebanking. A higher proportion of women earning over \$20,000 indicated that they would like homebanking via a personal computer than did women earning \$20,000 or less. Within income groups, younger women were more in favour of home banking than older women, and the difference was most significant in the less affluent group.

Women consistently cited convenience in support of the idea of home banking. This was especially so for women who:

- lived in rural areas
- had young children
- were working
- were elderly and disabled (although adoption by the former would appear to be contradictory to most studies on banking technology).

Those who did not support home banking cited security risks, a dislike of computers, a loss of personal interaction, and a concern that the service would be too expensive.

Lafferty Business Research (1987) conducted a wider study on delivery mechanisms in the U.S.A. Interviews were held with 600 people and attitudes toward home banking were obtained. Apart from France, most consumers were generally opposed to home banking. This opposition is illustrated in Table 3.15. It is quite clear that in countries outside France, where the Government does not subsidise equipment, there is much less interest in home banking. In fact, in all of the countries except France, more than half the replies indicated a lack of interest.

Table 3.15 Interest in Home Banking

Country	Very interested	Fairly interested	Not interested	Base
All countries	11%	16%	54%	6,230
France	18%	24%	40%	1,018
Great Britain	18%	19%	55%	1,051
Netherlands	11%	17%	49%	1,034
Spain	6%	14%	54%	1,000
Sweden	8%	14%	63%	996
Germany	3%	6%	64%	1,131

Adapted from Evans, S. A European Study of Consumer Payments. *Journal of Retail Banking*, Vol 9, No 3, Fall 1987, p12

Respondents were asked to show their level of agreement with the statement "I am interested in home banking". The following weightings were used:

Strongly agree	+2
Tend to agree	+1
Neither agree nor disagree	0
Tend to disagree	-1
Strongly disagree	-2

Results for respondents were collated and related to various variables, as illustrated in Table 3.16. These results suggest that customers who use credit cards and/or are better educated, tend to favour home banking. Customers who use bank branches often are less likely to be interested in home banking.

Table 3.16 Agreement with Statement: 'I am interested in home banking'

Characteristic	Score	Base
<u>Group</u>		
All	-.56	1,857
Men	-.46	1,015
Women	-.65	842
<u>Sex-Age</u>		
Male 18-34	0.09	528
Female 18-34	-.18	429
<u>Frequent Users</u>		
Bank branches	-.32	649
Cheques	0.03	583
ATMs	0.31	552
Credit cards	0.44	333
Interest in EFTPOS	-.18	716
<u>Age Finished Education</u>		
Up to 16	-.85	596
Over 16 and up to 19	-.27	612
20 or over	0.06	540

Respondents who were interested in home banking were asked why. The British and Germans stressed the fact that it was easier and more comfortable banking from home. The remaining countries also expressed this as their main benefit, except for the French (who were more interested in home banking's ability to provide precise, up-to-date information). The Dutch and Germans were more interested (relative to respondents in other countries) in the fact that home banking saves time.

Gallagher (1989) reported on a study by the U.K based market research company Systems Dynamics. This study found that 34% of respondents aged under 35 expressed much interest in having a terminal for home banking. This finding is similar to that of Snyder and Veneziano (1984) who discovered 32% of personal computer owners would be

prepared to move to a bank which offered home banking. However, 25% of respondents in Gallagher's study said they would only take a terminal if it were free. A further 18% of respondents were prepared to pay up to 20 pounds per month for having the service.

3.3.5 ADOPTION OF SMARTCARDS

The Smartcard is often perceived as being something of a "mystery" technology as far as capabilities and workings are concerned. Therefore, some explanation is required.

According to Smith (1987), a Smartcard is quite simply a card with on-board processing and memory power (for a detailed description of the technical workings of Smartcard see *Electronic Banking and Finance*, Vol 2, No 5, July 1985, pp1-3). In layman terms, this means that transactions involving the card can be approved without being "on-line" (ie linked to a host computer). The "Super Smartcards" have this plus enhanced memory, liquid crystal display (LCD), and a keyboard.

A greater appreciation of Smartcard can be obtained by drawing a comparison with the conventional magnetic stripe card. The problem with the magnetic stripe card is that it has a number of weaknesses, as outlined by Joly, Michaud, and Philipee (1985). The stripe card can be reproduced cheaply. For instance, it is relatively easy to make many false cards from one real card. This makes the card system vulnerable since there is no guarantee that the card presented is, in fact, an authentic card.

Measures have been taken to solve this problem. In some cases holograms have been incorporated into the card. However, these measures have a problem in that while the holograms may prove that the card is authentic, they do not provide proof that the bearer is authentic or if there are enough funds in the account - to achieve this the payment point must be connected to a computer or CPU while the bearer moves around. As electronic payment systems grow, an extremely complex and costly network would be needed. Also, because authentication takes place outside the card, it is open for attack/fraud.

These limitations point to an advantage of Smartcard. With Smartcard everything within the card has been designed to make duplication practically impossible. This attribute, combined with the fact that the card has a built in processor and memory, has several implications:

*Greater security means retailers will be prepared to accept larger transactions.

*The card can be used in off-line situations. In fact the only time host contact is required is for periodic update and card refreshment.

The second weakness of the magnetic stripe system relates to identifying the bearer at the point-of-sale, when PINs and decoding data (ie an algorithm) must be used. These data must be kept confidential. However, it is possible to decode and access data contained on a magnetic stripe. It is not possible to access the microchip in a Smartcard since the chip has a certain number of memory areas which can only be accessed under certain conditions. All decoding takes place within the card.

The third problem with magnetic stripe cards is that they have limited memory capacity. Smartcards, however, can contain a log file of recent transactions, which is useful. For example, suppose a customer wrote his PIN on his Smartcard and then lost the card. A thief would be tempted to use the card and even exceed the authorised limits. However with the Smartcard, the log file is updated each time the card is used, and a "block" goes in place once the card reaches a predetermined limit. Furthermore, a customer can consult his/her log file in stand-alone terminals, without having to pass through a central file; or reserve parts of the memory for specialised uses (eg keeping a record of regular bill payments).

Given the enhanced memory capabilities of the smart card, it has a far greater range of functions. For instance, workers at the Fujita construction company in Tokyo have been issued with smart cards which enable them to charge purchases or bill them to their account, receive cash advances for company expenses, reserve corporate meeting rooms, and access restricted areas. On the card is also stored the list of equipment, such as cranes and trucks, the worker is licensed to operate. This lets the foreman immediately assign his labourers as they arrive at the construction site. Further, Fujita has developed a portable device that will record such important health data as the worker's blood pressure and pulse rate on the card.

International Developments

In 1974 a Frenchman by the name of Roland Moreno patented a new technology known as the "Smartcard" (Bright, 1987). The primary objective of the Smartcard was to replace the "dumb" magnetic stripe card which has limited memory capacity and absence

of intelligence (a similar card had been patented by Dr Arimura in 1970, but he limited his filing to Japan only).

By the late 1970s, the efforts of the pioneering French companies (Honeywell Bull, Philips Data Systems, and Flonic Schlumberger) had attracted the attention of the French Government, who decided to use the Smartcards for pay-phones (Bright, 1988). Later they were issued to customers to authorise or validate home banking and home shopping transactions.

Banks, namely Carte Bleue (Visa) and Carte Verte (MasterCard) then became interested in Smartcard due to the increasing incidence of card fraud. Other banks soon followed suit, and in 1982 the Carte Bancaire organisation was established in order to represent all the major bank groups.

France is now recognised as world leader in this technology. Some 10,000 million Smart cards are now being used for banking and telephone purposes in France (Bottorff, 1991).

The first U.K test of Smartcards for financial applications was in mid 1982 at a Midland University campus (Bright, 1988). The card tested was a non-contact card developed by GEC Ltd and was used for a variety of transactions ranging from small-value transactions off-line at the cafeteria to larger purchases for which deductions from the card holders bank account are conducted on-line.

An interesting observation was the retailers' desire to restrict off-line transactions to "low-value" purchases only. This suggests a degree of caution.

Japan has the worlds highest concentration of Smartcard trials, with the main application being the "visual card". This card has been tested in Tokyo and has the unique feature of a liquid crystal display which allows the user to inspect the balance and recent transaction records without resorting to a separate card reader. This represents the first Smartcard outside Europe to be aimed specifically at retail banking (Bright, 1988).

One of the earliest Smartcard initiatives by an American bank was known as the "Marbella Project", so named because the Spanish resort town of Marbella was one of the three locations chosen for this Smartcard trial - the others being London and Jersey. The service was designed for Citibank clients with a minimum of \$100,000 deposited in

their European branches. The main function of the trial card was that of secure identification and confirming that sufficient funds were available.

In late 1985 Mastercard International commenced a large scale test of Smartcards, issuing a total of 40,000 cards in two sites. The major motivation for this trial was to reduce fraud. In March 1988 Visa International launched a multinational test of Smartcards. 11,000 cards were issued between Europe, the US, and Japan for a four month trial period. In contrast to Mastercard's trial, Visa used a version of the "Super-smart card" ie with LCD display and keyboard (Bright, 1988).

Smartcard is very much in its early stages in Australia. Like so many other countries, there is a lack of feedback from consumers in the form of quantitative studies.

The first Smartcard experiment was introduced by Westpac in April 1988. However, this card is not intended for use by retail customers. Instead the card is part of a security system enabling corporate customers to conduct their banking on a personal computer (ANZ Banking Group NZ Ltd, 1988). There are a number of other Australian institutions conducting Smartcard experiments, and these are expected to run well into the 1990s.

In September 1987 New Zealand became the first country to introduce a nationally used retail Smartcard. The "Asset card" venture had a number of novel features. Firstly, it was funded as a joint venture by a leading retailer - LD Nathan Ltd (which holds 30% of the subsidiary "Asset Card Ltd") and New Zealand's leading merchant bank Fay Richwhite (70% holding). Secondly, the card was affiliated to Mastercard and could be used worldwide, through relying on its magnetic stripe in other countries (the presence of this stripe gives the card the advantage of being able to co-exist with other technologies) (Bright, 1988).

The Asset card could be used to make purchases in three ways (*Electronic Banking and Finance*, Vol 4, No 9, Nov 1987):

- The card operated as a normal credit card, giving shoppers up to 50 days interest free.

- Purchases could be charged directly to an Asset working account. Card holders can also make deposits into the account and earn daily interest, or make withdrawals.

-Purchases could be charged directly to the card-holder's bank account, which had the same effect as writing a cheque.

Unfortunately, this particular project was abandoned in late 1989 due to a lack of patronage.

Adoption of Smartcards

Empirical studies relating to Smartcard are rare. The only published study of significance was by Lafferty Business Research (1987). This study involved interviews with over 6,000 Europeans.

A Smartcard was described to interviewees in simple terms and then they were asked how they felt about the following:

Increased protection - PINs can be stored inside the card in a secure manner.

Immediate information - one can recover transaction details from the card through a simple terminal.

Quicker credit authorisation - the card contains all the information needed to approve a transaction.

The levels of interest are shown in Table 3.17. As this table shows, the increased protection offered by Smartcard is of most interest to the Dutch (86%). This is also the case with immediate access to information. Evans suggests that this may indicate no more than the Dutch credit card system, being underdeveloped by comparison with almost all the rest of Europe, imposes delays on those who pay with plastic.

These findings seem to indicate, in respect of protection at least, that consumers are looking for new technologies such as Smartcard. The reaction to the idea of Smartcard varies little by age, although the younger are more interested in having information stored on the card than the older respondents (31% of the 18-21 age group mentioned this compared to 24% for the population as a whole). Other factors, such as sex, income, and usage of other banking services, do not affect views about the Smartcard.

Table 3.17 Services of Interest From a Smartcard

Service	Swiss	French	German	British	Dutch	Spanish
More protection	47%	50%	41%	53%	86%	58%
Immediate information (stored on card)	27%	27%	13%	22%	52%	15%
Quicker credit authorisation	4%	14%	10%	14%	35%	22%
None	13%	5%	11%	10%	7%	3%
Don't know	9%	4%	24%	4%	-	4%
Base: all with a credit card	405	592	223	604	106	303

Source: Evans, S. A European Study of Consumer Payments. *Journal of Retail Banking*, Vol 9, No 3, Fall 1982, p13.

3.3.6 ADOPTION OF LASER CARDS

The Laser card is a somewhat unknown technology, and is yet to be commercially proven. The advantage that the Laser card has over the Smartcard is its superior memory capacity and the fact that the card itself may be slightly cheaper. These are the only advantages over Smartcard. On the debit side, its terminal equipment is considerably more expensive, it has no processing capability, and it is less secure (in terms of illegal reading, alteration, and counterfeiting).

The memory capacity advantage of the Laser card is overwhelming, but this must be considered in the context of what are the reasonable memory requirements of a card used in the financial services/banking field. It may very well be that the Laser card is destined for applications in other industries.

3.4 SUMMARY

The literature indicates that human tellers are still the primary means of product delivery, although new technology has reduced the frequency of branch visits. Queues, however, are very much a problem when using a human teller.

The findings by several authors suggest that the service industries, or more particularly the banking industry, is unique in the sense that it is a people based business. For instance:

-Marr and Prendergast (1991) found that 33% of non ATM users preferred to deal with humans in banking.

-Zeithmal and Gilly (1987) found that the main reason both elderly and non-elderly customers did not use ATMs was because they preferred to use the customary method (ie human tellers).

-Boland (1986) found that 85% of retail customers preferred banking services that were more personal.

-Kwan (1991) found that consumers enjoyed going personally to their financial institution to conduct business.

-Moutinho and Meidan (1989) found a group of customers who place a great deal of importance on the human factor in banking.

-Shortall (1987) found that the second main reason for not using an ATM was that respondents preferred personal service.

-Victoria University (1987) found that 49% of non-cardholders preferred contact with human tellers.

-Stanley, Berry, and Danko (1979) found that personal service was the most important factor for customers in banking.

-Pugh and Ingram (1975) found that resistance to ATMs occurs mainly because customers are receiving adequate satisfaction from the current human teller system.

The people-based branch environment is important for many customers, especially those who are older, less educated, and in blue collar occupations. For these people, dealing with humans is important in banking, and there is increasing resistance to more and more banking functions becoming mechanised.

For other customers, banking technology is attractive, especially those who are younger, more educated, and in white collar occupations.

Customers have different reasons for using different technologies. ATM use is below 50% of the population in most countries. The main reasons for using them is that they provide increased time and place utility. EFTPOS use is below 30% of the population in most countries, and banks are disappointed with their investments. This usage rate is low because most people are not clear on who benefits from EFTPOS: banks, retailers, or customers. Customers who do use EFTPOS like it for its convenience and security. However, other customers are concerned with the immediate debit aspect of EFTPOS. Home banking by computer is still in its pilot stages in most countries. Adoption is hampered by the costs involved for customers - which perhaps indicates a market for home banking by telephone. Customers, however, are very much interested in home banking by computer if it is cheaper than the other banking alternatives, especially for obtaining information on their accounts (balances etc).

Smartcard appears to be a favourable technology for banks (who save on communications costs) and customers (who gain through increased security). However, with the exception of France, Smartcard is fairly much unknown to the market and therefore it is difficult to gauge customer acceptance. One fact stands out, however, and that is that banks have invested large amounts of money in magnetic stripe technology and therefore are likely to be less enthusiastic about introducing a technology such as Smartcard which makes this investment redundant.

CHAPTER IV

EMPIRICAL STUDIES RELATING TO THE FUTURE OF RETAIL BANKING

4.1 INTRODUCTION

From a marketing information point of view, some of these futuristic studies may be of little value because, given the time elapsed between the time of the study and the time of this literature review, the future is now. However, such studies are useful to review from a methodology point of view, and to identify the issues of interest to researchers. Therefore, the aim of this section is to analyse critically these studies from the point of view of the conclusions drawn and the methodology used.

4.2 EMPIRICAL STUDIES RELATING TO THE FUTURE OF RETAIL BANKING

Mason and Mayer (1979) conducted a study in 1978. Mail questionnaires were distributed to selected members of the Young Bankers Association of one south eastern state in the U.S.A. Respondents had not necessarily been in banking for a long period (80% had been in banking 1-10 years). However, the experts were chosen because (presumably) they would be the individuals who would most likely be making senior management decisions by 1985.

The findings of this study suggested that competition, regulation, and technology would be issues of importance in the macro environment in 1978. 40% of experts considered it very important to understand the impact of government and regulation on business, and 36% considered it important. 56% of experts considered it either very important or extremely important that a firm keep up with technological developments in their area, and 35% considered it important. 67% of experts considered it either very important or extremely important that a firm monitors its competitors, and 30% considered it important.

Respondents were then asked to identify the importance of issues in 1985 (ie 7 years into the future). Results are shown in Table 4.1.

Table 4.1 Management Perceptions of the Importance of Selected Issues in 1978 vs 1985 (%)

Issue	Same importance in 1985 as now	More important in 1985 than now	Less important in 1985 than now
Consumerism and banking	15.5%	75.7%	8.7%
Government and regulation	18.6%	77.5%	3.9%
Revolutionary technological changes affecting banking	14.7%	83.3%	2.0%

Adapted from: Mason, J and Mayer, M. Bank Management and Strategic Planning for the 1980s. *Long Range Planning*, Vol 12, August 1979, p38.

The experts were then questioned on their perception of the environment in 1985. The majority of experts agreed that, by this time:

-Remote handling of money will be well advanced and customers will make cash transfers without leaving their homes.

-EFT systems will allow electronic "branches" in all major stores.

-Expansion of banks will be more through increasing penetration of current markets than new branches.

In hindsight, the fact that even by 1990 these events have not occurred, may place a question mark over the "expertise" of the participants.

A study by Catherine Smith (1984), which was conducted in 1982, obtained information by means of personal interviews with experts in the U.K. This study is important to the literature because the length of time being forecasted (20 years) is longer than any other study. Experts from 28 technology companies and 22 banking institutions were interviewed. However, rather than obtaining combined opinions, separate questions were targeted at the two groups. Smith examined many issues relating to the future of banking in general, however, only those of relevance to the topic of this thesis are discussed under the following headings.

Product Delivery

Issue 1: How important will the conventional bank branch be in the delivery of bank services in the next five, ten, and twenty years?

Branches will remain important in the short term. In the medium term, their significance in bank delivery systems will decrease. However they will not become insignificant. Self-service machines and automated branches will be an *addition* to the network, not a replacement.

Issue 2: Where and how soon will most customers have access to remote banking?

Unmanned branches will be slow to come. Banks will be reluctant to set them up in new sites since this is where it is important to establish personal relationships. ATMs and EFTPOS will dominate up until 1995. By 2000 ATM and POS terminals will be in most retail areas.

Issue 3: Which retailer groups are likely to be the users of EFTPOS in five, ten, and fifteen years time?

The petrol stations will come first, followed by retail chains, clothing chains, airport ticket desks and car hire companies. The cost/pricing of EFTPOS will dictate the timing of its implementation. The great unknown is the response of the customers.

Issue 4: When will the majority of bank customer categories use home banking services?

In terms of usage penetration (high/medium/low), home banking will be used by:-

-Large companies: high by 2000

-Small businesses: high by 2000

-High net worth individuals: medium by 2000

-General customers: Low/medium by 2000

Currently the main problems with home banking relate to security, lack of a fee paying market, and difficulty in charging for the service.

Issue 5: The development of services through electronic delivery systems.

Table 4.2 shows what technology suppliers perceive as being the future for terminal activity by the year 2000.

Issue 6: Will card-based accounts become more common than passbook accounts within five, ten, or twenty years?

Suppliers agree that in about ten years, most countries will have phased out passbooks in favour of cards.

Issue 7: In which countries will the use of paper (cheques and credits etc) become insignificant in comparison with other forms of money transmission within five, ten, and

twenty years?

Table 4.2 Terminal Activity by 2000

Services Available Through Terminals	Manned Terminals	ATM	Unmanned Terminal or Home Banking
TRANSACTIONS			
Cash withdrawal	*	***	
Deposit transactions	**	**	
EFT	**	*	**
Account to account transfer	*	*	**
Foreign currency dealing	**	*	**
OTHER SERVICES			
Loan quotations	**	**	
Loan authorisation	**	**	
Mortgage quotation	*	*	
Mortgage authorisation	*	*	
Quotations for assurance/insurance/pensions etc	*	**	

Importance of access mode: *** very important
 ** important
 * unimportant

Adapted from: Smith, C. *Retail Banking in the 1990s: The Technology Suppliers' View*. Lafferty Publications, London, 1984, p44.

Technology suppliers suggest that paper will never be entirely eliminated because it suits human beings (especially when paying bills by post). However the actual paper clearings will be replaced by cheque truncation. Technology suppliers claim that this area ie

paper handling, is where the real cost-saving potential exists. They also claim that banks are not ready for radical changes in the area of paper handling because they pay more attention to more glamorous developments, such as EFTPOS and home banking.

Many bankers are hopeful that EFTPOS will reduce the use of paper-based funds transfer methods. However, this demands a nationwide system. In the U.S.A, for example, cheques will persist for a long time because the fragmented nature of the banking system will retard effective nationwide EFTPOS.

Competition

Issue 8: Which groups are likely to own EFTPOS terminals and networks in the next five, ten, and twenty years?

Technology suppliers suggest that, by 1995, the oil companies, food supermarkets, general retail chains, consortia of travel agents, and equipment suppliers will own terminals. Communication authorities and equipment suppliers will also own networks.

Issue 9: Who will be the chief suppliers of home banking services in five, ten, and twenty years?

According to technology suppliers, home banking will be offered in the short term by major banks (on a pilot basis), savings banks, and building societies. In the medium term it will be offered by major banks (due to competition from other sectors) and mail order companies (as a payment mechanism for teleshopping). In the longer term it will be offered by other financial institutions (as part of a general financial information package) and mail order companies (as a mass market banking service).

Equipment, Techniques, and Security

Issue 10: Present day self-service banking is based on magnetic stripe card technology. What new technologies will become important in five, ten, and twenty years?

Technology suppliers believe that the magnetic stripe card will remain for some time - due mainly to the fact that banks have invested large amounts in the technology. The magnetic stripe card will co-exist with the Smartcard and laser card.

Magnetic stripe cards, however, are insecure. Technology suppliers suggest that in ten years time signature recognition will be available and within twenty years, voice recognition will be available.

Issue 11: What will be the dominant delivery mode of home banking services in five, ten, and twenty years?

Over the next ten years, videotex and intelligent telephones with printers are likely to be equally important. In most cases remote banking will use telephone networks.

Issue 12: Security in banking, and electronic delivery.

Suppliers state that the security aspect will become an increasingly important responsibility for bank management. One bank suggested that banks are not attempting to develop perfect systems, they are simply trying to stay a few years ahead of the criminals.

Security can be provided by physical means (eg photographs, embossed holograms) or electronic means (eg fingerprint identification, the "watermark" card).

General Forces Affecting Change

Issue 13: What are the main factors which affect the pace of technological change in retail banking?

Table 4.3 shows those factors affecting change, as ranked by suppliers and bankers. The most important factor in promoting change is competition. Consumer resistance rates as *least* important. This finding would appear to be consistent with Hypothesis 2 of this thesis.

Table 4.3 Factors Affecting Change

Promoting change	
**	cost pressures
***	competition in the market
***	cheque and credit card fraud
**	cooperation between financial institutions
**	external imposition of standards on equipment and software
**	availability of software
Retarding change	
**	implementation difficulties
**	size of installation
**	lack of industry standards
**	software development problems
**	user and consumer education difficulties
**	inertia of bank staff
**	inertia of bank staff
**	inertia of bank structures
**	conservatism of management
*	customer resistance
Key:	
***	very important
**	important
*	unimportant

Issue 14: What will be the main factors in establishing EFTPOS?

The main factor, which is unknown, is customer response. Other factors promoting EFTPOS include:

- Cash risks at petrol stations
- Credit card and cheque fraud
- Cost of cheque clearing
- Cash handling costs for retailers
- Government interest
- Active selling of EFTPOS by retailers

Factors retarding EFTPOS include:

- Failure to agree on cost sharing
- Lack of industry standards
- Loss of float for customers (ie 24 hours grace)
- Customer suspicion
- Communications difficulties

Issue 15: Will banking be technology led in the next twenty years?

Expert opinion: Suppliers believe that bankers will, in the main, continue to be relatively uninformed about technology over the next ten years, although at the end of that period there will be more awareness among bankers of how to use technology, especially from a marketing point of view. In twenty years time, technology will no longer lead bankers.

Elliot's (1986) Australian study is interesting from New Zealand's point of view since several Australian banks have a controlling influence in New Zealand banks, and therefore the opinions of these experts may have a flow-on effect to New Zealand. Also, from a methodology perspective, this is the only published application of Delphi in banking.

Apart from exploring a range of forecasting techniques, one objective of the study was to produce a detailed picture of the "most likely" future of the banking industry over the period 1982-1992. The research, however, was not targeted directly towards technology. A panel of approximately 70 respondents participated in the study from backgrounds such as: academia, banks, trade unions, economics, consultants, and representatives of building societies, credit unions, finance companies, and the Reserve Bank. Given that the study was not targeted directly at technology, it is not unexpected that there was an absence of technology suppliers in this sample. The most likely profile of the future banking environment emerged as:

- *More intense competition

- *A reduction in Government intervention

- *Entry of new competitors

- *A "zero-sum game" amongst competing organisations

- *Competitive strategies will be dominated by "absorption" and "parasitism"

- *Oligopoly will continue to be the industry structure

- *Marketing innovation will be used increasingly as a competitive weapon

- *Competitive boundaries will become less clear

Like Mason and Mayer (1979) and Smith (1984), competition, regulation, and technology emerged as being issues of importance. The study also suggested that the EFTS/payment system area will be the main area of competition between the banks and the non-bank financial intermediaries (NBFI's) and amongst the banks themselves. Table 4.4 shows the experts' predictions in the area of payment systems/EFTS.

Table 4.4 Payment Systems/EFTS

Trend (1982 = 100)	1987		1992	
	Median	Range	Median	Range
<i>Events (probability)</i>				
NFBI's establish ATM networks of 100 or more	(%) 79.8	(%) 52-92	(%) 98.3	(%) 86-100
NBFI's join Bankcard	9.7	0-21	10.1	0-30
Bankcard operates as a debit card	30.5	20-49	59.8	48-78
New banks join clearing house	73.9	51-89	97.9	82-100

Adapted from: Elliot, G. The Changing Competitive Environment for the Australian Banking/Finance Industry: Review of a Forecasting Study. *International Journal of Bank Marketing*, Vol 4, No 5, 1986, p35.

Experts were also asked in what areas they expected marketing innovations. Their responses are shown in Table 4.5. Perhaps the most unexpected finding in this table is the expectation of bank branches adopting retail hours ie late nights and weekends.

Clearly there must be underlying factors causing the changes outlined in Table 4.5. The experts suggested that the main factor is competition, and predicted increases in several areas of competition as a result of deregulation. Increases were expected in the numbers of trading banks. Declines, however, were expected in the number of building societies, credit unions, and finance companies. The experts expected the retail banks to increase their share of business at the expense of building societies, credit unions, and finance companies.

Table 4.5 Expected Marketing Innovations

Trend (1982 = 100%)	1987		1992	
	Median	Range	Median	Range
<i>Events (probability)</i>	(%)	(%)	(%)	(%)
Electronic home banking	10.2	5-25	51.3	32-76
Alternative payments mechanism	11.2	4-21	31.8	21-51
Bank branches adopt retail trading hours	21.3	11-38	48.8	23-60
Nationally operating bank first pays interest on cheque account	52.3	49-80	89.7	79-96
Banks commence limited service "money shops"	70.0	49-85	91.8	62-100

Adapted from: Elliot, G. The Changing Competitive Environment for the Australian Banking/Finance Industry: Review of a Forecasting Study. *International Journal of Bank Marketing*, Vol 4, No 5, 1986, p36.

Overall it can be seen that Elliot's work provides a useful backdrop to this thesis, despite the absence of input from technology suppliers. It has been suggested by some critics, however, that the pace of change in all areas has been more rapid than expected, and these developments may well have largely invalidated the survey findings. Elliot argues that this is not altogether correct. He makes two points:

- * A forecast which is expressed in terms of an "a priori" probability distribution can never be proven to have been "right" or "wrong" by the outcome.

- * The "gestalt" of the forecast ie the indications of a less regulated and more competitive industry - remains valid.

It is important to realise that the principal concern of this study was to examine critically a range of long-range forecasting techniques: Delphi, search conference, and cross-impact analysis. This analysis demonstrated *inter alia*, the common failures of futures research to recognise the ability of organisations to behave purposefully in choosing their desired futures, and the consequent likelihood of frequent changes in the fundamental systems-environment relationships. Sack (1974) had a similar objective of comparing Delphi to other forecasting methods when looking at the future of the *commercial* banking sector (as opposed to the retail banking sector). Three Delphi groups and three Committee groups forecasted economic variables. All indications were that the Delphi method was superior to the Committee method.

Rule and Sedgwick (1986) reported on two Delphi studies conducted by Arthur Anderson and Co in the U.S.A and Europe. The findings can be broken down into several areas.

Competition

The experts in both countries anticipated that while retail banking will remain the major source of profits, there will be increased competition from nonbank organisations. High net worth individuals are likely to become the province of specialists.

Future Products and Services

Nonbank competition will prompt greater product diversification from traditional banking institutions. Both the U.S and European bankers agree that the best response to competition is to develop and concentrate on specific products, and marketing/product development will be a key to maintaining profitability in the future.

To meet the increased competition banks planned to reduce the number of branches. The remaining branches will be turned into 'one stop' convenience centres where the emphasis is on cross-selling.

Technology

The European and U.S bankers agreed that technology will be crucial to the success of banks over the next ten years. Expenditure on technology will increase more rapidly than other expenses. At the same time, however, this new technology will reduce costs and improve productivity.

The experts stated that competitive pressures from nonbanks was the main reason for investing in technology. Table 4.6 shows the main reasons for investing in technology.

The use of ATM's is expected to continue to grow rapidly in Europe and the U.S. Europeans expected greater growth in EFTPOS than the Americans, although predictions are less dramatic than for ATM's. More specifically, the study reported that respondents believed that more than 50% of personal customers would regularly use ATMs to execute transactions. By 1995, over 40% of respondents believed that this figure would have risen to more than 75% across Europe.

The majority views suggest, in the technology area, that:

-POS terminals will be used by more than half of bank customers by 1995, by which time retailers will own up to 25% of POS networks

-About a quarter of retail customers will subscribe to home banking systems by 1995

Table 4.6 Reasons for Investing in Technology: European and U.S.A Views

Reasons	Europe	U.S.A
Reduce operations cost and improve productivity	96%	95%
Improve competitive position	97%	94%
Achieve economies of scale	91%	91%
Respond to nonbank competition	68%	81%
Respond to bank competition	92%	81%
Respond to customer requests	83%	81%
Increase fee income	73%	77%
Attract and retain quality personnel	61%	60%
Respond to bank personnel requests	50%	46%
Automate the lending process	NA	41%
Improve product delivery methods	95%	NA

Source: Rule, J.E and Sedgwick, M.J. Europe Meets America on the Bottom Line. The Southern Line. *Southern Banker*, August 1986, p18.

Arthur Anderson and Co (1989) conducted a study which is of vital importance to the literature because it is the only published study which is concerned solely with the area of technology; in that sense this study comes closer to the topic of this thesis than any other. For this reason Arthur Anderson's study warrants significant documentation.

Personal interviews were conducted with both banking executives and technology suppliers in Australia, in an attempt to ascertain the shape of technology in the 1990s. These experts (the exact definition of which is unknown) were chosen on the basis of availability.

Overall the study found that the 1990s will be characterised by management concentrating on consolidating and expanding market share while also exerting considerable effort in managing internal profitability and cost structures. This phase has been labelled as the period of "focused management" and will be concerned with two factors:

- * A renewed market orientation

- * Operational considerations

Both these factors have significant implications for technological investment.

1. Renewed market orientation: The key revenue enhancing strategies will include ensuring optimum use of the existing customer base and the expansion of profitable segments within this base - to ensure future growth. Central to the achievement of these goals by the banks is the development of integral customer information systems (CIS). Information will be classified according to customer type rather than product type. This will enable pricing without cross subsidisation.

2. Operational considerations: The main concern of management will not be so much on cutting costs, but on the efficient allocation of resources in order to meet profitability objectives. Therefore, when considering technology, an understanding of the relationship between investment and subsequent returns will become increasingly important.

Planning needs to become more sophisticated if resource allocation is to be optimised; this includes integrating the technology plan into the strategic plan, and then monitoring the plan to ensure goals are met.

Technology may result in staff savings. Rather than making staff redundant, they could be redeployed to areas of improving customer service and marketing.

The respondents in this study consistently stated that they were not getting as high returns from technology investment as anticipated.

According to these researchers, banks' retail customers obtain services through a combination of customer delivery technologies and branch resources. The nature of the supporting communication networks and processing environments are determined by how technology is used.

1)The Retail Branch

Branches are still the primary means of product delivery. However, branch costs continue to rise, mainly in the area of :

- * "Bricks and mortar" capital costs
- * Operational costs, comprising largely staff costs
- * Processing inefficiencies

Bank experts in the study suggested several ways in which they planned to control costs in the future:

-Bricks and mortar costs: Banks planned only modest reductions in the size of their branch networks in the short term, preferring instead to increase productivity through revised clerical procedures and use of technology.

-Operational costs: Banks planned to have a two-tiered branch structure. Suburban branches would make greater use of technology to deliver services to the mass consumer market (however the branch will still have some human staff).

High net worth individuals, who require more specialised banking relationships, will be serviced by branches at a regional or area level. These branches will have less technology and more highly trained staff.

-Increased automation: More back-office functions would be automated.

-Improved marketing capabilities: A number of the experts were concerned with the poor marketing capabilities of branch staff (especially in the area of cross-selling) and suggested that in the 1990s staff will be provided with product information facilities as part of the increased intelligence of the future branch work-station.

2) Non-Branch customer delivery

ATMs: According to the experts, the rapid growth in ATM investment is showing signs of reaching a plateau. EFTPOS will reduce the need for ATMs because they reduce the need for cash. This change, however, is expected to occur slowly.

The experts suggest that in the 1990s a revolution will take place in ATM use. They pointed to several factors encouraging change:

-Equipment will become cheaper, meaning more ATMs will be deployed.

-Institutions will begin placing more and more of their ATMs in-lobby, as they try to attract customers back to the branch.

There will be increasing demand for off-premises banking facilities eg clubs, office blocks etc. These devices will not be full ATMs, but will be cash dispensers only. This equipment will be owned by the third party, and the banks will simply provide the processing network.

EFTPOS: Most of the experts in the study regarded EFTPOS as being unsuccessful so far due to low volumes. Experts suggested that low volumes are due to restricted card (ie debit cards and not credit cards) and network access, a lack of support from principal retailers, and a lack of agreement over who bears the costs involved. The study suggested that the long-term success of EFTPOS depends on the retailer, who must encourage the customers to use it.

Costing of EFTPOS will continue to be an area of debate. Originally, EFTPOS terminals were stand-alone and paid for by the banks (the retailers were unwilling to pay for them). Now, however, most of the major suppliers of EFTPOS equipment supply electronic cash registers with a built in card reader and PIN keyboard - which is far less costly. As retailers replace old cash registers with the newer versions, they may automatically pay for EFTPOS facilities as part of the package.

The second major cost concern of EFTPOS relates to the network communications cost.

Card issuers suggest three means of recovering these costs:

- Charge the retailer on a per-transaction basis

- Charge the retailer a monthly fee which is independent of volume

- The card issuer or retailer may charge the customer for EFTPOS - but this would discourage use. For this reason, the card issuers considered this option infeasible.

Despite the fact that EFTPOS has been of dubious success to date, the experts from the major institutions, and half of the technology suppliers, anticipated substantial future growth of EFTPOS. The other half of the suppliers suggested EFTPOS would remain dormant for at least another ten years.

Non-cash lobby devices: Experts pointed to the emergence of non-cash lobby devices to reduce branch costs and focus staff resources on selling products. Branch functions likely to be automated include:

- Handling customer product enquiries
- Supplying investment advice
- Processing cheque book requests; and
- Credit scoring of loan applications

Support for these devices, however, tends to come from technology suppliers rather than banks. Banks prefer these activities to be handled by tellers.

Smartcard: Experts from financial institutions accept the idea of widespread use of the Smartcard being inevitable and only the timing of its introduction and the range of its applications remain to be decided. The development of this attitude has been encouraged by an increase in magnetic stripe card (debit and credit) fraud and bad debts. Technology suppliers intend concentrating their Smartcard marketing on retailers and public authorities, rather than financial institutions.

Although financial institutions see Smartcard's arrival as being inevitable, they are doing very little (in the marketing area) to prepare for this arrival. Arthur Anderson and Co suggest that this may result in an "ill-planned scramble for customer related benefits from the technology" soon after its introduction. They suggest that Smartcard offers the financial institution savings in hardware and communication costs. However, the Smartcard must be developed further so that it can offer value added services to the customer.

Home Banking: Experts from financial institutions believe that the critical success factor in retail banking is to provide convenience to customers; hence the interest in home banking. Only a small group of institutions operate home banking facilities, and even then it is on a pilot basis. However, executives from these institutions anticipated steady growth within select markets. The bulk of institutions do not provide home

banking, and experts from these do not plan to in the future. They believe that only a small segment of the retail market favours the idea, and that home banking requires too big a shift in customers banking habits. Banking experts, however, are much more optimistic over telephone banking and are preparing for a large scale acceptance of the technology.

The technology suppliers have mixed feelings over the future of home banking. The larger suppliers suggest that equipment costs and lack of user friendliness will be major obstacles to overcome before generating large scale demand.

Other Technologies

Arthur Anderson and Co's study went beyond self-service technology and also looked at back-office technology. While this area is not the immediate concern of this thesis, it is still important to at least have a partial awareness of what is happening in other areas in order to have a global perspective of technology developments. This is necessary in order to obtain a greater appreciation of self-service technology in the overall technology structure.

The two major classes of technology supporting product delivery are:

- *Communications networks

- *Host processing

Communications Networks

Financial institutions in this study believed that there is significant potential for cost savings in the communications network. One means of achieving this is by integrating, or rationalising, internal networks so that EFTPOS, ATMs, teller terminals etc can run off the same network - allowing for compatibility and information exchange. Financial experts suggest that achievement of this goal goes well beyond the 1990s.

Another means of cost saving is through inter-bank integration (ie shared networks). Bank experts are investigating the potential of "Packet Switching Networks" (PSN) which would mean only one communication point between each financial institution and the network. Transactions are received, grouped into packets, and delivered across the network to the relevant financial institution in the most efficient manner. This development is not expected in the 1990s.

As more and more banking transactions become electronic, bank experts are becoming more concerned with network security and intend, in the future, spending increasing amounts on providing adequate security - with encryption at the point of origin being a future option.

The Host Environment

At present, most host processors are centrally sited simply due to economies of scale and the presence of skilled technical support. Experts from financial institutions suggest that the future will see fully distributed data processing and storage ie centralised hosts will be supplemented by other processors located in separate geographical areas. The argument here is that if the on-line network crashes, only a particular geographical area is affected.

Experts also suggest a move towards further off-host processing - known as "co-operative processing". This occurs when part of a transaction is processed at the point of origin, and part is processed at the host (eg currently ATMs handle the PIN validation process and the host handles funds authorisation and account updating).

Other Emerging Technologies

Financial institutions plan to invest a large amount of money in cheque truncation over the course of the 1990s. This procedure means that, when a receiving bank receives a cheque domiciled at another bank, it sends a record of the cheque details to the owning bank (rather than sending a physical cheque). This has the potential to save much money

in reduced paper handling.

A similar technology, which experts believe will follow cheque truncation, is image processing. This means that images of cheques will be captured and stored on an optical disk. This technology overcomes the storage and retrieval problems of micrographics.

Roth and Van Der Velde (1989) conducted a study in 1987 relating to the future of banking in the U.S.A. Mail surveys were sent out to 1244 American retail banks, with a response of 117 (10%). Clearly, the results of this research could be subject to a great degree of non-response bias. Questionnaires were directed towards the senior executives in retail banking. The aim of the study was to ascertain how industry leaders plan to invest in technology in order to remain competitive.

The study was short-term and extrapolative in nature - examining current activities in technology and assuming this will continue into the 1990s.

According to this study, bankers anticipate that in the 1990s self-service technology such as ATMs will be conducting the vast majority of routine depository transactions. Technology will have an important part to play in the delivery of more information-based products.

An unexpected finding was that, during the 1990s at least, bankers anticipated that upgrading and increasing bricks and mortar branches would dominate their capital expenditures.

Bankers were asked to rank 19 capabilities that may be important to competing in the market up until the mid 1990s. The results are interesting because of their implications regarding technology. The factor which emerged as being most important was courteous service. This is an appropriate finding when one considers the large number of customer complaints about impolite and inefficient tellers in Marr and Prendergast's (1990) New Zealand study. Roth and Van Der Velde suggested that the extent to which technology influences the customers' perception of courteous service is a vital consideration for

banks pursuing a strategy of both courteous service and high technology.

The capability to deliver a consistent level of quality was the second most highly rated critical success factor. Again Roth and Van Der Velde suggest implications for technology since technology-based delivery channels may play a strategic role in assuring reliability, in contrast to the more heterogeneous levels of service delivered by human tellers.

4.3 SUMMARY

The literature suggests that the future of banking will be one in which bank staff are replaced by technology. Sooner or later this will be met by a reduction in the number of "bricks and mortar" branches, as the concept of a cashless and branchless society becomes more of a reality. The sale of information to customers will become just as important as the sale of products. The main factor driving change will be increased competition, which is likely to result from increased deregulation.

Ironically, it appears that as banks use technology to compete amongst their direct competitors, banks as a group are reducing the boundaries between themselves and other organisations wishing to become retail bankers because they eliminate the need for what is currently a major barrier to entry into the retail banking market - a branch network. This is ironic because actions aimed at combatting competition may in fact result in increased competition from outside the immediate banking sector.

Another problem is that increased technology means increased communication, which may result in security risks. Banks plan to spend increasing amounts in the area of security.

Several trends emerged from a research methodology perspective. Experts from both banks and technology suppliers are the most common means of obtaining scenarios on the future in banking. This is probably because of the turbulent environment and therefore the inappropriateness of extrapolative methods of forecasting. The research

methodologies are subject to criticism in the areas of reliability and validity, and sample selection procedures. Experts tend to be chosen on the basis of availability, with no or little regard to their being representative of the population. In addition, no consideration is given to obtaining the views of indirect environmental groups (such as consumer welfare groups) in the research. In this sense the studies take on a narrow perspective, perhaps as a result of banking having until now been a regulated industry in most countries, and assume that the banking industry will operate in a vacuum. The mail surveys suffer from low responses, especially in America. This introduces non-response bias.

Delphi seems to emerge as the 'least worst' of the forecasting techniques used in the banking area. This assertion is supported by the studies of Sack (1974) and Elliot (1986), which compared Delphi against other forecasting techniques, in the banking industry.

Given the qualitative nature of the work, it is not unexpected to find that the range of statistics used to analyze the data is fairly limited - usually in the form of frequencies, ranges, and medians. Both mail surveys and personal interviews are utilised, with no clear indication of which is more appropriate.

The topic of the studies tend to be general in nature, covering the overall future of banking, rather than one specific aspect of banking. None of the studies has made a specific attempt to forecast diffusion levels for self-service technologies, human tellers, and the branch network. One would assume, however, that consideration of one technology cannot be made without consideration or reference to the others. It appears that competition is guiding the level of investment in technology, rather than any specific consideration of likely consumer response.

The literature suggests that three factors are critical to the future diffusion of self-service technologies in retail banking. Similarly, three sources of knowledge must be tapped in order to understand the content of these factors.

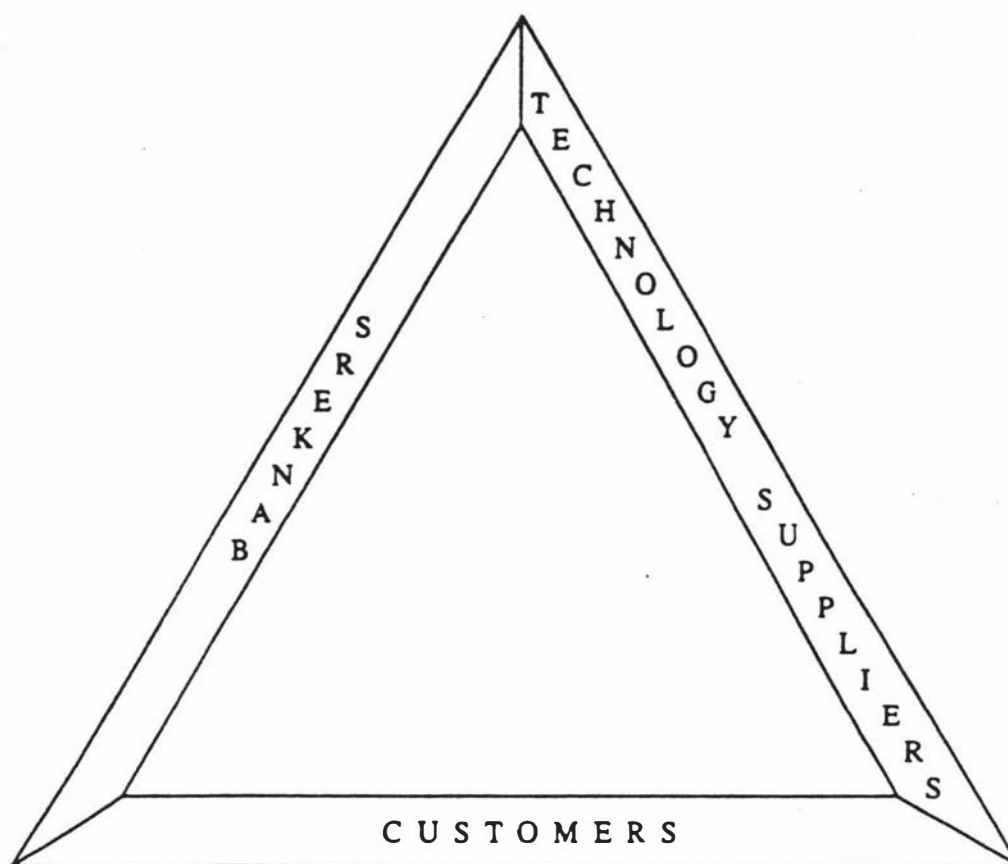
Factor 1: Existence of the technology (knowledge sourced from experts within those organisations).

Factor 2: Belief in this technology by bankers (knowledge sourced from experts within banks).

Factor 3: Adoption of this technology by customers (knowledge sourced from representative groups of consumers).

This has led to the development of the idea of the "metamorphic triangle", as illustrated in Figure 4.1.

Figure 4.1 The Metamorphic Triangle



Beyond this triangle are the constituencies or the indirect groups in society, such as the consumer welfare groups. To date, no single study has examined Roger's (1962) concept of disenchantment discontinuance in the diffusion of self-service technologies by profiling the current and future use of self-service technologies and the branch network in banking to the year 2010. In addition, no study has simultaneously obtained the views of all three members of this triangle, plus the indirect influencers (ie technology experts, banking experts, customers, and constituencies). Therefore, the correction of this deficiency is the goal of this research.

CHAPTER V

THE DELPHI TECHNIQUE

5.1 INTRODUCTION

Before embarking upon research which utilises a particular technique, a thorough understanding of that technique and its alternatives is required. More importantly, limitations of the technique must be understood, so that one can draw boundaries as to the potential usefulness of the findings of the study, and improve those areas which other researchers have identified as being sources of weakness/potential improvement.

Futurology, or the attempt to describe and then ascribe a timescale to the future, is not new. No method is generally accepted as being satisfactory in all circumstances. The further ahead one tries to see the more difficult it becomes, and the less confident one is of simply projecting forward from past experience or current trends. Yet, more and more business people are exhorted to plan for the future, and not allow themselves to be simply buffeted by events. The very concept of marketing embodies this principle.

5.2 FEATURES AND HISTORICAL DEVELOPMENT

Features of the Delphi Technique

According to Linstone and Turoff (1975), Delphi may be characterised as:

".....a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem.

To accomplish this "structured communication" there is provided, some feedback of individual contributions of information and knowledge, some assessment of the group judgement or view, some opportunity for individuals to revise views, and some degree of anonymity for the individual responses."

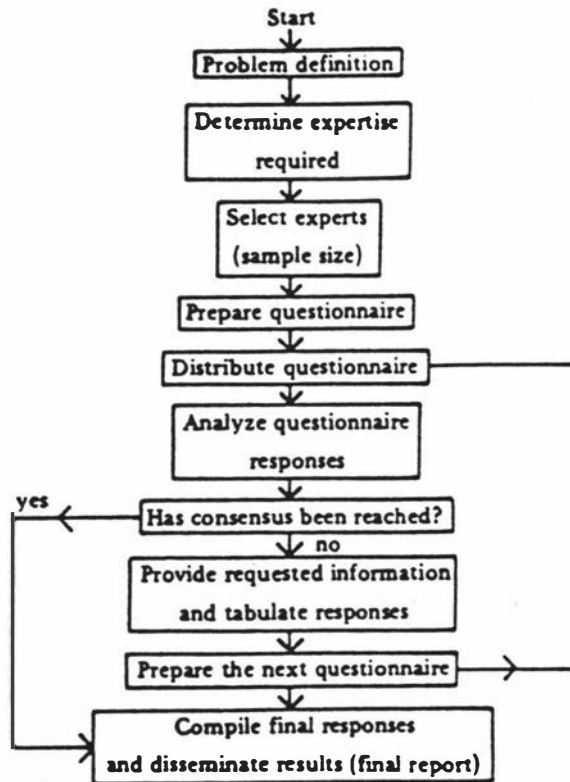
The central aim is to eliminate any direct confrontation of the experts, and to allow their projections to reach a consensus based upon increasing amounts of information becoming available.

Linstone and Turoff (1975) claim that the following circumstances can lead to a need for the Delphi technique:

- I. The nature of the problem means that collective subjective judgements are more appropriate than precise analytical techniques.
- II. The individuals needed to contribute to the examination of the problem have no history of adequate communication and have diverse backgrounds regarding experience or expertise.
- III. So many individuals are needed that it would be inappropriate to interact in a face-to-face exchange.
- IV. Time and cost requirements are such that frequent meetings are infeasible.
- V. The potential for disagreements among individuals is so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured.
- VI. The heterogeneity of the participants must be preserved to assure validity of the results ie avoidance of domination by quantity or by strength of personality (the "band wagon effect")

Tersine and Riggs (1976) have illustrated the Delphi process diagrammatically, as shown in Figure 5.1 below.

Figure 5.1 The Delphi Process



Source: Tersine R.J. and Riggs W.E. The Delphi Technique: A Long-Range Planning Tool. *Business Horizons*, April, 1976, p53.

Several steps are required before questionnaires can be administered. The problem must be defined and the level of expertise determined. Tersine and Riggs (1976) suggest five basic criteria which should be considered when selecting experts: They must:

- Have a basic knowledge of the problem area
- Have a good performance record in their area
- Possess a high degree of objectivity and rationality
- Have the time available to take part in the program to its conclusion.

The actual composition of experts must also be considered. If the problem area is highly technical, most of the experts would need technical expertise. If the problem is more abstract in nature, participants who are generalists may be desired.

The sample size will depend on how homogeneous the respondent group is. As the degree of homogeneity declines, a larger number is necessary to achieve the level of quality desired by the researcher.

Respondents may be contacted before distributing the first questionnaire. They may be told the purpose of the study, the part they will play in it, and how their unique abilities are important in the total effort. The questionnaire itself may state the primary problem in general terms or specific terms - specific terms is desirable but not always possible, since the future is still uncertain.

The second questionnaire is formed from the composite of responses from the first questionnaire, along with any misconceptions on the part of respondents, and some measure of central tendency (usually mean or median) and range. Each individual expert is then asked to revise his/her opinion based upon the new data from his/her peers. Should an expert's opinion/estimate fall outside the range, he/she should either conform or give justification for his deviation. These justifications are distributed to remaining experts in the next round so that they have the opportunity to voice their disagreement if necessary. By providing feedback it is hoped to achieve convergence of opinion. Parente *et al* (1984) had mixed attitudes to feedback. The aim of their study was to determine which components of the Delphi method contributed to forecast accuracy. Their data indicated that amalgamation of a group forecast was both necessary and sufficient to enhance accuracy beyond the range of the individual panel member. In addition, iterative polling interacted with amalgamation to improve accuracy of 'when' type predictions. Providing consensus-feedback, however, was neither necessary nor sufficient to increase accuracy.

The number of questionnaires varies, but Tersine and Riggs (1976) suggest that a minimum of three is necessary to achieve a reasonable consensus of opinion. A study

by Erffmeyer, Erffmeyer, and Lane (1986) found that Delphi groups reach stability after the fourth iteration. This study also suggested that, despite reducing the amount of administrative work, reducing Delphi to two rounds would result in incomplete results. However, a study by Barnette, Danielson, and Algozzine (1978) found that the differences in variances generated by the second round of this survey were highly predictable from the first round item variances. This finding suggests that subsequent iterations may not provide additional information. However, the researchers suggested that this aspect of Delphi methodology required further investigation. Barnette, Danielson, and Algozzine also found that the time lag between rounds, ranging from several months to two years, did not seem to effect the response rates of the study.

Attrition Rates and Patterns of Responses

A major problem associated with Delphi panels is the tendency for high panel attrition. Typically, large numbers of the chosen respondents fail to return the first questionnaire, and succeeding smaller numbers of respondents return questionnaires at each iteration. This has been found by Barnette et al (1978) whose research had the specific objective of measuring the response rate of Delphi in the context of large samples. This study was related to education, and involved an initial sample of 2,865 experts. In the first round, 1,142 questionnaires were returned. The second questionnaire was issued to these respondents, and 255 were returned. The third questionnaire was issued to these respondents, and 69 were returned. Overall approximately 30 to 40 percent of the questionnaires were returned for each round of Delphi. Barnette *et al* suggest that, given the low final response to the third round, the initial sample chosen for a Delphi study must be large. This conclusion, however, may be misleading. It is possible that the response rate would have been quite different had the research been conducted in a different industry, or reminders had been issued to the experts.

One could assume that many respondents clearly find the Delphi exercise more burdensome than anticipated. The attrition rate is a crucial variable to consider, since high rates of attrition may mean that the final results are based upon an unrepresentative subset of the original sample or population. According to Hill and

Fowles (1975) no reported Delphi study has considered the problem of attrition in any detail by analysing the character of individuals who do and do not respond, or even by eliciting reasons for nonresponse. Furthermore, there is no literature relating to the actual pattern of responses to each round in a chronological sense. While Hill and Fowles made this comment in 1975, there has been an absence of literature relating to this area since that time. This is not necessarily unexpected since, as has been mentioned previously, Delphi, as a technique has received little notice in the literature since the mid 1970s.

Historical Development

The Delphi technique, which was named after the ancient Delphian Oracle, was originally developed at the Rand Corporation by Norman Dalkey and Olaf Helmer (1963). The first known Delphi experiment was carried out by the Rand Corporation in California in 1948 when it was used in an attempt to predict the outcomes of horse races. However, the experiment had several theoretical problems, which tended to obscure any real potential that Delphi possessed (Quade, 1967).

In the early 1950s, the Rand Corporation explored the effectiveness of using group information for short-term predictions of technological events (ie less than one year). Clearly the time span of one year cannot be considered long term, however this quasi-Delphi experiment made two observations which can be seen to be important in today's Delphi technique:

- That more accurate projection results could be obtained from combining individual responses.

- That preventions (ie keeping respondents anonymous) could be taken against individuals influencing the opinion of the group.

However, the first significant experimentation with the Delphi technique did not take place until 1953. This experiment was conducted by Dalkey and Helmer (1963). This

work was a highly confidential scheme known as "Project Delphi" and was undertaken when the Rand Corporation was contracted to forecast the international military situation between the years 1966 - 2015. The experimental subjects were a group of airforce atomic warfare experts (a more comprehensive description of "Project Delphi" can be seen in : Dalkey, N and Helmer, O. An Experimental Application of the Delphi Method to the use of Experts. *Management Science*, Vol 9, No 3, April 1963, pp458-467). "Project Delphi" had a panel of seven experts: four economists, one physical-vulnerability specialist, one system analyst, and one electrical engineer. There were five questionnaires in total, submitted at approximately weekly intervals. The experts were advised that they were not to discuss the study while the experiment was in progress. This was necessary in order to keep their identity anonymous, and to avoid any face-to-face confrontation which might result in biased opinions. Throughout the whole process of controlled opinion, feedback, and iterative questionnaires there was the opportunity for experts to reconsider or revise their previous judgements.

After five successive questionnaires, a convergence of opinion was identified. Table 5.1 illustrates results from one particular aspect of the study, which relates to the estimated number of bombs required to destroy the U.S.A munition outputs.

Table 5.1 Estimated Number of Bombs

Response	Answer		
	Smallest	Median	Largest
Initial	50	200	5000
Final	159	255	494
Corrected	167	276	360

Source: Dalkey, N and Helmer, O. An Experimental Application of the Delphi Method to the use of Experts. *Management Science*, Vol 9, 1963, p460.

This question was referred to as the "primary question". In a follow-up interview to this question, each respondent was asked to provide a breakdown of the number of bombs specified by him, and to reproduce some of the reasoning that went into his estimates.

In their critique of the experiment, however, Dalkey and Helmer (1963) suggested that:

-The experts' responses were not strictly independent, and it is possible that several experts discussed the experiment with each other while it was in progress.

-Some "leading" by the experimenters inevitably resulted from the selection of the information supplied by the experts.

-At least one of the experts was also used by the experimenters as a consultant on one aspect of the subject matter of the experiment.

Given the topic of this first notable Delphi study (and its subsequent confidentiality), it took a later effort to bring Delphi to the attention of people who were outside the immediate defence industry. This effort came in the form of a study by Gordon and Helmer (1964). The aim of this study was to obtain from experts predictions for periods of up to 50 years ahead for important areas such as scientific breakthroughs, automation, space progress, the probability and prevention of war, and future weapon systems.

A secondary aim of the study was to explore the methodological aspects of Delphi. This study, which used many of the techniques common in Delphi use today, set the trend in the early and mid 1960s for a number of individuals to begin experimentation in non-defence areas. Since this time the process of Delphi has been refined, although the central characteristics of the technique have remained unchanged.

5.3 DISADVANTAGES OF THE DELPHI TECHNIQUE

First of all it must be stated that Delphi, despite being a very specialised form of research, still has a large amount of literature - especially from the 1970s. Unfortunately, a large number of these items (especially in the area of Delphi applications) are inaccessible due to their confidentiality.

Several "pre-Delphi" studies were conducted before the technique itself was formalised. McGregor (1938) and Cantril (1938) both approached the area from a social psychological angle. They found that attempting to forecast using questionnaires gave respondents the opportunity to project personal values. McGregor suggested that the relative "expertise" of the expert does not impact significantly on the quality of predictions. Cantril made a similar suggestion saying that it is difficult for experts to be objective due to ego involvement.

Another pre-Delphi study was by Kaplan, Skogstad, and Girshick (1950) who aimed their criticisms at the use of experts. This is a particularly interesting critique, because it too was made before the Delphi technique had been formally developed. They investigated the use of experts in policy making, and suggested three questionable areas of prediction studies; the group of predictors, the questions asked, and the procedure. They pointed out several areas of concern, such as differences in questionnaire items which essentially related to the same area, subjective factors influencing the researchers' judgment, time constraints in selecting items, and the possibility of experts thinking differently under experimental conditions.

Quinn (1967) targeted his limitations at technological forecasting in general, rather than Delphi in particular. Four major problems were mentioned:

- 1) Unpredictable interactions: The interaction of several technological advances may lead to unexpected changes.

- 2) Unprecedented demands: Conditions in the future which one cannot foresee may result in whole new areas of primary and secondary demand. For instance, the development of the computer stimulated people to think of more complex problems which needed computation.
- 3) The discovery of whole new phenomena are fairly much unanticipated (eg lasers and penicillin). However, Quinn admits that the majority of discoveries are a result of "cumulative synthesis" ie a step by step development.
- 4) Inadequate data: This problem basically affects all research to a certain degree. Unless the forecaster has sufficient funds to conduct adequate primary research, cost considerations will limit the analyst's sample size, thus affecting accuracy.

Waldron (1970) investigated the relationship among conceptual level, time delay of information feedback, and performance in the Delphi process. Waldron recommended computerisation of Delphi, in which experts in the same room would feed their answers into terminals and receive immediate feedback. This, according to Waldron, would reduce the hazards inherent in time lulls.

Problems are also suggested with the use of Delphi results. Delphi should not be considered for routine decision making - its use is for issues which call upon wide and representative input.

Quinn (1971) had criticisms not aimed at Delphi in particular, but more at forecasting in general. He suggested limitations such as inability to forecast surprise events, inadequate or biased data, and unpredictable interactions.

Weaver (1972) made a substantial contribution to the critical literature on Delphi. He suggests that Delphi studies are uncritical. He points to the technical limitations of Delphi, stating that the method is subject to experimenter bias in collating and

summarising responses, subjectivity, and no checks on wording or order of items. Weaver makes reference to the problems inherent in summarising mass information into narrow forecasts, saying that there is a serious lack of any effort to probe beneath the surface for explanations.

Weaver states that Delphi is an intuitive forecasting tool, and as such has several inherent problems. He suggests that intuitive forecasting:

- employs collective opinion or intuition as basic inputs to the forecasting process;
- does not begin, as do extrapolations, with a demonstration of how future events grow out of specific present or past conditions;
- does not necessarily reveal the models upon which their authors base their opinions nor their sources of inputs to the opinion formulating process;
- thus reveals little in the way of an understanding about sources of bias, underlying assumptions, and the nature and validity of inputs.

The problem with Weaver's criticisms is that they are based on Delphi in its original form, which does not incorporate some of the modifications which can be seen in more recent versions of Delphi (for instance, asking experts to give a *reasoning* for their estimate).

Weaver suggested several changes to Delphi:

- Move away from mere description of events toward explaining events.
- Most likely drop anonymity, statistical feedback of dates and probabilities, and consensus forcing procedures (Weaver is doubtful of whether convergence improves the accuracy of a forecast).

- Add face-to-face interaction in order to ensure that assumptions and arguments are exchanged.

In other words, Weaver would change those factors which are fundamental to the Delphi technique.

Derian and Morize (1973) were concerned with Delphi's tendency to pool expert opinions. They used factor analysis to show that it is possible to have subgroups of experts with consistent opinions. Individuals tend to have a preference for what has happened in the past, and if something does not relate to past experience, they tend to be pessimistic (Martino, 1970). Weaver (1969; 1970) hinted towards this problem by stating that Delphi pays inadequate attention to psychological values.

Perhaps the most comprehensive Delphi critique to emerge from the literature was published by Harold Sackman in 1975. He examines Delphi in the context of standards set for psychological research and comes up with some constructive suggestions. For instance:

- Analysis of Delphi results should use known statistical techniques, such as factor analysis.
- One should attempt to ascertain the experience and qualifications of the experts, so that weightings can be attached to their answers.
- Panellists should be told what the current situation is, in order to establish a baseline for projections into the future (since panellists may disagree over what exists "today").
- Demographics of respondents should be ascertained.
- A record should be kept of any systematic sampling effects ie it should be known not only who pulls out of the survey or refuses to answer specific questions, but why.

- The researcher should be accountable for his/her interpretation of Delphi results (ie he/she should specify how the opinions were combined and any assumptions made).
- The reliability of the questionnaire should be examined (eg test and re-test reliability). Validity may also be examined by giving the questionnaire to a group of non-experts.
- The sample should be well planned (ie it should include experts from large and small institutions, rather than simply including experts on the basis of availability).
- The Delphi report should state whether scores varied for groups differing on age, sex, experience, etc. One cannot assume that the pooled opinion of experts is better than that of any sub-group of experts.

Sackman (1975) goes on to question Delphi in ten areas, and provide answers to these questions. These questions and answers are detailed below. Where possible the author has included cases both in favour of/against Sackman's point of view.

1. Is the Delphi concept of the expert and its claim to represent valid expert opinion scientifically tenable?

According to Sackman, the method by which experts have been selected is dubious. An empirical study is needed in order to ascertain if the results obtained using conventional Delphi with a panel of experts is better than (or different from) results that would be obtained using another population. He also suggests that collective expert opinion reinforces unaccountability. Also, how does one distinguish between an expert and non-expert? Sackman suggests that there is no proof that results from experts are more accurate.

2. Are Delphi claims of superiority of group over individual opinion, and of the superiority of remote and private opinion over face-to -face encounter, meaningful and valid generalisations?

Derian and Morize (1973) were also concerned with Delphi's tendency to pool expert opinions. Martino (1970) stated that Delphi represents a distinct improvement over either individual experts or face-to-face panels. However, Sackman points out that when looking for studies comparing groups and individuals, there is a near vacuum. Milkovich, Annoni, and Mahoney (1972) developed a case study to examine use of the Delphi technique in the area of manpower forecasting. They suggest that valuable data is lost because panellists are not permitted to interact directly. Waldron (1970) concluded from his study on information feedback delays that not performing Delphi in a face-to-face/group type situation does not necessarily detract from results. Dalkey (1969) made a comparison between face-to-face and anonymous Delphi interaction for almanac-type questions (in which the true answers were available). He found a statistically nonsignificant tendency toward more accurate opinion in the anonymous setting. However, Campbell in his 1966 dissertation found significantly better forecasting from his Delphi groups, compared with face-to-face confrontation.

3. Is Delphi consensus authentic or specious consensus?

Sackman suggests that the "feedback" process effectively rewards conformity and penalises individuality in order to arrive at a consensus (ie the bandwagon effect) - thus only the first round can be said to represent independent opinion. Bedford (1972) conducted a Delphi study relating to future home communication services. He found that there was no consistent statistical differences in forecasting results between housewives and experts. Bedford was moved to recommend dropping the consensus aspect of Delphi and instead having "controlled conflict" between contrasting groups. Dalkey (1969) supports this by saying that, once the panellist knows the median for a problematic item, he has in fact been given the "correct" answer to the problem.

4. Does Delphi anonymity reinforce scientific accountability or unaccountability in method or findings?

According to Sackman, research users should be aware of the limitations of Delphi, research directors need to be accountable for any flaws in the methodology, and experts should be accountable for providing incorrect scenarios on the future.

5. Does Delphi systematically encourage or discourage the adversary process and exploratory thinking?

Sackman suggests that arguments are filtered out in Delphi, so panellists can participate in the whole Delphi process without having to justify opinions (apart from major dissenters).

6. Are Delphi questions precise and meaningful?

Since questions tend to be open-ended, it is difficult to be sure that everyone interprets them in the same way, and bases their answers on the same assumptions. An experiment with Delphi in the field of drugs by Thompson (1973) led him to believe that the most challenging aspect of future applications of Delphi will almost certainly be in the area of questionnaire design, and substantial pre-testing will be required to ensure all questions have the same meaning to all participants. Hills and Fowles (1975) have also expressed a concern over the clarity of questions.

7. Are Delphi responses precise and unambiguous?

In order to ensure cooperation, researchers assure experts that the questions can be answered quickly. This may result in inaccurate "snap" answers from experts.

8. Are Delphi results meaningful and unambiguous?

Sackman suggests that users of Delphi rarely examine validity and reliability, or make known the limitations of their study. As well as including a standard error measure, factor analysis is recommended to discover redundant items.

9. Is Delphi primarily concerned with collections of snap-judgment opinions of polled individuals from unknown samples, or is it concerned with coherent predictions, analyses, or forecasts of operationally defined and systematically studied behaviour or events?

Delphi tends to forecast vague items (which Sackman calls "inkblots") in the future. These items lack shape and boundaries, and therefore it is difficult to measure their occurrence (eg consider the item "widespread use of robots" - Sackman suggests that there are as many scenarios for this item as there are respondents).

10. Does Delphi represent a critical tradition, or is it uncritically isolated from the mainstream of scientific questionnaire development and behavioural experimentation?

Sackman suggests that Delphi is isolated from the mainstream of behavioural science and should be more open to criticism.

Clearly Sackman shows little support for Delphi, and indeed this is the most severe criticism of Delphi by any author. Sackman does, however, stress that the evaluation of Delphi as presented was strictly his responsibility and he was free to develop his own position.

Coates (1975) made an interesting reply to Sackman's critique. He suggests that Delphi, although not necessarily totally accurate, is the least worst technological forecasting tool available. He goes on to say:

"One should expect very little of it compared to applicable analytical techniques. One should expect a great deal of it as a last resort in laying bare some crucial issues on a subject for which a last resort technique is required....."

If one believes that the Delphi technique is of value not in the search for public knowledge, but in the search for public wisdom; not in the search for individual data, but in the search for deliberative judgement, one can conclude that Sackman missed the point."

Coates suggested that the criticisms made by Sackman were not Delphi specific, and were characteristic of mediocre workers in every field.

Hill and Fowles (1975) have written a large document examining the problems associated with Delphi. They point to five main problem areas: The clarity of questions, choice of respondents, character of the first round, administration of the questionnaire, and consensus. A major criticism was that Delphi is weakened by an absence of recognised standards. Sackman (1975) also pointed to this problem, suggesting it is because Delphi is a "young" research technique. Hill and Fowles conclude that Delphi is only as good as the person using it - researchers must be aware of the intricacies of Delphi.

Linstone and Turoff (1975) have not so much pointed to serious methodological flaws in Delphi but rather, suggest some pitfalls to avoid in implementation. For instance:

- * The researcher imposing his/her views and preconception of a problem upon the experts by over-specifying the structure of the Delphi and not allowing for the contribution of other perspectives related to the problem (in other words, experts should be able to consider 'cross impacts').

- * Poor methods of summarizing and presenting the response from the group and not ensuring that experts interpret the evaluation scales in the same way.

- * A failure to explore disagreements, so that discouraged dissenters drop out and an artificial consensus is generated. Sackman (1975) also pointed to the need to explore disagreements.

* Underestimating the demanding nature of a Delphi.

These authors suggested the rather novel idea of recognising experts as consultants and compensating them for their time. Indeed a later Delphi study by Barnette, Danielson, and Algozzine (1978) found that respondents complained about the amount of time that it took to complete the questionnaires.

Linstone and Turoff (1975) have several pieces of advice for those embarking upon a Delphi study. Most people have short memories and planning horizons, and therefore one should not ask experts to look too far into the future. One should avoid trying to simplify the issue and should look at the system as a whole and realise that sub-systems interact with sub-systems. Also, researchers should be aware that where one stands depends on where one sits (ie neither layman nor expert can be expected to be free of bias).

Researchers should not make questionnaire statements too specific or vague as this will reduce the amount of information from the respondent. Salinack *et al* (1971) also had some advice in this area. As a result of their investigations they suggested that researchers must be very careful when describing events for others to interpret and predict. In particular they said that in general anything under 20 words or over 25 words will deteriorate the response. They also said that if the idea to be expressed is a familiar one, keep it short; adding specifics only adds confusion.

Researchers should not become too enthusiastic about repeatedly using Delphi in the same area. According to Goodman (1970) repeated Delphi studies involving the same experts will lead to experts becoming bored.

Researchers should be aware that anonymity of Delphi may, in fact, facilitate dishonesty. For example, the researcher may feed back false information to experts so that experts change their views (so that the researcher can achieve the results he/she desires). Cyphert and Gant (1970) conducted such an experiment and found that the experts distorted their own subsequent responses, to reflect acceptance of the new

input. Like Weaver (1972) and Sackman (1975), Linstone and Turoff (1975) also stress the importance of identifying the reasons for disagreement between experts.

Tersine and Riggs (1976) suggest several problems with Delphi. The most vital step in the Delphi process is the selection of experts. Delphi will be of little use if the experts lack either the motivation or knowledge to participate in the study. The length of time required for the analysis can also be a problem since it can take several weeks for a three-round Delphi. If results do not come quickly, the motivation of the participants may fall. Tersine and Riggs also pointed to the difficulty in validating or testing the accuracy of Delphi predictions, since the events will not normally take place for a number of years. They concluded that, while comparison studies are practically non-existent, it would appear that Delphi is at least as good as, if not superior to, other methods of long-range forecasting. However Riggs (1983) later stated that Delphi is superior to the conference method for long-range forecasting in both high and low information environments.

Granger (1980) aimed his criticism (which incidently is not mentioned by any other critiques) at the attitudes of the experts. He suggested that participants in Delphi appear to be playing a game rather than thinking deeply about their position, trying to defend their views, or attacking the views of others. Preble (1983) has criticised Delphi for being administratively complex and often taking several weeks or even months to complete. He went on to say that if the questionnaires are poorly designed and vague, communications misunderstanding may occur and responses may be of little value for analysis. He also questioned the ability to determine the long-range accuracy of the technique.

The panel selection method can lead to a loss of a sampling technique, which is basically essential for any research. This casts doubt over the representativeness of an "expert" panel, and panellists may know each other, so their comments may not be independent (Preble, 1983; Rabiega, 1982).

5.4 ADVANTAGES OF THE DELPHI TECHNIQUE

Despite the previous section discussing at length the problems associated with Delphi, authors have pointed to the advantages of Delphi. In comparison to the disadvantages, there is a lot more consensus over the advantages of Delphi.

One of the first discussed advantages of Delphi related to the costs of implementation. Helmer (1966) suggested that a Delphi study is relatively inexpensive to conduct and involves much less effort than a conference. A well designed mail questionnaire can elicit information from relatively large numbers of participants who cannot physically come together.

Dalkey (1969) is well known for his support of the Delphi technique. He claims that Delphi is a highly effective experimental structure:

"I can state from my own experience, and also from the experience of many other practitioners, that the results of a Delphi exercise are subject to greater acceptance on the part of the group than are the consensus arrived at by more direct forms of interaction".

Evidence of the superiority of Delphi over alternative forms of technological forecasting was provided in a Rand memorandum prepared for NASA - the National Aeronautical Space Administration. In this document it was stated that the Delphi technique may be more capable in the long-range planning process of NASA than any other known futuristic analytical techniques (Models, Simulation, Worth Relevance Trees, Decision Analysis, Operational Gaming, Systems Synthesis, Scenarios, Cohort Analysis).

Rescher (1969 and 1967) stated that :

"The systematic (and preferably structured) utilisation of experts' opinion and speculation is perhaps the principal and most promising forecasting tool in the technological-scientific-social domain with which we are concerned".

He claims that in the case where value conflicts arise in a group, "Delphi procedures can in principal be most useful for determining its nature and extent".

According to Cyphert and Gant (1970) Delphi is a more socially representative tool because modifications to Delphi have meant that "expert" respondents are no longer limited to "highly educated and experienced specialists" but rather, they can include any type of person who can contribute the relevant information required.

Jolson and Rossow (1971) pointed to several advantages of Delphi. The technique avoids time consuming and argumentive meetings. Delphi assists the experts in acquiring an integrated overview of the problem area and acts as a catalyst in crystallizing the reasoning process, even in the absence of a group consensus. If the Delphi process is properly managed it can be highly motivating because it's systematic procedures lend an air of objectivity to the outcomes. But Jolson and Rossow suggest that probably the major advantage of Delphi lies in compelling each judge to make explicit what elements of a situation he/she takes into consideration and clarify the concepts he/she uses.

In spite of all his criticisms in the previous section, Weaver (1972) too suggests that the Delphi technique is of value. In particular, Weaver sees Delphi being useful as:

- A method for studying the process of thinking about the future.

- A pedagogical tool (teaching tool) which forces people to think about the future in a more complex way than they usually would. This was also highlighted by Fوسفeld and Forster (1971) who claim that the key advantage of Delphi is that it stimulates thinking and involves management in the forecasting process.

-A planning tool which may aid in probing the priorities held by members and constituencies of an organisation.

Holland (1972) found that of all the intuitive tools used in technological forecasting to obtain estimates from experts, the Delphi technique proved superior to both the committee method and questionnaire method.

Linstone and Turoff (1975) have suggested that one of the strengths of Delphi is its ability to make explicit the limitations on the particular design and its applications. While Delphi (like most research methodologies) has inherent problems, these problems assume greater clarity since Delphi makes the communication process and its structure explicit. Therefore the researcher using Delphi has the advantage of recognising the boundaries of validity. According to Linstone and Turoff, absence of these boundaries turns research into mythology.

Tersine and Riggs (1976) point to the value of anonymity in Delphi. They claim that a participant finds it easier to change his mind if he has no ego involvement in defending an original estimate. In other words, he is less subject to the halo effect and bandwagon effect discussed earlier. Tersine and Riggs claim:

"Delphi encourages individual thinking, forces a panel to get on with the business at hand, and forces respondents to move towards a consensus, unless strong convictions to the contrary are held."

They went on to say that a particular strength of Delphi is its versatility. Originally Delphi was developed to solve problems of a military nature. Since this time Delphi has had numerous applications in fields such as Government planning, education, and business.

Helmer, as quoted in Boucher (1977), provides a defense for the relative inaccuracies of Delphi. He suggests that, because of the pragmatic nature of futures research, its function is primarily predictive rather than exploratory. By forecasting the future

environment and the consequences of alternative plans for coping with that environment, it attempts to improve the decision making process. While it would be good to have a deeper understanding of the underlying causes, the worth of research such as Delphi has to be measured in terms of the quality of the decisions it makes possible rather than of its explanatory force. Helmer goes on to say that the researcher using Delphi constructs an ad-hoc model, fully aware that it is imperfect and in need of later correction as more data and experience is accumulated. Helmer does not claim that such imperfect models produce perfect foresight. It is not correct to reject a Delphi research effort simply because the resulting decisions are often non-optimal, or result in the most desirable outcome. Its objective is to produce the best practically attainable decisions at that time.

Nash (1978) pointed to the non-technical nature of the Delphi technique. His work suggested that it is appropriate for use with a population not familiar with more complex research techniques.

Delphi's features of response anonymity, controlled information feedback, and statistical group response allow an equal opportunity for respondents to affect the decision-making by the group. This also reduces the likelihood of the "band-wagon" effect or the "halo effect" with highly articulate or high-status committee members (Tersine and Riggs, 1976; Pill, 1971; Helmer, 1966)

Riggs (1983) suggested that there is also the possibility that the Delphi process may accommodate novel and interesting feedback to respondents, thus minimising the possibility of overlooking some divergent viewpoints. This suggestion is supported by Pill (1971) and Battersby (1979).

Elliot (1986) argues that the principal benefit of long-range forecasting techniques (such as Delphi) lies not in the product but in the process itself. The real objective of conducting a forecast is not the production of a highly accurate "snapshot" of the industry in the future, but more importantly in the identification of adaptive strategies that organisations might pursue to ensure their continued viability and progress. This

view is also held by Helmer (as quoted in Boucher, 1977), who suggests that Delphi is the best planning tool when one is faced with imperfect information.

Of central relevance to this thesis are two studies: one by Sack (1974) and the other by Elliot (1986). These studies are related to forecasting in banking, and are discussed in Chapter IV. Their research had the central aim of examining the appropriateness of Delphi versus other forecasting techniques in the banking area. Both researchers concluded that the Delphi method was the most appropriate.

5.5 ALTERNATIVE APPROACHES TO DELPHI

The reason for forecasting technology is quite simple - to maximise gain or minimise loss from future conditions. Two questions need to be asked. Firstly, are there any alternatives to forecasting? If the answer is no, then one must ask if there are any alternatives to Delphi as a method of forecasting.

Alternatives to Forecasting

Martino (1983) suggested six alternatives to forecasting.

1) **No forecast:** In other words, facing the future blind folded. Obviously an organisation will not survive in these circumstances. Even if the environment is unchanging, this still needs to be known.

2) **Anything can happen:** This attitude suggests that future changes are completely random. Nothing can be done to influence the future so, therefore, there is no point in trying to forecast it.

Organisations which run on this philosophy will only survive in the short term as they will be overtaken by competitors who realise that it is more important to attempt a forecast than have none at all.

3) **The glorious past:** This attitude looks to the past and ignores the future. They assume that actions which enabled them to survive in the past will enable them to survive in the future. Unfortunately, this will not be the case if the future is different from the past.

4) **Window-blind forecasting:** This attitude assumes that technology runs on a fixed track (like a roller-blind) and the only way is up. The future will be the same as the past except technology will be 'higher', 'faster', 'better', etc. This attitude ignores the fact that a particular technical approach may come to a halt or move sideways if another technical approach supersedes it.

5) **Crisis action:** This means being 'reactive' - waiting for the problem or crisis to arrive and then taking action. This action has two assumptions:

*That there will be time to respond effectively.

*That a forecast would not have assisted in avoiding the crisis.

These assumptions may not hold.

6) **Genius forecasting:** This is more of an alternative to rational and explicit forecasting methods than an alternative to forecasting itself.

This approach simply involves asking a single genius about the future. While sometimes these forecasts may be correct, more often they are incorrect. Where rational and explicit forecasting methods are available, these should be used.

Recitation of the alternatives indicates clearly that, if an organisation wishes to exercise more control over its destiny, there is no real alternative to forecasting.

This leads to the next question which is, given the argument posed by this thesis, which is the most appropriate technological forecasting technique? In particular, what are the

alternatives to Delphi?

Alternatives to Delphi

1) **Forecasting by Analogy:** This method attempts to compare historical patterns with existing situations in order to forecast future progress and developments. However, there is nothing inevitable about the outcome of a situation. There is no guarantee that if the circumstances are repeated in detail, the outcome will be repeated also. While this method is suitable for the long term (ie longer than two years), problems arise when there is no analogy and situations are unique (Chambers et al, 1971).

2) **Curve Fitting:** Curve fitting is often done to approximate the basic trend component of a time series. Historical data is required for this method. The identified pattern of the past is used to forecast ahead. However, there is no guarantee that the past will bear a relationship to the future, and the method is less useful for forecasting the long term. In other words, it is difficult to recognise the signs or precursor events that signal a change of pace or direction. Also, there are difficulties in determining which form of curve will best fit the available data and give an accurate forecast for the future (Makridakis and Wheelwright, 1978).

3) **Trend Extrapolation:** One of the limitations of curve fitting previously discussed is that it is not possible to forecast long into the future. This is a situation in which trend extrapolation is useful. A forecast is based on a weighted sum of past observations.

The assumption however is that the aggressive actions which shaped the trend in the past will continue. An established trend may be altered by the introduction of a competitive product or a different technology; a cyclical pattern may be changed by counter-cyclical government policies; a seasonal pattern may be changed by the company's own marketing actions. If it is known that any of these circumstances may occur, another forecasting method is needed - otherwise turning points may be missed. This method is less useful for forecasting the long term.

4) **Scenario Development Methods:** Scenario writing takes a well-defined set of assumptions, and then develops an imaginative conception of what the future would look like if these assumptions were true. In selecting the most appropriate scenario, the decision maker must determine the viability of the assumptions. However, according to Makridakis and Wheelwright (1978), scenarios should not be used to assess the likelihood of occurrence. Rather, they should be used after the forecasts have been made to draw attention to these possibilities. Chambers *et al* (1971) suggests that this is a poor long term forecasting technique.

5) **Cross Impact Matrices:** With this method, a list of events likely to have an impact on the system being analysed is generated. The probabilities of each of these events happening are then estimated. The conditional probability of event 'A' happening given that event 'B' has happened, for all possible events A and B, is also estimated. From these assumptions it is possible to refine the probabilities relating to the occurrence of individual future developments and their interaction with other developments. This method is more suited for short to medium term forecasts.

The problem with this method is that the probabilities of a particular development is often sequence dependent (ie dependent on a sequence of activity). This increases the magnitude of the problem, but does not change the fact that this technique has found a number of uses in business and government (Ayres, 1969).

The methodologies explored thus far, including Delphi, are 'exploratory' in the sense that they start with the knowledge and assessments about the past and seek to forecast the future.

The following methods are subjective methods, which are used in circumstances for which there is very little historical knowledge. Owing to the subjective nature of these methods, the reliability of their results is often questionable.

6) **Jury of Executive Opinion:** This simply involves the executives of a corporation sitting around a table and deciding as a group what is the most likely outcome for the

future. One of the main drawbacks of this method is the potential for the 'band wagon' effect. Chambers *et al* (1971) suggest that this technique is more suited for short term forecasting.

7) **Formal Surveys and Market Research Based Assessments:** An alternative to using a handful of experts is to sample the population whose behaviour and actions will determine future trends and activity levels of the item in question. This method has its value, although when applied to this thesis it has less use since it is the hypothesis that the future of banking will be determined more by what bankers consider important (with little consideration for the customer). Also, surveys may tend to probe more for current attitudes than future attitudes. This method of forecasting is more suited for the short to medium term than the long term.

The next collection of forecasting methods examined are normative methods. An exploratory forecast has implicit within it the idea that the capability will be desired when it becomes available. Normative methods, however, start with the future needs and identify the technological performance required to meet these needs.

8) **Relevance Trees:** Relevance trees use the concepts and methodologies of decision theory and decision trees to assess the desirability of future goals and to select those areas of development that are necessary in order to achieve the desired goals. Specific technologies can then be singled out for further development (Martino, 1983). According to Fowles (1975) this technique, especially in its quantitative form, is of limited value in futures research because it requires a good deal of very precise data.

9) **Morphological Models:** A morphological model is a scheme for breaking a problem down into parallel parts, as distinguished from the hierarchical breakdown of the relevance tree. The parts are then treated independently. For example, possible solutions to the problem 'engine type' may be internal combustion, external combustion, turbine or electric (Martino, 1983). This technique is more suited to the medium to short term.

10) **Mission Flow Diagrams:** This involves mapping all the alternative routes or sequences by which some task can be accomplished. All the significant steps on each route must be identified and the researcher can then determine the difficulties and costs associated with each route.

The normative models discussed above have many applications. However, these methods may tend to impose rigidity on the solutions proposed, and they are in no sense a substitute for creativity or imagination.

5.6 POSITIVISM, HUMANISM, AND VALIDITY

Some of the techniques mentioned in the previous section were qualitative in nature. There is a school which questions the validity of qualitative research techniques such as Delphi. In particular the doctrine of positivism holds that:

- science is the only true source of knowledge

- science deals only with that which is able to be observed and manipulated

- human matters should only be investigated using the methods developed for studying the physical world.

Positivism, in its modern form in market research, has come to mean those attitudes which prefer research that is seen as involving a minimum of interpretation and a maximum of facts. These nearly always mean quantitative techniques.

This positivist's view contrasts with humanism because positivists believe that studies of people, in areas such as psychology, sociology, marketing and market research, call for special people-orientated methods, and methods of the natural sciences are incomplete, or even inappropriate.

Positivists' believe that science is a set of specific methods for trying to discover facts about the real world. If there is a theory about how things work, then data can provide an objective test of that theory. Humanists, however, are relativists (ie people who believe that objective knowledge does not exist and that all knowledge is relative to the knower). Data do not provide an objective test of a theory because data are created, at least in part, by theory. All knowledge claims are equally valid and there is no basis on which to make judgements among the various contenders (Gabriel, 1991).

It is of use to contrast the views of positivists and humanists when it comes to their views of validity and reliability. The positivists view of validity is best shown by an example. A measuring instrument is said to be reliable if one can get the same answer when using it on different occasions. For instance, instruments for measuring length need to be fixed in length themselves, so an elastic tape measure would be an unreliable instrument for length. The measuring instrument is said to be valid if it measures what the researchers think it is measuring: so a metal rule would be a reliable and valid indicator of length, but not of weight or time. In market research, the positivist traditionally measures reliability by providing a statistical statement (such as p is less than 0.01) which gives a probability of not finding similar results on another occasion. As long as this probability is small everybody rests content that the effect is reliable. Two types of validity also need to be examined:

- internal validity ie is the study well enough constructed for the researcher to assume that the observed effect was caused by what the researcher thought it was?
- external validity ie what are the limits of the study, and how far may the results be generalised?

There is no simple statistical response to these questions of validity. The validity of studies is improved by very careful attention to experimental design. The validity is not decided by statistical method, but by being sure that the questions were not ambiguous, that the interviewers were properly trained and properly monitored, and that the coding was done effectively. After all this, the figures still need interpretation. So the

acceptability of findings (in terms of validity) of even the most positivist type of market research comes down in the end to discussion and judgement.

There is the temptation for some to believe the validity of quantitative research, in contrast to qualitative research, because quantitative results are expressed numerically, and (more specifically) because reliability is given statistically; which apparently has a magical effect of also ensuring validity. The aura of numbers is powerful. The fact is that there are no formulae for being sure about anything, comforting as such an illusion might be.

Humanism: methods and validity

The humanist view is that the aim of qualitative research is not to have answers to put through a computer to achieve percentages, statistics, reliability statements etc, but rather to gain an understanding of what people are saying, to understand how the area in which you are interested looks to them. But, how are these transcripts turned into reliable, valid, and useful statements? Lincoln and Guba (1985) and Hirschman (1986) have suggested four checks or tests: credibility, transferability, dependability and confirmability. Not all of these tests, however, will be appropriate to all qualitative studies, because studies differ so much in their aims and outcomes.

The credibility test is to present the interviewee or group with the research findings and to take account of how they react to it. Does the group accept or reject the findings?

The transferability test is satisfied when the research shows similar findings among similar groups. But, even within this check, some interpretation is inevitable; no two sets of groups can be the same. The question arises of whether the differences are big enough to cause suspicion of the interpretation.

Dependability is the humanist research answer to reliability. To establish dependability is to attempt to show that the results are not a fluke. The obvious way to establish this is to have at least two researchers on any study so that their results may be compared.

Confirmability is the last of these validity and reliability tests from the humanist research standpoint. This check involves the use of auditors whose job it is to review the documentation, notes, methodological statements and any other available documents, to ensure that the conclusions are the most reasonable ones attainable from the data.

5.7 SUMMARY

As far as both forecasting and market research are concerned, Delphi is a relatively new technique - having its first significant application in 1953.

The literature suggests that Delphi, while not an ideal forecasting technique, is the most appropriate in the case of technology. In forecasting, the issue is not one of using the "best" technique. The issue is one of applying the most appropriate technique to a given problem. If as a result of the forecast a better decision is made than would have been made without it, the technique is of use.

Delphi has several advantages as a forecasting tool. Delphi encourages individual thinking and integrates the wisdom of experts.

However, the literature pays more attention to the disadvantages of Delphi than its advantages. All the negative comments on Delphi can be condensed into one criticism - the possibility that the technique is "unscientific". However, most of the criticisms aimed at Delphi are able to be dealt with if the person applying the tool uses common sense and brings in certain measures. In particular, several moves can be taken to overcome the sampling and instrumental limitations of Delphi.

One criticism which cannot be overcome, for the simple reason that it is a philosophical criticism rather than a methodological criticism, is that Delphi is "crystal ball gazing", and the future is not predictable. The fact remains, however, that if an organisation is to be proactive, some form of forecasting or anticipation is required. If the environment is turbulent, extrapolation of the past is of little use in forecasting.

Even if an application of Delphi results in no expert consensus being reached, this finding is of use. It is a useful finding because it indicates to management that the future is not predictable, and therefore strategy should incorporate a suitable amount of caution and flexibility. The public pool of knowledge is better served by the application of a criticised technique which has incorporated potential improvement, than the application of a tested and proven technique which adds only to the frequency of the technique's use and nothing to the knowledge of research methodologies.

In its insistence upon experience, accurate observation and verifiability, science has placed great emphasis upon measurement. To measure something is to experience it in a certain dimension, a dimension in which one can make observations of great accuracy which are repeatable by others. Clearly the use of measurement has led to a greater understanding of the universe, but by virtue of its success, measurement has become a kind of scientific idol. The result is an attitude on the part of many scientists of not only scepticism but outright rejection of what is difficult to (or cannot be) measured accurately. Such an attitude could be targeted at the tapping of expert opinion. But, it is incorrect to assume that things which are not easy to study do not merit study.

One of the necessary prerequisites in choosing the appropriate forecasting technique is, of course, to have at least a basic understanding of the techniques available. There is no 'best' technique, regardless of the nature of the research. Delphi has been chosen because it is the 'least worst' technique. Key considerations in making this choice were the nature of the hypothesis being tested in this thesis, and the low importance of the past in estimating the future. Many of the mentioned forecasting methods have been found to be useful for forecasting the short term (less than two years). However, apart from econometric models and input-output models, only Delphi has been found to be useful in forecasting the longer term (Chambers, Mullick, and Smith, 1971).

It is necessary to interpret the results of a Delphi study in the Humanist framework. In other words, the aim of a Delphi study should not be to achieve percentages, statistics, reliability statements etc, but rather to gain an understanding of what people are saying, and how the area of interest looks to them.

Unfortunately, comparison studies comparing Delphi and other techniques are limited at this time, but it would appear that Delphi is at least as good as, if not superior to, other long-range forecasting techniques. According to Martino (1983), whenever adequate time is available, Delphi should be considered as a practical approach to obtaining the required forecast. As was mentioned earlier, comparison studies by Sack (1974) and Elliot (1986) suggest that, in the banking industry at least, Delphi is a most appropriate forecasting technique.

All research methodologies, including Delphi, have problems to varying degrees. However, since Delphi makes the communication process and its structure explicit, most pitfalls assume greater clarity than a less structured method. While it may not be possible to eliminate these pitfalls, Delphi at least allows the researcher to recognise the impact of these pitfalls. Therefore, the strength of Delphi is the ability to understand the boundaries of validity. Without this understanding, research becomes the practice of mythology (Linstone and Turoff, 1975). Forecasting is not an exact science. Some would claim that it is still a creative art, working within certain constraints much as the artist has to work within the limitations of his/her canvas or the medium he/she uses (Rodger, 1984).

The literature has made several recommendations as to how Delphi may be used in a more scientific manner. Unfortunately, the people making these recommendations, and subsequent users of the technique have not implemented these recommendations in a live setting. Essentially, Delphi as a technique has remained unchanged since its conception. It is all very well to contribute to the critical literature, but ideally this should be followed by a contribution to the methodological literature.

Knowledge is a process of cumulative synthesis. Therefore it is the role of successive researchers to build on techniques, and to improve them. For this very reason, the application of Delphi in this thesis has incorporated several of the recommendations made by Sackman (1975), Lincoln and Guba (1985), and Hirschman (1986). More specifically, the following innovations have been incorporated into this application of Delphi:

- application of the credibility, confirmability, transferability, and dependability tests
- the identification of the experts' qualifications and experience
- a more scientific approach to sample selection
- providing panellists with a statement of 'where we are today', to provide a common baseline for projections
- pretesting the questionnaire for reliability
- a record will be kept of systematic sampling effects by identifying why experts withdrew from successive rounds of Delphi.

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CHAPTER VI

RESEARCH METHODOLOGY

6.1 INTRODUCTION

As was mentioned in Section 1.7, the key objective of this study is to examine Roger's (1962) concept of disenchantment discontinuance in the diffusion of self-service technologies by profiling the current and future use of self-service technologies and the branch network in banking to the year 2010.

To fulfil this objective, the methodology was comprised of two key stages: the collection of data via a survey of consumers and a Delphi study.

This chapter provides a detailed breakdown of the various steps involved in the primary research. The relationship is then explained between the research hypothesis, the research methodology, and the theory.

6.2 DESCRIPTION OF THE METHODOLOGY USED

6.2.1 CONSUMER RESEARCH

Survey Method

In order to ascertain consumers current and future attitudes to self-service technology, primary research was conducted. The aim was not only to measure the possible existence of disenchantment discontinuance in diffusion, but also to obtain views which could be compared with the experts. The three 'established' self-service technologies were under examination: ATMs, EFTPOS, and telephone banking.

300 telephone interviews (Appendix U) were conducted in June and July 1991, with people in households who were 18 years or over and having the next birthday. 150

interviews were conducted in Wellington and 150 in Palmerston North. This enabled a comparison between a provincial centre and a metropolitan centre. The sample size of 300 was considered appropriate given the objective of this field work, time, and financial constraints.

The results of this data collection were then analysed using the Massey University VAX mainframe computer and the *SPSSX* statistical package.

Sampling Method

The phone numbers were selected randomly from the provincial and metropolitan centre telephone directories. A table of random numbers was consulted to select a starting point. Call back procedures were put in place, including how to deal with engaged numbers or if the selected person was out (in this case, three call-backs were made). If the telephone was no longer connected, the respondent refused, or the number selected was a business, the next name was randomly selected from the telephone directory.

Questionnaire Pretest

The questionnaire was pretested on 15 individuals. Ten were pretested by telephone and five were pretested by means of personal interviews. Respondents were asked to explain why they answered each question as they did, to state what each question meant to them and to describe any problems or uncertainties they had in completing the questionnaire.

6.2.2 DELPHI RESEARCH

The Delphi research represented the beginning of the primary research. The Delphi technique is a widely used and recognised technique of long range forecasting. It can be characterised as:

'... a method for structuring a group communications process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem To accomplish this 'structured communication', there is provided: some feed-back of individuals' contributions of information and knowledge, some assessment of the group judgement or view, some opportunity for individuals to review views, and some degree of anonymity for the individual responses.'

Linstone and Turoff (1975)

The technique attempts to achieve the most reliable consensus from a group through a series (or 'rounds') of intensive questionnaires alternated with controlled feedback in the form of the statistical summary of the groups' opinions together with a summary of the reasoning or explanations advanced by individual respondents. The three frequently stressed attributes of Delphi are 'anonymity of responses', 'iterative sessions using controlled feedback' and 'statistical treatment of the group or panel response' (Linstone and Turoff, 1975).

Delphi is a method of steering consensus, that is, to facilitate agreement among the experts on the most likely date of occurrence for the events under study.

Expert opinions were obtained from senior personnel within the New Zealand financial sector. Experts were sourced from the following areas:

- * Databank
- * Technology suppliers eg IBM, Wang
- * Retail Banks (Departments of Marketing, Information Technology, and Strategic Planning)
- * Building Societies and Finance Companies
- * Academia
- * Telecom
- * Consumer Groups

The Delphi component of the study was broken down into several sub-components.

1) Statement Generation

To discuss the research problem, the research methodology, and develop the content for the Delphi questionnaire, two brain storming sessions were held in Wellington, since most of the experts tend to be concentrated in the head offices in this city. The initial approach was made in late May 1990, with brain storming sessions held in late June-early July 1990.

It was necessary to define and identify experts to take part in the brainstorming: This was a critical phase in the research, since essentially these experts would be developing the questionnaire for their colleagues. Therefore the people chosen to participate were those with the greatest known expertise - not only according to their peers, but as evidenced by the positions they held within their organisations. It was essential that they were leaders in their field. Experts were chosen from each of those sectors which had the potential to influence the future shape of banking. Their names and addresses had to be identified, invitations to take part in a brain storm had to be dispatched, and objectives for the brain storming sessions had to be formulated.

Two forces were present to determine the numbers of experts in the sessions. Firstly, it must be recognised that people who took part in the sessions were unlikely to also want to take part in the Delphi rounds themselves. Given that the Delphi sample was small in the first place, it was important not to 'use' all the experts in the brain storming sessions. However, an adequate number of brain storm participants was still required in order to generate cross-fertilisation of ideas.

Specific input into the sessions was received from:

- * Three banking executives (from the areas of retail banking, strategic planning, and information technology) from the three leading retail banks.

- * Three technology company executives, from the areas of research and development and marketing.
- * Two executives from the central clearing house (Databank).
- * Two banking technology consultants.
- * One executive from the telecommunications authority.
- * One executive from the financial sector trade union.
- * The Director of the New Zealand Bankers' Association.
- * The Chief Executive of the Consumers' Institute.
- * The Minister of Commerce.
- * The opposition spokesperson for trade and industry.
- * One policy executive from the Ministry of Consumer Affairs.
- * The President of the New Zealand Computer Society.

Separate interviews were held with the Minister of Commerce, and the opposition spokesperson for trade and industry, in their own offices. It did not suit their time table to attend the scheduled brain storming sessions.

It is important to realise the diversity of the participants who took part. A profile of the current and future use of self-service technologies and the branch network in banking not only needs to involve bankers and technology suppliers, but it must also involve those constituencies in society which can have indirect influences on the future of banking.

b) Questionnaire Development

The brainstorming sessions, in addition to the literature, generated the content for the first Delphi questionnaire. Due to the number of issues that needed to be covered, it was necessary to have a rather long questionnaire. There was the concern that respondents might become lethargic towards the end of the instrument, and not give as much thought to questions positioned towards the end of the questionnaire. Therefore, two questionnaires were developed. Both contained identical questions, the only difference related to structure: The order of the questions was changed so that questions

which were at the back of the first questionnaire were placed at the front of the second questionnaire. The first questionnaire was then issued to half of each panel, selected at random. The second questionnaire was issued to the second half of each panel.

c) Questionnaire Pretest

It was necessary to pilot the questionnaire before issuing it to the nationwide sample. The questionnaire (whose covering letter is contained in Appendix I) was pretested on a group of 10 individuals composed of: six banking experts (from banks of varying size), three technology experts (from different areas of specialisation), and one clearing house expert. To check reliability the questionnaire was then reissued (without amendment) to three of the above experts for re-completion.

As a result of the pretest several questions were changed considerably. Therefore, it was necessary to pretest these questions again, on a different pilot sample.

d) Letter of Invitation

It was considered necessary to ensure expert cooperation before sending the questionnaire. Therefore, a letter of invitation (Appendix G), preceding the dispatch of questionnaires, was sent to the full sample. This letter explained the purpose of the research, and the role for the expert if he/she decided to participate.

e) Delphi Rounds

Three rounds were necessary in order to generate a consensus on the issues.

The first questionnaire (Appendix K) sought experts' opinions on those issues identified in the brainstorming sessions. The results were then combined and represented by interquartile ranges and means. There is much debate in the literature over whether the mean or the median should be used as a measure of central tendency. There are no empirical studies to demonstrate which is more appropriate.

With the second round questionnaire (Appendix O), the letter (Appendix M) announced to participants the areas of consensus (Appendix N) and invited "dissenters" to state their reasons. This process resulted in a narrower range of estimates.

In the third round the same procedure was followed as for the second round. The range of estimates was narrowed down even further.

This part of the study was very time consuming. Results had to be collated after each round, new questionnaires (tailored for each panel) sent out, and a substantial amount of time elapsed while awaiting returns.

f) The Delphi Sample

Before identifying the experts within companies, it was first necessary to identify the companies themselves. The identification of financial institutions was relatively easy, since it was possible to consult the "Business Who's Who". This also provided the names of managing directors.

The identification of companies supplying technology to financial institutions was more difficult. Three steps were taken:

- Letters were sent to the General Managers of information technology in a large and small bank. The reason for contacting a large *and* small bank was because it was considered possible that they might source their technology from different companies. These General Managers were invited to instruct one of their staff to peruse their technology supplier files and identify the names of companies with which they have had contact in the past ten years.
- The names from the two lists were then combined into a single master list.
- The master list was taken to the Business Directory, in order to identify the managing directors.

In total 58 technology supplying companies were identified. This list was later refined to 42 companies when it was discovered that some of the companies had merged or gone out of business.

Informal discussions with bankers, as well as the brainstorming sessions, assisted in identifying 'constituent' groups who could also take part in the research. While not directly involved in the supply and marketing of technology, these groups still have the potential to impact upon a forecast eg Databank, the Consumers' Institute.

After identifying the names of the various financial institutions, technology companies, and constituent groups, the next task was to identify appropriate individuals within these organisations who could be deemed 'expert' for the purposes of this research. The most appropriate definition of 'expert' was determined from the brainstorming sessions. It was concluded that three variables should be considered:

- The nature of past experience (ie have they been involved in which are relevant to this study).
- The amount of past experience (ie how many years have they been in the industry).
- Their current position in the organisation.

Three specific approaches were required for the three specific 'sample segments'.

Sample Segment 1: Identification of financial institution experts

A letter (Appendices D and E) was sent to the chief executive within each of the financial institutions. This letter asked them to send the researcher the names and titles of people who:

- were currently in a management position or higher

- had been in the industry for at least five years, and
- had, at some stage in their career, been involved in the research and development of technology, or the marketing of such applications to final consumers.

It should be pointed out that these were minimum criteria: The chief executive was requested to select those individuals who were most experienced, given these criteria. If experts left the industry, retired, or moved to a less relevant position in their current firm during the study, they were deleted from the sample.

The chief executive was asked to consider people in the areas of marketing, strategic planning, and information technology.

Small institutions (ie with a branch network of less than 150) were asked to identify the two most appropriate individuals. Large institutions (ie with a branch network of 150 or more) were asked to identify six or more of their most appropriate individuals.

In total, 106 names and titles were received (all but one of the institutions forwarded at least two names). One institution did not wish to take part in the research due to a fear of revealing competitively sensitive information. 86 replied positively to the letter of invitation (Appendix G) to take part in the research, 5 had left the organisation by the time of the first questionnaire, 8 replied negatively, and 7 did not reply after two letters.

These names resulted in three Delphi panels:

- Large institutions: technology experts.
- Large institutions: marketing and strategic planning experts.

In these two groups, managing directors and chief executives were allocated according to their most recent departmental experience ie marketing or technology.

- Medium and small institutions: variety of experts.

Sample Segment 2: Identification of technology supplier experts

The same process was carried out as for the identification of the financial institution experts ie a letter (Appendix F) was sent to the chief executive in each company, and they were asked to supply the names and titles of people who:

- were currently in a management position or higher
- had been in the industry for at least five years, and
- had, at some stage in their careers, been involved in the research and/or development of technological applications for the finance industry, or the marketing of such applications to financial institutions.

Again, these were minimum criteria. The executive was requested to select those individuals who were most experienced, given these criteria. If experts left the industry, retired, or moved to a less relevant position within their firm during the study, they were deleted from the sample.

Each of the 42 companies to receive a letter was asked to identify the 3-4 most experienced individuals who met the qualifying criteria. 29 of the companies replied with a total of 46 names. Of the other companies, three did not wish to be involved for reasons of confidentiality, seven did not have anyone who met the criteria required, and three did not reply to two letters.

Of the 46 individuals who were sent an invitation to take part in the study, 39 replied positively, 4 replied negatively, and 3 never replied.

Sample Segment 3: Identification of Constituent group experts

This refers to all those experts outside of the financial institutions and the technology supplying companies who still had the ability to impact upon the future of banking technology in New Zealand. Given the small number of people involved in this group, it was very easy to make a number of telephone calls in order to identify which people should have an input into the research. No specific criteria was given for defining the expert. Rather, the nature of the research was explained to the organisation and the consequent conversations pointed directly to the relevant people who should be included in the survey. 16 such people were invited to take part in the research, and all agreed to do so.

The literature has indicated that Delphi experts tend to be chosen on the basis of availability, with little or no regard for representativeness. As the preceding discussion indicates, this was not the case with this study. First, from a micro perspective, representativeness was assured by choosing banking experts from three relevant bank departments: marketing, information technology, and strategic planning. Secondly, from a macro perspective, representativeness was assured by covering every possible type of relevant organisation in the retail banking area (this includes different sizes of banks, and technology suppliers with varying areas of specialisation). Table 6.1 shows a list of the number of organisations which the researcher approached for participation in this study, and the resulting number of experts who agreed to take part.

The first questionnaire was distributed on January 24 1991, with a covering letter (Appendix J) indicating that the questionnaires must be returned by February 28. Reminder phone calls were made on March 1 and 4, 1991.

Table 6.1 Number of Organisations and Experts

Type of Organisation	Number of Organisations	Number of Experts Agreeing to Take Part
Large Retail Banks (more than 150 branches): Technology	5	27
Large Retail Banks (more than 150 branches): Marketing and Strategic Planning	5	31
Medium and small Retail Banks, finance companies and Building Societies (0 to 150 branches)	6	28
Technology Suppliers and Consultants	42	39
<u>Constituencies</u>		
Bank Processing Centre	1	3
Network Suppliers	1	7
Computer Society	1	1
Government	1	1
Consumer Groups	1	1
Academics	1	1
Bankers' Association	1	1
Financial Sector Trade Union	1	1

Out of the total of 141 questionnaires sent, 114 were returned completed. A number of the experts did not return the first questionnaire, although they initially agreed to do so. It appears that this was a result of the time elapsed between the initial invitation and their actually receiving the first questionnaire. By the time some of the experts actually received the first questionnaire:

- five of them had changed their current positions in the company and no longer qualified as an expert.

- three of them had left the industry all together.

- two of them had retired.

- two of them were overseas for indefinite periods.

This problem was not limited to only the first round of Delphi, although its magnitude decreased in successive rounds.

After receiving the returned first questionnaire, a decision had to be made with regards to what constitutes a 'consensus' on a question, and therefore would not be included in the next round.

According to the literature (Hill and Fowles, 1975) the most advanced approach so far to the issue of measuring consensus is the use of a simple, but uniformly applied, rule of thumb. While the setting of such rules is reasonable, and represents an improvement over purely subjective assessment, it remains an arbitrary criterion.

It was decided that the following decision rules would apply:

Year Questions: Consensus = the interquartile range has a spread of no more than five years. If more than 50% of the panel responded to a year estimate with 'never', it was decided that this event would never occur.

Percentage Questions: Consensus = the interquartile range has a spread of no more than ten percentage points.

Index Questions: Consensus = the interquartile range has a spread of no more than ten index points.

Probability Questions (expressed out of 100): Consensus = the interquartile range has a spread of no more than ten probability points.

Any events which the experts suggested would occur after the year 2010, were also coded as a 'never' statement. This was decided after a discussion at the brainstorming session in which the experts suggested that in such a dynamic environment forecasting events beyond 20 years is unrealistic.

Therefore on the 30 April 1991, 114 second round questionnaires were sent out. By the 5th of June, 93 replies were received. On July 23 1991, 93 third round questionnaires were sent out, and by October 1 1991, 81 replies were received. It was decided at this point that a consensus had been found on a sufficient number of issues, and therefore a further Delphi round would not be necessary. It should be noted ~~that~~ the final analysis included those events for which a consensus was not reached.

Previous researchers using Delphi tend to withdraw such events in the progress of the research. Yet, there may be as much information for policy makers in these findings as in those where high consensus resulted. Studies by Erffmeyer et al (1986), and Martino (1983) indicate that four rounds are usually sufficient in a Delphi. However, these researchers defined the first round as being an open ended questionnaire used to generate the issues needed to be examined. This study of course conducted brainstorming sessions in place of the first round open ended questionnaire. In essence, therefore, this could also be considered a four round Delphi study.

It is of use to consider the final size of each panel. It has been found in previous studies that average group error drops rapidly as the number in the Delphi group is increased

to about eight to twelve. After reaching a number of about thirteen to fifteen, the average group error decreases very little with each additional member (Fusfeld and Foster, 1971). Thus a Delphi user could consider a panel as small as eight as being appropriate. However, one must recognise that each Delphi study is unique, relating to specific areas and types of experts. Whether or not the results of research by Fusfeld and Foster could be generalised to other Delphi studies is debatable.

5) Systematic Sampling Effects

As mentioned in the literature review, Delphi studies tend to suffer from very high attrition rates, but no research has identified why this is the case. Therefore a letter (Appendices Q and S) and a free post envelope were sent to those experts who returned the first questionnaire only, or the first and second questionnaire only. This letter asked them why they withdrew from the study before completing the requirements. If they did not return the letter they were personally telephoned.

However, the final response to the Delphi study pertaining to this thesis is of great interest because, out of all the Delphi studies and literature reviewed, it had the *highest reported response rate* overall. As previously mentioned in the literature review, there has been no attempt by researchers to identify why experts withdraw from a Delphi study before completing the requirements. At the same time, however, there has been no attempt by researchers to identify why experts *take part* in a full Delphi study. It was decided at this stage, given the high response to the study, to find out why the experts took part. Therefore at the completion of all three rounds a letter (Appendix T) and a free post envelope were sent to those experts who actually completed all the requirements of the study. This letter asked them what motivated them to complete the requirements of the study.

6) Analysis of Results

Traditionally, Delphi has not been associated with particularly complicated statistical techniques. The key reason for this is the nature of data that the Delphi technique

produces. In essence, Delphi data violates the basic assumptions of most statistical tests. For instance:

- the data is not independent after the first round. Sackman (1975) makes reference to this specific point. He claims that the first Delphi round is basically designed to secure independent expert judgement. The second and successive rounds produce strictly correlated, or biased judgements. The use of standardized statistical techniques for hypothesis testing based on random sampling assumptions, which may offer no major problems for independent first round judgements, becomes incorrect for successive rounds.

- the research is dealing with the total population (by definition of 'expert') and therefore no extrapolation is required. There is no need to generalise the results of the sample to a population as the total population has been examined.

As a result, the calculations able to be performed on the Delphi data were limited. For each statement the researcher calculated the probability, year, index, percentage and response confidence/competence. For each of these areas, the mean, inter-quartile range, standard deviation, frequency, and percentage of responses was calculated.

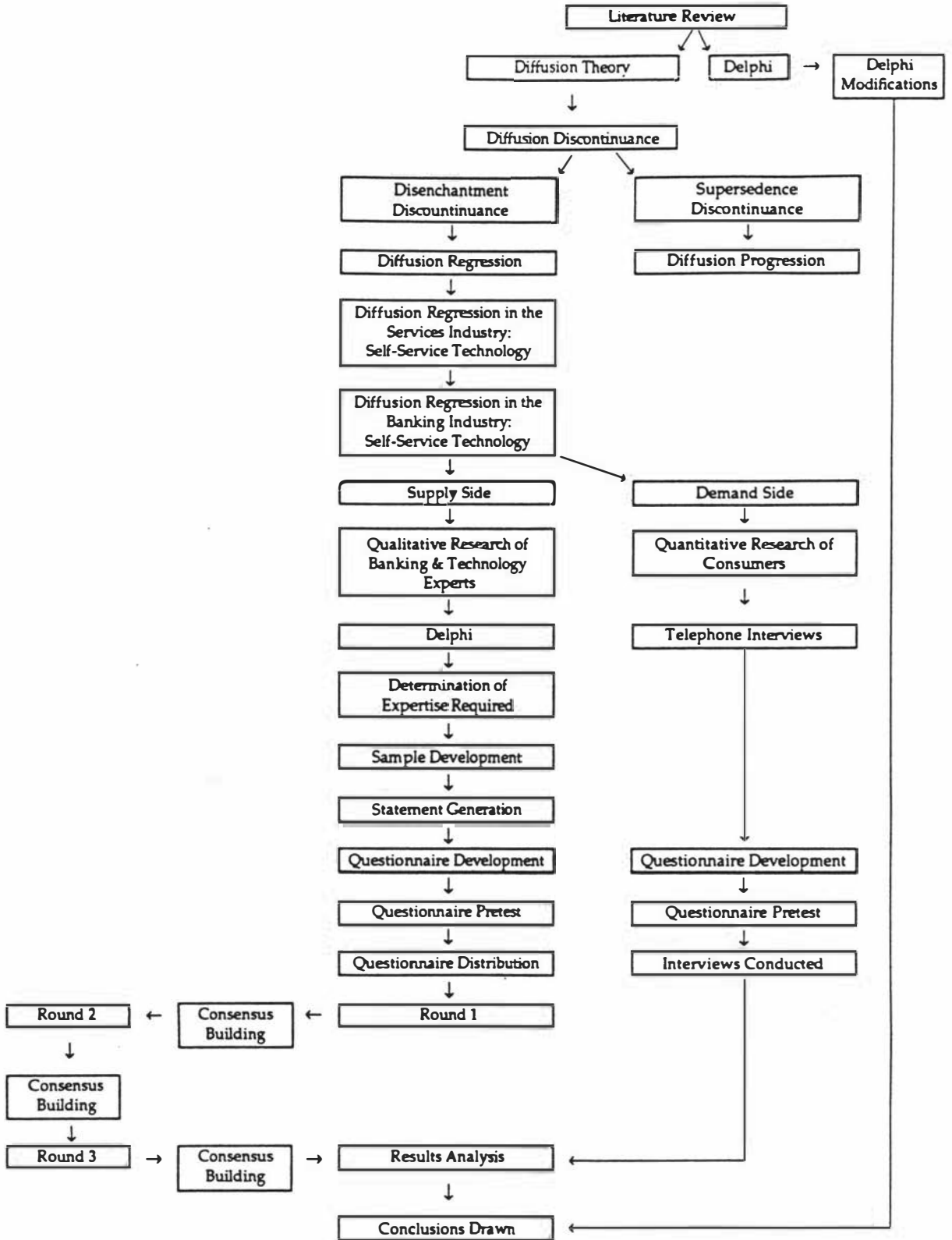
In interpreting the results of the Delphi research, the Humanist framework (as opposed to the Positivist framework) should be considered. As mentioned, it is not the aim of Delphi to produce percentages, statistics, reliability statements etc, but rather to gain an understanding of what people are saying, and how the area of interest looks to them.

On all the data, the four tests of transferability, dependability, credibility, and confirmability, were conducted.

Results of this data collection were then analysed using the Massey University Vax mainframe computer and the *MTB* data analysis program.

The overall methodology for this study is summarised in Figure 6.1.

Figure 6.1 Methodology



6.3 RELATIONSHIP BETWEEN THEORY, HYPOTHESES, AND METHODOLOGY

Introduction

This thesis uses expert and consumer opinion to profile the current and future use of self-service technologies and the branch network in banking, and then relates this information to diffusion theory. The hypothesis of this thesis argues that the increasing provision of self-service technologies in the banking industry results in disenchantment discontinuance in diffusion due to consumer antagonism towards depersonalisation of services. Although these self-service technologies may have a 'relative advantage' in the Rogers (1962) sense because they offer increased time and place utility to customers, it is argued that they are not compatible with existing norms, values and behaviour. Over the past fifteen years or so situations in which humans served customers have been replaced by self-service technologies. Eventually banks will return to the use of human bank staff. This change will be customer driven as customers demand more personalisation in a world which is becoming increasingly impersonal ie there will be increasing antagonism towards impersonalisation.

Theory

Very little use has been made of Diffusion Theory in the banking industry. Chapter II contains a review of the small amount of literature relating to the historical development of Diffusion Theory, and of the limited use it has had in the banking industry. In banking this thesis suggests that new technologies will be adopted by consumers, and then rejected as the human teller returns in popularity. However, the human teller will not return in its normal 'order taking' role. Rather, the human teller will return as an expert in cross-selling.

This concept of diffusion regression has appeared under another name - 'disenchantment discontinuance'. According to Rogers (1962), an innovation may be rejected at any stage of the adoption process. Rejection of an innovation can also occur after adoption. This behaviour is called a 'discontinuance'. A *discontinuance* is a decision to cease use of an

innovation after previously adopting it. Two types of discontinuance have been suggested: replacement/supercedence discontinuance (when an innovation replaces the current product, and consumers adopt it because it better meets their needs), and disenchantment discontinuance - which occurs when consumers stop using an innovation, and go back to the previous innovation, because they realise that the new innovation does not meet their needs as well. Several research studies have identified discontinuances, but mostly by accident. No research has specifically examined disenchantment discontinuances. This disenchantment discontinuance in diffusion has implications for other firms in the services industry which are attempting to automate many aspects of their service at the customer interface.

The Methodological Difficulties of Taking a Measure Over Time

In order to identify the presence of disenchantment discontinuance in diffusion, or its emergence, diffusion must be examined over time. A single measure, or a snapshot, gives nothing more than a view of where it is at the moment, and no indication of a *trend* or trend reversal.

There are several approaches to the problem of measuring disenchantment discontinuance in diffusion. For instance:

1) The Past Approach: Secondary Data: One could look at the level of transactions being conducted with human tellers, or with various technologies, over a period of time. An inherent problem with this, which emerged in preliminary interviews with banking and technology experts (and was later confirmed at the brainstorming sessions) was that such statistics, assuming they were available in all cases, are highly confidential. There was no prospect of obtaining these statistics either directly or indirectly.

There are additional problems with this approach. The number and availability of technologies and human tellers is consistently changing, and therefore their usage rates or levels of usage per unit are not an accurate measure of diffusion. Added to this is the fact that the population is constantly changing in number and location.

2) The Past Approach - Primary data: One could simply ask consumers if they had 'adopted' technologies in the past, and then whether they discontinued, or are still using them. The problem here, however, is relying on consumer memory. More importantly, the disenchantment discontinuance trend is an emergent or recent trend, which may not be identified if the researcher goes too far back in history.

3) The Tracking Approach: One could conduct a tracking/longitudinal study (such as that which was conducted by Johnson and van der Ban in 1959) with a set sample from the population. For example, one could select a random group of respondents and ask them what technologies they are using. Then at a later time, reissue the same questionnaire to the same group, to see if they are still using the technologies, moved to more advanced technologies, or become disenchanted and regressed to previous technologies. A similar study could also be conducted with the suppliers of the technology (in this case the banks) since they too may be subject to this phenomenon of diffusion discontinuance (for instance, they may realise that by encouraging technology they are reducing the need for a branch network and therefore reducing the barriers to entry - which is a competitive threat). While such a method obviously has its merits, the time span for such a study is well beyond that of a PhD thesis.

4) The Present-Future Approach: The final option, and the one chosen for this research, is to examine whether or not disenchantment discontinuance in diffusion has occurred or will occur by utilising expert opinion, supplemented by asking consumers questions on present use.

At the early stages of this research, it was not intended for the study to become a forecasting exercise. It was the intention to examine the pattern of diffusion, and possibly disenchantment discontinuance, by looking at the past up to the present. Identifying this historic diffusion pattern would be relatively simple: examine the bank statistics which look at usage rates for various banking technologies and human tellers. For reasons already mentioned, this method was not possible. In the light of this development, the situation had to be re-evaluated, and the research had to take an important turn: rather than taking the *past-present* perspective (and bearing in mind that

in order to determine the pattern of diffusion a measure needs to be taken over time) it became a *present-future* perspective.

Use of Delphi in banking is supported in the results of empirical studies by Sack (1974) and Elliot (1986). One of the key reasons for choosing Delphi was that the experts are required to give written reasonings for their estimates. Therefore, if the experts suggested that regression would occur in the future, based on the fact that consumers are or will become disenchanted, this rationale would be reflected in their written reasonings. In addition, a non-extrapolative forecasting technique was required since what is being examined is trend reversal, and the current turbulent environment bears little relation to what has happened in the past. The present-future perspective is of additional use as it is possible to discover whether or not there is a difference between the views of the suppliers and the customers.

When making long-range forecasts on events for which a suitable database does not exist to permit model building or extrapolation, there are few alternatives but to solicit informed opinion. For most applications, it is well accepted that opinion gleaned from several experts is superior to the opinion of just one expert.

It could be asserted that expert opinion is not the most appropriate means of testing the thesis hypothesis, since one could argue that experts are not likely to forecast a discontinuance in diffusion because, *if they believed this was going to occur, they would not introduce the technology in the first place*. Such a suggestion, however, makes the assumption that experts are currently investing in technology on the basis that they believe discontinuance will not occur. However, four considerations emerge which undermine the validity of this assumption:

- It has only been in recent times that an emergence of consumer resistance to technology has occurred. This is after banks have already invested substantially in the major technologies under examination ie ATMs, EFTPOS, home banking, and pilot projects relating to self-service in the areas of personal loans, travel, and insurance.

- Banks often overlook consumer demand when evaluating technological projects. Other motives emerge such as cost savings, the image of being innovative, or simply keeping up with the competition. For instance, recently in a New Zealand bank, General Management was discussing the merits of introducing a centralised cheque book mailing system: while consumers were concerned with the possibility of books being lost in the mail, banks were determined to introduce the service because of the potential cost savings. Some banks may introduce a technology not necessarily to meet consumer needs, but to prevent competitors from gaining a market advantage.

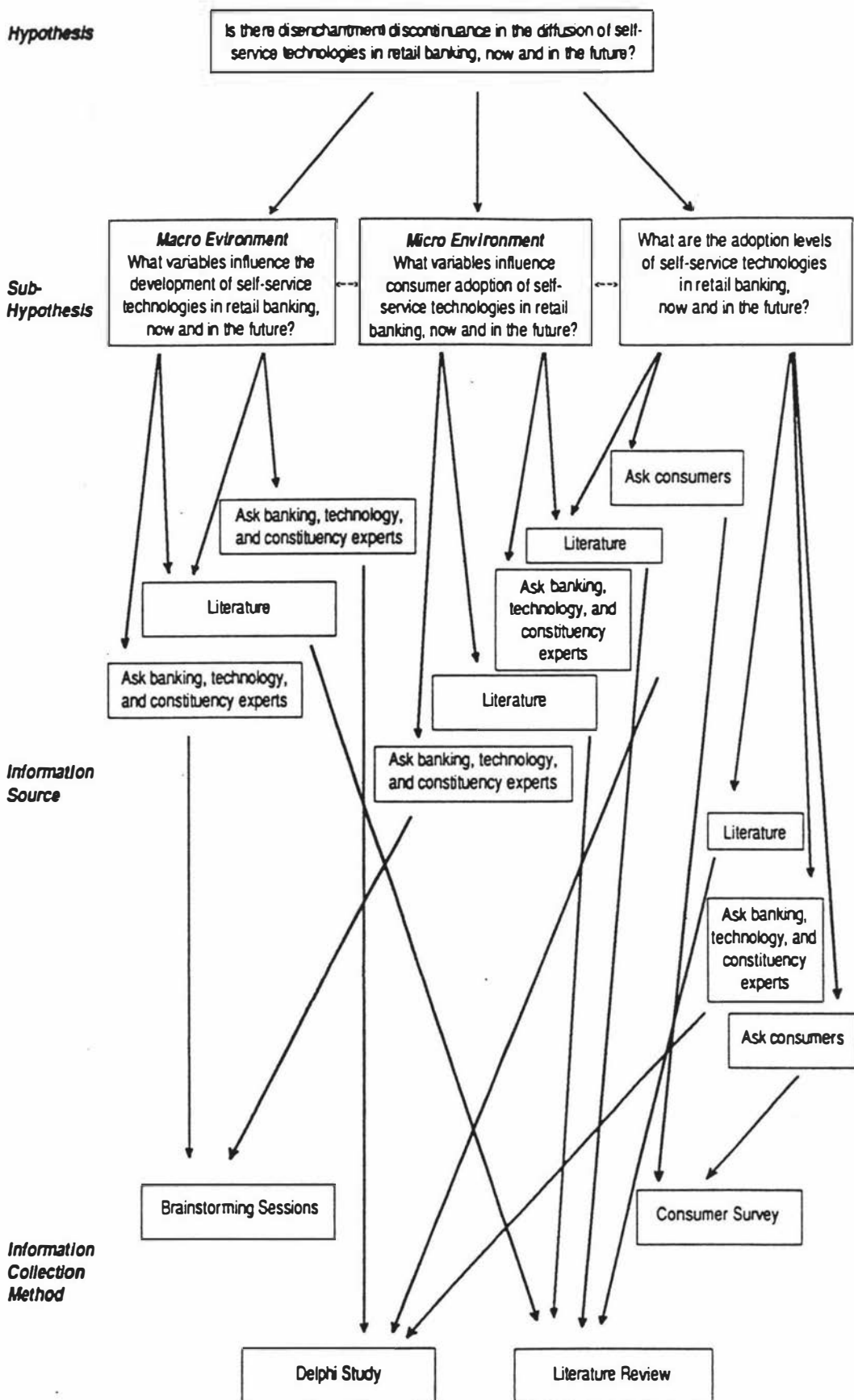
- The technology supplying companies have obvious motivation for 'pushing' the technology on to the bank: whether or not discontinuance occurs in the long term is not their immediate concern.

- Banks do not necessarily introduce a technology in the belief that consumers will utilise it from now until eternity. To a certain extent, banks 'use' one level of technology to acclimatise customers to the next level of technology. For example banks believe that the wide spread introduction of ATMs will prepare a customer base which will more readily adopt home banking.

With the combined effect of peer influence, and the fact that potential consumer demand is not always at the top of the priority list, banks tend to develop a form of tunnel vision. Under the anonymous and probing conditions of a Delphi study, however, the individual expert may well be more prepared to admit that it is possible that technological investment is not being driven by consumer demand -latent or otherwise - and technological discontinuance is therefore a possibility. This 'anonymity' characteristic of Delphi, and the fact that it raises awareness of potential issues relating to the future, is a key reason for utilising this technique.

The relationship between theory, method, and hypothesis is demonstrated in Figure 6.2.

Figure 6.2 Relationship Between Theory, Hypothesis, and Methodology



Essentially, this idea of disenchantment discontinuance could be linked, in this case at least, to the Wheel of Retailing Theory (McNair, 1958). This theory says that forms of retailing develop as consumer adoption increases; the forms next become widespread, then lose popularity - showing signs of maturity. Many forms are later reintroduced, usually with somewhat different characteristics, and again proceed through the cycle.

6.4 SUMMARY

This chapter has demonstrated that the nature of the research problem dictates the nature of the methodology. The measurement of disenchantment discontinuance requires a measure over time. Since it was not possible to examine disenchantment discontinuance by taking a 'past-present' perspective, it was necessary to take a 'present-future' perspective. The present was measured by a consumer survey, involving 300 respondents who were randomly selected from a provincial and metropolitan telephone directory. The future was measured by a Delphi study - which incorporated modifications over previous applications.

In order to develop a valid questionnaire for Delphi, it was necessary to have a credible panel of experts take part in brain storming sessions. The resultant questionnaire was then pretested, and implemented over three Delphi rounds. Certain steps had to be taken to identify the experts for the Delphi study, who were from areas directly and indirectly related to retail banking.

CHAPTER VII

RESULTS

7.1 INTRODUCTION

This chapter is divided into two main sections. The first section deals with the current and future situation with regard to self-service technologies by examining the attitudes of consumers identified in the telephone survey. The second section deals with the future situation with regards to self service technologies by examining the attitudes of industry experts obtained in the Delphi component of the research.

7.2 RESULTS OF CONSUMER RESEARCH

7.2.1 INTRODUCTION

The following section identifies findings from the telephone interviews conducted with 302 respondents in Wellington (metropolitan centre) and Palmerston North (provincial centre) areas. For analysis the results from the two centres have been combined, and where appropriate, the distinguishing characteristics have been isolated. In certain cases the Chi² statistic (with the minimum acceptable level of significance being set at .05) has been used to examine whether there are any significant differences between the observed frequencies and the expected frequencies.

7.2.2 CURRENT AND FUTURE USE OF TECHNOLOGIES

Table 7.1 shows the current use of self-service technologies.

Table 7.1 Current Use of Self-Service Technologies

Response	Automatic Telling Machines	EFTPOS	Telephone Banking
Had used	67.2%	32.5%	20.9%
Had not used	32.8%	67.5%	78.5%
Invalid	--	--	.7%
TOTAL	100%	100%	100%

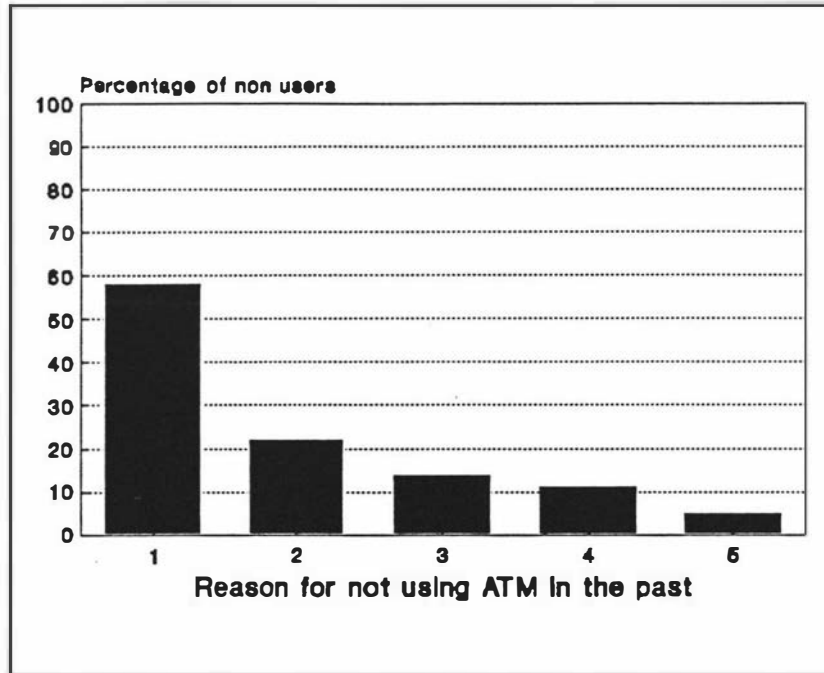
1. Automatic Telling Machines

In total 32.8% of respondents said they had not used ATMs. These respondents were asked why. The results are shown in Figure 7.1.

The main reason for not using ATMs was that respondents preferred to deal with humans in banking. A Chi² test for independence indicated that there was a significant relationship between ATM use and the respondents' age (Chi² significance = .0000 with 5 degrees of freedom), ATM use and respondents' level of personal income (Chi² significance = .01818 with 5 degrees of freedom), ATM use and respondents' location (Chi² significance = .00012 with 1 degree of freedom), ATM use and respondents' sex (Chi² significance = .02116 with 1 degree of freedom), and ATM use and respondents' occupation (Chi² significance = .00071 with 11 degrees of freedom). ATM use is significantly higher amongst younger age groups, those on higher personal incomes, those living in a metropolitan centre, males, and those in white collar occupations.

However, there was not a significant relationship between respondent's use of ATM and level of household income.

Figure 7.1 Respondents Reason for not using ATM in the Past



Key

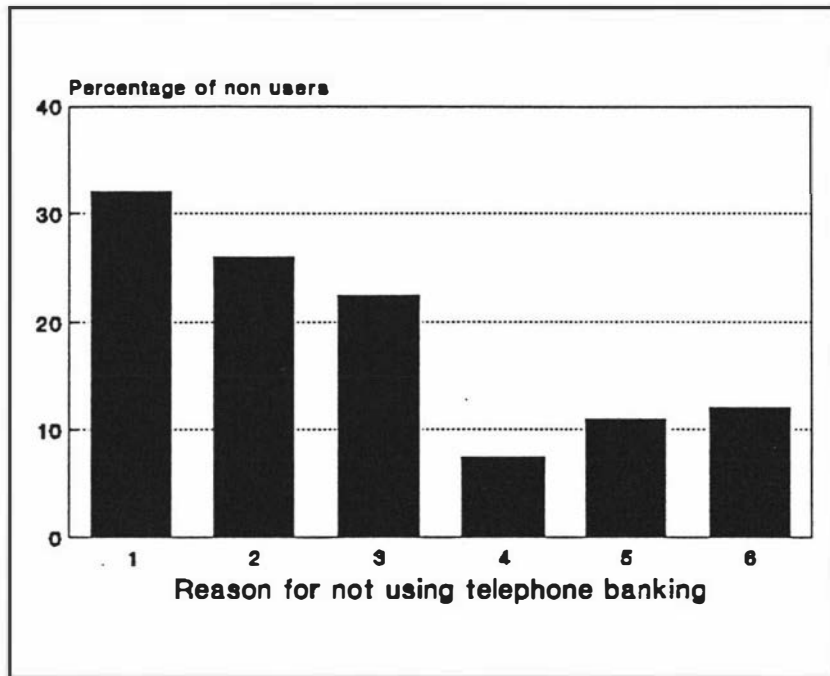
- 1 = I prefer to deal with humans in banking
- 2 = I simply do not have a need for ATMs
- 3 = I find it easier to use a cheque or visa
- 4 = There is no particular reason
- 5 = Other

2. Telephone Banking

In total 78.5% of respondents had not used telephone banking. These respondents were asked why. The results are shown in Figure 7.2.

The main reason for not using telephone banking was that respondents felt they had no need for telephone banking. A Chi² test for independence indicated that there were no significant relationships between respondents use of telephone banking and any of the demographic variables.

Figure 7.2 Respondents' Reason for not using Telephone Banking in the Past



Key

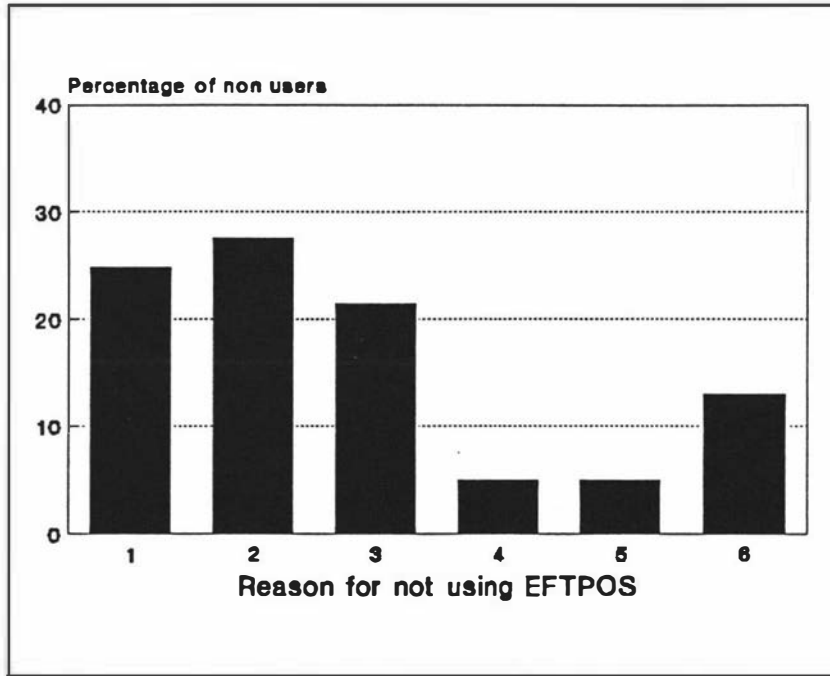
- 1 = I have no need for telephone banking
- 2 = I have never heard of telephone banking, or know very little about it
- 3 = I prefer to deal with humans in banking
- 4 = I do not have enough money to warrant using this facility
- 5 = There is no particular reason
- 6 = Other

3. EFTPOS

In total 67.5% of respondents had not used EFTPOS. These respondents were asked why. The results are shown in Figure 7.3.

27.6% of respondents who had not used EFTPOS said they preferred to use cash or cheque. A Chi² test for independence indicated that there was a significant relationship between respondents' use of EFTPOS and age (Chi² significance = .02503 with 5 degrees of freedom). Use of EFTPOS is higher amongst the younger age groups.

Figure 7.3 Respondents' Reason for not using EFTPOS in the Past



Key

- 1 = I am not aware of EFTPOS, or know very little about it
- 2 = I prefer to use cash or cheque
- 3 = I have no need for EFTPOS
- 4 = No particular reason
- 5 = Other

However, there was not a significant relationship between respondents' use of EFTPOS and household income, respondents' use of EFTPOS and personal income, respondents' use of EFTPOS and occupation, respondents' use of EFTPOS and sex, and respondents' use of EFTPOS and location.

Future use of Technologies

Respondents were given a description of various self-service technologies, and were asked if they would be prepared to make use of the service in the future. Results are shown in Table 7.2.

Table 7.2 Future use of Self-Service Technologies

	ATM	EFTPOS	Telephone Banking
Will use	74.2	49.3%	46.7%
Will not use	24.2%	48.7%	49%
Invalid	1.7%	2%	4.3%
TOTAL	100%	100%	100%

1. Automatic Telling Machines

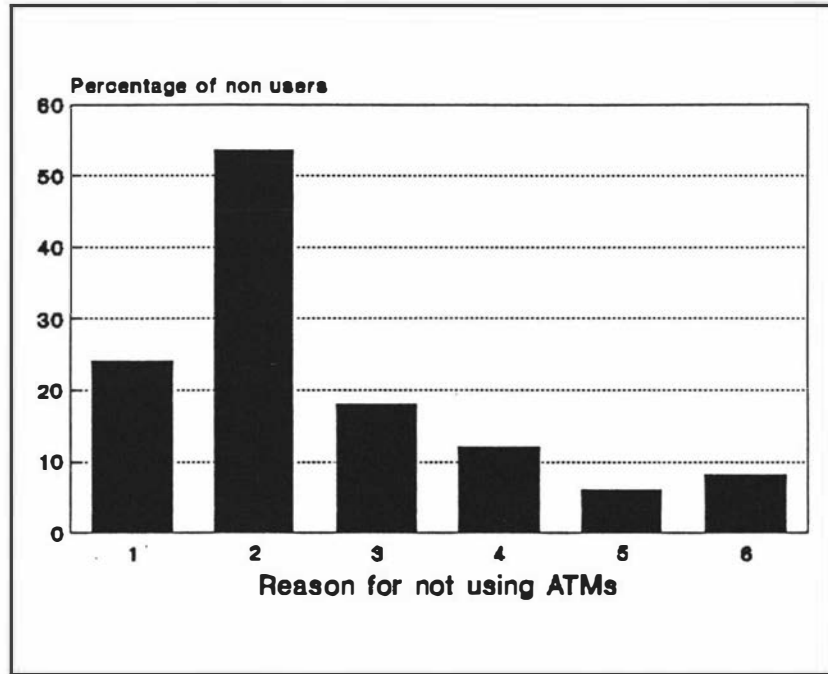
24.2% of respondents said they would not use this service in the future. These respondents were asked why. The results are shown in Figure 7.4.

The main reasons for respondents not using ATMs in the future was because they preferred to deal with humans in banking (53.6%). The second main reason for respondents not using ATMs in the future was because they did not understand the technology (23.5%). An even smaller percentage of respondents considered it to be undignified to stand at a machine.

The 'other' category was made up of a variety of responses, including:

- there are not enough machines available to make it worthwhile
- the ATMs do not offer enough services
- ATMs lack security

Figure 7.4 Respondents' Reason for not using ATMs in the Future



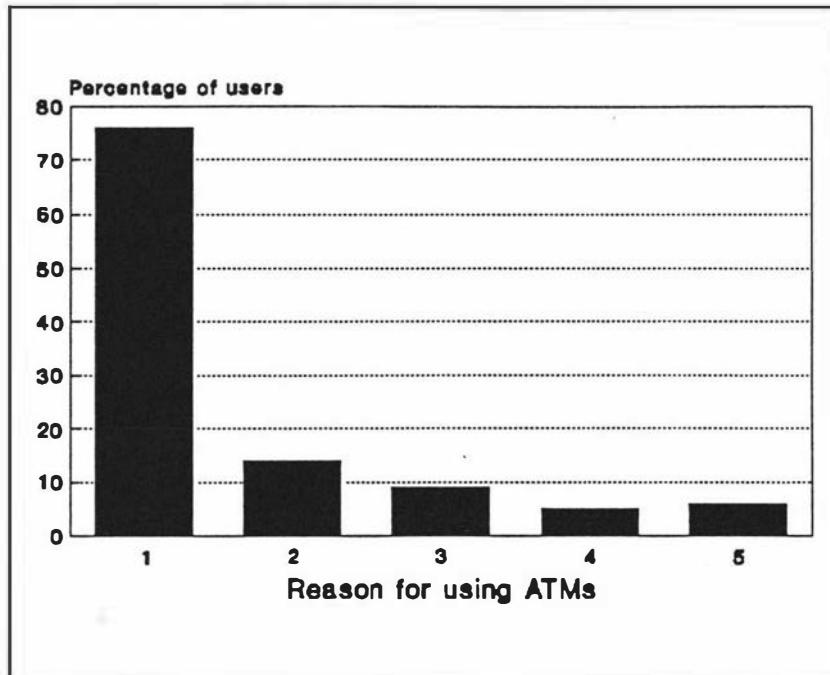
Key

- 1 = I do not understand this technology
- 2 = I prefer to deal with humans in banking
- 3 = I consider it undignified to stand at a machine
- 4 = They might cause me to overspend
- 5 = No particular reason
- 6 = Other

In total 74.2% of respondents said they would use this technology in the future. The reasons for using the technology in the future are shown in Figure 7.5.

Respondents suggested that the main incentive for using ATMs in the future was because they provide greater time utility. A Chi² test for independence indicated that there was a significant relationship between future ATM use and respondents' age (Chi² significance = .00003 with 5 degrees of freedom), future ATM use and respondents' occupation (Chi² significance = .00011 with 11 degrees of freedom), future ATM use and respondents' sex (Chi² significance = .00832 with 1 degree of freedom), future ATM use and respondents' location (Chi² significance = .0007 with 1 degree of freedom).

Figure 7.5 Respondents' Reason for using ATMs in the Future



Key

- 1 = ATMs provide greater time utility
- 2 = ATMs provide greater place utility
- 3 = ATMs are quicker than human tellers
- 4 = No particular reason
- 5 = Other

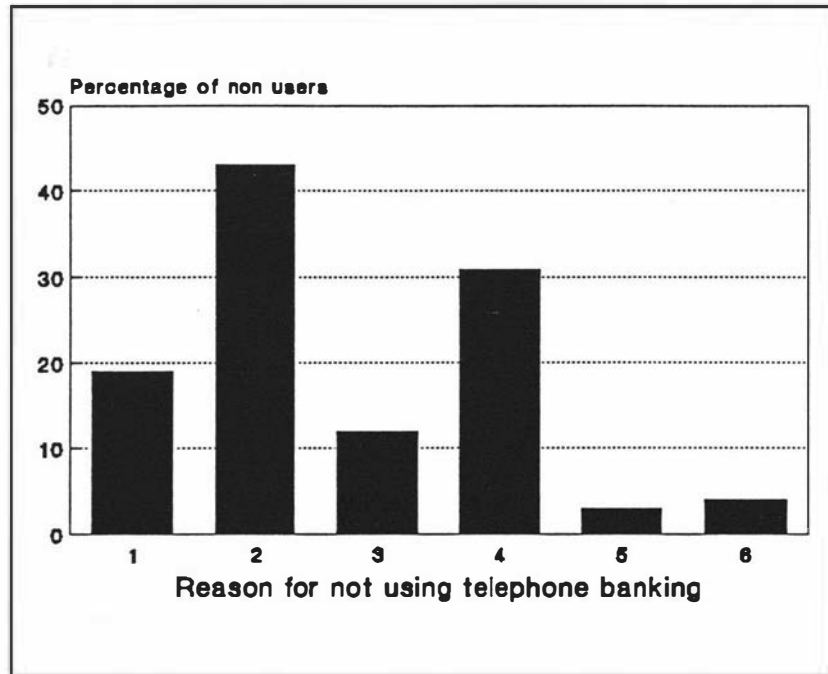
Therefore, future ATM use will be higher among those in younger age groups, white collar occupations, males, and those living in a metropolitan centre.

However, there was not a significant relationship between respondents' future use of ATMs and their levels of personal or household income.

2. Telephone Banking

In total 51.2% of respondents said they would not use this service in the future. These respondents were asked why. The results are shown in Figure 7.6.

Figure 7.6 Respondents' Reason for not using Telephone Banking in the Future



Key

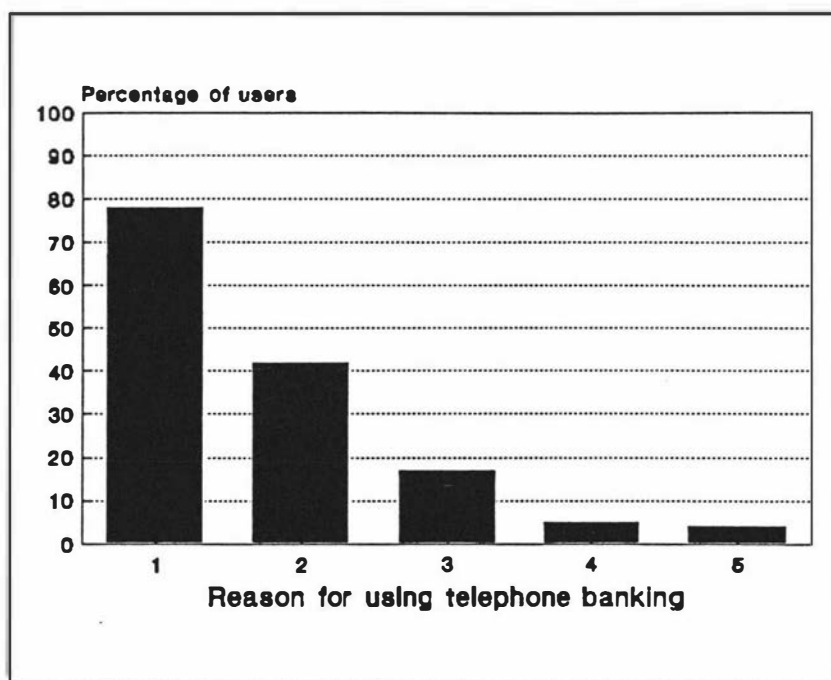
- 1 = I know very little about telephone banking
- 2 = I prefer to deal with humans in banking
- 3 = I have insufficient earning power to warrant using this service
- 4 = I simply have no need for this service
- 5 = No particular reason
- 6 = Other

43% of non telephone banking users said they would not use this technology in the future because they preferred to deal with humans in banking.

In total 48.8% of respondents said they would use this service in the future. These respondents were asked why. The results are shown in Figure 7.7.

The main reason for using telephone banking in the future was that it provides greater time utility (78%). A Chi² test for independence indicated that there were no significant relationships between respondents' future use of telephone banking and any of the demographic variables.

Figure 7.7 Respondents' Reason for using Telephone Banking in the Future



Key

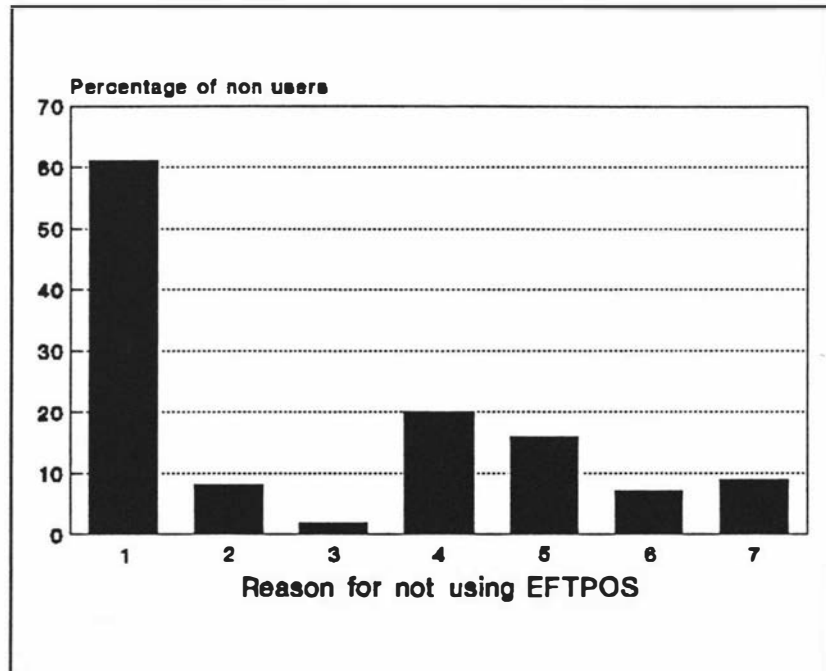
- 1 = Telephone banking provides greater time utility
- 2 = Telephone banking provides greater place utility
- 3 = Good if you are housebound
- 4 = No particular reason
- 5 = Other

3. EFTPOS

In total 49.7% of respondents said they would not use EFTPOS in the future. These respondents were asked why. The results are shown in Figure 7.8.

The main reason for not using EFTPOS in the future was because respondents preferred to use cash or cheque. A greater proportion of the provincial centre respondents (78% as opposed to 44% from the metropolitan centre) considered that cash or cheque was more convenient than EFTPOS.

Figure 7.8 Respondents' Reason for not using EFTPOS in the Future



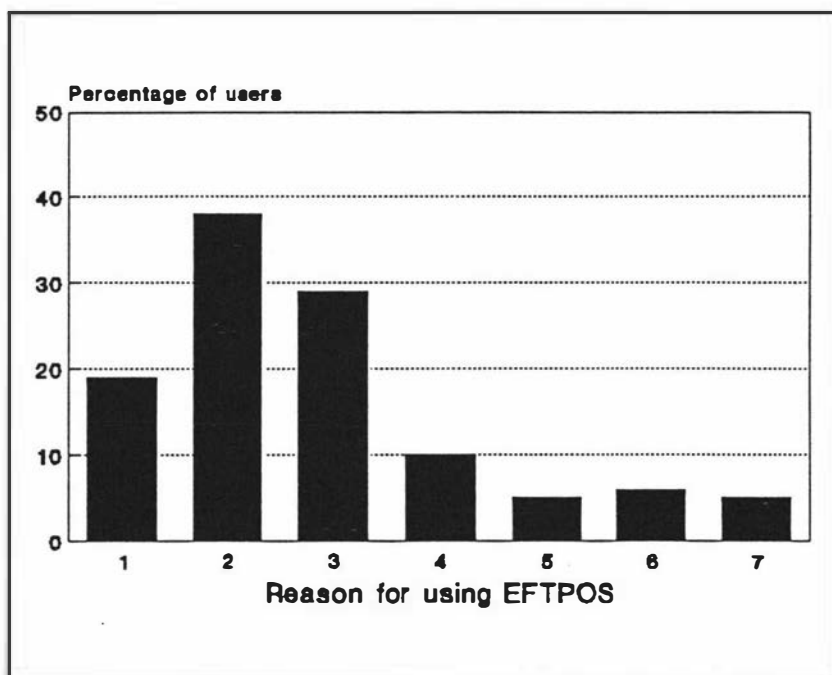
Key

- 1 = I prefer to use cash or cheques
- 2 = I do not like the immediate debit aspect of EFTPOS
- 3 = EFTPOS may cause me to overspend
- 4 = I know little about EFTPOS
- 5 = I do not have sufficient earning power to warrant using this service
- 6 = No particular reason
- 7 = Other

In total 50.3% of respondents said they would use EFTPOS in the future. Several reasons were given for using EFTPOS in the future, as shown in Figure 7.9.

The main reason for using EFTPOS in the future was because the respondents said it was quicker than other payment forms (38%). A Chi² test for independence indicated that there was a statistically significant relationship between the respondents' future use of EFTPOS and respondents' age (Chi² significance = .02775 with 5 degrees of freedom), the respondents' future use of EFTPOS and location (Chi² significance = .00136 with 1 degree of freedom). Future use of EFTPOS will be higher among those in the younger age groups, and living in a metropolitan centre.

Figure 7.9 Respondents' Reason for using EFTPOS in the Future



Key

- 1 = I would use it, if it was more widely available
- 2 = It is quicker than other payment forms
- 3 = It is handy for petrol or groceries
- 4 = It is convenient when out of cash
- 5 = It is more secure because there is no need to carry cash
- 6 = No particular reason
- 7 = Other

However, there was a less than significant relationship between respondents' future use of EFTPOS and their personal income, household income, sex, or occupation.

Disenchantment Discontinuance

In order to identify whether disenchantment discontinuance is occurring, a cross tabulation was conducted to identify whether those respondents who had adopted the various technologies were still using them. It was found that of the respondents who had used an ATM, 95.1% said they would continue to use it. 4.9% said they would not use

them again. Those who had used telephone banking intended to continue to use it. 93% of those who had used telephone banking said they intended to use it again. 7% said they did not intend using it again. Of those respondents who had used EFTPOS, 85.6% said they would continue to use it, and 14.4% said they would not continue to use it. These figures alone would suggest that there is a less than significant degree of disenchantment discontinuance taking place.

To test this statistically, the Poisson distribution was used as an approximation of the Binomial distribution (see Table 7.3). This was used to find the probability that the level of discontinuance identified in the case of each technology could occur by chance. In the calculation, a 'success' was defined as a respondent who had used a technology at least twice in the past, but did not intend using that same technology in the future.

The Poisson distribution can be a reasonable approximation of the binomial when the number of trials is large, the binomial probability of success is small, n is equal to or greater than 20, and p is equal to or less than .05 (Levin, 1987). In the calculations, a 10% level of discontinuance was set. Therefore the calculations show the probability, (given the level of discontinuance found in this research and the sample sizes in each case), of obtaining a level of discontinuance greater than 10%.

As the results indicate, the probabilities of achieving a level of discontinuance of greater than 10%, given the level of discontinuance found in this research, are very small for ATMs and telephone banking. The probability for EFTPOS, however, is quite high. However this is not due to disenchantment discontinuance. Those respondents who had used EFTPOS in the past, but did not intend using it again in the future, simply had no choice because their particular bank withdrew from the EFTPOS scheme. It was not a case of these respondents ceasing to use EFTPOS due to a preference for dealing with humans in banking.

Table 7.3 Poisson Probabilities of Achieving a Level of Discontinuance Greater than 10%

Technology	Number of Respondents who had used technology in the past	Number of Respondents who had used technology in the past, but did not intend using in the future (discontinuers)	Poisson approximation to the Binomial Probability (P)
ATMS	203	10	.0005
Telephone Banking	61	4	.0511
EFTPOS	97	14	.8244

7.2.3 DISCUSSION

There was a small and less than significant number of people who had used the technologies in the past, but did not intend using them again in the future. This does not imply that future usage rates will remain static or fall since there was a larger number of people who have not used these technologies in the past, but intended using them in the future. The overall trend, therefore, is towards increased use of technologies. The number of people using ATMs will increase by 7%, EFTPOS by 17%, and telephone banking 25.8%. It appears that the more established the technology, the less likely is substantial future growth in usage. For instance ATMs are the most established of the retail banking technologies, and their use is projected to grow by the least amount (relative to current usage rates).

Thus, rather than experience disenchantment discontinuance, it appears that it will be more a case of diffusion *saturation*. Diffusion will reach a peak level which will be well short of 100% adoption due to a proportion of non-adopters who will never use the technology. Current use of ATMs is 67.2%, and this is likely to grow to 74.2% - a growth of 7%. Current use of EFTPOS is 32.5%, and this is likely to grow to 49.3%.

The anticipated growth of telephone banking is less than either of these two technologies, with future usage unlikely to be beyond 46.7% of the banking population.

It is necessary to examine each of the technologies individually. ATMs will reach a maximum diffusion level of 74%. The main reason for not adopting ATMs was that the respondents preferred to deal with humans in banking - rather than self service technologies. 29% of non-adopters said that they still did not understand ATMs. Bearing in mind that ATMs have been available to the market for some 14 years, this finding is somewhat unexpected. Of those respondents who said they would use the technology in the future, 76% said they would do so due to the greater time utility of ATMs ie the fact that ATMs are open outside of normal bank branch hours.

The second main reason was greater place utility ie the fact that an ATM is more likely to be in a convenient location than a bank branch. Current ATM usage is significantly higher among those in higher age and personal income groups, males, those living in a metropolitan centre, and those in white collar occupations. In the future, all of these demographics, apart from level of personal income, will remain significantly important in relation to ATM use.

EFTPOS will reach a maximum diffusion level of around 49% of the population, which is somewhat less than that for ATMs. One must bear in mind, however, that EFTPOS is characterised as being a relatively new technology, and the literature suggests that the marketing of EFTPOS on the part of the banks was somewhat inadequate. The main reason for not using EFTPOS was that respondents' considered cash or cheque to be more convenient. The main reason for using EFTPOS was that it was considered quicker than other payment forms. These respondents, it appears, have a more thorough understanding of EFTPOS than the non-adopters.

The only significant demographic variable related to current EFTPOS use was age, with EFTPOS users tending to be in younger age groups. While age will still be a significant factor in the future, it will be less significant than it has been in the past.

Telephone banking will apparently reach a maximum diffusion level of 46.7%. The main reason for not using telephone banking was that respondents' did not perceive a need for the service. The second main reason was respondents' had not heard of the service, and the third main reason was that respondents' preferred to deal with humans in banking.

There were no significant relationships between current or future use of telephone banking and any of the demographic variables. This may suggest that consumers perceive telephone banking as being more of a mass market service.

7.2.4 POSITIVE AND NEGATIVE VIEWS ON TECHNOLOGY REPLACING HUMANS

Respondents were asked if they had any comments (positive and negative) with regard to being able to perform most of their banking tasks on their television at home or a machine on the street, rather than with a human teller.

In total there were 310 negative comments and 96 positive comments (responses are greater than 302 due to multiple comments from individuals). Only six respondents had no views at all, 61 respondents had positive views only, 184 respondents had negative views only, and 51 respondents had both positive and negative views.

There were more negative views in the provincial centre (181) than the metropolitan centre (129).

Negative views

53.6% of respondents suggested that they preferred to have contact with humans than machines despite the additional place and time utility of machines. For instance, some of the comments included:

'There are little problems or concerns which a human can pick up but a machine can't. You can't explain things or argue with a machine.'

'It would be a shame to get rid of personal service. It would be a shame not to have people. You feel more secure with people. Not that I don't trust the machines, I just really like personal attention.'

'You can converse with a person and have the personal touch with service. I don't see the need to have all these self-service machines. You lose the rapport built up with a bank or institution you've been with for a long time.'

'I prefer the human touch. I'm not really into computers. If I had the option I would go to a person rather than a machine. It bothers me actually - people are people - I prefer the personal contact.'

'What a horrible thought. Human contact is very good, especially for me as I don't get out much. There are too many machines around now. We will be walking robots.'

'Its a funny thing to ask people in NZ because compared to the rest of the world we are keeping up with technology. But people like to talk to people. I say it's funny because I work in the computer field. People like people. Machines are too impersonal.'

'I like the personal touch of the staff member. It is far more pleasant to talk to somebody who has knowledge about things than just press buttons. They will make us all nothing but numbers if we do everything by these machines.'

'The day they do that I'll go to a bank with human tellers only. There is more to a bank than just putting money in a machine. It can be very pleasant to visit the bank. You meet lots of people.'

20% were concerned that machines would cause more unemployment. Comments included:

'I prefer humans to machines because they cause more unemployment. It is high enough as it is.'

'What will we do with all the people that would be unemployed? Unemployment is already bad and it will only get worse.'

'A lot of people would lose their jobs and I don't think that would be good for the country.'

'People would lose their jobs, but I suppose we can't do much about this because technology is here to stay.'

'It's very sad. I can't fight it. People should be employed. We've managed for hundreds of years with people and should continue to do so.'

'High technology means high unemployment. It would not be good.'

'I'm not impressed with machines. They put people out of work.'

10.2% were concerned with the effects on society ie we become lazy and antisocial.

11% were concerned with security problems ie the machine breaking down, the effect of a power cut, or unauthorised access.

A number of respondents gave other reasons, including the fact that they were concerned that they would not be able to understand the machines. 3% were concerned that the machines would cause them to overspend or that the machines could make mistakes.

Again, those in the provincial centre showed a greater preference for humans. 63% of the provincial centre respondents said that they preferred humans, as opposed to 45% of the metropolitan centre respondents.

Positive views

17.9% of respondents said that the machines would offer greater time and place utility. Comments included:

'It would be useful because I have to look after my children at home.'

'Good if the weather is awful or you're not well. You can order things from home.'

'Positive. Ease of use, hassle free. Sitting at home doing your banking and accounts would be very handy.'

'Good for housebound people or people with little mobility.'

'Marvellous. I would think it was fantastic if I could do all my banking and business from home. I am a lazy beggar and this has a lot of appeal for me.'

'Good news. More convenient in my time, no cares. Time to think. No pressure, convenience. Not tied to an 8 hour day, location independent. Don't have to be close to my bank.'

'Very convenient. I'm all for it. I'm involved in that sort of thing. I have my own computer so I am familiar with the technology.'

'Waiting in queues at a teller is irksome. ATMs make it less of a wait, and are in many locations.'

'I am never happy going into a bank. This system would be much better.'

'It would be great if you could do all that at home - much easier. You don't have to go into town, find a park etc. It would simply save time.'

'The banks really annoy me, especially during my important lunch hours. I want to do things myself.'

'I'm all for it. Banking when you want it and where you want it. I am sure society is heading this way.'

'Sometimes you just don't feel like going out. These are the times it would be useful.'

5% said they would be more efficient/quicker than tellers.

6% said they will have to adopt the machines because they will be forced upon them.

Respondents gave other reasons, including the fact that machines would be good if one were housebound or the weather was bad, or they considered that the machines would be fairer because they could not discriminate on the basis of appearance.

Product Specific Preferences

Respondents were given a list of banking services and were asked for each one whether they would prefer to obtain this service from a machine or a human. The assumption was made that the self service machine and the human staff member were standing side by side, the fees charged were the same, and there were no queues at either. In other words, all possible influencing factors were equalised, apart from the fact that one was a machine and the other was a human.

The respondents' preferences are shown in Table 7.4, together with the associated Chi² significance and degrees of freedom.

Table 7.4 Respondents' Preferences: Human Versus Machine

<u>Type of Service</u>	<u>Prefer Machine</u>	<u>Prefer Human</u>	<u>Chi²</u>	<u>DF</u>
Travel enquiry	3%	97%	.000	1
Travel booking	5.7%	94.3%	.000	1
Loan quotation	15%	85%	.000	1
Loan approval	7%	93%	.000	1
Life insurance quotation	17.5%	82.5%	.000	1
Life insurance approval	13.2%	86.6%	.000	1
Obtaining a balance on cheque account	63.3%	36.4%	.000	1
Withdrawing cash from cheque account	56.7%	43.3%	.022	1
Ordering a bank statement	49.7%	50.3%	.907	1
Mortgage quotation	12.1%	87.9%	.000	1
Mortgage approval	4.7%	95.3%	.000	1

This table shows that there are certain services for which a significant proportion of respondents preferred self-service technology, and other services for which a significant proportion of respondents preferred to use humans. The only service which was not significant was ordering a bank statement, which had an equal preference for both machines and humans. Standard services which involve little risk appear to be more

suitable for machines, while those services which involve more risk (such as obtaining a loan quotation) appear to be more suited for a human.

7.2.5 DISCUSSION

Consumers, while in some cases prefer to have the time and place utility of self-service technology, would be most concerned if they did not also have the choice of going to a human teller. When respondents were asked to comment on the idea of being able to perform most of their banking tasks on their television at home or a machine on the street, the majority of comments were negative. Most of these negative comments were made up of respondents who said they preferred to deal with humans in banking. One respondent commented 'I prefer the human contact on personal things. Everybody's needs are different and a machine cannot cope with all that. Straight withdrawals might be OK, but not loans or mortgages where strict dollars and cents are not the only criteria. A machine cannot sense a person's character as a human can.' Respondents were also concerned that machines could cause unemployment. This may be more of an issue at the moment since New Zealand is currently suffering from record levels of unemployment.

Of those respondents who had positive views on the concept of performing their banking tasks on their television or a machine, the majority suggested that it was due to time and place utility. No longer do customers have to rush to the bank branch in their lunch hour or before 4.30pm. Also, ATMs are more likely to be located in a place which is more convenient for the customer.

There is quite clearly a distinction between preferences according to the level of (financial) risk involved with the product, and the amount of information needed to be exchanged. In cases of high risk/high information products, the preference is for human contact. Self-service technology is suitable for low risk/low information products. For instance, ordering a bank statement is a low risk/low information product, and in this case most respondents were quite happy to obtain it from a machine. Obtaining a loan quotation is not so much high risk, but it is high information. The preference,

therefore, was for human contact. For loan approval, there is both high risk and high information, so the demand for human contact is even greater.

7.2.6 SAMPLE DEMOGRAPHICS

This final section describes the demographic characteristics of the sample. Where possible a comparison is made with official New Zealand census statistics.

The first table, Table 7.5, shows respondents' age. Pearson's correlation was performed on the data in Table 7.5 to examine the closeness of the sample age spread to that of the population. This indicated a perfect correlation ($r = 1.000$).

Table 7.5 Respondents' Age

Age Bracket	Frequency	Percentage	*Population Percentage
15-19 years	15	5.0%	5.0%
20-29 years	69	23.3%	24.6%
30-39 years	80	21.3%	22.5%
40-49 years	57	16.9%	17.8%
50-59 years	35	12.3%	13.0%
60 years or more	46	21.1%	22.2%
Total	302	100%	100%

* Based on 1986 New Zealand Yearbook

Table 7.6 shows that the respondents were evenly spread throughout each income group. 50.2% of respondents had an annual household income before tax of over \$40,000. Only a small number (2.4%) had an annual household income before tax of less than \$9,999.

Table 7.6 Respondents' Household Annual Income Before Tax

Household Income	Frequency	Percentage
Less than \$9,999	7	2.4
\$10,000 - \$19,999	37	12.9
\$20,000 - \$29,999	47	16.4
\$30,000 - \$39,999	51	17.8
\$40,000 - \$49,999	33	11.5
\$50,000 - \$59,999	30	10.5
\$60,000 - \$69,999	33	11.5
\$70,000 or more	48	16.7
Missing	16	--
Total	302	100%

Table 7.7 illustrates respondents' personal annual income before tax.

Table 7.7 Respondents' Personal Annual Income Before Tax

Income Bracket	Frequency	Percentage
Less than \$9,999	65	22.0
\$10,000 - \$19,999	55	18.6
\$20,000 - \$29,999	66	22.4
\$30,000 - \$39,999	54	18.3
\$40,000 - \$49,999	20	6.8
\$50,000 - \$59,999	14	4.7
\$60,000 or more	21	7.1
Missing	7	--
Total	302	100%

According to Table 7.7, respondents tended to be concentrated in the lower income groups, with more than 80% of respondents earning less than \$40,000 per annum before tax.

Table 7.8 shows respondents' occupation.

Table 7.8 Respondents' Occupation

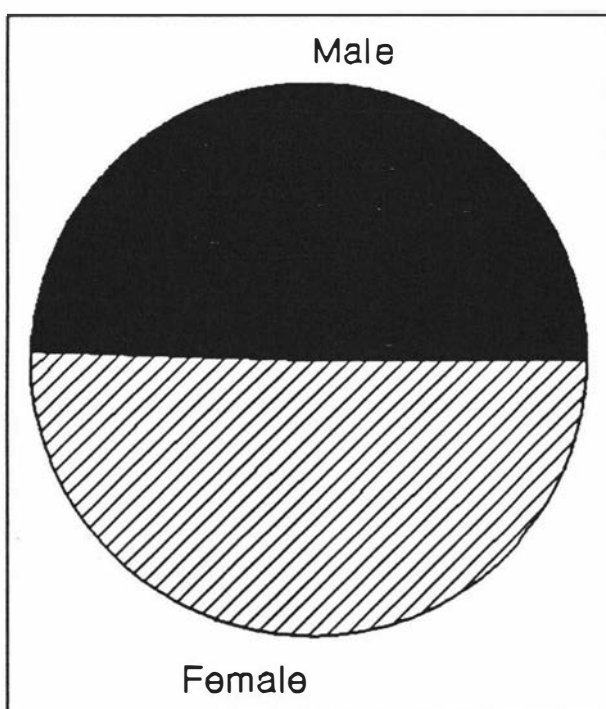
Occupational Group	Frequency	Percentage
Professional/Technical	59	19.9
Administrative/Management	27	9.1
Clerical	20	6.7
Sales Worker	11	3.7
Service Worker	26	8.8
Agriculture, Animal Husbandry and Forestry, fisher or hunter	4	1.3
Production, operators, labourers	11	3.7
Pensioner/Retired	46	15.5
Houseperson	32	10.8
Student	23	7.7
Out of work/Unemployed	7	2.4
Other	31	10.4
Missing	5	--
Total	302	100%

According to Table 7.8, three occupational groups accounted for nearly 50% of respondents: Professional/technical; Production, operators, labourers; and pensioner/retired. That category which contained the greatest number of respondents

was the professional/technical group, which accounted for 19.9% of respondents.

Figure 7.10 illustrates the sex of the respondents. These figures correspond exactly to the New Zealand 1986 yearbook statistics which state that there are 50.5% females and 49.5% males in New Zealand.

Figure 7.10 Respondents' Sex



7.2.7 SUMMARY

This section presented the results to the consumer survey. The evidence suggests that there is a less than significant level of disenchantment discontinuance taking place among the three established self-service technologies which were under examination. Not only will those who have used the technologies in the past continue to do so, but a large proportion of those who have not used the technologies in the past, intend to use them in the future. Thus rather than experience disenchantment discontinuance, in which users of technologies return to conventional banking due to a preference for

dealing with humans, it is more a case of market saturation. Diffusion will reach a peak level which is short of 100%, but it will probably not regress.

However, the human element still emerged as being important for non-users of the technologies. A preference for dealing with humans was the main reason for not using ATMs. The human preference also emerged as being important for non adoption of telephone banking. When the respondents were asked to give negative and positive comments on the concept of performing most of their banking on their television or a machine on the street, the majority of comments were negative. The main negative comment related to the fact that respondents preferred to deal with humans in banking, despite the increased time and place utility provided by self-service technology.

Certain banking services are more appropriate for self-service technology than others. The respondents were prepared to use self-service technology for low involvement type products, such as obtaining an account balance. However, they preferred the human touch for services such as obtaining a loan quotation or authorisation.

Various demographic characteristics emerged as being important in identifying potential users of self-service technologies. The most important of these was age, with usage being higher among the younger age groups.

Finally, the demographics of the sample were given, and where possible they were compared with official New Zealand census statistics. In those areas able to be compared, this sample would appear to be representative. Geographical representation, however, has not been achieved since the sample was drawn from only two areas.

7.3 RESULTS OF DELPHI RESEARCH

7.3.1 INTRODUCTION

Table 7.9 summarises the numbers of responses from each round of Delphi.

Table 7.9 Delphi Responses

Panel	Number of Experts Meeting Criteria	Number of Experts Agreeing to Complete Research	Round 1 Replies	Round 2 Replies	Round 3 Replies
A	33	27	22	19	17
B	41	31	27	19	18
C	32	28	24	21	21
D	49	39	31	25	16
E	17	16	10	9	9
Total	172	141	114	93	81

Between developing the sample and sending out the first questionnaire, some 14 of the experts had to withdraw from the study because of varying commitments (going overseas, changing companies, or the fact that someone else in their organisation was completing the study also, and they felt this was enough).

To assist in interpreting the results of this Delphi study, it is worthwhile repeating the definitions of some of the key terms used:

AVERAGE COMPETENCE

For each question in the Delphi study, the experts were asked to estimate their competence or the amount of confidence they placed in their response, on a scale of nought to five. Nought meant that the expert considered him or herself to have very little competence in answering that particular question, and five meant the expert considered him or herself to have much competence in answering that particular question. The average was then calculated for each panel on each question.

INTERQUARTILE RANGE (IQR)

This refers to the range of the middle 50% of responses, when all the responses are ranked from smallest to largest. For example, suppose there were eight experts in a panel and their response to the question 'in what year will the cashless society occur?' was: 1999, 2003, 2006, 2007, 2007, 2008, 2009, and 2009. The interquartile range, therefore, is 2006-2008.

PANEL A

Involved experts from the departments of marketing and strategic planning in large banks ('large' in this case refers to a bank which is represented by 150 or more branches in New Zealand).

PANEL B

Involved experts from the department of information technology in large banks.

PANEL C

Involved experts from the marketing, strategic planning, and information technology departments in medium to small (ie less than 150 branches in New Zealand) financial institutions. 'Financial institutions' refers not only to banks, but also experts from finance companies, and building societies.

PANEL D

Involved experts from technology supplying companies.

PANEL E

This involved a constituent group of experts. This panel involved those people who were not directly involved in the marketing of technology to customers, but had an influence.

The experts were asked to give estimates using four different measures: indexes, percentages, probabilities, and years:

INDEX QUESTIONS

The experts were asked to attach index weightings to various factors, with the index in 1991 being set at 100. An estimate greater than 100 suggested that the expert thought that particular factor would increase in importance. An index estimate of less than 100 suggested that the expert thought that particular factor would decrease in importance. An estimate of exactly 100 suggested that the expert thought that particular factor would not change in importance.

PERCENTAGE QUESTIONS

The experts were asked to estimate the percentage(out of 100) for the particular event.

PROBABILITY QUESTIONS

The experts were asked to estimate the probability (out of 100) of an event occurring.

YEAR QUESTIONS

The experts were asked to estimate the year in which they thought the stated event would occur.

7.3.2 TECHNOLOGICAL DIFFUSION

Factors Encouraging Consumer Acceptance of Technologies

The experts were asked to attach index points (with 1991 = 100) to a list of factors which encourage consumer acceptance of technologies. The indices are shown in Table 7.10.

Response

Table 7.10 Factors Encouraging Consumer Acceptance of Technologies

	<u>Panel A</u>	<u>Panel B</u>	<u>Panel C</u>	<u>Panel D</u>	<u>Panel E</u>
Simplicity of use	M1 128	M1 131	M1 145	M1 131	M1 139
	M2 136	M2 153	M2 135	M2 137	M2 142
	IQR1 120-130	IQR1 124-140	IQR1 145-150	IQR1 126-140	IQR1 130-145
	IQR2 128-148	IQR2 130-140	IQR2 150-160	IQR2 130-140	IQR2 130-150
Time convenience	M1 134	M1 137	M1 145	M1 138	M1 128
	M2 146	M2 145	M2 152	M2 141	M2 138
	IQR1 125-138	IQR1 130-141	IQR1 150-154	IQR1 130-140	IQR1 120-135
	IQR2 138-150	IQR2 140-153	IQR2 150-160	IQR2 140-145	IQR2 130-143
Place convenience	M1 134	M1 129	M1 147	M1 133	M1 134
	M2 146	M2 137	M2 153	M2 138	M2 144
	IQR1 130-140	IQR1 118-140	IQR1 150-151	IQR1 126-140	IQR1 130-140
	IQR2 140-150	IQR2 132-150	IQR2 150-160	IQR2 130-145	IQR2 140-150
Security	M1 118	M1 125	M1 134	M1 112	M1 106
	M2 123	M2 129	M2 141	M2 118	M2 108
	IQR1 110-120	IQR1 120-131	IQR1 130-140	IQR1 106-120	IQR1 100-110
	IQR2 115-128	IQR2 126-136	IQR2 140-150	IQR2 110-129	IQR2 100-118
Standardisation of equipment	M1 125	M1 115	M1 128	M1 111	M1 110
	M2 130	M2 122	M2 135	M2 117	M2 112
	IQR1 113-128	IQR1 110-120	IQR1 120-138	IQR1 106-119	IQR1 103-120
	IQR2 115-130	IQR2 115-130	IQR2 130-140	IQR2 110-124	IQR2 106-120
Wide availability of the technology	M1 120	M1 128	M1 138	M1 121	M1 126
	M2 129	M2 128	M2 146	M2 127	M2 137
	IQR1 110-128	IQR1 120-135	IQR1 140-140	IQR1 120-129	IQR1 115-135
	IQR2 120-140	IQR2 123-137	IQR2 145-151	IQR2 120-139	IQR2 120-150

Table 7.10 continued

	<u>Panel A</u>	<u>Panel B</u>	<u>Panel C</u>	<u>Panel D</u>	<u>Panel E</u>
Efficiency	M1 119	M1 119	M1 144	M1 114	M1 116
(relative to a	M2 130	M2 125	M2 149	M2 121	M2 118
human teller)	IQR1 113-125	IQR1 110-126	IQR1 140-150	IQR1 110-120	IQR1 103-123
	IQR2 120-132	IQR2 120-130	IQR2 145-153	IQR2 113-130	IQR2 105-130
Average Competence	3.000	3.167	2.905	2.530	3.333

Conclusions

All the panels considered time and place convenience to be important, as shown below.

The main factors encouraging consumer acceptance of technologies were:

Panel A:

By 2000 time convenience and place convenience.

By 2010 time convenience and place convenience

Those factors which increased most in importance between the years 2000 and 2010 were "place and time convenience", which both increased by 12 index points.

Panel B:

By 2000 time convenience followed by simplicity of use

By 2010 simplicity of use followed by time convenience

The factor which showed the greatest increase in importance between the years 2000 and 2010 was "simplicity of use", which increased by 22 index points.

Panel C:

By 2000 place convenience followed by time convenience and simplicity of use

By 2010 place convenience followed by time convenience

The factor which showed the greatest increase in importance between the years 2000 and 2010 was "simplicity of use", which increased by 10 index points.

Panel D:

By 2000 time convenience followed by place convenience

By 2010 time convenience followed by place convenience

The factor which showed the greatest increase in importance between the years 2000 and 2010 was "efficiency (relative to a human teller)" which increased by 7 index points. This panel also had the lowest self-competence rating (2.530).

Panel E:

By 2000 simplicity of use followed by place convenience

By 2010 place convenience followed by simplicity of use

The factor which showed the greatest increase in importance between the years 2000 and 2010 was the "wide availability of technology", which increased by 11 index points. This panel had the highest self-competence rating (3.333).

Rationale

First, all the factors showed an increase in importance. The experts suggested that this was due to the increasing influence technology is having on society.

Comments included:

'All these factors will continue to grow in importance as customers realise the benefits of accessibility and speed.'

'All factors will become more and more important as the social structure adjusts to the increasing use of technology in ordinary life.'

Three main factors emerged across all panels: time convenience, place convenience, and simplicity of use. They are summed up in the following comments:

'The main point is the tangible benefit to consumers. No amount of slick marketing is going to encourage customers to use a service unless they can see the benefit.'

'Time is money. Customers demand time and place convenience.'

'Time and convenience are critical to customers. Doing their banking is about as exciting as shopping in a supermarket.'

'Customers are demanding (and I believe will continue to demand) more convenience in their banking. They will want to be able to use a greater amount of leisure time more effectively.'

Simplicity of use emerged as being particularly important amongst members of Panel E.

'Simplicity is the key to customer adoption.'

'Customers must feel confident when using technology.'

'Customers want easy to use, easy to understand technology, 24 hours a day, 7 days a week.'

Factors Discouraging Consumer Acceptance of Technologies

The experts were asked to attach index points (with 1991 = 100) to a list of factors which discourage consumer acceptance of technologies. Table 7.11 shows the responses.

Response

Table 7.11 Factors Discouraging Consumer Acceptance of Technologies

	<u>Panel A</u>	<u>Panel B</u>	<u>Panel C</u>	<u>Panel D</u>	<u>Panel E</u>
The 'habit' of using human tellers	M1 87	M1 90	M1 92	M1 92	M1 88
	M2 74	M2 81	M2 86	M2 83	M2 82
	IQR1 80-90	IQR1 90-95	IQR1 89-95	IQR1 90-99	IQR1 80-100
	IQR2 68-80	IQR2 80-90	IQR2 80-90	IQR2 76-90	IQR2 63-100
A preference for dealing with humans in banking	M1 88	M1 94	M1 96	M1 96	M1 92
	M2 74	M2 88	M2 94	M2 90	M2 83
	IQR1 85-90	IQR1 90-99	IQR1 93-99	IQR1 91-100	IQR1 80-100
	IQR2 69-80	IQR2 84-97	IQR2 89-96	IQR2 85-99	IQR2 65-105
The 'big brother' aspect ie the fear of banks taking over peoples' lives	M1 87	M1 93	M1 83	M1 93	M1 63
	M2 81	M2 86	M2 77	M2 87	M2 59
	IQR1 80-95	IQR1 90-95	IQR1 80-89	IQR1 90-100	IQR1 40-90
	IQR2 70-90	IQR2 81-91	IQR2 76-85	IQR2 80-95	IQR2 38-85
The absence of sufficient benefits of banking technology over and above human tellers	M1 83	M1 88	M1 82	M1 86	M1 75
	M2 72	M2 79	M2 78	M2 82	M2 72
	IQR1 80-84	IQR1 81-91	IQR1 80-85	IQR1 80-90	IQR1 58-90
	IQR2 60-80	IQR2 79-90	IQR2 75-80	IQR2 76-90	IQR2 55-85
Average Competence	2.824	3.222	2.550	2.625	2.111

Conclusions

All of the panels estimated that the factors discouraging consumer acceptance of technologies will fall in importance in the future. The main factors discouraging consumer acceptance of technologies were:

Panel A:

By 2000 a preference for dealing with humans in banking, followed by the 'habit' of using human tellers and the 'big brother' aspect (ie the fear of banks taking over peoples' lives)

By 2010 the 'big brother' aspect, followed by a preference for dealing with humans in banking and the habit of using human tellers

The factor which showed the greatest decrease in importance was "a preference for dealing with humans in banking", which fell by 14 index points.

Panel B:

By 2000 a preference for dealing with humans in banking followed by the 'big brother' aspect

By 2010 a preference for dealing with humans in banking followed by the 'big brother' aspect

Those factors which showed the greatest decrease in importance were "the 'habit' of using human tellers and "the absence of sufficient benefits of banking technology over and above human tellers", which both fell by 9 index points. Panel B also had the highest self-competence rating (3.222).

Panel C:

By 2000 a preference for dealing with humans in banking, followed by the habit of using human tellers

By 2010 a preference for dealing with humans in banking, followed by the habit of using human tellers

The factor which showed the greatest decrease in importance was "the 'big brother' aspect", which fell by 6 index points.

Panel D:

By 2000 a preference for dealing with humans in banking, followed by the 'big brother' aspect

By 2010 a preference for dealing with humans in banking, followed by the 'big brother' aspect

The factor which showed the greatest decrease in importance was "the 'habit' of using human tellers", which fell by 9 index points.

Panel E:

By 2000 a preference for dealing with humans in banking, followed by the habit of using human tellers

By 2010 a preference for dealing with humans in banking, followed by the habit of using human tellers

The factor which showed the greatest decrease in importance was "a preference for dealing with humans in banking", which fell by 9 index points. This panel had the lowest self-competence rating (2.111).

Rationale

All factors show a fall in importance, even the "preference for dealing with humans in banking". In fact one expert suggested 'I believe the "human barrier" has been broken. Customers now accept that more and more of their daily transactions (not just banking, but petrol purchase etc) now require their input.' Basically, the experts believe that there is currently a portion of the population which is technologically literate, and will grow in time. However the main factor which is slowing consumer acceptance of technologies is still "a preference for dealing with humans in banking". This was the case for all panels.

Comments included:

'Humans will always have a place in the direct provision of services and in obtaining the acceptance of technology deliverable.'

'Banking is more than exchanging cash. Machines can dispense information but rarely advice.'

'There will always be customers who prefer to deal with human tellers. As mentioned earlier, the issue of personal privacy will increase and may result in anti-technology feeling.'

'At some point there will be a return to human 'face to face' contact.'

The second main factor was the 'big brother' aspect, which basically suggests that consumers are becoming more and more aware of data about themselves being held on an organisation's computer.

Comments included:

'Over the next decade concern over use of remote computerised data on persons will increase.'

'Increasing technology will raise concerns about the data machines are capable of storing.'

'People are worried by the 'big brother'. The activities of the current government does not help matters either.'

The Cashless Society

The experts were asked to estimate the year that the cashless society, a society where at least 80% of the volume of funds transfers are performed by electronic means, will occur. Table 7.12 shows the responses.

Response

Table 7.12 The Cashless Society

Panel	Mean	Interquartile Range	Average Competence
A	2006	2005-2010	2.647
B	2007	2005-2010	2.800
C	2007	2005-2010	2.810
D	2006	2000-2010	2.818
E	Never	-----	3.182

Conclusions

Despite the literature suggesting that the cashless society is a myth, four of the five panels estimated that it would become a reality before the year 2010. The only panel which did not think it would occur was the constituency panel (Panel E). Panel E also had the highest self-competence rating (3.182). Only one year separated the estimates of the other four panels.

Rationale

Experts suggested two main reasons for the occurrence of the cashless society.

- a rise in the cost of processing paper-based transactions, which in turn is resulting in....
- the increased promotion and encouragement of electronic based transactions by the banks.

Comments included:

'The rapid growth of credit cards and automatic payment services seem to indicate an ever increasing swing to 'cashless' transactions.'

'EDI, data capture, and imaging will be so cost efficient that this will happen.'

However the experts were very quick to point out that, despite their belief that this change will happen eventually, progress will be slowed due to consumer resistance.

Comments included:

'Consumers have been using cash for thousands of years. It will take a long time to change their perceptions and, besides, they have no real incentive to change.'

'A lot of public education and awareness would have to take place for this to be accepted.'

'EFTPOS has a long way to go before we get anywhere near a cashless society. Consumer acceptance is increasing though.'

Panel E, which suggested that the cashless society would never occur, placed more emphasis on consumer resistance than the other panels. Consider the following comments:

'Small transactions (low value) will always be completed by cash because of the transaction costs faced by customers when using alternative means.'

'Consumers like cash. It will take a long time to change.'

'Consumers will think that some transactions are so small that cash will be the only viable option.'

Estimated Rates of Diffusion for Self-Service Technologies

The experts were given the current level of diffusion for self-service technologies, and asked to estimate the percentage of the population aged 15 years and over which will use various technologies on a 'regular' basis by the year 2000 and 2010. 'Regular' in this case refers to at least once a week - unless the technology is marked with an *, in which case 'regular' refers to at least once every six months. The responses are shown in Table 7.13.

Response

Table 7.13 Estimated Rates of Diffusion for Self-Service Technologies

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
EFTPOS	10%	A	M = 28 IQR = 20-30	M = 43 IQR = 33-50
		B	M = 26 IQR = 22-30	M = 41 IQR = 35-46
		C	M = 29 IQR = 25-35	M = 43 IQR = 35-50
		D	M = 32 IQR = 25-40	M = 44 IQR = 35-50
		E	M = 31 IQR = 25-39	M = 52 IQR = 40-60
In-lobby ATMs	12%	A	M = 24 IQR = 20-25	M = 36 IQR = 30-40
		B	M = 28 IQR = 25-30	M = 40 IQR = 34-43
		C	M = 27 IQR = 20-30	M = 43 IQR = 33-40
		D	M = 33 IQR = 30-40	M = 39 IQR = 36-46
		E	M = 37 IQR = 30-45	M = 44 IQR = 40-50

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
Through the wall ATMs	35%	A	M = 49 IQR = 45-50	M = 61 IQR = 59-66
		B	M = 48 IQR = 45-50	M = 60 IQR = 54-64
		C	M = 45 IQR = 40-50	M = 56 IQR = 45-66
		D	M = 49 IQR = 45-50	M = 61 IQR = 60-70
		E	M = 48 IQR = 43-53	M = 66 IQR = 58-73
Automated Telephone Banking	5%	A	M = 11 IQR = 7-15	M = 17 M = 10-20
		B	M = 14 IQR = 10-19	M = 24 IQR = 20-30
		C	M = 16 IQR = 14-20	M = 27 IQR = 25-30
		D	M = 19 IQR = 15-24	M = 27 IQR = 20-30
		E	M = 14 IQR = 10-19	M = 20 IQR = 16-24

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
Home Banking via TV	0%	A	Never	Never
		B	Never	Never
		C	Never	Never
		D	M = 5 IQR = 0-5	M = 10 IQR = 0-10
		E	M = 4 IQR = 2-5	M = 17 IQR = 10-18
Home Banking via Personal Computer	0%	A	M = 7 IQR = 3-13	M = 15 IQR = 8-16
		B	M = 5 IQR = 2-10	M = 12 IQR = 6-16
		C	M = 7 IQR = 0-5	M = 12 IQR = 4-11
		D	M = 8 IQR = 5-10	M = 15 IQR = 10-19
		E	M = 6 IQR = 4-9	M = 13 IQR = 10-19

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
Human Bank Staff	85%	A	M = 69 IQR = 65-70	M = 57 IQR = 50-63
		B	M = 72 IQR = 70-80	M = 64 IQR = 60-70
		C	M = 71 IQR = 65-75	M = 61 IQR = 57-67
		D	M = 62 IQR = 60-69	M = 50 IQR = 45-60
		E	M = 66 IQR = 60-75	M = 57 IQR = 50-65
Credit Cards	30%	A	M = 38 IQR = 35-40	M = 46 IQR = 40-50
		B	M = 38 IQR = 35-40	M = 45 IQR = 40-49
		C	M = 38 IQR = 35-40	M = 43 IQR = 40-50
		D	M = 46 IQR = 40-50	M = 55 IQR = 50-60
		E	M = 42 IQR = 36-49	M = 50 IQR = 46-59

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
Combined Debit/Credit Cards	0%	A	M = 12 IQR = 10-18	M = 20 IQR = 15-30
		B	M = 15 IQR = 11-20	M = 25 IQR = 17-30
		C	M = 11 IQR = 5-15	M = 17 IQR = 12-20
		D	M = 17 IQR = 10-20	M = 28 IQR = 22-32
		E	M = 17 IQR = 11-23	M = 32 IQR = 25-39
Deposit Machines	0%	A	M = 3 IQR = 0-5	M = 5 IQR = 0-10
		B	M = 3 IQR = 0-5	M = 4 IQR = 0-6
		C	M = 3 IQR = 1-5	M = 5 IQR = 2-10
		D	M = 9 IQR = 0-5	M = 10 IQR = 0-10
		E	M = 1 IQR = 0-1	M = 1 IQR = 0-1

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
Smartcards	0%	A	M = 5 IQR = 4-5	M = 15 IQR = 9-20
		B	M = 5 IQR = 4-7	M = 11 IQR = 6-15
		C	M = 3 IQR = 1-5	M = 7 IQR = 4-10
		D	M = 12 IQR = 5-13	M = 23 IQR = 12-20
		E	M = 6 IQR = 3-10	M = 14 IQR = 8-20
Balance Enquiry Machines	0%	A	M = 7 IQR = 2-10	M = 10 IQR = 5-15
		B	M = 11 IQR = 6-10	M = 23 IQR = 10-28
		C	M = 10 IQR = 5-15	M = 16 IQR = 10-20
		D	M = 9 IQR = 5-10	M = 15 IQR = 5-15
		E	M = 8 IQR = 5-10	M = 14 IQR = 8-20

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
Product Profile Machines	0%	A	M = 8 IQR = 5-10	M = 16 IQR = 10-20
		B	M = 6 IQR = 5-10	M = 15 IQR = 10-15
		C	M = 9 IQR = 5-10	M = 16 IQR = 10-20
		D	M = 11 IQR = 6-16	M = 16 IQR = 10-20
		E	M = 6 IQR = 3-9	M = 8 IQR = 4-14
*Loan Enquiry Machines	0%	A	M = 11 IQR = 6-16	M = 22 IQR = 14-24
		B	M = 11 IQR = 8-14	M = 21 IQR = 15-24
		C	M = 15 IQR = 10-20	M = 33 IQR = 30-40
		D	M = 11 IQR = 5-15	M = 20 IQR = 10-28
		E	M = 9 IQR = 5-10	M = 16 IQR = 10-20

Table 7.13 continued

<u>Technology</u>	<u>Current usage Rates</u>	<u>Panel</u>	<u>Year 2000 Estimate</u>	<u>Year 2010 Estimate</u>
*Travel Enquiry Machines	0%	A	M = 6 IQR = 3-5	M = 12 IQR = 5-10
		B	M = 6 IQR = 3-7	M = 12 IQR = 5-14
		C	M = 5 IQR = 3-9	M = 11 IQR = 7-15
		D	M = 10 IQR = 5-11	M = 16 IQR = 10-20
		E	M = 7 IQR = 5-7	M = 11 IQR = 7-14
*Insurance Enquiry Machines	0%	A	M = 6 IQR = 3-5	M = 14 IQR = 10-20
		B	M = 6 IQR = 5-10	M = 14 IQR = 8-18
		C	M = 8 IQR = 5-10	M = 15 IQR = 10-20
		D	M = 9 IQR = 5-10	M = 14 IQR = 10-20
		E	M = 5 IQR = 5-5	M = 7 IQR = 5-10

Average Competence on these estimates:	Panel A: 2.824
	Panel B: 3.118
	Panel C: 3.143
	Panel D: 2.533
	Panel E: 2.333

Conclusions

The most appropriate way to draw conclusions from these results is to analyse them technology by technology:

EFTPOS (current utilisation = 10%)

All panels suggested that use of EFTPOS will continue to increase. The most optimistic panel up to the year 2000 was Panel D, which estimated usage rates of 32%. The most optimistic panel up to the year 2010 was Panel E, which estimated usage rates of 52%. The other three panels, A, B, and C, estimated that between 26% and 29% of customers will use EFTPOS by the year 2000, and between 41% and 44% of customers will use EFTPOS by the year 2010.

In-lobby ATMs (current utilisation = 12%)

All panels suggested that the use of in-lobby ATMs will continue to increase. The most optimistic panel up to the year 2000 was Panel E, which estimated a usage rate of 37%. All estimates were between 24% and 37%. The most optimistic panel up to the year 2010 was again Panel E, which estimated a usage rate of 44%. All usage rates were between 36% and 44%.

Through the wall ATMs (current utilisation = 35%)

All panels suggested that the use of through the wall ATMs will continue to increase. The most optimistic panels up to the year 2000 were Panels A and D, which estimated

a usage rate of 49%. All estimates were between 45% and 49%. The most optimistic panel up to the year 2010 was Panel E, which estimated a usage rate of 66%. Panel E, however, also had the lowest self-competence rating. All usage rates were between 56% and 66%.

Automated Telephone Banking (current utilisation = 5%)

Automated telephone banking, relative to the other technologies, made the greatest gains in adoption. The most optimistic panel to the year 2000 was Panel D, which estimated a usage rate of 19%. All estimates were between 11% and 19%. The most optimistic panel up to the year 2010 was Panels C and D, which estimated a usage rate of 27%. All estimates were between 17% and 27%.

Home Banking via Television (current utilisation = 0%)

For this technology the experts estimated nil to minimal usage. The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of only 5%. The most optimistic panel up to the year 2010 was Panel E, which estimated usage rates of 17%. The banker panels (Panels A, B, and C) suggested that no one would ever use home banking by TV within the time frame of this study.

Home Banking via Personal Computer (current utilisation = 0%)

The panels saw the use of this technology increasing, although overall usage rates will still be very low. The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 8%. All estimates were between 5% and 8%. The most optimistic panels up to the year 2010 were Panels A and D, which estimated usage rates of 15%. All estimates were between 12% and 15%.

Human Bank Staff (current utilisation = 85%)

All the panels saw a reduction in the use of human tellers. From the bankers point of view, an 'optimistic' estimate is one which sees a reduction in the use of human tellers. Following on from this, therefore, the most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 62%. All estimates were between 62% and 72%. The most optimistic panel up to the year 2010 was again Panel D, which estimated a usage rate of 50%. All estimates were between 50% and 64%.

Credit Cards (current utilisation = 30%)

The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 46%. All estimates were between 38% and 46%. The most optimistic panel up to the year 2010 was again Panel D, which estimated a usage rate of 55%. All estimates were between 43% and 55%.

Combined debit/credit cards (current utilisation = 0%)

The most optimistic panels up to the year 2000 were Panels D and E, which estimated usage rates of 17%. All estimates were between 12% and 17%. The most optimistic panel up to the year 2010 was Panel E, which estimated a usage rate of 32%. All estimates were between 17% and 32%.

Deposit machines (current utilisation = 0%)

All the panels estimated an increase in usage, although overall usage rates are still very low. The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 9%. All estimates were between 1 and 9%. The most optimistic panel up to the year 2010 was again Panel D, which estimated a usage rate of 10%. All estimates were between 1% and 10%.

Smartcards (current utilisation = 0%)

Again all the Panels estimated an increase in usage, although overall usage rates would still be very low. The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 12%. All estimates were between 3% and 12%. The most optimistic panel up to the year 2010 was again Panel D, which estimated a usage rate of 23%. All estimates were between 7% and 23%.

Balance enquiry machines (current utilisation = 0%)

The most optimistic panel up to the year 2000 was Panel B, which estimated a usage rate of 11%. All estimates were between 7 and 11%. The most optimistic panel up to the year 2010 was again Panel B, which estimated a usage rate of 23%. All estimates were between 10% and 23%.

Product Profile Machines (current utilisation = 0%)

The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 11%. All estimates were between 6% and 11%. The most optimistic panels up to the year 2010 were Panels A, C, and D, which all estimated usage rates of 16%. All estimates were between 8% and 16%.

Loan Enquiry Machines (current utilisation = 0%)

The most optimistic panel up to the year 2000 was Panel C, which estimated a usage rate of 15%. All estimates were between 9% and 15%. The most optimistic panel up to the year 2010 was again Panel C, which estimated a usage rate of 33%. As has been mentioned, Panel C also had the highest self-competence rating. All estimates were between 16% and 33%.

Travel Enquiry Machines (current utilisation = 0%)

The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 10%. All estimates were between 6% and 10%. The most optimistic panel up to the year 2010 was again Panel D, which estimated a usage rate of 16%. All estimates were between 11% and 16%.

Insurance Enquiry Machine (current utilisation = 0%)

The most optimistic panel up to the year 2000 was Panel D, which estimated a usage rate of 9%. All estimates were between 5% and 9%. The most optimistic panel up to the year 2010 was Panel C, which estimated a usage rate of 15%. All estimates were between 7% and 15%.

Rationale

It would have been unreasonable to ask the experts to give a reasoning for each of their estimates in this statement. Instead, therefore, the experts were asked to give a single broad reasoning as to why all of their estimates were rational.

Despite this, some comments were made about specific technologies: ATMs are more readily accepted than EFTPOS, and therefore will have higher usage rates. Home banking, be it by computer or television, will not be a great success and will be targeted at specific market segments. Credit cards will become very popular, mainly because they are an established and understood technology. Machines which offer added services (insurance, travel) will be combined into the one machine ie multifunctional rather than dedicated. Use of these machines, however, will still be limited even if dedicated, because customers will prefer to deal with 'humans' when it comes to high involvement transactions of this nature. It is the low involvement transactions (such as the withdrawal of cash) which will be conducted predominantly by machine. Therefore, one can expect a consolidation of machines, especially with the introduction of ISDN which will see the integration of the functions of the phone, television, and personal computer.

Not unexpectedly, the technology suppliers panel consistently had the most optimistic views. The reasoning of these experts, however, was quite different from the other panels. The technologists tended to justify their responses by saying that the technologies meet a consumer demand - rather than reducing any specific bank costs.

Of all the estimates, telephone banking appears to be the one which will make the greatest gain in the near future. The reasoning for this can be summed up in the comments of two particular experts:

'I believe a telemarketing centre (human telephone service representatives) will become big news for banks. They will become important as human tellers are now for securing the customer/bank relationship.'

'People want contact (personal contact) with the bank but don't have the time. Banks would like to have more personal contact with their customers, but can't afford the huge cost of premises and staff, especially in areas of marginal growth. Accordingly the telephone offers a great 'personal' medium for communication with the customer at a much lower cost.'

According to all the panels except the technology suppliers, bank costs, rather than benefits to the consumer, is the main factor which is driving change.

Comments included:

'Technology will continue to increase in importance in order to keep costs down.'

'Technology is basically available. The drive to their use will be cost driven.'

'Bank costs continue to spiral. Technology must be used to get them under control.'

'The banks are still cost driven, and I see no change despite deregulation.'

Costs, rather than lack of demand, was also mentioned as the reason why the 'added technologies' (eg loan enquiry machines) will have only minimal use.

'Cost justification will not allow for development resource to be dedicated to all of these functions. Maximising more 'standard' existing technologies will be prioritised.'

'Slow trend for some technologies due to bank investment required. The scale of investment required to make the listed technologies widely available is going to mean selected investment by banks.'

'A lot of work, expensive work, would need to be done in the area of security first.'

'The small percentage of the market who would use this service would not make it a viable investment by the banks.'

Those technologies dealing with high-involvement type products saw consistently low usage rates ie loan enquiry machines, travel enquiry machines, insurance enquiry machines.

Diffusion Regression

A clear trend is emerging in retail banking. Banks have been investing in technologies which allow for greater customer self-service rather than reliance upon bank employees. This is resulting in significant depersonalisation of banking services, but increased convenience.

The experts were asked to estimate the probability that by the years 2000 and 2010, the trend referred to above will begin to reverse, due to customers demanding a return to more personal contact with bank staff when completing their banking tasks. The responses are shown in Table 7.14.

Response

Table 7.14 Diffusion Regression

Panel		Mean	Interquartile Range	Average Competence
A	2000	28	15-30	3.000
	2010	29	13-36	
B	2000	24	15-30	3.125
	2010	27	15-36	
C	2000	21	15-20	2.905
	2010	21	15-24	
D	2000	23	20-26	2.722
	2010	23	20-30	
E	2000	16	8-20	2.714
	2010	22	10-35	

Conclusions

Again, from a banker's perspective, 'optimism' in this case refers to a small probability. Following this scenario, the most optimistic panel to the year 2000 was Panel E, which estimated a diffusion regression probability of 16. Panel E also had the lowest level of competence. All estimates were between 16 and 28. The most optimistic panel to the year 2010 was panel C, which estimated a diffusion regression probability of 21. All estimates were between 21 and 29. Interestingly the large banks (Panels A and B) considered that diffusion regression was more likely than the remaining panels.

All panels estimated that the probability of diffusion regression would increase over time.

Rationale

It can be seen that the estimated probability of diffusion regression is not negligible, and could well reach 25% by the year 2010. Interestingly, the probability increases with time (one may have expected that it would decrease with time as the population becomes more technology literate).

The majority of experts however agreed that as time progresses, the population will become more technology-literate, and the technology will become more user friendly. Technology will definitely be the major force when it comes to routine or low-involvement transactions. High involvement transactions will always have the personal contact. A minority of experts also suggested that the customers actually prefer self service. This view was particularly evident, perhaps not unexpectedly, in the technology suppliers panel. Comments from some of these suppliers included:

'I do not believe there is a great need to put personalisation back into banking. Most people prefer to use self-service devices.'

'There may be the possibility of such an occurrence (ie regression), but I believe that banks will have ensured that the trend does not happen. Technology will be 'humanised' by then, and ultra user-friendly eg voice modules in ATMs now available.'

'Personal contact will still be available but customer preference may be to utilise electronic technology.'

'My contention is that with time the move to technology will be reinforced rather than a reversal becoming apparent ie the new generation of customers will not have known or will not remember the 'personal contact' days.'

'I believe that customers are actually choosing self-service technology because of convenience and good staff are hard to find in most businesses these days.'

'Convenience will be the main attraction for customers and self-service = convenience.'

'Transactional banking will be handled more and more by self-service. Personal contact will be reserved for more sophisticated products and consultancy.'

Some members of other panels had different views, and supported the hypothesis of this thesis not only with their own personal feelings but also with overseas evidence:

'Banks are now starting to treat customers as people not numbers. Personal contact will become stronger as banks try and win back and maintain customers. You only need to look at the U.K.'

'Customer pressure already exists. Hence the development of the joint use of technology with human bank staff, rather than stand alone technology.'

'Customer pressure already exists to provide a real live face.'

'In my view the trend had already begun to reverse - for example with introduction of 'platform banking' planned for most banks now.'

'Trend reversal is already occurring.'

'Overseas experience , eg U.K, is beginning to trend this way now.'

'The banks will drive customers back to the branches in order to cross-sell.'

'Some banks will perceive personal contact as a means of differentiating themselves and will adopt personal contact as a marketing strategy.'

Reduction in ATM Numbers

The experts were asked to estimate when the widespread availability of EFTPOS, which has the ability to dispense cash, will lead to a 40% reduction in the number of ATMs. The responses are listed in Table 7.15.

Response

Table 7.15 Reduction in ATM Numbers

Panel	Mean	Interquartile Range	Average Competence
A	Never	-----	3.132
B	Never	-----	3.240
C	2004	2003-2008	2.381
D	Never	-----	2.517
E	Never	-----	3.000

Conclusions

Four of the panels suggested that the widespread availability of EFTPOS will never lead to a 40% reduction in ATM numbers, even by the year 2010. Only one panel suggested that this would occur and this was Panel C which estimated that the 40% reduction would occur by 2004. Panel C, however, also had the lowest self-competence rating (2.381).

Rationale

The main argument to emerge from all panels, including Panel C, was that EFTPOS is a complement to, not a replacement for, ATMs. This is because ATMs provide more services than simply cash dispensing, and therefore will always be in demand.

Comments included:

'EFT is complementary to ATMs and will enhance their usage as more people move from paper to electronic transactions.'

'The range of services available at an ATM will always make it more attractive.'

'The most effect EFTPOS will have on ATMs is to lower the cash taken from them. But the development of other services on ATMs will keep them in place.'

'ATMs will have more services in the future.'

However Panel C, which suggested that EFTPOS would lead to a 40% reduction in the number of ATMs, also stressed the fact that retailers are moving toward seven days a week trading. Assuming they hold EFT terminals, the time convenience of ATMs will be less. One member of this panel said, 'recent changes in hours of trading (7 days a week) for major food chains will lead to this.'

Credit Card Use

Currently there are around 2.3 million credit cards in New Zealand, with each one being used on average 2.2 times per month. The experts were asked to estimate by what year these cards will be used, on average, at least 5 times a month. The responses are listed in Table 7.16.

Response

Table 7.16 Credit Card Use

Panel	Mean	Interquartile Range	Average Competence
A	1999	1996-2001	3.000
B	2000	1995-2000	2.773
C	2001	2000-2004	2.667
D	1999	1997-2001	2.591
E	1999	1998-2000	2.200

Conclusions

All the panels suggested that credit card usage will increase. The most optimistic panels were Panels A, D, and E, which estimated that credit cards would be used at least 5 times a month by the year 1999. All estimates were between 1999 and 2001.

Rationale

All the panels were very similar in their estimates. The panels' rationale was also similar, relating mainly to three areas. In order of importance these were:

- growing market acceptance
- the move by banks towards card 'duality' ie the combining of a debit and credit card in one

- more vendors accepting the technology

These areas are supported by the following comments from respondents:

'Credit cards will also act as a debit card and therefore will be used more frequently.'

'Customer acceptance due to familiarity. These cards will be the launching pad for the cashless society ie multifunction debit/credit.'

'Growing market acceptance of the technology.'

'Already a high holding/usage of cards.'

'There is an increasing acceptance by the population not only of these cards but of the concept of credit.'

'With the linking of debit cards to credit cards this level will be reached very soon.'

Technology/Human Mix

The experts were told that the delivery of banking services can be placed on a spectrum between the following extremes:

- zero automation or total human delivery (where one can only access bank services through human tellers in a bank branch, and technology is virtually non-existent), and
- 100% automation or total technological delivery (where one can only access bank services through some kind of mechanical device, and human tellers are virtually non-existent).

In between these two extremes is a 'human/technology mix', where customers access some banking services through humans and others through technology. Currently the average degree of automation across all banks is around 35-40%.

Looking at it purely from a customer acceptance perspective, and assuming free customer access to both human delivery and technology delivery, the experts were asked to estimate what percentage of automation the majority of customers are likely to accept by the years 2000 and 2010. The responses to this question are contained in Table 7.17.

Response

Table 7.17 Technology/Human Mix

Panel		Mean	Interquartile Range	Average Competence
A	2000	48	42-52	3.000
	2010	61	60-70	
B	2000	46	40-50	2.824
	2010	57	55-65	
C	2000	52	50-60	2.952
	2010	62	58-68	
D	2000	55	51-61	2.591
	2010	66	60-70	
E	2000	53	50-58	2.750
	2010	70	65-78	

Conclusions

All panels estimated that the proportion of transactions dealt with by technology will increase. The most optimistic panel up to the year 2000 was Panel D, which estimated that automation will make up 55% of banking activities. Panel D also had the lowest self-competence rating (2.591). All estimates were between 48% and 55%. The most optimistic panel up to the year 2010 was Panel E, which estimated that automation will make up 70% of banking activities. All estimates were between 57% and 70%.

Rationale

The main reason for the increasing trend is that banks will want to reduce costs, and will do this by using technology (with the cost of technology falling and the cost of labour rising) which will become increasingly accepted by the market. In other words, it will be a combination of technology push and market pull. However it appears to be the cost factor which is the main driving force as far as the bankers are concerned, while the technology suppliers see the main factor as being consumer demand.

Comments included:

'As time progresses the youth of today, who will have grown up in a technological world, will not only accept technology but will be demanding more automated delivery (due to a more technologically familiar public and the reduction in the generation gap).'

'NZ banks will be required to shift their cost structures considerably over the next 10-20 years. Technology is a means of achieving this.'

'I envisage

- greater acceptance by public of automated self-service
- cost differential by banks as price of electronics comes down and labour goes up
- competitive innovation will push down the barriers to progress.'

'Demand for service will drive technology development forward. Demand = service when the user requires it and is not cognisant of established (present) working hour patterns.'

'Technology will be forced on customers because it is far cheaper than human elements, hence the percentage of automation will rise through stronger economic reasons as opposed to acceptance.'

'As I said earlier, the banks are cost driven. Customers wont have a choice when it comes to the implementation of cost-effective technology.'

'The technology meets customer needs while also keeping bank costs under control. It is to be expected that the advancement of technology, and the demise of the transaction processing human teller, will continue.'

'I believe technology will continue to exist, however, something must be done about increasing customer acceptance. The banks cannot afford to maintain two infrastructures for a long period of time.'

All the panels agreed that 100% automation would never be achieved, at least not in the foreseeable future. This was because a small segment of the market will always desire personal services, but will have to be prepared to pay for this personal attention.

Services Available from Technologies

Loan Facilities on ATMs

The experts were asked to estimate by what year all ATM card holders will be able to apply for most types of personal loan through an ATM. The responses are listed in Table 7.18.

Response

Table 7.18 Loan Facilities on ATMs

Panel	Mean	Interquartile Range	Average Competence
A	2002	2000-2005	2.889
B	2001	2000-2001	2.688
C	1999	1997-2000	3.095
D	1998	1995-2000	3.136
E	2003	2001-2006	2.500

Conclusions

All ATM cardholders will be able to apply for loans from an ATM at or near the turn of the century. The most optimistic panel was Panel D, which estimated that all ATM card holders will be able to apply for most types of personal loan through an ATM by 1998. Panel D also had the highest self-competence rating (3.136). All estimates were between 1998 and 2003.

Rationale

The main reason to consistently emerge from all panels was that the technology is available now, and it is just a matter of banks implementing it.

Comments included:

'ATM applications are now available for this type of service.'

'The technology is already available and it is only a matter of time before implementation.'

'Technology is already available and is being used overseas eg Marks and Spencer in the U.K.'

'Once databases are upgraded there are no impediments to this service.'

Several experts also mentioned the necessity for dedicated machines which deal with loans only. If this facility was placed on an ATM, lending customers may well hold up the queue for those customers who require simple and quick transactions such as a cash withdrawal.

However the experts also had the reservation that the banks' current record keeping procedures will need to be updated in order to facilitate this change.

Comments included:

'Banks have not yet compiled enough base data on customers to be able to automate lending.'

'Point scoring is already in place with some institutions, but needs to be further developed.'

'Credit processes are currently under development that will enable this. The technology is already here.'

Bills Payment Facility on ATMs

The experts were asked to estimate by what year all ATM card holders will be able to use ATMs for bills payment. The estimates are listed in Table 7.19.

Response

Table 7.19 Bills Payment Facility on ATM

Panel	Mean	Interquartile Range	Average Competence
A	2002	1995-2000	3.182
B	2001	2000-2005	3.240
C	2001	2000-2003	2.381
D	2001	1998-2003	2.517
E	2001	2000-2005	3.000

Conclusions

By the year 2002, all ATM card holders will be using ATMs for bills payment. The most optimistic panels were Panels B, C, D and E, which estimated that all ATM card holders will be able to use ATMs for bills payment by 2001. Panel A estimated that this would occur by 2002.

Rationale

This issue had more consensus than any of the other issues. All panels came up with the same main rationale: the facility exists already in other forms, and it is only a matter of time before the service is extended to ATMs also.

Comments included:

'Facility is already available across the counter and via the telephone, and the ATM will be a natural progression.'

'The facility exists already in different forms. Purely a matter of time before introduced into ATMs.'

'I do not envisage any obstacles preventing this. However it will be necessary for banks to have more accurate information on their customers'

'Could be implemented with very little problem.'

'ASB have already installed bill payment facilities. Technology is not a barrier.'

Other reasons were less frequently cited. For instance, if EFTPOS reduces the need for cash, then the range of services available on ATMs will have to be extended in order to justify their existence. Consumers will demand such a service as the drive for convenience continues. Panel E suggested that it would be necessary first to gain cooperation between the banks themselves (with regards to setting the necessary standards for this service) and between the banks and the participating retailers.

It was also suggested that the telephone may be more appropriate for bill payment than the ATM. If the ATMs functions become too numerous and complex, this may well increase queuing time which would be to the detriment of customer service.

Loan Application via Home Banking

The experts were asked to estimate by what year all users of home banking terminals would be able to apply for any type of personal loan from their home. The responses are listed in Table 7.20.

Response

Table 7.20 Loan Application via Home Banking

Panel	Mean	Interquartile Range	Average Competence
A	2000	1995-2000	2.889
B	2003	2000-2005	2.688
C	2004	2000-2005	3.095
D	2000	1998-2003	2.607
E	2002	2000-2004	2.500

Conclusions

All users of home banking terminals will be able to apply for any type of personal loan from their home by the year 2004. The most optimistic panels were Panels A and D, which estimated that all users of home banking terminals would be able to apply for any type of personal loan from their home by the year 2000. All estimates were between the years 2000 and 2004.

Rationale

The main reason for the occurrence of this event is that the technology is already available. The only reservation, particularly from Panel C's point of view, is that the banks will need to update their databases on customers first. The second main reason is that it meets customer demands.

Comments included:

'Credit processes are currently under development that will enable this. The technology is already here.'

'Some banks have already piloted such a technology.'

'These technologies are common place in some places overseas, and New Zealand will follow suit.'

'Technology is already available and being used overseas. Once databases are upgraded there are no impediments to the introduction of this service.'

'Demand will exist for these services via technology.'

'Demand will push this change.'

'Banks will need to develop such systems to obtain and retain customers.'

'It meets customer demands.'

7.3.3 DISCUSSION

First, it is necessary to understand those factors influencing consumer adoption of technologies. This is the microenvironment. Of those factors encouraging consumer adoption, time and place utility were considered the most important. Bank branches are often not open at the time consumers would like, or in a place consumers would like. Remote banking technology meets consumer demand for extended banking hours and location convenience. This situation was supported by several of the experts. For instance, one of the technology suppliers commented 'clearly the easier and more accessible the facilities are, the more readily they will be used. People are getting busier, the costs of travel are increasing: time and place convenience will be important.'

The main factor discouraging consumer adoption, according to this research, relates to the hypothesis of this thesis. The main factor discouraging adoption is a preference for dealing with humans in banking. While this thesis argues that people who have used technology are going back to humans, the experts suggest that those consumers who have not used technology will be reluctant to do so due to a preference for dealing with humans in banking. Even the technologists agreed with this point. One banker commented 'Habits will change with each generation, but 'preference' is harder to change.' A member of Panel C commented, 'customers currently prefer to deal with humans in banking. I do not see advances in technology changing this easily.' Another member of Panel C said, 'banking is a service industry and must emphasise the role of humans.'

The 'big brother' aspect refers to the idea of technology controlling people, rather than people controlling technology. Technology has the capacity to hold more and more information on customers, and it cannot be assumed that customers will not be aware of this fact. A member of Panel C commented, 'customers will become more concerned about privacy issues. The issue of personal privacy will increase and may result in anti-technology feeling.' The issue of personal privacy is currently of particular relevance in New Zealand. Recently (December 1991) the Government has issued over 1 million 'Community Services' cards to its citizens, so that they can produce identification when they are entitled to certain discounts for social services. This has become an issue of media debate, and already there has been a public outcry as to invasion of privacy.

The same theme for the existence of the cashless society emerged for the development of most of the technologies in banking: banks will encourage a move towards electronic based transactions because of the increasing cost of paper based transactions. A member of Panel A commented, 'it will occur for the reason that it will cost less to use (transaction cost cheaper). Banks and companies will discourage the use of cash.' Panel E was the only panel which said the cashless society would never occur. The majority of this panel suggested that this is because there are numerous small value transactions, which will always be dealt with by cash. For instance, one Panel E member commented,

'you have to look at size of transaction. How many are less than \$5?' Another member of the same panel said, 'cash will always be in demand for low value transactions.'

The first conclusion from the diffusion figures is that the adoption of all technologies will increase, and the use of human tellers will decrease. There is no evidence to suggest that disenchantment discontinuance in diffusion will occur. Indeed the experts suggest quite the opposite. Although the adoption of all technologies will increase, the level of this adoption is quite different for each technology. So rather than disenchantment discontinuance, the adoption of a technology will simply reach a saturation level, at which a certain proportion of the market will always make regular use of that technology, and a proportion of the market will always make regular use of human tellers. In this case, conventional diffusion theory, rather than disenchantment discontinuance, is more appropriate. Those technologies with the greatest potential are ATMs, EFTPOS, telephone banking, credit cards. This finding is consistent with that of Smith (1984) who reported that experts in the U.K suggested that ATMs and EFTPOS will dominate up until 1995. Rule and Sedgewick (1986) reported that in the American and European studies, experts in all countries believed that by 1995, 50% of customers would regularly use ATMs to execute transactions (the exact definition of 'regular', however, is unknown). Roth and Van Der Velde (1989) reported that in the 1990s bankers anticipate that self-service technology such as ATMs will be conducting the vast majority of routine depositary transactions in the U.S.A.

In the longer term, it appears that adoption of EFTPOS will be at or near 50% of the population. Again this is similar to the findings by Rule and Sedgewick (1986), whose experts in Europe and America said that EFTPOS will be used by more than half of bank customers by 1995.

In lobby ATMs will show a large increase in adoption. This is in line with the previous finding that banks want to attract customers back to the bank branch. This finding is also consistent with that of other studies. For instance, Arthur Anderson and Co (1989) found in Australia that experts suggested that institutions will begin placing more and more of their ATMs in-lobby, as they try to attract customers back to the branch. The

technology with the highest adoption is through the wall ATMs, which will reach up to 60% of the population. This is not unexpected given that the ATM is already an established technology. The use of human bank staff falls quite markedly - from a current level of 85% to 50%-60%. Again, this is in line with earlier findings: banks will encourage customers to use technology for transactional type products. Customers will continue to use humans for those services which require human input less often eg loan advice, travel etc. This also explains why use of travel, insurance, and loan enquiry machines is low. Thus the branch of the future will contain customers who, overall, visit the branch less often, but when they do, it is either to conduct a simple transaction such as a cash withdrawal on self-service technology in the branch, or they will visit the branch to see human staff for more 'high-involvement' type services such as travel, loan, or investment advice. In turn, the bank staff will want to see the customers, in order to engage in cross-selling activities. Other customers will use remote technology for routine transactions, and will visit the branch for high involvement products only. A member of Panel B commented, 'growth will occur in areas which provide convenience and initial enquiries. Personal contact will still be required for other than straight forward transactions.' A technology supplier suggested 'the trend is definitely towards greater use of self-service devices for transaction needs and banks are more likely to site these in their branches in order to create greater opportunities for marketing.'

The experts in the Australian study by Arthur Anderson and Co (1989) also suggested that rather than technology making human tellers redundant, they (the tellers) could be redeployed to areas of improving customer service and marketing.

Smartcards were not perceived as being a major force in technology within the next 20 years. This finding is not consistent with that of Arthur Anderson and Co (1989) in Australia. They found that experts from financial institutions accepted the idea of widespread use of the Smartcard being inevitable, and only the timing of its introduction and the range of its applications remain to be decided. This difference in optimism between Australian and New Zealand experts may be because New Zealand has already experienced the failure of a nationwide Smartcard system. On the other hand, Arthur Anderson did find that experts considered that only a small segment of the retail market

favours the idea of home banking by computer, and experts from the bulk of institutions did not plan to introduce it in the future. This finding is more consistent with this research. Another similar finding to that of Arthur Anderson was that the experts believed telephone banking had far greater potential than home banking by computer, and were preparing for large scale adoption of the technology. Indeed, this research found that telephone banking will make the greatest gain in adoption in the future. Rule and Sedgwick (1986) found that experts in the US and Europe considered that about a quarter of retail customers would subscribe to home banking systems by 1995. This is rather more optimistic. Smith (1984) found that U.K experts only predicted high net worth customers to be making any major use of home banking by 2000.

The experts were asked to estimate the probability that customers would move away from technology and back to human bank staff, due to a preference for dealing with humans in banking. The relatively low probabilities (which showed approximately a one in four chance) suggested that this was an unlikely occurrence. The findings here reinforce earlier findings in this same research. That is, technology will certainly be used for routine transactions, and in this sense will distance customers from the branch. However, high involvement transactions such as lending or investment advice will always have personal contact, for which the customer will pay. Rather than this being caused by bank costs, it appears that banks are simply aware that there are some services for which the customer will always demand personal contact, and there are other, more routine, services for which the customer will demand time and place convenience provided by self-service technology. A member of Panel A commented, 'the majority of personal banking is mundane deposits, withdrawals, statements etc, and convenience is the key. It is the lending portfolio customer and the serious investor who will continue to demand and receive personal attention.' A technology supplier had similar views: 'I think it is necessary to delineate the types of 'service' sought. For transaction-based services, I believe the trend of greater self-service will continue, especially as consumers become more attuned to using the technology. The corollary to this is that bank staff are free to give sales advice and service for non-transaction based services eg investment advice.' The idea of bank staff moving from being processors to sellers supports research by Rule and Sedgwick (1986) in Europe and the U.S.A. Experts in

these countries agreed the emphasis in branches will be on cross-selling. In this context, one could assert that the wheel of retailing hypothesis (McNair, 1958) is coming into effect. Tellers who once offered transaction based services without charging customers high fees, are now becoming cross-sellers who offer, and charge for, advice and services related to high involvement products. Tellers are being specifically trained in this role, and if customers desire personal service, they will have to pay for it. This may well present an opportunity for new banks wishing to offer services with a lower fee structure to the mass market.

In hindsight, the statement suggesting that a reduction in ATM numbers will occur, due to increasing use of EFTPOS, may have been somewhat unrealistic since it assumed that all retailers would be willing to become cash dispensers (which may not be so) and it ignored the fact that ATMs - although research suggests that they are predominantly used for cash withdrawals, are also used for other services. Additionally, the experts suggest that in the future ATMs are likely to have an even wider range of services.

However, the study by Arthur Anderson and Co (1989) found that the experts thought EFTPOS would reduce the need for ATMs because they reduce the need for cash. This change, however, was expected to occur only slowly. Therefore it may be that the initial assertion made by this research was correct, but the 40% reduction figure was too large.

Credit card usage will continue to grow, as this already accepted technology becomes more popular. The experts suggested this was due to growing market acceptance not only of credit cards, but of the credit concept in general. It is interesting to consider a point mentioned in the introductory chapter of this thesis: credit cards, on their own, do not represent a 'technology' to the customer, since the customer does not come into contact with any technology (apart from a plastic card) when using it, not even a P.I.N entering pad. The fact that the experts suggest usage will grow due to increasing market acceptance may be related to the fact that there is an absence of 'fearful technology' at the customer interface when a credit card is used. This assertion, however, would need to be proved in empirical research.

The experts were asked to estimate the human/technology mix of the future. The results appear to be consistent with the previous findings that the human tellers will definitely have a role in the future. The experts suggested, at most, a 70% level of automation will be reached, with the remaining 30% being looked after by human staff. The main factors causing this change were a combination of market pull (due to consumer demand) and technology push (due to an increasingly competitive environment calling for lower cost technology). These two factors were also identified earlier by the experts as being important catalysts for the advancement of technology in general.

Despite the fact that the experts suggest 'high involvement' transactions will be dealt with by humans, the ability to apply for a loan through an ATM will still be available for those who demand it.

The experts suggest that the banks have already made the investment in the hardware itself (ATMs), and adding this additional service would simply be a matter of adding an application software. A member of Panel A commented, 'loans through ATMs are on our medium/long term planning list, so other banks will undoubtedly do the same.' A member of Panel B said, 'ATM applications are already available for this type of service.'

All the panels suggested that a bills payment facility would be available on ATMs around the turn of the century. Similar to loans on ATMs, a bills payment facility is simply an application software, to be applied to the already existing hardware. A technology supplier suggested 'It is available now - only commercial agreements are preventing wider usage.' A member of Panel A commented, 'this is on our bank's medium/long term planning list.' Another member of the same panel said, 'it could be implemented with very little problem. It is a logical extension of existing ATM services.'

One feature to emerge in the reasoning was that some individuals were concerned with customer service aspects of bills payments. The customer would have to be able to perform the function quickly, or it may hold up the queue for those customers wanting to perform more routine transactions such as cash withdrawals.

7.3.4 FACTORS SHAPING TECHNOLOGICAL CHANGE

Factors Promoting Technological Advancement

The experts were asked to place indices (with 1991 = 100) to various factors influencing the development of retail banking technology. In particular, they were given a list of factors and asked how important they were likely to be in promoting technological advancement in banking by the years 2000 and 2010.

In Table 7.21, M1 and IQR1 relate to the mean and interquartile range for the year 2000. M2 and IQR2 relate to the mean and interquartile range for the year 2010.

Response

Table 7.21 Factors Promoting Technological Advancement

	<u>Panel A</u>	<u>Panel B</u>	<u>Panel C</u>	<u>Panel D</u>	<u>Panel E</u>
Consumer demand for enhanced services	M1 125	M1 133	M1 135	M1 137	M1 123
	M2 138	M2 149	M2 151	M2 149	M2 135
	IQR1 125-130	IQR1 129-140	IQR1 130-140	IQR1 135-140	IQR1 118-130
	IQR2 135-142	IQR2 144-151	IQR2 150-160	IQR2 148-150	IQR2 120-153
Cooperation between financial institutions	M1 107	M1 93	M1 125	M1 116	M1 107
	M2 111	M2 93	M2 132	M2 127	M2 108
	IQR1 100-108	IQR1 90-100	IQR1 120-130	IQR1 110-123	IQR1 100-115
	IQR2 103-110	IQR2 90-100	IQR2 130-140	IQR2 120-136	IQR2 100-120
Increasing security problems	M1 112	M1 109	M1 115	M1 114	M1 110
	M2 119	M2 114	M2 120	M2 122	M2 111
	IQR1 110-115	IQR1 100-115	IQR1 110-120	IQR1 110-120	IQR1 105-116
	IQR2 115-125	IQR2 100-120	IQR2 120-130	IQR2 111-130	IQR2 103-118
Government legislation supporting technology	M1 105	M1 102	M1 107	M1 103	M1 101
	M2 110	M2 104	M2 111	M2 106	M2 103
	IQR1 100-110	IQR1 100-105	IQR1 105-110	IQR1 100-108	IQR1 100-103
	IQR2 105-113	IQR2 100-110	IQR2 110-112	IQR2 100-110	IQR2 100-108
Increasing competition for retail customers, due to deregulation	M1 125	M1 135	M1 139	M1 134	M1 134
	M2 133	M2 143	M2 151	M2 143	M2 142
	IQR1 123-130	IQR1 130-136	IQR1 138-140	IQR1 130-140	IQR1 128-140
	IQR2 130-140	IQR2 139-150	IQR2 150-160	IQR2 140-150	IQR2 130-160

Table 7.21 continued

	<u>Panel A</u>	<u>Panel B</u>	<u>Panel C</u>	<u>Panel D</u>	<u>Panel E</u>
Top management support	M1 122	M1 117	M1 133	M1 119	M1 125
	M2 130	M2 126	M2 152	M2 125	M2 134
	IQR1 120-128	IQR1 110-126	IQR1 130-140	IQR1 111-121	IQR1 120-130
	IQR2 128-139	IQR2 110-136	IQR2 150-160	IQR2 114-130	IQR2 130-140
Effective marketing	M1 132	M1 121	M1 150	M1 128	M1 133
	M2 140	M2 129	M2 164	M2 136	M2 140
	IQR1 125-140	IQR1 120-126	IQR1 150-153	IQR1 121-135	IQR1 130-138
	IQR2 130-148	IQR2 124-140	IQR2 160-170	IQR2 130-140	IQR2 135-145
The increasing availability of software and front end technology	M1 125	M1 130	M1 130	M1 139	M1 121
	M2 139	M2 141	M2 146	M2 147	M2 130
	IQR1 120-130	IQR1 120-136	IQR1 130-140	IQR1 139-144	IQR1 118-125
	IQR2 135-150	IQR2 130-147	IQR2 140-150	IQR2 147-150	IQR2 119-140
Rising costs of processing paper	M1 124	M1 116	M1 126	M1 125	M1 118
	M2 136	M2 122	M2 137	M2 129	M2 126
	IQR1 115-130	IQR1 110-122	IQR1 120-130	IQR1 116-130	IQR1 110-123
	IQR2 125-148	IQR2 110-130	IQR2 128-150	IQR2 116-139	IQR2 115-135
Rising costs of labour	M1 121	M1 124	M1 132	M1 130	M1 111
	M2 129	M2 124	M2 146	M2 138	M2 117
	IQR1 120-128	IQR1 111-130	IQR1 128-140	IQR1 125-139	IQR1 105-120
	IQR2 130-140	IQR2 118-135	IQR2 140-158	IQR2 130-148	IQR2 105-130
The rate at which overseas banks are implementing change	M1 109	M1 104	M1 114	M1 114	M1 103
	M2 113	M2 107	M2 122	M2 118	M2 103
	IQR1 105-110	IQR1 100-105	IQR1 110-120	IQR1 110-120	IQR1 100-105
	IQR2 110-116	IQR2 100-110	IQR2 120-130	IQR2 110-124	IQR2 100-105
The innovative nature of the New Zealand population	M1 106	M1 104	M1 114	M1 104	M1 106
	M2 114	M2 108	M2 121	M2 106	M2 108
	IQR1 100-110	IQR1 100-105	IQR1 110-118	IQR1 100-110	IQR1 100-113
	IQR2 110-118	IQR2 101-110	IQR2 117-125	IQR2 100-110	IQR2 100-115
An increase in population, creating a more economical critical mass	M1 103	M1 101	M1 110	M1 108	M1 101
	M2 106	M2 104	M2 118	M2 110	M2 106
	IQR1 100-105	IQR1 100-105	IQR1 100-110	IQR1 105-110	IQR1 100-100
	IQR2 100-110	IQR2 100-110	IQR2 110-120	IQR2 104-116	IQR2 100-110
Comparable developments elsewhere which 'acclimatise' customers to technology eg computers in schools	M1 130	M1 130	M1 133	M1 133	M1 127
	M2 130	M2 144	M2 154	M2 142	M2 141
	IQR1 129-131	IQR1 125-135	IQR1 130-140	IQR1 130-140	IQR1 125-130
	IQR2 129-131	IQR2 134-150	IQR2 150-160	IQR2 139-150	IQR2 133-148
Average Competence	2.941	3.111	2.450	2.437	2.222

Conclusions

Several conclusions can be drawn from the results in Table 7.21. First, the factor which is most likely to promote technological advancement by the year 2000 and 2010 varies for the different panels.

Panel A:

By 2000 effective marketing, closely followed by the influence of comparable developments elsewhere.

By 2010 effective marketing, followed by consumer demand for enhanced services.

The factor which experienced the greatest increase in importance between the years 2000 and 2010 was "the increasing availability of software and front end technology", which rose by 14 index points.

Panel B:

By 2000 increasing competition for retail customers due to deregulation, followed by consumer demand for enhanced services.

By 2010 consumer demand for enhanced services, followed by increasing competition for retail customers, due to deregulation.

The factor which experienced the greatest increase in importance between the years 2000 and 2010 was "consumer demand for enhanced services", which rose by 16 index points. This panel had the highest self-competence rating (3.111).

Panel C:

By 2000 effective marketing, followed by increasing competition for retail customers due to deregulation.

By 2010 effective marketing, followed by increasing competition for retail customers due to deregulation, and consumer demand for enhanced services.

The factor which experienced the greatest increase in importance between the years 2000 and 2010 was "comparable developments elsewhere", which rose by nineteen index points.

Panel D:

By 2000 the increasing availability of software and front-end technology, followed by consumer demand for enhanced services.

By 2010 consumer demand for enhanced services, followed by the increasing availability of software and front-end technology.

The factor which experienced the greatest increase in importance between the years 2000 and 2010 was "consumer demand for enhanced services", which rose by 12 index points.

Panel E:

By 2000 increasing competition for retail customers due to deregulation, followed by effective marketing.

By 2010 increasing competition for retail customers due to deregulation, followed by comparable developments elsewhere.

The factor which experienced the greatest increase in importance between the years 2000 and 2010 was "comparable developments elsewhere", which rose by 14 index points. This panel had the lowest self-competence rating (2.222).

Rationale

Consumer demand, effective marketing, and increasing competition are important for the banking panels. Panels B and C are especially aware of increasing competition. Technology suppliers see the main factor as being technology availability. One supplier commented 'the rising cost of labour and the flow of technology from overseas will be the driving forces.'

Other comments included:

'A key issue here is the cost effective delivery of technology on a small population base and the price structure the consumer is prepared to pay.'

'To the extent that technology actually provides a better customer service and meets the real needs of customers then it will be more widely introduced by banks at the customer interface level.'

'Banks are concerned with costs, and that will be their area of focus in the future.'

'There is less and less cooperation between financial institutions. Cooperation has diminished following deregulation and I would expect it to break down further through competition/deregulation.'

'The main drivers of technological advancement will be banks' desires for efficiency coupled with competitive forces resulting from deregulation.'

Factors Retarding Technological Advancement

Again using index points, the experts were given a list of factors and asked how important they were in retarding technological advancement in banking by the years 2000 and 2010. In Table 7.22, M1 and IQR1 relate to the mean and interquartile range for the year 2000. M2 and IQR2 relate to the mean and interquartile range for the year 2010.

Response

Table 7.22 Factors Retarding Technological Advancement

	<u>Panel A</u>		<u>Panel B</u>		<u>Panel C</u>		<u>Panel D</u>		<u>Panel E</u>	
Bank staff resistance to technology	M1	84	M1	82	M1	84	M1	86	M1	81
	M2	63	M2	69	M2	76	M2	81	M2	73
	IQR1	80-90	IQR1	80-85	IQR1	80-90	IQR1	80-90	IQR1	80-81
	IQR2	50-70	IQR2	68-76	IQR2	70-83	IQR2	79-85	IQR2	70-74
Lack of human expertise to implement and maintain the sophisticated computer systems required	M1	95	M1	88	M1	93	M1	87	M1	59
	M2	90	M2	80	M2	90	M2	82	M2	51
	IQR1	94-100	IQR1	80-95	IQR1	90-100	IQR1	80-95	IQR1	40-90
	IQR2	90-100	IQR2	70-91	IQR2	85-99	IQR2	76-89	IQR2	30-80
Potential resistance to change by customers	M1	97	M1	94	M1	98	M1	95	M1	82
	M2	89	M2	86	M2	98	M2	94	M2	73
	IQR1	90-100	IQR1	90-96	IQR1	95-103	IQR1	91-100	IQR1	70-100
	IQR2	82-92	IQR2	80-95	IQR2	95-103	IQR2	90-100	IQR2	50-98
Conservatism of top management	M1	96	M1	85	M1	94	M1	92	M1	76
	M2	94	M2	77	M2	86	M2	88	M2	64
	IQR1	92-102	IQR1	80-89	IQR1	90-100	IQR1	90-95	IQR1	65-83
	IQR2	90-100	IQR2	74-85	IQR2	85-100	IQR2	85-100	IQR2	50-80
Problems in developing the software and front end technology	M1	93	M1	85	M1	91	M1	91	M1	55
	M2	88	M2	77	M2	87	M2	83	M2	46
	IQR1	90-96	IQR1	80-88	IQR1	85-95	IQR1	84-99	IQR1	45-68
	IQR2	80-90	IQR2	70-85	IQR2	80-95	IQR2	79-89	IQR2	30-60
The large amount of current investment in magnetic stripe technology	M1	85	M1	90	M1	95	M1	86	M1	87
	M2	66	M2	83	M2	91	M2	73	M2	65
	IQR1	80-93	IQR1	90-95	IQR1	90-100	IQR1	81-90	IQR1	80-98
	IQR2	60-80	IQR2	80-90	IQR2	88-95	IQR2	66-75	IQR2	55-90
Average Competence	2.824		2.889		2.579		2.437		2.222	

Conclusions

The first important conclusion to be drawn from this data is that all of the factors were thought to be less important by the years 2000 and 2010. One expert commented 'these factors have all been recognised by the industry and are being addressed at all levels.'

The most important factor retarding technological advancement by the year 2000 for each panel was:

Panel A:

By 2000 potential resistance to change by customers, followed by the conservatism of top management.

By 2010 conservatism of top management followed by lack of human expertise to implement and maintain the sophisticated computer systems required.

The factor which experienced the greatest decrease in importance between the years 2000 and 2010 was "bank staff resistance to technology", which fell by 21 index points.

Panel B:

By 2000 potential resistance to change by customers, followed by the large amount of current investment in magnetic stripe technology.

By 2010: potential resistance to change by customers, followed by the large amount of current investment in magnetic stripe technology.

The factor which experienced the greatest decrease in importance between the years 2000 and 2010 was "bank staff resistance to technology", which fell by 13 index points. This panel had the highest self-competence rating (2.889).

Panel C:

By 2000 potential resistance to change by customers, followed by the large amount of current investment in magnetic stripe technology.

By 2010 potential resistance to change by customers, followed by the large amount of current investment in magnetic stripe technology.

The factor which experienced the greatest decrease in importance between the years 2000 and 2010 was "bank staff resistance to technology" and "conservatism of top management", both down 8 index points.

Panel D:

By 2000 potential resistance to change by customers, followed by the conservatism of top management.

By 2010 potential resistance to change by customers, followed by the conservatism of top management.

The factor which experienced the greatest decrease in importance between the years 2000 and 2010 was the "large amount of current investment in magnetic stripe technology", which was down 13 index points.

Panel E:

- By 2000 The large amount of current investment in magnetic stripe technology, followed by potential resistance to change by customers.
- By 2010 Potential resistance to change by customers, together with bank staff resistance to technology.

The factor which experienced the greatest decrease in importance between the years 2000 and 2010 was "the large amount of current investment in magnetic stripe technology", which was down 22 index points. This panel had the lowest self-competence rating (2.222).

Rationale

Potential resistance to change by customers emerged as a major factor for all panels. However as time passes the population is becoming more technology literate.

Comments included:

'Technology is obviously here to stay. Customers and staff alike must now accept technological changes.'

'As computer processing becomes more pervasive in everyday life, problems of conservatism and resistance should decrease. There will always be problems in developing software for commercial use as the development of software and hardware had continually outstripped its application.'

'Banks will provide more training to staff to ensure they become more technologically skilled. The next generation of management will be more change orientated. While the general populace will also become more technological minded they will be the major slowing down factor in the rate of technological advance used by banks.'

The technology suppliers saw the conservatism of top management as being a major influence. However the banks will engage in programmes of education. If there is still resistance, those within banks who resist will eventually be replaced by technology literate staff. Indeed three panels saw staff resistance falling considerably.

Comments included:

'With more emphasis on training and younger top management and constant change, staff should not hamper technological advancements. However the fact is that advancements do not always allow time for staff to keep up.'

'Heavy initial resistance and lack of expertise will be overcome in time as conservative elements, both internal and external, roll over.'

'Staff will be thoroughly trained, so this should in effect cancel out any resistance to change'

'Staff that resist technology will be made redundant. For banking or any industry to succeed it will be a shape up or ship out mentality. Conservative top management will have to perform or get replaced.'

Influence of Environmental Groups

Groups Concerned with Consumer Welfare

The experts were asked to estimate the probability (out of 100) that groups concerned with consumer welfare (such as the Consumers' Institute) will halt the progress of technology in banking by the years 2000 and 2010. Table 7.23 contains the responses.

Response

Table 7.23 Groups Concerned with Consumer Welfare

Panel	Mean	Interquartile Range	Average Competence
A 2000	11	0-10	2.864
2010	9	0-10	
B 2000	3	0-5	3.280
2010	3	0-5	
C 2000	8	0-10	2.211
2010	8	3-13	
D 2000	4	0-8	2.067
2010	3	0-5	
E 2000	8	0-10	2.100
2010	8	0-10	

Conclusions

It is quite clear that all panels do not see it being very likely that consumer welfare groups will pose a major threat to the advancement of technology in banking. Panel A had the greatest probability, but even this was only a maximum of 11 by the year 2000. Panel B had the lowest probabilities (3 for both the year 2000 and the year 2010). Panel B also had the highest self-competence rating (3.280).

Rationale

All the panels considered the statement to be too extreme, namely, by using the word 'halt'. Instead, the experts suggested that these consumer welfare groups will *influence*

the development of technologies, and possibly slow its progress. The consumer welfare groups will have particular needs, and the banks will meet them before advancing too far.

Comments included:

'They have no reason to halt progress. But they may slow it down. The key is for banks to include them in the decision making process.'

'Consumer welfare groups will ensure customer viewpoints are considered in technological changes, but they are unlikely to halt progress completely.'

'Such groups will be concerned with confidentiality and security, but their concerns will be able to be answered.'

'These groups will not halt progress but will influence use and acceptance.'

A minority of experts, mainly from the technology suppliers panel, suggested that consumer groups will not be of any relevance because consumers are demanding the technology. Their comments seem to reflect a production orientation.

Comments included:

'Technology will be used to aid the consumer and will be accepted more readily in future and will provide greater security.'

'Technology benefits will begin to favour the consumer.'

'We provide what the consumer wants. If these groups interfere, then they do not understand consumer needs.'

'Consumer groups?! They will never have that much power.'

Government Involvement

The experts were asked to estimate the probability that the Government, due to concern with the rates of crime in a cash society, becomes actively involved in the promotion and support of electronic funds transfer systems by the year 2000 and 2010. The responses are shown in Table 7.24.

Response

Table 7.24 Government Involvement

Panel		Mean	Interquartile Range	Average Competence
A	2000	16	5-23	2.437
	2010	21	10-25	
B	2000	11	0-16	2.722
	2010	13	0-18	
C	2000	12	5-20	2.571
	2010	14	10-20	
D	2000	16	10-20	2.185
	2010	17	11-24	
E	2000	8	0-10	2.500
	2010	9	1-15	

Conclusions

As with the consumer groups, the panels estimated that there was little chance of the Government becoming involved in the promotion and support of electronic funds transfer

systems. However, while the probabilities were low, all panels agreed that there was more chance by the year 2010 than by the year 2000. Panel A gave the greatest probability, with that being 16 by the year 2000 and 21 by the year 2010. That panel with the highest self-competence rating, however, was Panel B.

Rationale

The panels suggested that government involvement is very unlikely, especially with the current trend towards less and less government involvement in the private sector.

Comments included:

'The government will not be concerned. They are paid to run the economy, not banks.'

'It is not the government's business. 'Cash' related crime in New Zealand will never reach a level of significance to drive a government reaction. Note, however, recent Australian legislation requiring stricter control on bank account ownership.'

'If recent trends are to continue the government will not become involved in any such practice and will allow the market to take its course.'

'Displacement of cash with EFT will be very costly. Who pays? Certainly not the government, not consumers, not banks! Most likely retailers.'

'Hardly a government area - if crime is a rising problem it is likely banks will provide added security and greater use of credit cards.'

'Government does not need to be involved. If cash security is a severe problem then companies such as supermarkets will be induced to encourage alternatives.'

Pricing Strategies

The experts were asked to estimate the probability that the majority of banks introduce 'differential pricing' to encourage customers to use technology ahead of human bank staff by the years 2000 and 2010. The responses are shown in Table 7.25.

Response

Table 7.25 Pricing Strategies

Panel	Mean	Interquartile Range	Average Competence	
A	2000 2010	86 95	79-92 94-98	3.118
B	2000 2010	77 85	75-85 84-96	3.389
C	2000 2010	91 99	79-95 88-100	3.190
D	2000 2010	85 91	80-90 89-95	2.733
E	2000 2010	89 93	80-100 88-100	2.333

Conclusions

All panels agreed that there was a high chance that banks would introduce differential pricing strategies in the future. Panel C gave the highest probability for the year 2000 (91) and the year 2010 (99). Panel B gave the lowest probability for the year 2000 (77)

and the year 2010 (85). Panel B also had the highest self-competence rating (3.389).

Rationale

Banks are already engaging in differential pricing, or about to engage, due to cost pressures.

Comments included:

'Margins are being squeezed. Therefore overheads must be reduced and service provided in the most cost effective manner balanced by customer expectation.'

'We are already preparing a fee table to ensure this happens.'

'Our bank has introduced differential pricing this month and will become an industry trend.'

'This is already a reality and will continue in the drive to reduce costs.'

'This must be encouraged because self-service transactions are so much cheaper.'

However, a minority number of the experts in Panels A and B rejected this statement strongly, suggesting that the reverse may in fact happen:

Comments included:

'Banks are now starting to treat customers as people not numbers. Personal contact will become stronger as banks try and win back and maintain customer needs.'

7.3.5 DISCUSSION

The results in this section are important for understanding the macro environmental factors effecting the rate of diffusion. The banks viewed competition (which calls for lower cost technology) and consumer demand as the main driving factors in technology. This is similar to other studies. Elliot (1986) found that Australian bankers consider competition to be the main driving factor - especially in the area of EFTS/payment systems. Rule and Sedgwick (1986) reported on two Delphi studies in the U.S.A and U.K. The experts suggested that in both countries there would be increased competition, and competitive pressures were the main reasons for investment in technology. Smith (1984) found that competition in the market and cheque and credit fraud were the main factors promoting change in this area. Even Mason and Mayer (1979), who forecasted the US banking environment up to the year 1978, found that competition, regulation, and technology emerged as being the issues of importance in the macroenvironment.

Despite the banks seeing competition as the main factor, the technology suppliers considered the main factor to be technology availability. In drawing a contrast between the results of the banks and the results of the technology suppliers, there appears to be a 'technology gap'. To quote a technology supplier 'Banks must use technology and suppliers must supply it. It is essential that the two parties have a common understanding.' These results suggest that the two parties do not have a common frame of reference. Smith (1984) found in the U.K that technology suppliers believed that bankers will, in the main, continue to be relatively uninformed about technology over the next ten years. It is not appropriate for bankers to think in terms of their immediate environment only, and ignore technology availability. At the same time, technologists must be aware of the environment the banks are operating in, if they are to adequately meet the banks technology requirements.

All panels considered effective marketing to be important. One banker suggested that technologists need to have good communication with the banks with regards to customer needs, but all too often the banks do not keep technologists informed of customer requirements. As a result the technologists develop technology, but they are uncertain

about its final application in the market. Closely related to the need for effective marketing are two other factors: the intensity of competition and the need to understand consumers. A member of Panel C commented, 'the main drivers of technological advancement will be banks' desires for efficiency coupled with competitive forces such as deregulation and consumer demand for better service.' This comment was echoed by a member of Panel D: 'technology advancements will be driven by the need to be more cost competitive, and to reflect consumer demand resulting from a better educated base.' All of New Zealand's banking institutions, as a result of deregulation and the resultant competition, now have established marketing functions. Indeed since 1984 the New Zealand financial sector has been exposed to waves of deregulation which have meant that the banks are now in a better position to more effectively meet customer needs. The finding that competition will be more intense is reinforced by a second finding which shows that cooperation between financial institutions is not a major factor in promoting technology. Banks are determined to obtain customers for themselves, and do not intend working in collusion with other financial institutions to obtain them.

Consumer demand for enhanced services emerged as the second main factor promoting technological change in banking, indicating that the industry has learnt from the past mistakes of being technology driven, and intend to be more market driven in the future. In such a dynamic competitive environment, the correct allocation of marketing resources is based on a thorough understanding of consumer demand.

When considering factors *retarding* technological change in banking, it is important to realise that all these factors scored less than 100 index points. This indicates that all of the factors are thought to be less of an obstacle in the future. A member of B commented, 'as technology continues to advance and people become more accustomed to its use the importance of these retarding factors will decrease.' Another member of the same panel said, 'these factors are all recognised by the industry and are being addressed at all levels.' The main factor retarding change will be potential resistance to change by customers, closely followed by the conservatism of top management. This is in dramatic contrast to the finding by Smith (1984) in the U.K. She found that

customer resistance was the least important factor retarding change. Other factors which were more important were implementation difficulties, size of installation, lack of industry standards, software development problems, user and consumer education difficulties, inertia of bank staff, inertia of bank structures, and conservatism of top management.

Both the bankers and the technology suppliers were in agreement regarding consumer resistance. A technology supplier commented 'most institutions will offer high tech services if there is customer demand (market share and marginal rate of return). Therefore customers represent the key to change. Most important issues are therefore: 1. Customer awareness/desire for high tech product benefits 2. Ability of products to deliver efficiently/consistently.' In relation to conservatism of top management, a supplier commented 'the conservatism of top managers I am in contact with has a very negative effect.' However the feeling was that these managers either change their attitude or get replaced by other managers, because technology is here to stay.

Bank staff resistance to technology will fall because banks now realise that staff training is required. A member of Panel A said, 'technology training and development for staff is now a specialised subject that staff have been accustomed to and brought up with. Technology development should not be a problem in the future!' A member of Panel C said, 'Education is overcoming this perceived problem. Removal of people is not a driver for the introduction of technology.'

Panels B, C, and E made mention of the large amount of current investment in magnetic stripe technology as being a barrier to technological advancement. Smith (1984) found that technology suppliers in particular believed that the magnetic stripe card will remain for some time due to the fact that banks have invested large amounts in the technology.

Consumer welfare groups are not thought likely to halt technology advancement - although they may certainly have an influence. The reason put forward by experts was that, in the main, technology is to the benefit of consumers. In addition, the banks will make sure, before any change is imposed on consumers, that it meets the needs of such

groups. A member of Panel E commented, 'the demand will be consumer driven' and 'the influence groups or consumer welfare groups may be a modifying factor but unlikely to halt cost effective technology with customer benefits.' The chief executive of the Consumers' Institute itself said 'consumer groups are not interested in hampering technological progress, but rather ensuring it is offered to consumers on a fair and equivalent basis, particularly in relation to standard terms and conditions of use.'

Involvement in banking technology is not the role of government either, despite the increasing rates of crime in a cash society. Basically, in a free market economy, it is not the government's area of concern. A member of Panel A commented, 'this is not likely to be perceived as a government role. The Government is paid to run the country, not the bank system.' A technology supplier suggested that 'Lack of understanding and first hand experience will see little intervention (by Government) in the medium term.'

Of all the issues in this study, it appears that differential pricing is the one most likely to materialise. The reason is that a number of banks have already adopted this strategy because it is cheaper for the bank if the customer uses self-service. Therefore, the banks need to force reluctant customers to the technology by using pricing strategies. Given the structure of the banking market in New Zealand, the remaining banks are likely to follow suit. A member of Panel C said, 'some banks are doing this now and the fact that banks need to be more efficient and reduce wages encourages differential pricing.' A member of Panel B said, 'for transactional type banking, banks must try to maximise their returns on investment in technology such as ATMs, self-service devices. Additionally, they must reduce processing costs. These two factors will see a conscious move by banks to encourage consumers from paper-based transactions to electronic-based transactions by differential pricing. I am aware of two banks presently developing strategies along these lines.'

7.3.6 HUMAN STAFF AND THE BRANCH NETWORK

Staffless Branches

The experts were asked to estimate the year that staffless branches, which are staffed predominantly by self-service technology, will exist in all the main city centres ('main city centres' in this case refers to those cities with a population of 60,000 or more). The responses are shown in Table 7.26.

Response

Table 7.26 Staffless Branches

Panel	Mean	Interquartile Range	Average Competence
A	1999	1995-2000	3.056
B	1999	1996-2000	2.882
C	1998	1995-2000	2.857
D	1999	1995-2000	2.483
E	1998	1996-2000	2.750

Conclusions

The panels agreed that all the main city centres will have staffless branches before the turn of the century, with the most optimistic panels being Panels C (experts from medium to small banks) and E (constituency experts). Panel A (experts from marketing and strategic planning in large banks) was less optimistic, but also had the highest self-competence rating. The panel with the lowest self-competence rating was the

technology suppliers (Panel D).

Across all panels there was a spread of only two years.

Rationale

All panels cited a number of reasons as to why the main city centres would have staffless branches before the turn of the century, the main one being that the technology is already available and banks are experimenting with it now. Other reasons included the need to get a competitive edge and the cost of bricks and mortar branches.

Comments included:

'The cost benefits of staffless branches will become increasingly attractive as self-service technology acceptance increases in the public. Technology costs will fall and user-friendliness rise.'

'Staff costs are still the major overhead in retail banking and predominantly self-service technology branches will become increasingly popular with banks.'

A minority group of experts suggested that these types of branches would not be popular, because people prefer to deal with people.

Platform Automation

The experts were asked to estimate the year that 'Platform Automation', which means that tellers will have personal computers which both they and customers can use to obtain product profiles, will be available in at least 50% of the branches. Table 7.27 shows the responses.

Response

Table 7.27 Platform Automation

Panel	Mean	Interquartile Range	Average Competence
A	1999	1995-2000	3.318
B	2000	1995-2000	3.500
C	1998	1995-2000	3.273
D	1997	1995-2000	2.926
E	1998	1995-2000	2.889

Conclusions

Again, all of the panels estimated that at least 50% of the branches would be utilising platform automation before or by the year 2000. The most optimistic panel was Panel D (experts from technology suppliers) and the least optimistic panel was Panel B (technology experts from large banks). Panel B also had the highest self-competence rating (3.500).

Rationale

All panels suggested that this technology is developed and being piloted by some banks. The wide availability of cash dispensing technology will relieve tellers of some of their normal duties. This will give them time for cross-selling, which can be greatly assisted by technology.

Comments included:

'My bank already has this facility. It's just a matter of when the others catch up.'

'It is the current trend in banking. Some banks have developed it and the others are bound to follow suit.'

'The technology is developed, is cost efficient and allows improved sales and service environment.'

'I know of a bank using this facility already. It is a must if tellers are to take on a selling role'

'The concept is well used overseas. All NZ retail banks are attempting to move from transaction processing solely, to sales and service. The objective being to consolidate existing relationships in a nil growth market, typified by increasing competition.'

'Focus will continue to be on quality service at tellers. Cross-selling by tellers will evolve once cash dispensing technology is introduced.'

The estimates for Panels A (marketing and strategic planning experts from large banks) and B (technology experts from large banks) were somewhat less optimistic since some of these experts considered that the traditional view of tellers being processors or order takers rather than sellers will endure for some time.

In-branch Technology

The experts were asked to estimate the year in which self-service machines in the branch 'vestibules', which would be accessible after hours, would be available in at least 50% of the branches. The responses are shown in Table 7.28.

Response

Table 7.28 In-branch Technology

Panel	Mean	Interquartile Range	Average Competence
A	2004	2000-2010	3.250
B	2000	1999-2002	2.824
C	1999	1995-2000	2.955
D	1996	1995-1997	2.545
E	1998	1995-2000	2.400

Conclusions

Three of the panels estimated that self-service machines in the branch vestibules would be available in 50% of the branches by the year 2000. Only one panel, Panel A (marketing and strategic planning experts from large banks), estimated that this would occur after the year 2000. Panel A also had the highest self-competence rating (3.250).

Rationale

All panels agreed that one of the key success factors for banking in the future will be convenience for customers - in both a time and place sense. Also, with adoption of ATMs now moving towards the late majority, some effort must be made to enhance the security of machines - something which could be achieved by placing them in the vestibule of a reputable bank.

Comments included:

'Convenience is the key to service. Competition will demand it.'

'All the banks essentially sell identical products. The key factor for success in the future will be availability.'

'A good way to retain customers and give after hours service.'

'The older customers are very scared of technology. They will feel more secure in the branch.'

'Banks must begin to attract customers back to the branch environment. If they don't, they will miss opportunities to cross-sell'

'In these days of robberies, this strategy is necessary to attract the technology shy and security conscious customer.'

'Where I live, customers need protection from the weather as well as the robbers.'

Panels A (marketing and strategic planning experts from large banks) and B (technology experts from large banks) were less optimistic in their estimates because they thought that considerable construction and remodelling of existing premises was required to accommodate equipment and security.

Branch Numbers

Currently there are around 1500 full service retail bank branches in New Zealand, but the increasing availability of remote banking technology may suggest that this is too many. The experts were asked by what year they expected the branch network to be reduced to 1200 and 1000. Table 7.29 contains the responses.

Response

Table 7.29 Branch Numbers

Panel		Mean	Interquartile Range	Average Competence
A	1200	1998	1995-2000	3.381
	1000	2005	2005-2010	
B	1200	1996	1995-1998	3.080
	1000	2002	1998-2003	
C	1200	1999	1996-2000	2.900
	1000	2002	2000-2005	
D	1200	1996	1995-1998	2.591
	1000	2000	1998-2001	
E	1200	1996	1994-1999	2.250
	1000	2001	1997-2006	

Conclusions

All panels agreed that the reduction to 1200 branches would occur before the year 2000, and the reduction to 1000 branches would occur after the year 2000. Panels B (technology experts from large banks), D (technology supplying experts), and E (constituent experts) suggested that these changes would occur quicker than panel A - which suggested a reduction to 1200 branches by the year 1998, and a reduction to 1000 branches by the year 2005. Panel A, however, had the highest self-competence rating (3.381).

Rationale

Four forces are at work in the environment which will ensure this will happen within a relatively short time period. In order of importance they are:

- New Zealand is currently over-banked
- Mergers and takeovers will see rationalisation
- Bricks and mortar branches are very expensive
- The availability of electronic and remote banking will reduce the need for branches

The technology suppliers, Panel D, tended to place more importance on the last factor than the other panels.

Comments included:

'Bank amalgamation will augment the availability of remote automated facilities. Community banks (eg Trust Banks) will be slow to reduce their network.'

'Full-service branches will be trimmed as increasing competition shrinks profitability, but banks want to retain visible outlets.'

The one factor which will work against this, however, is the fact that New Zealand has an ageing population, which are traditionally resistant to change.

Customer Loyalty

The experts were told that it is possible that remote banking technology forces customers away from the branch and therefore reduces customer loyalty. Using index 1991 = 100, the experts were requested to estimate how much this loyalty will change

(ie increase or decrease) by the years 2000 and 2010. The responses are listed in Table 7.30.

Response

Table 7.30 Customer Loyalty

Panel		Mean	Interquartile Range	Average Competence
A	2000	97	90-100	3.063
	2010	96	90-100	
B	2000	93	90-96	2.882
	2010	87	84-96	
C	2000	93	90-96	2.632
	2010	90	85-95	
D	2000	95	90-100	2.429
	2010	91	90-95	
E	2000	97	88-100	2.500
	2010	97	90-100	

Conclusions

All panels tended to agree that there would be no major change in loyalty. Panels C and D estimated that by the year 2000 the index would fall to 93. Panel D also had the lowest self-competence rating (2.429). Panel B estimated that by the year 2010, the index would fall to 87.

Rationale

All panels were relatively even in their estimates, although Panel C (small banks) was marginally lower than the rest. The panels were not convinced that loyalty is, in fact, a function of visiting the branch. The experts tended to point to quality of service and pricing as being more relevant to retaining or losing customers.

Comments included:

'Technology provides better service which will in fact increase loyalty.'

'Quality of service and product, including price competitiveness, will aid loyalty.'

'I am not very convinced that customer loyalty depends on visiting branches. Efficient and quick service combined with personal service (by letter or telephone) is important.'

'Little change in loyalty is based on increasing technology. Loyalty is now based on pricing.'

'In my view, loyalty is not built by the branch or the tellers, but the service provided. Greater use of technology will not alter this.'

'Loyalty is a function of the effort required to move institutions. It is this effort which is the single biggest factor stopping people doing it now.'

Value of Personal Relationships

It was suggested to the experts that 'personal relationships' (ie dealing with human bank staff rather than technology) are being valued more by customers in banking. Using index 1991 = 100, the experts were requested to estimate how important personal relationships will be for customers in banking by the years 2000 and 2010. The responses are contained in Table 7.31.

Response

Table 7.31 Value of Personal Relationships

Panel		Mean	Interquartile Range	Average Competence
A	2000	103	95-115	3.529
	2010	100	80-116	
B	2000	113	105-116	2.882
	2010	119	110-122	
C	2000	102	95-110	3.000
	2010	102	90-110	
D	2000	99	97-104	2.524
	2010	97	94-104	
E	2000	86	90-98	2.375
	2010	78	78-90	

Conclusions

When comparing the results, there is no consistent direction across the panels. All the banking panels (Panels A, B, and C) estimated that personal relationships will become slightly more important. Panels D and E, however, estimated that personal relationships will become slightly less important. By the year 2010, Panel B suggested that the index weighting for personal relationships will stand at 119. All remaining panels estimated that the index weighting for personal relationships would be lower or the same as for the year 2000.

Rationale

All the panels agreed that personal relationships will be a premier service for customers, which will be charged for accordingly, and therefore will be available only to a select few. In turn, the relationship will depend on the nature of the transaction.

High net worth customers cannot only afford personal service, but demand it due to the nature of the services they require (which are generally more complex than transactions such as cash withdrawals).

Comments included:

'Personal relationships will be a luxury offered only to the select clientele.'

'Personal relationships are already only being extended to the minority high net worth customer.'

'I think it depends on the transaction. For money transmission the human contact will become less and less important. For counselling and borrowing I believe banks will try to differentiate themselves on the 'superior human touch.'

Panel B had a noticeably higher estimate. These experts agreed with the above rationales, but also suggested that the provision of technology for straight forward transactions will free up staff time so that they can concentrate on building relationships with customers. This is also necessary in order to increase cross-selling.

Comments included:

'Banks will have to focus on relationships in order to cross-sell.'

'Banks will offer a wider range of services. Consumers will need to place greater emphasis on bank advisory services. The human interface will be important in closing business. Technology will be used mainly in the area of transaction processing.'

'Electronic delivery will allow bank sales reps to get out and visit customers, thus cementing customer/bank relationships.'

'The personal approach will take on more meaning in directing services to particular needs. Selling will be more personal, delivery will be less personal.'

The technology suppliers based their estimates on a customer perspective. They said, quite simply, that personal relationships will be less important because customers will not demand them.

Comments included:

'Younger people in future will not be interested in the personal relationship side of banking. Over the next twenty years these people will become the older group who today probably do value the personal relationships.'

'The only reason people want to pass banking transactions to a person is to let someone else 'take care' of it. If technology advances are acceptable, they would prefer the privacy of the high tech way.'

'Personal relationships are not always positive!!'

'Society is making people be more dependent on themselves. More human interface is being promoted at present. This will die off and people will do-it-themselves.'

'Human staff at present cause more problems than they solve.'

7.3.7 DISCUSSION

The once held belief that a 'branchless' society would one day be a reality is not supported by these findings. In the short term the branch network in its current form will remain very important. In the longer term, while the network will still be very important, one can expect changes not only in number, but also the form of branches. This finding is similar to that of Arthur Anderson and Co (1989) who found that Australian banks planned only a modest reduction in the number of branches in branch network in the short term. Elliot (1986) also found that to meet competition Australian banks planned to reduce the number of branches, but only marginally. These findings are in contrast to those of Roth and Van Der Velde (1989) who found that in America bankers anticipated that in the 1990s the upgrading and increasing bricks and mortar branches would dominate their capital expenditures.

The New Zealand banking environment is currently thought to be over-branched. A member of Panel A commented, 'there are too many banking outlets for the size of the New Zealand market. It is still based on a regulated system. Technology will enable greater rationalisation, but this will take some time to achieve.' Not only is the cost of the physical branch and its labour rising, but the cost of technology is falling. Therefore, one can expect some branches to disappear completely, while remaining branches will be more automated.

The main city centres will supply customers with staffless branches - a branch which is dominated by self-service technology, rather than human staff. Again, this change will be cost driven, rather than meeting any recognisable consumer demand. These branches will be a complement to the conventional branches, not a replacement.

Smith (1984) also found that in the U.K experts predicted that unmanned branches will be slow to come. However when they do, they will be an addition to the network, not a replacement. A member of Panel B commented, 'the lower price and quality of technology will allow greater facilities eg 24 hour banking.' Both the bankers and the technology suppliers agree that changes in the branch structure and form can take a long

time to implement - especially with the public impact of releasing a number of staff or premises.

In branches which are still dominated by human staff, tellers will be provided with platform automation ie personal computers which both they and staff can access in order to obtain product profiles and other information. The presence of platform automation (which provides staff and customers with product and customer profiles) will assist front line staff greatly in the task of cross-selling. In this new competitive environment, this is vital. The provision of platform automation for staff was also found in a study by Arthur Anderson and Co (1989) in Australia in their interviews with bankers. They found that in the 1990s staff would be provided with product information facilities as part of the increased intelligence of the future branch work-station. Platform technology is already well developed and being piloted by New Zealand banks. In fact, it is asserted by banks that, while initially technology (remote) forced the customer away from the branch, there is now the need to attract the customer back into the branch in order to cross-sell other services. There are clear benefits to the customer from platform automation. A member of Panel D commented, 'the focus will continue to be on quality service at the tellers. Cross selling by tellers will evolve once cash dispensing technology reduces their workload.' There is faster response time on inquires and problem solving, more accurate information about the customer relationship, and better service and sales attitudes among platform personnel. Platform automation is one of the key reasons why human staff will always have a place in banking. According to Young (1988) 'the era of the human teller may return, but they may be in the guise of marketing consultants; armed with automated facilities and databases, and marketing new services in order to compete in the marketplace created by the proliferation of electronically generated information.'

In-branch technology in the branch 'vestibules' will also become popular. There is much discussion about the security of banking technology, especially the security of remote technology. Arthur Anderson and Co (1989) suggested in their study that experts pointed to the emergence of non-cash lobby devices to reduce branch costs and focus staff resources on selling products. As with this research, they found the technology suppliers

to be more optimistic in their estimates.

In-branch technology is an ideal way of encouraging reluctant adopters to adopt technology, especially those who prefer to experiment with the technology in the security of a branch. A technology supplier commented 'these customers (the non-adopters) will not use a machine on the street. They need the security of bricks and mortar and staff at arms reach.' In-lobby or branch technology also assists in branding the bank, and retaining customer loyalty. A member of Panel B said, 'banks are currently looking at ways to attract customers back to the branch, in order to maintain their hold.' One of the potential problems of remote technology is that it distances the customer from the bank. In-branch technology encourages the customer back to the bank. After all, of what use is a platform automation system designed to sell services if fewer and fewer people are coming into the bank in the first place? Also, in-branch technology helps absorb customers during peak customer times. This has customer service implications with regards to queue reduction. Banks overseas are already experimenting with 'hard' and 'soft' areas in their branches -the soft part of the branch offers machines for routine transactions, and the hard part of the branch offers staff to deal with the more complex transactions eg account opening, loans etc. This idea was first experimented with by Verbraucher bank in Germany and has now spread to other parts of the world, including New Zealand.

To understand the changes taking place in the form and the number of branches, one must recognise the environmental changes taking place, and their impact upon banks. More than a third of customers have adopted self-service technologies, which in part reduces the need for branches. There are also increasing technological possibilities, and the increasing cost of maintaining a branch network. It would appear that the conventional branch network will essentially stay intact, despite technological advancements; which from a competitive point of view will be to the banks' advantage. The branch network of an individual bank represents a major barrier for potential competitors into the retail banking market. If the need for a network were reduced, this would improve competitors' chances of entering the market.

The branch of the future will reflect a retail image within a high-technology environment. The real challenge to banks will be to design a branch which appeals to both customers and employees, increase productivity, and facilitates the achievement of marketing objectives. Studies (Baker *et al* 1988) show just how much impact branch facility design has. Banks must try very hard to meet the needs of customers and staff. Some customers demand technology in remote areas, in order to provide place convenience. Other customers demand technology in the branch, where security is enhanced. Other customers demand no technology in the branch, and prefer instead to deal with humans. The findings suggest that human tellers will remain, but in a selling role rather than transactional role. Transactions will be dealt with by technology. Thus while there may be a return in the importance of the human teller, this is by no means caused by consumers disenchantment discontinuance. The change is being induced by the banks who realise that in order to sell to customers, they must first attract them into the branch.

It could be asserted that remote banking reduces customer loyalty because the customer visits the branch less often, and therefore has less identification with the branch. The experts, however, suggested that loyalty is not a function of remote banking. Rather, it is a function of quality of service and pricing. Customers will remain with a bank which offers quality service and competitive pricing. Conversely, customers will not leave a bank because it encourages its customers to use remote banking.

A member of Panel A commented, 'quality of service and product, including price competitiveness, will aid loyalty.' Some experts also suggested that all banking products are very similar, but when they are dispensed through technology, they become virtually identical commodities. Therefore with increased use of technologies, banks will have to consider branding strategies. A member of Panel A suggested that, 'customers are becoming more and more confused with the advertising noise. To ease an already tense existence, they will become brand loyal to particular tried and true products. This will be supported internally by marketing strategists. Banks will endeavour to cement their customer connections one way or another.' This comment was reinforced by a member of the same panel: 'customer loyalty is falling because of the difficulty banks have in

differentiating themselves and their products from competition in a way that is meaningful to the customer. Technology is not the sole cause.' It therefore makes sense that in an environment where products are virtually identical, it is the pricing and service strategies which win customer loyalty.

Related to loyalty is the idea of 'personal relationships' between the bank and the customer, and how important they will or will not be in the future, given the adoption of self-service technology. Looking across the panels, there is inconsistency with regards to how important personal relationships will be. All the banking panels saw the value increasing - as it will be demanded, and paid for, by high net worth customers. A member of Panel A said, 'our more affluent clients expect personal relationships, and will get it. They are profitable enough. The remainder of the customers expect and deserve technology, and will get it.' Arthur Anderson and Co (1989) also found that Australian experts considered that high net worth individuals would require more specialised banking relationships. The remaining two panels, however, saw a fall in the value of personal relationships. Their reasonings were no different to those panels who saw an increase in the value of personal relationships. A possible explanation for the slight reduction in value of relationships is that the majority of customers are not high net worth, and, as today's customers become more technology literate, this majority will see relationships as being less important.

In general, however, one could conclude that there is not a great deal of change in the value of personal relationships. Again this finding does not lend support to this thesis, which suggests that customers who are using technology will eventually reject it and go back to people based banking, due to the value they place on these personal relationships.

7.3.8 SAMPLE DEMOGRAPHICS

Tables 7.32, 7.33, 7.34, and 7.35 show the demographic characteristics of the experts who participated in this Delphi study. The first table, Table 7.32, shows how many years each of the experts had had in the current organisation.

Table 7.32 Number of Years Expert Has Had in Current Organisation

Number of Years in Organisation	Panel A Frequency	Panel B Frequency	Panel C Frequency	Panel D Frequency	Panel E Frequency
0 - 2 years	0	3	2	3	5
3 - 5 years	4	2	2	3	1
6 - 9 years	2	6	2	2	0
10 - 12 years	3	0	1	4	0
13 - 15 years	2	2	2	1	0
more than 15 years	7	5	11	3	3
No Response	0	0	1	0	0
Total	17	18	21	16	9

Apart from Panel E, most of the experts in this study had been in their current organisation for at least ten years. 24 of the experts had been in the organisation for five years or less. More than half of Panel E had been in their current organisation for two years or less.

The number of years the experts had been in the current industry is contained in Table 7.33. The majority of the experts in Panels C, D, and E have been in the industry for more than 15 years. While Panels A and B also have a number of experts with this level of experience, they also contain a number of experts with 'moderate' experience (five to nine years). More than 50% of all experts had been in the industry for more than 15 years. This table suggests that in terms of industry experience, this sample was very experienced.

Table 7.33 Number of Years Expert Has Had in Current Industry

Number of Years in Industry	Panel A Frequency	Panel B Frequency	Panel C Frequency	Panel D Frequency	Panel E Frequency
3 - 5 years	3	3	1	0	1
6 - 9 years	2	6	5	2	1
10 - 12 years	3	0	1	4	0
13 - 15 years	1	2	2	0	0
more than 15 years	8	7	12	10	7
No Response	0	0	0	0	0

Table 7.34 contains the age of the experts.

Table 7.34 Age of Expert

Age Bracket	Panel A Frequency	Panel B Frequency	Panel C Frequency	Panel D Frequency	Panel E Frequency
Less than 20 years	0	0	0	0	0
21 - 30 years	3	4	2	2	0
31 - 40 years	4	5	7	4	0
41 - 50 years	8	9	10	9	0
more than 50 years	2	0	2	1	7
No Response	0	0	0	0	2
Total	17	18	21	16	9

None of the experts were aged less than 20 years, which is not unexpected given that, in order to qualify for the study, the experts needed at least five years industry experience. 60% of all the experts were aged 41 years or more.

The level of education completed by the expert is contained in Table 7.35. Tertiary qualifications tend to dominate in this table. More than 50% of all the experts had a tertiary qualification.

Table 7.35 Level of Education Completed by Expert

Level of Education Completed	Panel A Frequency	Panel B Frequency	Panel C Frequency	Panel D Frequency	Panel E Frequency
Primary	0	0	0	0	0
Secondary - No School Certificate	0	0	1	0	0
School Certificate	2	4	6	0	1
University Entrance or Matriculation	5	1	4	3	2
Technical or Trade Qualification	1	0	5	0	1
University Graduate	4	9	2	10	4
Other Tertiary Qualification	5	4	3	3	1
No Response	0	0	0	0	0
Total	17	18	21	16	9

7.3.9 DELPHI ATTRITION RATES AND RESPONSE PATTERNS

As mentioned in Chapter V, a major problem associated with Delphi panels is the tendency for high panel attrition. Typically, large numbers of the chosen respondents fail to return the first questionnaire, and successively smaller numbers of respondents return questionnaires at each iteration.

One could assume that many respondents clearly find the exercise more burdensome than anticipated. The attrition rate is a crucial variable to consider, since high rates of attrition may mean that the final results are based upon an unrepresentative subset of the original sample or population. According to Hill and Fowles (1975), no reported Delphi study has considered the problem of attrition in any detail by analysing the character of individuals who do and do not respond, or even by eliciting reasons for non response. Furthermore, there is no literature relating to the actual pattern of responses to each round in a chronological sense. While Hill and Fowles made this comment in 1975, there has been an absence of literature relating to this area since that time. This is not necessarily unexpected since Delphi, as a technique, has received little notice in the literature since the mid 1970s.

Delphi Withdrawals

In this application of Delphi, a total of 33 experts withdrew before completing the requirements (ie they completed the first round questionnaire only, or the first and second round questionnaires only). These individuals were sent a questionnaire, with a free post envelope, asking them to specify why they withdrew. Those experts who did not reply to this questionnaire were personally telephoned. The reasonings are listed in Table 7.36 (responses add to greater than 33 due to multiple responses by some experts).

The main reason for withdrawing from the research was that the experts had more urgent priorities. Unfortunately, this is a problem which is difficult to avoid. An expert commented 'this work was of a voluntary nature, so was always getting pushed to the bottom of my in-tray.' It may be possible to give the experts more time to respond to

each round. However, a Delphi study is typically conducted over a long time period, which can cause a problem when it comes to retaining the experts interest. Extending the time given to the experts may accentuate this problem.

Seven of the experts forgot about the questionnaire. This is unexpected when one considers that reminder phone calls were made to all those experts who had not returned the questionnaire. However, in some cases the expert was not available when telephoned, and a message had to be left. It may well be in some cases that these messages were never received.

Table 7.36 Experts' Reasons for Delphi Withdrawal

Reason for withdrawing	Frequency
Expert did not receive the questionnaire	3
Expert had more urgent priorities	19
Expert forgot about questionnaire	7
Expert had changed position	3
Expert did not agree with the research	1
Expert overseas	6
Expert retired	3
Total	42

Looking at it from a panel perspective, the greatest rate of attrition was suffered by Panel D (the technology suppliers). Originally 31 experts in this panel completed the first round questionnaire, yet only 16 of this group saw the study through to the final

round. The banking panels were relatively consistent - with attrition rates ranging from five to nine for each panel. Those bankers who did withdraw had, in the main, gone overseas, changed positions, or retired. Unexpectedly, that panel with the least attrition was Panel E, from which only one of the original ten experts withdrew - due to going overseas. This is unexpected since one would assume that the members of this panel were the least involved in banking, and therefore were more likely to lose interest sooner. Thus the main 'offender' in terms of having other priorities was Panel D - the technology suppliers. This is either a reflection of the large workloads people in this industry suffer from, or possibly it is a reflection that these experts were not directly (at least, not as direct as the bankers) involved with banking technology, and therefore their interest, or possibly their knowledge, waned over time.

The expert who disagreed with the research was a technology supplier who said that he felt his answers reflected his mood at the time. He said 'I find the double negatives and the freedom very difficult. I find that my answers reflect my mood at the time (not very professional, I know). I don't think my answers are consistent and I want to qualify them all the time.'

Two experts were unable to be located.

Reasons for Taking Part in Delphi Research

This particular application of Delphi received the highest response rate of all those applications reviewed in the literature. Given that Delphi traditionally suffers from very low response rates, and nobody knows why, this was an interesting result.

In the light of this development it was considered of sufficient methodological importance to identify why the particular experts in this Delphi study took part to completion. Therefore, a questionnaire and a free post envelope were sent to the experts with a copy of the research results (which they were guaranteed if they completed the study). This letter asked them why they completed the requirements of the research. In total 81 experts completed the requirements of the study and 59 of

them replied to the questionnaire. It was not considered appropriate to send reminders to those experts who did not reply since they had already completed a three round Delphi study, and the researcher did not want to build up any antagonism.

The reasons for the experts completing the requirements of the study are shown in Table 7.37.

Table 7.37 Experts' Reasons for Completing Requirements of Delphi Study

Reason for Completing Requirements	Frequency	Percentage
Expert wanted to obtain a free copy of the results at the end of the research	18	30.5
Expert felt obliged to complete the research since he/she agreed to take part in the first place	42	71.2
Expert wanted to know what his/her colleagues were thinking	23	38.9
Expert was happy to do the work since it was for a voluntary cause	11	18.6
Expert was once a student, and was aware how important it is to have people cooperate in research	24	40.7
Other	12	20.3

Note: Responses add to greater than 59 due to multiple responses.

The main reason for completing the requirements of this study was that the expert felt obliged to do so since he/she agreed to do so at the outset. This reason was given by over 70% of the respondents. It will be recalled from the methodology chapter that, prior to distributing the first Delphi questionnaire, the experts were sent a letter which described the nature of the Delphi technique and the research. Attached to the letter was a form which they had to detach and return to the researcher. This form asked the experts for their name, official title, and whether or not they were agreeable to being included in the research. It would therefore appear wise for future users of the

technique to consider using this 'foot in the door' strategy. The Managing Director of a leading New Zealand trading bank commented 'If you say you are willing to assist, then do it.'

This finding is of methodological importance since it is not specific to this research. For instance, it has nothing to do with the fact that the topic was banking. Therefore the strategy could be employed by other Delphi users across all industries.

40.7% of the respondents said that they completed the requirements of the research because he or she was once a student also, and was aware how important it is to have people cooperate in research. This finding may suggest that a user of Delphi may have more chance of getting a high response if he or she is from an academic institution. This would seem to be a plausible assertion. It would indeed be unlikely that a high response would have been received for this study if the researcher was a member of one of the banks, or a technology supplying company - especially when one considers that the experts are submitting strategically sensitive information in some cases.

The third main reason for completing the requirements of the research was that the expert wanted to know what his or her colleagues were thinking. This specifically refers to the feedback process which is an integral part of the Delphi technique.

20.3% of responses fell into the 'other' category. These related to the value of the results and the professional impression the experts formed of the research at the early stages. Comments included:

'I agreed to participate in the first place because of my interest in the topic, and also because of the favourable impression I formed of the candidate suggesting that the study would be carried through to completion in an able and competent manner.'

'At last something positive and relevant to analyse. Something that looked into the future and not just into the next day. The results are valuable.'

'It is important that well considered research is conducted in New Zealand and as a leading company we should participate.'

'The research project and its results are critical for the longer term planning of financial institutions and as such the effort was worthwhile and given freely.'

'As a supplier of technology to the banking marketplace the information obtained from the study allows me to view the future directions of the company with strong indicators for the industry direction obtained from the research.'

'This research was in an area of vital importance to NCR.'

'A consensus view gives some form of benchmark for the acceptance/introduction of technology - this is valuable information.'

Clearly the industry considers this study to have generated information of great value to them. In addition, early impressions in a Delphi study are vital. The researcher must give the impression, right from the very first piece of correspondence, that the research will be conducted in a professional manner. After all, the value of the experts' time is substantial, so the researcher should not give the impression that it will be wasted.

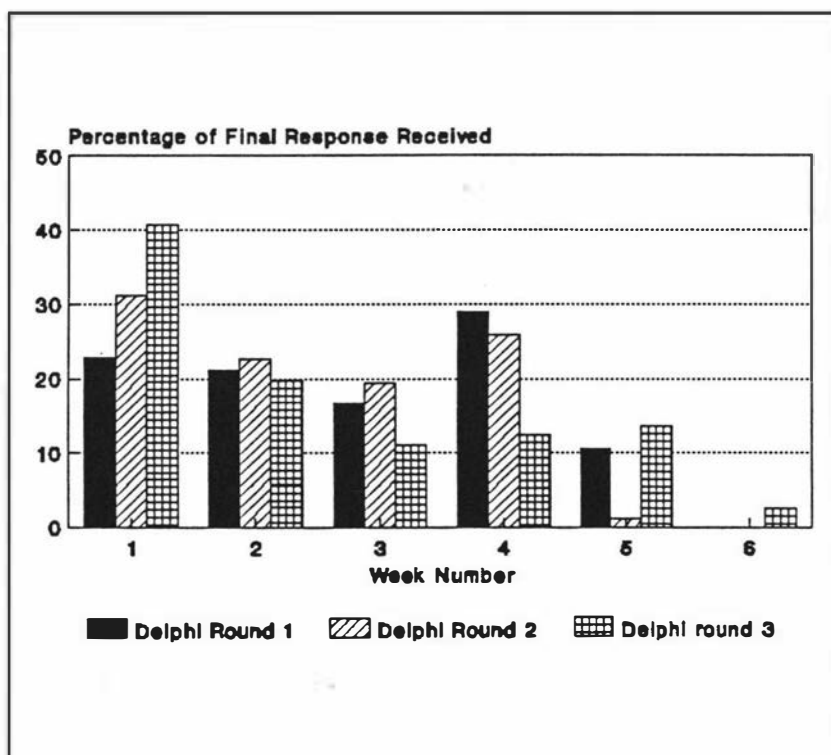
Patterns of Response

Figure 7.11 shows the pattern of response for each of the three Delphi rounds. The vertical axis measures the percentage of responses received for that particular round. The horizontal axis measures the weeks which passed after the mail out of questionnaires. Reminder calls were made in the fourth week of all rounds.

Looking at round one, the greatest percentage of questionnaires were returned in week 4, when the reminder calls were made. Rounds two and three were quite different, as the greatest percentage of questionnaires were returned in the first week. This demonstrates the need to give experts adequate time to respond to the first round. The

experts were relatively slow to return the first questionnaire because they were still coming to grips with the study and learning its background and purpose. By the second and third rounds the experts were more familiar with the area, and knew what was required of them.

Figure 7.11 Pattern of Responses for Each Delphi Round



7.3.10 VALIDITY OF THE DELPHI RESULTS

It has been mentioned that the humanist view is that the aim of qualitative research such as this is not to have answers to put through a computer to achieve percentages, statistics, reliability statements etc, but rather to gain an understanding of what people are saying, to understand how the area of interest looks to them. How are these transcripts turned into reliable, valid, and useful statements? Lincoln and Guba (1985) and Hirschman (1986) have suggested four checks or tests: credibility, transferability,

dependability and confirmability. Not all of these tests, however, will be appropriate to all qualitative studies because studies differ so much in their aims and outcomes.

The credibility test is to present the interviewee or group discussion with your findings and to take account of how it reacts to them. Does the group accept or reject the findings? This measure was taken in this research, in an indirect sense, when the experts were sent a letter (with the research results) asking them why they took part in the research. Many of the experts took this opportunity to comment on the research and its findings. This was described in section 7.3.9.

The transferability test is satisfied when the research shows similar findings among similar groups. Even within this check some interpretation is inevitable; no two sets of groups can be the same. The question arises whether the differences are big enough to cause suspicion of the interpretation. This test has been conducted by examining the responses to the same questions across the five panels. This examination suggests, given the relative similarity of the experts estimates and reasonings, that all panels had similar interpretations of the questions.

Dependability is the humanist research answer to reliability. To establish dependability is to attempt to show that the results are not a fluke. The obvious way to establish this is to have at least two researchers on any study so that their results may be compared. This measure was very difficult given that a PhD is essentially one individual's piece of research. The results of this research have been discussed in the context of similar studies overseas. However, the comparison is very difficult to make due to differences in research objectives, methodologies, and location.

Confirmability is the last of these validity and reliability tests from the humanist research standpoint. This check involves the use of auditors whose job it is to review the documentation, notes, methodological statements and any other available documents, to ensure that the conclusions are the most reasonable ones attainable from the data. Essentially, this is the role of the researcher's supervisor and advisor.

7.3.11 SUMMARY

This research suggests that the current branch network will essentially remain intact in the future, despite customers utilising self-service technology, and despite the presence of a small number of staffless branches. The function of the branch, however, will see a change: as more and more transactions are performed on self-service technology, staff time will be freed up enabling them to take on a selling role. In particular, staff will engage in the selling of non-transaction type services, or high involvement services, and cross-selling.

However, remote self-service technology removes the customer from the branch, and negates the strategy of cross-selling by the tellers. Therefore, a focus of banks in the next 20 years will be on the placement of in-branch self-service technology. As a result, banks will gain in two areas:

- Transactions will be performed on electronic medium, rather than human medium, therefore reducing costs

- The performance of these transactions by self-service technology will free up staff time, enabling them to offer more quality personal service and engage in cross-selling activities.

The macro-economic environment reflects those factors encouraging the move to more self-service technology. The banking experts saw competition and consumer demand as being the main driving factors, while the technology suppliers saw technology availability as being the main driving factor. Effective marketing also emerged as being important, reflecting the impact of a deregulated environment.

All those factors which currently retard technological change in banking will be less of a barrier in the future. Of these factors, consumer resistance to change will be the most important. Bank staff resistance to change will fall considerably, mainly because the banks intend to implement staff training and education programmes.

The future of self-service technology in banking does not appear likely to be influenced by consumer interest groups or Government. Consumer groups will not interfere because technology is, in the main, to the consumer's benefit. Assuming continuation of current policies, the Government will not become involved because, in a deregulated economy, it is not perceived as a Governmental role.

The main factor discouraging consumer adoption of self-service technologies is a preference for dealing with humans in banking. Although not able to be supported by scientific tests, logic would suggest that it is unlikely that current users of self-service technology will stop doing so due to a preference for dealing with humans in banking. Consumers will continue to use self-service technology for low-involvement or convenience type services. Consumers will continue to use human bank staff for high involvement transactions such as investment and insurance.

In the future, the adoption of all self-service technologies will increase, while the use of human tellers will decrease. The most popular technologies will be those used for transactional or low involvement type purposes: for instance, obtaining an account balance or withdrawing cash. There are two factors which reinforce this trend:

- The experts suggested that there is only a low probability that disenchantment discontinuance will occur. Banks are aware of those services which customers consider suitable for self-service technology, and those which customers consider unsuitable.
- The experts estimated a 'human/technology' mix of around 70% for technology and 30% for humans. This 30% is made up of the high involvement type services, for which customers desire human contact.

Despite the suggestion that customers buying or enquiring about high involvement type services will always demand personal contact, the experts believed that a small section of the market will be willing to utilise ATMs for loan applications and bills payment, and the banks will cater for this.

The experts suggested that, despite the movement to remote self-service technology, customer loyalty will remain relatively unchanged in the future. Loyalty is a function of price and quality service, not whether the customer physically comes into the branch. The value of personal relationships for customers will also remain relatively unchanged - although it may increase in value for high net worth customers who demand, and are prepared to pay for, a personal relationship with their banker.

During the study, and at its conclusion, an attempt was made to identify why experts withdrew from the study, why they took part, and the pattern of Delphi responses over time. The main reason for experts withdrawing from the research was that they had other priorities. The main reason for the experts taking part in the research was they felt obliged to since they agreed to take part when sent the letter of invitation. Typically, Delphi responses came back quicker in the second and third rounds, reflecting a learning curve among the experts.

The humanist approach was taken to determining the validity of the results of the Delphi research. While still requiring some interpretation, one could conclude that the results are as valid as one could get, given the research objectives.

7.4 CONSUMERS' VIEWS VERSUS EXPERTS' VIEWS

The first conclusion to emerge when comparing the views of the experts in the Delphi study and the consumers in the telephone survey is that there is a great deal of commonality in the views of the respective parties. This may suggest that the experts used in this research were indeed experts. For instance, consider the following similarities in findings.

- Both the experts and the consumers agreed that the main reason for using self-service technology is time utility, followed by place utility.

- The experts believed that the main factor discouraging customers from using self-service technology was a preference for dealing with humans in banking. When asked why they had not utilised self-service technology, the consumers' main reason was that they preferred to deal with humans in banking.

-Levels of future adoption for the three key self-service technologies (ATMs, EFTPOS, and telephone banking) were very similar. The experts suggested that adoption of EFTPOS will reach between 40% and 50% in the future. In the consumer survey, 49.3% of respondents said they planned to use EFTPOS in the future. The experts suggested that adoption of ATMs will reach between 56% and 66% in the future. In the consumer survey 74.2% of respondents said they planned to use ATMs in the future. The only major exception was with telephone banking, where experts suggested that adoption of telephone banking will reach between 17% and 27%, and a higher 46.7% of consumers said they intended using the service in the future.

- The experts suggested that disenchantment discontinuance will not occur, and the consumer survey reinforced this due to the less than significant number of respondents who had used self-service technologies in the past, but did not intend using them again in the future.

- When asked what services they would accept from a machine, and which services they would prefer to receive from a human teller, the consumers' views were very similar to the experts. The consumers tended to categorise services according to their level of involvement and risk. To the consumer, a low risk service such as obtaining an account balance can be achieved using self-service technology. However, consumers preferred to see human tellers for services such as loan quotations or applications. The experts also believed that transactional type services, such as obtaining an account, balance will move to self-service technology. For the more high involvement services, however, the experts believed human tellers will always be retained.

Chapter VIII

CONCLUSIONS

8.1 INTRODUCTION

This study produced results of theoretical, methodological, and practical importance. It is toward these three areas that this discussion is articulated.

In this chapter, the limitations of the study are discussed. These should be kept in mind when the conclusions are considered. After the limitations, the research hypotheses are examined in turn and conclusions are drawn from the research as to their retention or rejection. While the consumer survey provided statistical evidence relevant to the hypotheses, the Delphi study needs to be interpreted in the humanist framework, using logic to determine whether or not the hypotheses relevant to this aspect of the research should be accepted or rejected.

The conclusions to the research are broken down into three main areas: methodological, theoretical, and practical. The methodological and theoretical conclusions represent new contributions to their respective areas. In this context, the findings of this study are of interest to future researchers intending to embark upon research in the same theoretical area and/or utilising the same research methodology. While some of the banking-specific findings also represent new contributions to the literature, other findings either confirmed, or disagreed with, what previous researchers had already found. For this reason the banking-specific findings are broken down into three areas: findings which confirm the findings in other studies, findings which are in disagreement with the findings in other studies, and new findings.

This study not only produced results, but it also generated a number of questions. These questions are addressed in the section which makes suggestions for further research.

8.2 LIMITATIONS OF THE RESEARCH

8.2.1 LIMITATIONS OF THE CONSUMER RESEARCH

- The telephone directories for the metropolitan and provincial centres do not include unlisted numbers, those whose telephone was connected after the book was printed, or those without telephones.

- While the researcher conducted the provincial centre interviews, the task of conducting the metropolitan centre interviews was delegated to a telephone interviewer in that area. The metropolitan respondents appeared to give much longer responses to open-ended questions than the provincial centre respondents, possibly reflecting a difference in probing techniques between the researcher and the metropolitan interviewer.

8.2.2 LIMITATIONS OF THE DELPHI RESEARCH

The main limitation of this research is that it is a case study (in the context that it only examined retail banking as a sector of the services industry), and the results must be interpreted as such. The Delphi technique, however, has a number of limitations, and these have been well documented in Chapter V.

8.3 RESEARCH HYPOTHESES

Basic Hypothesis

That the increasing provision of self-service technologies in the banking industry results in disenchantment discontinuance in diffusion due to consumer antagonism towards depersonalisation of services.

The consumer survey suggested that there were less than significant levels of disenchantment discontinuance occurring for the three technologies under examination: ATMs, EFTPOS, and telephone banking. The Delphi study suggested that there was less than a 30% chance that the trend towards increasing use of self-service technology will begin to reverse, due to consumers' preference for dealing with humans in banking. It appears, therefore, that there is insufficient evidence to support the basic hypothesis, and it must be rejected on the basis of the findings of this study.

Sub - Hypotheses

H1 That customer demand is not the main factor driving change in self-service technologies.

In the Delphi study, the banks viewed competition (which calls for lower cost technology) as the main factor. The technology suppliers, however, considered the main factor to be technology availability.

All panels considered effective marketing to be important, but not as important as increased competition.

No panel suggested that consumer demand is the main factor driving change in the area of self-service technology. Therefore the research supported H1.

H2 That there will be a significant number of consumers who have adopted self-services technologies in the past, but do not intend using them in the future, due to a preference for dealing with humans in banking.

The Poisson approximation to the binomial distribution indicated that there is a small and less than significant number of people who have adopted self-service technologies in the past, but do not intend using them again in the future. In fact the overall trend, when one includes those consumers who have not yet adopted self-service technologies, but plan to do so in the future, is towards increased use of self-service

technologies. ATM use will grow by some 7%, EFTPOS use by some 17%, and telephone banking use by 25.8%. This finding was supported by the Delphi study, whose experts suggested there was a less than 30% probability that the trend towards increased use of self-service technology will reverse before the year 2010.

H2 must be rejected on the basis of the findings in this study.

H3 That more than 50% of experts show decreasing estimates for the adoption of self-service technologies up to the year 2010.

The information to support or reject this hypothesis comes from the Delphi study. The experts were asked to estimate the adoption levels for all self-service technologies in banking up to the year 2010. These estimates indicated that the adoption of all technologies will increase, and the use of human tellers will decrease. Not one expert suggested that the use of any of the self-service technologies would actually decrease. This is in fact the antithesis of the basic hypothesis of this thesis.

However this finding does not conclusively show that the experts consider disenchantment discontinuance to be an unlikely event. It is possible that the experts do consider that some current users of self-service technology will stop using them, but the number of new adopters will be greater than the discontinuers. This possibility is dealt with in the next hypothesis.

On the basis of these particular findings, however, H3 can be rejected.

H4 That the majority of the experts think that there is greater than a 50% chance that the trend towards increasing use of self-service technology will begin to reverse, due to consumers' preference for dealing with humans in banking.

In the Delphi study the experts were asked to estimate the probability that the thesis of this research becomes a reality before the year 2010. That is, that customers move away from self-service technology and back to human bank staff, due to a preference for dealing with humans in banking. No panel considered that there was greater than a 30% chance of this event occurring. The adoption estimates of the experts (which show that the majority of customers will adopt self-service technologies for routine transactions, but only a minority of customers will adopt self-service technologies for high involvement transactions) suggest that the experts are aware that there is technology which can be widely used for routine transactions. However, high involvement transactions such as lending or investment advice will always have personal contact.

The banks claim they know that there are some services which the customer will always demand personal contact, and there are other, more routine, services for which the customer will demand time and place convenience provided by self-service technology.

It appears therefore that there is insufficient evidence to support H4, and it must be rejected on the basis of the findings of this study.

8.4 CONCLUSIONS

8.4.1 METHODOLOGICAL CONCLUSIONS

The literature does not make it clear why little effort to date has been made to enhance Delphi so that it is more in line with mainstream scientific methods. This particular application of Delphi incorporated several changes to the technique. Clearly, it is difficult to prove the methodological worth of these enhancements. To do so would require an empirical study in a controlled setting. However, the experience with this application of Delphi would suggest that the following modifications to Delphi are appropriate:

Traditional Delphi studies use an open-ended questionnaire in the first round which asks the experts to identify all the possible issues relating to the future. This information is then used to generate the next questionnaire. Rather than use an open-ended questionnaire in the first round to identify the issues relating to the future, this research used brainstorming sessions with selected groups of experts. These are considered more appropriate than an open-ended questionnaire, because they allow for the cross-fertilisation of ideas, and therefore encourage wider thinking. Also, because the brainstorming sessions only use a limited number of select experts, it means that 'use' of all the experts is not necessary in the first round. Therefore, respondent fatigue is less likely to eventuate.

The questionnaire is the most criticised aspect of the Delphi technique. Several enhancements can be made to the way questionnaires have been used by past researchers: Panellists should be given an explanation of 'where we are today', before answering the questionnaire. This allows for a common baseline for projections. Determining where (exactly) we are today can be made one of the topics of the initial brainstorming session.

The final part of the questionnaire should be used to identify the experts' formal qualifications and experience. This data can then be used to check that the experts who took part in the study actually met the original definition of 'expert'. Alternatively, the data may be used to attach weightings to the experts' answers.

It is possible to pretest a Delphi questionnaire. Reliability can be examined by using the 'test and re-test' method. The experts used in the pretest, as with the experts in the brainstorming sessions, cannot be expected to take part in the 'live' Delphi rounds. Not only would they consider the work load to be too great, but they would have insights over and above the other panel members as a result of their early participation in the research.

The sample itself also requires consideration. If it is a forecast of the industry, then the sample must be representative of the industry. Therefore, panellists for the Delphi questionnaires must be selected from large, medium, and small organisations. In a deregulated environment constituency groups are also an essential, yet previously overlooked, input to a forecast. If panellists withdraw from Delphi after completing the first or second round of questionnaires, the researcher must ascertain why this was the case. The expert may be dismayed with the majority opinion, and have a valid reason for not bothering to conform.

- The main reason for withdrawing from Delphi was that the experts had 'other priorities'. This demonstrates that future users of the technique must give adequate time for the experts to respond, and possibly choose a time of the year when the experts in that particular industry do not have heavy workloads. This is especially so in the first round where, not only do the experts have to answer the questionnaire, but they must also learn the nature and purpose of the study.

-The main reason for taking part in the Delphi study was because the experts felt obliged since they agreed to do so when sent the initial letter of invitation. This is an important observation, since traditionally Delphi has suffered high attrition rates. And, this particular application had the highest response rate of any Delphi study observed in the literature. Future users of the technique would be wise to send potential experts an invitation prior to the questionnaire, rather than sending the questionnaire direct. A letter of invitation is a means of getting a 'foot in the door'.

- Delphi responses tend to be returned more quickly in the second and third rounds. Assuming this is due to the experience effect, future researchers using Delphi need to give adequate time to the experts in the first round.

8.4.2 THEORETICAL CONCLUSIONS

- There is an absence of empirical research examining disenchantment discontinuance. The earlier work on disenchantment discontinuance was not only conducted some 20 years ago (when technology was not such an issue), but it did not set out with the specific objective of identifying disenchantment discontinuance - it did so by chance. This research has taken an original approach to Rogers (1962) concept of disenchantment discontinuance by examining it in the context of self-service technology versus humans in the retail banking industry.

While the research did not suggest that disenchantment discontinuance is occurring, or will occur, it at least narrows down the area for future researchers wishing to examine disenchantment discontinuance in the context of consumers rejecting self-service technology in favour of human staff. In this research, conventional diffusion theory is more appropriate than disenchantment discontinuance. In other words, it is a case of market saturation rather than disenchantment discontinuance. That is not to say that disenchantment discontinuance will not occur in another part of the services industry, or in another industry. The problem with examining disenchantment discontinuance is that it is the *exception* to the rule (with the *rule* being conventional diffusion). Therefore, it is not adequate to find the presence of disenchantment discontinuance in one industry, and say that it must also apply to other industries. An industry-by-industry study is required. This research was a case study in banking, and must be recognised as such.

- Self-service technology will certainly be used for routine transactions, and in this sense will distant customers from the branch staff. Customers will be encouraged to use self-service technology for this purpose due to the banks implementing differential pricing strategies. However, high involvement transactions such as lending or investment advice will always have personal contact, but customers will pay for this. Rather than this being caused by bank costs, it appears that banks are simply aware that there are some services for which the customer will always demand personal contact, and will pay for. There are also other, more routine, services for which the

customer will demand the time and place convenience provided by self-service technology.

Given that bank staff will be freed from transaction type duties, they will be able to pay more attention to giving advice and selling. In this context, one could assert that the wheel of retailing hypothesis is coming into effect. Tellers who once offered transaction based services without charging customers high fees, are now becoming advice givers, sellers, and cross-sellers who offer, and charge for, services related to high involvement products. Tellers are being specifically trained for this role, and unless customers are prepared to pay for personal service, they will have to utilise self-service technology. This may well present an opportunity for new banks wishing to offer services with a lower fee structure to the mass market.

- It can be concluded that self-service is not limited to the vending of soft drinks, cigarettes, or other physical products. Indeed retail banking is an example of a service industry which has taken to self-service with enthusiasm and success. The services industry, or more particularly the banking industry, is most certainly a contender when it comes to the implementation of self-service strategies.

- While this research did not have any specific criteria to define 'high' and 'low' involvement products, it is quite clear that for those products with a low financial risk (such as withdrawing cash or obtaining a cheque account balance) self-service technology is acceptable for consumers. Conversely, for those products with relatively high financial risk (such as taking out a personal loan or a mortgage), consumers prefer to go to human staff.

8.4.3 BANKING SPECIFIC CONCLUSIONS

Future researchers could make reference to this study, not only because it is the first of its type in New Zealand, but since it is the most comprehensive to date. It is the most comprehensive because:

-It included all members of the metamorphic triangle, plus constituencies.

-It simultaneously looked at human tellers, the branch network, and self-service technologies.

This section has been broken down into three parts: findings which confirm the findings of other researchers, findings which are in disagreement with the findings of other researchers, and findings which are new to the literature - due to the fact that they have not been examined before.

Findings confirming other studies:

- The branch network will essentially remain, with a slight reduction in numbers in the longer term. However the form of branches will change - including the provision of staffless branches and in-branch technology.

- In branches still dominated by human staff, tellers will be provided with platform automation to assist them in cross-selling.

- In-branch self-service technologies in the branch vestibules will become available in the majority of bank branches.

- The banks viewed competition (which calls for lower cost technology) as being the main driving factor in technological change.

- Those technologies with the greatest potential (measured in adoption levels) are ATMs, EFTPOS, and telephone banking.

- In-branch technology, such as ATMs, will increase in number as banks try to attract customers back to the branch.

- As the bulk of transactional type work moves from tellers to self-service technology, tellers will have a reduced workload, and thus will be able to devote more of their time to looking after high involvement type products and cross-selling.

Findings in disagreement with other studies:

- While the panels viewed competition as being the main driving factor in technology, the panels also viewed effective marketing as being important.

- Smartcards are not perceived as being a major force in technology within the foreseeable future.

- The experts believed that the main factor retarding technological change in the future will be consumer resistance to change.

- Experts do not believe that there will be a return to the traditional form of telling.

- ATMs will be important for both loan quotations and bills payment.

New findings

- When considering the degree of marketing orientation of bankers introducing self-service technology, it appears that the intentions of the bankers and the views of the consumers are not markedly different.

- Consumer welfare groups will not halt the progress of technology, although they will influence its development.

- The Government will not become involved in the promotion of electronic banking, because this is not perceived (currently) as a Government role in a deregulated economy.

- Banks have introduced, and will continue to introduce, differential pricing strategies in order to move customers to electronic banking.
- The experts viewed time and place utility as being the most important factors in encouraging consumer adoption of self-service technologies.
- The experts do not consider it likely that disenchantment discontinuance will occur.
- The experts believed that the cashless society would be a reality within the time period of this forecast.
- The adoption of self-service technologies involving 'high involvement' type products will be minimal.
- The use of human tellers will decrease by around 20% to 30% over the next 20 years.
- The wide availability of EFTPOS will lead to a less than 40% reduction in the number of ATMs.
- The human/technology mix of the future will be around 70% automation and 30% humans.
- The increased use of remote banking will not lead to a reduction in customer loyalty.
- The experts suggested that 'personal relationships' between customers and human staff will be relatively unaffected by remote banking, although personal relationships will become more important for high net worth customers.

8.5 RECOMMENDATIONS FOR FURTHER RESEARCH

Future Research on Disenchantment Discontinuance and Self-Service

- A longitudinal study is required which specifically measures usage rates of an innovation over a series of time periods, to discover whether disenchantment discontinuance actually occurs.
- Is there a generic self-service customer? ie do the same types of people use self-service machines, regardless of the product being dispensed?
- This research has shown that some banking services are acceptable on self-service technology and some are not. A study is required which measures the importance of human interaction in service delivery over a range of service industries (and not just banking).

Future Research on Delphi

- This application of Delphi made several enhancements to the technique. Further research would be needed to see if these changes are worthwhile in the context of producing a more accurate forecast.
- The accuracy of self-rating scales for measuring the competence of experts.
- The accuracy of indices in Delphi questionnaires.
- What is the effect of the composition of the group of participants, the nature of the problem being solved, and the type of feedback provided for the participants, on the number of rounds required to reach stability in a Delphi study?

One of the inherent problems when making modifications to a technique such as Delphi is determining whether or not the changes have been effective. In some cases, the events forecasted may not take place for five or ten years into the future.

Clearly, a researcher is unlikely to want to wait this period of time in order to check the accuracy of the forecast. It would be possible, however, to examine the effect of modifications to Delphi under controlled experimental conditions. A single sample of experts could be used, and two questionnaires could be administered dealing with the same issues. One of the questionnaires would be based on a conventional Delphi study, while the other questionnaire would incorporate modifications to Delphi. The questionnaires would use almanac type questions, for which the answer is known. This would enable an immediate examination of the accuracy of the experts' responses. While this would not measure forecasting accuracy as such, it would measure the concept of expertise. This is the central issue since expertise is the basis of the Delphi technique.

Alternatively, in place of the almanac type questions, researchers could deal with events which have a much shorter forecasting horizon, say one to two years. This would at least give a measure of the contribution of the modifications to the short term forecasting accuracy of Delphi.

8.6 SUMMARY

This research achieved its objective in that it examined Roger's (1962) concept of disenchantment discontinuance in diffusion, in the area of humans versus self-service technology in retail banking. It did so by taking a present measure (in the consumer survey) and a future measure (in the Delphi study). However, the results of the research suggest that disenchantment discontinuance is not occurring and will not occur. The adoption of self-service technology will simply reach a market saturation level. This is not to say that users of self-service technology do not value human contact: they simply value time and place utility more for some products. Non-users

of self-service technology, however, value human contact more than time and place utility.

The fact that disenchantment discontinuance was not identified in this study does not mean that it would not be identified in other service industries. To discover this would require an industry by industry approach. This research, however, has at least reduced the potential area in which future researchers might look.

Transaction based services, for which banks traditionally charged a relatively low fee, are moving away from human tellers and towards self-service technology. This is freeing up time for human tellers, who are now being trained in the giving of advice related to high involvement banking services and cross-selling. Fees for this new service have increased (and will increase) accordingly. In this context, the *wheel of retailing hypothesis* can be seen to be coming into effect. Tellers who once offered low-priced, no frills service, are now charging for, and offering, higher priced quality service. This could well represent an opportunity for another financial institution to enter the market offering a lower priced service.

Unexpectedly, there were few major differences in the estimates across the panels - although the technology suppliers were consistently more optimistic than the bankers concerning the implementation and acceptance of self-service technology.

From a methodological perspective, the pattern of responses to Delphi rounds, and the reasons why experts withdraw from a Delphi study, were identified. Delphi questionnaires tend to be returned quicker in the second and third round than the first round. Presumably this is due to the experience effect, and demonstrates that future users of the technique may need consider giving additional time to experts in the first round. The main reason for withdrawing from the Delphi study was because the experts had other priorities. Again, this suggests that future researchers using Delphi need to give adequate time to the experts to respond, and possibly select a time of the year when that industry is particularly quiet.

Research does not always begin and end with a single objective, since during the research itself there may be further developments which necessitate examining an additional area, which was previously unnoticed or considered unimportant. For instance, as a result of the high response rate to the Delphi study, and the traditional problems with Delphi attrition rates, it was also decided to identify the reason why experts took part in the Delphi study. The main reason given by the experts for taking part in this Delphi study was because they felt obliged to, since they agreed to do so when sent the initial letter of invitation. It would therefore seem sensible for future users of the Delphi technique to follow a similar strategy of sending potential Delphi participants a letter of invitation, which asks them to commit themselves, before issuing a questionnaire.

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APPENDICES

Appendix A

Key words used in electronic literature search

The electronic literature search used the following key words, both individually and in combination.

Financial Services

Financial services, banking, bank, banks, building society, credit union, thrift, banking institutions, services industry.

Technology

Vending distribution, goods and services distribution, automatic telling machines, ATM, channels, self-service, EFT, EFTPOS, EPOS, POS, electronic, debit cards, transfer, point of sale, point of sale system, delivery system, telephone banking, telebanking, phone banking, automat, tell, tellers, television banking, minitel, computer banking, personal banking, videotex, checkless society, cashless society, voice response technology, human tellers, laser card, platform, automated clearing, Smart card, chip, chip cards, memory, intelligent card, integrated circuit card, telebanking

Forecasting

Future, predictions, changes, innovative, forecast, forecasting, technological forecasting, new, development, scenario, trend, trends, future of banking, Delphi, research, market research methods

Diffusion

Diffusion, diffusion of innovation, diffusion theory, disenchantment, adoption, adopter, adopter categories, adoption process.

Appendix B

Invitation to brainstorming sessions (reduced)

Facsimile



**MASSEY
UNIVERSITY**

Palmerston North
New Zealand
Telephone (0631) 69-099

**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

28 May 1990

Dear

As a result of my interest in retail financial services technology and marketing, I am undertaking doctoral research aimed at identifying (as near as possible) the use of customer interface technologies to the year 2020, and their implications on the marketing mix. Customer interface technologies are defined here as being those technologies which the customer interacts with eg ATMs, EFTPOS, home banking. As these examples show, particular attention is placed on product delivery technologies.

In conducting a study on the future of retail financial services technology several benefits will emerge, I believe: planning effectiveness will be maintained; viability assured; the undesirable can be avoided; and 'futures awareness' among our colleagues will emerge.

I intend to identify customer interface technologies by the year 2020 and their implications on the marketing mix by utilising a tested scientific process known as the Delphi technique (for your interest, a detailed description of this technique is attached). This is a series of three opinion questionnaires, whereby opinions from industry experts will be solicited (by mail), collated, and systematised into a group judgement.

The reason for my writing is not necessarily to ask you to take part in answering the three questionnaires discussed above (although you may be invited to participate at a later date). I do, however, ask for your 'one-off' help in developing the first questionnaire by seeking your attendance at one of two brainstorming sessions.

I intend to hold two brain storming sessions from 2.00-3.30pm on Friday June 29 and Monday July 9 1990, at the ANZ Bank Headquarters, corner of Lampton Quay and Featherstone Streets, Wellington, Level 1 (in the Area Manager's Conference room). I am grateful to the ANZ Bank for them letting me use their facilities.

The aim of these sessions will be to identify events, trends, conditions, developments, etc, as they relate to customer interface technologies up to the year 2020 (perhaps you would like to have a think about the topic before you attend the session). These brain storming sessions will be limited to one and a half hours, during which I anticipate there will be free-wheeling discussion. I should make it clear that I am only expecting information of a generic nature, and will not be expecting you to reveal insights which are competitively sensitive.

Each session will involve around 6 - 8 different 'experts'. These experts

will have a variety of backgrounds including bankers, technology suppliers, Government, and Telecom representatives.

Tea, coffee, and savories will be served at the conclusion of the session.

At the bottom of this page I have detailed the dates for the two brainstorming sessions. Please indicate (with a tick) which date is most convenient for you, and return that portion of the page to me in the *free-post* envelope provided.

I ask for your expert assistance in one of these brain storming sessions and hope that you will choose to participate. I am confident that this will be a relaxed and informal event which, apart from making a vital contribution towards the overall success of my thesis, will be enjoyed by you and your colleagues.

Yours sincerely

Gerard.P.J.Prendergast

Brain Storming Session

NAME: _____

TIME: 2.00pm - 3.30pm

DATE: I would prefer to attend the brain storming session on:

Friday June 29, 1990 ____

Monday July 9, 1990 ____

(Please place a tick beside the most convenient date)

LOCATION: ANZ Bank, New Zealand Headquarters, Corner of Lampton Quay and Featherstone Streets, Wellington. Level 1 (Area Managers Conference Room).

Information about the Delphi Technique

The Delphi technique has experienced widespread application in many fields. It has proven to be a valuable tool in deriving group consensus about a particular issue. It is used here as a solicitation of experts' ideas about retail technologies in the financial sector up to the year 2020.

Simply defined, Delphi is a collation of informed, intuitive judgments. Rather than bringing the participants together into a face to face situation, the survey will be conducted through a series of three questionnaires. In this way the basic rules of the technique will be preserved, that is, anonymity, controlled feedback, and statistical group response. Anonymity eliminates the psychological deterrent of a dominant individual in a group and maintains the integrity of an individuals response. Feedback, which will be controlled by this researcher, decreases the possibility of entertaining irrelevant material throughout the experiment. A group median and quartile range will be computed to determine the degree of consensus on a particular point.

More than one questionnaire is necessary in order to carefully consider and refine group opinion. The first questionnaire will provide experts with a list of events/items relating to customer interface technologies to the year 2020, and they will be asked to check on a scale of 1 to 10 the probability and desirability of each item actually occurring. Also, a competence / confidence index will be included. Here again it will be necessary that the experts circle the appropriate score to evaluate in his/her own thinking their feeling of relative competency and/or confidence to respond to that particular item. In the second questionnaire, experts will be fed back the medians and quartile ranges of the first questionnaire. Here again the experts will be asked to consider the possibility and desirability of each item occurring. The medians and quartile ranges of the second questionnaire will then be fed back to experts in the third round. Again the experts will be asked to consider the probability and desirability of each item occurring. The median of that final group response should reflect the group's feeling for each item.

At this point, you have probably realised that there is no one correct answer. The experts own best effort, be it based on past experience, knowledge of trends, foresight, extrapolation and/or intuition, is most adequate. Their answers will remain confidential. The prerogative to change their response because of an afterthought will be open to the experts throughout the study. The experts are also encouraged to explain their answer (if desired), are instructed not to consult with other panel members in formulating their response, and are asked to try to be as specific as possible in their judgements.

Appendix C

**Letter thanking experts for participation
in brainstorm (reduced)**

2 July 1990

Facsimile



**MASSEY
UNIVERSITY**

Palmerston North
New Zealand
Telephone (063) 69-099

**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

Dear

On behalf of my supervisor (Dr Norman Marr), and myself, I would like to thank you very much for your input into my brain storming session last week. I consider the session to have been a great success and, after the second session next week, I shall be very busy preparing the questionnaire for your colleagues. The session made me aware of just how much there is for me to learn before I can consider myself an 'expert' in the area of retail banking technology. To the best of my knowledge, this was the first time a collection of such individuals had been brought together for such an academic purpose. I hope you found it as interesting as I did.

It is quite some time to the completion of my Phd (somewhere around early to mid 1992). However I assure you that you will receive a summary of my research results as soon as they are available.

Thank you once again.

Regards

Gerard P Prendergast
Department of Marketing

Appendix D

Letter to large banks asking for names of experts (reduced)

15 June 1990



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

Dear

As a result of my interest in retail financial services, technology, and marketing, I am undertaking doctoral research aimed at identifying the use of customer interface technologies in banking to the year 2010, and their implications on the marketing mix. Customer interface technologies are defined here as being those technologies which the customer interacts with eg ATMs, EFTPOS, Home banking. As these examples show, particular attention is placed on product delivery technologies.

In conducting a study on the future of retail financial services technology several benefits will emerge. I believe: planning effectiveness will be enhanced, relevance will be maintained, viability assured, the undesirable can be avoided, and "futures awareness" among our colleagues will emerge.

Collectively we can identify customer interface technologies by the year 2010 and their implications on the marketing mix by utilising a tested scientific process known as the Delphi technique. It is a series of three opinion questionnaires, whereby 'experts' responses will be solicited (by mail), collated and systemised into a group judgement (detailed information is given about the Delphi technique on the attached sheet). These experts will have a variety of backgrounds, including bankers, technology suppliers, Telecom, and Government representatives.

When using the Delphi technique all responses are anonymous and combined to form one future scenario only, and it is not possible to identify the origin of the input. It is also important to realise that information of a *generic* nature only will be sought, and experts will not be asked to reveal competitively sensitive insights.

The reason for my writing is that my study has reached the stage of developing a list of potential experts to whom I can send an invitation to take part in my study. Therefore I am seeking your assistance in identifying the names and positions of experts within your own company.

As a guide, these experts should meet the following criteria:

- * Have been in the industry for a minimum of 5 years
- * Have, at some stage during their career, been involved in the research and/or development of new technological applications for banking, or the marketing of such developments to final consumers
- * Be in a management position or above
- * Be from the departments of marketing, strategic planning, and information technology.

Please feel free to place as many names as you like in the table on the next page (ideally you would be able to identify at least 6 people within your organisation who best meet this criteria - which may of course include yourself). If you feel that certain people should be included in the study, but do not meet the above criteria, please add them to the list - with a justification as to why they should be included. It may be the case that your organisation does not contain any individuals who meet the criteria I've given. If this is so, please write the words "no qualifiers" in the box. In either situation, I would be pleased if you could then detach this box and return it to me in the reply-paid envelope provided. Should you have any enquiries, please contact me at Massey University on (063) 69-099 ext 4116.

Thank you for your assistance in this matter, and the contribution you have made to my academic endeavour. I will forward you a summary of my research results as soon as they become available.

Yours sincerely

Gerard.P.J.Prendergast
Department of Marketing

Name of Organisation: _____

NAME OF EXPERT:	POSITION IN COMPANY:

Information about the Delphi Technique

The Delphi technique has experienced widespread application in many fields. It has proven to be a valuable tool in deriving group consensus about a particular issue. It is used here as a solicitation of experts' ideas about retail technologies in the financial sector up to the year 2020.

Simply defined, Delphi is a collation of informed, intuitive judgments. Rather than bringing the participants together into a face to face situation, the survey will be conducted through a series of three questionnaires. In this way the basic rules of the technique will be preserved, that is, anonymity, controlled feedback, and statistical group response. Anonymity eliminates the psychological deterrent of a dominant individual in a group and maintains the integrity of an individuals response. Feedback, which will be controlled by this researcher, decreases the possibility of entertaining irrelevant material throughout the experiment. A group median and quartile range will be computed to determine the degree of consensus on a particular point.

More than one questionnaire is necessary in order to carefully consider and refine group opinion. The first questionnaire will provide experts with a list of events/items relating to customer interface technologies to the year 2020, and they will be asked to check on a scale of 1 to 10 the probability and desirability of each item actually occurring. Also, a competence/confidence index will be included. Here again it will be necessary that the experts circle the appropriate score to evaluate in his/her own thinking their feeling of relative competency and/or confidence to respond to that particular item. In the second questionnaire, experts will be fed back the medians and quartile ranges of the first questionnaire. Here again the experts will be asked to consider the possibility and desirability of each item occurring. The medians and quartile ranges of the second questionnaire will then be fed back to experts in the third round. Again the experts will be asked to consider the probability and desirability of each item occurring. The median of that final group response should reflect the group's feeling for each item.

At this point, you have probably realised that there is no one correct answer. The experts own best effort, be it based on past experience, knowledge of trends, foresight, extrapolation and/or intuition, is most adequate. Their answers will remain confidential. The prerogative to change their response because of an afterthought will be open to the experts throughout the study. The experts are also encouraged to explain their answer (if desired), are instructed not to consult with other panel members in formulating their response, and are asked to try to be as specific as possible in their judgements.

Appendix E

Letter to small banks asking for names of experts (reduced)



**MASSEY
UNIVERSITY**

Private Bag
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Telephone 0-6-356 9099
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**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

15 June 1990

Dear

As a result of my interest in retail financial services, technology, and marketing, I am undertaking doctoral research aimed at identifying the use of customer interface technologies in banking to the year 2010, and their implications on the marketing mix. Customer interface technologies are defined here as being those technologies which the customer interacts with eg ATMs, EFTPOS, Home banking. As these examples show, particular attention is placed on product delivery technologies.

In conducting a study on the future of retail financial services technology several benefits will emerge. I believe: planning effectiveness will be enhanced, relevance will be maintained, viability assured, the undesirable can be avoided, and "futures awareness" among our colleagues will emerge.

Collectively we can identify customer interface technologies by the year 2010 and their implications on the marketing mix by utilising a tested scientific process known as the Delphi technique. It is a series of three opinion questionnaires, whereby 'experts' responses will be solicited (by mail), collated and systemised into a group judgement (detailed information is given about the Delphi technique on the attached sheet). These experts will have a variety of backgrounds, including bankers, technology suppliers, Telecom, and Government representatives.

When using the Delphi technique all responses are anonymous and combined to form one future scenario only, and it is not possible to identify the origin of the input. It is also important to realise that information of a generic nature only will be sought, and experts will not be asked to reveal competitively sensitive insights.

The reason for my writing is that my study has reached the stage of developing a list of potential experts to whom I can send an invitation to take part in my study. Therefore I am seeking your assistance in identifying the names and positions of experts within your own company.

As a guide, these experts should meet the following criteria:

- * *Have been in the industry for a minimum of 5 years*
- * *Have, at some stage during their career, been involved in the research and/or development of new technological applications for banking, or the marketing of such developments to final consumers*

- * Be in a management position or above
- * Be from the departments of marketing, strategic planning, and information technology.

Please feel free to place as many names as you like in the table below (ideally you would be able to identify at least 2 people within your organisation who best meet this criteria - which may of course include yourself). If you feel that certain people should be included in the study, but do not meet the above criteria, please add them to the list - with a justification as to why they should be included. It may be the case that your organisation does not contain any individuals who meet the criteria I've given. If this is so, please write the words "no qualifiers" in the box. In either situation, I would be pleased if you could then detach this box and return it to me in the reply-paid envelope provided. Should you have any enquiries, please contact me at Massey University on (063) 69-099 ext 4116.

Thank you for your assistance in this matter, and the contribution you have made to my academic endeavour. I will forward you a summary of my research results as soon as they become available.

Yours sincerely

Gerard.P.J.Prendergast
Department of Marketing

Name of Organisation: _____

NAME OF EXPERT:	POSITION IN COMPANY:

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Appendix F

**Letter to technology suppliers asking
for names of experts (reduced)**



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

15 June 1990

Dear

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Collectively we can identify customer interface technologies by the year 2010 and their implications on the marketing mix by utilising a tested scientific process known as the Delphi technique. It is a series of three opinion questionnaires, whereby 'experts' responses will be solicited (by mail), collated and systemised into a group judgement (detailed information is given about the Delphi technique on the attached sheet). These experts will have a variety of backgrounds, including bankers, technology suppliers, Telecom, and Government representatives. Quite clearly, technology suppliers are crucial in determining the future shape of banking.

When using the Delphi technique all responses are anonymous and combined to form one future scenario only, and it is not possible to identify the origin of the input. It is also important to realise that information of a generic nature only will be sought, and experts will not be asked to reveal competitively sensitive insights.

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- * *Have, at some stage during their career, been involved in the research and/or development of new technological applications for banking, or the marketing of such developments to financial institutions*
- * *Be in a management position or above.*

Please feel free to place as many names as you like in the table below (ideally you would be able to identify at least 3-4 people within your organisation who best meet this criteria - which may of course include yourself). If you feel that certain people should be included in the study, but do not meet the above criteria, please add them to the list - with a justification as to why they should be included. It may be the case that your organisation does not contain any individuals who meet the criteria I've given. If this is so, please write the words "no qualifiers" in the box. In either situation, I would be pleased if you could then detach this box and return it to me in the reply-paid envelope provided. Should you have any enquiries, please contact me at Massey University on (063) 69-099 ext 4116.

Thank you for your assistance in this matter, and the contribution you have made to my academic endeavour. I will forward you a summary of my research results as soon as they become available.

Yours sincerely

Gerard.P.J.Prendergast
Department of Marketing

Name of Organisation: _____

NAME OF EXPERT:	POSITION IN COMPANY:

Information about the Delphi Technique

The Delphi technique has experienced widespread application in many fields. It has proven to be a valuable tool in deriving group consensus about a particular issue. It is used here as a solicitation of experts' ideas about retail technologies in the financial sector up to the year 2020.

Simply defined, Delphi is a collation of informed, intuitive judgments. Rather than bringing the participants together into a face to face situation, the survey will be conducted through a series of three questionnaires. In this way the basic rules of the technique will be preserved, that is, anonymity, controlled feedback, and statistical group response. Anonymity eliminates the psychological deterrent of a dominant individual in a group and maintains the integrity of an individual's response. Feedback, which will be controlled by this researcher, decreases the possibility of entertaining irrelevant material throughout the experiment. A group median and quartile range will be computed to determine the degree of consensus on a particular point.

More than one questionnaire is necessary in order to carefully consider and refine group opinion. The first questionnaire will provide experts with a list of events/items relating to customer interface technologies to the year 2020, and they will be asked to check on a scale of 1 to 10 the probability and desirability of each item actually occurring. Also, a competence/confidence index will be included. Here again it will be necessary that the experts circle the appropriate score to evaluate in his/her own thinking their feeling of relative competency and/or confidence to respond to that particular item. In the second questionnaire, experts will be fed back the medians and quartile ranges of the first questionnaire. Here again the experts will be asked to consider the possibility and desirability of each item occurring. The medians and quartile ranges of the second questionnaire will then be fed back to experts in the third round. Again the experts will be asked to consider the probability and desirability of each item occurring. The median of that final group response should reflect the group's feeling for each item.

At this point, you have probably realised that there is no one correct answer. The experts own best effort, be it based on past experience, knowledge of trends, foresight, extrapolation and/or intuition, is most adequate. Their answers will remain confidential. The prerogative to change their response because of an afterthought will be open to the experts throughout the study. The experts are also encouraged to explain their answer (if desired), are instructed not to consult with other panel members in formulating their response, and are asked to try to be as specific as possible in their judgements.

Appendix G

**Letter to experts inviting them to take
part in Delphi (reduced)**



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

1 November 1990

Dear

Recently I approached a senior executive in your organisation seeking the names of appropriate people to take part in my research into the future of banking technology in New Zealand. Your name was suggested. In fact you are a member of a very small group of people in New Zealand who are considered 'expert' enough to take part in this research. Given that this group is so small, it is even more important that I receive your help.

Firstly let me give you some background on my research:

As a result of my interest in retail financial services, technology & marketing, I am undertaking doctoral research aimed at identifying (as near as possible) the use of customer interface technologies, human tellers and the branch network in banking to the year 2010, and their application to the Product Life Cycle (PLC) concept. Customer interface technologies are defined here as being those technologies which the customer interacts with eg Automatic Telling Machines (ATMs), Electronic Funds Transfer at the Point of Sale (EFTPOS), Home banking. As these examples show, particular attention is given to product delivery technologies.

In conducting a study on the future of customer interface technologies, human tellers and the branch network several benefits will emerge, I believe: planning effectiveness will be enhanced; relevance will be maintained; viability assured; the undesirable can be avoided; and "futures awareness" among our colleagues will emerge.

Collectively we can identify the use of customer interface technologies, human tellers, and the branch network to the year 2010 by utilising a tested scientific process known as the Delphi technique (detailed information about this technique is on the attached page). This is a series of three opinion questionnaires, whereby your responses will be solicited (by mail), collated and systematised into a group judgement. *It is important to be aware that all responses are anonymous and combined to form one future scenario only, and it will not be possible to identify the origin of the input. Also, I am not expecting you to reveal competitively sensitive information, and instead ask that you confine your thinking to a 'generic' sense only. It is your personal views only that I am interested in, and I will not interpret them as being representative of the organisation that you work for.*

Please fill in the next page, which indicates your willingness (or otherwise) to take part in this study. I would be pleased if you could then detach this page and return it in the reply paid envelope provided (**NO STAMP REQUIRED**). All you will be committing yourself to is taking part in a round of mail questionnaires.

I would be most appreciative if you could return this page to me at your earliest convenience so that I may be able to collate the names of participants and arrange to have the first questionnaire sent¹. I plan to distribute the first questionnaire in mid January 1991.

I thank you for your expert assistance in this research project, and the contribution you have made to my academic endeavour. As I mentioned at the beginning of my letter, you are a member of a very small group of people who are suitably qualified to take part in this study. I am, therefore, very dependent on your cooperation. I can assure you that your time and efforts will be wisely used, and at the conclusion of the total study I will be able to provide you with a summary of my overall research findings, for your interest. I am sure you will find the results of value.

Yours sincerely

Gerard P J Prendergast
Department of Marketing

¹ This questionnaire was developed by your colleagues in a series of brain storming sessions in Wellington in June and July this year. Input to these sessions was received from trading banks, technology suppliers, Databank, Telecom, consultants, the Computer Society, the Consumers' Institute, the Bankers' Association, the Financial Sector Union, and the Government. Some of the attendants at these sessions included the likes of Chief Executives and Cabinet Ministers.

Participation in Delphi Study

1. **YES** I am willing to take part in
this Delphi study _____ (please tick)

In addition, I will be requiring a free copy of the research
results

_____ (please tick)

Confirmation of name, title, and mailing address

Please complete the following section:

Name: Mr/Mrs/Ms _____

Title: _____

Mailing Address _____

2. **NO** I am not willing to take
part in this Delphi study _____ (please tick)

THANK YOU FOR YOUR HELP

Information about the Delphi Technique

The Delphi technique has experienced widespread application in many fields. It has proven to be a valuable tool in deriving group consensus about a particular issue. It is used here as a solicitation of your ideas about retail technologies in the financial sector up to the year 2010. You are one of only 156 individuals in New Zealand selected as the panel for this Delphi experiment. These people come from areas such as financial institutions, technology companies, Databank, the Bankers' Association, the financial sector trade union (FINSEC), Telecom, Government, and consumer groups.

Simply defined, Delphi is a collation of informed, intuitive judgments -- your judgments. Rather than bringing the participants together into a face to face situation, the survey will be conducted through a series of three questionnaires. In this way the basic rules of the technique will be preserved, that is, anonymity, controlled feedback and statistical group response. Anonymity eliminates the psychological deterrent of a dominant individual in a group & maintains the integrity of an individuals response. Feedback, which will be controlled by this researcher, decreases the possibility of entertaining irrelevant material throughout the experiment. A group median and quartile range will be computed to determine the degree of consensus on a particular point.

More than one questionnaire is necessary in order to carefully consider and refine group opinion. The first questionnaire will provide you with a list of events/items relating to customer interface technologies to the year 2010, and you will be asked to estimate when these items will occur using index, year, percentage and probability estimates. Also, a confidence/competence index will be included. Here it will only be necessary that you circle the appropriate score to evaluate in your own thinking your feeling of relative competency &/or confidence to respond to that particular item. In the second questionnaire, you will be fed back the medians and quartile ranges of the first questionnaire. Here again you will be asked to estimate when each item will occur. The medians and quartile ranges of the results of the second questionnaire will then be fed back to you in the third round. Again you will be asked to estimate when each item will occur. The median of that final group response should reflect the group's "feeling" for each item.

At this point, you have probably realised that there is no true or correct answer. Your own best effort, be it based on past experience, knowledge of trends, foresight, extrapolation and/or intuition, is most adequate. Your answers will remain confidential. The prerogative to change your response because of an afterthought will be open to you throughout the study. You are also encouraged to explain your answer, if desired. Please do not consult with other panel members in formulating your response and try to be as specific as possible in your judgments.

Appendix H

**Letter thanking experts for agreeing
to take part in Delphi (reduced)**



**MASSEY
UNIVERSITY**

Private Bag
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Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

12 November 1990

Dear

Recently I received your response to my invitation to take part in my PhD research on the future of customer interface technologies, human tellers, and the branch network in the New Zealand retail banking environment.

I am very pleased that you have responded positively, especially since you must be a very busy person. Your expertise is valuable, and I thank you for your assistance in this academic endeavour.

I will be sending you the first questionnaire in mid January 1991.

Yours sincerely

**Gerard P J Prendergast
Department of Marketing**

Appendix I

Cover letter for pretesting Delphi questionnaire (reduced)



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

19 October 1990

Dear

Thank you for agreeing to take part in the pre-testing of my questionnaire¹. This is an extremely important phase of my PhD research. If I do not ensure the reliability and validity of the questionnaire before distributing it to the full nationwide sample, the foundation of my research could be questioned. *Your role, therefore, is an important one.* As an Academic, I am dependent on your 'real world' knowledge.

Basically, I am asking you to answer this questionnaire in the normal fashion. While you do this, please consider the following:

- *Problems with the phrasing of questions. Are they ambiguous?*
- *Problems in the format and lay out of the questionnaire.*
- *Problems in the questionnaire instructions.*

Also, given the title of my research, do you think I have omitted relevant questions, or possibly included irrelevant ones?

¹ This questionnaire was developed by your colleagues in a series of brainstorming sessions and interviews. Input came from trading banks, technology suppliers, Databank, Telecom, consultants, the Computer Society, FINSEC, the Bankers' Association, the Consumers' Institute, and the Government. Specific individuals included the likes of Chief Executives and Cabinet Ministers.

Three general rules apply:

- 1 *Bear in mind that this questionnaire is on the future. Therefore please think twice before dismissing statements as being irrelevant, since anything can happen in the future.*
- 2 *Please criticise freely: I have selected you on the basis that you have the expertise and/or objectivity to help me develop a sound questionnaire.*
- 3 *This questionnaire is also being examined by colleagues within your own organisation, and other organisations. It is critical that you do not discuss this questionnaire with these people. I am interested in your opinion.*

I have attached an explanation of the Delphi research technique: the principal methodology being used in this thesis. This will help you understand the context in which the questionnaire is to be used.

I know that you will enjoy taking part in this pretest. This is a revolutionary study for New Zealand. The results will have commercial and academic relevance.

I appreciate that this is a long questionnaire. However, to ensure the study maintains its timetable, I would be pleased if you could return the questionnaire in the envelope provided by 12 November 1990. I will then talk to you or your colleagues personally about the manner in which questions were answered, and problems encountered.

Yours sincerely

Gerard P J Prendergast
Department of Marketing

Appendix J

Cover letter for first Delphi questionnaire (reduced)



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

24 January 1991

Dear

You may recall me writing to you towards the end of last year with regards to my PhD research here at Massey University. That letter invited you to take part in my Delphi study on the future of customer interface technologies, human tellers, and the branch network in retail banking in New Zealand (a description of the Delphi technique is attached). Thank you for agreeing to take part in this study. You are one of only a small group of appropriate experts in New Zealand and therefore your assistance is greatly appreciated.

As promised, a copy of the first questionnaire is enclosed. This questionnaire was developed by your colleagues in a series of brainstorming sessions and interviews. Input came from the trading banks, technology suppliers, Databank, Telecom, consultants, the Computer Society, FINSEC, the Consumers' Institute, and the Government. Specific individuals at these sessions included Chief Executives and Cabinet Ministers.

If possible, I would like to have your response within four weeks of your receipt of this letter (26 February). This will enable me to collate and feed back the results to you and your colleagues in the shortest possible time. A *free-post* envelope (no stamp required) is enclosed for your use.

I would like to remind you that when using the Delphi technique all responses are anonymous and combined to form one future scenario only, and it will not be possible to identify the origin of the input. It is also important to realise that information of a *generic* nature only is being sought, and you are not asked to reveal competitively sensitive insights.

You will notice in the questionnaire that you are asked to give a *reasoning* for each answer. Clearly it will take you a long time to answer this questionnaire if you give a comprehensive reasoning for each question. *Simple and straight forward reasonings are more than adequate for this research.*

I am sure you will enjoy taking part in this revolutionary study. In conducting a study of the future of customer interface technologies, human tellers, and the branch network, several benefits will emerge. I believe: planning effectiveness will be enhanced, relevance maintained, viability assured, the undesirable can be avoided, and "futures awareness" among our colleagues will emerge.

Thank you for your time and efforts which I can assure you will be wisely used. Should you have any questions you would like to ask me, I can be contacted at Massey on (063) 69-099 ext 4116. Alternatively you may call my supervisor (Dr Norman Marr) on extension 7989.

Yours sincerely

Gerard P J Prendergast
Department of Marketing

Appendix K

First Delphi questionnaire

A Forecast in Retail Banking

**The Future of Customer Interface
Technologies, Human Tellers, and the
Branch Network in New Zealand.**

**A Study by
Gerard P Prendergast**

EVENT STATEMENTS 1-22 ARE POSSIBLE CHANGES RELATING TO THE FUTURE OF CUSTOMER INTERFACE TECHNOLOGIES, HUMAN TELLERS AND THE BRANCH NETWORK IN NEW ZEALAND. YOU ARE REQUESTED TO PROVIDE THE ANSWERS REQUESTED BY EACH SECTION, AS FOLLOWS:

SECTION 1: YEAR STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE A YEAR ESTIMATE FOR THE ANTICIPATED OCCURRENCE OF THE EVENT.

SECTION 2: PROBABILITY STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE A PROBABILITY ESTIMATE FOR THE ANTICIPATED OCCURRENCE OF THE EVENT.

SECTION 3: INDEX STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE AN INDEX RATING (ASSUMING THAT 1991 = 100) TO EACH OF THE FACTORS GIVEN.

SECTION 4: PERCENTAGE STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE A PERCENTAGE ESTIMATE RELATING TO THE RETAIL BANKING MARKET.

ALL OF THESE FIRST FOUR SECTIONS ASK YOU TO GIVE YOUR REASONS WHICH LED TO YOUR YEAR, PROBABILITY, INDEX OR PERCENTAGE ESTIMATE. YOU ARE ALSO ASKED TO MARK YOUR PERCEIVED COMPETENCE TO INDICATE THE CONFIDENCE YOU HAVE IN YOUR ANSWER.

SECTION 5: DEMOGRAPHICS

- * IN THIS SECTION YOU ARE REQUESTED TO PROVIDE VARIOUS DETAILS ABOUT YOURSELF. THIS SECTION IS NECESSARY TO ENSURE THE REPRESENTATIVENESS OF THE RESEARCH SAMPLE.

Retail Banking in New Zealand Today

Before you give your predictions in this questionnaire, it is important from a validity point of view that all the experts taking part in this study start from a similar base or a similar understanding of where the state of technology is today.

Therefore, below is a description of where financial institutions have progressed to in terms of customer interface technologies, human tellers, and the branch network. This description should be used as a benchmark, against which you answer your questions.

For the purpose of this research, please accept this description as being true, even if you disagree with components of it.

The election of the Lange Government in 1984 can be seen as the starting point for change in the New Zealand financial sector. Financial institutions have been significantly freed up and the market opened for new institutions.

This new environment has led many commentators to suggest that the financial system is in a state of turmoil. Rapid deregulation of all parts of the finance, foreign exchange and capital markets, the addition of new banking institutions, major changes in technology, and basic economic restructuring, have driven banks and other financial institutions into a reassessment of their roles and market positioning. Thus the battle to obtain and hold customers has become intense.

One of the methods of obtaining customers is for banks to provide increased convenience in banking via electronic means. Currently around 80% of the adult population in New Zealand hold magnetic stripe cards which are capable of being used in an ATM or EFTPOS terminal. Of this group of people, about 35% regularly (ie at least once a week) use their card in an ATM. There are several versions of ATM's available, including through the wall, drive-up, in lobby, and in branch. Around 15-20% of card holders, who bank with an institution providing an EFTPOS service, regularly (ie at least once a week) use their card in an EFTPOS terminal. EFTPOS is yet to become well established in the market. Characterised by an uncertain beginning, it now seems likely that EFTPOS will be re-launched to the market.

Banks currently face the dilemma of building up two infrastructures: the paper based infrastructure for processing cheques, and the electronic infrastructure for processing electronic funds transfers. The number of paper based transactions has peaked, while the number of electronic transactions are slowly growing.

Smartcards are still at the experimentation stage, with little or no significant market acceptance. Bank branches sometimes offer other types of self-service technology (such as balance machines and statement printing machines) but this is the exception rather than the rule.

Human tellers are still the dominant form of product delivery, with about 90% of customers making use of a human teller at least once a fortnight. There

are around 1500 retail bank branches in New Zealand, predominately staffed by humans rather than technology. Branches which are staffed mainly by self service technology (such as the BNZ's Ready Bank in Wellington) are still very much in the pilot stage.

The United States is experimenting with self-service technology which enables customers to open their own accounts, and to arrange their travel or insurance requirements. These particular types of technology, however, are yet to be seen in New Zealand.

Retail Banking in New Zealand Today

Before you give your predictions in this questionnaire, it is important from a validity point of view that all the experts taking part in this study start from a similar base or a similar understanding of where the state of technology is today.

Therefore, below is a description of where financial institutions have progressed to in terms of customer interface technologies, human tellers, and the branch network. This description should be used as a benchmark, against which you answer your questions.

For the purpose of this research, please accept this description as being true, even if you disagree with components of it.

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This new environment has led many commentators to suggest that the financial system is in a state of turmoil. Rapid deregulation of all parts of the finance, foreign exchange and capital markets, the addition of new banking institutions, major changes in technology, and basic economic restructuring, have driven banks and other financial institutions into a reassessment of their roles and market positioning. Thus the battle to obtain and hold customers has become intense.

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Human tellers are still the dominant form of product delivery, with about 90% of customers making use of a human teller at least once a fortnight. There

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The United States is experimenting with self-service technology which enables customers to open their own accounts, and to arrange their travel or insurance requirements. These particular types of technology, however, are yet to be seen in New Zealand.

DEFINITION OF KEY TERMS

ATM (Automated Telling Machine)

This is a machine for distributing cash and providing information services to customers on presentation of computer-readable card, and keying of PIN (personal identification number).

BANK

Refers specifically to retail banks ie those who service private customers and small businesses.

DIFFERENTIAL PRICING

May be used when a bank has two alternative product delivery modes eg ATMs and human tellers. The bank can encourage the use of one mode and discourage the use of the other mode by charging higher fees for one of the modes of delivery.

EFTPOS (Electronic Funds Transfer at Point of Sale)

This involves making payments electronic at the point of sale by entering a computer readable card into an EFTPOS terminal.

HOME BANKING

Is a service which enables customers to perform banking transactions from their own home. This may be achieved via a home computer or television.

MAIN CITY CENTRES

Refers to those cities with a population of 60,000 or more. There are approximately 10 such cities in New Zealand.

PLATFORM AUTOMATION

Refers to automation at the tellers cubicle. Typically it involves screen access to product profiles, which assists tellers in cross-selling.

PRODUCT PROFILE MACHINES

These machines, which are currently being piloted in some branches, allow customers to obtain profiles of the various bank products available.

SMALL BUSINESSES

Refers to organisations which employ fewer than 20 people and/or have an annual turnover of less than \$1 million before tax.

SMARTCARD

This is a card with on-board processing power. Supersmart cards are an advancement of the Smartcard, and have enhanced memory and processing power, and a miniature keyboard and display.

TELEPHONE BANKING

Is an automated telephone service (which involves the telephone being answered by a computer of some description, rather than a human bank officer) which enables customers to perform banking transactions.

NOTES

- (1) "NEVER" IS A VALID ALTERNATIVE TO AN ACTUAL DATE.
PLEASE WRITE ACROSS BOX.

'0' IS A VALID ALTERNATIVE TO A PROBABILITY.

'0' IS A VALID ALTERNATIVE TO A PERCENTAGE.

- (2) CIRCLE THE VALUE WHICH YOU FEEL REFLECTS YOUR
COMPETENCE TO ANSWER THE STATEMENT.

. 0 IS NOT COMPETENT

5 IS VERY COMPETENT

- (3) INDEXES ARE USED TO REFLECT EITHER AN INCREASE OR
A DECREASE IN THE VARIABLE (EG 'IMPORTANCE') BEING
DISCUSSED. IF YOU RESPOND WITH AN INDEX GREATER
THAN 100, THIS REPRESENTS AN INCREASE IN THE VARIABLE
BEING DISCUSSED. IF YOU RESPOND WITH AN INDEX LESS
THAN 100, THIS REPRESENTS A DECREASE IN THE VARIABLE
BEING DISCUSSED. IF YOU RESPOND WITH AN INDEX OF
EXACTLY 100, THIS REPRESENTS NO CHANGE IN THE VARIABLE
BEING DISCUSSED.

Section 1: Year Statements

EXAMPLE

Eighty percent of retail customers will be using telephone banking facilities at least once a week by

2000 Year (1)

REASONING behind your year estimate

The telephone is a familiar technology and customers will be comfortable with it.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have average competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

Event Event Description
No

1 *'Staffless' branches, which are staffed predominately by self-service technology, will exist in all the main city centres by*

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

2 *'Platform automation' (SEE DEFINITIONS PAGE AT THE BEGINNING OF DOCUMENT), where tellers have PC's which both themselves and customers can use to obtain product profiles, will be available in at least 50% of branches by*

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

3 *Self-service machines in the branch 'vestibules', which would be accessible after hours, will be in at least 50% of branches by*

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

4 All ATM card holders will be able to apply for most types of personal loan through an ATM
by

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description

5 The widespread availability of 'EFTPOS' (SEE DEFINITIONS PAGE AT THE BEGINNING OF DOCUMENT), which
has the ability to dispense cash, will lead to a 40% reduction in the number of ATMs by

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description

No

6 A bills-payment facility will be available on all ATMs by

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

7 *All customers using 'home banking terminals' (SEE DEFINITIONS PAGE AT THE BEGINNING OF DOCUMENT) will be able to apply for any type of personal loan from their home by*

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

8 *Currently there are around 1500 full service retail bank branches in New Zealand, but the increasing availability of remote banking technology may suggest that this is too many. By what year will this be reduced to 1200? 1000?*

Reduced to 1200 _____ Year (1)

Reduced to 1000 _____ Year (1)

REASONING behind your year estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

9 *Currently around 85% of the volume of transactions are completed using cash. The Retail Banking 'Cashless Society', a society where at least 80% of funds transfers are performed by electronic means, will occur by*

_____ Year (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

10 *Currently there are around 2.3 million credit cards in New Zealand, with each one being used on average 2.2 times per month. By what year will these cards be used, on average, at least 5 times a month?*

Year _____ (1)

REASONING behind your year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 2: Probability Statements

EXAMPLE

What is the probability that at least 50% of retail bank branches will offer customers in-branch ATM services by the year 2010?

90 Probability (1)

REASONING behind your probability estimate

These will be needed in order to encourage the 'technology shy' to use them.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have little competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

Event Event Description
No

11 *What is the probability that groups concerned with consumer welfare (such as the Consumers' Institute) will halt the progress of technology in banking by the year 2000 and 2010?*

Year 2000 _____ Probability (1)

Year 2010 _____ Probability (1)

REASONING behind your probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

12 *What is the probability that the majority of the banks will introduce 'differential pricing' (SEE DEFINITIONS PAGE AT THE BEGINNING OF DOCUMENT) to encourage customers to use technology ahead of human bank staff by the years 2000 and 2010?*

Year 2000 _____ Probability (1)

Year 2010 _____ Probability (1)

REASONING behind your probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

13 *A clear trend is emerging in retail banking: banks have been investing in technologies which allow for greater customer self-service rather than reliance upon bank employees eg ATMs, Telephone Banking. This is resulting in significant depersonalisation of banking services, but increased convenience.*

What is the probability that by the years 2000 and 2010, the trend referred to above will begin to reverse, due to customers demanding a return to more personal contact with bank staff when completing their banking tasks?

Year 2000 _____ Probability (1)

Year 2010 _____ Probability (1)

REASONING behind your probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

14 *What is the probability that the Government, due to concern with the rates of crime in a cash society, becomes actively involved in the promotion and support of electronic funds transfer systems by the year 2000 and 2010?*

Year 2000 _____ Probability (1)

Year 2010 _____ Probability (1)

REASONING behind your probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 3: Index Statements

EXAMPLE

It has been suggested that personal relationships are being valued more by customers in banking. Using index 1991 = 100, how important will personal relationships in banking be for customers in 2010?

70 (index) (3)

REASONING behind your index estimate

Personal relationships will become less important due to the convenience of technology.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have much competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

(3) means 'see note three'

Event Event Description
No

15 *Listed below are a number of factors which promote technological advancement in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?*

	<u>2000</u>	<u>2010</u>	
Consumer demand for enhanced service	_____	_____	(3)
Cooperation between financial institutions	_____	_____	(3)
Increasing security problems	_____	_____	(3)
Government legislation supporting technology	_____	_____	(3)
Increasing competition for retail customers, as a result of deregulation	_____	_____	(3)
An increase in population, creating a more economical critical mass	_____	_____	(3)
Top management support	_____	_____	(3)
Effective marketing	_____	_____	(3)
Comparable developments elsewhere, which 'acclimatise' customers to technology eg computers in schools	_____	_____	(3)
The increasing availability of software and front end technology	_____	_____	(3)
Rising costs of processing paper	_____	_____	(3)
Rising costs of labour	_____	_____	(3)
The rate at which overseas banks are implementing change	_____	_____	(3)
The innovative nature of the New Zealand population	_____	_____	(3)

REASONING behind your index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event No Event Description

16 Listed below are a number of factors which retard technological advancement in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?

	<u>2000</u>	<u>2010</u>	
Bank staff resistance to technology	_____	_____	(3)
Lack of human expertise to implement and maintain the sophisticated computer systems required	_____	_____	(3)
Potential resistance to change by customers	_____	_____	(3)
Conservatism of top management	_____	_____	(3)
Problems in developing the software and front end technology	_____	_____	(3)
The large amount of current investment in magnetic stripe technology	_____	_____	(3)

REASONING behind your index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

17 Below are a number of factors which encourage customer acceptance of technology in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?

	<u>2000</u>	<u>2010</u>	
✓ Simplicity of use	_____	_____	(3)
Time convenience	_____	_____	(3)
Place convenience	_____	_____	(3)
Security	_____	_____	(3)
Standardisation of equipment	_____	_____	(3)
Wide availability of the technology	_____	_____	(3)
Efficiency (relative to a human teller)	_____	_____	(3)

REASONING behind your index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event No Event Description

18 Listed below are a number of factors which discourage customer acceptance of technology in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?

	<u>2000</u>	<u>2010</u>	
The 'habit' of using human tellers	___	___	(3)
✓ A preference for dealing with humans in banking	___	___	(3)
The 'big brother' aspect ie the fear of banks taking over peoples lives	___	___	(3)
✓ The absence of sufficient benefits of banking technology over and above human tellers	___	___	(3)

REASONING behind your index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

19 *It has been suggested that remote banking technology forces customers away from the branch and therefore reduces customer loyalty. Using index 1991 = 100, how much will this loyalty change (ie increase or decrease) by the year 2000 and 2010?*

Year 2000 (3) _____ Year 2010 (3) _____

REASONING behind your index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

20 *It has been suggested that personal relationships (ie dealing with human bank staff rather than technology) are being valued more by customers in banking. Using index 1991 = 100, how important will personal relationships be for customers in banking by the year 2000 and 2010?*

Year 2000 (3) _____ Year 2010 (3) _____

REASONING behind your index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 4: Percentage Statements

EXAMPLE

What percentage of bank account holders do you think will be using home banking services at least once a week by the year 2000?

10% Percentage (1)

REASONING behind your percentage estimate

Use will be limited to the high-nett-worth customers only.

COMPETENCE/CONFIDENCE RATING (2) 0 1 (2) 3 4 5 (please circle)

In this example, the respondent considered him/herself to have average competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

Event Event Description
No

21 *The market for customer interface technologies in New Zealand could be defined as all people who hold bank accounts. Under the years 2000 and 2010 indicated in the table on the next page, please insert the percentage of this market that you believe will make regular use of each of the customer interface technologies listed.*

If you believe that the long term regular usage rate (ie after the year 2010) will be different to the regular usage rate you indicated for the year 2010, please show this usage rate (and the year that you expect it to occur) in the two right hand columns. For example, you may believe that in the year 2010, 70% of customers will use ATMs. In the longer term (say 2020) you may believe that ATM usage rates will fall to 50% as some customers will rebel against technology and revert to traditional banking methods with human bank staff. Alternatively, you may believe that in the longer term positive experiences with ATMs will see usage rates climb to 90% of customers at some time after 2010.

'Regular use' in the context of this question is defined as at least once a week.

When considering your response, assume that there are no barriers to customer access to the technology (including fees and technology availability).

To act as a bench mark, you have been provided with the percentages as they stand now (1991). Please accept these estimates as being accurate.

	<u>Now (%)</u>	<u>2000 (%)</u>	<u>2010 (%)</u>	<u>After 2010</u> <u>(year & %)</u>	
EFTPOS	<u>10%</u>	_____	_____	—	—
In-Lobby ATMs	<u>12%</u>	_____	_____	—	—
Through the wall ATMs	<u>35%</u>	_____	_____	—	—
Automated Telephone Banking	<u>5%</u>	_____	_____	—	—
Home Banking via TV	<u>0%</u>	_____	_____	—	—
Home Banking via PC	<u>0%</u>	_____	_____	—	—
Human Bank Staff	<u>85%</u>	_____	_____	—	—
Credit Cards	<u>30%</u>	_____	_____	—	—
Combined Debit/Credit Cards	<u>0%</u>	_____	_____	—	—
Deposit Machines	<u>0%</u>	_____	_____	—	—
SmartCards	<u>0%</u>	_____	_____	—	—
Balance Enquiry Machines	<u>0%</u>	_____	_____	—	—
Product Profile machines	<u>0%</u>	_____	_____	—	—

Please perform the same estimates for loan, travel, and insurance enquiry machines as indicated below. This time, however, 'regular use' is defined as at least once every six months.

	<u>Now (%)</u>	<u>2000 (%)</u>	<u>2010 (%)</u>	<u>After 2010</u> <u>(year & %)</u>
Loan enquiry machines	<u>0%</u>	_____	_____	_____
Travel enquiry machines	<u>0%</u>	_____	_____	_____
Insurance enquiry machines	<u>0%</u>	_____	_____	_____

REASONING behind your percentage estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event No Event Description

22 *The delivery of banking services can be placed on a spectrum between the following extremes:*

Compare

- zero automation or total human delivery (where one can only access bank services through human tellers in a bank branch, and technology is virtually non-existent), and
- 100% automation or total technological delivery (where one can only access bank services through some kind of mechanical device, and human tellers are virtually non-existent).

In between these two extremes is a 'human/technology mix', where customers access some banking services through humans and others through technology.

Looking at it purely from a customer acceptance perspective, and assuming free customer access to both human delivery and technology delivery, please estimate what percentage of automation the majority of customers are likely to accept by the years 2000 and 2010?

Year 2000 _____ Percentage

Year 2010 _____ Percentage

REASONING behind your percentage estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 5: Demographics

In order to ensure the validity of this research, it is necessary that I have a representative sample. I would therefore be pleased if you could answer the following questions about yourself, bearing in mind that all results are, of course, confidential. Please place a tick beside the appropriate response.

23 *Approximately how many years have you been employed with your current organisation?*

a) 0 to 2 years _____

b) 3 to 5 years _____

c) 6 to 9 years _____

d) 10 to 12 years _____

e) 13 to 15 years _____

f) more than 15 years _____

24 *Approximately how many years have you been in the current industry?*

a) 0 to 2 years _____

b) 3 to 5 years _____

c) 6 to 9 years _____

d) 10 to 12 years _____

e) 13 to 15 years _____

f) more than 15 years _____

25

Which age group contains your age?

- a) Less than 20 years _____
- b) 21 - 30 years _____
- c) 31 - 40 years _____
- d) 41 - 50 years _____
- e) more than 50 years _____

26

What was the last level you completed in your formal education?

- a) Primary school _____
- b) Secondary school - no school certificate _____
- c) School certificate _____
- d) University Entrance or Matriculation _____
- e) Technical or trade qualification _____
- f) University Graduate _____
- g) Other tertiary qualification _____

THANK YOU FOR YOUR HELP.

Appendix L

**Letter thanking experts for returning first
Delphi questionnaire (reduced)**



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

11 April 1991

Dear

Thank you for responding to the first round of my Delphi study on the future of technology in the New Zealand financial sector. The overall response was excellent. I appreciate your time and effort to date.

I am currently working on the *second* Delphi questionnaire - which contains those issues for which a consensus was not found in the first round. Some very interesting results have been found to date, and I look forward to your continued support in this research. I plan to have the second, and penultimate, questionnaire to you by late April/early May.

Your sincerely

**Gerard P Prendergast
Department of Marketing**

Appendix M

Cover letter for second Delphi questionnaire (reduced)



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

30 April 1991

Dear

Welcome to the second and penultimate round of this Delphi study, through which we are attempting to forecast the future of customer interface technologies, human tellers, and the branch network in retail banking in New Zealand.

Thank you for completing the first round of the Delphi study. Your input thus far is invaluable to the objective of this study and reflects diligent efforts on your part. The first round of questionnaires saw a pleasing response. The average experience in the industry for the 114 experts who responded is around 14 years: a healthy level of expertise indeed.

As a result of the heartening response to the first round of Delphi, I have split the sample of 114 experts into five panels. I consider it useful to do this so that I can compare the views of large financial institutions (Panels A and B), medium and small sized financial institutions (Panel C), technology suppliers (Panel D), and a miscellaneous panel made up of environmental/public sector interests (Panel E). These panels are of a size that is only just feasible. **It is vital, therefore, that you remain with this study for the final two rounds, or the whole panel will have to be abandoned.** There are some interesting comparisons to be made between the panels already, but *I will send you the full summary of the research results, including the summary of the total sample and then a panel summary, at the end of the third and final Delphi round.*

You will find that there are two documents enclosed. Both of these documents contain the results of the first Delphi round as they relate to your panel only. The first document is yours to keep. It contains those events from the first Delphi questionnaire, which no longer need to be included in this study. Either a consensus was found on the events, or the experts agreed that the events would never occur.

The remaining events i.e. those for which a consensus was not reached, have been included in the second (shorter) Delphi questionnaire. The means (M) and Interquartile Ranges (IQR) for these events are given, so that you may *reconsider* or revise your estimate (YRE - Your revised estimate), given this information. The interquartile range is the range of the middle 50% of responses, when all the responses are ranked from smallest to largest. For example, suppose in the first round there were eight experts in your panel and their responses to the question 'in what year will the cashless society occur?' was: 1999, 2003, 2006, 2107, 2018, 2019, 2020, and 2222. The interquartile range, therefore, is 2006-2019.

The revised questionnaire is similar to the last one, taking into account the results of the first round. It is especially important, if your revised estimate falls outside the interquartile range, that you write a brief reasoning (in the space provided) as to why you hold this position. **Once you have completed the questionnaire, kindly return it in the free-post envelope provided at your earliest convenience and if possible before 4 June 1991.**

I have enjoyed working with you to date and sincerely appreciate the time and efforts you have spent helping in the completion of this study. Should you have any questions you would like to ask me, I can be contacted at Massey on (063) 69-099 ext 4116. Alternatively you may contact my supervisor, Dr Norman Marr, on ext 7989.

Yours sincerely

Gerard P Prendergast
Department of Marketing

Appendix N

Example of second round results feedback (reduced)

A Forecast in Retail Banking

**The Future of Customer Interface
Technologies, Human Tellers, and the
Branch Network in New Zealand.**

**Results Section for Panel 'A' (Large Financial
Institutions): Delphi Study Round One**

Consensus events and events which will never occur

Consensus Statements

The majority of experts in Panel A agreed on the following events:

2. 'Platform automation' (SEE DEFINITIONS PAGE IN SECOND QUESTIONNAIRE), where tellers have PC's which both themselves and customers can use to obtain product profiles, will be available in at least 50% of branches by

Mean 1999 Interquartile Range 1995-2000

6. A bills-payment facility will be available on all ATMs by

Mean 2002 Interquartile Range 1995-2000

7. All customers using 'home banking terminals' (SEE DEFINITIONS PAGE IN SECOND QUESTIONNAIRE) will be able to apply for any type of personal loan from their home by

Mean 2000 Interquartile Range 1995-2000

8. Currently there are around 1500 full service retail bank branches in New Zealand, but the increasing availability of remote banking technology may suggest that this is too many. By the follow years their numbers will be reduced to 1200 and 1000.

Reduced to 1200: Mean 1998 Interquartile Range 1995-2000

Reduced to 1000: Mean 2005 Interquartile Range 2005-2010

11. The probability that groups concerned with consumer welfare (such as the Consumers' Institute) will halt the progress of technology in banking by the year 2000 and 2010 is

Year 2000: Mean 10.71 Interquartile Range 0-10

Year 2010: Mean 8.57 Interquartile Range 0-10

Never Statements

According to the majority of experts in Panel A, the following events will never occur:

5. The widespread availability of 'EFTPOS' (SEE DEFINITIONS PAGE IN SECOND QUESTIONNAIRE), which has the ability to dispense cash, will never lead to a 40% reduction in the number of ATMs.

21. Home banking by TV will not gain any consumer acceptance within the next 20 years.

Appendix O

Example of second Delphi questionnaire (reduced)

DELPHI QUESTIONNAIRE TWO: PANEL 'A'.

A Forecast in Retail Banking

The Future of Customer Interface
Technologies, Human Tellers and the
Branch Network in New Zealand

A study by
Gerard P Prendergast

THE FOLLOWING EVENT STATEMENTS ARE THE SAME AS THOSE YOU WOULD HAVE SEEN IN THE FIRST QUESTIONNAIRE. NO CONSENSUS WAS FOUND FOR THESE ITEMS, SO THEY HAVE TO BE REPEATED IN THIS SECOND ROUND OF DELPHI. THE EVENTS RELATE TO POSSIBLE CHANGES TO THE FUTURE OF CUSTOMER INTERFACE TECHNOLOGIES, HUMAN TELLERS AND THE BRANCH NETWORK IN NEW ZEALAND. YOU ARE REQUESTED TO PROVIDE THE ANSWERS REQUESTED BY EACH SECTION, AS FOLLOWS:

SECTION 1: YEAR STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE A YEAR ESTIMATE FOR THE ANTICIPATED OCCURRENCE OF THE EVENT.

SECTION 2: PROBABILITY STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE A PROBABILITY ESTIMATE FOR THE ANTICIPATED OCCURRENCE OF THE EVENT.

SECTION 3: INDEX STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE AN INDEX RATING (ASSUMING THAT 1991 = 100) TO EACH OF THE FACTORS GIVEN.

SECTION 4: PERCENTAGE STATEMENTS

- * IN THIS SECTION YOU ARE REQUESTED TO GIVE A PERCENTAGE ESTIMATE RELATING TO THE RETAIL BANKING MARKET.

ALL OF THESE FOUR SECTIONS ASK YOU TO GIVE YOUR REASONS WHICH LED TO YOUR YEAR, PROBABILITY, INDEX OR PERCENTAGE ESTIMATE. THIS IS ESPECIALLY IMPORTANT IF YOUR REVISED ESTIMATE (YRE) FALLS OUTSIDE THE INTERQUARTILE RANGE (IQR). YOU ARE ALSO ASKED TO MARK YOUR PERCEIVED COMPETENCE TO INDICATE THE CONFIDENCE YOU HAVE IN YOUR ANSWER.

Retail Banking in New Zealand Today

Before you give your predictions in this questionnaire, it is important from a validity point of view that all the experts taking part in this study start from a similar base or a similar understanding of where the state of technology is today.

Therefore, below is a description of where financial institutions have progressed to in terms of customer interface technologies, human tellers, and the branch network. This description should be used as a benchmark, against which you answer your questions.

For the purpose of this research, please accept this description as being true, even if you disagree with components of it.

The election of the Lange Government in 1984 can be seen as the starting point for change in the New Zealand financial sector. Financial institutions have been significantly freed up and the market opened for new institutions.

This new environment has led many commentators to suggest that the financial system is in a state of turmoil. Rapid deregulation of all parts of the finance, foreign exchange and capital markets, the addition of new banking institutions, major changes in technology, and basic economic restructuring, have driven banks and other financial institutions into a reassessment of their roles and market positioning. Thus the battle to obtain and hold customers has become intense.

One of the methods of obtaining customers is for banks to provide increased convenience in banking via electronic means. Currently around 80% of the adult population in New Zealand hold magnetic stripe cards which are capable of being used in an ATM or EFTPOS terminal. Of this group of people, about 35% regularly (ie at least once a week) use their card in an ATM. There are several versions of ATM's available, including through the wall, drive-up, in lobby, and in branch. Around 15-20% of card holders, who bank with an institution providing an EFTPOS service, regularly (ie at least once a week) use their card in an EFTPOS terminal. EFTPOS is yet to become well established in the market. Characterised by an uncertain beginning, it now seems likely that EFTPOS will be re-launched to the market.

Banks currently face the dilemma of building up two infrastructures: the paper based infrastructure for processing cheques, and the electronic infrastructure for processing electronic funds transfers. The number of paper based transactions has peaked, while the number of electronic transactions are slowly growing.

Smartcards are still at the experimentation stage, with little or no significant market acceptance. Bank branches sometimes offer other types of self-service technology (such as balance machines and statement printing machines) but this is the exception rather than the rule.

Human tellers are still the dominant form of product delivery, with about 90% of customers making use of a human teller at least once a fortnight. There are around 1500 retail bank branches in New Zealand, predominately staffed by humans rather than technology. Branches which are staffed mainly by self service technology (such as the BNZ's Ready Bank in Wellington) are still very much in the pilot stage.

The United States is experimenting with self-service technology which enables customers to open their own accounts, and to arrange their travel or insurance requirements. These particular types of technology, however, are yet to be seen in New Zealand.

DEFINITION OF KEY TERMS

ATM (Automated Telling Machine)

This is a machine for distributing cash and providing information services to customers on presentation of computer-readable card, and keying of PIN (personal identification number).

BANK

Refers specifically to retail banks ie those who service private customers and small businesses.

DIFFERENTIAL PRICING

May be used when a bank has two alternative product delivery modes eg ATMs and human tellers. The bank can encourage the use of one mode and discourage the use of the other mode by charging higher fees for one of the modes of delivery.

EFTPOS (Electronic Funds Transfer at Point of Sale)

This involves making payments electronic at the point of sale by entering a computer readable card into an EFTPOS terminal.

HOME BANKING

Is a service which enables customers to perform banking transactions from their own home. This may be achieved via a home computer or television.

MAIN CITY CENTRES

Refers to those cities with a population of 60,000 or more. There are approximately 10 such cities in New Zealand.

PLATFORM AUTOMATION

Refers to automation at the tellers cubicle. Typically it involves screen access to product profiles, which assists tellers in cross-selling.

PRODUCT PROFILE MACHINES

These machines, which are currently being piloted in some branches, allow customers to obtain profiles of the various bank products available.

SMALL BUSINESSES

Refers to organisations which employ fewer than 20 people and/or have an annual turnover of less than \$1 million before tax.

SMARTCARD

This is a card with on-board processing power. Supersmart cards are an advancement of the Smartcard, and have enhanced memory and processing power, and a miniature keyboard and display.

TELEPHONE BANKING

✓ Is an automated telephone service (which involves the telephone being answered by a computer of some description, rather than a human bank officer) which enables customers to perform banking transactions.

NOTES

- (1) "NEVER" IS A VALID ALTERNATIVE TO AN ACTUAL DATE.
PLEASE WRITE ACROSS BOX.

'0' IS A VALID ALTERNATIVE TO A PROBABILITY.

'0' IS A VALID ALTERNATIVE TO A PERCENTAGE.

- (2) CIRCLE THE VALUE WHICH YOU FEEL REFLECTS YOUR
COMPETENCE TO ANSWER THE STATEMENT.

0 IS NOT COMPETENT

5 IS VERY COMPETENT

- (3) INDEXES ARE USED TO REFLECT EITHER AN INCREASE OR
A DECREASE IN THE VARIABLE (EG 'IMPORTANCE') BEING
DISCUSSED. IF YOU RESPOND WITH AN INDEX GREATER
THAN 100, THIS REPRESENTS AN INCREASE IN THE VARIABLE
BEING DISCUSSED. IF YOU RESPOND WITH AN INDEX LESS
THAN 100, THIS REPRESENTS A DECREASE IN THE VARIABLE
BEING DISCUSSED. IF YOU RESPOND WITH AN INDEX OF
EXACTLY 100, THIS REPRESENTS NO CHANGE IN THE VARIABLE
BEING DISCUSSED.

Section 1: Year Statements

EXAMPLE

Eighty percent of retail customers will be using telephone banking facilities at least once a week by

Mean (M) 1999 Interquartile Range (IQR) 1995-2005

Your Revised Estimate (YRE) 1998 (1)

REASONING behind your revised year estimate

Customers know how to use a telephone. Adoption will be rapid.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have average competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

Event Event Description
No

1 *'Staffless' branches, which are staffed predominately by self-service technology, will exist in all the main city centres by*

M 2000 IQR 1995-2000 YRE _____

REASONING behind your revised year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

3 *Self-service machines in the branch 'vestibules', which would be accessible after hours, will be in at least 50% of branches by*

M 2002 IQR 1995-2010 YRE _____

REASONING behind your revised year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

4 *All ATM card holders will be able to apply for most types of personal loan through an ATM by*

M 2002 IQR 1996-2008 YRE _____

REASONING behind your revised year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

9 *Currently around 85% of transactions are completed using cash. The Retail Banking 'Cashless Society', a society where at least 80% of funds transfers are performed by electronic means, will occur by*

M 2009 IQR 2000-2017 YRE _____

REASONING behind your revised year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

10 *Currently there are around 2.3 million credit cards in New Zealand, with each one being used on average 2.2 times per month. By what year will these cards be used, on average, at least 5 times a month?*

M 2003 IQR 1996-2007 YRE _____

REASONING behind your revised year estimate

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 2: Probability Statements

EXAMPLE

What is the probability that at least 50% of retail bank branches will offer customers in-branch ATM services by the year 2010?

M 60 IQR 50-97 YRE 90 (1)

REASONING behind your revised probability estimate

As I said, they will be needed for the
'technology shy' customers.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have little competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

Event Event Description
No

12 *What is the probability that the majority of the banks will introduce 'differential pricing' (SEE DEFINITIONS PAGE AT THE BEGINNING OF DOCUMENT) to encourage customers to use technology ahead of human bank staff by the years 2000 and 2010?*

Year 2000: M 79 IQR 60-100 YRE _____

Year 2010: M 90 IQR 85-100 YRE _____

REASONING behind your revised probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

13 *A clear trend is emerging in retail banking: banks have been investing in technologies which allow for greater customer self-service rather than reliance upon bank employees eg ATMs, Telephone Banking. This is resulting in significant depersonalisation of banking services, but increased convenience.*

What is the probability that by the years 2000 and 2010, the trend referred to above will begin to reverse, due to customers demanding a return to more personal contact with bank staff when completing their banking tasks?

Year 2000: M 33 IQR 5-50 YRE _____

Year 2010: M 34 IQR 10-50 YRE _____

REASONING behind your revised probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

14 *What is the probability that the Government, due to concern with the rates of crime in a cash society, becomes actively involved in the promotion and support of electronic funds transfer systems by the year 2000 and 2010?*

Year 2000: M 26 IQR 5-50 YRE _____

Year 2010: M 35 IQR 10-75 YRE _____

REASONING behind your revised probability estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 3: Index Statements

EXAMPLE

It has been suggested that personal relationships are being valued more by customers in banking. Using index 1991 = 100, how important will personal relationships in banking be for customers in 2010?

M 102 IQR 70-120 YRE 90 (3)

REASONING behind your revised index estimate

They will be less important because the convenience of technology will become more important.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have much competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

(3) means 'see note three'

Event Event Description
No

15 Listed below are a number of factors which promote technological advancement in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?

		<u>2000</u>	<u>2010</u>
Consumer demand for enhanced service	M 128 IQR 120-142 YRE _____	148 120-171 _____	
Cooperation between financial institutions	M 107 IQR 99-120 YRE _____	116 99-128 _____	
Increasing security problems	M 115 IQR 107-125 YRE _____	124 107-140 _____	
Government legislation supporting technology	M 111 IQR 100-120 YRE _____	116 104-140 _____	
Increasing competition for retail customers, as a result of deregulation	M 130 IQR 118-143 YRE _____	138 120-150 _____	
An increase in population, creating a more economical critical mass	M 107 IQR 100-110 YRE _____	120 100-120 _____	
Top management support	M 126 IQR 117-140 YRE _____	135 120-150 _____	
Effective marketing	M 129 IQR 120-142 YRE _____	141 120-150 _____	
Comparable developments elsewhere, which 'acclimatise' customers to technology eg computers in schools	M 129 IQR 110-142 YRE _____	147 120-170 _____	

EVENT 15 CONTINUED.....

	<u>2000</u>	<u>2010</u>
The increasing availability of software and front end technology	M 132 IQR 117-135 YRE _____	150 120-171 _____
Rising costs of processing paper	M 128 IQR 104-150 YRE _____	139 109-168 _____
Rising costs of labour	M 127 IQR 120-130 YRE _____	142 127-150 _____
The rate at which overseas banks are implementing change	M 118 IQR 100-116 YRE _____	124 100-121 _____
The innovative nature of the New Zealand population	M 113 IQR 100-120 YRE _____	123 100-135 _____

REASONING behind your revised index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

17 Below are a number of factors which encourage customer acceptance of technology in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?

		<u>2000</u>	<u>2010</u>
Simplicity of use	M	125	133
	IQR	110-135	120-150
	YRE	_____	_____
Time convenience	M	129	141
	IQR	114-150	115-165
	YRE	_____	_____
Place convenience	M	130	149
	IQR	120-145	125-165
	YRE	_____	_____
Security	M	117	123
	IQR	110-130	110-132
	YRE	_____	_____
Standardisation of equipment	M	122	133
	IQR	110-132	110-150
	YRE	_____	_____
Wide availability of the technology	M	121	139
	IQR	109-130	110-152
	YRE	_____	_____
Efficiency (relative to a human teller)	M	121	136
	IQR	104-130	100-150
	YRE	_____	_____

REASONING behind your revised index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event
No

Event Description

18 Listed below are a number of factors which discourage customer acceptance of technology in banking. Using index 1991 = 100, how important are these factors likely to be by the year 2000 and 2010?

		<u>2000</u>	<u>2010</u>
The 'habit' of using human tellers	M	92	83
	IQR	80-100	60-100
	YRE	_____	_____
A preference for dealing with humans in banking	M	96	84
	IQR	84-112	60-100
	YRE	_____	_____
The 'big brother' aspect ie the fear of banks taking over peoples lives	M	92	86
	IQR	79-106	68-103
	YRE	_____	_____
The absence of sufficient benefits of banking technology over and above human tellers	M	95	88
	IQR	79-110	57-120
	YRE	_____	_____

REASONING behind your revised index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

19 *It has been suggested that remote banking technology forces customers away from the branch and therefore reduces customer loyalty. Using index 1991 = 100, how much will this loyalty change (ie increase or decrease) by the year 2000 and 2010?*

Year 2000: M 95 IQR 90-110 YRE _____

Year 2010: M 94 IQR 75-120 YRE _____

REASONING behind your revised index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

20 *It has been suggested that personal relationships (ie dealing with human bank staff rather than technology) are being valued more by customers in banking. Using index 1991 = 100, how important will personal relationships be for customers in banking by the year 2000 and 2010?*

Year 2000: Mean 112 IQR 90-121 YRE _____

Year 2010: Mean 114 IQR 80-143 YRE _____

REASONING behind your revised index estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Section 4: Percentage Statements

EXAMPLE

What percentage of bank account holders do you think will be using home banking services at least once a week by the year 2000?

M 15 IQR 5-15 YRE 10

REASONING behind your revised percentage estimate

Use will be limited to high-net-worth customers only.

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

In this example, the respondent considered him/herself to have average competence to answer this question.

(1) means 'see note one'

(2) means 'see note two'

Event Event Description
No

21 *The market for customer interface technologies in New Zealand could be defined as all people who hold bank accounts. Under the years 2000 and 2010 indicated in the table on the next page, please insert the percentage of this market that you believe will make regular use of each of the customer interface technologies listed.*

'Regular use' in the context of this question is defined as at least once a week.

When considering your response, assume that there are no barriers to customer access to the technology (including fees and technology availability).

To act as a bench mark, you have been provided with the percentages as they stand now (1991). Please accept these estimates as being accurate.

	<u>Now (%)</u>	<u>2000 (%)</u>	<u>2010 (%)</u>
EFTPOS	<u>10%</u>	M 30 IQR 17-35 YRE ____	M 45 IQR 29-60 YRE ____
In-lobby ATMs	<u>12%</u>	M 25 IQR 19-29 YRE ____	M 37 IQR 25-49 YRE ____
Through the wall ATMs	<u>35%</u>	M 49 IQR 40-50 YRE ____	M 59 IQR 49-70 YRE ____
Automated Telephone Banking	<u>5%</u>	M 17 IQR 7-20 YRE ____	M 24 IQR 10-26 YRE ____
Human Bank Staff	<u>85%</u>	M 64 IQR 60-80 YRE ____	M 58 IQR 40-75 YRE ____
Credit Cards	<u>30%</u>	M 38 IQR 31-41 YRE ____	M 45 IQR 34-60 YRE ____
Combined Debit/Credit Cards	<u>0%</u>	M 17 IQR 5-20 YRE ____	M 26 IQR 10-30 YRE ____
Deposit Machines	<u>0%</u>	M 5 IQR 0-5 YRE ____	M 8 IQR 0-10 YRE ____
SmartCards	<u>0%</u>	M 10 IQR 1-6 YRE ____	M 22 IQR 5-30 YRE ____
Balance Enquiry Machines	<u>0%</u>	M 9 IQR 1-10 YRE ____	M 12 IQR 0-10 YRE ____
Product Profile Machines	<u>0%</u>	M 8 IQR 2-10 YRE ____	M 17 IQR 5-22 YRE ____

Please perform the same estimates for loan, travel, and insurance enquiry machines as indicated below. This time, however, 'regular use' is defined as at least once every six months.

	<u>Now (%)</u>	<u>2000 (%)</u>	<u>2010 (%)</u>
Loan enquiry machines	<u>0%</u>	M 17 IQR 9-20 YRE ____	M 36 IQR 9-75 YRE ____
Travel enquiry machines	<u>0%</u>	M 6 IQR 1-6 YRE ____	M 12 IQR 3-13 YRE ____
Insurance enquiry machines	<u>0%</u>	M 8 IQR 2-11 YRE ____	M 15 IQR 5-21 YRE ____

REASONING behind your revised percentage estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

Event Event Description
No

22 *The delivery of banking services can be placed on a spectrum between the following extremes:*

- zero automation or total human delivery (where one can only access bank services through human tellers in a bank branch, and technology is virtually non-existent), and

- 100% automation or total technological delivery (where one can only access bank services through some kind of mechanical device, and human tellers are virtually non-existent).

In between these two extremes is a 'human/technology mix', where customers access some banking services through humans and others through technology.

Looking at it purely from a customer acceptance perspective, and assuming free customer access to both human delivery and technology delivery, please estimate what percentage of automation the majority of customers are likely to accept by the years 2000 and 2010?

Year 2000: M 48 IQR 35-60 YRE _____

Year 2010: M 61 IQR 50-70 YRE _____

REASONING behind your revised percentage estimates

COMPETENCE/CONFIDENCE RATING (2) 0 1 2 3 4 5 (please circle)

THANK YOU FOR YOUR HELP

Appendix P

Letter thanking experts for returning second Delphi questionnaire (reduced)



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

30 July 1991

Dear

Thank you for responding to the second round of my Delphi study on the future of technology in the New Zealand financial sector. The overall response was excellent. I appreciate your time and effort to date.

I am currently working on the *third* Delphi questionnaire - which contains those issues for which a consensus was not found in the first and second rounds. Some very interesting results have been found to date, and I look forward to your continued support in this research. I plan to have the final questionnaire to you by late July.

Your sincerely

Gerard P Prendergast
Department of Marketing

Appendix Q

**Letter asking experts why they did not return
second Delphi questionnaire (reduced)**



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

May 25 1991

Dear

Earlier this year I invited you to take part in my PhD research titled '*A Forecast in Retail Banking: The Future of Customer Interface Technologies, Human Tellers and the Branch Network in New Zealand*'. The technique I am using is 'Delphi', which involves sending out three questionnaires. While you completed the first questionnaire, I did not receive the second questionnaire. **It is important for the validity of my research that I identify the reason why various experts, including yourself, withdrew from the study before completing the requirements.** Therefore I would be most grateful if you could complete the question on the attached page, and then return it to me in the freepost envelope provided.

Thank you for your earlier participation in my research, and for your assistance in this matter.

Yours sincerely

**Gerard P Prendergast
Department of Marketing**

PS It is not too late to still return the questionnaire.

Reason for Withdrawing From Research

I did not return the second Delphi questionnaire because (please tick the appropriate box or boxes):

a) I never received it ()

b) I forgot about it ()

c) I had more urgent priorities ()

d) I am no longer in the same position
in the organisation ()

e) I am no longer in the same
organisation ()

f) I did not agree with the research (please specify why)

g) Other (please specify)

Name: _____

Organisation: _____

Appendix R

Cover letter for third Delphi questionnaire (reduced)



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

DEPARTMENT OF
MARKETING

23 July 1991

Dear

Welcome to the final round of our Delphi study on the future of customer interface technologies, human tellers, and the branch network in New Zealand banking. All is going very well and you are generating some very productive ideas. However it is still vitally important that this final round be completed to ensure the completion of the study.

As with the last round, I have enclosed two documents. Both of these documents contain the results of the second Delphi round as they relate to your panel only. The first document is yours to keep. It contains those events from the second Delphi questionnaire, which no longer need to be included in this study, as a consensus has been found on the events. You may find it interesting to see what you and your colleagues have formulated for the future.

The remaining events i.e. those for which a consensus has not been reached, have been included in the third (shorter) Delphi questionnaire. The means (M) and Interquartile Ranges (IQR) for these events are given, so that you may reconsider or revise your estimate (YRE - Your Revised Estimate), given this information. The interquartile range is the middle 50% of responses, when all the responses are ranked from smallest to largest. For example, suppose in the second round there were eight experts in your panel and their responses to the question 'in what year will the cashless society occur' was: 1999, 2003, 2006, 2007, 2018, 2019, 2020, and 2022. The interquartile range, therefore, is 2006-2019.

This revised questionnaire is similar to the last one, taking into account the results of the second round. It is especially important, if your revised estimate falls outside the interquartile range, that you write a brief reasoning (in the space provided) as to why you hold this position. **Once you have completed the questionnaire, kindly return it in the free-post envelope provided at your earliest convenience and if possible before September 6 1991.** Should you have any questions you would like to ask me, I can be contacted at Massey on (063) 69-099 ext 4116. Alternatively you may contact my supervisor, Dr Norman Marr, on ext 7989.

I have enjoyed working with you and sincerely appreciate the time you have spent helping in the completion of this PhD research. As you can appreciate, this study has been a major exercise, and I am confident that the results will be of great value. As soon as I have collated the questionnaires from this final round, I will send you a full summary of the research results, including a summary of each of the five panels and a full sample summary.

Again, thank you for your kind cooperation.

Yours sincerely

Gerard P J Prendergast
Department of Marketing

Appendix S

**Letter asking experts why they did not return
third Delphi questionnaire (reduced)**

25 September 1991



**MASSEY
UNIVERSITY**

Private Bag
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**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

Dear

Earlier this year I invited you to take part in my PhD research titled '*A Forecast in Retail Banking: The Future of Customer Interface Technologies, Human Tellers and the Branch Network in New Zealand*'. The technique I am using is 'Delphi', which involves sending out three questionnaires. While you completed the first and second questionnaires, I did not receive the third questionnaire. **It is important for the validity of my research that I identify the reason why various experts, including yourself, withdrew from the study before completing the requirements.** Therefore I would be most grateful if you could complete the question on the attached page, and then return it to me in the freepost envelope provided.

Thank you for your earlier participation in my research, and for your assistance in this matter.

Yours sincerely

**Gerard P Prendergast
Department of Marketing**

PS It is not too late to still return the final questionnaire.

Reason for Withdrawing From Research

I did not return the third Delphi questionnaire because (please tick the appropriate box or boxes):

a) I never received it ()

b) I forgot about it ()

c) I had more urgent priorities ()

d) I am no longer in the same position
in the organisation ()

e) I am no longer in the same
organisation ()

f) I did not agree with the research (please specify why)

g) Other (please specify)

Name: _____

Organisation: _____

Appendix T

Cover letter sent to experts at completion of study (reduced)



**MASSEY
UNIVERSITY**

Private Bag
Palmerston North
New Zealand
Telephone 0-6-356 9099
Facsimile 0-6-350 5608

**FACULTY OF
BUSINESS STUDIES**

**DEPARTMENT OF
MARKETING**

November 11 1991

Dear

Attached is a summary of the results of my Delphi research in which you kindly assisted. Also attached is a description of the Delphi technique, to enable you to interpret the results. You will notice in places that I make reference to the second main component of my research - a survey of consumers and their attitudes to self-service technology. Unfortunately, the results of this facet of the research have not been analysed at this stage.

The Delphi research was conducted between the period September 1990 - October 1991.

Relative to the size of my thesis, this is indeed a *summary* of the results. Should you require any further information, do not hesitate to contact me at Massey.

On quite a different matter, one of the most interesting findings in this research from a methodology point of view was the exceptionally high response rate to each round of the study - especially when one considers the length of each questionnaire, and the value of the time of the participants. Compared to other available Delphi studies across all industries, this study had the highest response rate. It is of great interest to me, and indeed to other researchers, to find out why exactly this was the case. Therefore I would be most grateful if you could tick the relevant boxes in the single question on the attached page, and return it to me in the free post envelope provided.

Again, thank you for your help. I appreciate that this was a major commitment on your part, and your voluntary help in this cause was much appreciated.

I trust you find the results of interest.

Yours sincerely

Gerard P Prendergast
Department of Marketing

Reason/s for Completing the Requirements of the Study

*I responded to all three rounds of the Delphi study because
(please tick the relevant box/boxes):*

- a) I wanted to obtain a free copy of the results at the end of the research ()
- b) I felt obliged to complete the research since I agreed to take part in the first place ()
- c) I wanted to know what my colleagues were thinking ()
- d) I was happy to do the work since it was for a voluntary cause ()
- e) I was a student once myself, and know how important it is to have people cooperate in research ()
- f) Other (please specify) ()

Information about the Delphi Technique

The Delphi technique has experienced widespread application in many fields. It has proven to be a valuable tool in deriving group consensus about a particular issue. It is used here as a solicitation of your ideas about retail technologies in the financial sector up to the year 2010. You are one of only 120 individuals in New Zealand selected as the panel for this Delphi experiment. These people come from areas such as financial institutions, technology companies, Databank, the Bankers' Association, the financial sector trade union (FINSEC), Government, and consumer groups.

Simply defined, Delphi is a collation of informed, intuitive judgments -- your judgments. Rather than bringing the participants together into a face to face situation, the survey will be conducted through a series of three questionnaires. In this way the basic rules of the technique will be preserved, that is, anonymity, controlled feedback and statistical group response. Anonymity eliminates the psychological deterrent of a dominant individual in a group & maintains the integrity of an individuals response. Feedback, which will be controlled by this researcher, decreases the possibility of entertaining irrelevant material throughout the experiment. A group median and quartile range will be computed to determine the degree of consensus on a particular point.

More than one questionnaire is necessary in order to carefully consider and refine group opinion. The first questionnaire will provide you with a list of events/items relating to customer interface technologies to the year 2010, and you will be asked to estimate when these items will occur using indexes, years and probability estimates. Also, a confidence/competence index will be included. Here it will only be necessary that you circle the appropriate score to evaluate in your own thinking your feeling of relative competency &/or confidence to respond to that particular item. In the second questionnaire, you will be fed back the medians and quartile ranges of the first questionnaire. Here again you will be asked to estimate when each item will occur. The medians and quartile ranges of the results of the second questionnaire will then be fed back to you in the third round. Again you will be asked to estimate when each item will occur. The median of that final group response should reflect the group's "feeling" for each item.

At this point, you have probably realised that there is no true or correct answer. Your own best effort, be it based on past experience, knowledge of trends, foresight, extrapolation and/or intuition, is most adequate. Your answers will remain confidential. The prerogative to change your response because of an afterthought will be open to you throughout the study. You are also encouraged to explain your answer, if desired. Please do not consult with other panel members in formulating your response and try to be as specific as possible in your judgments.

Appendix U

Consumer questionnaire (reduced)

Consumer Questionnaire

Introduction

Good morning/afternoon

This is Gerard Prendergast speaking and I am conducting research on behalf of the Marketing Department at Massey University. I'm doing a survey on peoples use of self-service machines such as soft drink vending machines. I would like to speak to the person living in your household who is eighteen years of age or over and having the next birthday.

Reintroduce Survey

Good morning/afternoon

This is Gerard Prendergast speaking and I am conducting research on behalf of the Marketing Department at Massey University. I'm doing a survey on peoples use of self-service machines. For example, soft drink vending machines, cigarette vending machines, cash dispensing machines. I wondered if you would mind answering a few simple questions for me. It will take about five minutes.

Questionnaire

Introduction

Computers are having an increasing impact on society. You may have seen self-service machines around the city - like cash machines or soft drink dispensing machines.

I am interested in self-service machines in the services industry. As far as machines go you could get banking advice, take out an insurance policy, or make travel bookings.

Now moving on to the questions.....

Q1. *Have you used any of the following banking technologies at least twice?*

Yes No

Automatic Telling Machine (that is, machines on the street which let you, among other things, withdraw cash from your account).

Col 1: 1 2

EFTPOS (this is 'electronic funds transfer at the point of sale', which enables you to pay for goods and services by the use of a plastic card which automatically deducts money from your cheque account. You may have seen this facility at supermarkets or petrol stations).

Col 2: 1 2

Telephone Banking (this is where you telephone the bank and your call is received by a computer, which then gives you the information you require)

Col 3: 1 2

EXPLAIN TECHNOLOGIES FURTHER IF NECESSARY

IF RESPONDENT ANSWERED YES TO ALL OF THE TECHNOLOGIES, GO TO Q3.

IF NO TO ANY, GO TO Q2.

Q2. *Are there any particular reasons why you have not used these technologies?*

PROBE UNTIL NO OTHER REASON

Automatic Telling Machines:

EFTPOS:

Telephone Banking:

Q3. *Assuming their continued availability, do you intend using any of the following technologies in the future?*

Automatic Telling Machines

Col 4: Yes 1
No 2

EFTPOS

Col 5: Yes 1
No 2

Telephone Banking

Col 6: Yes 1
No 2

IF YES OR NO, PROBE FULLY AS TO WHY

Automatic Telling Machines:

EFTPOS:

Telephone Banking:

Q4. I am about to read out a list of services which you may obtain at any bank. For each service please tell me whether you would prefer to go to a self-service machine, or a person in the bank. I want you to make the assumption that they are both available in the bank branch and ready to serve you, their service charges are the same the same, and that there are no queues at either. So tell me if you would prefer a machine or a person/staff member for the following.

	PM	PH
Making a travel enquiry	Col 7: 0	1
Making a travel booking	Col 8: 0	1
Loan Quotations	Col 9: 0	1
Loan Approval	Col 10: 0	1
Life insurance Quotation	Col 11: 0	1
Life Insurance Approval	Col 12: 0	1
Obtaining a balance on your cheque account	Col 13: 0	1
Withdrawing cash from your cheque account	Col 14: 0	1
Ordering a bank statement	Col 15: 0	1
Mortgage Quotations	Col 16: 0	1
Mortgage Approval	Col 17: 0	1

Q5. *It is possible that in the future more and more of the activities that you perform with a human teller will be able to be performed on a machine. In fact the day may well come when you wont have to visit a bank branch at all. Instead you will be able to perform all the tasks on a machine in the street, or possibly on the TV screen in your home. For example you could use a machine not only to perform the usual banking transactions, but also to apply for a loan, arrange travel, arrange insurance.*

What are your views on such developments, positive or negative? (PROBE UNTIL NO OTHER VIEWS).

Now I would like to ask you for some background information. This information will of course be strictly confidential.

Q6. Which of the following age groups contains your age?

- | | |
|---------------------|-----------|
| a) 15 - 19 years | Col 18: 1 |
| b) 20 - 29 years | 2 |
| c) 30 - 39 years | 3 |
| d) 40 - 49 years | 4 |
| e) 50 - 59 years | 5 |
| f) 60 years or more | 6 |

Q7. Which of the following income groups would best describe your households annual income before tax?

- | | |
|------------------------|-----------|
| a) less than \$9,999 | Col 19: 1 |
| b) \$10,000 - \$19,999 | 2 |
| c) \$20,000 - \$29,999 | 3 |
| d) \$30,000 - \$39,999 | 4 |
| e) \$40,000 - \$49,999 | 5 |
| f) \$50,000 - \$59,999 | 6 |
| g) \$60,000 - \$69,999 | 7 |
| h) \$70,000 or more | 8 |

Q8. Which of the following income groups would best describe your own personal annual income before tax?

- | | |
|------------------------|-----------|
| a) less than \$9,999 | Col 20: 1 |
| b) \$10,000 - \$19,999 | 2 |
| c) \$20,000 - \$29,999 | 3 |
| d) \$30,000 - \$39,999 | 4 |
| e) \$40,000 - \$49,999 | 5 |
| f) \$50,000 - \$59,999 | 6 |
| g) \$60,000 or more | 7 |

Q9. Now please tell me what your occupation is.
DO NOT READ.

- | | |
|---|----------|
| a) Professional, technical | Col 21 1 |
| b) Administrative, management | 2 |
| c) Clerical | 3 |
| d) Sales worker | 4 |
| e) Service worker | 5 |
| f) Agriculture, animal husbandry and forestry, fisher or hunter | 6 |
| g) Production, operators, labourers | 7 |
| f) Pensioner/Retired | 8 |
| g) Houseperson | 9 |
| h) Student | 10 |
| i) Out of work/Unemployed | 11 |
| j) Other (please specify) | 12 |

THANK YOU FOR YOUR HELP

CODE SEX:

Male Col 23: 1

Female 2

CODE AREA:

Palmerston Col 24: 1

Wellington 2

Appendix V

SPSSPC command file and frequency tables (reduced)

SPSS/PC+ The Statistical Package for IBM PC

9/2/91

SET BOXSTRING='-|+'.
 SET HIST='o'.
 SET BLOCK='O'.

SET MORE = OFF.

DATA LIST FILE 'b:TELEBANK' FIXED /

USEDTA 1
 USEDTE 2
 USEDTT 3
 FUTUSA 4
 FUTUSE 5
 FUTUST 6
 PREFTE 7
 PREFTB 8
 PREFLQ 9
 PREFLA 10
 PREFIQ 11
 PREFIA 12
 PREFBAL 13
 PREFWITH 14
 PREFBS 15
 PREFMQ 16
 PREFMA 17
 AGE 18
 HOUSEINC 19
 PERSINC 20
 JOB 21-22
 SEX 23
 AREA 24.

VARIABLE LABELS

USEDTA 'USED ATM'/
 USEDTE 'USED EFTPOS'/
 USEDTT 'USED TELEPHONE BANKING'/
 FUTUSA 'FUTURE USE OF ATM'/
 FUTUSE 'FUTURE USE OF EFTPOS'/
 FUTUST 'FUTURE USE OF TELEPHONE BANKING'/
 PREFTE 'PREFERENCE : TRAVEL ENQUIRY'/
 PREFTB 'PREFERENCE TRAVEL BOOKING'/
 PREFLQ 'PREFERENCE LOAN QUOTATIONS'/
 PREFLA 'PREFERENCE LOAN APPROVAL'/
 PREFIQ 'PREFERENCE LIFE INSURANCE QUOTION'/
 PREFIA 'PREFERENCE LIFE INSURANCE APPROVAL'/
 PREFBAL 'PREFERENCE OBTAINING A BALANCE:CHEQUE ACCOUNT'/
 PREFWITH 'PREFERENCE WITHDRAWING CASH FROM YOUR CHEQUE ACCOUNT'/
 PREFBS 'PREFERENCE ORDERING A BANK STATEMENT'/
 PREFMQ 'PREFERENCE MORTGAGE QUOTATIONS'/
 PREFMA 'PREFERENCE MORTGAGE APPROVAL'/
 AGE 'AGE OF THE RESPONDENTS'/
 HOUSEINC 'HOUSEHOLD ANNUAL INCOME BEFORE TAX'/
 PERSINC 'PERSONAL ANNUAL INCOME BEFORE TAX'/
 JOB 'OCCUPATION OF THE RESPONDENT'/
 SEX 'SEX OF THE RESPONDENT'/
 AREA 'AREA WHERE THE RESPONDENT BELONG TO'/.

VALUE LABELS

USEDTA TO FUTUST 1 'YES'
 2 'NO' /

```

PREFTE TO PREFMA 0 'PREFER MACHINE'
                  1 'PREFER HUMAN' /
AGE               1 '15-19 YEARS'
                  2 '20-29 YEARS'
                  3 '30-39 YEARS'
                  4 '40-49 YEARS'
                  5 '50-59 YEARS'
                  6 '60 YEARS OR MORE' /
HOUSEINC         1 'LESS THAN $9,999'
                  2 '$10,000-$19,999'
                  3 '$20,000-$29,999'
                  4 '$30,000-$39,999'
                  5 '$40,000-$49,999'
                  6 '$50,000-$59,999'
                  7 '$60,000-$69,999'
                  8 '$70,000 OR MORE' /
PERSINC          1 'LESS THAN $9,999'
                  2 '$10,000-$99,999'
                  3 '$20,000-$29,999'
                  4 '$30,000-$39,999'
                  5 '$40,000-$49,999'
                  6 '$50,000-$59,999'
                  7 '$60,000 OR MORE' /
JOB              1 'PROFESSIONAL, TECHNICAL'
                  2 'ADMINISTRATIVE, MANAGEMENT'
                  3 'CLERICAL'
                  4 'SALES WORKER'
                  5 'SERVICE WORKER'
                  6 'AGRICULTURE, ANIMAL HUS & FORESTRY'
                  7 'PRODUCTION, OPERATORS, LABOURERS'
                  8 'PENSIONER'
                  9 'HOUSEPERSON'
                  10 'STUDENT'
                  11 'UNEMPLOYED'
                  12 'OTHER' /
SEX              1 'MALE'
                  2 'FEMALE' /
AREA             1 'PALMERSTON'
                  2 'WELLINGTON' /

```

SAVE /OUTFILE 'B:sys1'.

The raw data or transformation pass is proceeding
 302 cases are written to the compressed active file.
 The SPSS/PC+ system file is written to
 file B:sys1

26 variables (including system variables) will be saved.
 0 variables have been dropped.

The system file consists of:

432 Characters for the header record.
 832 Characters for variable definition.
 1600 Characters for labels.
 12288 Characters for data.
 15152 Total file size.

302 out of 302 cases have been saved.

This procedure was completed at 14:36:22

FREQUENCIES /VARIABLES ALL.

***** Memory allows a total of 11247 Values, accumulated across all Variables.

There also may be up to 1406 Value Labels for each Variable.

USEDTA USED ATM

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
YES 67.2	1	203	67.2	67.2
NO 100.0	2	99	32.8	32.8
	Total	302	100.0	100.0
Valid cases	302	Missing cases	0	

USEDTE USED EFTPOS

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
YES 32.5	1	98	32.5	32.5
NO 100.0	2	204	67.5	67.5
	Total	302	100.0	100.0
Valid cases	302	Missing cases	0	

USEDTT USED TELEPHONE BANKING

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
YES 21.0	1	63	20.9	21.0
NO 100.0	2	237	78.5	79.0
	.	2	.7	Missing
	Total	302	100.0	100.0
Valid cases	300	Missing cases	2	

Page 10 SPSS/PC+
9/2/91

FUTUSA FUTURE USE OF ATM

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
YES 75.4	1	224	74.2	75.4
NO 100.0	2	73	24.2	24.6
	.	5	1.7	Missing
	Total	302	100.0	100.0
Valid cases	297	Missing cases	5	

Page 11 SPSS/PC+
9/2/91

FUTUSE FUTURE USE OF EFTPOS

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
YES 50.3	1	149	49.3	50.3
NO 100.0	2	147	48.7	49.7
	.	6	2.0	Missing
	Total	302	100.0	100.0
Valid cases	296	Missing cases	6	

Page 12 SPSS/PC+
9/2/91

FUTUST FUTURE USE OF TELEPHONE BANKING

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
YES 48.8	1	141	46.7	48.8
NO 100.0	2	148	49.0	51.2
	.	13	4.3	Missing
		-----	-----	-----
	Total	302	100.0	100.0
Valid cases	289	Missing cases	13	

Page 13 SPSS/PC+
9/2/91

PREFTE PREFERENCE : TRAVEL ENQUIRY

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 3.0	0	9	3.0	3.0
PREFER HUMAN 100.0	1	291	96.4	97.0
	.	2	.7	Missing
		-----	-----	-----
	Total	302	100.0	100.0
Valid cases	300	Missing cases	2	

Page 14 SPSS/PC+
9/2/91

PREFTB PREFERENCE TRAVEL BOOKING

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 5.7	0	17	5.6	5.7
PREFER HUMAN 100.0	1	283	93.7	94.3
	.	2	.7	Missing
		-----	-----	-----
	Total	302	100.0	100.0
Valid cases	300	Missing cases	2	

Page 15 SPSS/PC+
9/2/91

PREFLQ PREFERENCE LOAN QUOTATIONS

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 15.0	0	45	14.9	15.0
PREFER HUMAN 100.0	1	255	84.4	85.0
	.	2	.7	Missing
	Total	302	100.0	100.0
Valid cases	300	Missing cases	2	

Page 16
9/2/91

SPSS/PC+

PREFLA PREFERENCE LOAN APPROVAL

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 7.0	0	21	7.0	7.0
PREFER HUMAN 100.0	1	280	92.7	93.0
	.	1	.3	Missing
	Total	302	100.0	100.0
Valid cases	301	Missing cases	1	

Page 17
9/2/91

SPSS/PC+

PREFIQ PREFERENCE LIFE INSURANCE QUOTATION

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 17.5	0	52	17.2	17.5
PREFER HUMAN 100.0	1	245	81.1	82.5
	.	5	1.7	Missing
	Total	302	100.0	100.0
Valid cases	297	Missing cases	5	

Page 18
9/2/91

SPSS/PC+

PREFIA PREFERENCE LIFE INSURANCE APPROVAL

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 13.2	0	39	12.9	13.2
PREFER HUMAN 100.0	1	257	85.1	86.8
.	.	6	2.0	Missing
Total		302	100.0	100.0
Valid cases	296	Missing cases	6	

Page 19
9/2/91

SPSS/PC+

PREFBAL PREFERENCE OBTAINING A BALANCE:CHEQUE ACCCOUNT

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 63.6	0	185	61.3	63.6
PREFER HUMAN 100.0	1	106	35.1	36.4
.	.	11	3.6	Missing
Total		302	100.0	100.0
Valid cases	291	Missing cases	11	

Page 20
9/2/91

SPSS/PC+

PREFWITH PREFERENCE WITHDRAWING CASH FROM CHEQUE ACCOUNT

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 56.7	0	164	54.3	56.7
PREFER HUMAN 100.0	1	125	41.4	43.3
.	.	13	4.3	Missing
Total		302	100.0	100.0
Valid cases	289	Missing cases	13	

Page 21
9/2/91

SPSS/PC+

PREFBS PREFERENCE ORDERING A BANK STATEMENT

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 49.7	0	147	48.7	49.7
PREFER HUMAN 100.0	1	149	49.3	50.3
	.	6	2.0	Missing
	Total	302	100.0	100.0
Valid cases	296	Missing cases	6	

Page 22 SPSS/PC+
9/2/91

PREFMQ PREFERENCE MORTGAGE QUOTATIONS

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 12.1	0	36	11.9	12.1
PREFER HUMAN 100.0	1	261	86.4	87.9
	.	5	1.7	Missing
	Total	302	100.0	100.0
Valid cases	297	Missing cases	5	

Page 23 SPSS/PC+
9/2/91

PREFMA PREFERENCE MORTGAGE APPROVAL

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PREFER MACHINE 4.7	0	14	4.6	4.7
PREFER HUMAN 100.0	1	284	94.0	95.3
	.	4	1.3	Missing
	Total	302	100.0	100.0
Valid cases	298	Missing cases	4	

Page 24 SPSS/PC+
9/2/91

AGE AGE OF THE RESPONDENTS

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
15-19 YEARS 5.0	1	15	5.0	5.0
20-29 YEARS 27.8	2	69	22.8	22.8
30-39 YEARS 54.3	3	80	26.5	26.5
40-49 YEARS 73.2	4	57	18.9	18.9
50-59 YEARS 84.8	5	35	11.6	11.6
60 YEARS OR MORE 100.0	6	46	15.2	15.2
Valid cases	302	Total Missing cases	302 0	100.0 100.0

Page 25
9/2/91

SPSS/PC+

HOUSEINC HOUSEHOLD ANNUAL INCOME BEFORE TAX

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
LESS THAN \$9,999 2.4	1	7	2.3	2.4
\$10,000-\$19,999 15.3	2	37	12.3	12.9
\$20,000-\$29,999 31.7	3	47	15.6	16.4
\$30,000-\$39,999 49.5	4	51	16.9	17.8
\$40,000-\$49,999 61.0	5	33	10.9	11.5
\$50,000-\$59,999 71.4	6	30	9.9	10.5
\$60,000-\$69,999 82.9	7	33	10.9	11.5
\$70,000 OR MORE 99.7	8	48	15.9	16.7
100.0	9	1	.3	.3
	.	15	5.0	Missing
Valid cases	287	Total Missing cases	302 15	100.0 100.0

Page 26
9/2/91

SPSS/PC+

PERSINC PERSONAL ANNUAL INCOME BEFORE TAX

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
LESS THAN \$9,999 22.0	1	65	21.5	22.0
\$10,000-\$99,999 40.7	2	55	18.2	18.6
\$20,000-\$29,999 63.1	3	66	21.9	22.4
\$30,000-\$39,999 81.4	4	54	17.9	18.3
\$40,000-\$49,999 88.1	5	20	6.6	6.8
\$50,000-\$59,999 92.9	6	14	4.6	4.7
\$60,000 OR MORE 100.0	7	21	7.0	7.1
	.	7	2.3	Missing
Valid cases	295	Total 302	100.0	100.0
		Missing cases 7		

JOB OCCUPATION OF THE RESPONDENT

Cum Value Label Percent	Value	Frequency	Percent	Valid Percent
PROFESSIONAL, TECHNI 19.9	1	59	19.5	19.9
ADMINISTRATIVE, MANA 29.0	2	27	8.9	9.1
CLERICAL 35.7	3	20	6.6	6.7
SALES WORKER 39.4	4	11	3.6	3.7
SERVICE WORKER 48.1	5	26	8.6	8.8
AGRICULTURE, ANIMAL 49.5	6	4	1.3	1.3
PRODUCTION, OPERATOR 53.2	7	11	3.6	3.7
PENSIONER 68.7	8	46	15.2	15.5
HOUSEPERSON 79.5	9	32	10.6	10.8
STUDENT 87.2	10	23	7.6	7.7
UNEMPLOYED 89.6	11	7	2.3	2.4
OTHER 100.0	12	31	10.3	10.4
	.	5	1.7	Missing
Total		302	100.0	100.0

Valid cases 297 Missing cases 5

Page 28 SPSS/PC+
9/2/91

SEX SEX OF THE RESPONDENT

					Valid
Cum		Value	Frequency	Percent	Percent
Value Label					
Percent					
MALE		1	141	46.7	46.8
46.8					
FEMALE		2	160	53.0	53.2
100.0					
		.	1	.3	Missing
			-----	-----	-----
		Total	302	100.0	100.0
Valid cases	301	Missing cases	1		

Page 29 SPSS/PC+
9/2/91

AREA AREA WHERE THE RESPONDENT BELONG TO

					Valid
Cum		Value	Frequency	Percent	Percent
Value Label					
Percent					
PALMERSTON		1	150	49.7	49.8
49.8					
WELLINGTON		2	151	50.0	50.2
100.0					
		.	1	.3	Missing
			-----	-----	-----
		Total	302	100.0	100.0
Valid cases	301	Missing cases	1		

Page 30 SPSS/PC+
9/2/91

This procedure was completed at 14:37:22

Page 31 SPSS/PC+
9/2/91

Appendix W

SPSSPC Correlation and Chi² calculations (reduced)

Correlation Calculations

	AGE	HOUSEHOLD INCOME	PERSONAL INCOME
PAST ATM USE	.3500**	-.1235	-.1921**
PAST EFTPOS USE	.1146	-.0830	-.0841
PAST TELEPHONE BANKING USE	-.1079	.0097	-.0835
FUTURE ATM USE	.2910**	-.1893**	-.1592*
FUTURE EFTPOS USE	.1942**	-.0705	-.0918
FUTURE TELEPHONE BANKING USE	.0994	-.0009	-.0322

N of cases: 267 1-tailed Signif: * - .01 ** - .001

Chi² Calculations

USED ATM by AGE OF THE RESPONDENTS

Page 1 of 2

Count	AGE					Row Total
	15-19 ARS	20-29 YE ARS	30-39 YE ARS	40-49 YE ARS	50-59 YE ARS	
1	10	62	59	36	16	203
2	5	7	21	21	19	99
Column Total	15	69	80	57	35	302
(Continued) Total	5.0	22.8	26.5	18.9	11.6	100.0

Page 2 of 2

Count	60 YEARS OR MORE	Row Total
1	20	203
2	26	99
Column Total	46	302
Total	15.2	100.0

	Value	DF	Significance
Chi ²	37.13351	5	.00000
Likelihood Ratio	39.33085	5	.00000
Mantel-Haenszel test for linear association	29.98756	1	.00000
Minimum Expected Frequency -	4.917		
Cells with Expected Frequency < 5 -	1 OF	12 (8.3%)	

Number of Missing Observations: 0

USED ATM by HOUSEHOLD ANNUAL INCOME BEFORE TAX

	Count	HOUSEINC					Row Total
		LESS THAN \$9,999 1	\$10,000-\$19,999 2	\$20,000-\$29,999 3	\$30,000-\$39,999 4	\$40,000-\$49,999 5	
USEDTA							
YES	1	3	21	31	36	26	196 68.3
NO	2	4	16	16	15	7	91 31.7
(Continued)	Column Total	7 2.4	37 12.9	47 16.4	51 17.8	33 11.5	287 100.0

	Count					Row Total
		\$50,000-\$59,999 6	\$60,000-\$69,999 7	\$70,000 OR MORE 8	9	
USEDTA						
YES	1	21	19	38	1	196 68.3
NO	2	9	14	10		91 31.7
	Column Total	30 10.5	33 11.5	48 16.7	1 .3	287 100.0

	Value	DF	Significance
Chi ²	11.16260	8	.19266
Likelihood Ratio	11.42253	8	.17889
Mantel-Haenszel test for linear association	3.50311	1	.06125
Minimum Expected Frequency -	.317		
Cells with Expected Frequency < 5 -	4 OF	18 (22.2%)	

Number of Missing Observations: 15

USED ATM by PERSONAL ANNUAL INCOME BEFORE TAX

Page 1 of 2

	Count	PERSINC					Row Total
		LESS THAN \$9,999	\$10,000-\$29,999	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	
		1	2	3	4	5	
USEDATA							
YES	1	36	33	43	41	17	199 67.5
NO	2	29	22	23	13	3	96 32.5
(Continued)	Column Total	65 22.0	55 18.6	66 22.4	54 18.3	20 6.8	295 100.0

Page 2 of 2

	Count	PERSINC		Row Total
		\$50,000-\$59,999	\$60,000 OR MORE	
		6	7	
USEDATA				
YES	1	13	16	199 67.5
NO	2	1	5	96 32.5
	Column Total	14 4.7	21 7.1	295 100.0

	Value	DF	Significance
Chi ²	15.28071	6	.01818
Likeood Ratio	16.72700	6	.01034
Mantel-Haenszel test for linear association	12.21197	1	.00048
Minimum Expected Frequency -	4.556		
Cells with Expected Frequency < 5 -		1 OF 14 (7.1%)	

Number of Missing Observations: 7

USED ATM by OCCUPATION OF THE RESPONDENT

Page 1 of 3

USEDATA	Count	JOB					Row Total
		PROFESSI ONAL, TE	ADMINIST RATIVE,	CLERICAL	SALES WO RKER	SERVICE WORKER	
1	1	48	16	16	6	18	199
YES							67.0
2	2	11	11	4	5	8	98
NO							33.0
(Continued)	Column Total	59	27	20	11	26	297
		19.9	9.1	6.7	3.7	8.8	100.0

Page 2 of 3

USEDATA	Count	JOB					Row Total
		AGRICULT URE, ANI	PRODUCTI ON, OPER	PENSIONE R	HOUSEPER SON	STUDENT	
1	1	1	11	24	14	19	199
YES							67.0
2	2	3		22	18	4	98
NO							33.0
(Continued)	Column Total	4	11	46	32	23	297
		1.3	3.7	15.5	10.8	7.7	100.0

Page 3 of 3

USEDATA	Count	JOB		Row Total
		UNEMPLOY ED	OTHER	
1	1	5	21	199
YES				67.0
2	2	2	10	98
NO				33.0
	Column Total	7	31	297
		2.4	10.4	100.0

	Value	DF	Significance
Chi ²	32.20212	11	.00071
Likelihood Ratio	35.50160	11	.00020
Mantel-Haenszel test for linear association	3.13401	1	.07667
Minimum Expected Frequency -	1.320		
Cells with Expected Frequency < 5 -	6 OF	24 (25.0%)	

Number of Missing Observations: 5

USED ATM by SEX

Count	SEX		Row Total
	MALE	FEMALE	
USEDATA	1	2	
YES	104	98	202
NO	37	62	99
Column Total	141	160	301
	46.8	53.2	100.0

	Value	DF	Significance
Chi ²	5.31318	1	.02116
Continuity Correction	4.76158	1	.02910
Likelihood Ratio	5.36012	1	.02060
Mantel-Haenszel test for linear association	5.29553	1	.02138
Minimum Expected Frequency -	46.375		

Number of Missing Observations: 1

USED ATM by AREA

Count	AREA		Row Total
	PALMERST ON	WELLINGT ON	
USEDATA	1	2	
YES	85	117	202
NO	65	34	99
Column Total	150	151	301
	49.8	50.2	100.0

	Value	DF	Significance
Chi ²	14.77322	1	.00012
Continuity Correction	13.84517	1	.00020
Likelihood Ratio	14.95967	1	.00011
Mantel-Haenszel test for linear association	14.72414	1	.00012
Minimum Expected Frequency -	49.336		

Number of Missing Observations: 1

USED EFTPOS by AGE

USEDTE	Count	AGE					Row Total
		15-19 ARS	20-29 YE	30-39 YE	40-49 YE	50-59 YE	
1	2	33	24	19	10	98	
YES						32.5	
2	13	36	56	38	25	204	
NO						67.5	
Column Total	15	69	80	57	35	302	
(Continued)	5.0	22.8	26.5	18.9	11.6	100.0	

USEDTE	Count	AGE	Row Total
		60 YEARS OR MORE	
1	10	6	98
YES			32.5
2	36		204
NO			67.5
Column Total	46		302
	15.2		100.0

	Value	DF	Significance
Chi ²	12.82997	5	.02503
Likelihood Ratio	12.99756	5	.02340
Mantel-Haenszel test for linear association	3.35148	1	.06714
Minimum Expected Frequency -	4.868		
Cells with Expected Frequency < 5 -	1 OF	12 (8.3%)	

Number of Missing Observations: 0

USED EFTPOS by HOUSEHOLD ANNUAL INCOME BEFORE TAX

Page 1 of 2

USEDTE	Count	HOUSEINC					Row Total
		LESS THAN \$9,999	\$10,000-\$19,999	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	
1	1	1	9	12	20	10	94
YES							32.8
2		6	28	35	31	23	193
NO							67.2
(Continued)	Column Total	7	37	47	51	33	287
		2.4	12.9	16.4	17.8	11.5	100.0

Page 2 of 2

USEDTE	Count	HOUSEINC				Row Total
		\$50,000-\$59,999	\$60,000-\$69,999	\$70,000 OR MORE	9	
1	1	13	12	17		94
YES						32.8
2		17	21	31	1	193
NO						67.2
	Column Total	30	33	48	1	287
		10.5	11.5	16.7	.3	100.0

	Value	DF	Significance
Chi ²	6.80883	8	.55739
Likelihood Ratio	7.29784	8	.50486
Mantel-Haenszel test for linear association	2.39232	1	.12193
Minimum Expected Frequency -	.328		
Cells with Expected Frequency < 5 -	4 OF	18 (22.2%)	

Number of Missing Observations: 15

Page 1 of 2

USEDTE	Count	PERSINC					Row Total
		LESS THAN \$9,999 1	\$10,000-\$99,999 2	\$20,000-\$29,999 3	\$30,000-\$39,999 4	\$40,000-\$49,999 5	
YES	1	19	16	18	21	9	96 32.5
NO	2	46	39	48	33	11	199 67.5
(Continued)	Column Total	65 22.0	55 18.6	66 22.4	54 18.3	20 6.8	295 100.0

Page 2 of 2

USEDTE	Count	PERSINC		Row Total
		\$50,000-\$59,999 6	\$60,000 OR MORE 7	
YES	1	6	7	96 32.5
NO	2	8	14	199 67.5
	Column Total	14 4.7	21 7.1	295 100.0

	Value	DF	Significance
Chi	4.54728	6	.60304
Likelihood Ratio	4.45546	6	.61529
Mantel-Haenszel test for linear association	1.92519	1	.16529
Minimum Expected Frequency -	4.556		
Cells with Expected Frequency < 5 -		1 OF	14 (7.1%)

Number of Missing Observations: 7

USED EFTPOS by OCCUPATION OF THE RESPONDENT

Page 1 of 3

USEDTE	Count	JOB					Row Total
		PROFESSI ONAL, TE 1	ADMINIST RATIVE, 2	CLERICAL 3	SALES RKER 4	WO SERVICE WORKER 5	
YES	1	22	11	7	2	9	97 32.7
NO	2	37	16	13	9	17	200 67.3
(Continued)	Column Total	59 19.9	27 9.1	20 6.7	11 3.7	26 8.8	297 100.0

Page 2 of 3

USEDTE	Count	JOB					Row Total
		AGRICULT URE, ANI 6	PRODUCTI ON, OPER 7	PENSIONE R 8	HOUSEPER SON 9	STUDENT 10	
YES	1		5	10	11	8	97 32.7
NO	2	4	6	36	21	15	200 67.3
(Continued)	Column Total	4 1.3	11 3.7	46 15.5	32 10.8	23 7.7	297 100.0

Page 3 of 3

USEDTE	Count	JOB		Row Total
		UNEMPLOY ED 11	OTHER 12	
YES	1	3	9	97 32.7
NO	2	4	22	200 67.3
(Continued)	Column Total	7 2.4	31 10.4	297 100.0

	Value	DF	Significance
Chi ²	8.37928	11	.67898
Likelihood Ratio	9.80730	11	.54780
Mantel-Haenszel test for linear association	.90657	1	.34103
Minimum Expected Frequency -	1.306		
Cells with Expected Frequency < 5 -	6 OF	24 (25.0%)	

Number of Missing Observations: 5

USED EFTPOS by SEX OF THE RESPONDENT

Page 1 of 1

Count	SEX		Row Total
	MALE	FEMALE	
	1	2	
USEDTE	-----		
1	52	45	97
YES	-----		
2	89	115	204
NO	-----		
Column Total	141	160	301
	46.8	53.2	100.0

	Value	DF	Significance
Chi ²	2.63002	1	.10486
Continuity Correction	2.24447	1	.13409
Likelihood Ratio	2.62822	1	.10498
Mantel-Haenszel test for linear association	2.62129	1	.10544
Minimum Expected Frequency -	45.439		

Number of Missing Observations: 1

USED EFTPOS by AREA

Page 1 of 1

Count	AREA		Row Total
	PALMERST ON	WELLINGT ON	
	1	2	
USEDTE	-----		
1	41	56	97
YES	-----		
2	109	95	204
NO	-----		
Column Total	150	151	301
	49.8	50.2	100.0

	Value	DF	Significance
Chi ²	3.27709	1	.07025
Continuity Correction	2.84576	1	.09162
Likelihood Ratio	3.28713	1	.06983
Mantel-Haenszel test for linear association	3.26620	1	.07072
Minimum Expected Frequency -	48.339		

Number of Missing Observations: 1

USED TELEPHONE BANKING by AGE OF THE RESPONDENTS

	Count	AGE					Row Total
		15-19 ARS	20-29 YE	30-39 ARS	40-49 YE	50-59 ARS	
USEDTT		1	2	3	4	5	
YES	1	1	13	16	11	9	63 21.0
NO	2	13	56	64	46	25	237 79.0
(Continued)	Column Total	14 4.7	69 23.0	80 26.7	57 19.0	34 11.3	300 100.0

	Count	AGE	Row Total
		60 YEARS OR MORE 6	
USEDTT			
YES	1	13	63 21.0
NO	2	33	237 79.0
	Column Total	46 15.3	300 100.0

	Value	DF	Significance
Chi ²	4.03723	5	.54407
Likelihood Ratio	4.33143	5	.50275
Mantel-Haenszel test for linear association	3.08815	1	.07886
Minimum Expected Frequency -	2.940		
Cells with Expected Frequency < 5 -	1 OF	12 (8.3%)	

Number of Missing Observations: 2

USED TELEPHONE BANKING
by HOUSEHOLD ANNUAL INCOME BEFORE TAX

Page 1 of 2

	Count	HOUSEINC					Row Total
		LESS THAN \$9,999 1	\$10,000-\$19,999 2	\$20,000-\$29,999 3	\$30,000-\$39,999 4	\$40,000-\$49,999 5	
USEDTT							
YES	1	2	8	13	7	4	59 20.6
NO	2	5	29	34	44	29	227 79.4
(Continued)	Column Total	7 2.4	37 12.9	47 16.4	51 17.8	33 11.5	286 100.0

Page 2 of 2

	Count	HOUSEINC				Row Total
		\$50,000-\$59,999 6	\$60,000-\$69,999 7	\$70,000 OR MORE 8	9	
USEDTT						
YES	1	4	9	12		59 20.6
NO	2	26	24	35	1	227 79.4
	Column Total	30 10.5	33 11.5	47 16.4	1 .3	286 100.0

	Value	DF	Significance
Chi ²	7.46880	8	.48700
Likelihood Ratio	7.90257	8	.44304
Mantel-Haenszel test for linear association	.01666	1	.89731
Minimum Expected Frequency -	.206		
Cells with Expected Frequency < 5 -	3 OF	18 (16.7%)	

Number of Missing Observations: 16

USED TELEPHONE BANKING by PERSONAL ANNUAL INCOME BEFORE TAX

		PERSINC					Page 1 of 2
Count		LESS THA N \$9,999	\$10,000- \$99,999	\$20,000- \$29,999	\$30,000- \$39,999	\$40,000- \$49,999	Row Total
		1	2	3	4	5	
USEDTT	1	11	11	12	12	6	61
YES							20.8
	2	53	43	54	42	14	232
NO							79.2
	Column Total	64	54	66	54	20	293
(Continued)		21.8	18.4	22.5	18.4	6.8	100.0

		PERSINC		Page 2 of 2
Count		\$50,000- \$59,999	\$60,000 OR MORE	Row Total
		6	7	
USEDTT	1	1	8	61
YES				20.8
	2	13	13	232
NO				79.2
	Column Total	14	21	293
		4.8	7.2	100.0

	Value	DF	Significance
Chi ²	7.27484	6	.29618
Likelihood Ratio	7.09828	6	.31185
Mantel-Haenszel test for linear association	2.19528	1	.13843
Minimum Expected Frequency -	2.915		
Cells with Expected Frequency < 5 -	3 OF	14 (21.4%)	

Number of Missing Observations: 9

USED TELEPHONE BANKING by OCCUPATION OF THE RESPONDENT

Page 1 of 3

USEDTT	Count	JOB					Row Total
		PROFESSI ONAL, 1	ADMINIST RATIVE, 2	CLERICAL 3	SALES RKER 4	WO SERVICE WORKER 5	
YES	1	13	6	5		7	62 21.0
NO	2	46	21	15	11	19	233 79.0
(Continued)	Column Total	59 20.0	27 9.2	20 6.8	11 3.7	26 8.8	295 100.0

Page 2 of 3

USEDTT	Count	JOB					Row Total
		AGRICULT URE, 6	PRODUCTI ON, 7	PENSIONE OPER R 8	HOUSEPER SON 9	STUDENT 10	
YES	1			15	7	3	62 21.0
NO	2	4	10	31	25	19	233 79.0
(Continued)	Column Total	4 1.4	10 3.4	46 15.6	32 10.8	22 7.5	295 100.0

Page 3 of 3

USEDTT	Count	JOB		Row Total
		UNEMPLOY ED 11	OTHER 12	
YES	1	1	5	62 21.0
NO	2	6	26	233 79.0
	Column Total	7 2.4	31 10.5	295 100.0

	Value	DF	Significance
Chi ²	12.54713	11	.32395
Likelihood Ratio	17.38822	11	.09691
Mantel-Haenszel test for linear association	.20730	1	.64889
Minimum Expected Frequency -	.841		
Cells with Expected Frequency < 5 -	7 OF	24 (29.2%)	

Number of Missing Observations: 7

USED TELEPHONE BANKING by SEX OF THE RESPONDENT

Page 1 of 1

Count	SEX		Row Total
	MALE	FEMALE	
USEDTT	1	2	
YES	29	34	63
NO	111	125	236
Column Total	140	159	299
	46.8	53.2	100.0

	Value	DF	Significance
Chi ²	.02006	1	.88738
Continuity Correction	.00000	1	1.00000
Likelihood Ratio	.02007	1	.88735
Mantel-Haenszel test for linear association	.01999	1	.88757
Minimum Expected Frequency -	29.498		

Number of Missing Observations: 3

USED TELEPHONE BANKING by AREA

Page 1 of 1

Count	AREA		Row Total
	PALMERSTON	WELLINGT	
USEDTT	1	2	
YES	28	35	63
NO	120	116	236
Column Total	148	151	299
	49.5	50.5	100.0

	Value	DF	Significance
Chi ²	.81556	1	.36648
Continuity Correction	.57952	1	.44650
Likelihood Ratio	.81707	1	.36604
Mantel-Haenszel test for linear association	.81283	1	.36729
Minimum Expected Frequency -	31.184		

Number of Missing Observations: 3

FUTURE USE OF ATM by AGE

Count	AGE					Row Total
	15-19 ARS	20-29 YE	30-39 YE	40-49 YE	50-59 YE	
FUTUSA	1	13	59	65	41	224
YES						75.4
FUTUSA	2	1	9	14	14	73
NO						24.6
Column Total	14	68	79	55	35	297
(Continued)	4.7	22.9	26.6	18.5	11.8	100.0

SPSS/PC+

FUTUSA FUTURE USE OF ATM by AGE OF THE RESPONDENTS

Count	AGE	Row Total
	60 YEARS OR MORE 6	
FUTUSA	1	224
YES		75.4
FUTUSA	2	73
NO		24.6
Column Total	46	297
	15.5	100.0

	Value	DF	Significance
Chi ²	28.82423	5	.00003
Likelihood Ratio	27.42829	5	.00005
Mantel-Haenszel test for linear association	26.33629	1	.00000
Minimum Expected Frequency -	3.441		
Cells with Expected Frequency < 5 -	1 OF 12 (8.3%)		

Number of Missing Observations: 5

FUTURE USE OF ATM by HOUSEHOLD ANNUAL INCOME BEFORE TAX

Page 1 of 2

Count	HOUSEINC					Row Total
	LESS THAN \$9,999 1	\$10,000-\$19,999 2	\$20,000-\$29,999 3	\$30,000-\$39,999 4	\$40,000-\$49,999 5	
FUTUSA	-----					
1 YES	4	21	34	39	25	213 75.5
2 NO	3	16	11	10	8	69 24.5
Column Total	7	37	45	49	33	282
(Continued)	2.5	13.1	16.0	17.4	11.7	100.0

FUTUSA FUTURE USE OF ATM by HOUSEINC HOUSEHOLD ANNUAL INCOME BEFORE TAX

Page 2 of 2

Count	HOUSEINC				Row Total
	\$50,000-\$59,999 6	\$60,000-\$69,999 7	\$70,000 OR MORE 8	9	
FUTUSA	-----				
1 YES	23	25	41	1	213 75.5
2 NO	7	8	6		69 24.5
Column Total	30	33	47	1	282
Total	10.6	11.7	16.7	.4	100.0

	Value	DF	Significance
Chi ²	12.60436	8	.12621
Likelihood Ratio	12.39478	8	.13444
Mantel-Haenszel test for linear association	7.46915	1	.00628
Minimum Expected Frequency -	.245		
Cells with Expected Frequency < 5 -	3 OF	18 (16.7%)	

Number of Missing Observations: 20

FUTURE USE OF ATM by PERSONAL ANNUAL INCOME BEFORE TAX

Page 1 of 2

Count	PERSINC					Row Total	
	LESS THAN \$9,999 1	\$10,000-\$99,999 2	\$20,000-\$29,999 3	\$30,000-\$39,999 4	\$40,000-\$49,999 5		
FUTUSA	-----						
YES	1	44	37	48	42	18	219 75.5
NO	2	18	16	18	12	2	71 24.5
Column Total	-----						
(Continued)		62	53	66	54	20	290 100.0
		21.4	18.3	22.8	18.6	6.9	

Page 2 of 2

Count	PERSINC		Row Total	
	\$50,000-\$59,999 6	\$60,000 OR MORE 7		
FUTUSA	-----			
YES	1	12	18	219 75.5
NO	2	2	3	71 24.5
Column Total	-----			
	14	21	290	100.0
	4.8	7.2		

	Value	DF	Significance
Chi ²	6.29184	6	.39130
Likelihood Ratio	6.92872	6	.32749
Mantel-Haenszel test for linear association	4.92526	1	.02647
Minimum Expected Frequency -	3.428		
Cells with Expected Frequency < 5 -	2 OF	14 (14.3%)	

Number of Missing Observations: 12

FUTURE USE OF ATM by OCCUPATION OF THE RESPONDENT

FUTUSA	Count	JOB					Row Total
		PROFESSIONAL, TECHNICAL	ADMINISTRATIVE	CLERICAL	SALES WORKER	WORKER	
1	52	19	18	5	20	221	
2	7	7	2	4	6	72	
Column Total	59	26	20	9	26	293	
(Continued)		20.1	8.9	6.8	3.1	8.9	100.0

FUTUSA	Count	JOB					Row Total
		AGRICULTURE, ANIMAL	PRODUCTIVE, OPERATOR	PENSIONER	HOUSEPERSON	STUDENT	
1	3	11	28	16	22	221	
2	1		18	15	1	72	
Column Total	4	11	46	31	23	293	
(Continued)		1.4	3.8	15.7	10.6	7.8	100.0

FUTUSA	Count	JOB		Row Total
		UNEMPLOYED	OTHER	
1	7	20		221
2		11		72
Column Total	7	31		293
		2.4	10.6	100.0

	Value	DF	Significance
Chi ²	37.13504	11	.00011
Likelihood Ratio	42.45634	11	.00001
Mantel-Haenszel test for linear association	5.57821	1	.01819
Minimum Expected Frequency -	.983		
Cells with Expected Frequency < 5 -	6 OF	24 (25.0%)	

Number of Missing Observations: 9

FUTURE USE OF ATM by SEX OF THE RESPONDENT

Page 1 of 1

Count	SEX		Row Total
	MALE	FEMALE	
	1	2	
FUTUSA	-----		
1	116	107	223
YES	-----		
2	25	48	73
NO	-----		
Column Total	141	155	296
	47.6	52.4	100.0

	Value	DF	Significance
Chi ²	6.96322	1	.00832
Continuity Correction	6.26899	1	.01229
Likelihood Ratio	7.07242	1	.00783
Mantel-Haenszel test for linear association	6.93969	1	.00843
Minimum Expected Frequency -	34.774		

Number of Missing Observations: 6

FUTURE USE OF ATM by AREA

Page 1 of 1

Count	AREA		Row Total
	PALMERST ON	WELLINGT ON	
	1	2	
FUTUSA	-----		
1	96	127	223
YES	-----		
2	51	22	73
NO	-----		
Column Total	147	149	296
	49.7	50.3	100.0

	Value	DF	Significance
Chi ²	15.81717	1	.00007
Continuity Correction	14.76276	1	.00012
Likelihood Ratio	16.15436	1	.00006
Mantel-Haenszel test for linear association	15.76374	1	.00007
Minimum Expected Frequency -	36.253		

Number of Missing Observations: 6

FUTURE USE OF EFTPOS by AGE

FUTUSE	Count	AGE					Row Total
		15-19 ARS	20-29 ARS	30-39 ARS	40-49 ARS	50-59 ARS	
YES	1	11	41	42	25	14	149 50.3
NO	2	4	27	35	31	21	147 49.7
(Continued)	Column Total	15 5.1	68 23.0	77 26.0	56 18.9	35 11.8	296 100.0

FUTUSE	Count	AGE	Row Total
		60 YEARS OR MORE 6	
YES	1	16	149 50.3
NO	2	29	147 49.7
	Column Total	45 15.2	296 100.0

	Value	DF	Significance
Chi ²	12.57086	5	.02775
Likelihood Ratio	12.78696	5	.02546
Mantel-Haenszel test for linear association	12.10184	1	.00050
Minimum Expected Frequency -	7.449		

Number of Missing Observations: 6

FUTURE USE OF EFTPOS by HOUSEHOLD ANNUAL INCOME BEFORE TAX

Page 1 of 2

FUTUSE	Count	HOUSEINC					Row Total
		LESS THAN \$9,999 1	\$10,000-\$19,999 2	\$20,000-\$29,999 3	\$30,000-\$39,999 4	\$40,000-\$49,999 5	
YES	1	4	16	18	27	16	143 50.9
NO	2	3	20	27	22	17	138 49.1
(Continued)	Column Total	7 2.5	36 12.8	45 16.0	49 17.4	33 11.7	281 100.0

Page 2 of 2

FUTUSE	Count	HOUSEINC				Row Total
		\$50,000-\$59,999 6	\$60,000-\$69,999 7	\$70,000 OR MORE 8	9	
YES	1	18	18	26		143 50.9
NO	2	12	15	21	1	138 49.1
	Column Total	30 10.7	33 11.7	47 16.7	1 .4	281 100.0

	Value	DF	Significance
Chi ²	5.84533	8	.66455
Likelihood Ratio	6.25379	8	.61883
Mantel-Haenszel test for linear association	1.57158	1	.20998
Minimum Expected Frequency -	.491		
Cells with Expected Frequency < 5 -	4 OF	18 (22.2%)	

Number of Missing Observations: 21

FUTURE USE OF EFTPOS by PERSONAL ANNUAL INCOME BEFORE TAX

		PERSINC					Page 1 of 2
Count		LESS THAN \$9,999	\$10,000-\$99,999	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	Row Total
		1	2	3	4	5	
FUTUSE	1	31	26	27	33	11	147
YES							50.9
	2	32	27	39	20	9	142
NO							49.1
	Column Total	63	53	66	53	20	289
(Continued)	Total	21.8	18.3	22.8	18.3	6.9	100.0

		PERSINC		Page 2 of 2
Count		\$50,000-\$59,999	\$60,000 OR MORE	Row Total
		6	7	
FUTUSE	1	7	12	147
YES				50.9
	2	6	9	142
NO				49.1
	Column Total	13	21	289
	Total	4.5	7.3	100.0

	Value	DF	Significance
Chi ²	6.02603	6	.42028
Likelihood Ratio	6.07106	6	.41528
Mantel-Haenszel test for linear association	1.32790	1	.24918
Minimum Expected Frequency -	6.388		

Number of Missing Observations: 13

FUTURE USE OF EFTPOS by OCCUPATION OF THE RESPONDENT

Page 1 of 3

FUTURE USE	Count	JOB					Row Total
		PROFESSIONAL, TECHNICAL, 1	ADMINISTRATIVE, 2	CLERICAL, 3	SALES WORKER, 4	SERVICE WORKER, 5	
YES	1	34	13	11	4	11	147 50.5
NO	2	24	14	9	6	14	144 49.5
(Continued)	Column Total	58 19.9	27 9.3	20 6.9	10 3.4	25 8.6	291 100.0

Page 2 of 3

FUTURE USE	Count	JOB					Row Total
		AGRICULTURE, 6	INDUSTRIAL, MANUFACTURING, 7	PENSIONER, 8	HOUSEPARENT, 9	STUDENT, 10	
YES	1		5	18	14	18	147 50.5
NO	2	4	6	27	16	5	144 49.5
(Continued)	Column Total	4 1.4	11 3.8	45 15.5	30 10.3	23 7.9	291 100.0

Page 3 of 3

FUTURE USE	Count	JOB		Row Total
		UNEMPLOYED, 11	OTHER, 12	
YES	1	5	14	147 50.5
NO	2	2	17	144 49.5
(Continued)	Column Total	7 2.4	31 10.7	291 100.0

	Value	DF	Significance
Chi ²	17.64023	11	.09031
Likelihood Ratio	19.70351	11	.04958
Mantel-Haenszel test for linear association	.10359	1	.74756
Minimum Expected Frequency -	1.979		
Cells with Expected Frequency < 5 -	5 OF	24 (20.8%)	

Number of Missing Observations: 11

FUTURE USE OF EFTPOS by SEX

Count	SEX		Row Total
	MALE	FEMALE	
	1	2	
FUTUSE	-----		
1	77	71	148
YES	-----		
2	62	85	147
NO	-----		
Column Total	139	156	295
	47.1	52.9	100.0

	Value	DF	Significance
Chi ²	2.87176	1	.09015
Continuity Correction	2.49004	1	.11457
Likelihood Ratio	2.87658	1	.08988
Mantel-Haenszel test for linear association	2.86202	1	.09069
Minimum Expected Frequency -	69.264		

Number of Missing Observations: 7

FUTURE USE OF EFTPOS by AREA

Count	AREA		Row Total
	PALMERST ON	WELLINGT ON	
	1	2	
FUTUSE	-----		
1	60	88	148
YES	-----		
2	87	60	147
NO	-----		
Column Total	147	148	295
	49.8	50.2	100.0

	Value	DF	Significance
Chi ²	10.25321	1	.00136
Continuity Correction	9.52103	1	.00203
Likelihood Ratio	10.31342	1	.00132
Mantel-Haenszel test for linear association	10.21845	1	.00139
Minimum Expected Frequency -	73.251		

Number of Missing Observations: 7

FUTURE USE OF TELEPHONE BANKING by AGE

Page 1 of 2

Count	AGE					Row Total
	15-19 ARS	20-29 YE	30-39 YE	40-49 YE	50-59 YE	
FUTUST						
1	10	32	47	22	13	141
YES						48.8
2	5	33	32	32	19	148
NO						51.2
Column Total	15	65	79	54	32	289
(Continued)	5.2	22.5	27.3	18.7	11.1	100.0

Page 2 of 2

Count	AGE	Row Total
	60 YEARS OR MORE 6	
1	17	141
YES		48.8
2	27	148
NO		51.2
Column Total	44	289
	15.2	100.0

	Value	DF	Significance
Chi ²	9.61583	5	.08688
Likelihood Ratio	9.69727	5	.08428
Mantel-Haenszel test for linear association	5.27151	1	.02168
Minimum Expected Frequency -	7.318		

Number of Missing Observations: 13

FUTURE USE OF TELEPHONE BANKING
by HOUSEHOLD ANNUAL INCOME BEFORE TAX

Page 1 of 2

	Count	HOUSEINC					Row Total
		LESS THAN \$9,999	\$10,000-\$19,999	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	
FUTUST		1	2	3	4	5	
1		3	13	26	22	17	135
YES							48.9
2		3	22	19	26	16	141
NO							51.1
Column Total		6	35	45	48	33	276
(Continued)		2.2	12.7	16.3	17.4	12.0	100.0

Page 2 of 2

	Count	HOUSEINC				Row Total
		\$50,000-\$59,999	\$60,000-\$69,999	\$70,000 OR MORE	9	
FUTUST		6	7	8		
1		12	19	23		135
YES						48.9
2		16	14	24	1	141
NO						51.1
Column Total		28	33	47	1	276
Total		10.1	12.0	17.0	.4	100.0

	Value	DF	Significance
Chi ²	5.98949	8	.64841
Likelihood Ratio	6.40885	8	.60153
Mantel-Haenszel test for linear association	.19119	1	.66193
Minimum Expected Frequency -	.489		
Cells with Expected Frequency < 5 -	4 OF	18 (22.2%)	

Number of Missing Observations: 26

FUTURE USE OF TELEPHONE BANKING
by PERSONAL ANNUAL INCOME BEFORE TAX

Page 1 of 2

Count	PERSINC					Row Total
	LESS THAN \$9,999	\$10,000-\$19,999	\$20,000-\$29,999	\$30,000-\$39,999	\$40,000-\$49,999	
FUTUST	-----					
1	36	17	31	23	14	138
YES	-----					48.9
2	28	33	34	27	6	144
NO	-----					51.1
Column Total	64	50	65	50	20	282
(Continued) Total	22.7	17.7	23.0	17.7	7.1	100.0

Page 2 of 2

Count	PERSINC		Row Total
	\$50,000-\$59,999	\$60,000 OR MORE	
FUTUST	-----		
1	6	11	138
YES	-----		48.9
2	7	9	144
NO	-----		51.1
Column Total	13	20	282
Total	4.6	7.1	100.0

	Value	DF	Significance
Chi ²	9.93222	6	.12754
Likelihood Ratio	10.11363	6	.11995
Mantel-Haenszel test for linear association	.35752	1	.54989
Minimum Expected Frequency -	6.362		

Number of Missing Observations: 20

FUTURE USE OF TELEPHONE BANKING by OCCUPATION

Page 1 of 3

FUTUST	Count	JOB					Row Total
		PROFESSI ONAL, TE 1	ADMINIST RATIVE, 2	CLERICAL 3	SALES RKER 4	WO SERVICE WORKER 5	
YES	1	31	11	14	4	12	141 49.3
NO	2	27	16	6	6	12	145 50.7
(Continued)	Column Total	58 20.3	27 9.4	20 7.0	10 3.5	24 8.4	286 100.0

Page 2 of 3

FUTUST	Count	JOB					Row Total
		AGRICULT URE, ANI 6	PRODUCTI ON, OPER 7	PENSIO R 8	HOUSEPER SON 9	STUDENT 10	
YES	1	1	2	19	18	14	141 49.3
NO	2	2	7	27	14	8	145 50.7
(Continued)	Column Total	3 1.0	9 3.1	46 16.1	32 11.2	22 7.7	286 100.0

Page 3 of 3

FUTUST	Count	JOB		Row Total
		UNEMPLOY ED 11	OTHER 12	
YES	1	3	12	141 49.3
NO	2	3	17	145 50.7
	Column Total	6 2.1	29 10.1	286 100.0

	Value	DF	Significance
Chi ²	12.24909	11	.34521
Likelihood Ratio	12.55058	11	.32371
Mantel-Haenszel test for linear association	.29710	1	.58571
Minimum Expected Frequency -	1.479		
Cells with Expected Frequency < 5 -	7 OF	24 (29.2%)	

Number of Missing Observations: 16

FUTURE USE OF TELEPHONE BANKING by SEX

Page 1 of 1

	Count	SEX		Row Total
		MALE	FEMALE	
FUTUST		1	2	
YES	1	68	73	141 49.0
NO	2	67	80	147 51.0
Column Total		135 46.9	153 53.1	288 100.0

	Value	DF	Significance
Chi ²	.20276	1	.65250
Continuity Correction	.11034	1	.73975
Likelihood Ratio	.20277	1	.65250
Mantel-Haenszel test for linear association	.20205	1	.65307
Minimum Expected Frequency -	66.094		

Number of Missing Observations: 14

FUTURE USE OF TELEPHONE BANKING by AREA

Page 1 of 1

	Count	AREA		Row Total
		PALMERST ON	WELLINGT ON	
FUTUST		1	2	
YES	1	64	76	140 48.6
NO	2	74	74	148 51.4
Column Total		138 47.9	150 52.1	288 100.0

	Value	DF	Significance
Chi ²	.52949	1	.46682
Continuity Correction	.37169	1	.54209
Likelihood Ratio	.52970	1	.46674
Mantel-Haenszel test for linear association	.52765	1	.46760
Minimum Expected Frequency -	67.083		

Number of Missing Observations: 14

Appendix X

Poisson approximation to the binomial calculations

Poisson Approximation to the Binomial

Calculations at the 10% level were:

ATMs

$$n = 203 \quad m = 10$$

$$.10 \times 203 \approx 21$$

$$\begin{aligned} P(X > 21) &= 1 - P(X \leq 21) \\ &= 1 - (.0001 + .0005 + .0023 + .0076 + .0189 + .0378 + .0631 + .0901 + \\ &\quad .1126 + .1251 + .1251 + .1137 + .0949 + .0729 + .0521 + .0347 + .0217 + \\ &\quad .0128 + .0071 + .0037 + .0019 + .0009) \\ &= .0005 \end{aligned}$$

EFTPOS

$$n = 97 \quad m = 14$$

$$.10 \times 97 \approx 10$$

$$\begin{aligned} P(X > 10) &= 1 - P(X \leq 10) \\ &= 1 - (.0001 + .0004 + .0013 + .0037 + .0087 + .0174 + .0304 + .0473 + \\ &\quad .0663) \\ &= .8244 \end{aligned}$$

Telephone Banking

$$n = 61 \quad m = 4$$

$$.10 \times 61 \approx 7$$

$$\begin{aligned} P(X > 7) &= 1 - P(X \leq 7) \\ &= 1 - (.0183 + .0733 + .1465 + .1954 + .1954 + .1563 + .1042 + .0595) \\ &= .0511 \end{aligned}$$