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FROM BRICKS AND MORTAR TO BRICKS AND CLICKS: THE TRANSFORMATION OF A BANK BRANCH NETWORK WITHIN THE GREATER TORONTO AREA

by

Michelle Anne Mok

Bachelor of Environmental Science (Honours), University of Guelph, 1999

THESIS

Submitted to the Department of Geography and Environmental Studies in partial fulfillment of the requirements for Master of Arts

Wilfrid Laurier University
2002

Abstract

Over the last 20 years, Canadian retail financial services have undergone a dramatic transformation due to a number of *driving forces:* technology, globalization, changing lifestyles and demographics, competition, and deregulation. Because retail financial services have been impacted, the way Canadians perform banking transactions has also been impacted, resulting in a shift from a spatially-oriented banking approach to a non-spatial approach. Transactions are being performed using alternative delivery channels including the automated banking machine, telephone banking, internet banking, point of sale purchasing, and new format branches, rather than in the traditional branch network.

This research examines changes in the branch network of one bank, Bank X, between 1986 and 2000, in a portion of the Greater Toronto Area, Ontario, Canada. The first objective of this research was to identify where branches were located. The second objective was to investigate demographic characteristics of the population in areas where branches existed, and the third objective was to investigate demographic characteristics of populations utilizing various delivery channels. The objectives of this research were fulfilled using a combination of mapping and statistical techniques.

The branch network of Bank X was found to be decreasing, with an increased amount of changes occurring between 1996 and 2000. It was found that branch closures are occurring in many different types of areas, where populations are comprised of a diverse range of demographic characteristics. In addition, it was found that demographic characteristics alone do not determine delivery channel usage, as many different types of people are utilizing both traditional branch channels, as well as the alternative delivery channels that have been developed.

Acknowledgements

The completion of this thesis would not have been possible without the help of a number of individuals.

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Dedication

To Mom, Dad, Cathy, Lisa, Melissa, Chris, and Riley. Without your support, love, and encouragement, I would not have been able to attain this goal. Thank you for listening to my complaints, and thank you for always encouraging me to look for the positive aspects of situations. I truly have the most supportive family ever, and I thank you from the depths of my heart.

To Michael, it has been a long journey, and I thank you for standing by my side throughout it. You encouraged me, always managed to make me see the humorous side of things, and never gave up on me. Thank you for being there through the laughter, and more importantly, the tears. Without you, I would not have had the strength to complete this. I love you!

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Chapter 1: Introduction

1.1 Overview

Over the last 20 years, Canadian retail financial services have undergone a dramatic transformation due to a number of driving forces: technology, globalization, changing lifestyles and demographics, competition, and deregulation. These driving forces have altered the banking sector and ultimately the way Canadians perform daily banking transactions. In the past, transactions were completed at neighbourhood branches. Today, they are completed in a very different manner due to Alternative Delivery Channels (ADCs)* which evolved as a result of the aforementioned driving forces. ADCs remove traffic and transaction volume from local branches and eliminate the need for clients to visit traditional branches. Common ADCs include the automated banking machine (ABM), telephone banking, Internet banking, point of sale purchasing (POS), and new format branches including tellerless. Since large volumes of transactions are now completed outside the branch network, Canadian banks, and many internationally, are decreasing their branch networks.

One of the most significant changes that has occurred in the banking sector is the shift from a spatially oriented banking approach to a non-spatial approach, and there are definite social impacts on clients. According to the literature, a large number of branch closures are occurring internationally; many are in smaller rural communities, and low-income urban neighbourhoods (Jones 1996; McQueen 1999; Task Force 1998). If this is the case, then issues of accessibility arise, and studying where branches are closing,

^{*} Please see Appendix A for a full list of acronyms used

opening, or converting to tellerless will give insight into how clients are affected and adapting to the changing role of bank branches.

1.2 Research Problem and Relevance

Because the Canadian banking system has undergone such a dramatic transformation over the last 20 years, clients who use branches are having to change the way they complete daily banking transactions. The rise in use of ADCs is affecting the branch network; some branches are being closed, and some are converting to tellerless. The construction of new bank branches has also slowed in some areas. The increased use of ADCs and the resulting shrinking role of branches in meeting consumer needs are not the only reasons banks are decreasing branch networks. Additional factors include a traditionally high density of branches and a general ineffectiveness of traditional branches as compared to tellerless branches (Mendonca and Nakace 1996). With all the changes that are occurring, issues of exclusion and accessibility are introduced. Clients may not have a convenient branch to visit if they choose to continue banking in the branch network, some clients may not be able to use ADCs, and some clients may not have access to the equipment necessary for some ADCs, such as a computer with Internet access for Internet banking.

Literature indicates that ADCs are being used more often but there is still debate on whether branch closures are occurring as much as was anticipated and some studies have found that the bank branch is still the preferred delivery channel (Avkiran 1999; DeCloet 2000). Critics felt that branch banking would become extinct once ADCs were introduced, but this is not the case (Bekier *et al. 2000*). While the rationalization of branch networks is occurring internationally, the branch still has a strong presence in

many communities. This research will investigate changes in the branch network in order to determine the extent of rationalization, and more importantly, who is being impacted, and are changes in delivery channel usage occurring.

This research is relevant as a large majority of Canadians experience the branch network or ADCs on a daily basis and are therefore being impacted. Some Canadians may be impacted more than others, especially if they are living in low-income areas or rural neighbourhoods, where it is believed that branches are being closed more often. Although some research has focused on branch closures, few studies have focused on branch closures in Canada, and for this reason there is a lack of knowledge regarding the extent of closures as well as who is being impacted. For this research, this research can be defined as exploratory, in the sense that it is casting a wide net over a large topic with the goal of finding interesting patterns and relationships.

1.3 Research Focus and Scope

Banking is no longer solely about bringing the customer to the bank; it is also about bringing the bank to the customer, and the title of this thesis reflects how the banking landscape has changed. Prior to technological innovations, including ABMs, telephone banking, and Internet banking, consumers were accustomed to a purely bricks and mortar system where transactions were completed in a bank branch. Today, banks are moving towards a bricks and clicks approach where it is understood that consumers want to have access to branches as well as to the electronic ADCs that have been introduced, hence bricks and clicks. Traditional branch networks have undergone many changes and some are being replaced by delivery channels that focus on meeting the needs of consumers within a particular market area while increasing bank profits (Nixon 2000). The goal of

banks today is to find the right balance of bricks and clicks, and, in order to do this, an investigation into what types of clients are using the different delivery channels is imperative. In addition, investigating how consumers are utilizing available delivery channels is important, as the amount of acceptance will determine the success of ADCs and the extent of branch closures.

The focus of this research can be separated into two areas of interest; how the branch network is changing and the types of consumers these changes are impacting, and delivery channel usage with regard to what types of consumers are utilizing different delivery channels. In order to investigate the types of clients affected by changes in the branch network as well as the types of clients utilizing different delivery channels, a combination of census data and a market segmentation system referred to as PSYTE were used. Although consumers perform many different types of banking transactions, this research looks only at the common transactions which consumers perform often including withdrawing cash, depositing cheques and cash, POS, and paying bills. Less frequent transactions including loans, mortgages, and investments, are not included in this research as they are more complex. In addition, credit card use was not discussed as this type of banking product is used for purchasing, rather than completing daily banking transactions. These types of transactions can also be made outside of the branch network through the ADCs that have been developed.

The Canadian financial services sector can be viewed as a 3-phase model for the purposes of this research (see Figure 1.1). This research will focus on the changes that have brought Canadians from phase 1 to 3, and will investigate who these changes are affecting most.

Figure 1.1: A 3-phase model of Canadian retail financial services

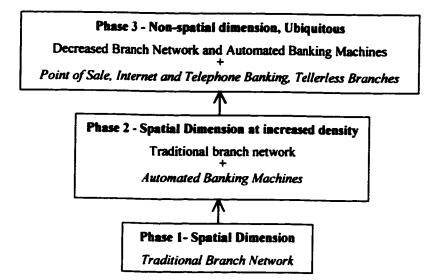


Figure 1.2 presents the scope of this research. Topics discussed in the literature review include retail banking of the past, retail banking of the present, and the driving forces that have transformed the way Canadians bank. The remaining research explores spatial changes in the branch network, the demographic characteristics of the population that is being impacted by these changes, delivery channel usage, and the demographic characteristics of the population that utilize these delivery channels.

Past Driving Forces Present Geo-Impacts Globalization Who are Technology Changes in changes the branch impacting? network Objective 2 Objective 1 Banking in Competition **Banking** the past today Who is utilizing Delivery Changing delivery channel usage lifestyle channels? **Objective 3** Deregulation

Figure 1.2: Scope of the research

Changes that are occurring in Canadian financial services are affecting all banks. This research focuses on the behaviour of one of Canada's top six financial institutions which together control 89% of Canada's bank assets, and 91% of deposits made (Globe and Mail 1998a). Some data used in this research, including delivery channel usage and number of clients per branch, are confidential, and for this reason an agreement was made to not divulge the identity of the bank under study. For this reason, the bank that was analyzed will be referred to as Bank X.

1.4 Research Objectives

This research focuses on the spatial and temporal changes that have occurred in Bank X's branch network, within a portion of the Greater Toronto Area between 1986 and 2000. The objectives of this research and accompanying research questions are:

- 1. To identify where branches existed between 1986 and 2000, and to present and explain patterns in spatial location.
 - What changes are occurring in the branch network and where are they occurring?
 - How are branches distributed among census subdivisions, and can their distribution be explained in terms of population density and population change?
 - How are branches distributed among urban and suburban areas?
- 2. To investigate relevant demographic characteristics of the population that live in census tracts where branches existed between 1986 and 2000, in order to determine whether relationships exist.
 - How are branches distributed amongst the PSYTE groups?
 - Is there a relationship between branch status and education level?
 - Is there a relationship between branch status and income level?
 - Is there a relationship between branch status and age?

- 3. To investigate relevant demographic characteristics of the population that live in census tracts where delivery channel usage data were available, in order to determine whether relationships exist.
 - Is there a relationship between delivery channel usage and PSYTE group?
 - Is there a relationship between delivery channel usage and education level?
 - Is there a relationship between delivery channel usage and income level?
 - Is there a relationship between delivery channel usage and age?
 - Is there a relationship between delivery channel usage and incidence of low-income?
 - Is there a relationship between delivery channel usage and value of dwelling?

1.5 Study Area

The study area used in this research is a portion of the Greater Toronto Area (GTA), located in southern Ontario, Canada (see Figure 1.3). Because the focus of this research was to explore changes in the branch network of Bank X, census subdivisions (CSDs) within the GTA that did not contain a branch were removed from the study area. These CSDs are located in the northeastern portion of the study area and include Brock, East Gwillimbury, King, Uxbridge, and Whitchurch-Stouffville. The CSDs of Scugog and Georgina, which contain one branch each, were also removed from the study area because street network and census tract coverage were not available. The study area is approximately 4670 km², and was inhabited by 4.4 million residents in 1996 (Statistics Canada 2001). Table 1.1 presents CSDs in the study area and selected characteristics. The study area was selected for a number of reasons. First, it is representative of both urban and suburban areas, and the contrast between developed and newly developing communities, as well as varying population densities are evident. The study area also

contains an established network of Bank X's branches, which includes branches that have remained the same, closed, opened, and converted to tellerless between 1986 and 2000.

Figure 1.3: The Greater Toronto Area, Ontario, Canada

(Greater Toronto Marketing Alliance 2002)

Table 1.1: Study area profile

Municipality	1991 Population	1996 Pompletics	Population	Land Area	1996 Population
	Population	Population	Change (%)	(km²)	Density (people/ km²)
Burlington	129575	136976	5.7	177.4	772.13
Milton	32075	32104	0.1	367.2	87.43
Oakville	114670	128405	12	138.18	929.26
Halton Hills	36816	42390	15.1	275.86	153.66
Mississauga	463388	544382	17.5	273.86	1987.81
Brampton	234445	268251	14.4	265.04	1012.12
Caledon	34965	39893	14.1	686.16	58.14
Toronto	2275771	2385421	4.8	630.09	3785.84
Vaughan	111359	132549	19	275.34	481.40
Markham	153811	173383	12.7	211.53	819.66
Richmond Hill	80142	101725	26.9	99.42	1023.18
Aurora	29454	34857	18.3	49.16	709.05
Newmarket	45474	57125	25.6	35.91	1590.78
Pickering	68631	78989	15.1	226.52	348.71
Ajax	57350	64430	12.3	67.7	951.70
Whitby	61281	73794	20.4	142.99	516.08
Oshawa	129344	134364	3.9	143.41	936.92
Clarington	49479	60615	22.5	607.79	99.73

(Statistics Canada 2001)

1.6 Organization of Thesis

The remaining research is organized as follows: Chapter 2 provides information on the retail banking system in Canada. Topics covered include retail banking in the past and present, driving forces responsible for changes in the financial services, as well as international experiences with changes in retail services. Chapter 3 focuses on research methodology, beginning with a description of data sources used, research assumptions, and scale of the research. This chapter also presents the data used and research procedures performed for each of the objectives. Chapter 4 presents the results of the analyses as they relate to each of the objectives, and includes a discussion of trends and patterns found. Chapter 5 presents the key findings of this research, and suggestions for future research.

Chapter 2: Review of Canadian Retail Financial Services

2.1 Introduction

This chapter focuses on the changes that have occurred in Canadian retail financial services. It discusses how daily banking transactions were performed in the past, as well as how they are performed today. The different types of delivery channels available, growth in use of these channels, as well as a review of how demographic characteristics relate to usage of these channels are discussed. The driving forces that have led to the transformation of banking from a spatial to a non-spatial phenomenon are also examined. In addition, this chapter discusses international experiences with changes in banking systems, and closes with a discussion of the social implications of changes that are occurring. It is also important to note that because the trend in branch rationalization and the increase in use of alternative delivery channels (ADCs) are relatively new phenomena, there is not a wide body of literature existing on the topic.

2.2 Retail Banking in the Past

Canadian retail financial services have changed dramatically over the last 20 years. In the past, consumer behaviour was quite different from today; the majority of consumer demands were satisfied at local branches, which were low-tech, and localized (Cardwell 1997). These localized networks were believed necessary to provide sufficient customer service (Birkin *et al.* 1996). During the 1970's and 80's, consumer demand in North America and Europe experienced significant growth, resulting in branch networks that had grown to accommodate the demand (Cardwell 1997; Greenland 1994). In the mainly cheque and cash-based society present during that time, the branch network was the main delivery channel consumers used for retail banking (Devlin 1995).

Banking in the 1980's was characterized by physical decentralization. Branches were scattered around more populated areas, thus providing a dense network of locations that attempted to distribute banking services. Banks believed that a large branch network gave consumers greater geographic access, as well as a sense of security (Jayawardhena and Foley 2000). Network planners also believed that there was a strong positive relationship between market share and network size; a large branch network resulted in more clients (Greenland 1994). The branch networks of many large banks were mostly unplanned and, in many instances, resulted in branch networks that were extremely dense. During the 1980's the banking sector experienced economic growth, closely followed by the collapse of the stock market and the onset of recession, causing many banks to suffer losses, which prompted an industry-wide shift towards decreasing branch networks (Greenland 1994). It was now necessary for banks to begin investigating the effectiveness and efficiency of their branch networks.

Technology also began to play a role in retail banking during the 1970's. With the introduction of faster, smaller computers during this time, retail banking began to undergo a number of changes. Tellers were now using computers to process client transactions, thereby making the process of visiting a branch more efficient. Advances in technology also led to the introduction of the automated banking machine (ABM) to Canada in the early 1970's, and since this introduction, Canadians have performed their daily banking transactions in a very different manner. The early version of the ABM allowed clients to withdraw cash and make deposits. The primary motivation for the introduction of the ABM was to reduce costs. They were also found to remove traffic from the branch network, thus freeing up tellers to perform sales tasks.

The introduction of the ABM revolutionized the delivery of financial services, and began the shift towards electronic banking (Moutinho and Smith 2000). Since the introduction of the ABM, both the presence and acceptance of these machines has grown rapidly (see Figure 2.1). As the presence of ABMs has grown, Canadians have been performing more transactions through them, thus removing further traffic and transaction volume from the branch network. When ABMs were first introduced, they were found exclusively at branch locations. However, as popularity grew, they began to appear in non-branch locations including gas stations, shopping centres, and grocery stores. In a study performed by Rugimbana and Iversen (1994) it was found that the overriding perceived benefit of ABMs for users was the convenience they provide. With the introduction of the ABM, clients were able to perform daily banking transactions 24 hours a day, seven days a week; a convenience that became part of the Canadian lifestyle, and continues to influence the branch network today.

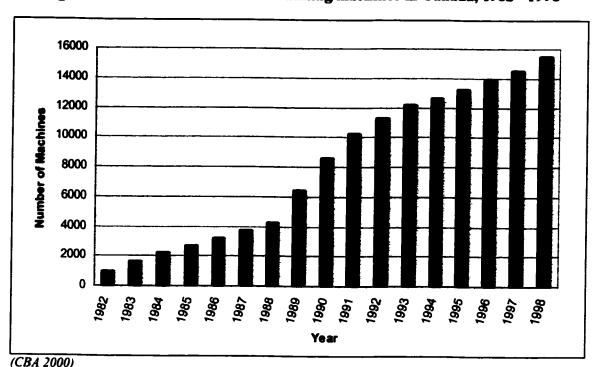


Figure 2.1: Number of automated banking machines in Canada, 1982 - 1998

During the 1970's, the number of branches remained stable, or grew slightly, in most countries. Beginning in the 1980's, however, there was an international trend towards decreasing the number of branch locations (Channon 1986). The number of ABMs and the number of delivery channels that consumers could use to access their accounts grew dramatically during the 1980's, and because there was a heavy investment in ADCs, banks began to disinvest in their branch networks (Channon 1986). In addition, U.S. banks were moving towards rationalizing their branch networks and focusing attention on ABM networks. Channon (1986) found that Bank of America closed one third of their overall branch network while increasing their ABM network, and Barclay's of the UK closed 100 of their 3000 full service branches, while converting 1400 of the remaining branches to tellerless. An early version of telephone banking also made a presence internationally during this time, and a strong move towards development and use of ADCs followed.

2.3 Retail Banking Today

Today, Canadian banking systems are very different from what was witnessed in the past. The economic growth experienced in the 1980's decreased in the early 1990's, leaving an underutilized and ineffective branch network (Cardwell 1997). As new technologies, including point of sale purchasing (POS), telephone banking, and Internet banking, became widely available in the early 1990's, changes in the branch network occurred, and continue to occur. Although ADCs are widely available, the branch network does still exist. Because the volume of branch transactions has decreased and banks want to become more cost efficient, the branch network has been, and will continue to be rationalized. While many aspects of the financial services industry have

changed, the branch network remains to be the greatest actual and planned modification (Cardwell 1997). Banking has been transformed from a very spatially oriented process where bank branches were visited, into a non-spatial process where only a telephone or computer with Internet access is required.

A number of ADCs have been developed in recent years that allow consumers to access their accounts through multiple channels. Electronic ADCs include ABMs, telephone banking, Internet banking, and POS. All of these ADCs, especially Internet and telephone banking, render location and time irrelevant (Jayawardhena and Foley 2000). In fact, some banks have made the location of a consumer's branch so irrelevant that they no longer publish the telephone numbers of individual branch locations, instead routing clients trying to reach their local branch to a central call centre where agents handle inquiries (Lamb 2000). Banks have also introduced non-electronic ADCs that alter the delivery of services within a branch setting, and are therefore referred to as new format branches. These new format branches, including tellerless branches, provide clients with more convenience and choice, as services are typically targeted to the types of consumers banking at specific locations. The following sections explore the different types of electronic and non-electronic ADCs available to consumers. The growth in use of ADCs, demographics of people using them, and the impacts that ADCs are having on the branch network are also discussed.

2.3.1 The Automated Banking Machine

Although ABMs were introduced in the early 1970's, many of the functions these machines perform today are new. Today, ABMs allow clients to withdraw cash, make deposits, pay many different types of bills, transfer funds between accounts, including

loan accounts and credit cards, as well as print statements. There are two types of ABMs in Canada: those that dispense cash only and those that provide a full range of services as described above. ABMs, especially full service machines, allow consumers to perform most daily banking transactions that were formerly completed in branches. With the exception of traveler's cheques, money orders, drafts, wires, and foreign exchange, all daily banking transactions can be made without stepping foot in a branch. In time, many of the aforementioned transactions will be done through an ABM, and there are currently pilot projects that are testing these technologies.

The primary motivation for the introduction of the ABM was to reduce costs. However, the initial costs are high, and for this reason ABM location is critical. For an ABM to be profitable, the transaction volume must be high enough to offset the costs of installation and maintenance. Transaction volume is dependent on the amount of traffic the location receives, and many banks are collaborating with retailers to increase brand recognition and transaction volume. For example, Royal Bank has collaborated with Esso to house their ABMs. The introduction of privately owned 'white-label' ABMs are also affecting the ABM market. These machines charge users extra fees because they are typically located in areas that cannot support a bank-branded machine due to low transaction volumes (Smith 2000).

Having an ABM network is an additional cost, and because many networks have not produced the personnel savings or branch closures that were anticipated, the economic efficiency of ABMs may decline. Lake *et al.* (1998) found that banks in the U.S. spend approximately \$20,000 to \$25,000 US\$ annually per ABM, and a number of banks believe the ABM market has become saturated. A combination of Internet and telephone

banking, the increase in direct deposit from employers and government, and use of POS to make purchases rather than using cash are making the ABM redundant. Just as the ABM once threatened the effectiveness of branch networks, these new technologies are threatening the effectiveness of ABM networks (Lake et al. 1998). With the introduction of these new ADCs, many banks are beginning to consider reducing ABM networks, especially where networks exceed consumer demand.

There is no doubt that ABMs will have a market into the foreseeable future, because clients need to be able to make deposits, and have some cash on hand. The question lies in how many machines will be adequate. Some banks are leasing machines rather than purchasing them, thereby decreasing overall costs. The ABM environment in the U.S. is similar. BankAtlantic removed half of their ABM network throughout Florida, Alabama, and Georgia because the machines were not meeting profitability expectations. Although the machines were breaking even, BankAtlantic found most clients were choosing POS at the checkout and receiving cash back, rather than using ABMs (ABMmarketplace 2001).

Many banks are also exploring how they can change the functions of their ABMs to increase use, as well as remove further traffic from the branch network. Currently, there are ABMs that dispense U.S. cash and U.S. traveler's cheques at specific locations such as airports, and audio banking machines for the visually impaired. Banks are also piloting machines that dispense postage stamps, bus tickets, sporting events tickets, traveler's cheques, money orders, and drafts. Some machines also use wait times to display on screen advertising (Lake et al. 1998).

2.3.2 Telephone Banking

Another electronic ADC that has allowed consumers the convenience of banking 24 hours a day, seven days a week is telephone banking. In the mid 1990's Canadian banks introduced telephone banking, which enables consumers to transfer between accounts, pay bills, and perform balance inquiries. Telephone banking is more accessible than Internet banking, because more people have access to telephones than computers with Internet access. In order for clients to use telephone banking, a personal identification number (PIN) is required. Many Canadian banks' telephone systems offer interactive voice response, which is a recorded voice that prompts clients to enter numbers into the telephone, in combination with live systems where clients speak one on one with an operator.

2.3.3 Internet Banking

Shortly after the introduction of telephone banking, Canadian banks introduced personal computer (PC) banking, and Internet banking. PC banking requires software to download banking information from the Internet, and therefore requires clients to obtain the necessary software. In contrast, Internet banking allows clients to access their accounts from anywhere they have access to the World Wide Web. Clients that use Internet banking are able to complete daily banking transactions, including transfers between accounts, bill payments, and balance inquiries. Many banks have replaced PC banking with Internet banking because it is more convenient, efficient, and cost-effective as no specific software is required.

There are generally two types of Internet banking structures available to consumers.

The first, which is sometimes referred to as bricks and clicks, offers a branch network

and Internet banking to clients. The second structure, referred to as net-only, offers Internet banking with no branch network. A new type of business that combines the two has recently been introduced. Some net-only banks are collaborating with real world businesses in order to provide a physical market presence. The importance of net-only banks having a physical presence was evident when Wingspan Bank, a U.S. net-only bank, announced plans to open physical locations (Pohl and Steele 2001). Businesses that have a physical presence, and are pairing with net-only banks include State Farm Insurance and Mail Boxes Etc. These retailers accept deposits from clients of certain net-only banks, and provide a physical deposit presence (Bickers 2001; US Banker 2000). Net-only banks are also collaborating with ABM operators, or investing in their own ABM networks, in order to provide deposit access for their clients. Some net-only banks have found that they are able to operate almost 10,000 ABMs for the same cost of running five traditional brick and mortar branches (Bickers 2001).

2.3.4 Point of Sale Purchasing

In 1994, POS was rolled out in Canada; pilot projects began as early as 1988 (CBA 2000). The POS system in Canada, Interac Direct Payment (IDP), allows consumers to purchase items using bankcards at retailers throughout the country. By using a bankcard with an associated PIN, client accounts are debited at the point of sale, and the retailer is credited automatically. The concern associated with non-sufficient fund cheques is reduced when POS is used, and retailers save time and money since less processing is required. This payment option is also convenient for consumers and provides a safe alternative to carrying cash. Some retailers offer the cash-back system, where clients are approved for an amount greater than their purchase and receive the difference in cash.

Mobile POS terminals have also been introduced that allow retailers to offer this payment option during home delivery of products. The number of retailers offering POS has grown substantially, and today most retailers offer this payment option to consumers (see Figure 2.2).

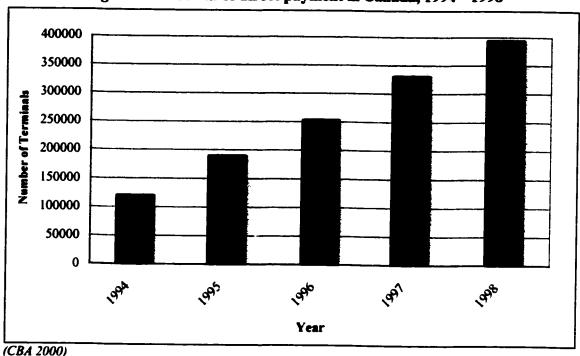


Figure 2.2: Growth of direct payment in Canada, 1994 - 1998

2.3.5 New Format Branches

All of the ADCs introduced thus far involve electronic channels that allow clients to access accounts from home, work, or anywhere outside of the branch network. Canadian banks are also, however, in search of alternatives for those clients that still prefer using bank branches. Although electronic ADCs are successful at meeting the service needs of existing clients, it has been found that having a physical branch outlet is still most important in bringing in new business (Bekier et al. 2000; Driscoll 1999). For this reason, banks are continuously experimenting with new format branches as delivery

channels. Strategies that banks have introduced in Canada include tellerless branches, large format branches, branches in retail stores, and different types of branch ownership.

By offering different types of delivery channels to clients, an inter-branch hierarchy is created which serves clients more economically and conveniently (Birkin *et al.* 1996). The 'hub and spoke' strategy has been used in the UK where 'hub' branches carry a full range of services and are responsible for smaller 'spoke' branches that offer limited services (Devlin 1995; Howcroft and Beckett 1996). This strategy enables banks to convert branches from transactional centres into sales centres (Lewis and Disney 2000). The branch network can be seen as a hierarchy, made up of several levels that provide different services to different clients (see Table 2.1).

Table 2.1: The branch hierarchy

Level	Type of Branch	Services Offered
1	Off-site ABM	ABMs detached from branch, located off-site.
2	Automated branch	Remote self-service outlet or kiosk, houses ABMs and telephone links, totally automated or one or two sales assistants present.
3	Limited service or tellerless branch	Small retail unit with ABMs, few offices, mobile bankers or nomadic sales advisors that meet with clients
4	Parent branch	Complete range of personal banking services including tellers and loan officers. Some offer corporate banking.
5	Large format or shared location branch	Large financial supermarket including investment specialists, loan and mortgage specialists, teller services, corporate banking. Branch is physically divided into specific product areas.

(Adapted from Greenland 1994)

The most popular type of 'new format' branch within Canada is the tellerless branch. These branches have a physical location, but offer a limited number of services to clients. This format is also known as "functional reconfiguration" because individual components of the branch that are underused are removed from the branch. Services offered at these types of branches are typically one of the following; corporate banking, personal banking including loans, mortgages, and investments, or any banking transaction that cannot be

completed through an ABM including purchase of travelers cheques, money orders, drafts, foreign exchange or wire transfers. By offering tellerless services to clients, banks are able to shift clients wanting to complete daily banking transactions in a branch, which causes unnecessary traffic, to electronic ADCs while targeting clients that are more profitable at the same time.

Consumer behaviour has become complex, and a number of geographically dispersed channels, including electronic ADCs and tellerless branches, are necessary to satisfy demand (Cardwell 1997). Having a distribution network that is comprised of numerous delivery channels enables banks to offer segment specific products which in turn increase profits and allows the bank to operate at a more cost-efficient level (Mendonca and Nakache 1996; Jones and Simmons 1993). By serving selected clients in tellerless branches, some banks have reduced costs by up to 10%, while doubling and tripling revenues (Leichtfuss and Mattern 1995). Although the introduction of tellerless branches has proven to be a beneficial strategy, banks are faced with the difficult job of finding the correct balance of full service and tellerless branches that will satisfy clients, while remaining cost effective.

Tellerless branches meet the needs of both clients and banks by providing access to clients, and reducing the costs involved with overhead, staffing, and premises for banks (Cardwell 1997). DeCloet (2000) has found that the tellerless strategy favours banks as it allows them to keep branches in areas where full service branches are unfeasible and still maintain a connection between the bank and the community, while also allowing them to benefit from the marketing that branches provide. Banks are also saving money because while 50% of profits typically come from the top 3 to 5% of clients, 60 to 80% of costs

come from the bottom 20%. By shifting less profitable clients to electronic channels, banks are able to concentrate on targeting the top clients through tellerless branches (Bird 1997 in Nelson 1999).

Banks are also introducing large format branches that offer a one-stop shopping area for clients. This type of branch houses many different services all under the same roof. For example, the Royal Bank has several large branches where tellers, personal bankers, investment specialists, securities specialists, mortgage specialists, and business bankers are found at the same location, thereby providing access to all services in one location. At one time, clients would have to visit different locations to see a mortgage specialist and a securities dealer, but today large supermarket type branches allow bank employees to refer clients to different divisions of the bank at the same location. This strategy can be considered a type of ADC because it combines many different functions under the same roof, thereby increasing sales and decreasing the amount of physical locations necessary.

In order to serve clients effectively while reducing costs, banks are also opening full service and tellerless branches in retail locations, rather than in freestanding buildings. Bank branches are opening in unexpected locations, moving out of traditional locations and targeting consumers where they live, work, and shop. Banks are increasing profits by reducing the number of costly stand-alone branches, while still serving clients in convenient locations. The Toronto Dominion Bank has opened in-store branches in retail outlets including Wal-Mart and Sobeys grocery stores, and the Bank of Montreal has opened 200 mini-branches in supermarkets throughout Western Canada and Ontario (Howland 2000). Banks are also experimenting with different forms of branch

ownership. In some urban and rural markets, alternative ownership structures have been set up to combat high real estate in urban areas, and a small client base in rural areas. Franchising or leasing out part of the branch is an option, and some banks are collaborating with retail franchises such as Starbucks, to increase traffic and share the cost of the premises. Another option that alleviates problems associated with a low client base is to outsource branch functions to non-banks, including grocery stores or post-offices, which complete basic transactions such as cashing cheques or accepting deposits (Bekier *et al.* 2000). The goal of each of these strategies is to retain clients while increasing profits, and each location needs to be investigated carefully before the decision to implement any of these strategies.

2.3.6 Growth in the Use of Alternative Delivery Channels

Academic literature on use of ADCs is at an early stage but the forecast is rapid growth and significant impacts on all types of markets (Daniel 1999). Canada is a world leader in ADC use; an estimated 85% of banking transactions were completed using a combination of ABMs, telephone banking, Internet banking, and POS in 1998 (Canadian Banker 1999). In addition, Canadian Banker (1999) found that Canada is second in the world for number of ABMs per person, third in number of POS terminals per person, and Canadians use ABMs more often than any others in the world. Telephone banking is also growing at a rapid rate, with a 50% increase each year since 1994 (Canadian Banker 1999). In 2000, approximately 600,000 clients of the Royal Bank were online, and growing at a rate of 12,000 per week (Cleghorn 2000). It is also estimated that 80% of consumers are using Internet banking, and use is growing at a rate of 10% per year (DeCloet 2000; Canadian Banker 1999). Use of POS has also grown at a rate of 91% per

year since 1994 (Canadian Banker 1999). Figure 2.3 presents delivery channel usage between 1996 and 1999, based on a consumer survey of delivery channels used the month before the survey was conducted. Use of electronic ADCs increased continuously during this time, and although use of the branch channel has remained relatively high, it was found to be decreasing in each year of the survey.

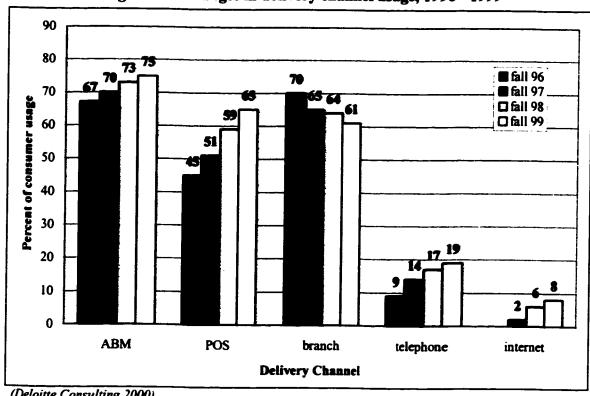


Figure 2.3: Changes in delivery channel usage, 1996 - 1999

(Deloitte Consulting 2000)

The introduction of ADCs has enabled banks to deliver services directly to clients without having them enter a branch. With this unprecedented period of change in the industry, banking now transcends geography (Howcroft and Beckett 1996). Lewis and Disney (2000) found that 50% of consumers are relying on electronic ADCs rather than banking in branches, and populations that were believed to rely heavily on the branch network, including those living in rural areas, are no longer depending on branches as

much as in the past. It is believed that once clients experience the virtual market space of ADCs, they are unlikely to return to the physical marketplace as time and cost savings are high (Rayport and Sviokla 1994).

Two goals of ADCs are to reduce expenses and to enhance revenue (Rubin 1999). Industry estimates have found that by using ADCs, transaction costs are 25 to 33% less than when executed in-branch (Cardwell 1997). Similarly, Birkin et al. (1996) found that ABMs reduce transaction costs by up to 50%, and Nevens (1999) found that the cost of executing a bank transaction decreased by as much as 80% when handled electronically. Table 2.2 compares the cost of a transaction completed through a number of different channels in the U.S. retail banking system. It is evident that banks are able to decrease costs significantly by shifting clients from the traditional branch network to electronic ADCs in order to complete transactions. Many of the cost savings that banks gain when they have a successful ADC network are transferred to clients in the form of reduced service fees when they choose to use the ADCs rather than the branch network. The long-term impact of ADCs on profitability will depend on consumers' attitudes and willingness to utilize these channels (Moutinho and Smith 2000).

Table 2.2: Comparison of transaction costs in U.S. retail banking

Cost per transaction	USS	
Traditional branch network	1.07	
Telephone banking	0.54	
ABM	0.27	
PC banking	0.02	
Internet banking	0.01	

(Lowe and Kuusisto 1999)

2.3.7 Demographics and Delivery Channel Usage

Not all ADCs are equal; they each serve different purposes, and therefore serve different markets (Redman 2000). In order to maximize ADC use while minimizing

branch use, diligent effort is required to identify the specific consumer segments that use different channels, as well as an understanding of the changing banking needs of these consumers (Redman 2000). While researching the demographics of populations utilizing ADCs, it was found that there is a lack of data on North American consumers. For this reason, much of the information used come from a variety of international sources and it is important to note that usage of ADCs and banking systems vary between countries.

Banks investigate demographic characteristics in order to determine the types of clients utilizing different delivery channels. Demographic variables are used most often because they are easily segmented, effective, and have spatial aspects (Reidenbach and Pitts 1986). Information including age, sex, income, family size, family life cycle, occupation, education, housing ownership and value, and social class are studied to determine delivery channel usage among populations, and studies have found differences in purchase behaviour between demographic variables such as these (Alfansi and Sargeant 2000). Demographic characteristics can be collected in a number of ways including surveying consumers, studying census data, or utilizing market segmentation systems. In early studies, the practice of using demographic characteristics in order to determine the propensity of different groups of the population to use automated equipment was evident (see Table 2.3). Frequent users of automated equipment were found to be younger, of a higher social class, somewhat better educated, and had higher incomes than non-users (Bennett 1975). Today, more clients are willing to use automated equipment such as ADCs, and therefore the range of demographic characteristics of those utilizing these technologies have increased dramatically. These

changes will continue to occur naturally as the population matures and computer usage increases among older as well as more diverse populations (Howcroft et al. 2002).

Table 2.3: Characteristics of users and non-users of automated equipment

		-	
Sex			_
Male	53.9	64.0	64.9
Female	46.1	36.0	35.1
Age			
21-34	36.8	49.3	54.5
35-49	47.4	44.0	39.0
50 and over	15.8	6.7	6.5
Social Class			
Upper Middle	27.6	14.7	33.8
Lower Middle	38.2	53.3	39.0
Upper Lower	34.2	32.0	27.3
Marital Status		-	
Married	86.8	85.3	87.0
Single	7.9	10.7	9.1
Widowed, Divorced	5.3	4.0	3.9
Education		- "	
Postgraduate	13.2	13.3	14.3
College graduate	23.7	32.0	29.9
Some college	28.9	32.0	28.6
High school graduate	25.0	17.3	19.5
Some high school	6.6	5.3	6.5
Eighth grade or less	2.6	-	1.3
Income			
Under \$5000	2.6	4.0	2.6
5000-7999	3.9	6.7	2.6
8000-10,999	21.1	22.7	10.4
11,000-13,999	19.7	24.0	15.6
14,000-17,999	13.2	10.7	18.2
18,000 and over	34.2	22.7	44.2
Refused	5.3	9.3	6.5

(Bennett 1975)

The ABM is the most widely used ADC available today for several reasons. The ABM was introduced to Canada over twenty years ago, enabling the population to become comfortable and accepting of them as a delivery channel. ABMs are also relatively easy to use, require only a bankcard, and are found in many different locations. Many different types of people utilize ABMs. The average user is aged 25 to 44 years with an average household income of \$25,000 to \$75,000 per year. Approximately 86%

of ABM users have household incomes of \$40,000 per year and are married with children. Heavy users of ABMs are younger in age, have white-collar jobs, are highly mobile, rent their homes, and have lower incomes due to single income earners. Light users of ABMs are older, less educated, less mobile, own their homes, and have higher incomes because two income earners are present (Reidenback and Pitts 1986).

Research performed in Canada by McDougall and Levesque (1994) found that consumers with higher education levels, as well as younger consumers had a significantly greater incidence of ABM use than others did. In regards to education, Rugimbana (1995) found that ABM usage in Australia peaked among persons with high school certificates, while all other educational levels, both higher and lower than high school, were found to use ABMs less frequently. Additional studies have found that employment status and age are the most significant predictors of ABM usage. In both Canada and Australia, it has been found that employed persons use ABMs more frequently than unemployed persons, and younger consumers use ABMs more frequently than older consumers (Marshall and Heslop 1988 in Howcroft et al. 2002; Rugimbana 1995). A survey conducted in Saudi Arabia by Al-Ashban and Burney (2001) found that telephone banking usage was also related to education and income level, with consumers having higher education and income levels using the channel more frequently.

The number of consumers using Internet banking is substantially less than for ABMs, and therefore the range of demographic characteristics is narrower. Populations utilizing Internet banking are typically well educated and earn higher household incomes. These consumers use technology to overcome time constraints and many are married couples. The average household income of these consumers is \$90,000, 75% are dual income

families, and both adults in 55% of households are college educated or beyond, compared to just 10% in all households. Bank marketers also define households that do not utilize Internet banking, which has been found to include approximately 44% of U.S. households. These populations are generally 15 years older than users of Internet banking, are less educated with only 7% earning a college degree, are typically single parent homes, and only 18% own personal computers (American Demographic 1999).

The types of populations that use the Internet can also be used as an indicator of who is utilizing Internet banking (see Table 2.4). Consumers aged 18 to 49 were found to use the Internet more often than older consumers, while little difference was found in education level of users. In contrast, white collar workers used the Internet more often than blue collar workers, and consumers with incomes less than \$50000, and greater than \$75000, used the Internet more than the middle income range (CyberAtlas 1999). Yakhlef (2001) found that 80% of Internet users surveyed in Sweden were born in the 1960s, 60% live in cities, and 75% were educated and earned higher incomes.

Table 2.4: Demographics of Internet users

	in the second		· Si Barria	
Demographic	Percent			
	E-shoppers	Wired but wary	Unwired	
Men	57	50	45	
Women	43	50	55	
Age 18-34	40	37	27	
Age 35-49	41	37	26	
Age 50+	18	26	46	
High school or less	30	35	59	
Some college (1-3 years)	34	35	27	
College graduate or more 4+years	35	30	15	
White collar	65	61	33	
Blue collar	19	21	24	
Household income <\$50,000	41	49	72	
Household income \$50,000-74,999	22	22	14	
Household income \$75,000+	36	29	14	
Use ABM	75	65	41	
Bank information accessed	47	25	0	

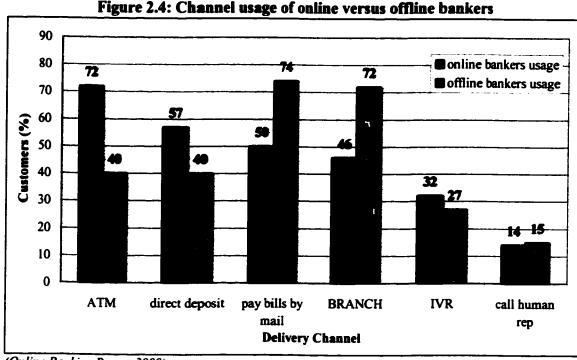
(CvberAtlas 1999)

In a study by Howcroft *et al.* (2002), a number of relationships between demographic characteristics and delivery channel usage were found. Consumers aged 26 to 35 had the lowest preference for the branch channel and the highest preference for the telephone channel, and consumers aged 18 to 25 had the highest preference for the Internet channel. In contrast, consumer's aged 56 to 65 had the least preference for telephone banking. It was also found that high-income earners preferred electronic channels such as telephone banking for daily banking transactions, while the branch channel was preferred for investments and financial advice. Consumers with lower incomes were found to prefer the branch channel for banking transactions.

Demographic characteristics of consumers using the branch channel differ significantly from those using ADCs. Mols (1999) identified two main consumer segments in financial services, a branch banking segment and an Internet banking segment. The branch banking segment is comprised of mostly elderly, computer-illiterate persons who value personal relationships and contact with human tellers. They are generally less informed of market conditions and it is believed that this segment will shrink in size in most industrialized countries in the coming years (Mols 1999). In contrast, the Internet banking segment is comprised of younger consumers who are computer-literate and have access to a personal computer at home, or at the workplace. This segment is connected to the Internet, uses email, has credit cards, and seldom requires complex advice regarding their bank activities. The Internet segment is also price conscious, relatively affluent, well educated, and prefer this channel because it is convenient and cost-effective. Today, the Internet banking segment is relatively small

but growing rapidly. Because growth is occurring at a fast rate, the characteristics of those that utilize Internet banking will continue to change.

Research has also shown that clients who use Internet banking (online bankers) use other electronic ADCs more often than those that do not use Internet banking (offline bankers). In contrast, offline bankers were found to use the branch, pay bills by mail, and seek help from a human representative more often than online bankers (see Figure 2.4). The numbers of transactions that online bankers execute as compared to offline bankers also differ significantly with online bankers performing more transactions than offline bankers for all transaction types investigated (see Figure 2.5). One reason online bankers initiate transactions more frequently may be a direct result of the convenience and ease of use that ADCs provide.



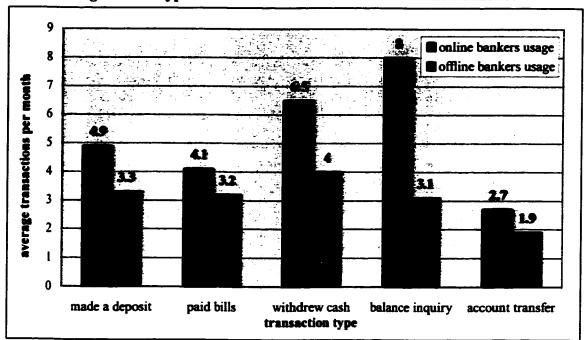


Figure 2.5: Types of transactions of online versus offline bankers

(Online Banking Report 2000)

2.3.8 Market Segmentation Systems

Many businesses, including the financial services, are interested in segmenting clients to determine what types of consumers are utilizing products, and more importantly where these consumers are located. For this reason, marketing companies that focus on segmenting populations are in demand. Banks usually divide their clients into segments, each of which prefers to use specific products (Kline 1999). By segmenting clients into groups based on demographic variables, marketers can target specific groups and develop new products and services to serve specific markets. Compusearch has developed one of the most comprehensive market segmentation systems used in Canada. This system, referred to as the PSYTE Cluster System, segments Canadian enumeration areas into one of 15 pre-defined major groups, which are further segmented into 60 pre-defined clusters. The PSYTE data is based on 250 individual demographic, geographic, and consumer purchase behaviour variables that are obtained from a number of sources. Data from the

1996 Canadian census are also incorporated into the PSYTE data set (Compusearch 2001).

Since private companies have developed many of the segmentation systems available, specific information regarding how the population has been segmented is kept private. Most companies provide descriptions of the types of people that each segment contains, and descriptions of the PSYTE groups that are found within the study area are located in Appendix B. Characteristics within the PSYTE data that bank marketers are typically interested in include age, income level, education, occupation, housing type, housing tenure, and projected growth. Although market segmentation systems are generalizations of populations living in areas, many banks incorporate such data in their network planning strategies.

2.3.9 Branch Location Strategies

Many consumers are utilizing ADCs but some still prefer to use the branch channel. DeCloet (2000) found that 70% of Americans prefer banking in branches and many clients find it necessary to visit their branch if problems occur. Although branch closures are occurring the extent of rationalization has not been as high as was originally anticipated when ADCs were first introduced. While the rationalization of branch networks is occurring internationally, the branch still has a strong presence in many communities. Industry analysts believe the branch will remain the main channel for retail banking into the foreseeable future, and many banks in the U.S. are increasing their branch networks (Mols 1999; Sheshunoff 2000). It has also been found that consumers who use ADCs want to be able to access accounts through multiple channels including branches (Lewis and Disney 2000). For this reason banks need to determine how a

branch network fits into their overall distribution strategy, and more importantly, the number of branches as well as the branch locations that will satisfy consumer demand and maximize profits.

Consumers want convenience in their bank's branch network with locations where they live and work. The most convenient network in an area typically wins a greater market share than an institution that has a greater total number of physical outlets. The number of branch locations that a bank has in a market area is relevant as it has an important affect on the success of a bank. Carroll (1992) states that having a high proportion of branches in a market gathers a more than proportionate share of the available deposits in that market, and banks with a low share of branches typically gather a less than proportionate share of deposits. This is a widely observable phenomenon in branch location planning, and the rule of thumb is to always have 10 to 20% of branches in an attractive market (Carroll 1992).

The location of a branch must satisfy the needs and wants of the marketplace while achieving the objectives of the bank; in many cases, the main objective is profitability. Banks look at factors including ratio of population per branch, new residential construction, new business, and commercial construction when planning their networks. Additional factors important to banks include the number of households in the area, employment levels, commercial activity, shopping facilities, competition, traffic patterns and access, compatibility with existing network, and potential money (Channon 1986).

The physical location of bank branches is very important to both clients and banks. The branch network continues to play a vital role as more than 90% of consumers, including users of ADCs, use branches for select activities (Cardwell 1997). It was once

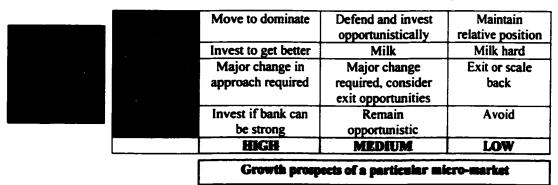
believed that when a bank had a small number of branches in a region, market share would be low because the density of access points was low (Birkin et al. 1996; Cardwell 1997). This phenomenon is known as the network effect where market share is enhanced through the development of the branch and ADC network. Beyond a certain level, the network effect begins and market share grows rapidly up to a point where the network is saturated and new branches are only taking clients from existing branches in the same network, resulting in an inefficient network (Birkin et al. 1996). The belief that market share is positively related to the size and density of the branch network may not be accurate anymore as ADCs have undermined the importance of having a large branch network. It is therefore important for banks to understand how their networks operate. Many banks agree that current branch networks are too dense, and banks that are looking to reduce costs often rationalize their branch networks (Mendonca and Nakache 1996).

Bank branches traditionally serve a primary service area, which is the geographic area from which 70-80% of clients originate (Channon 1986). Service area is not restricted to individual consumers' place of residence since a significant proportion of individuals conduct banking transactions where they work. Residential population in the primary service area is one of the most important factors in determining service area (Channon 1986). Additional factors affecting a branch's success include household statistics, population statistics, housing characteristics, and income. Many banks also look at existing branches in the area and services offered at these locations (Bennett 1975).

Some banks use a strategic decision matrix when deciding whether they should retract or move into a market (see Table 2.5). Factors considered include the growth and decline of populations in an area, how consumers are using the network, the value of outlets, and

locations of alternative outlets (Bekier et al. 2000). Carroll (1992) found that many banks over-represent themselves in naturally weak markets and have a poor location mix in attractive markets. Successful branch networks consider market selection, location selection, local network design, site selection, and tactical exploitation of the location, as revenue generating potential of a branch is a direct function of its location in the marketplace (Carroll 1992).

Table 2.5: Developing a micro-market strategy



(Bekier et al. 2000)

The decision whether to rationalize a branch network is a complex decision for banks to make; if they move out of an area, then they could potentially lose market share and if they stay in an area that is not providing the correct number of clients, then they stand to lose large amounts of revenue. Greenland (1994) cites several considerations made by banks when making the decision to rationalize their branch networks:

- Closure of non-profitable branches in markets offering little promise for improvement;
- Down-grading the level of service provision supplied at certain outlets and upgrading others where needed;
- Relocation to profitable new sites;
- Opening new branches in geographical locations where the bank is not yet represented;

 Minimization of client disruption and dissatisfaction resulting from restructuring of network.

It is also important for banks to determine whether they should stay in a less attractive market area for the sole purpose of remaining visible to consumers. Banks may do this in order to use the branch as a marketing tool, as well as to show support for the community in which they are located.

Many factors contribute to the planning of a branch network, and as financial services in Canada continue to change, it will be necessary for banks to continuously analyze how their networks are operating in order to maintain a network that both satisfies consumer needs and maximizes profits. Although the introduction of ADCs has changed how clients are banking, there will always be a need for bank branches. For this reason finding the correct balance between a banks branch network and the ADCs they offer is imperative.

2.4 Driving Forces of Changes in the Retail Financial Services

A number of driving forces have acted together to shape today's financial services industry. These driving forces are responsible for the change in how Canadians perform banking transactions and include: technology, globalization, changing lifestyles and demographics, competition, and deregulation. The following sections briefly outline these driving forces.

2.4.1 Technology

Technology has changed significantly in the last 20 years resulting in computers that are more sophisticated and powerful. This technological revolution, in combination with decreased information processing costs, has contributed to the development of ADCs (Task Force 1998; Devlin 1995). These developments are also enabling banks to

concentrate on the development of ADCs, which in turn enables them to reduce the amount of costly bricks and mortar branches (Macklem 1999; Lowe and Kuusisto 1999). Changes in the storage and speed of data transfer also affect how banks operate (Joseph et al. 1999). Many banks have centralized processing centres and call centres that reduce the need for large branch networks and profits are therefore increased (Moutinho and Smith 2000).

2.4.2 Deregulation and Policy Changes

Canadian markets have been extremely dynamic in the last 15 years due to the driving force of deregulation (Cardwell 1997). Canadian banks are publicly owned but regulated by government policies. Many policy changes have occurred including how foreign banks operate in Canada, how Canadian banks operate internationally, and how Canadian banks interact with one another. The government also regulates bank mergers and in recent years, there have been a number of proposed mergers between Canada's top banks. Royal Bank and Bank of Montreal announced their proposal in January 1998, and Canadian Imperial Bank of Commerce and Toronto Dominion Bank announced their proposal in April 1998 (Task Force 1998). Due to government regulation, neither one of these proposals was approved. In January 2000 the Canadian government approved the merger of Toronto Dominion bank with Canada Trust. A condition of the approval was the sale of 13 southern Ontario branches, as the merger would cause an excessively dominant market share in the area (Toulin 2000; Globe and Mail 1998b; Financial Post 2000). Toronto Dominion bank and Canada trust also announced they would close an additional 275 branches across Canada over the coming years (Whillington 2000; The Record 2000). Concerns regarding merger proposals revolved around the closure of

branches, and one study found that if all of the proposed mergers had been approved approximately 350 branches in the Toronto area would have closed. Banks state that closures are inevitable whether mergers occur or not (Canadian Press 1998).

Traditionally, financial services in Canada have been comprised of four pillars: banks, trust companies, insurance companies, and securities dealers. Deregulation is causing a breakdown of these barriers, as banks can now own subsidiaries that sell different products thereby allowing for increased profits and competition (Task Force 1998; Flur et al. 1997). Deregulation also affects the presence of foreign banks within the country and despite changes in policy, there are still significant barriers to foreign banks establishing themselves in Canada. Unless Canadian banking policies evolve, banks will face difficulties trying to break into new international markets, and many banks are closing branches in an attempt to compete more effectively outside the country (Morton 1999). Canada's bank regulatory scheme no longer reflects the conditions of the market and changes are needed if Canadian banks are going to compete effectively with one another and with companies internationally.

2.4.3 Globalization

Globalization is also influencing how the retail financial services industry operates. In the past, banks were localized and regional. Today, we are part of a truly global city and businesses are functioning almost without borders. Globalization has led to increased freedom of movement, transfer of monies and financial capital across the globe, and is integrating national markets into a new supranational system (Corbridge *et al.* 1994). Globalization is also weakening the importance of location as new technologies are

widening the choice of location and allowing firms to serve widely dispersed markets regardless of where they are located (Corbridge et al. 1994).

With the rejection of merger proposals in Canada, many banks are looking to generate profits by expanding into the U.S. and overseas, thereby resulting in a number of alliances between U.S. and Canadian banks. After the Canadian Imperial Bank of Commerce successfully expanded into the Canadian grocery chain Loblaws, they decided to pursue a U.S. bank with intentions of expanding into the U.S. Winn Dixie chain of supermarkets (Toronto Star 2000). Royal Bank has also expanded their Atlanta-based Internet bank, Security First Network Bank purchased in 1998, in hopes of increasing profits (DeCloet 2000). A number of international banks are also crossing borders to operate within Canada. A Netherlands banking and insurance conglomerate has opened a Canadian subsidiary, ING Canada, which accepts deposits, issues credit cards, and provides loans over the Internet only (Task Force 1998).

2.4.4 Competition

Competition also affects financial services. The current financial services industry is more competitive than in the past, and more concerned with operating costs resulting in an era of network rationalization (Cardwell 1997). Competition is increasing within Canada and with banks globally, and this increasingly competitive environment has resulted in pressure to develop and utilize ADCs (Daniel 1999). Canadian banks are trying to cut costs wherever possible to increase profits and compete effectively and, since the late 1980's, the increased demand for ADCs has presented an opportunity for banks to offset problems related to increased competition (Cardwell 1997). Canadian banks are competing with foreign banks, some of which are only operating Internet or

telephone services. This results in increased profits, as a costly branch network is not developed. In addition, the competition that Canadian banks face is increased (Birkin, et al. 1996; Macklem 1999; Whillington 1999; Lowe and Kuusisto 1999). The three main virtual banks in Canada are ING Direct, Citizens Bank of Canada, and mbanx (Stevenson 1999). Banks that encourage use of ADCs are innovative and gain a competitive advantage over those that focus on the branch network (Devlin 1995). In addition, Internet banks can operate at an expense ratio of 15-20%, compared to 50-60% for the average bank resulting in increased profits and competition (Booz 1997 in Sathye 1999).

2.4.5 Changing Lifestyles and Demographics

The growing acceptance of ADCs is largely attributable to changing lifestyles and demographics. Canadian lifestyles and demographics have changed dramatically in the last 20 years, resulting in increased mobility, increased use of technologies, and a generation that is more financially sophisticated (Jayawardhena and Foley 2000). The number of households with home computers has more than tripled to 36% in the past decade and it is estimated that in 1998, 50% had home computers and 37% were on the Internet (Task Force 1998). With the increased use of home computers and the Internet, banks are able to increase their geographic scope, and, as Canadians move out of cities into rural areas where branches are typically unavailable, the accessibility of ADCs is making it possible to complete banking transactions.

As consumers become more aware of ADCs and technology in general, their preferences are changing. ADCs provide a convenient way to bank from home, the office, or when traveling. Most consumers' wealth has increased over the last decade and more time is being spent on leisure activities resulting in less disposable time consumers

have to complete banking activities (Devlin 1995). Time is also important for families where both parents are working or have different work patterns resulting in increased demand for ADCs that provide time and cost savings and increased accessibility (Lowe and Kuusisto 1999). ADCs are giving consumers what they prefer: alternatives, lower costs, and convenient access to banking information and services. Canadians' need for banking products is also changing as there has been a shift from deposit accounts to investments such as mutual funds, thus changing the necessity of branches and in many cases making them inefficient to operate (Task Force 1998).

The demographics of Canadian societies are changing and many factors, including age, socio-economic group, occupation, household composition, and life-cycle stage, influence the uptake of financial services more than any other factors (Birkin *et al.* 1996). As a more computer literate generation emerges that is more trusting and at ease with technology, use of ADCs will continue to increase and affect the traditional branch network (Devlin 1995).

Consumer preference has become more heterogeneous as clients move between coexisting delivery channels, and changing consumer needs has been cited as one of the
reasons for the slowed construction of new bank branches as well as the increase in
branch closures (Daniel 1999; Moutinho *et al.* 1997). Clients today are empowered and
ADCs give the feeling of having direct control over ones finances. Traditional
relationships with banks have also been found to be less important as many clients are
shopping around and less loyal to their bank of choice (Task Force 1998; Lewis and
Disney 2000).

2.5 International Experiences in Retail Financial Services

It is difficult to compare the banking systems of different countries because all provide a different mix of products and services as well as different procedures, processes, and policies (Moutinho *et al.* 1997). However, it is apparent that many of the experiences that Canadian banks are having, including the move towards ADCs and restructuring of branch networks, are also occurring internationally.

2.5.1 Banking in the United Kingdom

Banks in the UK are experiencing increased competition resulting from government deregulation that began in the early 1970's, and up until that time, there was a heavy reliance on the traditional branch network (Devlin 1995). In the UK, insurance companies and retailers are entering the financial services market and affecting how banks operate (Lowe and Kuusisto 1999). Technology has also changed the delivery of services in the UK, thereby resulting in a strong ABM and point of sale (POS) network. Consumers in the UK enjoy the convenience of ADCs, as 66% of clients surveyed had not been to a branch in the 12 months before the survey (Howcroft and Beckett 1996). The UK banking industry is working to rationalize its branch networks to increase profits and compete effectively and many banks feel their branch networks are too dense (Longley and Clarke 1995).

Between 1980 and 1992, 2500 branches were closed in the UK; Barclays alone closed 400 branches between 1978 and 1989 (Birkin *et al.* 1996; Gentle 1993). In 1999, Abbey National announced the closure of half of their 3500 customer counters and began steering clients to less expensive ADCs (Bawden 1999a). UK banks are also closing branches due to increased use of their telephone banking system, which is one of the most

advanced systems in the world. Branch closures are also a concern in the UK where it was found that more than 600 communities were without a bank (Marketing Week 1999). Concerns regarding branch closures in the UK have also been raised, as they were found to occur in urban areas, and reflected income and class patterns that may result in accessibility issues for lower income areas (Leyshon and Thrift 1995).

2.5.2 Banking in the United States

Financial services in the U.S. have also undergone many changes. U.S. banks are trying to decrease branch transactions by introducing ADCs but have not been successful in closing branches. Although the number of U.S. banks has fallen since the mid 1980's, Rubin (1999) found that the number of branches has risen steadily at a rate of 2% annually. It has also been found that U.S. consumers select their bank based on availability of branches, regardless of frequency of use, and branches remain the dominant delivery channel for financial services (Rubin 1999; Sheshunoff 2000).

2.5.3 Banking in Australia

The financial services industry in Australia is also experiencing the same driving forces as Canadian banks including; competition, deregulation, and changes in technology (Avkiran 1999; Joseph *et al.* 1999). The branch is still the main delivery channel used in Australia and restructuring of the branch network continues (Avkiran 1999; Nahan 2000). Australian banks are also discouraging clients from using branches by imposing fees for branch use. This strategy is detrimental in the long-term, as customer satisfaction and therefore profits will decrease (Combs and Bourne 1995).

2.6 Social Implications of Changes in Retail Financial Services

The two main changes occurring in Canadian retail financial services include a changing branch network and an increase in the use of ADCs. These changes have social as well as spatial implications for the populations that are being impacted. Critics believe that with the changes that are occurring there will be some individuals that will not have access to financial services and are therefore financially excluded. It is necessary to investigate issues of accessibility because Canadians are having greater consumer participation in financial services, thereby resulting in more people being impacted by any changes that occur (Cardwell 1997). The issue of financial exclusion has received much attention from the media, public agencies, government agencies, as well as from the banks, but there is not a wide body of Canadian literature pertaining to this topic.

With the increased use of ADCs, many concerns regarding branch impacts have been raised; the primary concerns being how many branches will close and where. The Canadian Bankers Association (2000) found that the absolute number of bank branches in Canada has remained relatively constant over the past 20 years. This statistic looks at absolute number of branches and does not consider population growth. The Canadian Bankers Association also includes small banks and credit unions that do not act in the same manner as the larger banks. Research by the Task Force on the Future of the Canadian Financial Services Sector (1998) found that many communities have lost bank branches and, according to this data, 122 communities were left with no branch after closures had occurred between 1991 and 1996 (see Table 2.6).

Table 2.6: Communities* in Canada to lose branches 1991-1996, by Region

				_		
#Of branches in 1996:	Too	One	Ness	One	Neas	Ness
Alberta	1	1		1		10
British Columbia				1	ı	4
Manitoba	1					8
New Brunswick		1		1		4
Newfoundland		1		1		5
Nova Scotia						7
Ontario			1	3		28
PEI						1
Quebec	4			2	1	12
Saskatchewan	3			5		40
Total	9	3	1	14	2	119

^{*}Definition of 'community' based on place names listed in Canadian Payments Association Directory (Task Force 1998)

Research indicates that branch closures are of primary concern to those living in smaller rural communities and low-income urban neighbourhoods (Task Force 1998; McQueen 1999). Branches in rural communities must deal with populations that are shifting to suburban and urban areas and thereby reducing their consumer base. These small town branches are economically inefficient to operate and, with decreases in population and increased use of ADCs, decreasing the branch network has become a viable option. Loss of a branch does cause problems in communities especially when clients are uncomfortable with ADCs. Clients that use branches are often poorer than those using ADCs and residents of inner cities and small communities are less likely to use electronic services (Bawden 1999b; McCarthy 1999). Most major banks in the U.S. abandoned urban centres long ago by closing branches in many predominantly African-American and Latino inner-city areas (Leyshon and Thrift 1995). Some banks have opened branches to serve communities that do not have access. For example, Bank Boston opened branches in the inner city where 17% of the city population lived although only 4% of bank branches were present (Johnson 1998).

Leyshon and Thrift (1995) found that the inability of groups to access banking services prevents poor and disadvantaged social groups from gaining access to financial services and thus enlarges geographical differences in levels of income and economic development. Without access to banking services, daily life can become difficult especially since one third of transactions in the UK and the U.S. are made without cash (Leyshon and Thrift 1995). Jones (1996) found that banks identify branches that are non-profitable and under-performing for closure and, unfortunately, many branches in low-income areas will satisfy both criteria as populations with less income are typically not profitable to banks. Concerns in the U.S. regarding discrimination in lending is also becoming more apparent as banks 'steer' less profitable clients into delivery channels that may have higher rates or less customer service (Barefoot 2000).

Concerns regarding access to ADCs, which are often presented as alternatives to branch banking, are also increasing. Early studies in the U.S. have revealed evidence of a 'digital divide' with Internet users being generally wealthier and more highly educated (Barefoot 2000). If this is the case, an inequality exists between which groups have the ability to bank online and which groups do not. Furthermore, if branches are closing in areas where groups do not have access to ADCs then these consumers will be excluded from financial services (Katz and Aspden 1997).

The switch from branch banking to ADCs is occurring at a fast rate and concerns regarding how different segments of the population will deal with these changes are relevant. It is difficult for some clients to keep pace and many may find traditional routes disappearing before they are accustomed to ADCs (Task Force 1998). It has also been found that younger consumers are more likely to make extensive use of Internet banking

services as well as other ADCs. Banks need to be sure that ADCs are user-friendly for the aging population as well as for people with handicaps. It is important to note that the demographics of those using ADCs are changing, evident from the 15-20% of seniors in the U.S. utilizing the Internet (Lewis and Disney 2000).

Chapter 3: Methodology

3.1 Introduction

The objectives of this research were fulfilled using both qualitative and quantitative methods. The first objective was completed using a combination of mapping techniques and summary statistics in order to describe the distribution of branches in the study area. The remaining two objectives were fulfilled using a combination of contingency and regression analyses, as the goal was to find relationships between variables. This chapter presents scale of the research, the four types of data used, how the data was collected, research assumptions, descriptions of the statistical analyses that were performed, and research procedures for each objective. The chapter closes with a discussion of possible data errors.

3.2 Scale of the Research

All research was completed at the census tract (CT) level. The study area was made up of approximately 930 CTs for the 1986 census, 1050 for the 1991 census, and 1000 for the 1996 census. Only CTs where a branch existed at some point between 1986 and 2000 were investigated, since the focus of this research was on changes that occurred in the branch network during this period. Research was conducted at the CT level for a number of reasons. The first reason lies in the definition of a CT; a small geographic unit that represents urban or rural neighbourhood-like communities, and should be as homogeneous as possible in terms of socio-economic characteristics including similar economic status and social living conditions (Statistics Canada 1999). Because this research focuses on the demographic characteristics of populations that live in areas where branches existed, the fact that each area is as homogeneous as possible in terms of

these variables was ideal. Statistics Canada (1999) also states that the minimum population of CTs allow for statistically significant data tabulations, while the maximum facilitates delineation of homogeneous tracts.

An additional reason CTs were used relates to their population size. The population of a CT ranges between 2500 and 8000 while CTs in central business districts and peripheral areas sometimes have populations outside of this range. This range is closest to the average number of clients per branch of Bank X's 2000 network, which was 9700 clients per branch. The maximum population of an enumeration area (EA) is 800, which would have been too small of an area for the purposes of this research. In contrast, the average population of the census subdivisions (CSDs) used in this research was approximately 250,000, which would have been too large of an area for the purposes of this research.

3.3 Data Sources

Four types of data were used to fulfill the objectives of this research. These four types of data are discussed here. All data collected were entered into a database that consisted of one row for each branch that existed between 1986 and 2000. By organizing the data in this manner, mapping and statistical analyses could be performed with ease.

3.3.1 Branch Data

In order to map, as well as investigate changes to the branch network between 1986 and 2000, a listing of all branches that existed was required. A database of all branches with information including address, open date, close date (where applicable), branch intersection, and branch status was created. The branch status categories are found in Table 3.1, and were used to identify the status of each branch. The branch data is a

sample of Bank X's network over the specified period, within the study area. While the study spans 1986 to 2000, three different intervals were investigated in order to explore the changes that have occurred in more detail. These intervals include 1986 to 1990, 1991 to 1995, and 1996 to 2000, and were chosen based on the Canadian census years: 1986, 1991, and 1996. Changes that occurred within these intervals were examined in order to determine how Bank X's network had changed between 1986 and 2000.

Table 3.1: Branch status category descriptions

Branch Status	Description
Tellerless	Offers only tellerless services
No Change	Opened prior to 1986, remained unchanged
Opened 1986-1990	Opened between 1986 and 1990
Opened 1991-1995	Opened between 1991 and 1995
Opened 1996-2000	Opened between 1996 and 2000
Closed 1986-1990	Closed between 1986 and 1990
Closed 1991-1995	Closed between 1991 and 1995
Closed 1996-2000	Closed between 1996 and 2000

Although tellerless branches were not introduced into Bank X's network until 1997, branches that were converted to tellerless were coded as such for all periods in order to identify any differences that may exist between full service branches and branches that were converted to tellerless. A number of branches within the study area also relocated during the study period, and these branches were dealt with depending on where they had relocated. If a branch relocated and stayed within the same census tract where census data would be the same, then the branch was coded as no change. In contrast, if a branch relocated to a different census tract where census data would therefore be different, then the branch was treated as a closure of the original location and an opening of a branch at the new location to incorporate the two different sets of census data.

The branch data were collected from a variety of sources. All historical data were obtained from the Archival Department of Bank X. The data, including branches that

existed between 1986 and 2000, were provided in information sheets, which included addresses as well as dates when branches opened, closed, relocated, or converted to tellerless. A complete listing of the 2000 branch network was also obtained from the Network Planning Department of Bank X as latitude and longitude coordinates. All branch data were crosschecked using a number of different sources, including Bank X's customer service call centre where employees have access to branch directories. Bank X's web site, which lists current branches and services provided, was also utilized. For cases where postal code information was not provided, the postal code lookup function on the Canada Post website was used (Canada Post 2000). This main list of branches was then used for each of the objectives that relate to the branch network.

Delivery channel usage data were obtained from the Network Planning Department of Bank X, and were available only for branches that were operating in January 2000, the month the data were collected. The data does not represent delivery channel preference for each client, but rather the number of clients that used each of the channels. Because some clients utilize multiple channels to perform daily banking transactions, the data contains some overlap. The delivery channel data obtained were in two formats. The first contained the actual number of clients per branch that used each of the channels, and the second contained the percentage of the branches clients that used each of the channels.

Although point of sale purchasing (POS) was included as a delivery channel, it is different from the other delivery channels being analyzed. POS allows clients to purchase items, and receive cash back in some instances, but does not allow clients to perform daily banking transactions in the same manner as the additional delivery

channels being analyzed. It has been left in the analysis of delivery channel usage, in order to gain an understanding of who is using this service and how often. For this reason, care was taken in drawing conclusions in analyses where it was found that POS was used more often than other channels.

3.3.2 Spatial Data

Mapping changes in the spatial distribution of the branch network lends itself to analyses using a geographical information system (GIS), as there are definite spatial and attribute variables present. All maps were made using ArcView 3.2. In order to map changes that have occurred, spatial data were required. All spatial data were obtained from the TriUniversity Group of Libraries website, using the TriUniversity Data Resources (TDR) service (TDR 2001). Because this research focuses on changes that occurred between 1986 and 2000, and intervals of 1986 to 1990, 1991 to 1995, and 1996 to 2000, it was necessary to obtain spatial data for the years 1986, 1991, and 1996. Digital cartographic files for the 1991 and 1996 census tracts, the 1996 census subdivisions (CSDs), and the 1996 enumeration areas (EA) of the study area were obtained through the TDR site. The 1986 census tracts (CT) were also obtained through this site, although they were provided in the form of digital boundary files because cartographic files were not available for the 1986 census. The 1996 street network file was also obtained from this site.

3.3.3 Census Data

All objectives of this thesis required census data. The first objective required basic census data including population density and population change, while the remaining two objectives required census data that contained demographic information of the population

living in census tracts where branches existed during the study period. Canadian census data were used because it is available to the public and contained all variables that were required. The census data provided by the TDR consisted of a 20% sample of the population in order to suppress data for the purpose of anonymity. Exceptions to this 20% sample include the age group variable and the total population variable, which were based on 100% of the population. The highest level of education completed variable includes the population fifteen years of age and over. Census variables including income, incidence of low-income, and average value of dwelling contains data on private households. The definition of private household includes a person or group of persons occupying the same dwelling. The household may consist of a family group, with or without non-family persons; two or more families sharing a dwelling; a group of unrelated persons; or one person living alone, and excludes those people living in institutions or other collective dwellings (Statistics Canada 2002).

The census data obtained were found to have a large number of categories, making it difficult to decipher patterns and trends in the data. For this reason, the census variable categories were regrouped into new categories that would make the detection of patterns less difficult (see Table 3.2). The first two categories of the 1996 income data were found to be different from the 1986 and 1991 censuses, resulting in slightly different regrouped categories. Because this research is investigating the relationship between variables within each time interval, rather than comparing these relationships to different time intervals, the different income categories do not affect the analysis. All variables were regrouped based on prior studies that found differences in consumer usage of

delivery channels using similar groups (Al-Ashban and Burney 2001; Alfansi and Sargeant 2000; Howcroft et al. 2002; Rugimbana 1995; Stafford 1996).

Table 3.2: Regrouped census variables

	[REGROUPED		
VARIABLE	1986	CATEGORIES		
Education	Less than Grade 9	Less than Grade 9	1996 Less than Grade 9	Less than high
	Grade 9 to 13 no cert.	Grade 9 to 13 no cert.	Grade 9 to 13 no cert.	school
	Grade 9 to 13 cert.	Grade 9 to 13 cert.	Grade 9 to 13 cert.	
	Other non-uni. no dip.	Other non-uni. no cert.	Other non-uni. no cert.	High school
	University no degree	University no degree	University no degree	certificate
		University no cert.	University no cert.	
cert=certificate	Trade certificate	Trade cert.	Trade cert. or dip.	Certificate
uni=university	Other non-uni dip.	Other non-uni. cert.	Other non-uni. cert.	or diploma
dip=diploma	University degree	University degree	University cert.	University
	' '	University certificate	Uni. degree or higher	or higher
Income (\$)	< 9999	< 9999	< 9999*	< 14999
•	10k-14999	10k-14999		(1996 <9999)*
	15k-19999	15k-19999	10k-19999*	15k-19999
				(1996 10k-19999)
	20k-24999	20k-29999	20k-29999	20k-29999
	25k-29999			
	30k-34999	30k-39999	30k-39999	30k-39999
	35k-39999			
	40k-49999	40k-49999	40k-49999	40k-49999
	50000 >	50k-59999	50k-59999	50000 >
		60k-69999	60k-69999	50000
		70000 >	70k-79999	
		7,0000	80k-89999	
		1	90k-99999	
			100000 >	
Age	0-14	0-14	0-14	0-19
	15-19	15-19	15-19	• • •
	20-24	20-24	20-24	20-24
	25-34	25-29	25-29	25-34
	-0 0 .	30-34	30-34	25.54
	35-44	35-39	35-39	35-44
		40-44	40-44	33 -44
	45-54	45-49	45-49	45-54
	70°07	50-54	50-54	マノーンマ
İ	55-64	55-59	55-59	55-64
ĺ	JJ* U*	60-64	60-64	JJ-04
ļ	65 >	65 >	65 >	65 >
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^{*1996} regrouped income categories differ slightly due to differences in census income categories.

This research focuses on branches that existed between 1986 and 2000, with a more detailed investigation into time intervals including 1986 to 1990, 1991 to 1995, and 1996 to 2000. For this reason, the 1986, 1991, and 1996 censuses were used in order to have

the most accurate and recent data for each of the intervals investigated. The census data were obtained from the University of Toronto's Computing in the Humanities and Social Sciences Data Centre (CHASS), which was accessed through the TDR's 'Other Centres' service (CHASS 2002). The CHASS system had all required census data at the census tract (CT) level. Data from the three different censuses were attached to the appropriate branches, and changing the coding system of each differentiated the data of the different census years. A new variable was added to the database that identified which census years were applicable to each branch. For example, if the branch opened in 1989 and was still operating in 2000, the applicable census variable would indicate that 1991 and 1996 census data were applicable. Similarly, if the branch was operating in 1981, and closed in 1997, the applicable census variable would indicate that the 1986, 1991, and 1996 census data were applicable. The applicable census variable was used in the statistical analyses in order to omit branches that were not relevant to the specific analysis being performed. The delivery channel usage data was collected in January 2000, and for this reason was analyzed against the 1996 census data only, as this was the most recent census data available.

3.3.4 PSYTE Data

The 1999 PSYTE data, which were described in section 2.3.8, were obtained from the Network Planning Department of Bank X. Although the PSYTE data is at the EA level, it was used because it provides further insight into the demographic and socio-economic characteristics of the population living where branches exist. In order to correct for the numerous EAs located within a CT, as well as the possibility that these EAs may be

categorized as different PSYTE groups, the PSYTE group of the EA that the branch was located within was assumed to be the same for the entire CT.

Although the PSYTE data were based on a combination of the 1996 census, and 250 additional demographic, geographic, and consumer purchase behaviour variables, the data were analyzed against all time intervals, with the assumption that CTs have not changed drastically between 1986 and 2000. The PSYTE data were available at two different levels: groups and clusters. The group level consisted of 15 different categories while the cluster level consisted of 60 different categories. This research uses the group level which provides sufficient information to distinguish between demographic variables. The study area contains 10 of the 15 different groups. Descriptions of the different PSYTE groups located in the study area are found in Appendix B. The PSYTE data contains information on many different types of variables including urbanity, income level, age group, household type, education, occupation, housing type, housing tenure, and projected five-year growth. Although some of these variables are found in the census data, the PSYTE data were utilized as it contains many other types and sources of data thereby making it more complex.

3.4 Research Assumptions

This section discusses assumptions that were made in order to fulfill the objectives of this research. The first assumption made relates to the clients of Bank X. Because it was not feasible, or possible, to collect demographic data directly from the banks clients, it was necessary to find a surrogate source of data to study relationships between demographic variables of clients and the status of a branch, as well as delivery channel usage. The branch data set includes the number of clients associated with each branch,

and in turn, each branch in the study area is associated with a particular census tract that has its own set of demographic information from census data. The branch locations are also associated with a particular PSYTE group that contains its own set of demographic and socio-economic characteristics. The assumption being made in order to study these demographic variables is that the population that resides in the census tract where a branch is located is representative of the banks clients.

The analysis of delivery channel usage required a similar assumption since it was impossible to determine which types of consumers were utilizing the different delivery channels. The assumption made was that the proportion of transactions performed on a specific delivery channel in each census tract was distributed across the census variable's categories according to how the population was distributed across the same categories. For example, if 2.14% of a census tracts population has a less than grade 9 education, and there are 5077 clients of that census tracts branch that used an ABM, then the analysis assumed that 2.14% of these 5077 clients had a less than grade 9 education. Although caution must be used in how the results of this analysis are interpreted, they do allow one to get a sense of how delivery channel usage relates to the census variables being investigated. Contingency analyses that are affected by this assumption are identified by the message: *Delivery channel usage counts are scaled by the census tract counts, and impact the analysis of delivery channel usage against education, income, and age.

The final assumption made relates to the geographic location of Bank X's clients. The assumption made was that clients reside in the same census tract as the bank branch to which they are attached. Although some consumers do live in the same area as their bank branch, many consumers choose to be attached to branches in areas where they work.

Because many Canadian banks allow their clients to bank at any branch location, the need to transfer accounts when clients relocate to a new area has been negated. The rise in use of ADCs also makes it possible to bank from anywhere, with the location of the 'home' branch being irrelevant. The assumption was necessary since it was impossible for this research to factor in the spatial draw of branches in the study area.

3.5 Statistical Analyses

A Statistical Analysis System (SAS) program was used to run the selected statistical procedures including contingency and regression analyses. These statistical analyses were utilized to find spatial and temporal trends in the data, as well as to determine relationships between variables. The type of analysis performed in each objective was based on the type of data being used (UCLA 2002). Summary statistics, including frequency and percentages, were used to describe relevant variables. Contingency analysis was used to explore relationships between variables where both the independent and dependent variables were nominal, and were explored intuitively for the existence of spatial and temporal trends. For all contingency analyses performed, the dependent variable is shown in the vertical dimension, and the independent variable is shown in the horizontal dimension. Each cell in the body of the contingency table contains two numbers, an upper number and a lower number. The upper number indicates the number of clients in the sample of branches who had the associated values of the row and column variables. The lower number indicates the percentage that the upper number is of the total of the counts in the associated row. The row percents of the contingency analyses were graphed and explored to find trends within the data. Regression analysis was used to find relationships between variables where both the independent and dependent

variables were continuous. The standard statistical test of linear regression analysis was used to look for evidence of a relationship between the variables being analyzed. A critical p-value of 0.05 was used.

3.6 Objective 1: Spatial Location of the Branch Network

Objective I was to identify where branches existed between 1986 and 2000, and to present and explain their patterns in spatial location. This objective was achieved by mapping the distribution of branches and by summarizing the changes that were observed.

3.6.1 Data Used

Data used for the mapping aspect of this objective included the listing of all branches and their respective branch status category. The CSDs and PSYTE data were then used to describe the spatial locations of branches that were mapped. The distribution and density of populations as well population change within CSDs were also examined in order to determine how the distribution of branches relate to these variables. Population distribution was used to determine how the study areas population was distributed among the different CSDs, and population density was used to investigate how the population varies from area to area, and how this relates to branch distribution. The population percentage change of CSDs was also used to investigate how the areas were growing, or declining, and how this relates to branch location. For this objective, the PSYTE groups were collapsed into urbanity categories which was possible since each group is labelled as either urban, suburban, town, or rural.

3.6.2 Research procedure

The full branch networks of Bank X were mapped for the years 1986, 1991, 1996, and 2000. A second set of maps that show branch status changes including openings and closures in between these periods were produced. The branch data was added to the spatial data using two methods. In cases where latitude and longitude coordinates were available, the branches were mapped using them. If no geographic coordinates were available, the full addresses of the branches were used in the geocoding process. Branches that were not matched using the geocoding process were mapped manually, using postal code, street network file, and intersection information. By mapping the distribution of bank branches over the study area for the different periods being investigated, each branch was then associated with a census tract number from the spatial data. If the branch existed for all three time periods, then three census tract numbers were associated with it; 1986 CT, 1991 CT, and 1996 CT, and the census data could therefore be attached to the appropriate branches.

Once the changes in branch networks were mapped summary statistics including frequencies and percentages were used to further describe the distribution of bank branches over the study area. These summary statistics were also used in order to determine both the type of change and amount of change that had occurred. The changes in branch networks were also analyzed against variables that relate to spatial location including, CSDs and urbanity. Analysis of these variables also included summary statistics including frequencies and percentage of changes by CSD and urbanity to further describe changes in spatial locations. Because the PSYTE urbanity variable is related to the PSYTE group data, they follow a similar distribution in the study area. The urbanity

data, which includes urban, suburban, town, and rural categories, were used as it provides information on the type of spatial location being analyzed at a broader scale than the group data.

The branch networks were also compared to population distribution, population density, and population percentage change for the CSDs of the study area. Upon investigation of the population density and population percentage change variables of the 1986, 1991, and 1996 censuses obtained from the CHASS centre, it was found that discrepancies including extreme values were present, and likely introduced during the data entry stage. In addition, when the data from the CHASS centre were compared to data from the Statistics Canada community profile web page, it was found that too many errors were present in the CHASS data to make it useful (Statistics Canada 2002). For this reason, the 1996 population density and population percentage change between 1991 and 1996 by CSD obtained from the Statistics Canada website were used. Only the 1996 data were used, as it is most recent, and provides sufficient insight into both how populations are distributed among the study area and how these populations are changing.

3.7 Objective 2: Demographics and the Branch Network

Objective 2 was to investigate relevant demographic characteristics of the population that lives in census tracts where branches existed between 1986 and 2000, in order to determine whether relationships exist. Emphasis was placed on whether relationships exist between demographic variables and branch status in each of the time intervals rather than comparing how these relationships changed over time.

3.7.1 Data Used

The data used for this objective included the full listing of branch locations together with the branch status variable and various demographic variables. All variables used in objective 2 were categorized as nominal. The PSYTE data were utilized again, but rather than using the collapsed urbanity data, the group data were used as it provides a more thorough investigation of demographic and socio-economic characteristics. The census variables used to explore demographic characteristics include education, income, and age (see Table 3.3). These variables were chosen for the analyses as they are among those that most influence the uptake of financial services and delivery channel usage (Al-Ashban and Burney 2001; Birkin et al. 1996; Howcroft et al. 2002; Rugimbana 1995).

Table 3.3: Objective 2 – Nominal census variables

Census Variable	Description of Variable	Census Years		
Education	Number of people that have completed each of the categories as their highest level of education.	1986, 1991, 1996		
Income	Number of private households in the census tract that belong to each of the income range categories.	1986, 1991, 1996		
Age	Number of people in the census tract that belong to each of the age group categories.	1986, 1991, 1996		

3.7.2 Research Procedure

Summary statistics, including frequencies and percentages, of the PSYTE groups where branches existed were used in order to describe the demographics of the populations living in these areas. The PSYTE groups located within the study area were also mapped. Because each of the census variables used in this objective are categorized as nominal, contingency analyses were performed. The dependent variable in each analysis was branch status, and the independent variable was one of the census variables of interest including education, income, or age. Each analysis was performed for the census years 1986, 1991, and 1996, and the row percents of the contingency analyses

were graphed in order to explore trends between the dependent and independent variables.

3.8 Objective 3: Demographics and Delivery Channel Usage

Objective 3 was to investigate relevant demographic characteristics of the population that live in census tracts where delivery channel usage data were available, in order to determine whether relationships exist. Because the delivery channel usage data were collected in January 2000, all data were analyzed against the 1996 census data.

3.8.1 Data Used

The data used for this objective included the full listing of branch locations that were operating in January 2000, and their associated delivery channel usage data. The delivery channels investigated include ABM, branch banking, POS purchasing, telephone banking, and Internet banking. Two types of delivery channel data were used; those that contain the number of clients that used each channel, as well as the percentage of the total number of clients that used each channel. The type of data used depended on the relationship being investigated. The PSYTE group data were used in order to investigate relationships between demographic characteristics of the PSYTE groups and delivery channel usage. Nominal census variables, including education, income, and age, were utilized in order to determine how demographic characteristics of the population relate to delivery channel usage. Two additional census variables, which are categorized as continuous, were used for this objective; incidence of low-income households and average value of dwelling (see Table 3.4). These census variables were utilized as they provide further insight into the demographic characteristics of populations utilizing the different delivery channels.

Table 3.4: Objective 3 – Continuous census variables

Census Variable	Description of Variable			
Incidence of	Incidence of low-income among the population living in private			
Low-income	households, as a percentage. Based on family expenditure data,			
	and the consumer price index (Statistics Canada, 2002).			
Value of dwelling	Average value of occupied private dwellings			

3.8.2 Research Procedure

For variables categorized as nominal, contingency analyses were performed. These variables include PSYTE group, education, income, and age. The dependent variable in each analysis was delivery channel usage, and the independent variable was any one of the aforementioned variables. The contingency analyses performed on delivery channel usage data utilized the absolute numbers of clients that used each channel, rather than the percent of the branches clients using each of the channels. The data were collapsed into a single variable, transaction type, which had the five different delivery channels as possible values thus displaying the data as nominal. The row percents of the contingency analyses were graphed and explored for trends between the dependent and independent variables.

Because the independent variables in the next set of analyses was continuous, the delivery channel usage data used were in the form of the percent of the total number of clients that used each of the delivery channels, thus making it continuous as well. By using the delivery channel data in its continuous form, the issue of having different numbers of clients attached to the different branches was corrected. An appropriate procedure to study these relationships was regression analysis since both the independent variable and dependent variables were continuous. Regression analyses were used to determine the relationship between each of the five delivery channels, and the two continuous census variables; incidence of low-income and average value of dwelling.

The dependent variable in each analysis was one of the five delivery channels, and the independent variable was the continuous census variable of interest. For the regression analyses performed, each channel was analyzed individually against the census variable of interest. Because the delivery channel usage data and the incidence of low-income data were percent, their values were limited to a 0 to 100 range. This data, therefore, lacks variance stability, and were constrained in a way that made standard regression analysis not fully appropriate. For this reason, a correction was applied to the percentages to make the data behave more like regular variables. To stabilize the variance, the standard arcsine square root transformation was applied to the values (Draper and Smith 1998). All relationships that were analyzed and the type of analysis used in objective 3 are listed in Table 3.5.

Table 3.5: Objective 3 - Types of analyses used

Relationship	Type of Analysis
Channel use vs. PSYTE group	Contingency analysis
Channel use vs. education	Contingency analysis
Channel use vs. income	Contingency analysis
Channel use vs. age	Contingency analysis
Channel use vs. incidence of low income	Regression Analysis
Channel use vs. value of dwelling	Regression Analysis

3.9 Possible Data Errors

A number of possible errors that relate to the source of the primary data may have influenced the analyses. Through communication with the Archive Department of Bank X, it was found that errors may exist in the opening and closing dates of branches, as there was no formal way of collecting this data until recently. There also may be further inaccuracies in the census data obtained from the CHASS centre, as errors may have been introduced during the data entry process. Summary statistics of the census variables were

performed, and investigated for any 'unreasonable' values in order to minimize the occurrence of these errors.

There may have also been errors in the mapping of the bank branches, as data were mapped using geographic coordinates where available, geocoding, and manual techniques when the geocoding process was not able to find a match. Because the data were mapped using these different techniques, errors may have occurred. Care was taken in verifying the location of bank branches by looking at street intersections, as well as postal code and address information attached to the street network file.

Chapter 4: Analysis and Discussion

4.1 Introduction

This chapter presents the results of the research procedures performed for each of the objectives. The results of objective 1, which was to identify where branches existed between 1986 and 2000, include maps that were produced and summary statistics that describe spatial location. The results of objective 2, which was to investigate demographic characteristics of the population that lives in areas where branches existed between 1986 and 2000, include summary statistics and contingency analyses that explore the relationship between demographics and branch status. The results of objective 3, which was to investigate demographic characteristics of the population that live in areas where delivery channel usage data were available, include contingency and regression analyses that explore the relationship between demographics and delivery channel usage. This chapter also includes a discussion of each analysis with a focus on trends and patterns found in the data.

This research consists of three main objectives, each of which has a number of research questions. These research questions can be viewed in terms of hypotheses. The research hypotheses, together with how each relates to the three research objectives, are located in Table 4.1. Each of the research hypotheses was rejected or accepted, depending on the results of the analyses performed.

Table 4.1: Research Hypotheses

Objection	December 15
Commerce	Research Hypotheses The branch network of Rank Y has experiment an increased number of hours.
:	The branch hetwork of bank A has experienced an increased number of branch
	closures as compared to in the past.
I	 Branch status does not depend on population distribution, population density, or
	population change.
	 The branch network of urban areas is denser than suburban areas, with closures
	occurring in urban areas, and openings occurring in suburban areas.
	A larger percent of the branch network is located in the affluent PSYTE groups.
	In areas where education levels are lower, branch closures will occur more
2	frequently, and openings will occur less frequently (1986, 1991, 1996).
2	In areas where income levels are lower, branch closures will occur more
	frequently, and openings will occur less frequently (1986, 1991, 1996).
	• In areas where consumers are younger, branches will be opening more
	frequently, and in areas where age groups are older, branches will be closing
	more frequently (1986, 1991, 1996).
	 Alternative delivery channels (ADCs) are used more frequently by affluent
	PSYTE groups, and the branch channel is used more frequently by less affluent
	PSYTE groups.
	 ADCs are used more frequently where education levels are higher, and the
3	branch channel is used more frequently where education levels are lower.
-	ADCs are used more frequently where income levels are higher, and the branch
i	
	channel is used more frequently where income levels are lower.
	• ADCs are used more frequently where populations are younger, and the branch
	channel is used more frequently where populations are older.
	• As the incidence of low-income populations increases, use of ADCs decreases
	and use of the branch channel increases.
	 As the average value of dwellings in an area increases, use of ADCs increases
	and use of the branch channel decreases.

4.2 Objective 1: Spatial Location of the Branch Network

Objective 1 was to identify where branches existed between 1986 and 2000 and to explain patterns in spatial location. This objective was achieved by investigating where branches were located as well as where changes, including openings, closures, and conversion to tellerless occurred. A number of variables were used to describe spatial location of branches as well as to determine the extent of change that occurred. These variables include branch status, census subdivision (CSD), and urbanity. The results of the mapping and statistical summaries are presented here.

4.2.1 Mapping Results and Discussion

In order to investigate the spatial location of branches between 1986 and 2000, a number of variables were mapped and summarized using frequency and percent of occurrence. The maps produced for this objective were described using both the CSD and urbanity variables. The branch status variable identified the type of change that occurred in the branch network as well as the amount of change that occurred. This variable also enabled the mapping of the networks at different time intervals. The CSDs that branches were located in were used to describe the spatial location of branches as well as how changes in the network relate to population distribution, population density, and population change. The PSYTE urbanity data were used to further describe the distribution of branches over urban, suburban, and town areas.

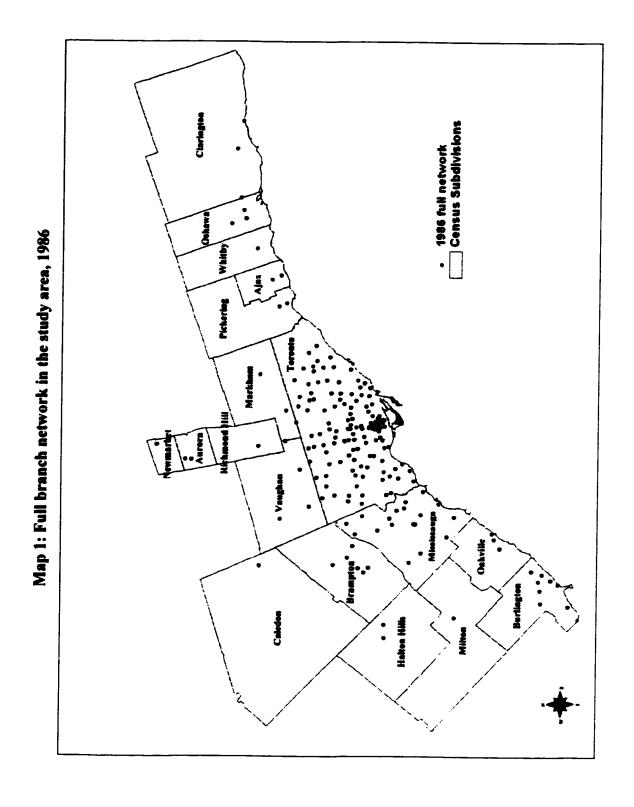
• Branch Status

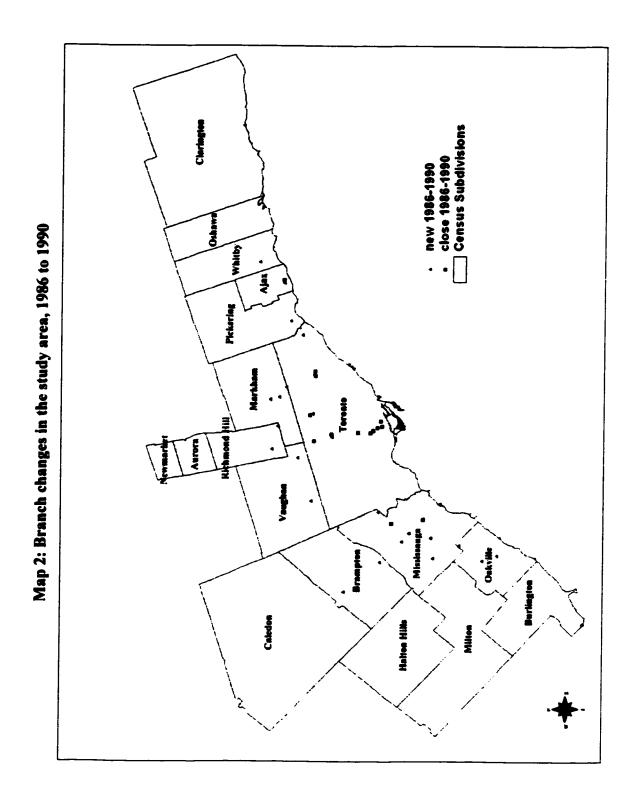
The full branch networks of 1986, 1991, 1996, and 2000 were mapped to determine how the distribution of branches changed between 1986 and 2000 (see Maps 1, 3, 5, and 7). The total number of branches in Bank X's network was found to increase between 1986 and 1991, and decreased for the remaining intervals. In 1986, the branch network consisted of 192 branches, in 1991 there were 215 branches, in 1996 there were 200 branches, and in 2000 there were 152 branches. Changes that have occurred, including openings and closures, were mapped and the 2000 network of tellerless branches was also mapped (see Maps 2, 4, 6, and 8). The branch status data were summarized in order to determine the type of changes that occurred as well as the extent of this change (see Table 4.2). It was found that for all branches that existed between 1986 and 2000, 9.05% converted to tellerless, 41.15% had no change, 12.35% opened, and 37.45% closed. The

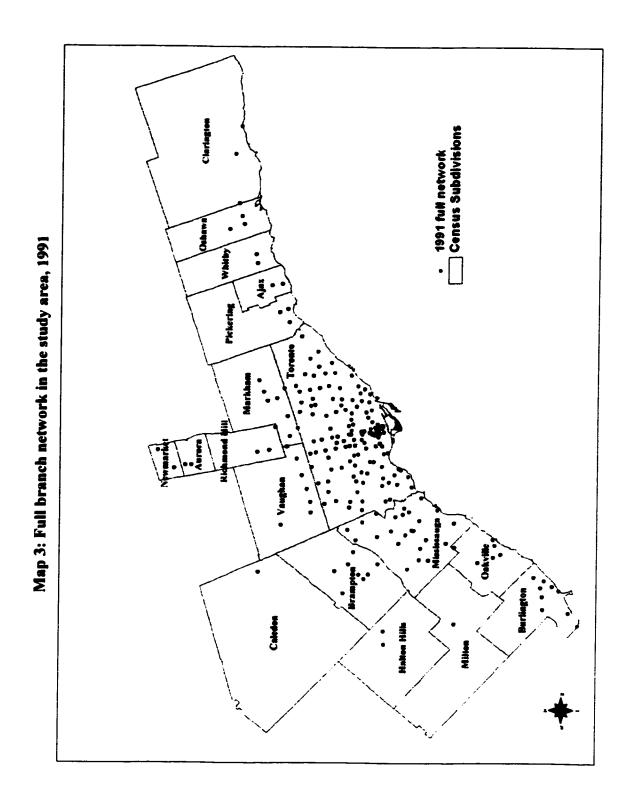
frequency of openings had declined through each of the time periods, with 13 branches opening between 1986 and 1990, 12 branches opening between 1991 and 1995, and 5 branches opening between 1996 and 2000. In contrast, the frequency of closings increased significantly, with 10 branches closing between 1986 and 1990, 33 closing between 1991 and 1995, and 48 closing between 1996 and 2000. The low occurrence of tellerless branches within the study area is due to the fact that Bank X did not introduce tellerless branches to their network until 1997. Although changes in the network have been occurring since 1986, it was found that the largest amount of closures occurred between 1996 and 2000, and the least amount of openings occurred between 1996 and 2000. The research hypothesis, which states that the branch network of Bank X experienced an increased number of branch closures as compared to in the past was therefore accepted.

Table 4.2: Summary of changes in branch status, 1986 - 2000

Branch Status	Frequency	Percent	
Telleriess	22	9.05	
No change	100	41.15	
Opened 1986-1990	13	5.35	
Opened 1991-1995	12	4.94	
Opened 1996-2000	5	2.06	
Closed 1986-1990	10	4.12	
Closed 1991-1995	33	13.58	
Closed 1996-2000	48	19.75	
Total	243	100	

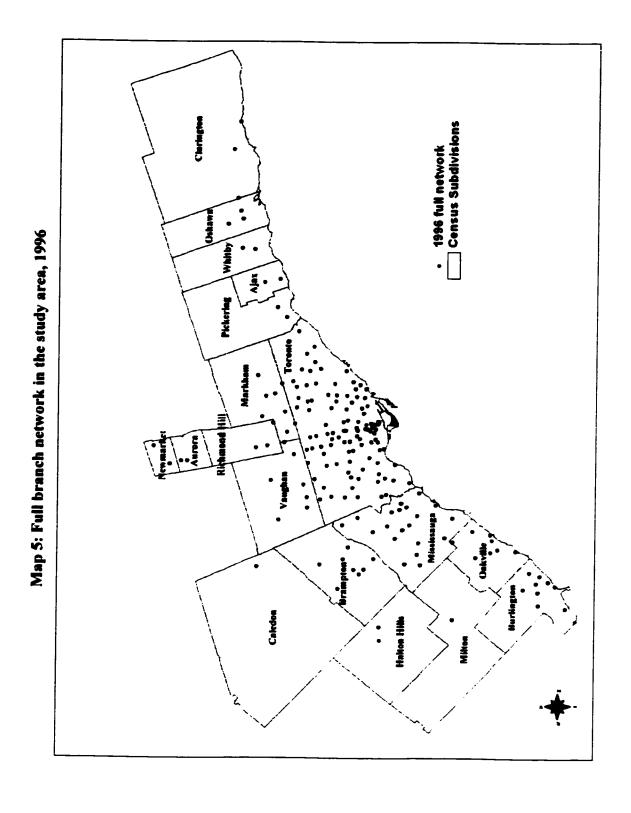


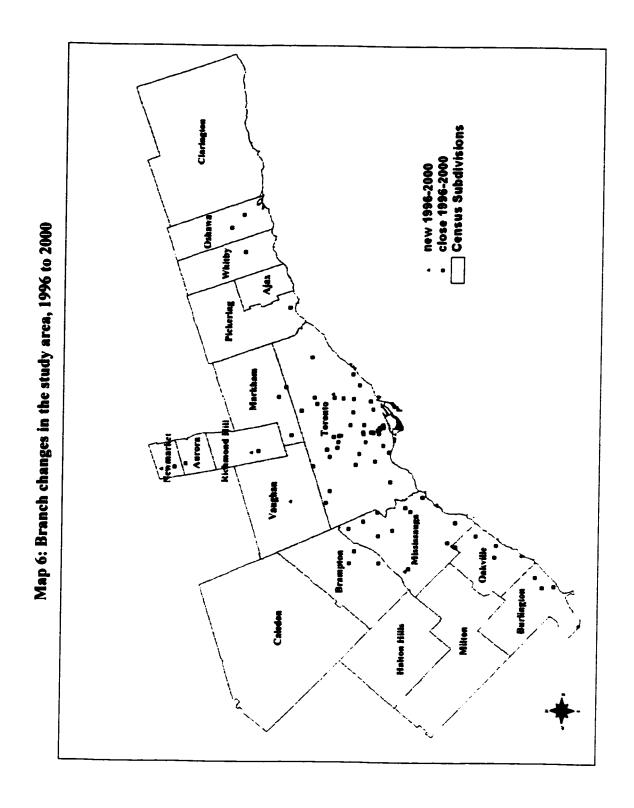




new 1991-1995 close 1991-1995 Census Subdivisions Map 4: Branch changes in the study area, 1991 to 1995 Pickering Markham Caledon

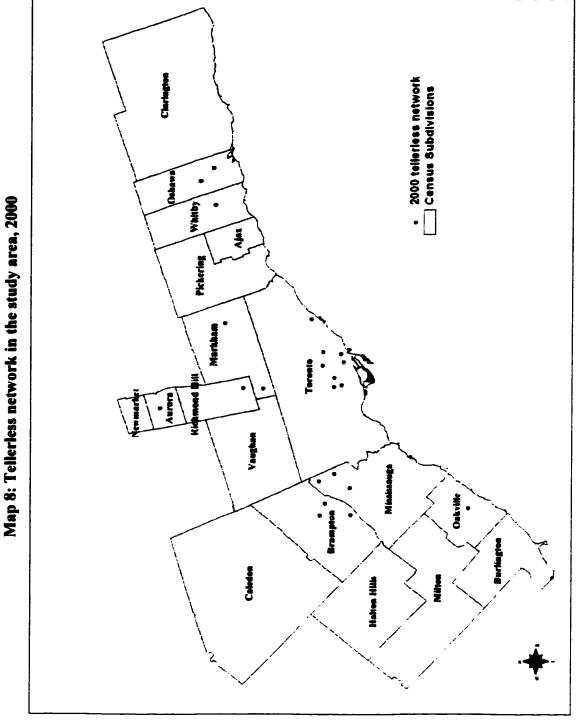
75





 2000 full network
 Census Subdivisions Map 7: Full branch network in the study area, 2000 Pickering Habes Hills

78



Census Subdivisions (CSDs)

The CSDs that branches were located in, as well as where changes have occurred, were investigated to describe spatial location. The distribution of branches across CSDs for 1986, 1991, 1996, and 2000 are shown in Table 4.3, and are also presented in Maps 1, 3, 5, and 7. For each of the years investigated, Toronto had the highest number of branches, although the number of branches was found to be decreasing between 1986 and 2000. Mississauga was found to have the second highest number of branches, and although the number of branches increased between 1986 and 1990, it was found to be decreasing between 1991 and 2000. Between 1986 and 2000, there were no changes in the number of branches in Milton, Halton Hills, Caledon, Ajax, Oshawa, and Clarington, and the number of branches in Brampton and Whitby remained the same since 1998. The remaining eight CSDs fluctuated in number of branches, with seven CSDs experiencing decline in the number of branches and one remaining the same between 1996 and 2000.

Table 4.3: Summary of branches by census subdivision, 1986 - 2000

		***		F
	1986	1991	1996	2000
Burlington	8	8	9	6
Milton	1	1	1	1
Oakville	3	6	8	5
Halton Hills	2	2	2	2
Mississauga	18	24	22	16
Brampton	6	8	8	8
Caledon	1	1	l	1
Toronto	132	131	109	79
Vaughan	4	8	9	9
Markham	2	6	7	5
Richmond Hill	1	3	5	4
Aurora	2	2	3	2
Newmarket	1	2	3	2
Pickering	2	3	3	2
Ajax	2	2	2	2
Whitby	ı	2	2	2
Oshawa	3	3	3	3
Clarington	3	3	3	3

The distribution of branches across CSDs were also compared to the distribution of population within the study area as well as population density. As previously stated, the 1996 CSD data for population density were used since the 1986, 1991, and 1996 data by census tract obtained from the CHASS centre were found to contain errors. For this reason, only the 1996 branch network was used in the comparison of population distribution and density in the study area. Table 4.4 presents the percent of the 1996 full branch network located in each CSD, together with the percent of the study area's total 1996 population located in each CSD, as well as the population density of each CSD (see Map 9). It was found that the distribution of branches across the CSDs followed the distribution of population over the study area closely. For example, the high occurrence of branches in Toronto and Mississauga can be explained by the large percentage of the study area's population that reside there, while the low occurrence of branches in CSDs including Milton and Caledon can be explained by the small percentage of the study areas population that reside there. The population density of CSDs were also compared to the distribution of branches within the study area. The large number of branches found in Toronto was consistent with the high population density of this CSD. The high occurrence of branches in Mississauga can also be attributed to high population density. In contrast, the low number of branches in Milton, Halton Hills, Caledon, and Clarington may be attributable to their low population densities.

Table 4.4: Distribution and density of population by CSD, 1996

Burlington	4.5	3.05	772.13
Milton	0.5	0.72	87.43
Oakville	4	2.86	929.26
Halton Hills	1	0.94	153.66
Mississauga	11	12.13	1987.81
Brampton	4	5.97	1012.12
Caledon	0.5	0.89	58.14
Toronto	54.5	53.13	3785.84
Vaughan	4.5	2.95	481.40
Markham	3.5	3.86	819.66
Richmond Hill	2.5	2.27	1023.18
Aurora	1.5	0.78	709.05
Newmarket	1.5	1.27	1590.78
Pickering	1.5	1.76	348.71
Ajax	1	1.44	951.70
Whitby	1	1.64	516.08
Oshawa	1.5	2.99	936.92
Clarington	1.5	1.35	99.73

709.05 - 1023.18 348.71 - 516.08 58.14 - 153.66 Clarington 3785.84 1967.81 1580.78 People/km³ Varighten Caledon Habon Hills

Map 9: Population density of CSDs within the study area, 1996

To further describe changes in the distribution of branches by CSD, the net changes that have occurred were explored together with population change (see Table 4.5). CSDs that had a net increase in their branch network have a positive number, those that had a net decrease have a negative number, and those that did not have any changes in their networks are assigned a value of 0. Toronto was the only CSD that experienced a net decrease in the branch network for all time intervals investigated, and also had the highest amount of change occurring. Mississauga was the only CSD to experience a net decrease in the branch network for the last two time intervals investigated. It was also found that while Toronto and Mississauga were the only CSDs that experienced net decreases between 1991 and 1995, the number of CSDs experiencing net decreases in their networks increased in the 1996 to 2000 time interval. Half of the CSDs in the study area were found to have net decreases during this time period, while the remaining CSDs were found to have no change occurring. No CSDs experienced net increases in their branch networks. CSDs that had a net decrease in branch network during this time interval include Burlington, Oakville, Mississauga, Toronto, Markham, Richmond Hill, Aurora, Newmarket, and Pickering. All remaining CSDs experienced no net change in their networks during this time interval.

The population change that occurred between 1991 and 1996 by CSD was examined to determine whether it was related to changes occurring in the branch networks (see Table 4.5). Similar to the population density data, only the 1991 to 1996 population change data was examined, as the data by census tract for all remaining census years were found to contain errors. All CSDs within the study area were found to have increasing populations between 1991 and 1996, although the rate of increase differed.

Milton and Oshawa had the lowest population growth, which may explain why the branch networks in these CSDs had remained unchanged between 1996 and 2000. Richmond Hill and Newmarket were found to have the highest percentage of population growth between 1991 and 1996, although they both experienced net negative changes in their networks between 1996 and 2000. The 1991 to 1996 population change data did not appear to play a role in where changes in branch networks were occurring, as all CSDs were found to be experiencing population growth differing rates, while none of the CSDs experienced net increases in their branch networks between 1996 and 2000. The research hypothesis, which states that branch status does not depend on population distribution, population density, or population change was therefore accepted for the first two variables, population distribution and density, and rejected for the population change variable.

Table 4.5: Change in branch occurrence by CSD, 1986 - 2000

				•
		Net Change	Net Change	Net Change
Burlington	5.7	0	1	-3
Milton	0.1	0	0	0
Oakville	12.0	3	2	-3
Halton Hills	15.1	0	0	0
Mississauga	17.5	6	-2	-6
Brampton	14.4	2	0	0
Caledon	14.1	0	0	0
Toronto	5.0	-l	-22	-30
Vaughan	19.0	4	1	0
Markham	12.7	4	l	-2
Richmond Hill	26.9	2	2	-1
Aurora	18.3	0	1	-1
Newmarket	25.6	1	1	-1
Pickering	15.1	1	0	-1
Ajax	12.3	0	0	0
Whitby	20.4	i	0	0
Oshawa	3.9	0	0	0
Clarington	22.5	0	0	0

PSYTE Urbanity

The PSYTE urbanity variable categorizes areas as urban, suburban, town, or rural based on the PSYTE market segmentation system. The urbanity data were mapped and summarized to further describe the spatial distribution of branches between 1986 and 2000 (see Map 10 and Table 4.6). In Table 4.6, frequency represents the absolute number of branches in each urbanity category, while percent represents the percentage of the full network in each urbanity category for each year. For all years investigated, more than half of the branches were located in urban areas, the second highest number of branches were in suburban areas, a small number of branches were located in town areas, and no branches were located in rural areas. By investigating the percent of each network located in these areas, it was found that the percentage of branches in urban areas has continually decreased between 1986 and 2000, while the percentage of branches in suburban areas continuously increased between 1986 and 2000.

Table 4.6: Summary of branches by PSYTE urbanity, 1986 - 2000

	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Urban	131	68.23	136	63.25	117	58.50	88	57.89
Suburban	54	28.13	72	33.49	75	37.50	61	40.13
Town	1	0.52	2	0.93	2	1.00	1	0.66
Rural	0	0	0	0	0	0	0	0
Not Coded	6	3.12	5	2.33	6	3.00	2	1.32
TOTAL	192	100	215	100	200	100	152	100

To understand why differences were found in the distribution of branches throughout the urbanity categories, the distribution of these categories over the entire study area were investigated. The study area was found to be 53.47% urban, 37.35% suburban, 2.36% town, and 0.01% rural. The distribution of branches over the urbanity categories was found to be very similar to the study area distribution, and therefore many of the patterns

observed were explained. For example, the large number of urban areas within the study area explained the high occurrence of branches in urban areas, while the absence of a rural branch network was explained by the lack of rural areas in the study area. The research hypothesis, which states that the branch network in urban areas is denser than in suburban areas, with closures occurring in urban areas, and openings occurring in suburban areas, was therefore accepted for the first statement, but rejected for the second statement, as it was found that branch closures were occurring in both urban and suburban areas.

PSYTE Urbanity
Urban
Urban
Town Not Coded

Map 10: PSYTE Urbanity in the study area, 1999

Objective 1 explored the spatial distribution of branches over the study area and changes that have occurred in this distribution between 1986 and 2000. A number of trends were observed and are presented here. The number of branches in the network of Bank X was found to be decreasing since 1991. Similarly, it was found that the number of closures increased over the time intervals, while the number of openings decreased over the same time interval. Literature pertaining to branch closures was found to be conflicting, with some studies finding increases in branch networks (Mols 1999; Sheshunoff 2000), and others finding decreases in branch networks (Task Force 1998; Jones 1996). This research coincides with the findings of studies that have found decreasing branch networks. Because use of bank branches has been found to be decreasing in recent years, Bank X may be decreasing branch networks as some locations have become underutilized. In addition, many banks are beginning to move into different types of businesses, and by closing branches banks are able to save money to invest elsewhere (Cardwell 1997).

Although the amount of closures occurring had increased, and the amount of openings occurring had decreased in each time interval, the largest differences occurred between 1996 and 2000. This period coincides with the increased use of alternative delivery channels (ADCs), which may be affecting Bank X's branch strategy. Channon (1986) found that as banks begin to invest in ADCs, they simultaneously begin to disinvest in the branch network. It is difficult to determine whether this has occurred in the case of Bank X, as the relationship between ADCs and branches is complex. Consumers may be using ADCs more often as a result of decreased access to branches, or banks may be decreasing

their networks in response to decreased use. It is also possible that the decrease in the branch network is in response to a combination of both of these relationships.

The distribution of branches over CSDs were also investigated in order to describe spatial location, and it was found that most branches were located in Toronto and Mississauga. The percent of the full networks branches located in Toronto were found to be decreasing, while in Mississauga it was found to be increasing. It was also found that the distribution of branches in CSDs followed the population distribution and population density in the study area closely. This is an indication that the number of consumers in CSDs does affect how many branches are located there, and follows the traditional branch planning strategy where it was believed that a high proportion of branches in a market area gathers a more than proportionate share of the available market share (Carroll 1992). Today, this strategy is not entirely applicable as many consumers prefer banking through ADCs and banks are beginning to realize this and may be responding by decreasing their networks. Population change was also investigated in order to determine how growth in the CSDs relates to the distribution of branches. All CSDs were found to be growing in population between 1991 and 1996, while no net increases in branch distribution were found for any of the CSDs. In fact, the only changes that occurred in branch networks between 1996 and 2000 were found to be net decreases indicating that the growth that occurred in CSDs was not impacting the branch distribution.

The PSYTE urbanity data were also investigated to determine how branches were distributed across urban, suburban, town, and rural areas. The results of this investigation found that a large proportion of Bank X's network was located in urban areas, with the occurrence of branches in suburban areas following. The percent of each year's full

network in each of the urbanity categories were investigated to determine how the distribution of each years network was changing. It was found that although urban areas had more than half of the branches, the percent of the network located in urban areas was decreasing. Similarly, although the number of branches in suburban areas was also found to be decreasing, the percent of the network located in suburban areas for each year was increasing. From these results, it is evident that Bank X is decreasing the percent of the network located in urban areas while increasing the percent of the network located in suburban areas.

The results of the urbanity analysis were found to concur with previous research that found branch closures were occurring in urban neighbourhoods more frequently than other areas (Johnson 1998; Leyshon and Thrift 1995; Task Force 1998). However, because the urban areas continuously had the most amount of branches, it was found that the bank is not withdrawing from these areas completely. Previous research has indicated that many branch networks are too dense for the needs of consumers today, as the traditional planning process of many banks was based on the belief that the more physical outlets a bank had, the more clients they would attract (Mendonca and Nakache 1996; Jayawardhena and Foley 2000). The decrease in urban branches may be a result of the realization of branch planners that dense networks are no longer necessary to serve consumers, as many are shifting to ADCs to complete banking transactions.

4.3 Objective 2: Demographics and the Branch Network

Objective 2 was to investigate the demographic characteristics of the population living in census tracts where branches existed between 1986 and 2000 in order to determine whether relationships exist. This objective was achieved by summarizing the PSYTE

groups where branches existed, as well as by examining relationships between census variables and branch status using contingency analyses. The census variables that were used include education, income, and age. Although many studies have been conducted regarding how demographics relate to delivery channel usage, few studies have been conducted on how demographics relate to the opening and closing of branch locations. For this reason, many of the relationships observed in this objective were not compared directly to previous research, but instead focused on expected trends.

4.3.1 Summary Statistics Results and Discussion

PSYTE Groups

In order to describe the demographic characteristics of populations living in census tracts where branches existed between 1986 and 2000, the PSYTE group data were summarized. Descriptions of the PSYTE groups are found in Appendix B, and the distribution of branches over the PSYTE groups for 1986, 1991, 1996, and 2000 are presented in Table 4.7. In Table 4.7, frequency represents the absolute number of branches in each PSYTE group category, while percent represents the percentage of the full network located in each PSYTE group category for each year. For each of the branch networks examined, the urban young singles group had the highest number of branches, and the urban ethnic group had the second highest number of branches. The groups that had the lowest number of branches include the town grey collar, town upscale, and urban downscale groups.

Groups that were found to have a continuously increasing percent of the network between 1986 and 2000 include suburban affluent and suburban younger families. The suburban affluent is the most upscale suburban group consisting of two income earners

that typically have high average incomes, are well educated, and have white or grey collar occupations. The suburban younger families group consist of new families with two income earners, have a high school or trade school diplomas, and have grey or blue-collar occupations. The increase of branches in areas such as these can be explained by the strategy of many banks that target these types of clients with products that increase revenues including mortgages, loans, and credit lines.

In contrast, groups that were found to have a continually decreasing percent of the network between 1986 and 2000 include urban elite, urban young singles, and urban downscale. It was not expected that the percent of each networks branches in the urban elite group had decreased in all of the time intervals, as this is the most affluent of all the PSYTE groups. Literature indicates that high income earners, including those that belong to the urban elite group, use ADCs for daily banking transactions and the branch for more complicated financial advice including investments (Howcroft et al. 2002). Bank X may be decreasing their branch network in these areas in response to this type of behaviour. The percent of each network's branches in the urban young singles group was also found to be decreasing in each of the time intervals, although this was expected as the consumers in this group have a high propensity to utilize ADCs, which may be resulting in an underutilized branch network. The decrease in occurrence of branches in the urban downscale area, which have the highest unemployment rates and the lowest education levels of all PSYTE groups, follows previous work that indicates closures are occurring in low-income urban neighbourhoods (Leyshon and Thrift 1995; Task Force 1998). The remaining groups were found to fluctuate in both number and percent of each network's branches.

Table 4.7: Frequency and percent of branches by PSYTE group

	FREQ	%	FREQ	%	FREQ	%	FREO	%
Suburban Affluent	9	4.69	19	8.84	23	11.50	18	11.84
Suburban Upscale Families	18	9.37	20	9.3	18	9.00	14	9.21
Suburban Older Singles/Couples	20	10.42	21	9.77	21	10.50	17	11.18
Suburban Younger Families	7	3.64	12	5.58	13	6.50	12	7.89
Town Upscale	1	0.52	1	0.46	1	0.50		0.66
Town Grey Collar	0	0	1	0.46	1	0.50	0	0.00
Urban Elite	18	9.37	19	8.84	16	8.00	12	7.89
Urban Ethnic	34	17.71	39	18.14	34	17.00	29	19.08
Urban Older Singles / Couples	20	10.42	21	9.77	20	10.00	15	9.87
Urban Young Singles	47	24.48	45	20.93	38	19.00	26	17.11
Urban Downscale	12	6.25	12	5.58	9	4.50	6	3.95
Not Coded	6	3.13	5	2.33	6	3.00	2	1.32
				;		2.00		

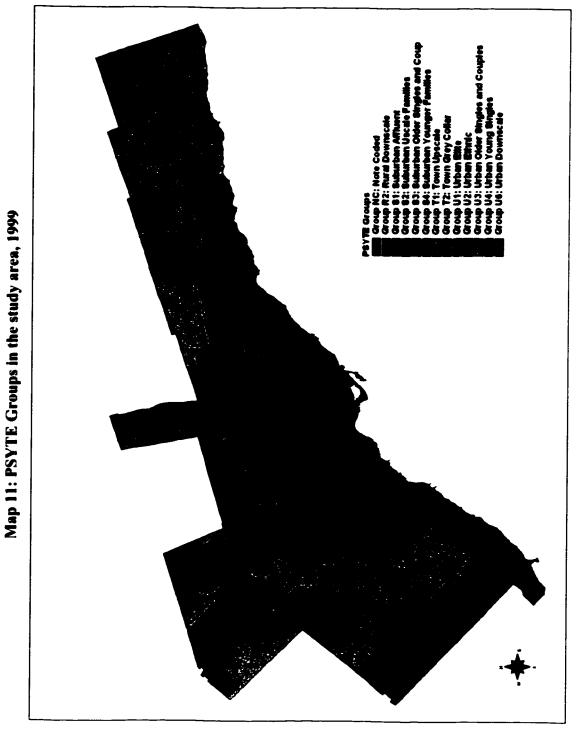
The distribution of PSYTE groups over the entire study area was also found in order to investigate how the distribution of branches relates to the study areas distribution (see Table 4.8 and Map 11). The high number and percent of each network's branches in the urban ethnic and urban young singles groups can be explained by their distribution over the entire study area. The study area was found to contain 20.20% urban ethnic and 15.74% urban young singles. In contrast, the low number and percent of each network's branches located in town upscale, town grey collar, urban elite, and urban downscale groups may be attributable to the low occurrence of such groups in the study area.

The distribution of branches over the PSYTE groups was also be compared to the study areas distribution in order to gain an understanding of which areas are being over represented and which areas are being under represented in the branch networks. For example, 6.02% of the study area is categorized as urban older singles and couples and this group contained 9.87% of the branches in the 2000 network. This may be an indication that banks are targeting the consumers located in these areas. Although this group contains the highest percent of people aged 75 and over, and typically have low

educations levels, they also have the second highest average income of all urban groups, which may make them desirable to banks. In addition, the high percent of elderly consumers in this group may make it a less desirable area to retract from, as many elderly consumers prefer to bank in a branch. Similarly, 5.89% of the study area is categorized as urban elite and this group contained 7.89% of the branches in the 2000 network indicating that the bank may be targeting wealthy consumers as potential clients. In contrast, while the urban downscale group made up 5.62% of the study area, this group contained only 3.95% of the 2000 network's branches. Although the difference is relatively small, it does indicate that the bank is underrepresented in the urban downscale areas. The bank may be underrepresented here because it is the most downscale group within the PSYTE system and therefore have low revenue generating potential. The fact that the branch network is underrepresented in these low-income areas follows previous findings that banks are closing branches in low-income urban areas (Johnson 1998; Task Force 1998). The research hypothesis, which states that a larger percent of branches are located in affluent PSYTE groups was therefore rejected as branches were found in lower and average income PSYTE groups more frequently than the elite and affluent areas.

Table 4.8: Distribution of PSYTE groups over study area

PSYTE Group	Percent
Suburban Affluent	12.05
Suburban Upscale Families	8.66
Suburban Older Singles / Couples	10.04
Suburban Younger Families	6.61
Town Upscale	1.47
Town Grey Collar	0.89
Urban Elite	5.89
Urban Ethnic	20.20
Urban Older Singles / Couples	6.02
Urban Young Singles	15.74
Urban Downscale	5.62
Rural downscale	0.02
Not Coded	6.80



4.3.2 Contingency Analyses Results and Discussion

To further explore the relationship between demographic characteristics of populations living where branches existed between 1986 and 2000, a number of census variables were used including education, income, and age. Contingency analyses were used in order to explore the relationship between branch status and demographic characteristics. The dependent variable in each contingency analysis was branch status and the independent variable was one of the demographic variables of interest. The row percents of each contingency analysis were graphed in order to determine the relationship between branch status and the demographic variables. These graphs are presented in the following sections, and the contingency tables are located in Appendix C.

Branch Status and Education

The relationship between branch status and education was investigated by performing contingency analyses on branch status versus education for the 1986, 1991, and 1996 censuses. Branches that existed between 1986 and 1990 were explored against the 1986 education data. The row percents obtained from the contingency analysis were graphed and a number of observations were made (see Figure 4.1). Census tracts where branches had no change, closed between 1991 and 1995, and closed between 1996 and 2000 had a very similar distribution of consumers among the education levels. The differences that existed in education levels included census tracts where branches later converted to tellerless, opened between 1986 and 1990, and closed between 1986 and 1990. Census tracts where branches converted to tellerless had a slightly higher percent of consumers with less than high school educations, and the second lowest percent of consumers with university or higher education. Census tracts where branches opened between 1986 and

1990 had the highest percent of consumers with less than high school educations, with a significantly higher value than the other branch status categories. These census tracts also had a lower percent of consumers with high school certificates and university or higher education. In contrast, census tracts where branches closed between 1986 and 1990 had a lower percent of consumers with less than high school educations, a higher percent of consumers with high school certificates and university or higher educations.

Although many of the branch status categories in the 1986 analysis followed similar education distributions, the two differences observed, including open 1986 to 1990, and the close 1986 to 1990, had unexpected results. Census tracts where branches opened between 1986 and 1990 had lower education levels and branches closed where education levels were found to be higher. The research hypothesis, which states that branches are closing where education levels are lower, and opening where education levels are higher between 1986 and 1990, was therefore rejected as the opposite was found to occur.

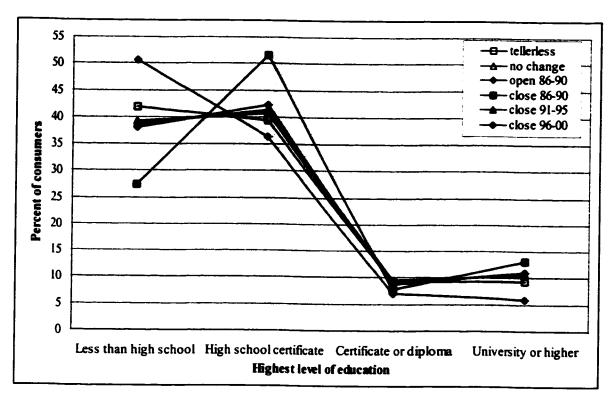


Figure 4.1: Branch status and 1986 Education

Branches that existed between 1991 and 1995 were analyzed against education data from the 1991 census (see Figure 4.2). Unlike the 1986 education level analysis, there was very little difference in the distribution of education among the different branch status categories for 1991. The largest difference occurred for the open 1991 to 1995 branch status category, which had the highest percent of consumers with university or higher educations. It was also found that the open 1991 to 1995 branch status category had the lowest percent of all other education levels, although they were similar to the remaining branch status categoriess. The research hypothesis, which states that branches are closing where education levels are lower, and opening where education levels are higher between 1991 and 1995, was therefore rejected, as a strong relationship was not observed.

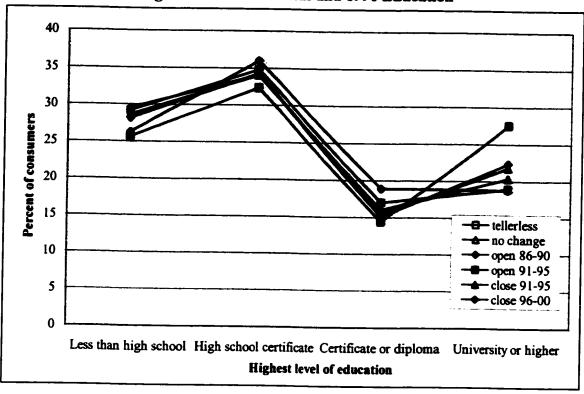


Figure 4.2: Branch status and 1991 Education

Branches that existed between 1996 and 2000 were analyzed against education data from the 1996 census (see Figure 4.3). Similar to results of the 1991 analysis, the distribution of education levels over the branch status categories were very similar. The largest difference was found to be with branches that opened between 1991 and 1995. These census tracts had a lower percent of consumers with less than high school educations, and a higher percent of consumers with university or higher educations. The research hypothesis, which states that branches are closing where education levels are lower, and opening where education levels are higher between 1996 and 2000, was therefore rejected, as a strong relationship was not observed.

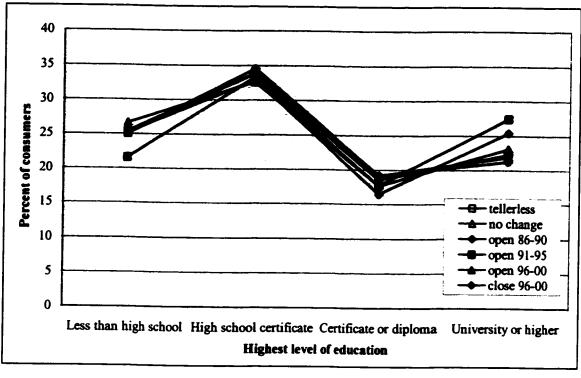


Figure 4.3: Branch status and 1996 Education

Through the analyses performed on branch status versus education levels, it was found that education did not play a major role in determining branch status for any of the time periods investigated. The largest differences were found in the analysis of 1986

education against branch status categories, and the results were found to be contradictory to what was expected as branches were opening in areas with lower overall education levels, and closing in areas with higher overall education levels. In both the 1991 and 1996 education level analyses, the education distribution for each of the branch status categories were found to be very similar with only small differences found. These differences, however, followed the expected pattern where banks target consumers with higher education levels, as they typically have higher revenue generating potential.

Branch Status and Income

The relationship between branch status and income was investigated by performing contingency analyses on branch status versus income for the 1986, 1991, and 1996 censuses. Branches that existed between 1986 and 1990 were explored against the 1986 income data. The row percents obtained from the contingency analysis were graphed and a number of observations were made (see Figure 4.4). The percent of consumers in each of the branch status categories were found to follow a similar distribution over the income categories, with only a few differences observed. These differences included census tracts where branches closed between 1986 and 1990, and census tracts where branches opened between 1986 and 1990. Census tracts where branches closed between 1986 and 1990 had a higher percent of consumers with household incomes of less than \$14999. Census tracts where branches opened between 1986 and 1990 were also slightly different from the remaining branch status categories, with a lower percent of consumers in the \$20k to 29999 income range, and a higher percent of consumers with incomes in the \$30k to 39999 range. Although the distribution of income ranges were similar over all branch status categories, the differences that were observed followed the expected

pattern of banks closing in areas where income is generally lower. The research hypothesis, which states that branches are closing where income levels are lower, and opening where income levels were higher between 1986 and 1990, was therefore rejected, as a strong relationship was not observed.

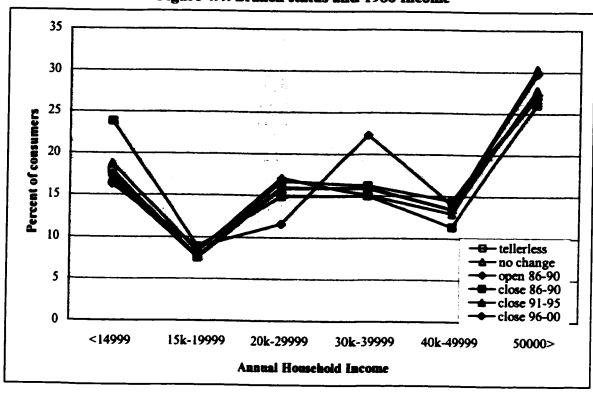


Figure 4.4: Branch status and 1986 Income

Branches that existed between 1991 and 1995 were analyzed against income data from the 1991 census (see Figure 4.5). Similar to the 1986 income analysis, it was found that the percent of consumers in each of the branch status categories followed a similar distrubtion over the income ranges with only a few small differences observed. Census tracts where branches had opened between 1986 and 1990 were found to have lower percents of consumers in all income ranges with the exception of \$40k to \$49999, and \$50000 and greater. For the \$40k to 49999 range, the percent of consumers in this range were similar to the remaining branch status categories while the percents of consumers in

the greater than \$50000 range was found to be significantly higher than all other branch status categories. The research hypothesis, which states that branches are closing where income levels are lower, and opening where income levels were higher between 1991 and 1995, was therefore rejected, as a strong relationship was not observed.

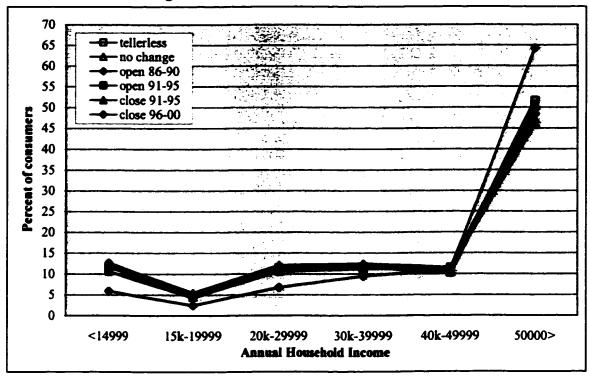


Figure 4.5: Branch status and 1991 Income

Branches that existed between 1996 and 2000 were analyzed against income data from the 1996 census (see Figure 4.6). The distribution of income over census tracts where branch status changes had occurred were similar to one another, with the exception of the \$50000 and greater range, which had a more varied distribution. Census tracts where branches had opened between 1996 and 2000 had slightly lower percents of consumers in the less than \$9999, \$10k to 19999, and \$20k to 29999 income ranges, and a higher percent of consumers in the \$50000 or greater income range. The most amount of variation between the different branch status categories occurred in the \$50000 and

greater income ranges. For this income range, census tracts where branches opened between 1996 and 2000 had a higher percent of consumers in this range, and was followed by open 1986 to 1990, open 1991 to 1995, and tellerless, while the branch status categories that represent closures had lower percents of consumers within this income range. The research hypothesis, which states that branches are closing where income levels are lower, and opening where income levels were higher between 1996 and 2000, was therefore rejected, as a strong relationship was not observed.

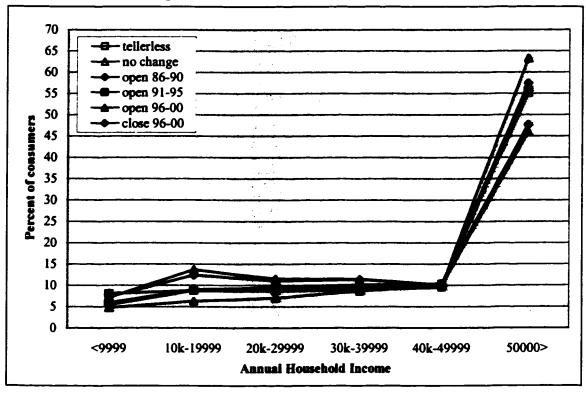


Figure 4.6: Branch status and 1996 Income

Through the analyses performed on branch status and income, it was found that income did not play a major role in determining branch status. Although the branch status variables had similar income distributions for all time periods investigated, a number of differences were found. These differences were found to include branches that opened, and followed the expected pattern that branches were opening in census tracts

that had higher percents of consumers in the upper income ranges and lower percents of consumers in the lower income ranges.

Branch Status and Age

The relationship between branch status and age was investigated by performing contingency analyses on branch status versus age groups for the 1986, 1991, and 1996 censuses. Branches that existed between 1986 and 1990 were explored against the 1986 age group data. The row percents obtained from the contingency analysis were graphed and a number of observations were made (see Figure 4.7). The analysis of branch status with 1986 age groups was found to have very similar distributions of consumers among the age groups, with differences occurring in census tracts where branches were opened between 1986 and 1990, and where branches closed between 1986 and 1990. Census tracts where branches opened between 1986 and 1990 were found to have a slightly higher percent of consumers in the age 0 to 19 range. This branch status category also had a lower percent of consumers age 20 to 24, and 25 to 34. Census tracts where branches closed between 1986 and 1990 had a lower percent of consumers age 0 to 19 and had a higher percent of consumers in the age 25 to 34 category. The research hypothesis, which states that branches are opening more frequently where consumers are younger, and closing more frequently where consumers are older between 1986 and 1990, was therefore rejected, as a strong relationship was not observed.

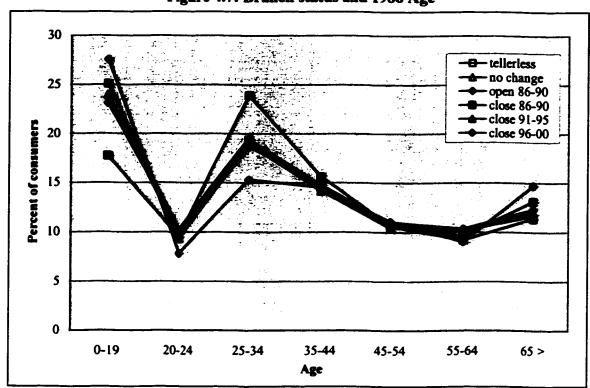


Figure 4.7: Branch status and 1986 Age

Branches that existed between 1991 and 1995 were analyzed against age group data from the 1991 census (see Figure 4.8). The distribution of branch status categories over the age groups were found to be similar with differences found in census tracts where branches opened between 1986 and 1990, and in census tracts where branches later converted to tellerless. Census tracts where branches opened betweeen 1986 and 1990 were found to have a higher percent of consumers age 0 to 19, as well as a lower percent of consumers age 55 to 64, and 65 and over. These census tracts also had a slightly higher percent of consumers age 35 to 44. Census tracts where branches were later converted to tellerless followed a similar pattern, with the second highest percent of consumers age 0 to 19 and the second lowest percent of consumers age 65 and over. The research hypothesis, which states that branches are opening more frequently where

consumers are younger, and closing more frequently where consumers are older between 1991 and 1995, was therefore rejected, as a strong relationship was not observed.

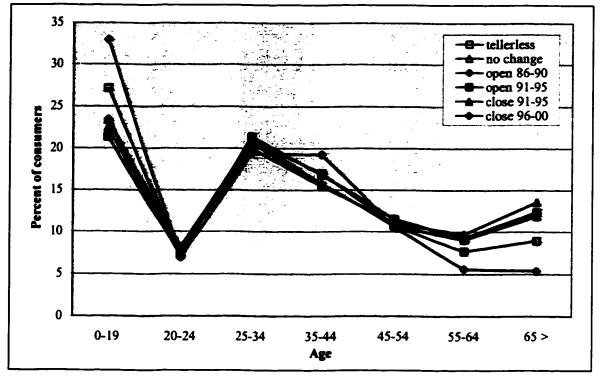


Figure 4.8: Branch status and 1991 Age

Branches that existed between 1996 and 2000 were analyzed against age group data from the 1996 census (see Figure 4.9). The distribution of age groups among census tracts where branch status changes occurred were found to be very similar, with some variation observed in the age 0 to 19, and age 65 and over groups. Census tracts where branches opened between 1986 and 1990 had a higher percent of consumers in the age 0 to 19 group, followed by open 1996 to 2000, tellerless, open 1991 to 1995, close 1996 to 2000, and no change. The distribution of the branch status categories in the age 65 and over group had the reverse pattern with census tracts where branches had no change had the highest percent of consumers age 65 and over, followed by close 1996 to 2000, open 1991 and 1995, tellerless, open 1996 to 2000, and open 1986 to 1990. The research

hypothesis, which states that branches are opening more frequently where consumers are younger, and closing more frequently where consumers are older between 1996 and 2000, was therefore rejected, as a strong relationship was not observed.

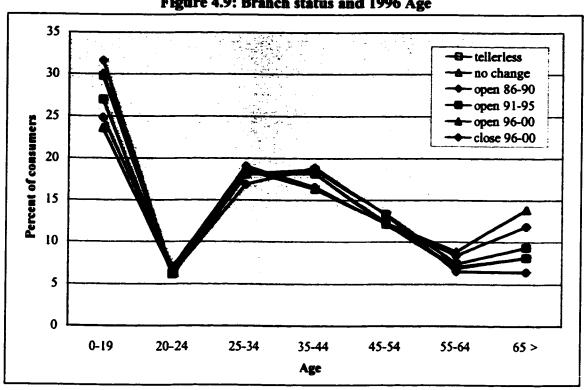


Figure 4.9: Branch status and 1996 Age

Through the analyses performed on branch status and age categories, it was found that age did not play a major role in determining branch status. Although the branch status variables had similar age distributions for all time periods investigated, a number of differences were found in the 1986 and 1991 analyses. These differences were found to include branches that opened as well as branches that closed and converted to tellerless. It was found that the most amount of variation occurred in the age 0 to 19 group, with branches opening in census tracts where the percent of consumers in this age group were higher, and because little research has been performed into the relationship between age groups and branch closures, it is difficult to ascertain why this pattern occurred.

A number of different demographic variables were investigated against branch status categories in objective 2. The results of the PSYTE group analyses provided some insight into the types of populations being impacted by branch status changes, and the patterns observed followed expected results. The results of analyses using census data, including education, income, and age, did not have any major differences in their distribution over the branch status categories. The distributions of all analyses were found to follow similar patterns, indicating that these variables did not play a significant role in determining where branches were being opened, closed, or converting to tellerless. Because few studies have focused on the education and age groups of populations where branches are closing and opening, it is impossible to compare this research to previous work, although a majority of the small differences that were observed followed expected patterns that can be seen as how banks 'typically' define consumers as being profitable. The only analysis that had results that differed from what was expected was the investigation of branch status versus 1986 education data. The results of this analysis found that branches were opening where education levels were lower, and branches were closing where education levels were higher.

One reason that the results obtained from the branch status versus census data analyses were not as informative as expected may be that banks are looking at additional variables in order to determine where branches should open, close, or convert to tellerless. This would also explain why results from the PSYTE group analyses followed the expected pattern as this data contains variables that are more complex than just demographics alone. In addition, the results of the investigation of population distribution and population density in Objective 1 found that the distribution of branches, as well as

changes occurring in the branch network, were related, thereby indicating that Bank X may place a greater importance on the absolute number of consumers located in areas, rather than focusing completely on demographic characteristics.

4.4 Objective 3: Demographics and Delivery Channel Usage

Objective 3 was to investigate the demographic characteristics of the population living in census tracts where branches existed in January 2000 and the delivery channel usage, associated with each branch. The five delivery channels analyzed include ABM, branch, POS, telephone, and Internet. This objective was achieved by examining relationships between demographic characteristics and delivery channel usage using contingency and regression analysis. The variables investigated include PSYTE group data, and census variables including education, income, age, incidence of low-income households, and average value of dwelling. The sample size for the delivery channel analyses consisted of 151 branches for which delivery channel usage data were available. The sample size was reduced to 149 branches, as 1996 census data were not available for two of the census tracts being analyzed.

4.4.1 Contingency Analyses Results and Discussion

In order to explore the relationship between demographic characteristics of populations living where branches existed in January 2000 and delivery channel usage, a number of demographic characteristics were investigated. Variables categorized as nominal were used in the contingency analyses and include the PSYTE group data, education, income, and age. The dependent variable in each contingency analysis was delivery channel usage and the independent variable was one of the nominal demographic variables of interest. The row percents of each contingency analysis were graphed in

order to determine the relationship between the demographic variables and delivery channel usage. These graphs are presented in the following sections, and all contingency tables are located in Appendix C.

Delivery Channel Usage and PSYTE Group

Delivery channel usage was analyzed against the PSYTE groups in order to determine whether patterns existed in the use of these delivery channels. Full descriptions of the PSYTE groups are located in Appendix B. The row percents obtained from the contingency analysis were graphed in order to determine the relationship between delivery channel usage and PSYTE groups (see Figure 4.10). From the analysis, it was found that most PSYTE groups used each of the delivery channels with the same frequency, with only a few differences observed. The largest differences found involved the branch and Internet channels, while use of ABM, POS, and telephone banking were similar. The suburban affluent group was found to use the Internet channel more frequently than any of the other channels, with the branch channel being used the least. The suburban older singles and couples group used the Internet channel more frequently than the other delivery channels, and the difference in use of this channel was much higher than the remaining channels. The urban elite group was also found to use the Internet channel slightly more than the remaining channels. The urban ethnic group was found to have the most variation in use of the delivery channels investigated, with branch use being significantly higher than any other channel, and the Internet channel being used the least. The urban young singles group was found to use the ABM channel most frequently, while Internet use was found to be lower. Similarly, the urban downscale

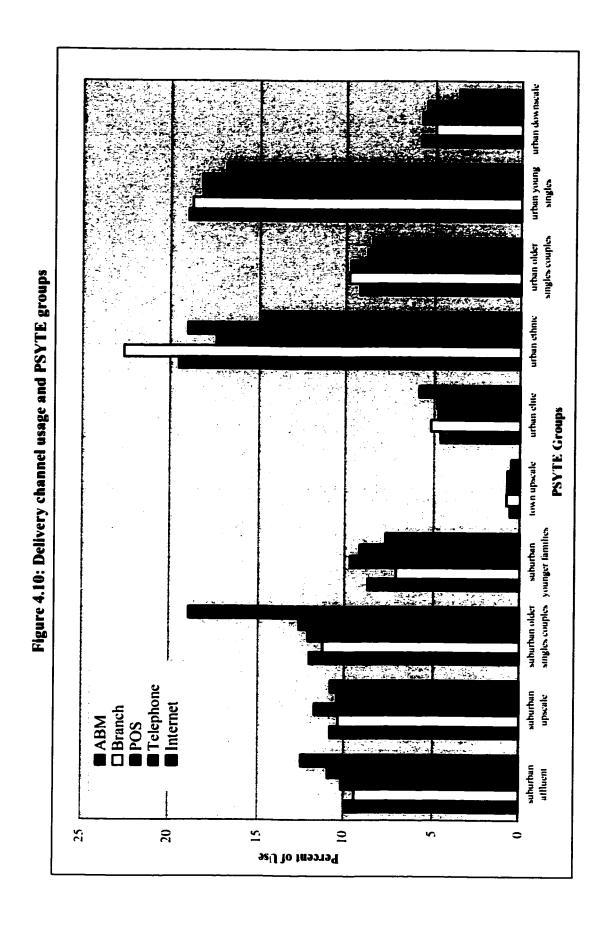
group was found to use the Internet channel less frequently than the other delivery channels being investigated.

From the analysis of delivery channel usage and PSYTE groups, it was found that many groups use each of the channels with the same frequency with the most differences occurring with use of the Internet and branch channels. For this reason, the research hypothesis, which states that ADCs are being used more frequently by affluent PSYTE groups, and the branch channel is used more frequently by less affluent PSYTE groups, was rejected, as a strong relationship was not observed. The suburban affluent group, and the suburban older singles and couples group, were found to have higher use of the Internet channel. Previous research has found that internet banking is higher among consumers who are younger, computer-literate, have access to a computer at home or at work, are relatively affluent, well educated, and prefer channels that are convenient and cost-effective (Mols 1999). Many of these characteristics are attributes of the suburban affluent and suburban older singles and couples groups.

Groups that were found to use Internet banking less frequently were urban ethnic, urban downscale, and urban young singles. American Demographic (1999) found that consumers that do not use Internet banking are typically older, less educated, single-parent homes, and only 18% own personal computers. These characteristics are similar to attributes of the urban ethnic and urban downscale groups indicating that the findings of this analysis were similar to those from previous research. It was unexpected that the urban young singles group, who are typically young, well educated, and have white-collar occupations, use the internet channel the least as their characteristics are similar to what Mols (1999) described as the internet banking segment. This group was found to

use ABMs more frequently than any other delivery channel, and this concurs with previous research that found ABM users to be younger in age, have white-collar jobs, are highly mobile, and rent their homes, which are characteristics of the urban young singles group (Reidenback and Pitts 1986).

The only group that was found to use the branch delivery channel more frequently than other channels was the urban ethnic group. Previous research has found that consumers that prefer the branch channel are mostly elderly, computer-illiterate, are less informed of market conditions, and have lower incomes (Mols 1999; Howcroft *et al.* 2002). These characteristics were found to be similar to those associated with the urban ethnic groups and therefore were found to agree with the literature.



Delivery Channel Usage and Education

Delivery channel usage data were analyzed against the 1996 education data in order to determine whether patterns existed in use of these delivery channels. Because the delivery channel data were collected in 2000, they were compared to the 1996 census data only. The row percents obtained from the contingency analysis were graphed in order to determine the relationship between delivery channel usage and education levels (see Figure 4.11). Delivery channel use within each of the education levels were found to be very similar with the largest difference occurring with Internet channel use. In the less than high school and certificate and diploma categories, it was found that the Internet was used less frequently. In contrast, in the university or higher category, internet use was found to be used most frequently, as well as relatively more often than any of the other delivery channels. The remaining education levels were found to use the different delivery channels with similar frequency indicating that education does not play a strong role in determining their use. The research hypothesis, which states that ADCs are used more frequently where education levels are higher, and the branch channel is used more frequently where education levels are lower, was therefore rejected, as significant differences in use were not observed. However, because differences were found in the use of the Internet channel, it can be concluded that education plays a role in determining the extent of use for the Internet channel.

Although some studies have found that education level is an important indicator in determining use of delivery channels, others have found that it plays less of a role (Rugimbana 1995; Howcroft et al. 2002). Research conducted by Howcroft et al. (2002) found that educational levels of respondents were not important in encouraging or

discouraging use of ADCs. It found that for those with fewer educational qualifications, accessibility to necessary equipment was important as consumers with lower educational qualifications may have less opportunity to access a telephone or the Internet at work. The results of this research did not find much difference between use of delivery channels among the education levels, with the exception of the Internet channel, which was used less frequently by those with less than high school educations, and more frequently by those with university or higher educations.

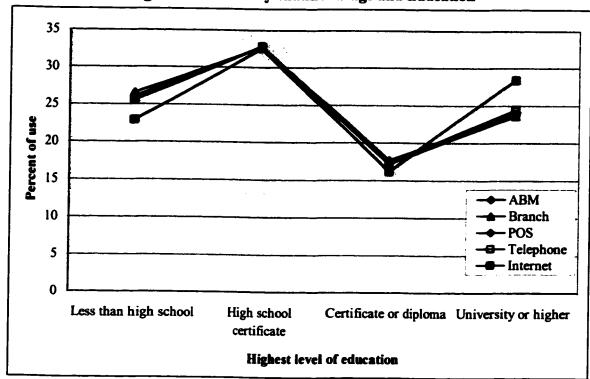


Figure 4.11: Delivery channel usage and Education

Delivery Channel Usage and Income

Delivery channel usage data were analyzed against the 1996 income data in order to determine whether patterns existed in use of these delivery channels. The row percents obtained from the contingency analysis were graphed in order to determine the relationship between delivery channel usage and income categories (see Figure 4.12).

Use of each of the delivery channels were found to be very similar for each of the income ranges being analyzed. Only small differences were found in use of the Internet channel with a higher percent of consumers in the \$50000 and greater range using Internet banking, and a slightly lower percent of consumers using the branch channel.

The research hypothesis, which states that ADCs are used more frequently where income levels are higher, and the branch channel is used more frequently where income levels are lower, was therefore rejected, as significant differences in use were not observed. These results were different from previous studies that found high income earners using electronic ADCs more often than the branch channel, and lower income consumers preferring the branch channel over ADCs (Mols 1999). The small difference in delivery channel use in the \$50000 and greater range, which was a slightly higher use of the Internet channel, concurred with the research of Howcroft *et al.* (2002) that found high income earners preferred electronic channels for daily banking transactions.

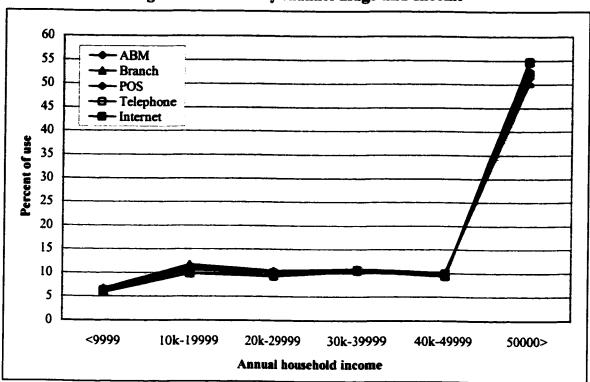


Figure 4.12: Delivery channel usage and Income

Delivery Channel Usage and Age

Delivery channel usage data were analyzed against the 1996 age group data in order to determine whether patterns existed in use of these delivery channels. The row percents obtained from the contingency analysis were graphed in order to determine the relationship between delivery channel usage and age (see Figure 4.13). Similar to the analysis of delivery channel usage against income, use of each of the delivery channels was found to be very similar for each of the age ranges being analyzed. Small differences were found for the Internet channel which had the lowest percent of consumers in the 0 to 19, and 65 and over age groups, and the highest percent of consumers in the 20 to 24, 25 to 34, 35 to 44, and 45 to 54 age groups. Similarly, the 65 and over age group used the branch channel slightly more than the other channels. The research hypothesis, which states that ADCs are used more frequently where populations are younger, and the branch channel is used more frequently where populations are older, was therefore rejected, as significant differences in use were not observed.

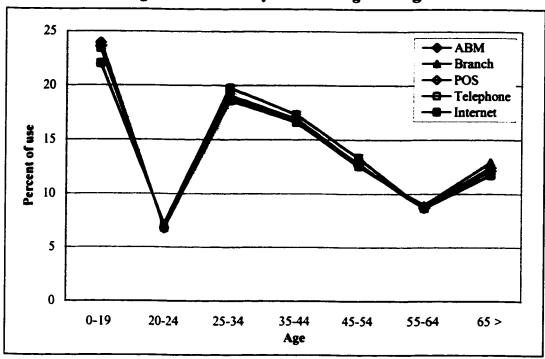


Figure 4.13: Delivery channel usage and Age

A number of demographic variables that are categorized as nominal were investigated against delivery channel usage in objective 3 by using contingency analyses. The results of the PSYTE analyses provided some insight into delivery channel usage among the different PSYTE groups, and the results were found to follow the findings of previous research. The results of analyses using census data, including education, income, and age, were found to follow very similar distributions, with use of the different delivery channels being very similar among the different census categories being analyzed. Because few differences were found, it can be concluded that these census variables do not play a strong role in determining delivery channel use, and because the PSYTE groups, which contain a much more complex set of variables, followed many of the expected patterns, it can be concluded that demographic variables alone do not explain delivery channel use.

4.4.2 Regression Analyses Results and Discussion

Regression analyses were performed to investigate the relationship between delivery channel use and the census variables that are categorized as continuous. The relationships being explored in this section include the proportion of clients utilizing each delivery channel against incidence of low-income households, as well as against average value of dwelling. Because these variables were not found to be used in previous research, comparison of the results was not possible. Because these variables are closely related to other variables including income and education, results of the analyses were compared to findings using these variables. All scatterplots are located in Appendix D.

It is also important to note that some outliers exist on the scatterplots of the regression analyses. These outliers were investigated, and they are not errors in the data, but rather

branches with special circumstances. One branch, located in the CSD of Clarington, has only five clients attached to it due to process changes that have occurred. For this reason, the percentages of clients utilizing each of the delivery channels were extremely low, or zero.

Delivery Channel Use and Incidence of Low-Income Households

Regression analyses were performed on the proportion of clients utilizing each of the delivery channels versus incidence of low-income households. The results of these analyses are summarized in Table 4.9, and the accompanying scatterplots are found Appendix D. The results presented in Table 4.9 represent the transformed analyses, as a correction was necessary to deal with the percentages. The scatterplots located in Appendix D represent the untransformed analyses for ease of interpretation. The incidence of low-income households variable is based on income and family expenditure data and identifies households that spend more of their income on basic necessities and are therefore in 'straitened' circumstances (Statistics Canada 2002).

Table 4.9: Results of delivery channel versus incidence of low-income

Dependent variable	Independent variable	Correlation coefficient F	t	Degrees of Freedom	<i>p</i> -value
ABM	Incidence low-income	-0.34	-4.41	147	< 0.0001
Branch	Incidence low-income	0.04	0.47	147	0.6369
POS	Incidence low-income	-0.41	-5.42	147	< 0.0001
Telephone	Incidence low-income	-0.21	-2.62	147	0.0098
Internet	Incidence low-income	-0.34	-4.42	147	< 0.0001

ABM versus Incidence of Low-Income Households

The regression analysis performed on proportion of clients utilizing ABM versus incidence of low-income was found to be significant with a p-value of <0.0001. The correlation coefficient was found to be negative, and the relationship is therefore decreasing; as the incidence of low-income increases, ABM usage was found to decrease

(see Appendix D, Figure D1). The research hypothesis, which states that as incidence of low-income populations increases, use of ADCs including the ABM decreases, was therefore accepted, as the relationship was found to be significant and decreasing. This trend follows findings from previous work that indicates ABM usage is lower among consumers with lower education levels and employment status (Marshall and Heslop 1988 in Howcroft et al. 2002; Rugimbana 1995).

• Branch versus Incidence of Low-Income

The regression analysis performed on proportion of clients utilizing the branch channel versus incidence of low-income yielded a p-value of 0.6369, which is greater than the critical p-value of 0.05 and therefore no evidence of a relationship between the two variables was found (see Appendix D, Figure D2). This, however, does not mean that no relationship exists between the two variables, but rather a relationship may exist, but this research was not powerful enough to find it. The research hypothesis, which states that as incidence of low-income populations increases, use of ADCs decreases, and use of the branch channel increases, was therefore rejected, as a significant relationship was not found. One of the reasons that the relationship between branch usage and incidence of low-income was found insignificant may be attributable to the fact that different groups of consumers use the branch for different purposes. For example, Howcroft et al. (2002) found that while lower income consumers prefer to use the branch channel for daily banking transactions, higher income consumers prefer to use the branch channel for investment purposes and financial advice. Mols (1999) also found that consumers preferring to use the branch are comprised of mostly computer-illiterate persons that are generally less well informed of market conditions. A more accurate

investigation of branch channel usage versus incidence of low-income may have been obtained if the type of transaction executed within the branch was considered.

Point of Sale Purchasing (POS) versus Incidence of Low-Income Households

The regression analysis performed on proportion of clients utilizing POS versus incidence of low-income was found to be significant, with a *p*-value of <0.0001. The correlation coefficient was found to be negative and the relationship is therefore decreasing; as the incidence of low-income increased, POS usage was found to decrease (see Appendix D, Figure D3). The research hypothesis, which states that as incidence of low-income populations increases, use of ADCs including POS decreases, was therefore accepted, as the relationship was found to be significant and decreasing. Because POS is a relatively new ADC, there is not a wide body of literature pertaining to how use is related to demographic characteristics. The results of this analysis follow what was intuitively expected; consumers that purchase more frequently typically have more disposable funds than low-income households who therefore purchase less frequently.

Telephone Banking versus Incidence of Low-Income Households

The regression analysis performed on proportion of clients utilizing telephone banking versus incidence of low-income was found to be significant, with a *p*-value of <0.0001. The correlation coefficient was found to be negative, and the relationship is therefore decreasing; as the incidence of low-income increased, telephone banking usage decreased (see Appendix D, Figure D4). The research hypothesis, which states that as incidence of low-income populations increases, use of ADCs including telephone banking decreases, was therefore accepted, as the relationship was found to be significant and decreasing. This relationship follows the findings of previous studies which found that telephone

banking usage was related to education and income level. Research conducted by Al-Ashban and Burney (2001) found that consumers with a better education, and higher incomes use the telephone channel more frequently.

Internet Banking versus Incidence of Low-Income Households

The regression analysis performed on proportion of clients utilizing Internet banking versus incidence of low-income was found to be significant, with a *p*-value of <0.0001. The correlation coefficient was found to be negative, and the relationship is therefore decreasing; as the incidence of low-income increased Internet banking usage decreased (see Appendix D, Figure D5). The research hypothesis, which states that as incidence of low-income populations increases, use of ADCs including Internet banking decreases, was therefore accepted, as the relationship was found to be significant and decreasing. The findings from this analysis follow findings from previous research that found consumers utilizing the Internet and Internet banking are well educated and have higher household incomes (American Demographic 1999; Mols 1999; Yakhlef 2001)

Delivery Channel Usage and Average Value of Dwelling

Regression analyses were performed on the proportion of clients utilizing each of the delivery channels versus average value of dwelling. The results of these analyses are summarized in Table 4.10, and the accompanying scatterplots are found in Appendix D. The results presented in Table 4.10 represent the transformed analyses, as a correction was necessary to deal with the percentages. The scatterplots located in Appendix D represent the untransformed analyses for ease of interpretation.

Table 4.10: Results of delivery channel versus value of dwelling

Dependent variable	Independent variable	Correlation coefficient P	t	Degrees of Freedom	<i>p</i> -value
ABM	Value of dwelling	-0.10	-1.23	147	0.2222
Branch	Value of dwelling	0.06	0.78	147	0.4373
POS	Value of dwelling	-0.02	-0.26	147	0.7935
Telephone	Value of dwelling	0.05	0.58	147	0.5645
Internet	Value of dwelling	0.26	3.22	147	0.0016

The regression analyses performed on average value of dwelling and proportion of clients utilizing the ABM, Branch, POS, and telephone channels were all found to be insignificant as the p-values were found to be greater than the critical p-value of 0.05 (see Appendix D, Figures D6 to D9). The research hypothesis, which states that as the average value of dwellings increase, use of ADCs increase and use of the branch channel decreases, was therefore rejected for the ABM, Branch, POS, and telephone channels, as no significant relationship was found. These results indicate that no evidence of a relationship between these variables were found. As mentioned previously, the results of these analyses do not mean that no relationship exists between these variables, but rather a relationship may exist, but this research was not powerful enough to find it. In addition, the contingency analyses performed in the earlier section of this objective found that demographic characteristics from the census including education, income, and age did not yield any significant differences in use among the different census categories. while the PSYTE data provided more insight into the relationship between delivery channel usage and the different PSYTE groups. This provides some indication that demographic characteristics alone are not strong indicators of delivery channel use. Furthermore, the results from the analysis of delivery channel use versus incidence of low income, which contains a number of different types of data, were found to yield mostly significant results that also agreed with the findings of previous research.

The research hypothesis was accepted for the Internet channel, which was found to have a significant relationship with average value of dwelling. The *p*-value of this relationship was found to be 0.0016. The correlation coefficient was positive, and the relationship is therefore increasing; as the average value of dwellings increase, Internet banking usage also increased (see Appendix D, Figure D10). The findings of the Internet channel analysis were in agreement with previous research that found consumers utilizing the Internet and Internet banking are well educated, relatively affluent, and have higher household incomes (American Demographic 1999; Mols 1999; Yakhlef 2001).

A number of different demographic variables were investigated against delivery channel usage in objective 3. The results of the PSYTE analyses provided some insight into the types of populations utilizing the various delivery channels and the patterns that were observed followed expected results. Similar to the results of objective 2, the results of analyses using census data, including education, income, and age, did not have any major differences in the percent of consumers using the different delivery channels between the census categories being investigated. The distributions of all analyses were found to follow similar patterns, indicating that these variables did not play a significant role in determining the type of delivery channel being used by the different consumers investigated. The small differences that were found included differences in use of the branch and internet channels. The results followed findings from previous studies where consumers with higher incomes and higher education levels use Internet banking more frequently than other types of consumers.

In objective 2, it was found that the PSYTE data provided more insight into the changes that were occurring, and who these changes were impacting. The findings of

objective 3 were found to be similar, and it is believed the reason this occurred was because the PSYTE data incorporate many more variables than the census data did. Education, income, and age were found to not influence the type of delivery channel being used, while the PSYTE data provided slightly more variation among the use of the delivery channels. It is evident for this reason that demographic variables alone do not provide much information as to what delivery channel is being utilized. Another possible reason that no differences were found in the census variables is the nature of the analysis, which assumed that the proportion of consumers using each of the delivery channels followed the same proportion of consumers in the study area. Although this is not completely accurate, it was believed that looking at the data in this way would provide sufficient insight. In addition, because the differences that were found involved the internet channel, it is possible that consumers are utilizing the remaining channels in the same capacity since access to channels including the branch, POS, telephone banking, and the ABM are somewhat more accessible than internet banking. These channels have also been present for a longer amount of time, and have therefore had more time to diffuse into the population.

Chapter 5: Key Findings and Conclusions

5.1 Introduction

The objectives of this thesis were to explore the changes that have occurred within the branch network of Bank X between 1986 and 2000, and to determine the demographic characteristics of populations affected by changes in the network, as well as the types of delivery channels these consumers are using. The objectives of this research were achieved by utilizing a number of different methods including mapping, summary statistics, contingency analysis, and regression analysis. The following sections highlight the key findings of this research, as well as opportunities for further research.

5.2 Key Findings

The first objective of this research was to investigate where branches existed between 1986 and 2000, and to present and explain patterns in spatial location. Through the analysis of branch locations and changes in branch status, a number of patterns were observed. The number of branches located in the study area was found to be decreasing, with the largest amount of branch closures occurring between 1996 and 2000. The smallest number of branch openings was also found to be during this time period, indicating that Bank X is decreasing their overall network size. This time period also relates to increases in the use of alternative delivery channels (ADCs), which may be affecting the number of closures that are occurring since branches may be utilized less often.

The spatial distribution of bank branches was also found to be related to both population density and population distribution, with a higher number of branches located in areas where a large percent of the study areas population were located, as well as

where population density was high. Population change for the CSDs were also examined, and it was found that while all CSDs had population growth, they were also experiencing decreases in their branch networks. Some CSDs that were found to have low population distribution and density, as well as low population growth were found to have no changes in their branch network. One reason this may be occurring is that Bank X is attempting to remain visible in the community, as the branch can be viewed more as a marketing tool rather than a service centre in some instances. Decreases in the branch network were found to be occurring most in urban areas, which may be a result of the traditionally dense branch network located in these types of areas. In contrast, the percent of the branch network located in suburban areas was found to be increasing, which may be attributable to expansion into newly developed areas.

This research found that there was a lack of knowledge surrounding branch closures, and more specifically, whom these closures are impacting. Previous research found that branch closures were occurring in mostly low-income urban areas (Leyshon and Thrift 1995; Task Force 1998). This research found that although most branch closures were occurring in the urban neighbourhoods of the study area, the bank was not completely retracting from these areas as the density of branches in those areas was found to be very high. In addition, it was found that branch closures were also occurring in the suburban areas of the study area, indicating that it is not only the urban areas facing decreases in the branch network.

Objective 2, which was to investigate the demographic characteristics of populations living in areas where branches existed between 1986 and 2000, was achieved by analyzing both the PSYTE group data, as well as census variables, including education,

income, and age. It was found that the PSYTE data did provide some insight into the types of populations being impacted by branch status changes, including openings and closures. Branches were found to be closing in both upscale and downscale areas, indicating that income is not the sole factor used in determining where branch closures are occurring.

The investigation of census variables including education, income, and age did not appear to be indicators of where branch status changes were occurring, as the distribution of these census categories among the different branch status categories were found to be similar. The expected pattern was that branches would be opening where education and income levels were higher, and age groups were lower, and closing where education and income levels were lower, and age groups were higher. This expected pattern was not observed, as branch status changes were occurring in many different areas where demographic characteristics varied. In addition, because the PSYTE data combine over 250 demographic, geographic, consumer purchase behaviour, and 1996 Canadian census variables in their segmentation system, it can be concluded that demographic variables alone do not play a role in determining where branch status changes are occurring.

Objective 3, which was to investigate the demographic characteristics of populations utilizing different delivery channels, was achieved by analyzing both the PSYTE group data, as well as census variables including education, income, age, incidence of low-income, and average value of dwelling. Similar to objective 2, it was found that the PSYTE group data provided more insight into delivery channel usage than the census variables investigated. Use of delivery channels was found to be quite similar for all PSYTE groups analyzed, but some small differences were found. The differences found

included use of the branch and Internet channels. Following results from previous studies, it was found that the Internet channel was used more frequently by consumers with higher incomes, and less often by consumers that had low education and income levels. Similarly, the branch channel was found to be used more frequently by older consumers, and consumers with lower incomes. The remaining channels, including ABM, POS, and telephone banking, were found to be used at the same frequency.

Regression analyses were performed on individual delivery channels and the incidence of low-income. All relationships were found to be decreasing with the exception of the branch channel that had an insignificant relationship with the incidence of low-income. The decreasing relationship indicates that as the incidence of low-income increases, the use of electronic ADCs decreases, which concurs with previous research. The relationships between individual delivery channels and the average value of dwellings were also investigated, although mostly insignificant relationships were found, with the exception of the Internet channel. The relationship between the Internet channel and the average value of dwellings was found to be increasing with the proportion of consumers using the Internet channel increasing as dwelling value increased. The results of analyses using census variables including education, income, and age indicated that these variables alone do not play a large role in determining use of delivery channels. The results of the analyses involving average value of dwelling also indicate that this variable does not play a large role in determining delivery channel usage. In contrast, the incidence of low income variable was found to be related to delivery channel usage, and because this variable contains more information than the individual census variables

alone, it is further evidence that demographic variables alone to not play a strong role in determining delivery channel usage.

This research was defined as exploratory from the onset, with a goal of investigating changes in the retail financial services that have occurred recently. Because there is a lack of knowledge on this topic, it was difficult to compare the results found here with results of other studies. Some of the results of the objectives were found to be inconclusive, demonstrating the need for further research on the topic. In conclusion, through the analyses that were performed for each of the three objectives, it was found that Bank X is decreasing the size of their branch network, but demographic variables alone were not found to play a strong role in determining where these branches are closing. In addition, it was found that branches are not closing solely in low income urban areas, as was anticipated, but closing in many different types of areas. Through the investigation of the demographics of consumers utilizing different delivery channels, it was also found that consumers are adapting well to the ADCs that have been introduced, and access to banking services does not appear to be an issue as consumers are utilizing the ADCs that have been introduced more than ever. Furthermore, as populations become accustomed to interacting with these ADCs, the need for a large branch network will be unnecessary, and the branch network will continue to be rationalized.

5.3 Opportunities for Future Research

This research found that many changes are occurring in the distribution of bank branches throughout the study area, with the majority of changes occurring between 1996 and 2000. Because this topic of research is relatively new, with few studies investigating the occurrence of branch closures as well as who these closures are impacting, there is a

need for further research. A particular emphasis should be placed on whom branch closures are affecting, and because demographic characteristics of populations living in areas where branches are closing did not yield a strong relationship; additional factors should be considered. One way of achieving this would be to perform a survey of financial institutions' network planning departments in order to determine the most important factors they consider in determining where branches are being closed, as well as opened.

The results of the analysis of delivery channel usage and demographic characteristics were also found to have few differences among use of delivery channels. One reason that this may have occurred is due to the nature of the analysis performed. A more accurate measure of the relationship between delivery channel use and demographic characteristics could be achieved by performing a survey of consumers that also includes behaviour variables as previous research has found that the inclusion of demographic variables as predictors of delivery channel use alone were not successful indicators of delivery channel usage (Rugimbana 1995).

Appendices

Appendix A: List of Acronyms

List of Acronyms

ABM Automated Banking Machine

ADC Alternative Delivery Channel

CHASS Computing in the Humanities and Social Sciences Data Centre

CSD Census Subdivision

CT Census Tract

EA Enumeration Area

GIS Geographical Information System

GTA Greater Toronto Area

IDP Interac Direct Payment

PIN Personal Identification Number

POS Point Of Sale purchasing

TDR TriUniversity Data Resources

Appendix B: PSYTE Descriptions

Suburban affinent	Most upscale suburban group falls second in affluence only to urban elite, largely composed of Asian and Italian ethnic groups. Average household income 1999 \$85717. Usually two income earners per household, ranging from 35-55 years of age. They are well educated, with white-collar (professional, managerial, and executive) and grey-collar (government service and retail trade) occupations. They typically live in newer suburbs outside of medium and large cities. Dwellings are large, mostly owned, heavily mortgaged, and less than 15 years old (70% built after 1981). Highest propensity to have children, and the lowest divorce rate. 1-2 children per household are common.
Suburban upscale families Suburban	Average household income 1999 \$73249. Usually two income earners ranging from 35-54 years of age. Attain high school, college, or trade school diplomas. The majority live outside of medium and large cities. Dwellings almost entirely owned and single-detached, built in '60s, '70s, and '80s. Dwellings range from quite expensive, to moderately priced. In 1999 average dwelling cost was \$197128. Children 6-14 years of age, fewer children than suburban affluent. Work hard and play hard.
older singles and couples	Characterized by the absence of children. Mix of singles and couples some young, but most being older and middle-class. Average household income 1999 \$63448. Well-educated, white-collar (professional managerial, and executive) and grey-collar (government service and retail trade) occupations. More women choose to work outside of the home than any other suburban group. Dwellings are owned, and single-detached. Homes may have been built as early as '50s or '60s. The price of housing varies greatly \$162462 to \$227512. Large proportion of high-quality rental dwellings.
Suburban	New family group. In 1999 average household income \$59565. Usually two income
younger families	earners, ranging from 25-54 years of age. Attain high school or trade school diplomas. Occupations largely grey-collar, but they occupy blue-collar jobs as well. Further removed from cities than suburban older singles and couples. Dwellings are owned, single-detached, and built as early as the 60's. In 1996, average dwelling cost range was \$129557 to \$169577.
Town upscale	Mortgages can be substantial. 1-2 children aged 14 and under. Upper middle-class families. The average household income \$58783 in 1999. The low cost of living makes this income quite respectable. Attain high school, college, or trade school diplomas. Largely grey-collar and blue-collar workers. Dwellings are large, owned and single detached. Puilt as collar workers.
	single-detached. Built as early as the '60s average cost of home \$148067. Have children,
Town grey collar	Generally older, middle-to-lower income earners who live in towns in English speaking Canada. Pace is slow. Conservative church going folks. Popular retirement enclaves, population of this group's neighbourhood is declining. In 1999 average household income \$42088. Attain high school college or trade school diplomas. They are grey-collar workers over the age of 65. Typically, own older single-detached houses built between 1960 and 1980. Dwelling prices range form \$87891 to \$141693. Some renters. There is a below-
	average immigrant population, with most immigrants present migrating before 1970.
	Most affluent group. Smallest PSYTE group. Average income 1999 \$111549. Income earners range from 40-65 years of age. They are well educated, with white-collar occupations. Live in large cities inhabiting urban, older neighbourhoods (Rosedale Forest Hill). Dwellings are large, owned and single-detached. In 1996 average dwelling cost \$377624, but does vary within the group. Typically, have 1-2 children in their teens or early twenties, many of whom attend private schools.
ethnic	Highest foreign-born population of any group. Many are second generation, immigrating since 1988. In 1999 average household income \$46431. Grey-collar workers with the highest percentage of single-parent families. Live in downtown and midtown areas. Range from Italian Toronto with children over 25, to Chinatown type areas. Own and rent dwellings, some younger ethnic mix eastern European, south Asians and blacks. Level of education is low, but there is a high proportion of university degrees in the Asian areas as well as the younger ethnic mixed areas.

Urban older singles and couples	Older urban singles and couples. Highest percentage of people over the age of 75. Immigrant population is above average. Few children, if they do under 14 years of age. In 1999 the average household income was \$48313. Some income earners are over 60 years of age. Education is low, with mixed occupations. Homes are owned, and single-detached, built between 1946 and 1980. Also, rent high-rise apartments and condominiums.
Urban young singles	roung, mobile urbanites that will move into the highest income groups (urban elite, and suburban affluent), as they get older. Largest group in Canada. Singles more prevalent than couples. Income earners range from 25-34 years of age, well educated (second to urban elite) with white-collar occupations. Average income varies between \$32023 and \$57731. In 1999 average household income \$42095. Young single renters paying off student loans. Rent more than any other group, from high-rise apartments to subdivided houses to dorms. Rent is expensive consuming 30% of household income. Move at least once every five
Urban downscale	years. Live in or near downtown areas (Yonge and Eglinton). Lowest incidence of children. Most downscale of PSYTE groups. In 1999 average household income \$30079. Has the highest unemployment rate in the country. Those who are employed have part-time grey-collar and blue-collar service positions. 20% drop out of school before completing grade 9. Immigrant and ethnic populations are very high. A large proportion of social payments are given to this group. Single-parent families are common, and this group has the highest divorce rate. Typically renters, in central city neighbourhoods. 30% of household income goes towards rent. Older multiple dwellings and low rises are most common. Income earners are both young and old.
Not coded	The area has not been coded within the PSYTE data set

(Compusearch 2000)

Appendix C: Contingency Analysis Tables

Table C1: Branch status versus Education, 1986

	Highest	Level of Educa	tion Complete	d: 1986
Frequency Row Percent	Less than high school	High school certificate	Certificate or diploma	University or higher
Telleriess	24030	22560	5310	5400
(22)	41.94	39.37	9.27	9.42
No Change	150570	161065	37070	40870
(100)	38.65	41.34	9.52	10.49
Opened 86-90	1260	905	175	145
(13)	50.70	36.42	7.04	5.84
Closed 86-98	9855	18500	2815	4715
(10)	27.47	51.55	7.84	13.14
Closed 91-95	41830	43525	9875	11470
(33)	39.20	40.79	9.26	10.75
Closed 96-00	55335	61405	12720	16020
(48)	38.04	42.21	8.74	11.01

(N) is the number of census tracts where branch status change occurred Frequency represents number of people in particular education level of census tracts surveyed

Table C2: Branch status versus Education, 1991

		Higher	st Level of Educ	ation Completed	: 1991	
	Frequency Row Percent	Less than high school	High school certificate	Certificate or diploma	University or higher	
_	Telleriess	25965	30935	15105	16820	
	(22)	29.23	34.83	17.00	18.94	
	No Change	125195	144340	67920	86135	
2	(100)	29.56	34.08	16.03	20.33	
State	Opened 86-90	17390	23815	12515	12430	
	(13)	26.29	36.00	18.92	18.79	
Branch	Opened 91-95	6475	8170	3645	6955	
Ē	(12)	25.65	32.36	14.44	27.55	
•	Closed 91-95	42325	50295	22845	32195	
	(33)	28.66	34.06	15.47	21.81	
	Closed 96-00	57410	69955	30835	45655	
	(48)	28.17	34.31	15.13	22.39	

(N) is the number of census tracts where branch status change occurred
Frequency represents number of people in particular education level of census tracts surveyed

Table C3: Branch status versus Education, 1996

	Frequency	Highes	t Level of Educ	ntion Complete	d: 1996
	Row Percent	Less than high school	High school certificate	Certificate or diploma	University or higher
	Telleriess	38805	51605	28315	33940
	(22)	25.42	33.80	18.55	22.23
	No Change	123390	151175	81985	106850
2	(100)	26.63	32.62	17.69	23.06
Ĭ	Opened 86-98	23070	31830	17695	19595
ä	(13)	25.02	34.52	19.20	21.26
필	Opened 91-95	13915	21480	11395	17735
Ē	(12)	21.56	33.29	17.66	27.49
	Opened 96-00	12330	16670	9390	10755
Į	(5)	25.09	33.92	19.11	21.88
	Closed 96-00	60075	78395	39180	60565
	(48)	25.22	32.91	16.45	25.42
					ľ

(N) is the number of census tracts where branch status change occurred
Frequency represents number of people in particular education level of census tracts surveyed

Table C4: Branch status versus Income, 1986

				Income	(S): 1986			
	Frequency Row Percent	<14999	15k- 19999	20k- 29999	30k- 39999	40k- 49999	50000>	
	Telleriess	4700	2005	4385	4265	3790	7090	
	(22)	17.92	7.64	16.71	16.26	14.45	27.02	
	No Change	30500	13645	28590	28850	24380	54845	
2	(100)	16.87	7.55	15.81	15.96	13.48	30.33	
5	Opened 86-90	175	95	125	240	150	290	
Sta	(13)	16.28	8.84	11.63	22.32	13.95	26.98	
2	Closed 86-90	4710	1750	2940	2970	2240	5140	
Ē	(10)	23.85	8.86	14.89	15.03	11.34	26.03	
	Closed 91-95	9175	4070	8340	7380	6310	13605	
	(33)	18.77	8.33	17.06	15.10	12.91	27.83	
	Closed 96-00	11420	5085	10510	10490	8875	19640	
	(48)	17.30	7.70	15.92	15.89	13.44	29.75	
								

(N) is the number of census tracts where branch status change occurred
Frequency represents number of households in particular income range of census tracts surveyed

Table C5: Branch status versus Income, 1991

				Income	(S): 1991		
	Frequency Row Percent	<14999	15k- 19999	20k- 29999	30k- 39999	40k- 49999	50000>
	Telleries	3780	1585	3780	4005	4080	18420
	(22)	10.60	4.45	10.60	11.23	11.45	51.67
	No Change	22855	9925	21750	22435	20790	82980
2	(100)	12.65	5.49	12.03	12.41	11.50	45.92
豆	Opened 86-90	1415	585	1605	2235	2625	15230
ã	(13)	5.97	2.47	6.77	9.43	11.08	64.28
2	Opened 91-95	1265	515	1235	1265	1105	5395
Ē	(12)	11.73	4.78	11.46	11.73	10.25	50.05
œ	Closed 91-95	7415	3125	7370	7520	6960	28815
	(33)	12.11	5.11	12.04	12.29	11.37	47.08
	Closed 96-00	10530	4205	9015	9830	9495	40320
	(48)	12.63	5.04	10.81	11.79	11.38	48.35

(N) is the number of census tracts where branch status change occurred
Frequency represents number of households in particular income range of census tracts surveyed

Table C6: Branch status versus Income, 1996

				Income	(5): 1996			
	Frequency Row Percent	<9999*	10k- 19999*	20k- 29999	30k- 39999	40k- 49999	50000>	
	Telleriess	3365	5125	5390	5735	5905	31310	
	(22)	5.92	9.02	9.49	10.09	10.39	55.09	
	No Change	13520	25740	21690	21510	18980	86340	
2	(100)	7.20	13.71	11.55	11.45	10.11	45.98	
=	Opened 86-90	1825	2955	2920	3200	3260	19105	
Sta	(13)	5.49	8.88	8.78	9.62	9.80	57.43	
2	Opened 91-95	2220	2405	2390	2445	2625	15225	
2	(12)	8.13	8.81	8.75	8.95	9.61	55.75	
	Opened 96-00	775	1020	1150	1425	1615	10305	
	(5)	4.76	6.26	7.06	8.75	9.91	63.26	
	Closed 96-00	7365	12445	11180	11360	10075	47665	
	(48)	7.36	12.43	11.17	11.35	10.07	47.62	
					* * *			

(N) is the number of census tracts where branch status change occurred

Frequency represents number of households in particular income range of census tracts surveyed

*1996 Income ranges differ slightly from 1986 and 1991 income ranges

Table C7: Branch status versus Age, 1986

	Frequency		_	Agr	Groups: 1	986			
1	Row Percent	0-19	20-24	25-34	35-44	45-54	55-64	65>	
	Telleriess	17850	6800	13780	10485	7545	6560	8075	
	(22)	25.11	9.56	19.38	14.75	10.61	9.23	11.36	
	No Change	114515	44335	89240	70005	51960	49265	57320	
2	(100)	24.02	9.30	18.72	14.69	10.90	10.34	12.03	
	Opened 86-90	900	255	500	475	360	295	480	
_ !	(13)	27.56	7.81	15.31	14.55	11.03	9.04	14.70	
힣	Closed 86-90	7505	3980	10120	6605	4515	4070	5540	
₹	(10)	17.73	9.40	23.91	15.60	10.66	9.61	13.09	
-	Closed 91-95	31260	13345	25500	18510	13695	13340	15240	
Į	(33)	23.89	10.20	19.48	14.14	10.46	10.19	11.64	
ı	Closed 96-00	41100	17975	33640	25175	19585	18365	21810	
	(48)	23.13	10.12	18.94	14.17	11.02	10.34	12.28	

(N) is the number of census tracts where branch status change occurred Frequency represents number of persons in particular age group of census tracts surveyed

Table C8: Branch status versus Age, 1991

	Frequency			Age	Groups: 1	991			
	Row Percent	0-19	20-24	25-34	35-44	45-54	55-64	65>	
	Telleriess	27905	7685	21505	17500	10990	7880	9175	
İ	(22)	27.18	7.49	20.95	17.05	10.71	7.68	8.94	
	No Change	104650	36210	93440	72385	51380	45275	63415	
2	(100)	22.42	7.75	20.02	15.51	11.01	9.70	13.59	
Stat	Opened 86-90	26520	5590	15575	15485	8480	4470	4335	
Š	(13)	32.96	6.94	19.36	19.25	10.54	5.56	5.39	
2	Opened 91-95	5745	1950	5755	4525	3095	2490	3320	
2	(12)	21.37	7.25	21.41	16.84	11.52	9.26	12.35	
2	Closed 91-95	38070	13165	34410	25665	17420	14735	19375	
	(33)	23.38	8.08	21.13	15.76	10.70	9.05	11.90	
	Closed 96-00	52700	18490	46590	35365	24230	20390	27380	
	(48)	23.41	8.21	20.70	15.71	10.76	9.05	12.16	

(N) is the number of census tracts where branch status change occurred Frequency represents number of persons in particular age group of census tracts surveyed

Table C9: Branch status versus Age, 1996

	Frequency			Age	Groups: 1	996		
	Row Percent	0-19	28-24	25-34	35-44	45-54	55-64	65>
	Tellerless	53610	11370	32995	32735	22090	12620	14625
	(22)	29.78	6.32	18.32	18.18	12.27	7.01	8.12
	No Change	122860	33430	97170	85085	63625	46245	72085
3	(196)	23.60	6.42	18.67	16.35	12.23	8.88	13.85
Status	Opened 86-90	34595	6980	18480	20650	14520	7155	7050
_	(13)	31.61	6.38	16.89	18.87	13.27	6.54	6.44
핗	Opened 91-95	19705	4485	13220	13630	9740	5415	6835
E	(12)	26.99	6.14	18.11	18.66	13.33	7.41	9.36
-	Opened 96-00	17415	3645	10495	10535	7050	4005	4745
	(5)	30.08	6.30	18.13	18.20	12.18	6.92	8.19
	Closed 96-99	66295	18915	50940	44305	32605	22395	31625
	(48)	24.82	7.08	19.07	16.59	12.21	8.39	11.84

(N) is the number of census tracts where branch status change occurred Frequency represents number of persons in particular age group of census tracts surveyed

Table C10: Delivery Channel versus PSYTE group

Row Percent affluent	an suburban upcale families 62540 10.74 39783 10.32 44269 11.66 6054 10.39	suburban older singles and couples 69716 11.97 43155 11.20 45719 12.05 7321 12.57	Suburban younger families 50553 8.68 27314 7.09 36648 9.66 5309 9.11	town unthe upscale elli upscale elli 3295 268 0.57 4.6 2962 198 0.77 5.1 2675 179 0.70 4.7 4.6 281 0.70 4.8 2	arban elite elite 26825 4.61 19836 5.15 17961 4.73 2813 4.83	urban ethnic 113783 19.54 86928 22.56 66156 17.43 11091 19.04	urban older singles and couples 53477 9.18 37703 9.78 36800 9.70 5106 8.76	young singles 110658 19.00 72420 18.79 69175 18.23 10646 18.27 4664	33811 5.81 19155 4.97 21792 5.74 3183 5.46	
12.41	10.75	18.92	7.69	0.49	5.83	14.89	8.52	16.90	3.61	

Table C11: Objective 3 - Delivery Channel versus Education*

		Highest Level of Education Completed: 1996							
Frequency Row Percent		Less than high school	High school Certificate	Certificate or diploma	University or higher				
7	\BM	152781	192476	101665	140216				
		26.02	32.78	17.31	23.89				
B	ranck	102714	126451	66480	91459				
₫		26.53	32.67	17.17	23.63				
5 T	POS	99154	125969	67645	90881				
<u> </u>		25.84	32.84	17.63	23.69				
<u>≥</u> Tel	ephone	14999	19279	10100	14332				
Z		25.55	32.84	17.20	24.41				
	ternet	7629	10862	5386	9480				
		22.87	32.56	16.15	28.42				
			-						

^{*}Delivery channel usage counts are scaled by the census tract counts at each education level

Table C12: Objective 3 - Delivery Channel versus Income*

	requency Dw Percent	<9999	10k- 19999 65157	20k- 29999 60149	30k- 39999 62924	40k- 49999 58890	50000> 302574	
	ABM	37430						
_		6.37	11.10	10.24	10.72	10.03	51.54	
2	Branck	25715	45207	40370	41908	38714	195199	
		6.64	11.68	10.43	10.83	10.00	50.42	
5	POS	23270	41231	38671	40436	38154	201876	
Ž		6.06	10.75	10.08	10.54	9.95	52.62	
Delivery	Telephone	3702	6349	5908	6239	5848	30618	
		6.31	10.82	10.07	10.64	9.97	52.19	
	Internet	1993	3318	3133	3517	3143	18256	
		5.98	9.95	9.39	10.54	9.42	54.72	
	in the second							

^{*}Delivery channel usage counts are scaled by the census tract counts at each income range

Table C13: Objective 3 - Delivery Channel versus Age*

Frequency	Age Groups: 1996							
Row Percent	0-19	20-24	25-34	35-44	45-54	55-64	65>	
ABM	138507	39926	110844	98977	74541	51346	72972	
	23.59	6.80	18.88	16.86	12.70	8.74	12.43	
Branch	90771	26284	72108	64435	48775	34622	50129	
<u> </u>	23.45	6.79	18.62	16.64	12.60	8.95	12.95	
U POS	91796	25906	71988	64853	49085	33213	46770	
<u> </u>	23.93	6.75	18.77	16.91	12.79	8.66	12.19	
Telephone	13772	4010	11165	9913	7491	5099	7220	
Telephone	23.47	6.83	19.03	16.90	12.77	8.69	12.31	
Internet	7348	2376	6596	5791	4455	2893	3926	
	22.01	7.12	19.76	17.34	13.35	8.66	11.76	

^{*}Delivery channel usage counts are scaled by the census tract counts at each age group

Appendix D: Regression Analysis Scatterplots

_28pctalm = 43 536 -0.1655 +1614 55-# 149 8 1845 50 RUSE 5 266 45 Pet of Customers Using Abu 10 25 20 0 10 20 30 40 50 60 Fct of Law Income in Tract

Figure D1: Percent ABM clients versus incidence of low-income

Figure D2: Percent branch clients versus incidence of low-income

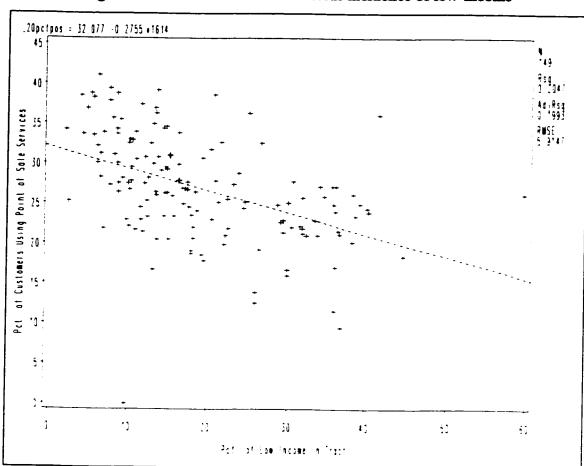


Figure D3: Percent POS clients versus incidence of low-income

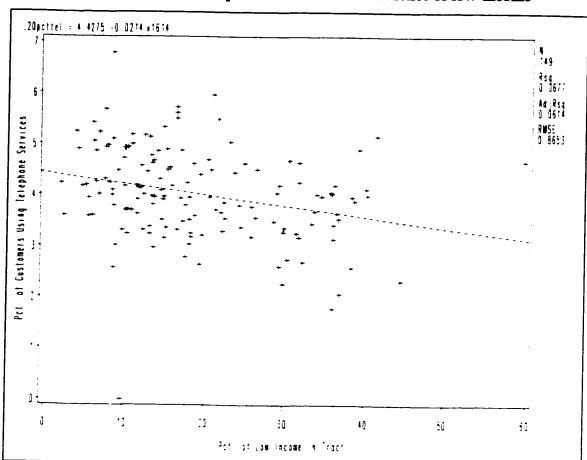


Figure D4: Percent telephone clients versus incidence of low-income

Part of LOW PACORE ON Fract

Figure D5: Percent Internet clients versus incidence of low-income

Figure D6: Percent ABM clients versus average value of dwelling

Insignificant relationship

100000

400000

500000

Average Value of Overlings in Tract

100000

.393000

1200000

1433333

ì

_20pctbra = 26 447 +221E-8 #1682 40 -N 143 3 5037 35 **98**5€ 4 6079 Pet of Customers Using Bronch •5 .] 100000 400000 500000 300000 .339083 .129999 .433333 Average facuse of Ower ings in Trace

Figure D7: Percent branch clients versus average value of dwelling

Average kafue of Ower-1 ngs in Tract

Figure D8: Percent POS clients versus average value of dwelling

Figure D9: Percent telephone clients versus average value of dwelling

Average faille at Dee tings in Tract

Figure D10: Percent Internet clients versus average value of dwelling

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