

TECHNOLOGICAL INNOVATION IN THE BANKING SECTOR

- A STUDY OF NEW TECHNOLOGY INTRODUCED INTO

THE COMMERCIAL BANKING SYSTEM IN THE

CARIBBEAN, WITH SPECIAL REFERENCE TO

GUYANA AND TRINIDAD AND TOBAGO

by

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INTRODUCTION

The balance of payments/foreign exchange/foreign debt/exchange rate issues are dominating policy attention at this particular conjuncture in the developing countries, resulting in much scrutinising of financial institutions. In this regard, the role of the commercial banks as 'organizers' of the credit, money and payments system and as providers of an essential service is significant, for even the International Monetary Fund (IMF) has been encouraging greater commitments from banks to countries with Fund-supported programmes, than probably ever before. In fact, the issue is not whether banks are vital to the development process, for it seems generally accepted that they have been closely associated with the development of today's industrialised and "newly industrialised" countries (NIC's). Indeed, their role in the whole process of financial intermediation cannot be over-emphasized.

In Guyana and Trinidad and Tobago, like in many other LDC's commercial banks play a most crucial and pivotal role in the financial system. As Compton Bourne puts it in his study of commercial banking in Trinidad and Tobago, the commercial banks constitute "the largest established financial formal institutions, and their provision of financial services extends to the widest range of economic activities, economic transact.ors and geographical areas". 1/

In this expanded role of these institutions, however, the issue of technological innovation is especially relevant and noteworthy since it has been observed that they are becoming increasingly computerised in this advanced age of micro-electronics. A revolution seems to have taken place, with technology playing an ever-increasing

role in shaping the system for delivering banks' services. Such is the pace of technology's advance in the banking system that the banks cannot afford to postpone decision to introduce the new technology. There is also a growing competition among the banks and even ^{between} the banks and non-banks for the expanded range of products offered by technology to attract more business from the customer.

The innovation in technology is applied with a sensitivity to all concerned - employees using the equipment, customers enjoying the results and shareholders receiving improved earnings. In the light of this automation in banking, it is felt that a whole new world of convenience has been opened up for customers and that the banks themselves have become more efficient.

It is self-evident that technology is inseparable from the processes of economic growth and development, and of capital accumulation. Given this fact and the significant role of commercial banks in the development process alluded to above, there is obvious scope for an investigation of the impact of this new technology in the banking system. Since the whole question of technology transfer is a very contentious issue, an analysis such as this paper purports to do is not only appropriate but important. Is there any special 'policy' for technology transfer in this sector? Is the technology purely a function of expanding market size or is it the result of the expansion of the operations of the multinational corporations (MNC's)? What are the likely effects of such technological innovation on employment, income and productivity, and how do customers benefit?

These are some of the issues that will be raised in this paper. However, it should be pointed out at the very outset that the scenario in the Caribbean is one in which the technological innovation referred to above is a relatively recent phenomenon. As a consequence, much of the desired information has not been documented and, thus, is not readily available. Even where it was available, there seemed to be a general reluctance to provide important **statistical** information for reasons not inconceivable. The analysis, therefore, must be seen in light of this real constraint.

In addition, it should also be noted that because of financial constraints, the research could only have taken place in two countries of the Caribbean, namely Guyana and Trinidad and Tobago, though it would have been desirable to focus attention on one or two other territories where it is felt that the innovation in banking technology is somewhat more pronounced. Also Guyana may not have been the 'best' country to study for a number of reasons. Firstly, there is a virtual absence of the underlying conditions which would immediately require such technology, for example, the undeveloped state of the payments system. Moreover, there is now a steady decline in the number of foreign banks with the recent demise of the Royal Bank of Canada and the Chase Manhattan Bank which would have been better disposed to acquire the new technology, given the problem of the availability of foreign exchange in Guyana. Generally speaking, there is limited evidence of such new technology in Guyana. Much of the information for the purpose of this analysis has therefore been garnered from research undertaken in Trinidad and Tobago.

For purposes of convenience and clarity, this paper is divided into five (5) sections. In Section 1, there is a review of the range of technological innovation as obtained in the developed countries and some major consequences/implications of such changes on those countries. Thus, in this connection an attempt will be made to examine (i) the impact of the new technology on monetary policy via the effects on the demand for money; (ii) the consequences of those changes for the payments system and intermediation process, i.e. the role of the commercial banks in the financial system will be determined in the light of the new technology. Also, this section will focus on the impact of the technological changes on competition in the financial system. In looking at these implications, the question arises as to whether they are the same for LDC's, given their institutional features.

In Section 11, it will be useful to present a picture of the type and level of technological innovation and the extent to which they are being introduced and utilized in the Caribbean, namely, Guyana and Trinidad and Tobago. This provides scope for a discussion as to the pre-requisites for the successful adoption or transfer of such technology (necessary and sufficient conditions) by comparing countries.

Section 111, highlights such issues as the sources of the new equipment and the mechanisms and structures (if any) through which the innovation takes place e.g. licensing laws, duties, service contracts etc., and the sequence of importation and introduction of such equipment. Such other issues as to whether there is any special policy of technology transfer in the banking sector and whether the introduction of such technology is a result of the expanding market size of the

banks and the role of the MNC's in the whole process will be addressed in this section.

In Section IV, an examination of the effects of the new technology will be undertaken. Here, the emphasis will be in determining the relative costs and benefits of the new technology, both from the standpoint of the banks and the customer, and problems encountered with its use. In addition, it will be useful to report on some of the organizational innovations that have accompanied the technological innovations.

Finally, the remaining section (V) will present an overview and summary and a conclusion based on the findings of the analysis. An attempt will then be made to identify some useful policy recommendations. Also, this section will contain footnotes and a bibliography.

SECTION 1A REVIEW OF THE RANGE OF TECHNOLOGICAL INNOVATION IN THE DEVELOPED COUNTRIES AND SOME CONSEQUENCES/IMPLICATIONS

Even a cursory view of the voluminous literature on banking technology ^{2/} would reveal that technological innovation in the banking system in the developed world has been proceeding with such tremendous pace that in order to remain viable, efficient and competitive, commercial banks have to keep abreast with the latest equipment available. In an era of pervasive and dynamic technological change and intensified competition both in the domestic and international markets, financial institutions must constantly innovate - in production techniques, delivery systems, products and much more - in order to succeed. They are in constant search for the expanded range of products offered by technology. As a consequence, there is an ever-increasing sweep of computer-based technology in the banking system.

The emergence of high technology into the banking systems has completely revolutionised the banking process particularly the payment system which has in turn affected banking habits, wage payment methods and bill payments, etc. The dramatic changes which have taken place have been largely responsive to the growing sophistication of the consumer who is demanding services of greater volume and complexity. It is felt that no matter how compelling an innovation may be, it is the consumer who will determine which products succeed in the market. As one writer puts it, the process of technological diffusion "is driven by the needs of the market place rather than by the inventions of engineers". ^{3/} To provide efficient and high quality service as demanded by the customer, the banks therefore, have had to rely very

heavily on the greater use of automated equipment and processes.

Perhaps it may be useful at this stage, for the purpose of the analysis, to define some of the more important or key concepts that are used in this study e.g. technology, innovation, payment system, automation.

According to Norman Girvan, technology may be properly defined as "the knowledge, skills, methods and procedures associated with the production and utilization of goods and services in a given society. Technology is materialized in designs, specifications, formulations, operating instructions, machinery, equipment, buildings, systems and other tangible forms. These latter should be regarded as the embodiment of technology rather than technology itself". ^{4/} This distinction between technology and the embodiment of products of technical knowledge is a fundamental one for developing countries. In this connection, a computer or a nuclear power plant, is not technology in and of itself. It is rather the results of its application. ^{5/}

In order to understand the question of genuine technology transfer, therefore, one must find out whether the host country has acquired the knowledge and the skills necessary to operate the equipment, to maintain it in good condition and repair it in the event of breakdowns, and to design, engineer and construct expansions to the equipment, or even an entirely new one if it becomes enecessary.

An innovation may be described as an idea or system perceived as new by an individual or society. It represents the application of an invention. Whereas an invention has little or no significance

until it is applied and does not win consumer acceptance, an innovation does not have some consumer acceptance. Thus, when we look at innovations such as electronic payment products, we must look beyond the products themselves to the perceptions that individuals or consumers hold about them. ^{6/} The definition suggests that the product alone cannot be the innovation. Consumer or market acceptance, not technological capability, will determine changes in payment products.

The payments system may be defined as the total set of institutions and procedures which act to transfer economic value. Efficient operation of the payments system produces benefits to many economic sectors and levels of society: households, businesses, financial institutions, and governmental bodies. The payment of value for goods or services purchased is executed in many different ways; in all cases, the payee benefits from prompt transfer. For example, the primary means of transferral of value by households is the paper cheque which is now changing with the advent and rapid acceptance of ATM's. Other innovations will be discussed more fully later.

Automation is the application of new technology to traditional services so that these services may be delivered more efficiently to the customer. Thus, automatic banking systems have evolved as a natural extension of the banks' traditional function as financial intermediaries and their central role in the payments system. As a financial intermediary, a bank facilitates the transfer of financial resources between savers and borrowers. As a member of the payments system, it enables depositors to write cheques against their deposit accounts to the order of other persons and conversely, to receive payments in

the form of cheques (or other similar instruments) from other persons.

While financial intermediation and cheque clearing are the most obvious functions of banks, another important function is the information processing which necessarily accompanies bank transactions. Whenever a deposit is made, or a cheque negotiated, or a loan processed, an accurate record must be kept.

Applications of new technology include the adoption of Electronic Funds Transfer Systems (EFTs) and information retrieval systems, the introduction of Automatic Teller Machines (ATM's), and the extension of the credit and debit card services. Today, money is changing hands with the help of plastic cards, magnetic stripes, magic middles, lasers, microwaves, satellites, computer terminals, telephones and television. Even the signature is disappearing, giving way to thumbprints, voice analysis, electronic signatures and PINs (Personal Identification Numbers). Robots residing in bank walls stoically pay out money, take in deposits and handle other routine teller transactions. Together with parallel developments in view data systems, word processing and other electronic devices, these elements herald the revolution in banking.

It should also be noted that the development of banking networks has gone hand in glove with the advance of technology in computers and in telecommunications. Developments in satellite technology are keenly followed by international banks who are the major commercial users of the systems developed through satellites. Increasingly, banks need to carry out transactions between continents and are thus working on

enhanced and telecommunications networks to provide new capacity and optimum customer service. Lloyds Bank International, for example, has developed its own private communications network. The Workers' Bank of Trinidad and Tobago has also joined the International community with SWIFT (Society for Worldwide Interbank Financial Telecommunications).

In spite of all the changes that have been referred to above, however, the basis of banking, that is, equal and off-setting entries in two or more sets of accounts, has not changed. Also, it is felt that cash and cheques will continue to dominate the payments system for many years, and it is extremely unlikely that the completely "cashless society" will ever materialize. In Canada, for example, about 80% of the dollar amount of all payments are made by cheque. While 30 million cheques are written in Canada each week, 100 million cheques change hands each day in the United States. Without automation, it would be impossible to process such a volume. That is why the Canadian payments system, for example, is characterized by a range of paper-based and EFT systems.

Projections of a research done in the USA,^{7/} however, show that the personal cheque which ranks as the "workhorse" of the American payments system will be displaced by such instruments as ATM's, debit cards and bill payments devices. By the end of the decade, the research reveals, the volume of personal cheque writing will decline sharply.

At this stage in the analysis, it would be apposite to provide a brief description of some of specific types of new technology which have been adopted in the banking systems of the metropole:

1) ELECTRONIC FUNDS TRANSFER (EFT)

This is a system which transfers funds through electronic messages instead of by traditional means, such as cheques or cash. For example, an EFT system is used if someone on holiday wants to make a withdrawal from an out-of-t^{OWN} branch of his bank. His withdrawal is electronically deducted from his account back home.

The inefficiencies in the cheque payment system have spawned the emergence of EFT just as cheques replaced currency as 'a better way'. Electronic banking replaces the written transaction and offers additional convenience to the customer. The improved delivery system which it has generated has helped the banks cope with rising operating costs, increasing transactions volume, the paper deluge and emerging non-bank competition. Eliminating paper handling and the heavily repetitive clerical tasks is a prime concern for all banks thus EFT is a significant break through.

Also, one of the arguments in favour of EFT is that it has the potential to reduce the circulation of cash. Trials abroad have shown that the average transaction time for payment by cash is 30 seconds; cheque writing 90 seconds; and only 25 seconds for EFT. This is particularly attractive for food retailers who handle millions of dollars/pounds worth of cash and cheques every year.

It is felt that banks could save up to 50% of their costs through EFT. In fact, economies of scale are achieved through such innovation.

There are three (3) basic methods of providing service in EFT:

i) Transaction Services

- (a) - ATM's ... designed to accept and move instructions
- cash dispensers
- point of sale (POS)
- (b) - credit cards ... identification media
- debit cards
- cheque guarantee

ii) Bill Payment Services

- pre-authorized payments
- electronic bill payment (pay by phone, etc.)

iii) Techniques or Facilities

- automated clearing house
(includes such systems as SWIFT, CHIPS, BASE 11, DATA PAC, etc.)

2) AUTOMATED TELLER MACHINES (ATM's)

These are terminals which perform many of the everyday banking functions required by the consumer. They are activated by a magnetically-stripped plastic card used in conjunction with a "Personal Identification Number" (PIN) which the card holder keeps to himself. The card is inserted into the machine followed by the PIN and a screen on the machine then guides the consumer through the transaction he wishes to perform. They are often installed in bank walls but are increasingly being found in shopping centres, retail shops, office buildings and other sites.

Through the use of ATM's, consumers can do their banking without the assistance of a teller, using them to get cash, make

deposits, transfer money between accounts, borrow against a line of credit, make bill payments and account balances inquiries, and update passbooks, etc. Some types provide a print-out which gives details of the six (6) previous transactions as well as the current balance. Many are accessible 24 hours a day and 7 days a week. Thus, customers are afforded the opportunity of using them outside of normal banking hours and without queuing up at the bank counter.

The growth of ATM's has been almost exponential, though there seems to be a levelling-off in the UK with the emphasis being to provide rapid cash dispensers which are much cheaper - to buy and install a full-service ATM costs some £30,000 while a simple cash dispenser is under £10,000.^{8/} The cost of supporting such an ATM is about £10,000 per year in the UK and about \$30,000 - \$60,000 per year in the USA. In the USA, it is estimated that by the end of 1985, there will be 90,000 ATM's, while in the UK the number is about 7,000 and in Japan which is one of the pioneers in electronic banking, at least 30,000 ATM's and cash dispensers are now in use.^{9/} Whereas a human teller can handle about 2,500 transactions per month, some ATM's have been able to perform between 6,000 to 12,000 transactions per month.

3) POINT-OF-SALE (POS)

This is an electronic system to transfer the purchase price of goods from one's bank account to the store's account. These electronic terminals are located in retail outlets. A debit card (or any type of card that a bank issues to access the POS system) is inserted into the counter-top terminal in a merchant's store. The customer then independently and privately enters his PIN, thus confirming his

identity. After verification of the customer's identity, the funds to cover the purchase are electronically transferred from the customer's account to the merchant's account. POS gives customers instant access to their accounts, and offers retailers the ability to cut down on bad cheques.

It is estimated in the USA that 45% of all cheques are cashed outside of the branch banking network as more retail outlets, typically supermarkets, are offering cheque cashing and POS services.

4) BANK CARDS

These are convenient means of making payments, instead of using cash or cheque. They have the effect of replacing cheques or greatly reducing their use. They also give customers access to ATM's and other electronic devices.

Bank cards are of two (2) main types: (i) credit card and (ii) debit card. The credit card offers the customer access to a pre-arranged line of credit without having to visit a branch. It also establishes the banks as partners in the buying of merchandise at the point of sale. Merchants are afforded the benefit of granting credit without having to issue their own card or to establish their own lines of credit with each customer.

The debit card is a logical extension of the credit card system but this time it allows consumers to pay retail merchants directly at the store, the purchase being debited to the buyer's bank account. With these cards, payments can only be made out of funds in one's account. There is also the cheque guarantee card which will guarantee your cheques up to a specified limit for purchases of goods and/or services at some retail shops.

Other uses served by Bank Cards include identification for a customer wanting to cash a cheque at a hotel or store or a branch other than his own. Merchants accepting bank cards as payment instruments rely upon the support of authorization networks, an electronic process that can provide authorization within less than a minute. For charges incurred abroad, the banks' authorization centres are linked to world-wide authorisation networks and it takes only minutes for the routing of information on a transaction in London to a customer's bank in Canada and just as quickly, authorization can be returned to London.

Consumer research has shown that in Canada, approximately 70% of the population holds some type of payment card and approximately 40% of Canadian financial institutions' customers have bank cards. More than 11 million bank credit cards are in circulation in Canada today. 10/

5) CHEQUE TRUNCATION

Cheque truncation means that the movement of a cheque is stopped somewhere in the processing cycle and does not end up at the branch of the account holder, or back in the account holder's possession. Ideally, it goes no further than the branch where it is deposited or cashed. The information on the cheque is sent to the data centre of the account holder's name and back to his branch, but the cheque itself remains with the processing bank. The bank's credit card systems also incorporate the principle of truncation in providing customers with descriptive statements rather than the return of their sales voucher.

Because the return of cheques is a costly operation, truncation is potentially a savings to the consumer. Such systems are in place in some European countries and in the USA.

6) AUTOMATED CLEARING HOUSES (ACH)

Automated Clearing Houses allows groups or associations of banks to transfer funds among themselves electronically. Messengers have been replaced by powerful computers with which the banks and their central banks communicate with each other. Each bank transmits and receives payment instructions through a so-called gate-way computer. Messages, once accepted by the system as authentic, are irrevocable. These computers are often linked with the customers' computers.

Bank customers can now enjoy the benefits of same-day funds transfer, without the costly and inefficient paraphernalia of telegraphic funds transfers. The system is so designed that even a company's computer can be in contact with its settlement bank's computer. Company 'A' could settle its debts, therefore, with Company 'B' with all the transactions totally automated and settled through the banking system in the same day.

Within this system also, pre-authorized debits and other funds transfer services can be accommodated. The pre-authorized debit payment is usually covered by a one-time authorization and permits the withdrawal, automatically each month, of a set payment. Such payments as payrolls, pensions, dividends and interest are credited through the ACH system. The government of Canada, for example, now uses this system for the payment of Canada Savings Bond interest.

7) ELECTRONIC BILL PAYMENT

This system allows personal customers to find out the state of their bank accounts, transfer money and pay bills, using nothing more sophisticated than a domestic telephone. Via the telephone, a customer with a touch-tone telephone can dial directly into a data base, and enter his account number and

personal identification number. A computer controlled audio-response unit acknowledges the information and then gives step-by-step instructions for paying bills. Through the use of codes, customers identify the person or company to be paid and the amount and date of payment. After each entry, the payment instructions are repeated by the audio-response unit so corrections can be made before the transaction is completed. This system is largely used in the USA.

8) HOME TELEVISION BANKING

Home television banking systems are also being introduced in the developed world. With these systems, a customer is able to call up a variety of information and undertake limited two-way communication through home video terminals. The development of such services relies on linking up computer and telecommunications technologies. TV companies are being encouraged to instal the type of network that can offer home banking as a by-product of mass entertainment. The growth in the use of home computers and videotex is also a possible opening for the banks. It is predicted that by the end of the century there could be about 60 million people using home banking systems in 25 million US households.

9) ON-LINE SYSTEMS

This is an automated system which can immediately update one's account when funds are deposited or withdrawn. This was not possible with ^{the} 'batch' system that was previously used. In this system, the customer presents his account number or his passbook and receives a complete update including the deposit or withdrawal he has just made. With its introduction, it is said that automation emerged from the "back office" of bank branches to the front counter. As a result, customers are made much more aware of the evolution in technology.

10) ANY-BRANCH BANKING

Through technological innovation, it is possible to have access to one's accounts from a branch of one's bank other than the one that is normally dealt with.

From the preceding discussion, it is clear that technology has really revolutionised the banking system. Such is the pace of technology's advance that self-service banking is a reality. It has certainly changed people's banking habits and the payments system, for it has permitted the customer to conduct his banking both away from the traditional location of his branch and outside normal banking hours, and has also allowed him to transfer funds to other parties with decreasing reliance on the traditional cheque. Increasingly, there seems to be a marriage of both computer and communications technologies. The banks are operating in an intensely competitive financial services market and, therefore, must adopt such technologies that would make them efficient, reliable and attractive to their customers.

The question which arises from all this is what are the consequences/impact of the new technology on such issues as monetary policy, the payments systems and intermediation process, and competition in the financial system.

IMPACT OF NEW TECHNOLOGY ON: (i) MONETARY POLICY

Monetary policy is that policy geared to increasing the availability of funds and/or reducing the costs of economic ventures through the provision of capital. It is assumed to be comprised of a series of individual components, for example changing of the interest

rates, the demand for money, mortgage rates, and so on.

The technological revolution in banking i.e., the transition from paper to electronic payments certainly have important implications far beyond banking and the cheque-processing business. Such a transition is significant for the conduct of monetary policy, for one thing, because the relationship between spending and transferable balances in 'checking' accounts constitutes a key relationship for policy-making. Similarly, the adoption of electronic cheque substitutes could be crucial to anyone offering financial services to households, since today's customers view the 'checking' account as the essential product within the array of financial services. If that type of account or the way funds in it are assessed is changing, it certainly introduces important opportunities and problems for institutions offering retail financial services such as the commercial banks. As already mentioned, the personal cheque unquestionably ranks as the 'workhorse' of the American payment system. The fact that research has shown that there is a tendency for a decline in the writing of personal cheques in the USA, ^{12/} is important for policy-making decisions since such a decline can be attributed to both a displacement and a slow-down consumption per household.

The technological innovations have resulted in a reduction in the demand to hold money. In other words, the liquidity-preference of customers seems to have been significantly reduced because customers can now have access to funds at anytime and anywhere through the literal self-service facility afforded by the use of ATM's at the banks and retail shops, etc. Studies conducted in the USA and other countries have shown that the use of ATM's has infact resulted in an increase

of customers deposits - more deposits being made than withdrawals. On a wider scale, it is felt that the demand and velocity of transactions would fall as less money goes into circulation. Consequently, there is a larger level of balances in the banks.

However, the IMF reports that globally there has been a substantial shift in the composition of deposits with commercial banks. ^{13/} While the relative shares of demand and savings deposits have declined steadily, there has been a rapid growth in accounts bearing higher interest rates - in particular time deposits and, during the last two (2) years or so, what is commonly referred to as NOW accounts, Super-NOW accounts, and money market deposit accounts. (See Table 1)

These findings have been supported by studies done in the commercial banking system in Trinidad and Tobago by Compton Bourne. ^{14/} As he puts it, "the changing structure of deposit ownership reflects the shift in deposit preferences by individuals as well as by business. Individuals and households displayed a greater preference for time deposits and a weaker preference for demand deposits and savings deposits during the 1970's. Business enterprises on the other hand reduced the strength of their preference for demand deposits and shifted towards time deposits". Table 2 illustrates this point.

Bourne also pointed out that there was considerable expansion of bank deposits in the system in both nominal and real terms, especially after 1973. At the end of 1982, the nominal value of total deposit liabilities had increased to TT\$6.7 billion; most of the growth taking place between 1973 and 1982 when the average annual rate do not appear to have stimulated deposit growth. Rather, the growth in bank deposits

TABLE 1
COMMERCIAL BANK DEPOSITS (1960-1983)

Types of Account	July					
	1960	1965	1970	1975	1980	1983
1: Demand Deposits	36	28	25	19	14	10
2: Other checkable deposits (including NOW and Super-NOW accounts).	-	-	-	-	-	-
3: Savings Deposits	18	19	15	14	10	6
4: Small-denomination time deposits	3	5	12	12	14	13
5: Large-denomination time deposits and repurchase agreements	-	4	5	12	13	12
	57	56	57	57	52	53

SOURCE: US Federal Reserve Board - Extracted from Development And Finance, Vol. 21, No.1, March 1984.

TABLE 2DEPOSIT PREFERENCES (1965-1982)

	1965	1970	1973	1975	1980	1983
<u>PANEL A: Individuals and Households</u>						
Demand Deposits (%)	14.4	8.6	7.5	9.2	9.6	9.7
Savings Deposits (%)	68.9	56.6	51.2	51.7	51.2	51.5
Time Deposits (%)	16.8	34.8	41.3	39.1	39.2	38.8
<u>PANEL B: Businesses</u>						
Demand Deposits (%)	88.3	62.7	53.2	53.4	54.5	56.1
Savings Deposits (%)	2.0	6.1	4.4	2.6	1.5	2.7
Time Deposits (%)	9.1	31.2	42.4	43.9	44.0	41.2

SOURCE: Compton Bourne - Structure and Performance of Commercial Banking in Trinidad and Tobago (mimeo). 1984.

were largely influenced by the growth in national income.

It is the contention of this paper that the growth in deposits, particularly after 1973, may have been attributable to the influx of new technology in the banking system. With the new technology, banks have become more efficient, reliable and attractive. It may thus be inferred that the technology variable was an important element in the attraction of deposits to the banks. Though there can be no one-to-one correspondence between technology and the growth of bank deposits, the inference has some significance when one takes into account that some degree of technological innovation began after the mid-1970's, the period that characterized the phenomenal growth in bank deposits in Trinidad and Tobago. After all, technology is inseparable from the processes of economic growth and capital accumulation, both from the macro and micro levels.

In the light of the above, therefore, it is clear that monetary policy must take cognizance of the effects of the new technology on the overall banking process which should be reflected in such issues as interests rates, liquidity ratios, the demand for money, etc.

IMPACT ON THE PAYMENTS SYSTEM, THE INTERMEDIATION PROCESS AND COMPETITION IN THE FINANCIAL SYSTEM

There is no doubt that the innovations in technology within the banking system in the developed countries have had considerable impact on the payments system, the intermediation process and competition in the financial system.

To begin with, many of the innovations have occurred directly within the payments system. As already defined, the payments system

is the means employed to facilitate the transfer of value from one owner to another. Through the centuries, the payments system has evolved from barter to today's diverse system that includes currency, cheques, bank cards, including credit and debit cards, electronic transfers and other retail-oriented payment systems such as ATM's, POS and home banking. Such is the revolution in banking that banking habits, wage payment methods and regular bill payment have been affected in country after country in Europe and North America.

Banking originated as a system for facilitating transactions. The transactions media changed over time, from shells to gold to currency and coinage, and by the 1930's local clearing mechanisms had developed. Until the 1960's, the payments system remained essentially unchanged except for the introduction of Telex. In the mid 1960's and 1970's, credit cards, electronic transfer, ATM's and micro-computers came into their own.

The banking industry used to promote the value of paper cheques as the prime payment system. The growth of that paper-based system has forced banks to invest in and develop highly sophisticated and efficient processing, clearing and settlement systems. One bank in the USA, for example, estimated that it would probably cost \$50 million to duplicate its technology and systems capability in cash management and wire services, ACH and cheque collection.

The payments system is by definition the core of commercial bank business. Historically, the primary motivation of banks was the gathering of deposits to fund lending operations. They have stood between purchasers and sellers, not only providing the means through

which transactions are settled (demand deposit accounts) but collecting and dispersing information relevant to these transactions. The latter is integral to the service banks provide because collecting and dispersing information facilitates the bank-customer contact on which customer loyalty is based.

But slowly and steadily, through technological advances the role of banks has moved from intermediators to transactors. In other words, their role as transactors in the payments system is growing while their role as financial intermediaries is eroding. In addition to their deposit-taking functions, the banks now offer an increasing variety of customer services. On the lending side, credit may be obtained through a bank in a number of ways: through direct loans to cover particular expenditures, such as commercial credit, mortgage financing, and credit for purchase of consumer durables; through pre-arranged overdraft facilities; and through the use of credit cards. Other non-banking but closely related financial services, such as discount brokerage, credit - related life insurance, and the issue of travellers' cheques, are also offered by many banks, often through a contractor or affiliate. Some banks even buy transactions from retailers on a loss-leader basis, hoping to attract more profitable business in return.

Overall, it is the drive to serve an expanding range of customer needs coupled with the innovations in technology that has brought about the changes in the payments system. Banks can no longer depend upon traditional strategies to generate deposits and to attract business in general. The questions which arise are: How will financial value be transferred in tomorrow's market place? What transitional products will lead the way to full-scale electronic financial service?

In which direction is the payments system moving.

Much of the revolution in retail banking involves a transformation in how bank and other financial services are distributed. With technological advances, non-banks are finding it advantageous to offer alternatives to the banks' payment systems. There is a strong and growing competition for the expanded range of products offered by technology in the payments system. The payments system has become a major fact in shifting competitive relationships among banks and between banks and their non-bank competitors. The last several years have seen a remarkable transformation of the financial structure of the USA and other countries in which the new technologies have occurred. Until recently, commercial banks, thrift institutions and other financial intermediaries played well-defined roles, each offering its customers a limited and specialized array of financial services. Today, these distinctions have evaporated and the alternative payments system offered by non-banks may effectively eliminate the unique payments system franchise commercial banks have traditionally enjoyed. Banks, thrift institutions, insurance companies, trust companies, retailers, data processors, communications companies, and vendors of the new technology all are locked in a serious struggle to establish their niches in the electronic payment systems of the future. What this means to the customer is that he can get financial management services from an insurance company; open a deposit account with a stockbroker; go to a bank for discount brokerage services; or take out life insurance with a bank or credit union.

As their services overlap, so do the various segments of the financial industry. A concurrent development has been the formation of financial conglomerates or supermarkets which combine many individual

financial institutions, often including a bank, thrift, or mutual fund. These conglomerates are able to offer the consumer a package of brokerage and banking services in one place and may take full advantage of the greater scale and geographical spread that their non-bank connections make possible. They may also offer a wide range of other specialized services, such as insurance brokerage, real estate and tax shelter sales, and financial advice. By taking advantage of the advances in banking technology, they have greatly enhanced the convenience and reduced the costs of financial transactions. They may be said to offer the traditional virtues of the supermarkets grocery, namely, the diversity of product and the convenience of one-stop shopping.

It seems likely that in such an emerging business environment, the financial institutions that do not follow such a path would only survive by meeting very particular needs for their clients'. There would still be a niche for "Boutique or Speciality Banking", offering very highly specialized services.

The resulting financial system is, therefore, very highly competitive and responsive to shifting market opportunities, in sharp contrast to the relatively rigid and segmented system from which it emerged. It is felt, however, that technology will continue to be a major factor in the survival of those traditional depository institutions that seem to have been "disenfranchised". How well they are able to adapt and adjust to the new economic and technological environment will determine their role in the new financial structure. They will need to invest in new systems.

As far as the commercial banks are concerned, even though it is felt that they have been "disonfranchised" in many respects, it may well be that the laws and regulations affecting banking and the payment system do not reflect technical and market realities, and permit competitors to benefit at the expense of banks. Some amount of deregulation, it is argued, is necessary in places such as USA and Canada if commercial banks are to keep up with their customers. The banks' franchise in the settlement area is not particularly threatened, however, because they still maintain control over the means of settlement, demand deposits. Much of banking requires a settlement mechanism. Unless new payment and settlement systems are created, banks do have a future role.

There are many implications for monetary policy because of the financial innovations. The conduct of monetary policy has been made more difficult by increased uncertainty about the monetary aggregates. This problem reflects the proliferation of accounts that can be used for both transactions and savings purposes; these include NOW and SUPER-NOW accounts, money market deposit accounts, etc.

The advent of supermarket banking has also raised concerns for the stability of individual financial institutions. In particular, doubt has been cast on the viability of those institutions that are unable to compete successfully with the new financial giants. While the process of deregulation enhances the potential opportunities for commercial banks and thrifts, many of these may lack the scale, geographic spread, or entrepreneurial talent to adapt successfully to the new environment. Such institutions would be swallowed by competitors

or become insolvent. In assessing such changes, it is important to bear in mind that the proper functioning of the market inevitably involves success and failure in order to allow for fluidity and change. In addition, it should be emphasized that the defenses against bank failures sparking a general financial crisis are more secure today than they were at the time of the Great Depression. The financial system is stabilized by the protection offered to the small saver by deposit insurance and by the regulatory authorities' commitment to ensure the adequacy of overall bank liquidity.

The challenge facing the financial policy-maker today is to strike the appropriate balance between removing unnecessary and inequitable restraints on the market and yet ensuring the safety and soundness of the financial system and safeguarding the efficacy of monetary policy. In this context, various legislative proposals are being considered (in the USA, for example) that follow the general trend of removing barriers to market forces and restoring the competitive position of banks and thrift institutions relative to non-banks. Proposals include the further relaxation of restrictions on bank acquisition and mergers and on interstate banking; such legislation would increase the opportunities to take advantage of economies of scale and would reduce the various inequities and anomalies under the existing laws. Also under consideration are the removal of existing laws. Also under consideration are the removal of restrictions on the payment of interest on reserve balances held by depository institutions with the regulatory authorities. Such actions would reduce incentives toward the development of transaction - type accounts outside the depository system, and thus reinforcing the ability to carry out

monetary policy efficiently.

The implications as outlined above may not be the same for LDC's, given their institutional features. The financial system is not so developed and thus many of the issues would not arise. As Compton Bourne points out "the sustained growth in bank deposits explains the continued dominance of the commercial banks in the financial system, despite the widening array of financial instruments and institutions. Commercial bank assets as a proportion of total assets of the overall financial system actually increased from 38% in 1977 to 44% in 1982". ^{15/} He also points out that "the sheer dominance of their size creates a counter-vailing power, making the regulatory authorities responsive to the banks' perceptions of their own ^{16/} interests".

With the increasing use of new technologies, however, monetary authorities in the Caribbean must protect the smaller institutions from competition with the larger ones. Given the weaknesses of the financial system and the intermediation process, the technologies should be rationalised to cater for the needs of the consumer in the Caribbean. The fact that many of these economies are tourist-oriented is crucial in determining the level and nature of technology. Consumers coming from the developed world expect certain services to be provided. In this light, the development of multi-purpose financial institutions may have a place in some economies. The question is whether they can be afforded. It would be more plausible for the commercial banks because of their dominance to expand the range of services offered by utilizing the technologies best suited for their purposes. The technology of the payments system is changing rapidly, and will continue to do so. Thus, banks cannot afford to ignore these changes which can make them more efficient, reliable and competitive.

SECTION 11THE LEVEL OF TECHNOLOGICAL INNOVATION IN THE CARIBBEAN

Technological innovation in the Caribbean region is catching on rapidly. Much of the impetus has come from the influence exerted on the financial system by the developments in the developed world.

The information for this part of the analysis was obtained through direct interviews conducted with relevant personnel of the commercial banks in Guyana, and Trinidad and Tobago. In Guyana, interviews were done with personnel from the Guyana National Cooperative Bank (GNCB), the National Bank of Industry and Commerce (the former Royal Bank of Canada) and the Barclays Bank while in Trinidad and Tobago, interviews were done at the National Commercial Bank, the Royal Bank, the Workers' Bank and the Republic Bank. These are the banks which have introduced some degree of technological innovation in their banking activity.

In Guyana, the level of innovation has not been as pronounced or rapid as that in other parts of the Caribbean. Some amount of computerization is now taking place and that is only in a few sections of their operations. They are by no means fully automated or computerized, though there are plans for the updating of their manual systems and full computerization. Even the computers being used are not as sophisticated as those in use in other parts of the Caribbean e.g. Trinidad and Tobago. The basic types are of the NCR 399 and 499 micro-computers which are said to be 1980-81 models. They carry the magnetic stripe as against the disc and main-frame types. These have been introduced mainly in the Demand Deposit Accounts (DDA) and Savings Sections of the Banks' activities. The loans section is still largely manually maintained, though in the case of

the GNCB, some computerization has taken place in that section. They plan to put their system on-line shortly while in the case of Barclays Bank, similar systems to those obtained in Barbados, St. Lucia and other parts of the Caribbean are in operation. With on-line systems, customers' account balances can be completely adjusted at the time that funds are withdrawn or deposited, quite unlike the 'batch' system which allows for the processing of transactions in batches, all at one time at the end of the day.

In addition, the banks in Guyana through their computers, are able to provide daily print-outs on their transactions to customers and the Central Bank. Because of this information system, customers can obtain the state of their balances within seconds instead of waiting 15-20 minutes for a manual up-date.

In Trinidad and Tobago, however, the level of innovation is much more advanced and started even before the drive for computerization began in Guyana where most started in 1980. The DDA system was changed from manual to computer in the case of the Royal Bank as early as 1975 - enquiries began even earlier than that. Both sides of the balance sheet are now subject to computer operations. The level of technological development in T'dad and Tobago is uneven so while some banks have ATM's, EFT's, Bank cards, POS and bill payments systems, others do not have. Some of them even use ABM's which are said to be more advanced than the ATM's currently in use. The ABM's deal more with general banking enquiries and loan applications, etc., where as the ATM's are said to deal with single payments but no standing orders.

In terms of specific hardware, the Royal Bank of Trinidad and Tobago started off with an IBM 36040 computer and then upgraded it to a IBM 4341 model. In all their branches, they have introduced mini-

computers (3600's) to which all tellers are connected by terminals in front of them. The National Commercial Bank has used NCR 8585 main-frame computers with NCR 2262 teller terminals and NCR 1773, 1780 and 5080 ATM's. Most of these systems are on-line i.e. they are on EFT systems.

The Royal Bank also has an Electronic bill payment system for the telephone and insurance companies as well as travel agents. This system helps with all payments on behalf of those companies and update their files at the same time. This bank was also expected by the end of 1985 to have EFT at POS at five (5) pilot locations in Trinidad and Tobago. The remarkable thing about this bank is that it has developed a unique electronic payment system which has been sold to about six (6) banks in countries outside of Trinidad and Tobago. These include Jamaica, Curacao, Barbados and the Bahamas. It is called Off-Host On-Line Automated Terminal System (OATS). Through this system, valuable foreign exchange is earned for Trinidad and Tobago.

The software or programming for this on-line banking system was developed through the ingenuity and creativity of the personnel at Royal and it is said that no other bank in the world has developed such a system. The fact that it is being marketed to other countries outside of the Caribbean (including developed countries) is contrary to the existing trend of technology transfer in which technology is exported from the developed countries to LDC's. Basically, the system is one in which teller terminals are booked directly into the main computer which is called the 'host' so there is a two-way communication that goes on between the host and the teller terminals. In this way, the bank was able to

create an independent data base and in the process has utilized its equipment in a way not intended by the manufacturer. This system is said to take care of poor telecommunications networks which are a characteristic feature of LDC's. Thus, banks in the LDC's can benefit from such a system.

Some amount of bank cards have been in use in the banks, though not fully e.g. the Republic Bank uses a bank card which is both a cheque guarantee card and a debit card. These cards are needed to access the ATM's and they also assist with cheque guarantee and customer identification. Debit and credit cards have not been in too wide usage. There is no cheque truncation or any-branch banking as yet, though the Royal Bank has already put the necessary telecommunications in place for introducing the latter. There is also no automated clearing system or home-television banking as yet. The Workers' Bank is looking at the Micro-wire which is a specialized telex for banking transactions. It is a software used with a personal computer to communicate directly with international correspondent banks. The Republic Bank has been using an Express Deposit System which instantly validates all payments and Deposits.

It should be pointed out that not only the payment system has been affected by the technological innovations but also the information system. Both individual and corporate customers have access to information which is processed by the banks electronically. Record-keeping has been vastly improved. For example, in Guyana, the NBIC formerly used about 26 pans with over 40,000 individual cards for customers. With the use of computers, there is no necessity for the time-consuming and bulky exercise of accessing each card manually. Financial statements can be obtained easily from the computer.

Most type-writers have been replaced by word processors (computers). By the end of 1985, the Royal Bank hopes to have all of them communicating with one another at all branches, thereby displacing the mail service.

Many reasons have been advanced for the introduction of new technology in the Caribbean as epitomised mainly by the Trinidad and Tobago experience and, to a less extent, Guyana. Those reasons might have been brought out in the analysis so far, but a presentation of them in this part of the paper may throw some light as to the prerequisites for the successful adoption or transfer of such technology.

To begin with, many of the banks found that their equipment were obsolete and lacked the capacity for optimum customer service. Some equipment were over ten (10) years old and could not be maintained in terms of spare parts and technical knowledge. They had limited functions and only catered for the 'batch' system of dealing with transactions. For survival and in order to keep up with the trends, the banks had to seek new equipment.

There was also the problem of overcrowded banking halls or lobbies. Customers had to wait long hours to transact their business while staff members were burdened with a large volume of routine work which was time-consuming too. In the case of Trinidad and Tobago, the Central Bank did not permit expansion of buildings nor could branches be opened to disperse facilities.

The economy of Trinidad and Tobago was also very buoyant resulting in a large volume of cash and transactions. The society is essentially cash-based; hence the deposit base of the banks was mainly

reflected in savings, thereby causing large numbers of people in the banking lobbies.

Other reasons include the need to be competitive, accurate and fast in providing service and to provide convenience for the customer. There was obviously demand for more efficient and reliable service. Moreover, there was need for better management control methods and improving the information base and access to it. One can point out the influence of advertisement of the technology that was being offered in the developed world. We live in a highly technological age and cannot ignore its influence.

The increasing demands by the employees union for more costly staff benefits was seen as a significant element in the process. The consumer's acceptance of change and his growing sophistication may be regarded as important elements in the process of change. The policies of the banks themselves in providing service should be taken into account. The availability and the question as to whether the equipment is reasonably affordable are important elements also.

More importantly, the state of the financial system and the financial climate are considerations in the drive to automation in the banking system. A viable and competitive financial system provides impetus for such a drive. There are also such factors as costs-savings and economies of scale to ^{be} derived from the new technology.

The issue of telecommunications cannot be overlooked. Most of the equipment depend on efficient telecommunications networks and other back-up services (power supply, servicing, security, storage and other infrastructure) for them to perform efficiently and successfully.

Central Bank support is also critical in the whole process.

SECTION 3

SOURCES AND STRUCTURES THROUGH WHICH INNOVATION TAKES PLACE

The sources of the new technology are basically IBM and NCR which operate through their local agents in the Caribbean region who are IBM and CCS (Caribbean Computer Systems) respectively. The latter are subsidiaries of the larger MNC's referred to and are the only two companies in the Caribbean in the business of computer systems. Most of the computers in use are IBM made while the ATM's have come from NCR, though the actual software may have come from other sources e.g. ANACOMP for software in on-line system. NCR seems to be more popular with financial institutions. There are no local manufacturers of hardware or software.

Generally, there is no direct importation of major equipment in the Caribbean, though plastic cards (cheque guarantee and ATM cards) and POS terminals (being introduced by Royal) have been introduced directly from the manufacturers. Cash registers have been provided by international correspondent banks in many cases. In some cases, the Head Office, Management Services Division, located in the developed world may buy the equipment in bulk and transfer it to the local bank but always through the agents. Of course, feasibility studies are first conducted to ascertain the suitability and potential profitability of the equipment in addition to checking on the support services, etc.

In relation to the mechanisms through which the technological innovation takes place, this research has found that there are no clear-cut ones. The institutional/legislative/administrative structures (licensing laws, duties, service contracts, etc) are not too well-defined. The over-riding trend is for the local agents, and marketing representatives of the computer companies to handle such matters both in Guyana and Trinidad and Tobago. There is no special arrangement, or licensing laws for the importation of bank equipment. Such equipment come under open-licensing arrangements in Trinidad and Tobago as none is produced locally. All that is required is the foreign exchange, for which the Central Bank approval is necessary. However, if the equipment is being imported for the first time, licenses are required from the Ministry of Industry and Commerce.

In Guyana, licences must be obtained from the Ministry of Trade after approval is given by a Data Management Committee which ascertains whether the equipment is needed in terms of the over-all needs of the country. Then, Central Bank permission is required for the procurement of foreign exchange. This process may be very lengthy and by the time it is completed, the implementation schedule for the equipment may have passed. The local agents of the Computer Company may then go ahead in bringing the equipment, subject to the payment of customs duty surcharge and purchase tax. Everything is handled by the agents in a total package in both countries studied - duties, shipping, insurance, etc, are all handled by the agents. These transactions are done in local currency. The equipment may be bought or rented. A discussion of costs will be done in the next section. Some banks even use the services of a customs broker who handles everything from licences to clearing and delivery of equipment and is then reimbursed.

Before the equipment is bought or rented, however, the bank in question sets up a Committee to do a feasibility study. It would look into such matters as licences, foreign exchange and potential local costs. It would also determine the method of usage and agreement contract with the manufacturers, and such issues as who bears the costs of bank cards, their design and distribution, the promotion and marketing of equipment to customers, storage, installation, security, certain ambiances (temperature, humidity, etc), sources of power, stationery on which to record transactions and training of staff, etc. When these arrangements are worked out, machinery is put in train for the subsequent importation of the equipment.

In terms of copyrights and patents, these are held by the manufacturers who are basically IBM and NCR. This has important implications for the bank which is developing and exporting its own software.

Service contracts with the suppliers of equipment vary from bank to bank and with the type of equipment. It is the responsibility of the local agents to attend to problems encountered with the use of the equipment, to provide spare parts, servicing and to ensure that the equipment is functioning satisfactorily. Technicians are on call 24 hours a day to provide technical support for both hardware and software. Some contracts are for one year and may be renewable, while some are for longer periods. The price of a contract can be very high, as much as 10% of the costs of a piece of equipment. For example, some banks pay as much as TT\$16,000 per annum per machine. In other cases the fee may range from TT\$4,000 - TT\$10,000 per month depending on the type of equipment.

In regard to the question of technology policy of the individual banks and the banking sector as a whole, this research has found no clear-cut or well-defined policy. There is an unwritten policy to acquire the best technology that would provide optimum customer service. Anything that will improve their service, profitability and competitiveness will be sought. They must follow the trends in international banking and keep abreast. In Trinidad and Tobago, the Institute of Banking organises monthly meetings to discuss different aspects of banking, including technology.

In relation to the influence of market size on the introduction of new technology in the Caribbean, this paper is of the view that, though important, the market size has not totally affected the level of technology. For, one of the smallest banks in Trinidad and Tobago the Workers' Bank with only six (6) branches and about 6% of the market share and 1/10 the asset size of the Royal Bank, was one of the earliest banks to introduce the ATM. The important factor is the thinking of management and the services customers require. In fact, what seems to happen is that market size may have improved as a result of new technology. For sure, the asset size of that bank expanded tremendously since it became computerized e.g., its total assets were TT\$52.5M in 1977 and this moved to TT\$650M by the end of 1985.

In the USA, studies have shown that in payments system technology where there are significant economies of scale, small institutions may not necessarily suffer relative to large institutions.^{17/} Shared networks and services promises to make sophisticated technology available to small institutions. It is even predicted that small institutions could even enjoy a unit cost advantage over large institutions during

the 1980's, and that a large bank is likely to be too heavily committed and heavily invested in a software/hardware system that becomes prematurely obsolete. So there is some hope for the small banks, in the Caribbean such as the Workers' Bank.

The role of the MNC's in the process of technological innovation in the Caribbean is also worth investigating. The foreign banks report that their Head Offices which are located in the metropole do influence some of their decisions in terms of buying certain equipment but on the whole, decision-making is internal or local. The headquarters provide mostly consultancy and advice in the process. Technically, one may say that the MNC's are the real purchasers of the technology, because the banks are their subsidiaries. Also, the real suppliers of the technology are MNC's who act through their agents - this role was discussed already. Before 1972 the Royal Bank of Trinidad and Tobago was a subsidiary of the Royal Bank of Canada. However, the process of computerization began after 1972 and today, this bank has made rapid progress in its technological development without the assistance or interference of the MNC in Canada. It has even become a registered exporter.

SECTION 4

COSTS AND BENEFITS OF NEW TECHNOLOGY AND EFFECTS

It will be useful to provide an analysis of costs and benefits to both customers and banks in order to determine the optimal level of technological change in the financial sector in the Caribbean. In this connection, we raise some issues of the divergence between 'social costs and benefits' and 'private costs and benefits'. The latter would presumably dictate the speed of adoption of new

technologies by the commercial banks while the former gives scope for wider policy discussion.

It should be remembered that change requires not just an available technology but a cost-effective bundling of the technology into products acceptable to the consumer. It is crucial to have a long-run economic justification for electronic products which requires a combination of cost savings and greater value and convenience.

In terms of costs of equipment, it was found that they are quite substantial. Prices vary according to the type of equipment and the supplier. One bank reported that it may cost about TT\$1m for everything in having an ATM installed and working. This involves price of equipment, duties, transportation, installation, servicing, storage, bank cards and other support services. The actual purchase price of such an equipment may be in the vicinity of US\$50,000 or about TT\$120,000. Installation costs may range from TT\$50,000 to TT\$60,000 while maintenance costs may be about TT\$16,000 per year per machine and insurance (against loss of cash, damage to equipment, malfunctioning of equipment, etc) costs are about TT\$16,000 per year. A micro-computer may cost about TT\$10,000 and teller terminals about TT\$5,000. Bank cards may cost from TT\$2 to TT\$20, depending on quality, design, etc.

The cost for a full blown, comprehensive on-line EFT system may be in the vicinity of TT\$600,000. In terms of rental of computers the GNCB (Guyana) is paying about G\$20,000 per month which is quite prohibitive. Thus, in a few years the cost of rental can be even greater than the purchase price of the equipment.

With respect to costs per transaction by an ATM, it is reported that in the USA the cost per transaction of an ATM doing 6,000 transactions per month exclusive of inquiries is approximately 28 cents while the cost to the bank of an EFT deposit is about 7 cents versus 24 cents for an over-the-counter teller deposit and 59 cents for a bank-by-mail deposit. ^{18/} In relation to the Caribbean, these costs could not be determined as they were regarded as proprietary information. There is no service charge on the use of the new technology ^{as} the bank bears all the costs. This is significant in the light of Bourne's findings that the operating costs of the commercial banking industry increased greatly in absolute terms from 1965 to 1982, moving from \$15.1M to \$573M in 1982. ^{19/} Interest costs rose because of shift to time deposits, while labour costs and the cost of physical capital (buildings, machinery, equipment) declined relatively. Advertising expenditures were also a larger proportion of total costs after 1970.

At the same time, however, the banks' profitability increased substantially as net revenues increased both as a proportion of total bank assets and shareholders capital. If we look at figures for the Workers Bank, for example, we see that there were substantial profits made in nominal terms. In 1977, their profits (before tax) were TT\$960,000 which moved to \$7.8M in 1981 and \$16M in 1985, while their total assets grew from \$52.5M in 1977 to \$650M in 1985. These increases have been attributable largely to the impact of the new technology. It is felt that over the long-run the costs of the new technology would fall considerably as banks' services become more electronic. The question changing from what does technology allow us to do to what gives the best economic return. Economies of scale are achievable.

ATM's generally offer three benefits: a teller cost is saved; longer hours increase customer conveniences and equipment utilization; and in well designed systems customer keying afford data capture economies and, possibly, additional processing benefits from lower error rate. Together, these benefits would offset the space costs, machine costs, and servicing expenses associated with ATM's. Another advantage may be the need to make branches smaller as more outlets for consumers access to banking services are established through ATM's.

The investment in electronic banking is quite heavy too. We have already seen what the costs of an ATM fully installed are likely to be. One bank has already invested over \$20M in bank equipment. Other figures are not available.

Some costs have been incurred in sensitizing customers to the new technology. There was a tremendous campaign to inform the public of the changes. Advertisements were done on the television and the news media. People were also informed directly by mail and on the bank premises through hand-outs, computer messages and film shows. This obviously contributed to the increased costs of operations, referred to earlier. It is reported that customers have reacted positively to the new technology. In the initial stages, some were hesitant and suspicious and unresponsive to change, while others preferred to stick to the traditional style of banking instead of looking for faster, more convenient and less costly transactions. However, as technology proceeds apace, many have become more responsive to it.

Staff response was also positive. In the initial stages, as with the consuming public, some members had difficulty with using the

Bank costs include the expense of developing a system, integrating it into other systems, investing in the purchase and maintenance of the hardware and software, and maintaining and servicing the facility. In addition, customers might have to be convinced that the system is beneficial to them and instructed in its use. Some banks might have comparative advantages in making the initial expenditures, particularly when they have had considerable experience in the development and maintenance of similar systems.

Banks benefit from increased efficiency and productivity. These are reflected in the savings in time, the improved quality of service and more reliable and accurate information formerly employers had to work long hours - about 10 hours per day. With computerization, the time spent is about 6 hours per day. It has certainly reduced the need for overtime work and pay as tellers can now do their balances much faster. There is thus less strain and tension in the working environment. This has social implications as more time is available for other activities such as sports, staff studies, meetings, etc.

The fact that customers save on time also has social implications since they do not need time-off to transact their business. This is important for national productivity as the public can use time saved for productive work.

As already noted, an ATM can handle a significantly greater number of transactions than a human teller e.g. the ATM network at Royal did over 100,000 transactions per month. It also works better in processing repetitive transactions and has fewer demands than a human teller. It also has the potential of making the banking environment more stable. The break-even point in terms of costs is said to be better in using an ATM than a human teller if we compare the average cost of an

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equipment. It is argued that if staff were not positively responsive, the rate of change in technology from the 1970's to the present would not have been so great.

equivalent human teller transaction as against that of an ATM. It is anticipated that the annual replacement cost of an ATM will reduce over time while the cost of human labour will increase. The disadvantage with an ATM is that it cannot interact with a customer personally.

Apart from the potential of increasing productivity both at the macro and micro levels, social and economic benefits can also be seen in terms of the effects of the new technology ^{on} employment. One would expect that the introduction of new capital equipment would displace labour to some extent. However, this research has found that there is no problem of displacement. Rather, there is a regrouping of functions and a rediversion of resources. New functions have been created e.g. some people are moved from teller transactions to the department that handles loans or to the data processing division, while others may be involved in advertising and selling bank cards or in monitoring the work of an ATM. New functions have been created.

The staff level has grown with the expansion of bank activity through the computerization programme, though the volume of transactions outstripped it. At the Workers' Bank in 1977, there were 3 branches and a staff of 105; in 1985 there were 6 branches and 163 staff members. At the Royal Bank, there were 300 workers in 1973; in 1985, there were 1400. At the same bank, the Electronic Data Processing (EDP) section comprised 23 employees; in 1985, the figure was 100. There was also upward mobility among employees and new careers were created.

The income of employees also increased through increased profitability brought about by the new technology. For example, the income of a basic entry clerk was TT\$500 per month in 1977. In 1985, that entry clerk obtained TT\$2300 per month.

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Social benefit is seen, moreover, in terms of the new skills and knowledge acquisition of employees. Training is being conducted all the time to improve staff capability to handle the new equipment and to improve performance. There are both in house or on-the-job and overseas training. Data processing staff and top personnel are sent on various training courses in computer technology. For example, there is a training centre in Chaguarmas, Trinidad, where training is done. Computer literacy courses are also conducted. The training is pervasive and on-going.

Changes have occurred in relation to people's banking habits. People are generally very resistant to change. With the new technology they are forced to adapt to change. This may lead to a general improvement of standards as they approach work and life in a more organised fashion. Social benefit may also be gained from less congestion and less demand for space. Better communications and other infrastructural facilities may result.

Tourism may be greatly enhanced through the innovations in technology. People require certain services which could only be done efficiently through the new technology. Valuable foreign exchange can be earned in the process as tourists would be encouraged to visit places where they can obtain the same standard of service.

Social costs may be incurred if the technology conflicts with national goals while benefits are obtained if linkages are established with any locally - generated technology. This paper has found that the technology is not in conflict with national goals to the extent that no technology of this nature is generated locally and to introduce any equipment, Central Bank approval is required. For example, the Royal Bank of Trinidad and Tobago wanted to establish an ATM at its Head Office which does not have

a branch there and were turned down by Central Bank because it would have conflicted with the Bank's policy of having ATM's outside of a branch. As far as linkages are concerned, there are none with any locally-generated technologies. In some cases, paper, ink and ribbon are bought locally but on the whole the equipment uses products of a certain quality, not obtainable on the local market. There might be some conflict if the technology resulted in a minimization of labour but this has not occurred.

SOME PROBLEMS IN THE USE OF THE TECHNOLOGY

Certain problems arise with the use of new technology. There are legal implications. For instance, what does a bank do when a customer swears on oath that his credit card has never left his possession and that his PIN has not been disclosed to any other person? Fraud, error and technical malfunction in EFT pose in some peculiar ways the basic question: Where does the liability lie? What can the customer do when there are unfair practices by the banks?

There is the possibility of systems which are expensive in capital equipment and low in consumer acceptance, and the vulnerability of Computerized Systems to large scale fraud, data theft, vandalism, illicit currency transactions, mistakes in product design, etc. Then there are problems of power ^{supply} security and support services.

The question that now arises is whether automation has satisfied the needs of customers locally. To a large extent it has but studies are going on continuously to improve on systems for even better quality service. To determine the optimal level of technology for our type of economies is very difficult. Obviously, one has ascertain whether the benefits outweigh the costs (both personal and social) to both consumers and the banks. There is every indication that this is happening but in

order to remain competitive, new methods and systems have to be found.

ORGANIZATIONAL CHANGES:

Concurrent developments ^{have} taken place in the organization of the banks. As a result of automation, some banks have separated their branches into 2 parts. One is a highly automated area, with relatively few tellers. The other side of the office is reserved for data processing and high-profit services - the consulting, investment, and credit services that require more personal, private banking. Some have seen divided into retail and corporate functions. They have had to change their internal control mechanisms which were geared for manual systems. Decision-making is more scientific. With the use of modern equipment, especially in the data processing department, there has developed a pool of secretaries who are able to serve many persons. There are also technical staff support teams, and project managers, etc.

SECTION 5OVERVIEW AND SUMMARY

This paper forms a study of technological innovations in the banking section in the Caribbean, with specific reference to Guyana and Trinidad and Tobago. Its scope was to investigate and report on the technical and organizational changes that have been taking place in the banking system in the region. In this respect, ^a brief review of the range of innovations taking place in the developed countries and their implications was undertaken. There is indeed a tremendous technological revolution in retail banking in the metropole in the form of ATM's, EFT's, POS, bank cards, electronic bill payments, home-television banking, etc. These have had considerable impact on monetary policy via the effects on the demand for money, the payments system and the intermediation process as well as competition in the financial system, with the result that commercial banks are no longer being seen as financial intermediaries but as financial transactors and their position in the financial system being seriously threatened by the competition offered by non-banks which are offering an increasing range of financial services.

In looking at those implications, we tried to ascertain whether they were the same for LDC's, given their institutional features. In this connection, the view was posited that they were not the same because the financial system is underdeveloped in terms of its range of activities and distribution of financial services and financial strength.

In the sections which followed, the paper focussed on the level of innovation and the extent to which they were introduced in the Caribbean. Here, it was pointed out that in Guyana the process has only recently started while in Trinidad and Tobago it was proceeding with great pace, with many of the products of technology being introduced into the banking system. This discussion provided some insight into what were the pre-requisites for the successful adoption of the new technology. A large consumer base with a demand for better quality service, forward thinking management, the need to be efficient and competitive and to follow current trends are some of the underlying influences. Then, we ^{proceeded} to highlight such issues as sources, structures, bank policies and the role of the MNC's and market size in the process. We found that there were no fixed sources of supply though the main ones were IBM and NCR, and there were no clearly-defined structures and policies. The role of the MNC's seems to be limited to the supply of the technology.

Finally, the paper looked at the effects of the new technology and the relative costs and benefits both to the banks and customers. We find that the effects have been quite positive on such factors as employment, income and productivity. Though the costs have been substantial and prohibitive, the benefits seem to outweigh the costs. Costs are likely to fall in the long-run. There were also concurrent organizational innovations with those in technology.

CONCLUSION

The conclusion is that the innovations in technology are certainly revolutionizing the payments system in retail banking in the Caribbean. Those countries that are tourist-oriented are likely to

take the lead in the whole process. There has been wide market acceptance of the changes taking place as people demand services of greater volume and complexity. The changes seem to be desirable from the point of view of the bankers and customers.

For policy decision-makers, however, the question is whether such automation will result in a stable and much improved financial system that will eventually lead to the solution of some of the problems of the region. There is no guarantee that that would happen. The technologies have made us even more dependent on the developed world for their products. We are totally dependent for these products as we have not developed our own systems and what we actually receive are the embodiments of technology and not the actual technology itself. The real technology, is with the suppliers, the MNC's. Even the servicing and maintenance of the equipment, copyrights, patents, etc, are in the hands of the suppliers. As C.Y. Thomas puts it: "recent developments indicate that the dynamic processes of technological dependence are leading to newer patterns in the global distribution of capitalist technology ... Inevitably, this has meant that the gap in technology between the capitalist states and the periphery is widening at a faster rate than even the much heralded gap in average incomes and levels of living".^{20/}

Given the nature and availability of this type of technology, however, the question is whether we can develop our own systems. Maybe it is possible, as exemplified by the case of the Royal Bank of Trinidad and Tobago which is even exporting its technology to other banks and earning valuable foreign exchange in the process. Countries with serious foreign exchange problems can hardly afford such

technologies when there are other development goals to be met.

The real issue is whether the technological innovations under discussion have improved the material conditions of the people. The answer is 'no', of course. Bankers and shareholders are enjoying greater profits and earnings but the masses of the people remain impoverished though their banking habits would have changed. To the extent that this is so, to that extent we can say that the process of dependency and underdevelopment would have been perpetuated. We, therefore, need to rationalize in what direction we are moving with the new technology, bearing in mind our desire for self-reliance and meaningful economic transformation. Transforming the payments system or the financial intermediation process alone would not give us that.

POLICY RECOMMENDATIONS

In light of the above conclusion, the following recommendations are proposed:

- 1: Monetary ^{authorities} in the Caribbean should ^{closely} monitor the technological developments taking place in the commercial banking system and determine appropriate policies in consonance with their goals for technology.
- 2: There should be a special policy for technology in this sector.
- 3: Linkages should wherever possible be encouraged with local industries.
- 4: Commercial banks should try as far as possible to develop

their own systems, best suited to their needs and improve existing ones. In this connection, technical competence should be developed ^{their} by own Research and Development (R and D).

5: Commercial Banks need to examine their role in the financial system and carefully determine their future roles in light of the present developments in the system.

Footnotes

- 1: Compton Bourne, Structure and Performance of Commercial Banking in Trinidad and Tobago (Mimeo), 1984, p.1.
- 2: See the recent issues of such journals as: Banking World, The Bankers' Magazine, Economic Review and The Caribbean Banker.
- 3: Economic Review, Federal Bank of Atlanta; August 1983, p.4.
- 4: Norman Girvan, "The Approach to Technology Policy Studies", Social and Economic Studies, Vol 28, No. 1, March 1979, p.1.
- 5: Norman Girvan, Some thoughts on Technology, Development and the Caribbean, Globus Lecture, City College of New York, April 1984, p.5.
- 6: Economic Review, op.cit., p.10.
- 7: Ibid., p.4.
- 8: Banking World, Journal of the Institute of Bankers and the Bankers' Magazine, Nov, 1984, p.43.
- 9: Ibid., pp.48-49.
- 10: The Canadian Bankers' Association, Automation in Banking: An Age of Transition, Canada, 1984, p.6.
- 11: S.B. Jones-Hendrickson, Rational Expectations, Causality and Integrative Fiscal-Monetary Policy in the Caribbean (Mimeo), Caribbean Research Institute of the Virgin Islands, St Croix Campus, 1984, p.19.
- 12: Economic Review, op.cit., August 1983, p. 4.
- 13: Collins, C and Horiguchi, Y., "Financial Supermarkets in the United States", Finance and Development, the IMF and the World Bank, March 1984, Vol 21 No. 1, p.20.
- 14: Compton Bourne, op.cit., p.23.
- 15: Ibid., p.24.
- 16: Ibid., p.1.
- 17: Economic Review, August 1983, p.40.
- 18: Ibid., July/August 1984, p.35.
- 19: Compton Bourne, op.cit., p.53.
- 20: C.Y? Thomas, Dependence and Transformation: The Economics of the Transition to Socialism, New York, Monthly Review Press, 1974. p42

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- 11: Odle, Maurice, Multinational Banks and Underdevelopment, Pergamon Press, 1981.
- 12: The Canadian Bankers' Association, Automation in Canadian Banking: An Age of Transition, Canada, 1984.
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