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**A PROFILE OF THE GEOGRAPHIC INFORMATION SYSTEM MARKET
AS A PART OF THE INFORMATION PROCESSING SEGMENT STUDY**

DELIVERABLE 1

July 1991

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Geographic Information Systems (GIS) - Deliverable 1, Task 1

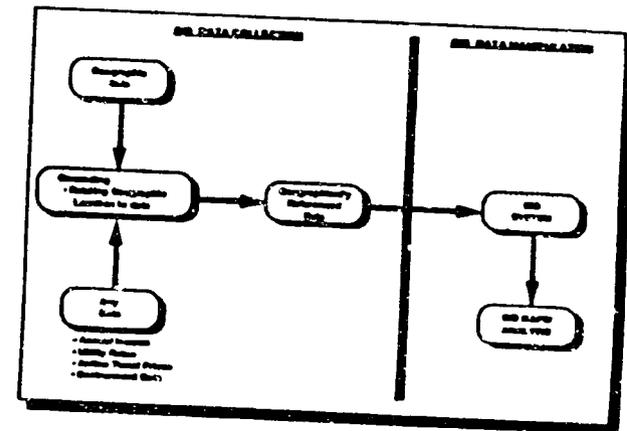
Information Processing Market Segment Study

This report was prepared by INTEX for Task 1 of the information processing industry segment study and is the first of a series of reports produced by INTEX in this task. As described by the Statement of Work, the scope of this task is to provide an overview of different information processing markets in North America suitable for the development and growth of Jamaica's local industry. Hence, this report focusses on the current state of the GIS market in the U.S. and provides an overview of its trends and projections. Final strategies, recommendations, and conclusions will result from our analyses of tasks 1 and 2 and will be presented in our next set of deliverables.

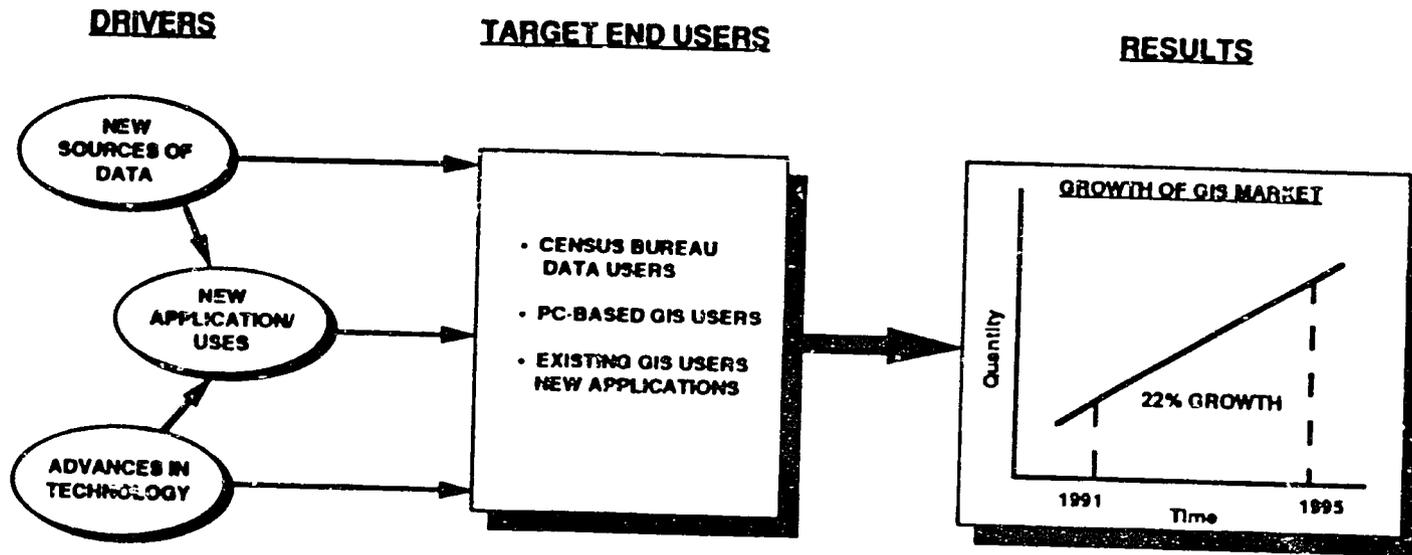
GIS Overview . . .

DEVELOPED 25 YEARS AGO FOR MAP PRODUCTION, GEOGRAPHIC INFORMATION SYSTEMS (GIS)'S ABILITY TO ORGANIZE, ANALYZE AND MODEL SPATIALLY-REFERENCED INFORMATION HAS LEAD TO DIVERSE APPLICATIONS OF THIS TECHNOLOGY:

- GIS is traditionally used to produce and access maps more efficiently
- New application of GIS technology include:
 - Environmental planning
 - Analysis of census statistics
 - Compilation of demographic databases
 - Vehicle navigation systems



MAJOR DRIVERS FOR GROWTH WITHIN THE GIS MARKET INCLUDE THE AVAILABILITY OF NEW SOURCES OF GIS DATA, NEW APPLICATIONS, AND ADVANCES IN TECHNOLOGY:



THESE MARKET DRIVERS WILL BE DISCUSSED IN GREATER DETAIL ON THE FOLLOWING PAGES

GIS Drivers . . . Availability of New Data

TOPOLOGICALLY INTEGRATED GEOGRAPHIC ENCODING REFERENCING SYSTEM (TIGER FILES) IS A JOINT DEVELOPMENT PROGRAM BETWEEN THE U.S. CENSUS BUREAU AND U.S. GEOLOGICAL SURVEY TO GEOGRAPHICALLY CODE CENSUS INFORMATION. THE TIGER FILES' ABILITY TO MAP CENSUS INFORMATION IS DRIVING THE NEED FOR NEW APPLICATIONS BECAUSE CENSUS DATA IS USEFUL TO A WIDE RANGE OF ORGANIZATIONS IN GIS FORMAT:

- **LOCAL GOVERNMENTS**: can use tiger files to automate the redistricting of their population and manage essential functions such as real estate taxation.
- **FEDERAL AGENCIES**: can use TIGER files to plan resource distribution of various national projects.
- **COMMERCIAL**: can use TIGER files to establish sale territories, develop a direct marketing campaign, and evaluate locations for a new store.

ADVANCES IN TECHNOLOGY AND THE SUBSEQUENT REDUCTION IN COST OF IMPLEMENTING A GIS SYSTEM HAVE CONTRIBUTED TO THE GROWTH OF THE GIS MARKET:

- CD-ROMS have significantly lowered the cost of storing data.
- PC-Based GIS systems have lowered the cost of the hardware component within GIS systems.
- Menu driven/user friendly (or so called reduced instruction systems) have lowered the cost and time of training new GIS users.

NEW APPLICATIONS AND THE EXPANSION OF EXISTING APPLICATIONS OF GIS TECHNOLOGY ARE DRIVING THE GIS MARKET GROWTH BECAUSE OF THE EXPANSION OF GIS UTILITY FROM MAPPING TO A WIDE RANGES OF OTHER USES:

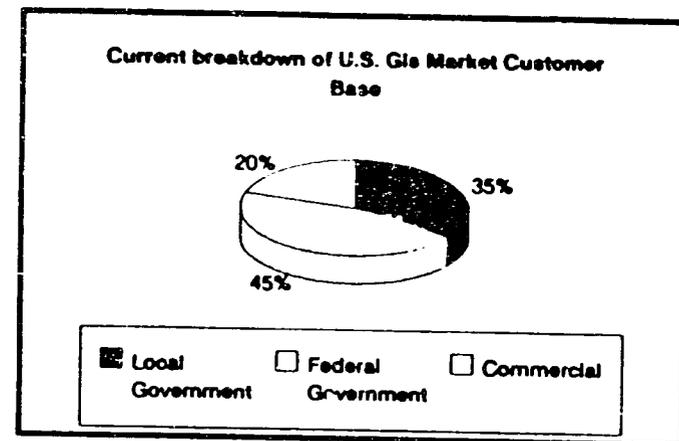
- **NEW APPLICATIONS:** the growth of the GIS market in recent years is greatly due to the large number of new applications of GIS technology:
 - Real Estate Industry is using GIS for matching prospective buyers to available homes.
 - Marketers are using GIS for direct mail and other marketing functions
 - Local governments are using GIS for voter redistricting.
 - Oil and energy companies are using GIS for mineral and energy exploration.
 - Emergency services such as 911 route vehicles using GIS technology.
 - Airlines calculate passenger prices using GIS.
 - Automobile and defense industry are combining Geographic Positioning Systems (GPS) with GIS to intelligently direct and route ships, trucks, and military vehicles.

GIS Drivers (Cont.)

- **EXPAND EXISTING USE OF APPLICATIONS:** the GIS market will continue to grow as industry expands use of existing applications:
 - Emergency services use of GIS is relatively small but will continue to grow as the benefits of GIS applications become apparent.
 - The transportation industry's use of GIS system will grow as automobile navigation systems are developed.
 - Parcel companies such as Federal Express and UPS have expressed interest in GIS systems for efficient distribution of packages.

A LITERATURE SEARCH AND KEY INTERVIEWS WITH INTERNAL AND EXTERNAL EXPERTS HAVE IDENTIFIED CERTAIN U.S. GOVERNMENT AGENCIES, LOCAL GOVERNMENTS, AND INDUSTRIES AS BEING KEY USERS OF GIS:

- **GOVERNMENT AGENCIES:**
 - U.S. Geological Survey- traditional map making applications.
 - NASA- analyze spatial data.
 - U.S. Census Bureau- demographic and statistical functions (TIGER files).
 - Bureau of Land Management- land management.
 - EPA- environmental planning.
- **LOCAL GOVERNMENTS:**
 - Redistricting voter districts.
 - Assessing property tax.
 - Routing of emergency vehicles.
 - Controlling the spread of diseases.
 - Distributing well fare checks.
 - Road and Facility Management



Current GIS Customers (Cont.)

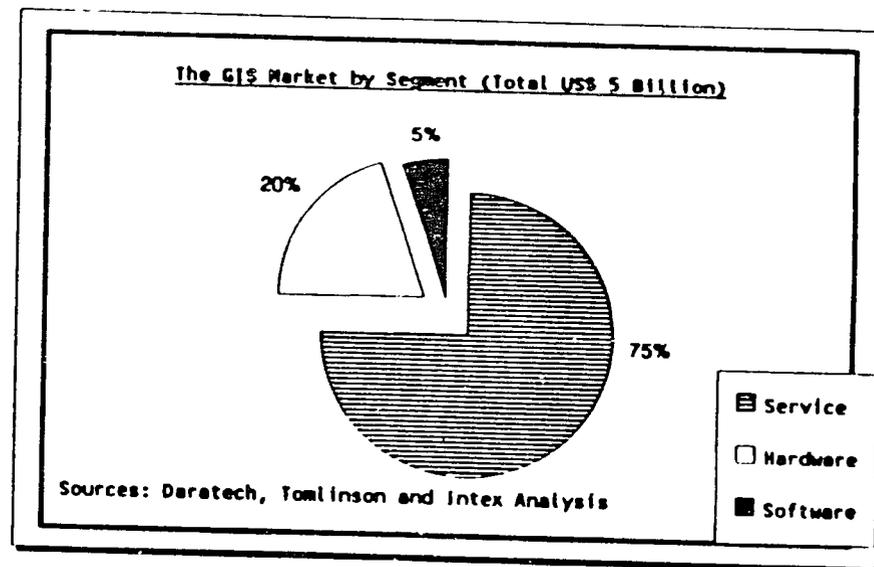
- **COMMERCIAL:**
 - Oil Industry- exploration of new sources.
 - Real Estate- property value analysis.
 - Airline Industry- calculating airfares.
 - Long-haul Transportation- tracking the location of vehicles.
 - Farming- fertilizing crops.

TOTAL U.S. GIS MARKET IS ESTIMATED AT \$5 BILLION WITH AN ANNUAL GROWTH RATE OF 22%. SERVICES IS THE BIGGEST PRODUCT CATEGORY, FOLLOWED BY HARDWARE, AND THEN SOFTWARE.

- **SYSTEM HARDWARE:**
 - Unix
 - PC-Based Systems
 - CD-ROMS

- **SYSTEM SOFTWARE:**
 - PC-Based Software
 - Workstation Software
 - Specific Application Software

- **SUPPORT SERVICES:**
 - System Integration
 - Data Conversion
 - Surveying Land to Update Databases
 - Custom Software



BASED ON THE SCOPE OF THE STUDY, WE ARE FOCUSING ON SUPPORT SERVICE AS AN AREA SUITABLE FOR JAMAICA.

GIS Market- Potential for Jamaica...Analysis of First Level Critical Factors

FIRST LEVEL CRITICAL MARKET FACTORS ARE THOSE THAT DETERMINE WHETHER A PARTICULAR SERVICE CAN BE EXPORTED IN AN OFF-SHORE MANNER. THOSE SERVICES WHICH MEET THE FIRST-LEVEL CRITICAL FACTORS WILL BE EXAMINED IN MORE DETAIL AS A TARGET MARKET FOR JAMAICA.

IN THE CASE OF THE GIS MARKET, FIRST LEVEL CRITICAL FACTORS ARE:

- **PORTABILITY**: Services which can be ~~can be~~ completed remotely from the user site.
- **EASE OF DISTRIBUTION**: Services which can be divided into independent work segments, completed in Jamaica, and later integrated with the rest of the system, without causing disruptions to the customer activities and the operation of the GIS system in use.

GIS Market- Potential for Jamaica...Analysis of First Level Critical Factors

PORTABILITY AND EASE OF DISTRIBUTION DETERMINE WHETHER A MARKET SEGMENT CAN BE SERVICED FROM AN OFF-SHORE FACILITY.

GIS SERVICE MARKET SECTORS	PORTABILITY	EASE OF DISTRIBUTION	OFF-SHORE POTENTIAL
SYSTEM INTEGRATION	-	-	NO
CUSTOM PROGRAMMING	+	+	YES
LAND SURVEYING	-	-	NO
DATA CONVERSION	+	+	YES

OUR FIRST LEVEL CRITERIA INDICATE THAT DATA CONVERSION AND CUSTOM SOFTWARE ARE THE MOST SATIABLE MARKETS FOR JAMAICA. OUR ANALYSIS ALSO INDICATED THAT LAND SURVEYING AND SYSTEM INTEGRATION ARE NOT SUITABLE FOR OFF-SHORE CONTRACTING.

● **PORTABILITY TEST:**

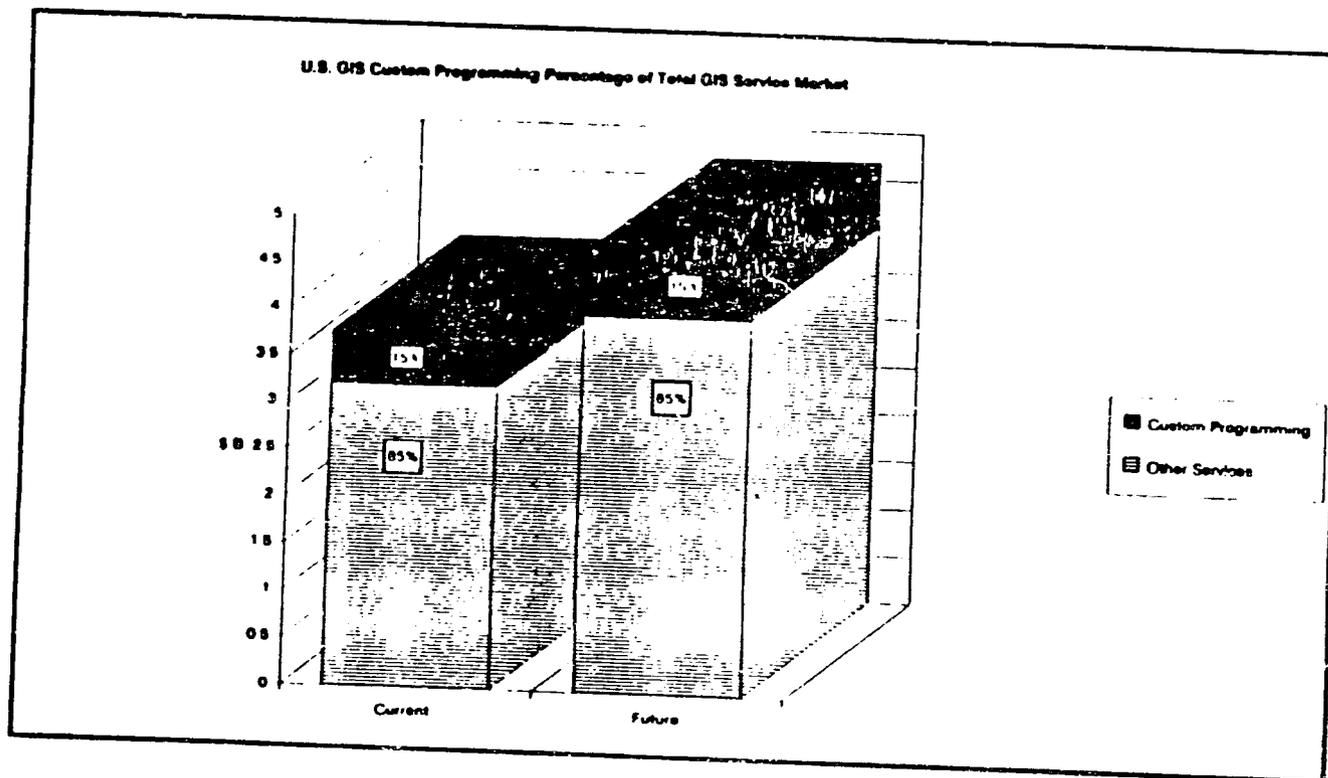
- Data conversion and customer software development can be completed remotely from the user site and later integrated into the system at the client's site in the U.S.
- Both System integration and land survey require on-site presence. Hence, they are not portable.

● **EASE OF DISTRIBUTION TEST:**

- Data conversion and customer software can be divided into independent work segments and easily integrated at a later time.
- System Integration and land surveillance require a coordinated effort and can not be easily broken down into distinct functions. Hence, they can not be treated as distributed tasks.

GIS Custom Programming - Overview

THE U.S. GIS CUSTOM PROGRAMMING MARKET IS ESTIMATED AT A \$563 MILLION WHICH IS 15% OF THE TOTAL GIS MARKET. CUSTOM PROGRAMMING WILL GROW AS THE TOTAL GIS MARKET EXPANDS BUT IT PERCENTAGE OF OVERALL SERVICES WILL REMAIN AT 15%.



THE GIS CUSTOM PROGRAMMING OUT-SOURCING MARKET IS PRESENTLY LIMITED BECAUSE THE MAJORITY OF CUSTOMIZATION IS DONE IN-HOUSE FOR GOVERNMENT CLIENTS.

- U.S. government GIS users tend to have dedicated GIS staff because:
 - More concerned with quality than cost.
 - Have already invested in large systems, hence, the investment in fixed costs is already made and systems will be used in-house.
 - Their extensive use of GIS justifies the cost of maintaining in-house full-time employees.

- Utilizing dedicated GIS staff within the government provides the stringent level of control and security requirements often sought by the government agencies.

AS THE CUSTOMER BASE SHIFTS FROM THE GOVERNMENT TO COMMERCIAL USERS, THE INCREASE IN COST SENSITIVITY AND NICHE APPLICATIONS WILL ALSO INCREASE THE DEMAND FOR PROGRAMMING SERVICES.

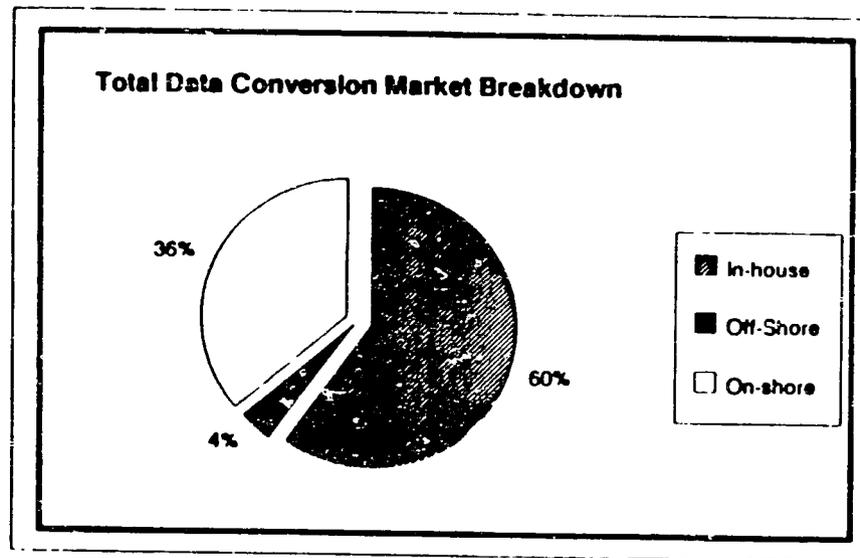
- Commercial customers are traditionally more price sensitive than government sector Therefore as the customer base becomes more commercial, price issues will become more important.
- Commercial customers will have more motivation to outsource:
 - More concerned with price and believe out-source quality to be satisfactory.
 - Their limited use of GIS technology does not justify dedicated GIS staff.
- The increase of the commercial GIS market will result in a growth of different applications:
 - Commercial users will need customized software to use with GIS off-shelve software to perform more specialized custom functions.
 - Existing commercial users will upgrade their existing GIS systems by developing in-house software to run on new hardware platforms, i.e., migrating from a Unix-base database management system to a DOS based version.

GIS CUSTOM PROGRAMMING MARKET IS CURRENTLY LIMITED AS AN OFF-SHORE SERVICE FOR JAMAICA AND IS LIKELY TO REMAIN SO IN THE NEXT FIVE YEARS. THIS IS MAINLY DUE TO THE FOLLOWING CRITICAL FACTORS:

- **CONTROL** - GIS custom programming will continue to require client control and supervision.
- **TRAINING** - The level of training and experience required for GIS programming is relatively high, and it is expensive to train specialists. Hence, this is an initial cost barrier for Jamaica, but one which will decrease over time.
- **SECURITY** - GIS is a strategic information system. Hence, many firms do not allow outsourcing for the fear of losing control over vital information. Security is especially important for the defense agencies in the U.S.
- **SPECIALIZED HARDWARE** - Most high-volume GIS systems currently use high-end workstations and software. Hence the cost of a typical installation acts as an additional cost barrier for off-shore markets.

GIS Data Conversion -- Profile

THE U.S. GIS DATA CONVERSION MARKET IS ESTIMATED AT A \$2.25 BILLION MARKET WHICH IS 60% OF THE TOTAL GIS MARKET. THE OUTSOURCE MARKET IS ESTIMATED AT \$900 MILLION WHICH IS 40% OF THE TOTAL MARKET. CURRENTLY, THE OFF-SHORE MARKET IS APPROXIMATED AT 10% OF TOTAL OUT-SOURCE MARKET AT \$90M.

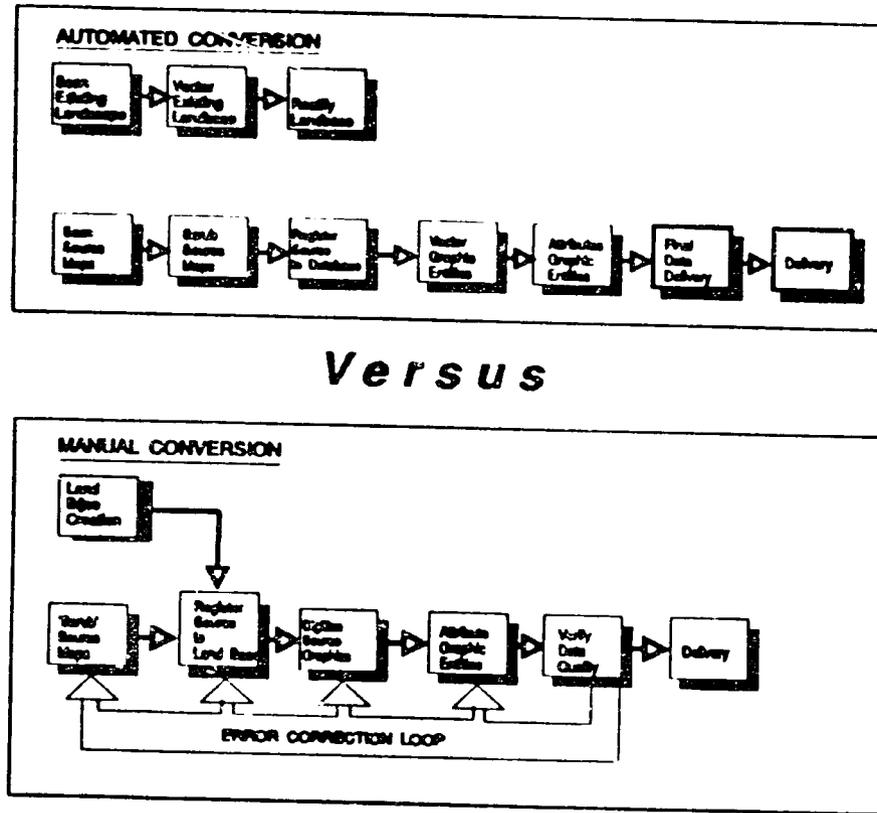


DATA CONVERSION, COMPRISES 60% OF THE TOTAL SERVICES MARKET, THE LARGEST COMPONENT OF THE SERVICE MARKET. IT INCLUDES THE FOLLOWING OPERATIONS:

- **Data entry**: The keying of data into a computer system.
- **Geocoding**: Relating data to geographic codes.
- **Scanning**: The scanning operation digitized the information into computer readable files.
- **Raster to vector conversion** - The process of identifying pixels which represent line work or graphics, separating these pixels from the background and converting them to a vector representation. This vector representation allows graphic information to be easily manipulated, edited and attributed and stored and is a basic component of GIS
 - Automated - Requires no human interaction
 - Interactive - Operator points to lines to be vectorized
- **Interactive Editing** - The use of high resolution color graphics workstation to allow an operator to easily view vector graphics as an overlay on top of an original grey scale image of the source document. This interactive editing station is a key ingredient in the automation of conversion including:
 - Vectorizing
 - Data base correction
 - Edge matching
 - Database Correction

GIS Data Conversion -- Labor Intensity

AS DEPICTED IN THE BELOW CHART, LABOR INTENSITY IS NOT GREATLY REDUCED BY AUTOMATED CONVERSION DUE TO THE EXTENSIVE DATA SCRUBBING THAT MUST BE DONE.



DATA CONVERSION IS ALSO THE HIGHEST COST FACTOR FOR IMPLEMENTING GIS SYSTEMS. THE AVERAGE RATIO OF GIS DATA CONVERSION COST TO OTHER COST IS 75% TO 25%. THIS IS MAINLY DUE TO:

- The poor quality of source materials (i.e., legal documents and maps) may require drawing maps on the computer using a mouse or a light pen, instead of digitization via scanners.
- Automated raster to vector conversion is not a fully refined process. Hence, this step often requires intense quality control and interactive editing, i.e., parts of maps have to be redrawn and checked for containing the correct information.
- Processing, editing, and verification of Map information require trained personnel. The labor component of GIS is relatively expensive:
 - On average the cost of digitizing a map into the GIS database ranges between \$25-\$150.

GIS Conversion - Summary

A summary of GIS' conversion are as follows:

-
- **Current Market size:**
 - Total GIS market: \$5 B
 - The Service Market: \$3.75 B (75%)
 - The Conversion Market: \$2.25 B (60%)
 - The Conversion Out-source Market: \$900 M (40%)
 - The Off-shore Conversion Market: \$90 M (10%)

 - **Market Growth:**
 - Market growth is projected at an annual 22%. This growth should continue or accelerate as new GIS application are developed.

 - **Training Requirements:**
 - Minimal training requirement for an average GIS conversion project includes a high school degree with additional computer training.

 - **Labor Intensity Cost Factor:**
 - The average ratio of labor to system costs in the GIS market is 75% to 25%.

 - **Information Sensitivity:**
 - Information sensitivity is relatively high in the GIS market because government sector constitutes the largest portion of the market.

GIS Conversion - Summary (cont)

A summary of GIS' conversion are as follows:

- **Basic costs of a base system:**
 - System and software cost range dramatically from \$10,000-\$60,000 for a PC-based system, 20,000-\$100,000 for hardware standalone system.
- **Geographic Proximity:**
 - Geographic proximity is important because the government, who is the largest user of GIS, associates geographic proximity as a good control measure.
- **Average Turnaround time:**
 - Turnaround time averages at 10 weeks or more.
 - Projects that require a faster turnaround time fall in the defense sector and are highly sensitive and therefore usually done on-site.
- **Major Customers:**
 - The U.S. government is currently the largest user of GIS products.
 - Other major customers include oil, utility, telephone, and mining companies.
- **Quality Control Importance:**
 - GIS conversion requires a relatively high level of quality control to maintain accuracy.
- **Technology Obsolescence:**
 - The GIS market is expected to continue to grow as more applications are developed to utilize GIS technology.

GIS Market Trends - Shift in the GIS Customer Base

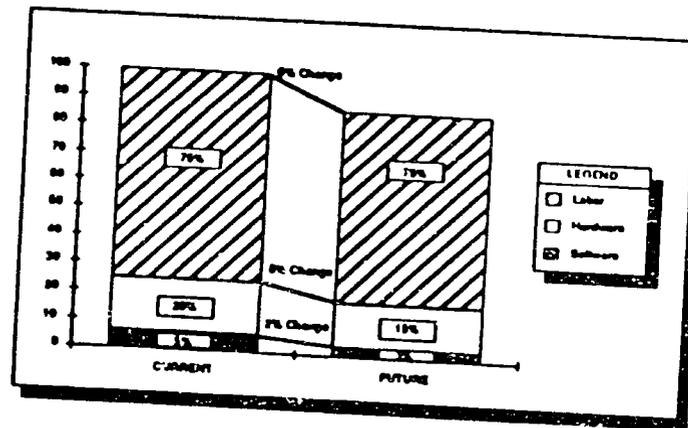
THE GIS MARKET CUSTOMER-BASE IS SHIFTING FROM GOVERNMENT TO COMMERCIAL CLIENTS. GIS VENDORS WILL HAVE TO ADAPT TO A COMMERCIAL ENVIRONMENT WHERE PRICING AND CUSTOMER SERVICE WILL BECOME MORE COMPETITIVE. JAMAICA'S DATA ENTRY SERVICES WILL BECOME MORE ATTRACTIVE FOR THE GIS USERS.

- The shift of market from government to commercial sector has the following immediate implications:
 - **PRICE SENSITIVITY**: Users will become more price sensitive.
 - **TURN-AROUND TIME**: Users will need to update their map and GIS databases more often and more quickly.
 - **CONTROL**: Control and security issues will become less important for GIS users as the market shifts towards more generic GIS applications, i.e., less defense oriented.

GIS Market trends - Change of Cost Components . . . Technology Advances

LABOR COST COMPONENT AS A PERCENTAGE OF TOTAL EXPENDITURE ON A TYPICAL GIS INSTALLATION WILL GROW. JAMAICA'S LOW-LABOR COSTS WILL BE A COMPETITIVE MAJOR ADVANTAGE

- Software and hardware prices are likely to fall by an average of 10-20% per year.
- Labor costs are more likely to increase than decrease in the United States.
- Hence, overall cost of system installations will be driven by labor costs.



COMPETITION IS LIKELY TO ARISE FROM COUNTRIES WITH STRONG INDUSTRIAL/ENGINEERING BASE AND EXPERIENCE WITH GIS-RELATED PROJECTS

- India, Brazil, and Mexico have a strong industrial base and already use GIS for their own internal markets. They, therefore, have a trained labor pool which can readily serve the U.S. Market needs. This is especially important for the high-end data conversion services, i.e., raster imaging, geocoding, and editing.
- Large GIS projects are being conducted in various developing nations with low labor costs. Hence, these nations will gain experience in using GIS and in transferring the expertise from the U.S. and Europe.
 - Peru implemented a GIS system based on a French computer for collecting municipal taxes.
 - Turkey has used GIS for land management and defense purposes.
 - Kenya's Wildlife Service Management is using GIS to monitor the national parks.
 - Mexico City recently awarded a \$15 million GIS contract for management of city information.
 - USAID is supporting Egypt's effort in using GIS for various nation-wide applications.

JAMAICA MUST ALSO EXPLORE MEANS OF NATIONAL GIS USAGE TO TRANSFER STATE-OF-THE-ART TECHNOLOGY AND EXPERTISE. THIS CAN BE ACHIEVED EITHER BY JAMAICAN-BASED FIRMS, OR INVESTMENT BY INTERNATIONAL AGENCIES FOR JAMAICA-SPECIFIC USE, I.E., THE USAID AND THE WORLD BANK.

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**A PROFILE OF THE IMAGING MARKET
AS A PART OF THE INFORMATION PROCESSING SEGMENT STUDY**

DELIVERABLE 2

July 1991

Prepared by:

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intex[↑]

Document Imaging - Deliverable 2, Task 1

Information Processing Market Segment Study

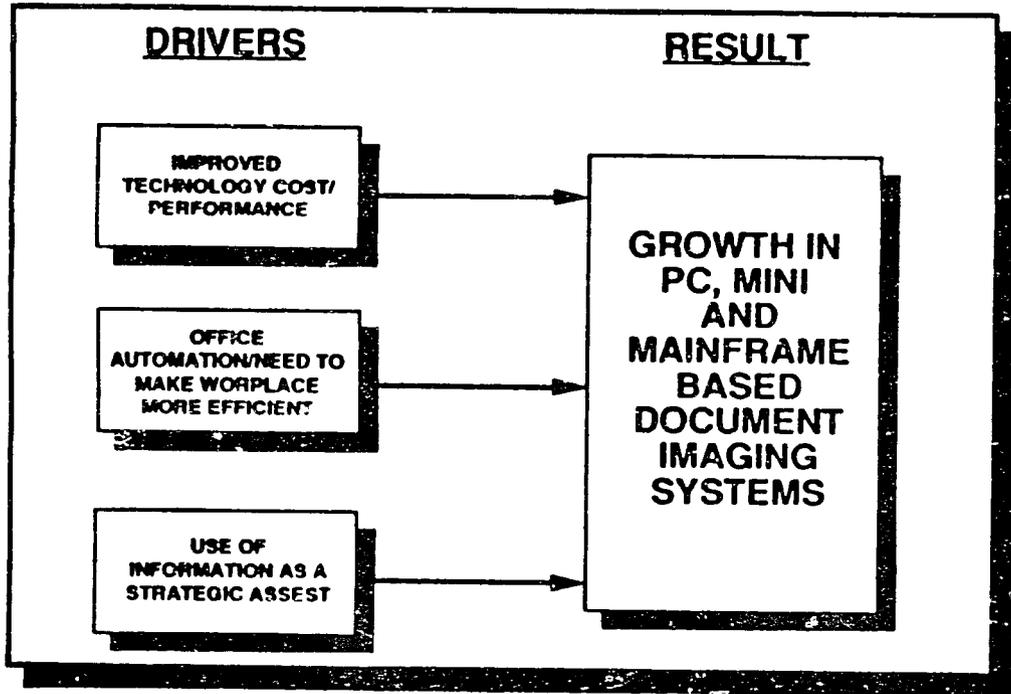
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DOCUMENT IMAGING TECHNOLOGY, DIGITIZING PICTURES AND PAPER-BASED INFORMATION INTO COMPUTER GENERATED FILES, HAS BEEN COMMERCIALY AVAILABLE SINCE THE EARLY 1980S. DOCUMENT IMAGING PROVIDES THE ABILITY TO STORE AND PROCESS VERY LARGE VOLUMES OF INFORMATION, AND DRASTICALLY REDUCES RELIANCE ON PAPER

- Document imaging technology uses a similar method of converting paper-based information to computer data as the one used in fax machines.
- With the integration of sophisticated software and peripheral devices, Document imaging systems are used to:
 - Store, retrieve, route, and process vital information in a matter of minutes instead of hours or days in an insurance company or bank
 - Maintain records safely for archival purposes for a long period of time, for example police files, or historical data
 - Store checks for verification in a central bank
 - File copies of credit card coupons and receipts

Document Imaging Overview...

MAJOR DRIVERS FOR GROWTH OF DOCUMENT IMAGING MARKET INCLUDE IMPROVING TECHNOLOGY COST/EFFECTIVENESS, THE NEED TO INCREASE EFFICIENCY AT THE WORK PLACE, AND THE INCREASING USE OF INFORMATION AS A STRATEGIC ASSET BY FIRMS



THESE MARKET DRIVERS WILL BE DISCUSSED IN GREATER DETAIL ON THE FOLLOWING PAGES

Document Imaging Drivers... Improved Technology Cost/Effectiveness

DOCUMENT IMAGING SYSTEMS HAVE BECOME INCREASINGLY COST/EFFECTIVE, WITH AN OVERALL DECREASE OF 15-20% PER YEAR. THERE ARE A RANGE OF SYSTEMS WITH LOW TO HIGH COSTS BASED ON MICROCOMPUTERS AND MAINFRAMES.

- In addition to the drop in the cost of system processors, the cost of system software has also dropped by 20%, while its functionality and performance has increased dramatically.
- Cost of peripheral equipment such as scanners, printers, plotters, jukeboxes, and optical disks has also decreased. Their reliability and performance has increased significantly.
- For most of the market, it is no longer a question whether document imaging is useful for them, rather, when should they invest in implementing one.

Document Imaging Drivers...Efficiency Gains

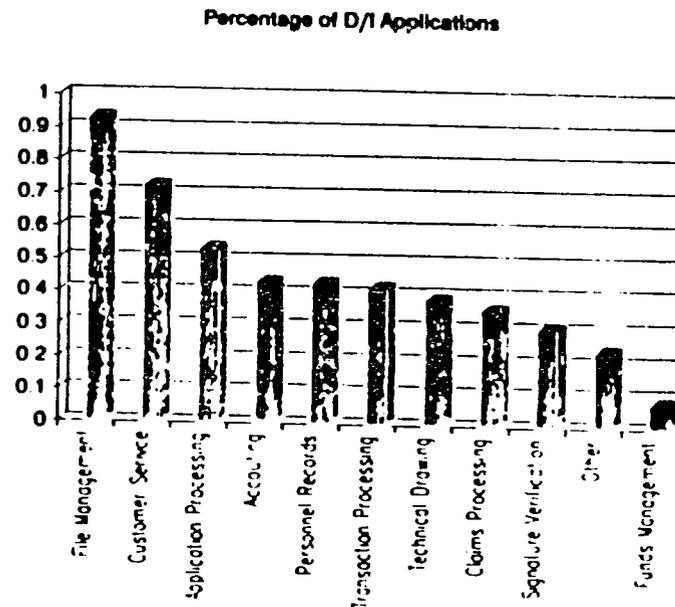
BY REDUCING RELIANCE ON USE OF PAPER DOCUMENTS, DOCUMENT IMAGING IMPROVES EFFICIENCY OF THE WORKPLACE IN MANY OF THE LARGE ORGANIZATIONS. GREATER EFFICIENCY GAINS RESULT FROM:

- **GREATER USER PRODUCTIVITY** - information is readily accessible, less time is wasted, operating expenses are lowered.
- **BETTER DOCUMENT ROUTING** - information can be passed from one location to another in a matter of seconds
- **REDUCED DOCUMENT HANDLING COSTS** - no need to maintain filing clerks, documents are stored automatically on the computer
- **IMPROVED DOCUMENT CONTROL/SECURITY** - documents are not lost, misfiled, or stolen as easily when in computer form.
- **IMPROVED COMPETITIVE ADVANTAGE** - the ability to quickly find and retrieve the information needed is important for many organizations where time to react to market conditions is important, i.e., investment banking, or a stock brokerage firm.

Document Imaging Drivers...Strategic Use of Information

DOCUMENT IMAGING SYSTEMS ARE PARTICULARLY SUITABLE FOR AUTOMATING MANY OF THE PAPER-BASED MANUAL PROCESSES ESSENTIAL FOR AN ORGANIZATION, I.E. MAKING PAYMENTS TO CLIENTS AS IN AN INSURANCE COMPANY, MAKING INVESTMENT DECISIONS AS IN A BANK, OR ACCESSING VITAL SECURITY INFORMATION AS IN THE DEFENSE DEPARTMENT

- File Management is the most widely use of document imaging systems
- Application processing, accounting, and personnel records management also represent a significant application area for Document imaging systems



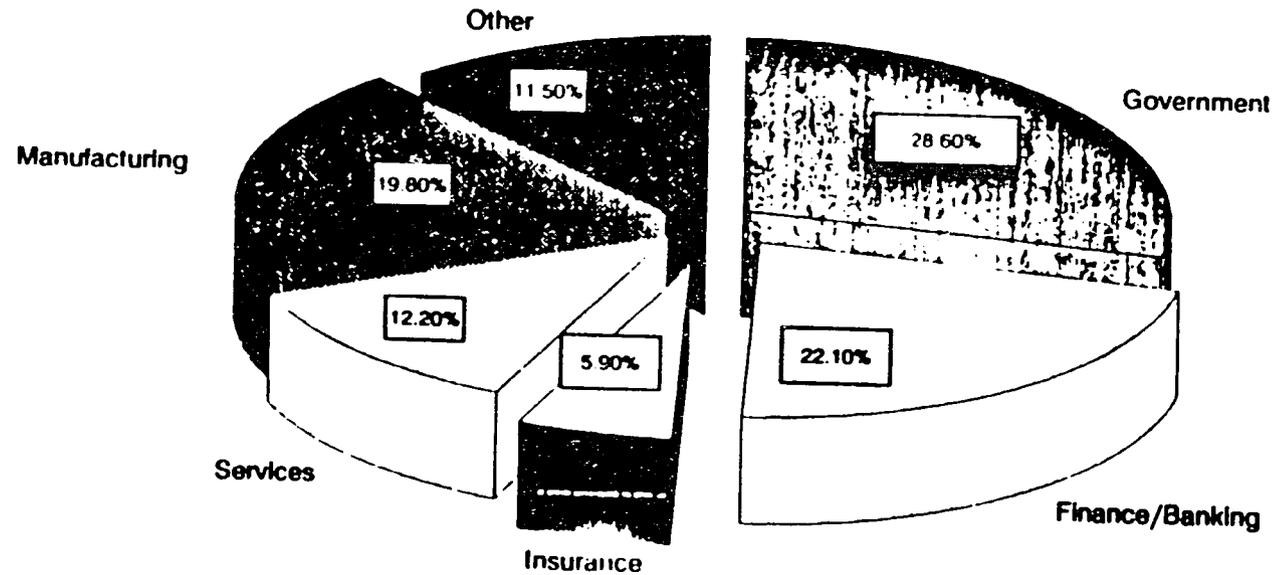
Source: Datapro

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Document Imaging Customers...Overview

DOCUMENT IMAGING'S USAGE ACROSS ALL INDUSTRIES HAS GROWN RAPIDLY. NEARLY 60-70% OF ALL ORGANIZATIONS WITH PAPER INTENSIVE OPERATIONS ALREADY HAVE OR WILL IMPLEMENT A DOCUMENT IMAGING SYSTEM. THE ANNUAL EXPENDITURE ON DOCUMENT IMAGING SYSTEMS ACROSS INDUSTRY IS AS FOLLOWS:

Annual Expenditure on D/I by Sector



Source: Bis Cap

Major Document Imaging Customers...Insurance

THE DESIRE TO INCREASE PRODUCTIVITY IS THE MAJOR INCENTIVE FOR INSURANCE COMPANIES TO USE DOCUMENT IMAGING SYSTEMS

- Insurance firms currently spend nearly \$100 million on Document imaging systems
- Sample of insurance firms using DOCUMENT IMAGING systems are:
 - USAA
 - The Hartford Insurance Group
 - Worker's Compensation Board of Ontario
 - Paul Revere Life Insurance Company
 - General American Life Insurance Company
 - Pacific Life Insurance Co.

Major Document Imaging Customers...Health Care/Pharmaceutical

HEALTH CARE HAS BEEN SLOWER IN USING DOCUMENT IMAGING. DOCUMENT IMAGING USAGE IN HEALTH CARE FALLS INTO A DIVERSE SET OF APPLICATIONS SUCH AS MANAGING PATIENT RECORDS, BILLING, AND HANDLING DOCUMENTATION FOR DRUGS AND PHARMACEUTICALS

- Document imaging investment in the health care industry is expected to reach \$30 million by 1993
- Sample of health care sector users of document imaging include:
 - The Sloan Kettering Memorial Hospital
 - University of Wisconsin Hospitals
 - Yale University Hospitals
 - Physer International
 - Dupont

Major Document Imaging Customers...Banking/Financial Services

DECREASE IN PROCESSING TIME FOR LOAN APPLICATIONS, CREDIT CARD CHARGE SLIPS AND INFORMATION STORAGE/RETRIEVAL ARE THE MAJOR INCENTIVES FOR THE USE OF DOCUMENT IMAGING IN BANKING AND FINANCIAL SECTOR:

- Document imaging investment in banking is currently estimated to be nearly \$350 million. This figure is projected to reach \$700 million to \$1 billion by 1993.
- Sample of banking/financial sector users of Document imaging are:
 - Texas Commerce bank
 - Merrill Lynch
 - First National Bank of Maryland
 - Goldman Sachs
 - Kidder Peabody
 - American Express
 - GTE Financial
 - Bank One of Columbus

Major Document Imaging Customers...Local/Federal Government

THE NEED TO DECREASE AND CONTROL COSTS AND THE LEGISLATIVE IMPERATIVE TO MAKE INFORMATION EASIER TO ACCESS IN THE U.S. ARE THE MAIN INCENTIVES FOR THE USE OF DOCUMENT IMAGING IN THE GOVERNMENT SECTOR:

- Document imaging investment by the government sector is estimated to be nearly \$450 million. This figure is projected to reach \$700 million by 1993.
- Sample of federal government users are:
 - The Veterans Administration
 - The Environmental Protection Agency
 - The Department of the Navy
 - The Department of the Army
 - The Federal Reserve Bank
 - The Federal Bureau of Investigation
- Sample of local government agencies using Document imaging systems are:
 - Pennsylvania Liquor License Board
 - Illinois State of Employment Security
 - California Motor Vehicle Department
 - State of Virginia
 - Wisconsin Motor Vehicle Department
 - State of Minnesota Department of Motor Vehicles

Major Document Imaging Customers...Manufacturing

THE MAJOR INCENTIVE FOR THE USE OF DOCUMENT IMAGING SYSTEMS IS TO REDUCE TIME TO MARKET NEW PRODUCTS BY MAKING PAPER PROCESSING OPERATIONS MORE EFFICIENT.

- Document imaging investment by the manufacturing sector is estimated to be nearly \$300 million. This figure is projected to reach \$700 million by 1993.
- Sample of the manufacturing sector users of Document imaging systems are:
 - 3M Company
 - Ralston Manufacturing
 - Westinghouse
 - GTE
 - GE
 - Boeing Aerospace

Major Document Imaging Customers...Services and Other Users

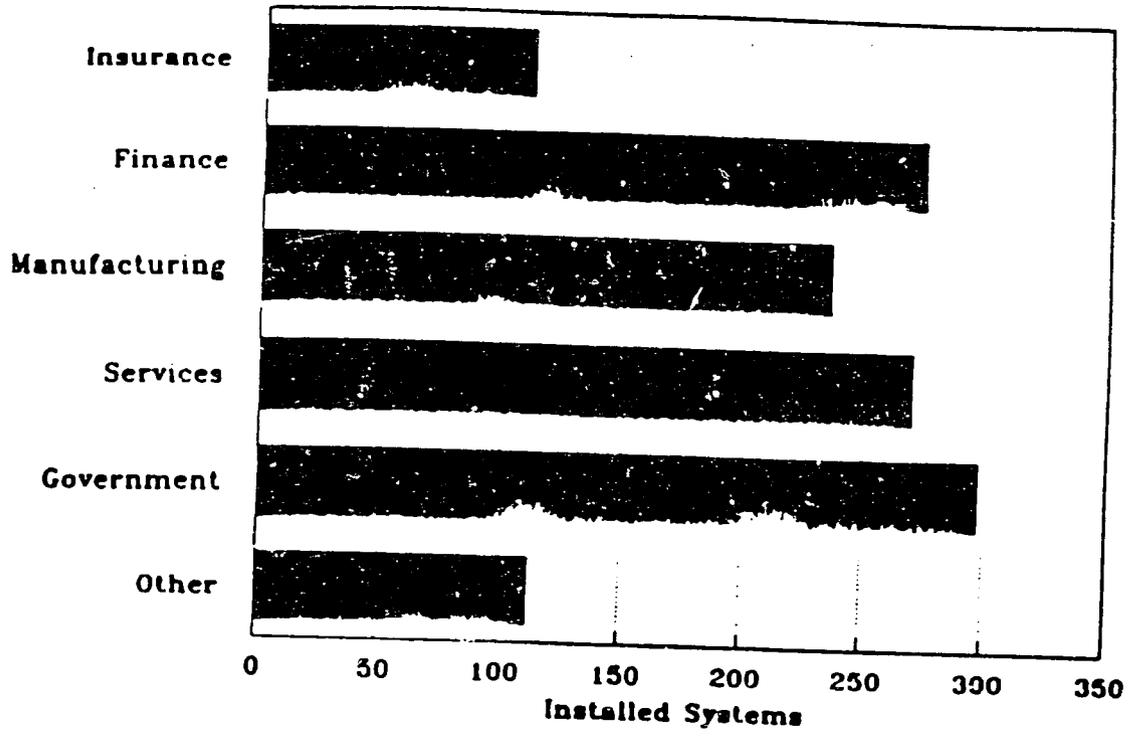
THE MAJOR INCENTIVE FOR THE USE OF DOCUMENT IMAGING IN THIS SECTOR IS BETTER RESPONSE TO CLIENTS, COST CONTROL, AND USE OF INFORMATION TO GENERATE NEW BUSINESS OPPORTUNITIES:

- Document imaging investment by the service sector (and other sectors) is estimated to be nearly \$360 million. This figure is projected to reach \$800 million by 1993.
- Sample of the service sector users of Document imaging systems are:
 - MCI Corp
 - Arco Gas
 - Baltimore Gas and Electric Nuclear Facility
 - Pennsylvania Power and Light Company
 - Nebraska Power
 - PSE&G Nuclear Power Plant
 - AVIS
 - HERTZ
 - Fleet America Trucking Company

Document Imaging Customers...Overview

TOTAL INSTALLED BASE OF DOCUMENT IMAGING SYSTEM IS ESTIMATED TO BE AT NEARLY 1,500 SYSTEMS.

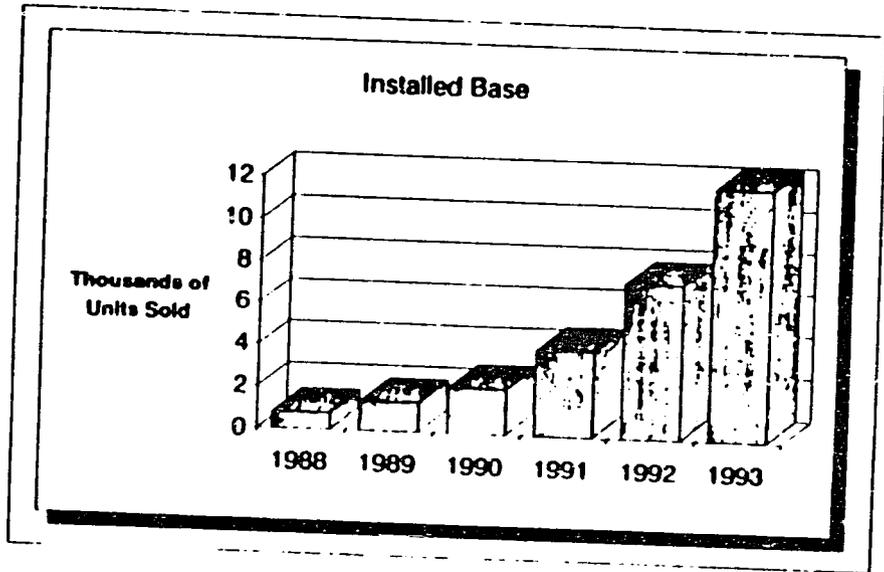
Installed Base of Document Imaging Systems, by Industry Group
Year-End 1989



Source: BIS CAP International

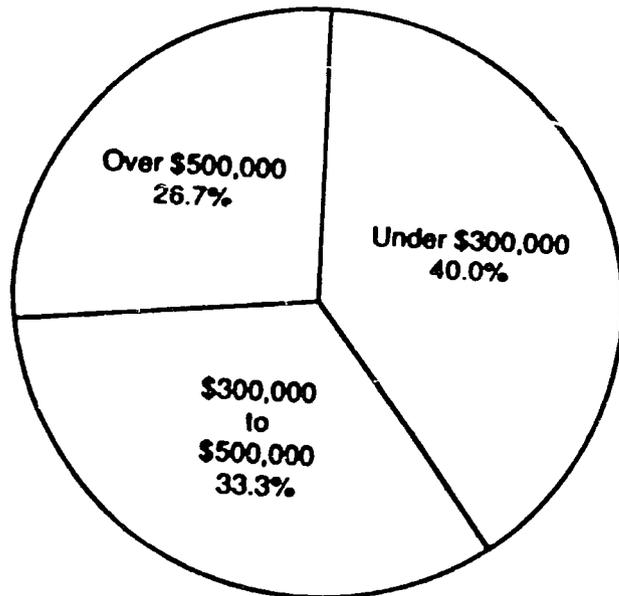
Document Imaging Customers...Overview

THE NUMBER OF INSTALLED SYSTEMS WILL CONTINUE TO INCREASE IN THE NEXT FIVE YEARS



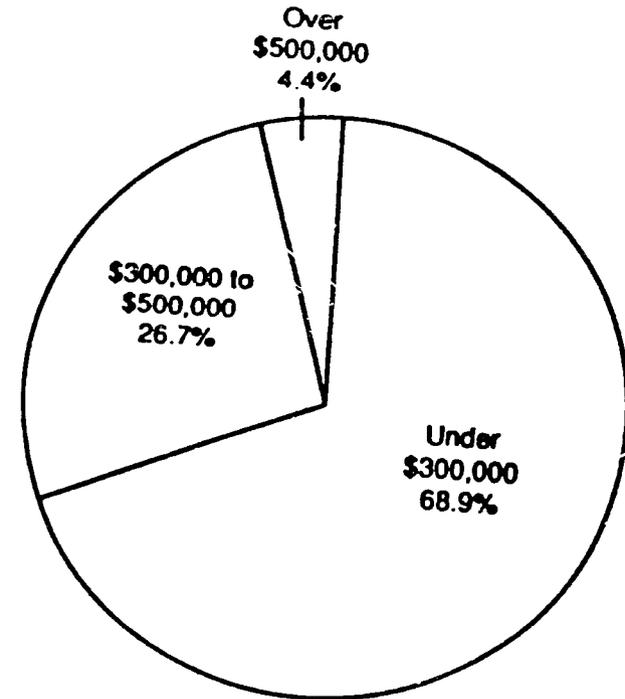
Document Imaging Customers... System Installations

DOCUMENT IMAGING SYSTEMS ARE BASED ON A RANGE OF STAND-ALONE AND NETWORKED MICROCOMPUTERS, MINICOMPUTERS, AND MAINFRAMES. THE PERCENT OF INSTALLED BASE OF EACH TYPE OF SYSTEM IS AS FOLLOWS:



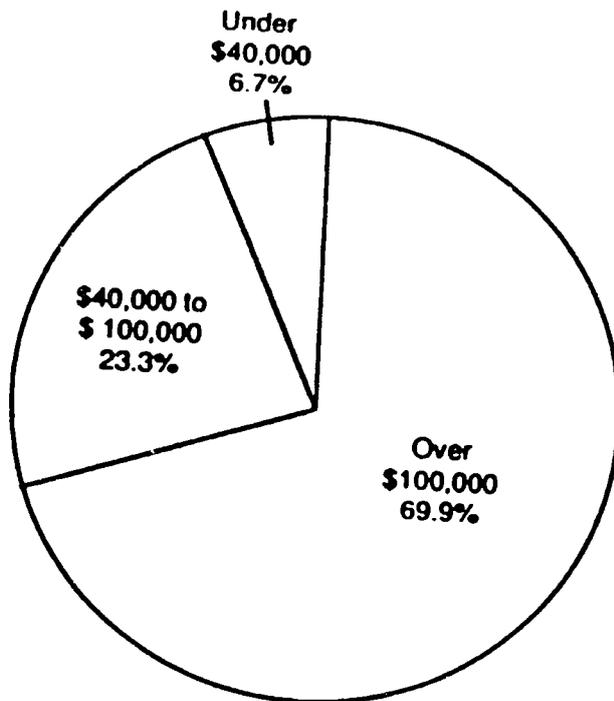
Percentages of mainframe-based systems priced below \$100,000, between \$100,000 and \$500,000, and over \$500,000.

Source: Datapro Research Group



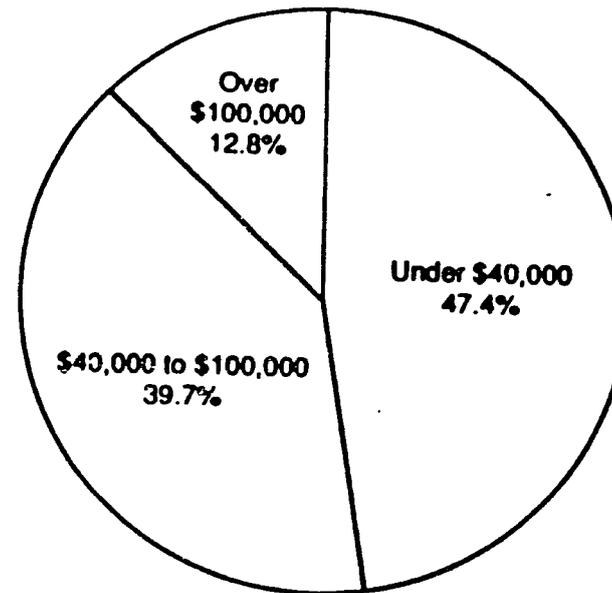
Percentages of minicomputer-based systems priced below \$100,000, between \$100,000 and \$500,000, and over \$500,000.

Document Imaging Customers... System Installations (cont.)

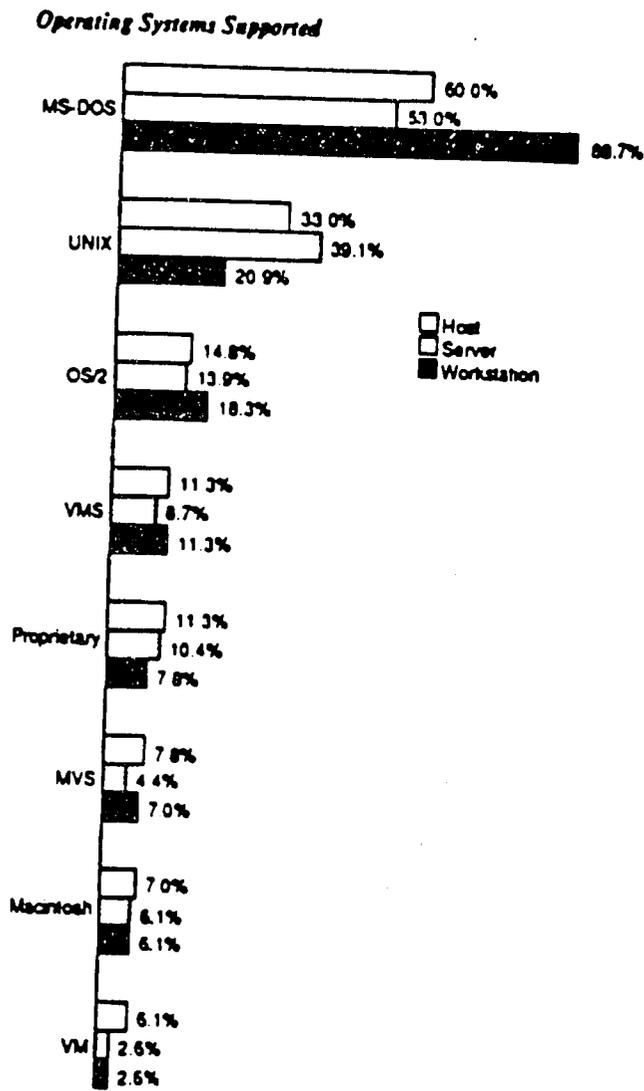


Percentages of networked microcomputer-based systems priced below \$40,000, between \$40,000 and \$100,000, and over \$100,000.

Source: Datapro Research Group



Percentages of standalone microcomputer-based systems priced below \$40,000, between \$40,000 and \$100,000, and over \$100,000.



Percentages of systems supporting various operating systems.

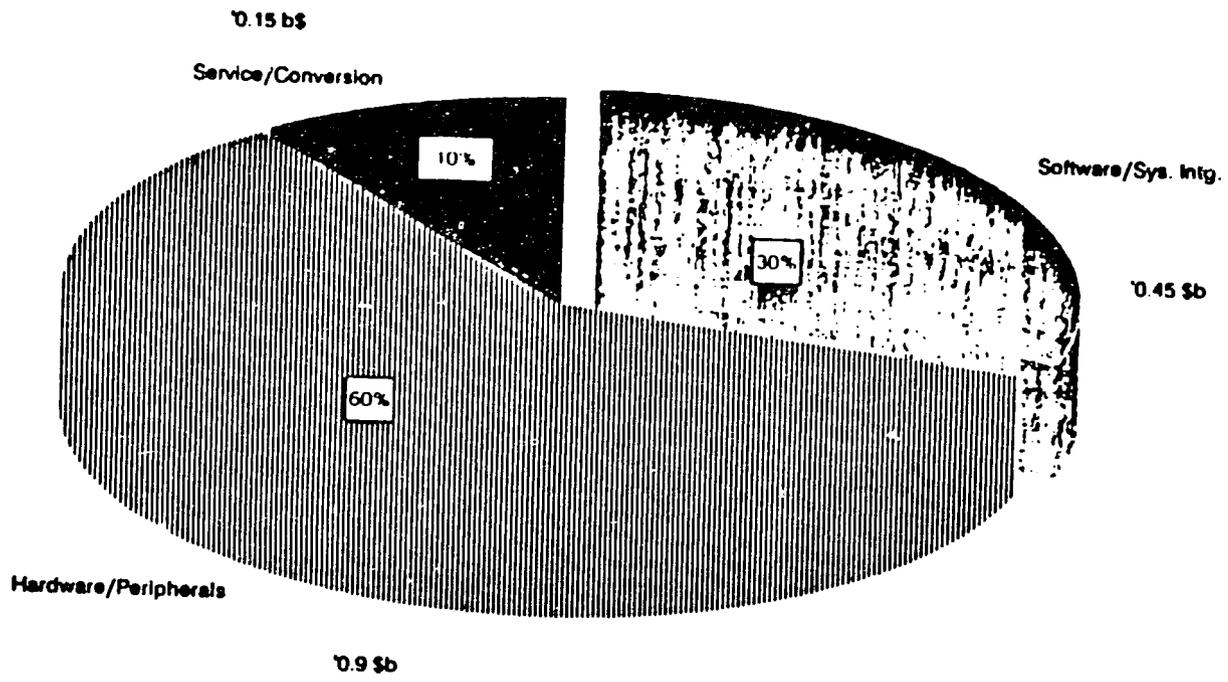
Source: Datapro Research Group

Document Imaging Market...Overview

THE CURRENT TOTAL DOCUMENT IMAGING MARKET IS ESTIMATED TO BE NEARLY \$1.5 BILLION WITH AN ANNUAL GROWTH RATE OF 20%-30%. This market CONSISTS OF:

- System Hardware
 - Micro, Mini, and Mainframe-based systems
 - Peripheral Equipment and Components
- Software
 - Off-the-shelf system software
 - Customized software and system integration
- Support Services
 - Document Conversion

The Current Estimated Document Imaging Market



Document Imaging Market- Potential for Jamaica...Analysis of First Level Critical Factors

FIRST LEVEL CRITICAL MARKET FACTORS ARE THOSE FACTORS THAT DETERMINE WHETHER A PARTICULAR SERVICE CAN BE EXPORTED IN AN OFF-SHORE MANNER. THOSE SERVICES WHICH MEET THE FIRST-LEVEL CRITICAL FACTORS WILL BE EXAMINED IN MORE DETAIL AS A TARGET MARKET FOR JAMAICA.

IN THE CASE OF THE DOCUMENT IMAGING MARKET, FIRST LEVEL FACTORS ARE:

- **PORTABILITY**: Services which can be completed remotely from the user site.
- **EASE OF DISTRIBUTION**: Services which can be divided into independent work segments, completed in Jamaica, and later integrated with the rest of the system, without causing disruptions to the customer activities and the operation of the Document imaging system in use.

IMAGING SERVICE MARKET SECTORS	PORTABILITY	EASE OF DISTRIBUTION	OFF-SHORE POTENTIAL
SYSTEM INTEGRATION	-	-	NO
CUSTOM PROGRAMMING	+	+	YES
DATA CONVERSION	+	+	YES

LEGEND :	
+	Passes first level critical factor test
-	Falls first level critical factor test
<input type="checkbox"/>	Potential Market For Jamaica

Document Imaging Market - Potential for Jamaica...Analysis of First Level Critical Factors

OUR FIRST LEVEL CRITERIA INDICATE THAT DATA CONVERSION IS THE MOST SUITABLE MARKETS FOR JAMAICA. OUR ANALYSIS ALSO INDICATED THAT SYSTEM INTEGRATION AND CUSTOM PROGRAMMING ARE NOT SUITABLE FOR OFF-SHORE CONTRACTING.

- **PORTABILITY TEST:**

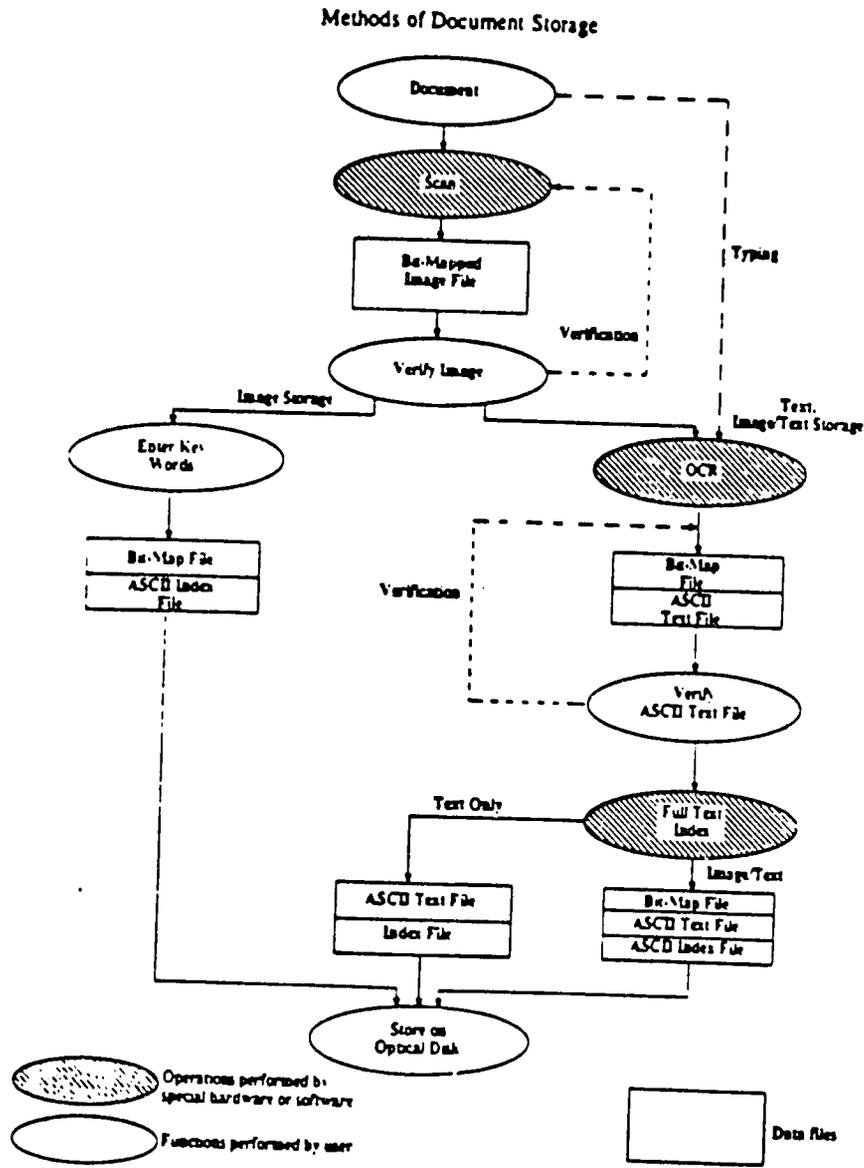
- Data conversion can be completed remotely from the user site and later integrated into the system at the client's site in the U.S.
- Both system integration and custom software programming for Document imaging applications require on-site presence. Hence, they are not portable.

- **EASE OF DISTRIBUTION TEST:**

- Data conversion is an independent work segment. Digitized information can be easily uploaded into the host system at the client site at a later time.
- System integration and document imaging custom programming require on-site presence. Hence they can not be easily broken down into distinct functions. Hence, they can not be treated as distributed tasks.

Document Conversion... Overview of the Process

THE PROCESS OF STORING DOCUMENTS ON A DOCUMENT IMAGING SYSTEM INVOLVES MANY AUTOMATED AND MANUAL STEPS:



Document Conversion...Its Importance for Document Imaging Applications

THE MANUAL PROCESS OF SCANNING, VERIFICATION, INDEXING, AND VERIFICATION OF INDEX KEY WORDS IS REFERRED TO AS DOCUMENT CONVERSION:

- Conversion is labor intensive
- Conversion is essential for storing information on Document imaging systems - without the necessary information Document imaging systems are useless
- Conversion is quality dependent, finding an incorrectly indexed document on a Document imaging system is like finding a needle in a haystack
- The quality of conversion and indexing varies for different markets - the higher the cost of an error, the more thorough the quality control process must be

GIVEN ITS LABOR INTENSITY, CONVERSION IS EXPENSIVE:

- The effort needed to scan and index each page varies
 - Dense pages full of text and graphs take longer to scan 3-10 seconds per page, depending on the type and the quality of the scanner
 - Pages with a larger number of key words for storing on the Document imaging system take index and verify
- Cost of conversion for a typical page in the U.S. varies between \$.15 to \$1.20 per page.
- A typical insurance firm stores 10 million pages of active policy files, each file contains an average of 20 multi-pages documents, each document averaging 3 pages. Hence at an average cost of \$.20 per page, the total cost of conversion for this insurance company is \$120 million.

Conversion Strategies

DUE TO ITS HIGH COSTS, FIRMS DO NOT CONVERT ALL THEIR DOCUMENTS INTO DIGITIZED COMPUTER FILES. INSTEAD THEY APPROACH CONVERSION IN TWO WAYS:

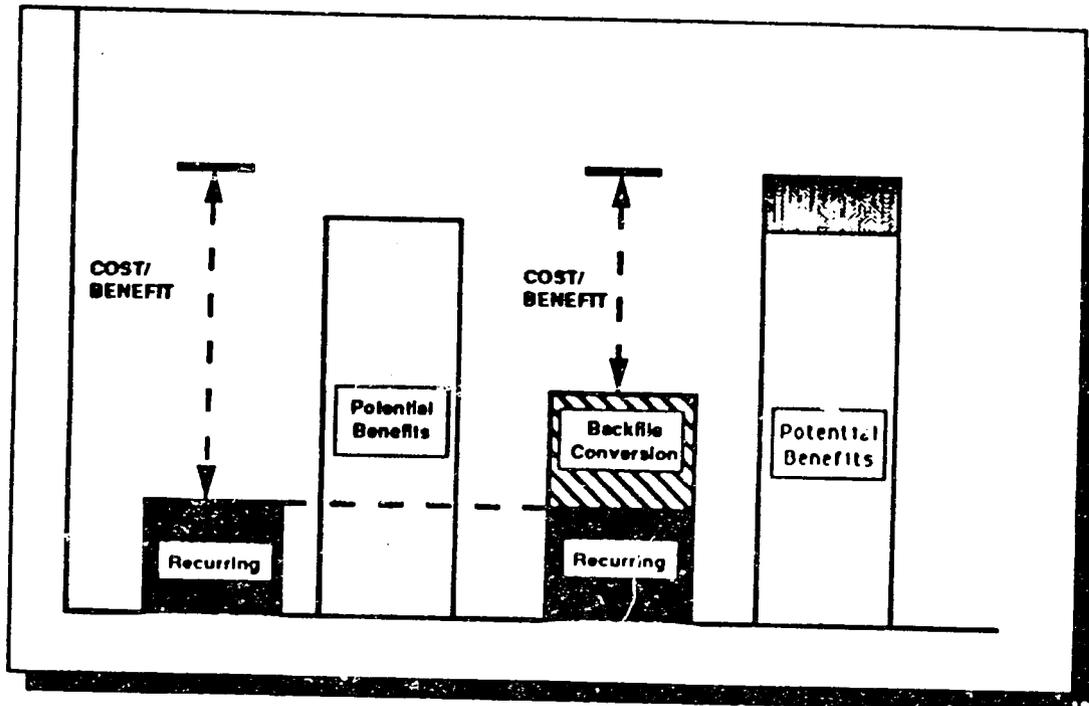
- **Backfile Conversion** - Conversion of all existing documents stored in folders in filing cabinets to digital information stored on a Document imaging system, i. historical data
- **Recurring Conversion** - Conversion of all new and incoming paper information on a daily or periodic basis as documents are received in the mail room, i.e., credit card applications, airline tickets, accounting receipts, etc.

BACKFILE CONVERSION IS COSTLY, TIME CONSUMING, AND DOES NOT IMMEDIATELY IMPROVE THE EFFICIENCY OF THE WORKPLACE. ONLY SELECT NUMBER OF DOCUMENT IMAGING USERS CURRENTLY OPT FOR BACKFILE CONVERSION:

- Document imaging vendors do not recommend total backfile conversion, since its high costs reduces the cost/effectiveness of the system and, hence, makes it more difficult to justify the purchase of the document imaging system to management.
- The portion of backfile information converted are mostly "active" files, i.e. files which have been already accumulated and are used fairly often, such as personnel records, or insurance claims reports, etc.
- End-users normally convert active files as they are needed, i.e., once a folder is needed, it is retrieved from the warehouse and scanned in the system.

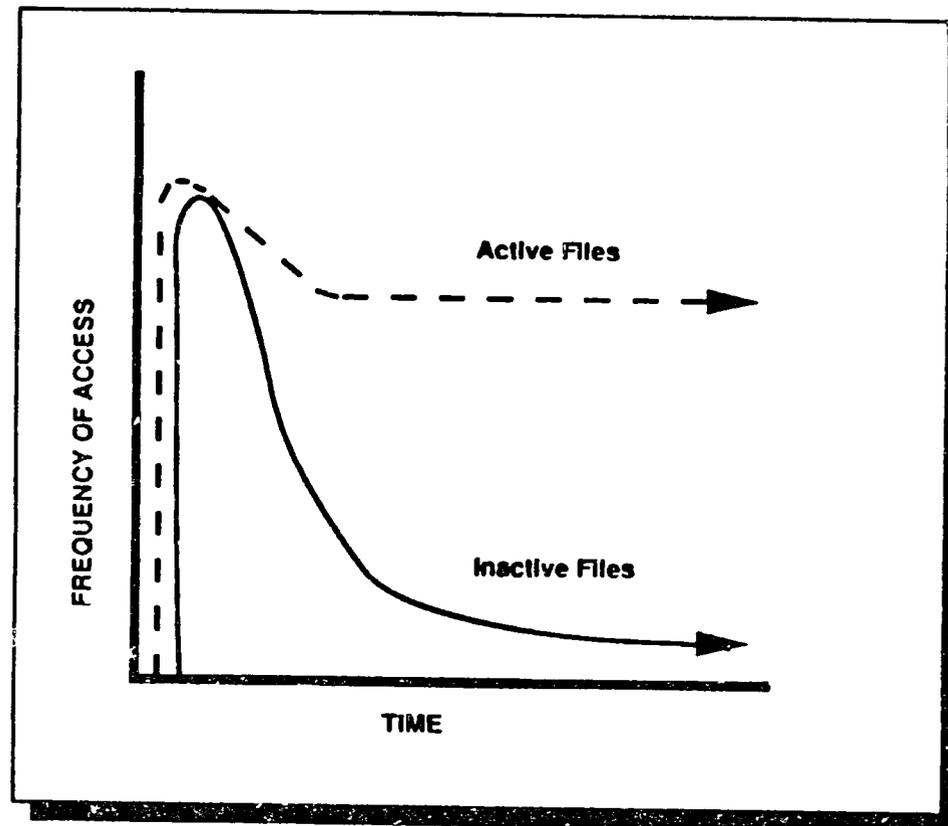
Backfile Conversion ... and System Cost/Effectiveness

BACKFILE CONVERSION DOES NOT ADD SIGNIFICANTLY TO THE COST/EFFECTIVENESS OF THE SYSTEM.



Usage Patterns of Active Versus Inactive Files

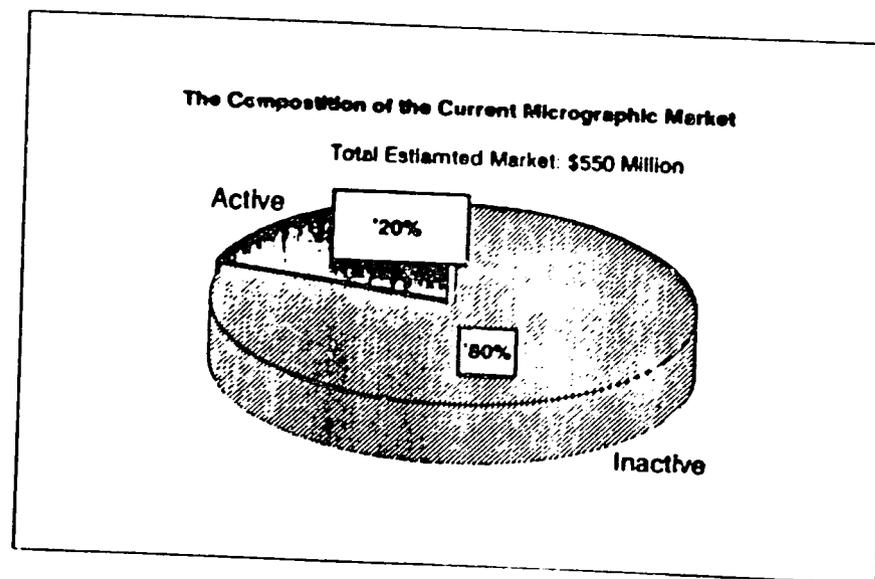
THE MORE OFTEN A DOCUMENT IS ACCESSED, THE MORE IT IS WORTH THE COST TO PLACE IT ON AN IMAGING SYSTEM.



Backfile Conversion ... Current Market Size

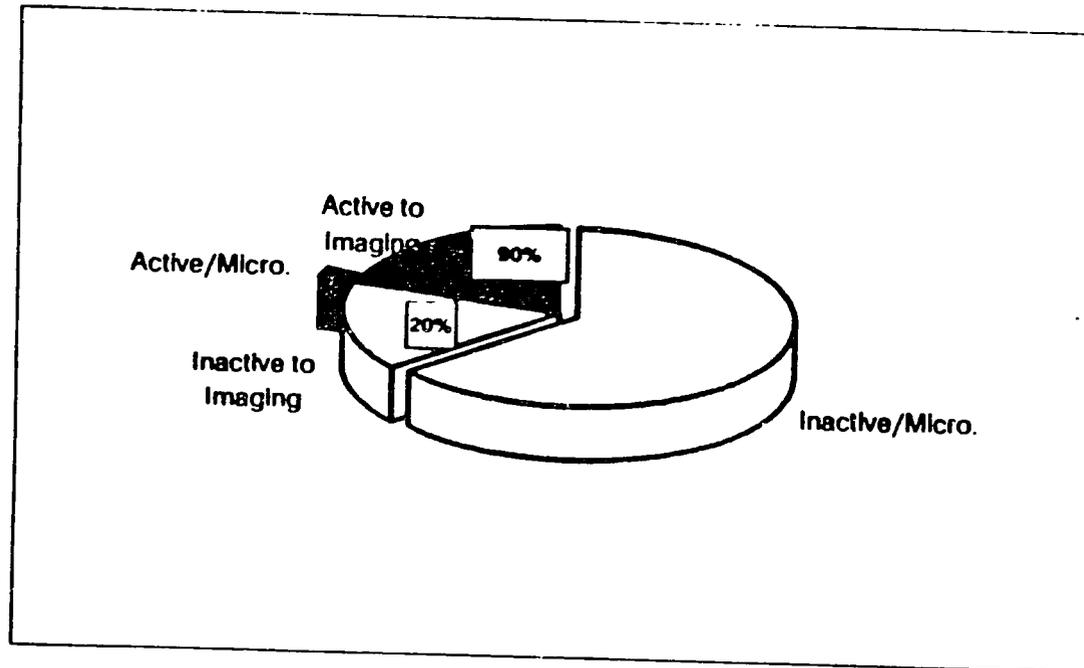
THE CURRENT MICROGRAPHIC MARKET PROVIDES A REASONABLE BASELINE ESTIMATE FOR THE SIZE OF THE EXISTING DOCUMENT IMAGING BACKFILE CONVERSION MARKET:

- 90% of the inactive information, which is currently microfilmed, is likely to remain on microfilm. There will be a fairly small migration of archival microfilm information to digital imaging in the next few years.
- Almost all of the active information, currently stored on microfilm, will be converted into digital imaging in the next few years. Most of this can be transferred to Jamaica.



Backfile Conversion ... Current Market Size

90% OF THE INACTIVE INFORMATION, WHICH IS CURRENTLY MICROFILMED, IS LIKELY TO REMAIN ON MICROFILM. THERE WILL BE A FAIRLY SMALL MIGRATION OF ARCHIVAL MICROFILM INFORMATION TO DIGITAL IMAGING IN THE NEXT FEW YEARS. ALMOST ALL OF THE ACTIVE INFORMATION, CURRENTLY STORED ON MICROFILM, WILL BE CONVERTED INTO DIGITAL IMAGING IN THE NEXT FEW YEARS. MOST OF THIS CAN BE TRANSFERRED TO JAMAICA.

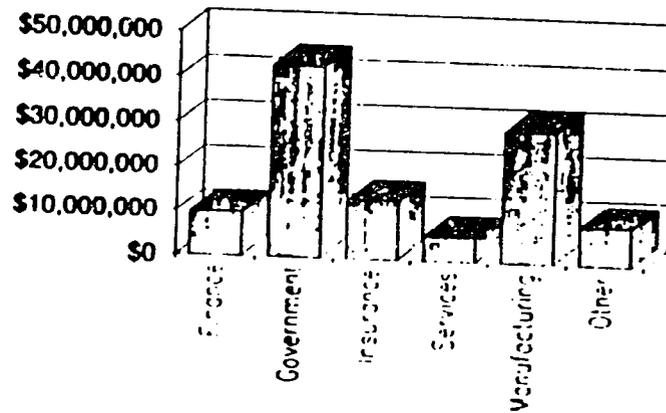


Backfile Conversion ... Current Market Size

THE GROWTH IN BACKFILE CONVERSION IS LIKELY TO OCCUR IN MARKET SEGMENTS WITH HEAVY RELIANCE ON ACTIVE DOCUMENTS SUCH AS INSURANCE, LEGAL, MEDICAL, AND THE GOVERNMENT SECTORS

- Based on our analysis, we estimate that 5% of the total expenditure on imaging systems will be spent on backfile conversion.

Estimated Backfile Conversion Costs For Different Market Segments



	Percent Market	Size \$Billion	% Backfile Conversion	Estimated Back. Con. Market
Finance	22%	0.33	3%	\$9,900,000
Government	29%	0.429	10%	\$42,900,000
Insurance	6%	0.0865	15%	\$13,275,000
Services	12%	0.183	3%	\$5,490,000
Manufacturing	20%	0.297	10%	\$29,700,000
Other	12%	0.1725	5%	\$8,625,000
Total Estimated Backfile Conversion Market				\$109,890,000

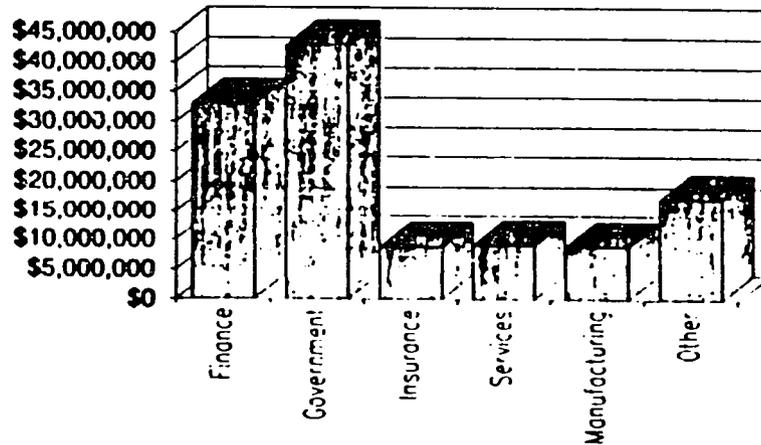
This figure is expected to grow by an average of 15%-20% per year in the next few years.

Recurring Conversion...Overview

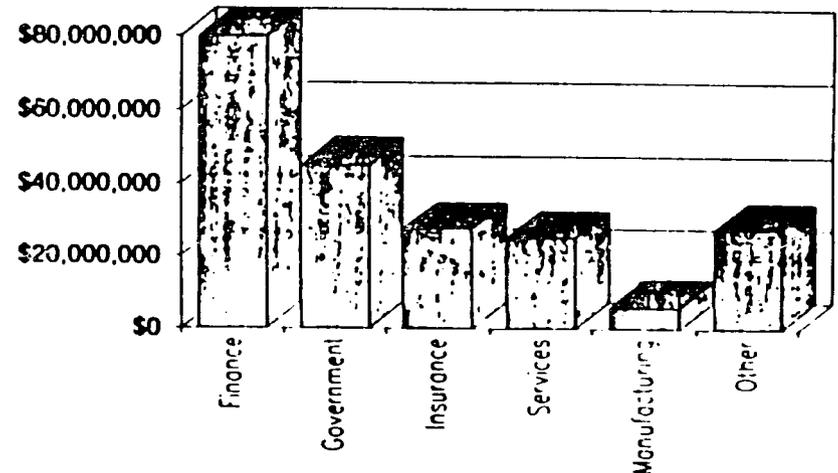
WITH THE INCREASING NUMBER OF SYSTEM INSTALLATIONS AND THE RELIANCE OF VARIOUS MARKET SEGMENTS ON DIGITAL IMAGES, THE SIZE OF THE RECURRING CONVERSION MARKET IS ON THE RISE.

- Imaging users are increasing the size and the number of systems they install for their operations.
- With the advent of newer high capacity optical disks and jukebox technology, the storage capacity of imaging system is also increasing.

Estimated Current Imaging Conv. Market



Projected Recurring Conv. Market - 1994



	Percent Market	Size \$Billion	% Recurring Conversion	Estimated Recurring Conv. Market
Finance	22%	0.33	10%	\$33,000,000
Government	29%	0.429	10%	\$42,900,000
Insurance	6%	0.0685	10%	\$6,850,000
Services	12%	0.183	5%	\$9,150,000
Manufacturing	20%	0.297	3%	\$8,910,000
Other	12%	0.1725	10%	\$17,250,000
Total Estimated				\$120,060,000
Recurring Conversion Market - 1991				

	Percent Market	Size \$Billion	% Recurring Conversion	Estimated Recurring Conv. Market
Finance	32%	0.8	10%	\$80,000,000
Government	18%	0.45	10%	\$45,000,000
Insurance	11%	0.275	10%	\$27,500,000
Services	20%	0.5	5%	\$25,000,000
Manufacturing	8%	0.2	3%	\$6,000,000
Other	11%	0.275	10%	\$27,500,000
Total Estimated	1			\$211,000,000
Backfile Conversion Market - 1994				

WHILE THE SIZE OF THE RECURRING MARKET IS ATTRACTIVE, CAREFUL ANALYSIS OF USER NEEDS IS REQUIRED TO WIN OFF-SHORE CONVERSION CONTRACTS FOR JAMAICA:

- Where the cost of an error is high, imaging users normally perform recurring conversions in-house. This enables them to directly control and supervise quality. i.e., typing in an extra zero in a bank statement may result in substantial loss of money and business.
- Confidential documents, proprietary information, and legal material are not contracted for outsourcing. In such cases, users prefer to perform document conversion in house (i.e. government, legal, and medical)
- Imaging systems sold are often configured with several scanners and printers, hence the end user has already made the capital investment for recurring conversion.
- Vendors of imaging systems do not recommend outsourcing, they prefer to sell the additional scanners and hardware equipment to one customer, hence to obtain higher profits
- Outsourcing is still new in many industry sectors and its cost/effectiveness not fully realized. Hence data processing managers in charge of imaging systems do not want to risk their reputation and jobs by outsourcing and introducing errors in their data.
- Imaging users demand quick turn around times and hence prefer to work with conversion service bureaus in close geographical proximity.

DESPITE THE MANY BARRIERS FOR CAPTURING THE RECURRING CONVERSION MARKET, JAMAICA HAS SEVERAL KEY COMPETITIVE ADVANTAGES:

- Since users need to enter the incoming information into their imaging system quickly, turn-around time is important in recurring conversion. Jamaica, given its close proximity and high-speed telecommunications network can complete the conversion of incoming documents in less than 48 hours.
- Jamaica's English speaking work force provides a better means of control and supervision to end-user in North America.
- Jamaica's labor cost is competitive and would reduce the overall cost of conversion for imaging users in the U.S.
- Using advanced fax machines and data links, Jamaican firms can increase their reliance on image transmission directly from the end-user site, thereby reducing the importance of geographical proximity.

Document Imaging Conversion - Profile

A summary of document imaging conversion services is as follows:

- **Current Market size:**
 - Total document imaging market: \$1.5 B
 - Backfile Conversion Service Market From Micrographic: Nearly \$190 M
 - Backfile Conversion Service Market From Document Imaging: Nearly \$100 M (60%)
 - Recurring Conversion: \$120 M per year

- **Market Growth:**
 - Market growth is projected at an annual 20%. This growth should continue or accelerate as new document imaging application are developed.
 - The recurring conversion market is expected to exceed \$210 Million by 1994.

- **Training Requirements:**
 - Minimal training requirement for an average data conversion project includes a high school degree with additional computer training.

- **Labor Intensity Cost Factor:**
 - The average ratio of labor to system costs in the market is moderate (depending on the specific application). 10% to 40% of the expenditure on an imaging system would be spent on conversion.

Document Imaging Conversion - Profile (continued)

- **Information Sensitivity:**
 - Information sensitivity is not a very important issue in the document imaging market. Users are already microfilming documents.

- **Basic costs of a base system:**
 - System and software cost range dramatically from \$30,000-\$50,000 for a PC-based system to \$2000,000-\$4000,000 for a mainframe-based system.

- **Geographic Proximity:**
 - Geographic proximity is important because users require on site conversion, or routine supervision of the conversion process as a good control measure.

- **Average Turnaround time:**
 - Backfile conversion turn-around time is about 10 weeks
 - Recurring turn-around time is about 2 days-1 week.

- **Major Customers:**
 - Government and insurance firms are currently the largest user of document imaging products.
 - Other major customers include banking, legal, and services companies.

Document Imaging Conversion - Profile (continued)

- **Quality Control Importance:**
 - Document imaging conversion requires a relatively high level of quality control to maintain accuracy. The importance of quality depends on the cost of an error for a particular application.
- **Technology Obsolescence:**
 - Standardization of optical disk media and file storage formats will make the purchase of different types of document imaging systems easier. The increase in the number of systems sold will result in an increased demand for conversion services.

SHIFT IN THE CUSTOMER BASE

The document imaging customer-base is not shifting drastically. Banking and the financial sectors are likely to take over the lead from government applications. The services sector, will also see an increase in number of systems installed. The overall increase of imaging by the more cost-conscious commercial sector will place Jamaica in a more competitive market position.

TECHNOLOGY ADVANCES

New breakthroughs in OCR, hand recognition, and pattern recognition will make data entry more efficient. Certainly, the labor intensive component of document conversion is likely to decrease in the next few years, from a fully manual process to a manual/automated process. This technology trend require Jamaica's conversion systems to also become more advanced and the labor force more trained with new technologies.

Labor cost component as a percentage of total expenditure on a typical document imaging installation will grow. Jamaica's low-labor costs will be a competitive major advantage. This is due to the dropping software and hardware prices, while the cost of labor in the U.S. is not likely to decrease.

COMPETITION

Competition is likely to continue from other Caribbean countries. English and quality of work will be the critical factors of success. Barbados and Ireland, who enjoy a positive reputation in quality of work, are likely to gain a larger percentage of the high-end conversion market. Mexico will also capture a modest portion of the conversion market.

PRESENTED TO:

JAMPRO

PROFILE OF THE COMPUTER AIDED DESIGN AND MANUFACTURING MARKET
(ASIA) PART OF THE INFORMATION PROCESSING SEGMENT STUDY

DELIVERABLE 3

July 1991

Prepared by:

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intex 



COMPUTER-AIDED DESIGN (CAD) AND COMPUTER-AIDED MANUFACTURING (CAM) TECHNOLOGY WAS DEVELOPED BY ENGINEERS AND SCIENTISTS WITHIN THE AEROSPACE AND AUTOMOBILE INDUSTRIES TO IMPROVE COST AND PERFORMANCE EFFICIENCY. THE TECHNOLOGY ENCOMPASSES TWO BASIC FUNCTIONS DESIGN AND MANUFACTURING:

- **DESIGN FUNCTION (CAD)** : Computer-aided design is an electronic aid for draftsman and design engineers which facilitates the construction of highly detailed drawings.
 - CAD systems have a library of stored shapes and commands to facilitate input of designs.
 - Complexity of CAD design software ranges from two dimensional to three dimensional (3-D) applications.
 - Two dimensional software is sufficient for drafting a design.
 - 3-D software allows designer to construct an "as-is" model to maximize product performance.

- **MANUFACTURING (CAM)** : Computer-aided Manufacturing is a computer assisted manufacturing tool. CAM allows users to control the entire manufacturing process including quality control and inventory management.
 - Facilitates the communications of errors/shortages on the manufacturing line.
 - Connects the manufacturing to design function and allows design engineers direct input the manufacturing process.

THE CAD/CAM SYSTEM MARKET CONSIST OF THREE MAJOR APPLICATION AREAS THAT VARY BY ENGINEERING SPECIALTY: MECHANICAL, ELECTRICAL/ELECTRONIC AND ARCHITECTURAL/CONSTRUCTION.

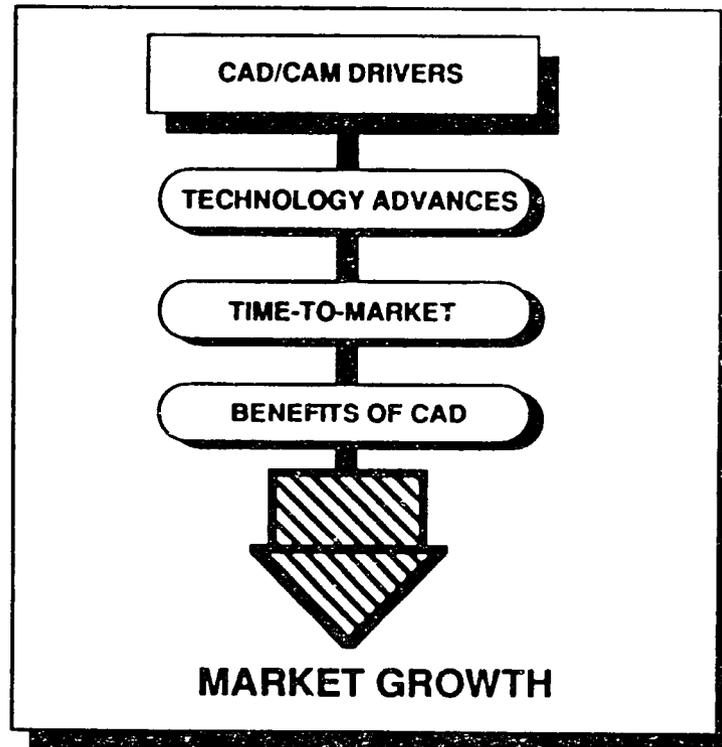
- **MECHANICAL** : CAD/CAM systems are used to design mechanical parts or structures in three dimensions. Benefits to users include:
 - Design analysis tools.
 - Pre-stored designs of components.

- **ELECTRICAL/ELECTRONIC** : CAD/CAM system applications are used for more complex and detail orientated electrical/electronic design. Application of the technology include integrated circuit (IC) and printed circuit board (PCB) layouts.

- **ARCHITECTURAL, ENGINEERING AND CONSTRUCTION (AEC)** : CAD/CAM systems are used to design building structures.
 - Plans for the structural design
 - Electrical, plumbing and layouts of new facilities.

CAD/CAM Drivers . . .

MAJOR DRIVERS FOR GROWTH IN THE CAD/CAM MARKET INCLUDE TECHNOLOGY ADVANCES, AND THE INCREASE IN THE IMPORTANCE OF TIME-TO-MARKET FOR DESIGN AND MANUFACTURING FUNCTIONS.



TECHNOLOGY ADVANCES AND THE SUBSEQUENT REDUCTION IN THE COST OF USING CAD/CAM SYSTEMS HAVE FUELED GROWTH OF THIS MARKET:

- **MENU DRIVEN COMMANDS** : have improved user friendliness and reduced training cost.
- **DECREASE IN COST** : a significant drop in workstation/PC hardware have lowered overall system costs.
- **GROWTH OF PC-BASED SOLUTIONS** : have also reduced cost of systems and broadened the lower end market (i.e., Small and Mid-sized Firms).
- **OPTICAL DISK TECHNOLOGY** : the introduction of optical disk has facilitated the storage, retrieval, and management of engineering document images:
 - Storage space for a library of drawings into a electronic database for immediate productivity.
 - Easy retrieval of document design to use with current design.
 - Quick distribution of designs for inputs via network.
- **IMPROVED DESIGN TOOLS** : such as 3-D software is increasing demand for CAD systems because of its enhanced features, which allow more sophisticated design capabilities.

THE BENEFITS OF CAD/CAM TO THE MANUFACTURING SECTOR HAS FUELED RAPID GROWTH IN THE CAD/CAM MARKET:

- **IMPROVED EFFICIENCY:**
 - Productivity/accuracy of engineering staff increases with use of computer-assisted design tools.
 - CAD's ability to track supplies needed for manufacturing results in more efficient inventory management.

- **REDUCED COST:**
 - Productivity increases result in reduced labor cost.
 - Better inventory management reduces inventory cost.
 - More accurate designs reduces defects and costs of production.

- **INFORMATION MANAGEMENT:**
 - CAD/CAM provides management with access to meaningful, timely information for the planning, execution, and control of the manufacturing process.

- **FLEXIBILITY:**
 - CAD/CAM technology provides achieve rapid response to market influences by allowing managers to make quick change in product/design features as well changes in the manufacturing process.

THE PRESSURE IN MANUFACTURING TO MINIMIZE "TIME-TO-MARKET" ENCOURAGES THE USE OF CAD/CAM:

- **TIME-TO-MARKET DEFINITION:**
 - The time it takes to develop a product from a concept to an actual design and then to manufacture that design.

- **IMPORTANCE OF TIME-TO-MARKET:**
 - Quick time to market gives a company a competitive advantage in establishing technology leadership.
 - Importance of quick time-to-market has been exemplified by Japanese companies successful capture of market share in various high-technology markets such as semiconductors.

- **HOW CAD REDUCES TIME-TO-MARKET::**
 - CAD makes a significant contribution to shortening design and development time by allowing design engineers to:
 - Quickly edit drawings.
 - Retrieve previously drawn components from stored libraries.
 - Test designs without having to construct a physical model.

Current CAD/CAM Customers . . . Overall . . .

THE FOLLOWING ORGANIZATIONS ARE MAJOR USERS OF CAD/CAM TECHNOLOGY. THE COMMERCIAL SECTOR IS THE LARGEST CUSTOMER GROUP FOLLOWED BY GOVERNMENT, AND THEN NON-PROFIT ORGANIZATIONS:

- **COMMERCIAL ORGANIZATIONS:**
 - Architectural Firms - use CAD to draft building designs.
 - Construction Firms - use AEC CAD to model plumbing and electricity design.
 - Industrial Companies (i.e., Aerospace and Automobile)- use CAD/CAM for research and development, designs, and manufacturing control.
 - Electronic Firms - use CAD to design circuit boards.
 - Manufacturing Firms - use CAD to integrate design and manufacturing departments.

- **GOVERNMENT :**
 - NASA- using CAD to design Space aircraft and stations.
 - Department of Defense- driving the use of CAD by contractors and also initiating standardization of CAD software for contractors.

- **NON-PROFIT ORGANIZATIONS:**
 - Universities- use CAD/CAM to conduct research or as an educational tool for engineering departments.
 - Research Institutes - use CAD for scientific research (i.e., model molecules).

THE U.S. GOVERNMENT USE OF CAD/CAM TECHNOLOGY IS LIMITED TO THE DEPARTMENT OF DEFENSE AND NASA. OTHER AGENCIES HAVE NOT FOUND RELEVANT APPLICATIONS OF CAD/CAM TECHNOLOGY.

- **NASA:**
 - NASA- using CAD to design Space Station Freedom project. The entire design, analysis, and refinement of the spacecraft will be computer-generated, and the only integrated, pre-launch testing will be in the form of computer simulations.

- **DEPARTMENT OF DEFENSE:**
 - The Computer Aided Logistic System (CALS) Initiative is focused on automating weapon support functions.
 - The CALS program requires that designs be in computer format.
 - The CALS program is also initiating standardization of CAD system formats.
 - Wright Paterson Air Force Base- uses CAD systems to model flight patterns.

COMPUTER/ELECTRONIC AND MANUFACTURING COMPANIES ARE THE LARGEST USERS OF CAD/CAM TECHNOLOGY WITHIN THE COMMERCIAL SECTOR.

- **COMPUTER/ELECTRONIC COMPANIES:** are the largest users of CAD/CAM technology. They are also the largest out sources of services because of their relatively small engineering departments compared to aerospace and manufacturing companies. Examples of their Outsourcing include:
 - GE and Siemens out sourcing the lay-out of PC board designs to a CAD design company.
 - DEC- out sources 35mm filming of engineering drawings to a service bureau in order to input them in to CAD systems.
 - IBM- out sources manufacturing, drafting and conversion to its strategic partner companies.

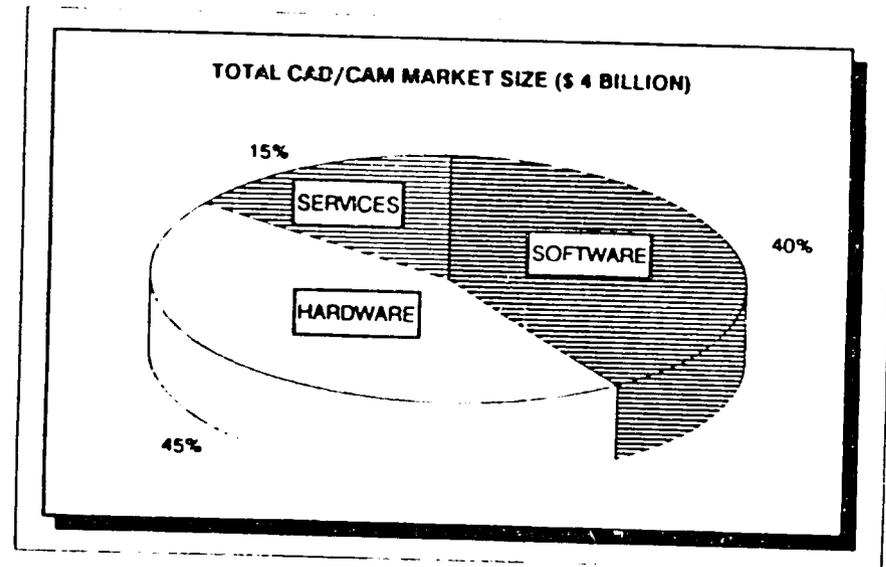
- **MANUFACTURING COMPANIES:** have made significant investments in CAD/CAM technology and will continue to find ways to use technology to improve cost/profit performance.
 - Minardi- is working on a Formula 1 car for the 1991 season using a CAD/CAM system from Computervision. The system will be used to build 3-D geometry, creating and analyzing complex sculptured surfaces, finite element modeling, producing engineering drawings, creating 3-axis surface machining programs and driving automated NC machinery.

CAD/CAM Customers... (Cont.)

- **AEROSPACE COMPANIES:** Aerospace companies include defense contractors and commercial aircraft manufactures. Both are traditional users of CAD/CAM technology and will continue to invest in the technology.
 - **Commercial Companies:** For the most part Commercial Aerospace firms maintain significant in-house computer-aided engineering departments.
 - Conair Aviation- drafts designs using CAD systems.
 - Boeing- has an CAD/CAM integrated manufacturing system.
 - **Defense Contractors:** The use of CAD/CAM technology by defense contractors will continue to grow as the government begins to require weapon designs deliverables to be in CAD format.
 - General Dynamics- using CAD to design tanks.
 - McDonnell Douglas- design and manufacture helicopters using CAD/CAM technology.

THE TOTAL CAD/CAM MARKET IS ESTIMATED AT \$17.8 BILLION A YEAR WITH AN ANNUAL GROWTH RATE OF 22%. A BREAKDOWN OF THE MARKET BY HARDWARE, SOFTWARE, AND SERVICES IS AS FOLLOWS:

- **SYSTEM HARDWARE:**
 - Unix
 - PC-Based Systems
 - CD-ROMS
- **SYSTEM SOFTWARE:**
 - PC-Based Software
 - Workstation Software
 - Specific Application Software
- **SUPPORT SERVICES:**
 - System Integration
 - Data Conversion
 - Drafting/layout Designs
 - Custom Software



BASED ON THE SCOPE OF THE STUDY, WE FOCUS ON SUPPORT SERVICE AS AN AREA SUITABLE FOR JAMAICA.

CAD/CAM Market- Potential for Jamaica...Analysis of First Level Critical Factors

FIRST LEVEL CRITICAL MARKET FACTORS ARE THOSE FACTORS THAT DETERMINE WHETHER A PARTICULAR SERVICE CAN BE EXPORTED IN AN OFF-SHORE MANNER. THOSE SERVICES WHICH MEET THE FIRST-LEVEL CRITICAL FACTORS WILL BE EXAMINED IN MORE DETAIL AS A TARGET MARKET FOR JAMAICA.

IN THE CASE OF THE CAD/CAM MARKET, FIRST LEVEL FACTORS ARE:

- **PORTABILITY**: Services which can be can be completed remotely from the user site.
- **EASE OF DISTRIBUTION**: Services which can be divided into independent work segments, completed in Jamaica, and later integrated with the rest of the system, without causing disruptions to the customer activities and the operation of the CAD/CAM system in use.

CAD/CAM Market...Potential for Jamaica...Analysis of First Level Critical Factors

PORTABILITY AND EASE OF DISTRIBUTION DETERMINE WHETHER A MARKET SEGMENT CAN BE SERVICED FROM AN OFF-SHORE FACILITY.

CAD/CAM SERVICE MARKET SECTORS	PORTABILITY	EASE OF DISTRIBUTION	OFF-SHORE POTENTIAL
SYSTEM INTEGRATION	-	-	NO
LAYOUT/DESIGN	+	+	YES
DATA CONVERSION	+	+	YES

LEGEND :

- +** Passes first level critical factor test
- Falls first level critical factor test
- Potential Market For Jamaica

OUR FIRST LEVEL CRITERIA INDICATE THAT DATA CONVERSION AND DRAFTING/LAYOUT ARE THE MOST SUITABLE MARKETS FOR JAMAICA. OUR ANALYSIS ALSO INDICATES THAT MODELING/DRAFTING AND SYSTEM INTEGRATION ARE NOT SUITABLE FOR OFF-SHORE CONTRACTING.

- **PORTABILITY TEST:**

- Data conversion and drafting/layout can be completed remotely from the user site and later integrated into the system at the client's site in the U.S.
- Both System integration and drafting/layout require on-site presence. Hence, they are not portable.

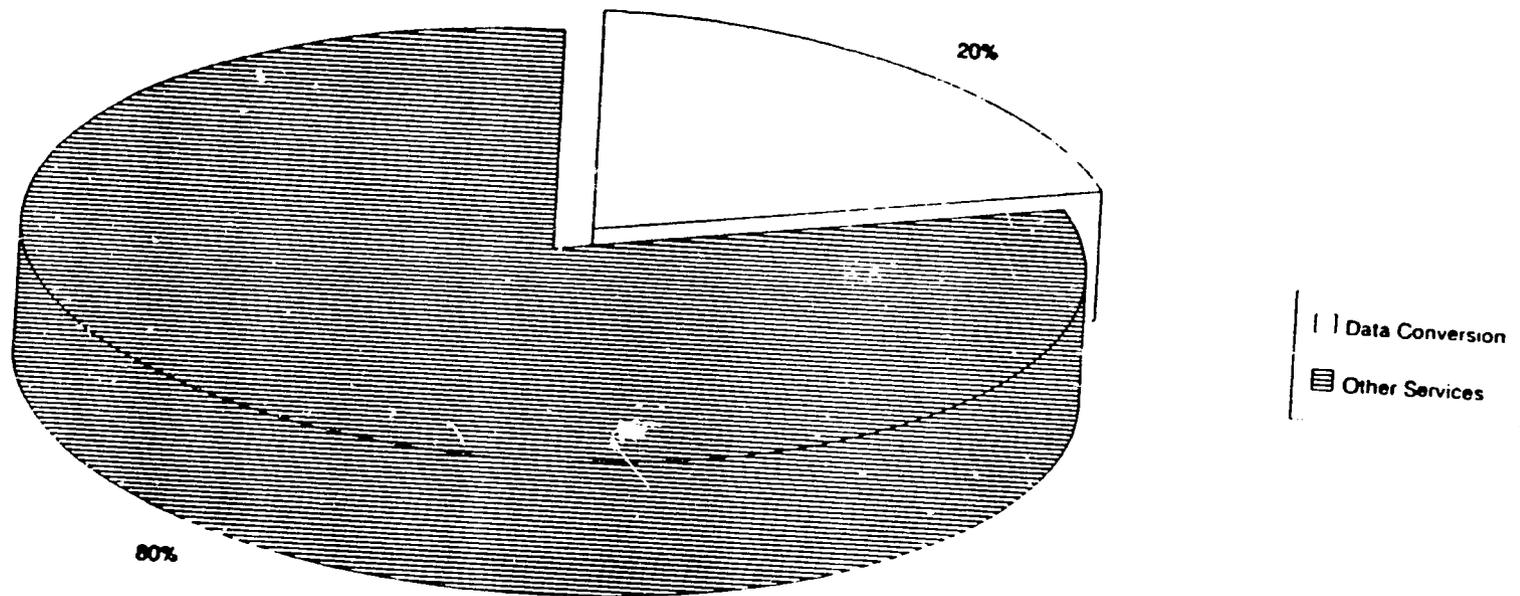
- **EASE OF DISTRIBUTION TEST:**

- Data conversion and drafting/layout design can be divided into independent work segments and easily integrated at a later time.
- System Integration and modeling/drafting require a closely coordinated effort and can not be easily broken down into distinct functions. Hence, they can not be treated as distributed tasks.

CAD/CAM Conversion/Translation...Overview

THE U.S. CAD/CAM CONVERSION/TRANSLATION MARKET IS CURRENTLY ESTIMATED TO BE \$ 121 MILLION WHICH IS 20% OF THE TOTAL CAD/CAM SERVICE MARKET.

Data Conversion Percentage of Total Service Market (\$121 Million)



WE IDENTIFIED THREE MAJOR MARKET SEGMENTS IN CAD/CAM CONVERSION. THE FOLLOWING SEGMENTS CAN BE DIFFERENTIATED AS EITHER PERFORMING A TRANSLATION, OR CONVERSION FUNCTION:

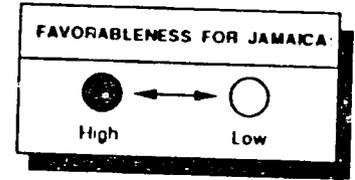
- **TRANSLATING ONE GRAPHIC SYSTEM TO ANOTHER**: includes translating engineering designs from one system format to another and consist of:
 - **New to New System Conversion** - translating designs from one current off-the-shelve software to another.(e.g. Mentor graphic 3-D to Cadence 3-D software).
 - This type of conversion is the simplest form of conversion and requires limited "decision-making".
 - This segment is limited because of the recent standardization and development of translation software in the CAD/CAM industry.
 - **Old to New System Conversion** - includes the translating designs from out-dated software to advance software.
 - This type of conversion is more complex and does require more "decision-making"
 - This segment remains a viable segment as organization translates old graphical system to new.

- **CONVERSION OF HAND DRAWINGS TO COMPUTER FORMAT:** consists of converting paper to computer file format.
 - This is a major segment in CAD/CAM conversion market that will continue to grow for the next five years as major corporations see the utility and benefits to productivity of using CAD/CAM systems (i.e., GM's need to convert old drawing into computer format to implement CAD/CAM system).

CAD/CAM Data Conversion/Translation Market . . . Second Level Critical Factor Screen

AS A NEXT STEP, WE RANKED THESE POTENTIAL SERVICES AGAINST SECOND LEVEL CRITICAL FACTORS THAT DETERMINE WHETHER MARKET REQUIREMENTS ARE FAVORABLE FOR JAMAICA. THE HAND DRAWING TO COMPUTER FILE FORMAT (e.i., DISK, APERTURE CARDS) SCORED HIGHEST FOR OFF-SHORE POTENTIAL IN JAMAICA.

		MARKET REQUIREMENTS	EDUCATIONAL REQUIREMENT	QUALITY CONTROL	LABOR INTENSIVE	FUTURE MARKET	TURN AROUND TIME	INFORMATION SECURITY	TOTAL IMPACT TO ENTRY BARRIERS
TRANSALTING	New To New System	●	●	●	○	●	○	●	
	Old To New System	●	●	●	●	●	●	●	
DATA CONVERSION	Hand Drawing to Computer File Format	●	●	●	●	●	●	●	



CAD CONVERSION (ENGINEERING DRAWINGS) IS LABOR INTENSIVE BECAUSE A SCANNED IMAGE OF CAD DESIGN REQUIRES EXTENSIVE EDITING TO ACHIEVE APPROPRIATE LEVELS OF ACCURACY.

- The scanned image of the engineering drawing is not totally accurate; it contains many approximation of the original raster image.
- Therefore, the real value-added of a service bureau is the process of correcting and editing the reconstructed vector image by comparing it with the raster image.
- Additional services provided include altering and enhancing the images.

CAD/CAM DATA CONVERSION SERVICES INCLUDE:

BASIC SERVICES IN THE CAD CONVERSION MARKET INCLUDE THE FOLLOWING:

- **Data entry**: The keying of data into a computer system.
- **Scanning**: The scanning operation digitizes the information into computer readable files.
- **Raster to vector conversion** - The process of identifying pixels which represent line work or graphics, separating these pixels from the background and converting them to a vector representation. This vector representation allows graphic information to be easily manipulated, edited, attributed, and stored. Vector representation is a basic component of CAD/CAM.
 - Automated - Requires no human interaction
 - Interactive - Operator points to lines to be vectorized
- **Interactive Editing** - This is the use of a high resolution color graphics workstation to allow an operator to easily view vector graphics as an overlay on top of an original grey scale image of the source document. This interactive editing station is a key ingredient in the automation of conversion, including:
 - Image Editing
 - Raster Drafting

A SUMMARY OF CAD/CAM CONVERSION MARKET IS AS FOLLOWS:

- **Current Market Size:**
 - Total CAD/CAM market: \$4 B
 - The Service Market: \$606 M (15%)
 - The Conversion Market: \$121 M (20%)
 - The Conversion Out-sourced Market: \$ 48M (40%)
 - The Off-shore Conversion Market: \$ 7M (15%)
- **Market Growth:**
 - Market growth is projected at an annual rate of 22%. CAD/CAM experts estimate over 1 Billion hand-drafted drawings laying in flat files in Industry, academic institutions and government.
- **Training Requirements:**
 - Minimal training requirement for an average CAD/CAM conversion project includes a high school degree with additional computer training.
- **Labor Intensity:**
 - The average ratio of labor to system costs in the CAD/CAM market is 60% to 40%.
- **Information Sensitivity:**
 - Information sensitivity is relatively high in the CAD/CAM market because of the strategic importance of designs.

CAD/CAM Conversion - Summary (cont)

- **Basic costs of a base system :**
 - System and software cost range dramatically from \$10,000-\$16,000 for a PC-based system to \$20,000-\$40,000 for a workstation system.

- **Geographic Proximity :**
 - Geographic proximity is not of major importance if a firm can provide accurate control.

- **Average Turnaround time:**
 - Turnaround time averages at 10 weeks or more.

- **Major Customers:**
 - The U.S. industrial/electronic sector is currently the largest user of CAD/CAM.
 - Other major customers include architectural, engineering, and construction companies.

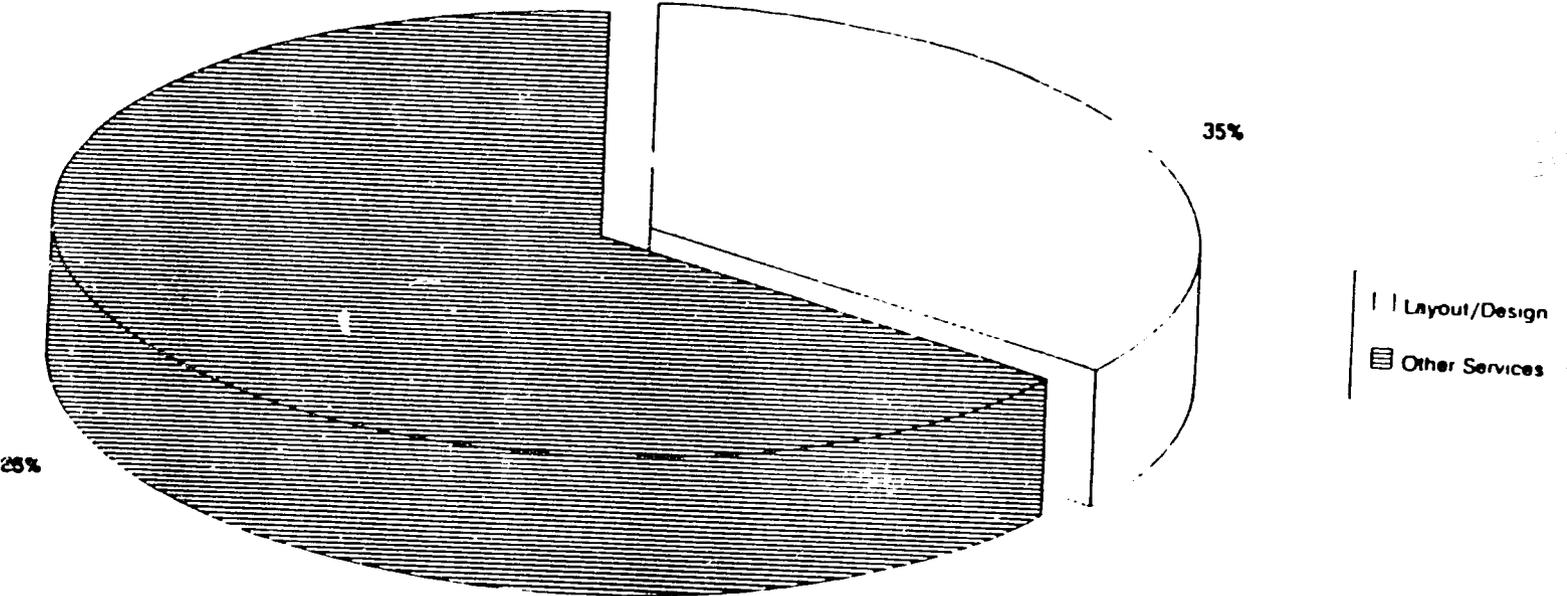
- **Quality Control Importance:**
 - CAD/CAM conversion requires a high level of quality control to maintain accuracy.

- **Technology Obsolescence:**
 - The CAD/CAM market is expected to grow at a steady rate as most companies automate design and manufacturing functions.

CAD/CAM Drafting/Layout Market . . . Overview

THE U.S. CAD/CAM DRAFTING/LAYOUT DESIGN IS ESTIMATED AT A \$ 212 MILLION WHICH IS 35% OF THE TOTAL CAD/CAM SERVICE MARKET.

Layout/Design Percentage of Total Service Market (\$212 Million)



THE FOLLOWING SEGMENTS WERE IDENTIFIED AS POTENTIAL SERVICES SEGMENT WITHIN THE DRAFTING/LAYOUT MARKETS:

- **ENGINEERING DESIGN**: The actual design of the product (Product specification and features are defined).

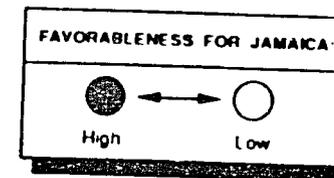
- **SOLID MODELING**: The process of adding surface to wiring drawing of engineering designs.
 - A computer drawing that has been done in a 2-Dimensional software package must be given surfaces to take advantage of "as-is" product features that new 3-D software has.

- **PRINT CIRCUIT BOARD LAYOUT**: The process of layout circuit designs on a board.
 - An electric engineer designs circuitry on paper and hands the resulting schematic to the PCB designer, who would use a CAD system to lay out the circuitry on a board. The PCB also receives specifications on positioning of key interface components and other details.

CAD/CAM Drafting/Layout Market . . .

AS THE NEXT STEP WE RANK THESE POTENTIAL SERVICES AGAINST SECOND LEVEL CRITICAL FACTORS TO IDENTIFY THE POTENTIAL OUTSOURCING MARKET.

MARKET REQUIREMENTS	EDUCATIONAL REQUIREMENT	QUALITY CONTROL	LABOR INTENSIVE	FUTURE MARKET	TURN AROUND TIME	INFORMATION SENSITIVITY	TOTAL IMPACT TO ENTRY BARRIERS
ENGINEERING DESIGN	○	○	◐	◑	◐	◐	◐
SURFACE MODELING	◐	◐	◑	◐	◑	◑	◑
PCBs LAYOUT	◑	◑	◑	◐	◑	◑	◑



THE PC BOARD LAYOUT HAS THE GREATEST POTENTIAL FOR OFF SHORE CONTRACTING WHEN COMPARING TURN AROUND TIME, TECHNOLOGICAL COMPLEXITY/EDUCATIONAL REQUIREMENTS, AND INFORMATION SECURITY OF POTENTIAL SECTORS. THE MAJOR BARRIERS FOR JAMAICA ON THE OTHER TWO POTENTIAL SERVICES ARE :

- **ENGINEERING DESIGN:**
 - Educational/training requirement entry barrier is extremely high, because of technical complexity of IC circuit design process.
 - Size of market is limited while the capital expenditure needed to purchase equipment is fairly low.

- **SOLID MODELING:**
 - The market is declining.
 - New CAD design tools have automatic surface features which eliminate the need for solid modeling.
 - Small firms are also investing in software tools and do not require a service bureau to perform modeling.

THE PRINTED CIRCUIT BOARD (PCBs) LAYOUT DESIGN OUT SOURCING MARKET IS ESTIMATED AT A \$340-400 MILLION DOLLAR. THE MARKET HAS GROWN RAPIDLY DUE TO THE WIDE USE OF ELECTRONIC PRODUCTS AND THE SHIFT OF TECHNOLOGY GOODS TO A "COMMODITY".

- **WIDE USE OF PCBs IN ELECTRONIC PRODUCTS:**
 - Not only do PCBs control electronic functions in computers, airplanes, cars, and telephone switching systems, they also form the backbone of electrical systems that automate huge factories and processing plants.
 - An average car has about 21 PCBs, these boards control the entire electronic system.
 - PCB production is extremely price sensitive - many producers at high quality. cost
- **SHIFT OF TECHNOLOGY FROM HI-TECH TO A COMMODITY:**
 - PCB production is extremely price sensitive - many producers of high quality. Cost is the determining factor.
 - Mass produced.

A SUMMARY OF CAD/CAM PCB LAYOUT MARKET IS AS FOLLOWS:

- **Current Market Size:**
 - Total CAD/CAM market: \$4 B
 - The Service Market: \$606 B (15%)
 - The Layout/Design Market: \$212 M (35%)
 - The Layout/Design Outsource Market: \$169 M (60%)
 - The Off-shore Conversion Market: \$17 M (10%)

- **Market Growth:**
 - Market growth is projected to grow at an annual rate of 22%.

- **Training Requirements:**
 - Minimal training requirement for an average CAD/CAM Drafting/Layout project includes a two year design degree plus substantial experience.

- **Information Sensitivity:**
 - Information sensitivity is relatively high in the CAD/CAM market because of the strategic importance of designs.
 - The drafting/layout especially requires information security because product enhancements are often implemented by PCBs board.

CAD/CAM Drafting/Layout Market . . . Summary (Cont.)

- **Basic costs of a base system :**
 - System and software cost range dramatically from \$10,000-\$16,000 for a PC-based system to \$20,000-\$40,000 for a workstation system.
- **Geographic Proximity :**
 - Geographic proximity is not of major importance if a firm can prove accurate control.
 - Most service bureaus tend to be in high tech centers such as Massachusetts, California and Texas which parallel concentration of computer firms.
- **Average Turnaround time:**
 - Turnaround time averages at 1 week or less. Customers are willing to pay a premium for shorter turn-around time.
- **Major Customers:**
 - The U.S. computer sector is currently the largest user of CAD/CAM drafting layout services.
 - Other major customers include electronic and manufacturing companies.
- **Quality Control Importance:**
 - Quality is of utmost importance because layout design drives the manufacturing of component. Hence, drafting errors could result in a batch of faulty components (e.g. computer boards design mistake could resulting millions of dollars in manufacturing loss).

CAD/CAM Drafting/Layout Market - Summary (Cont.)

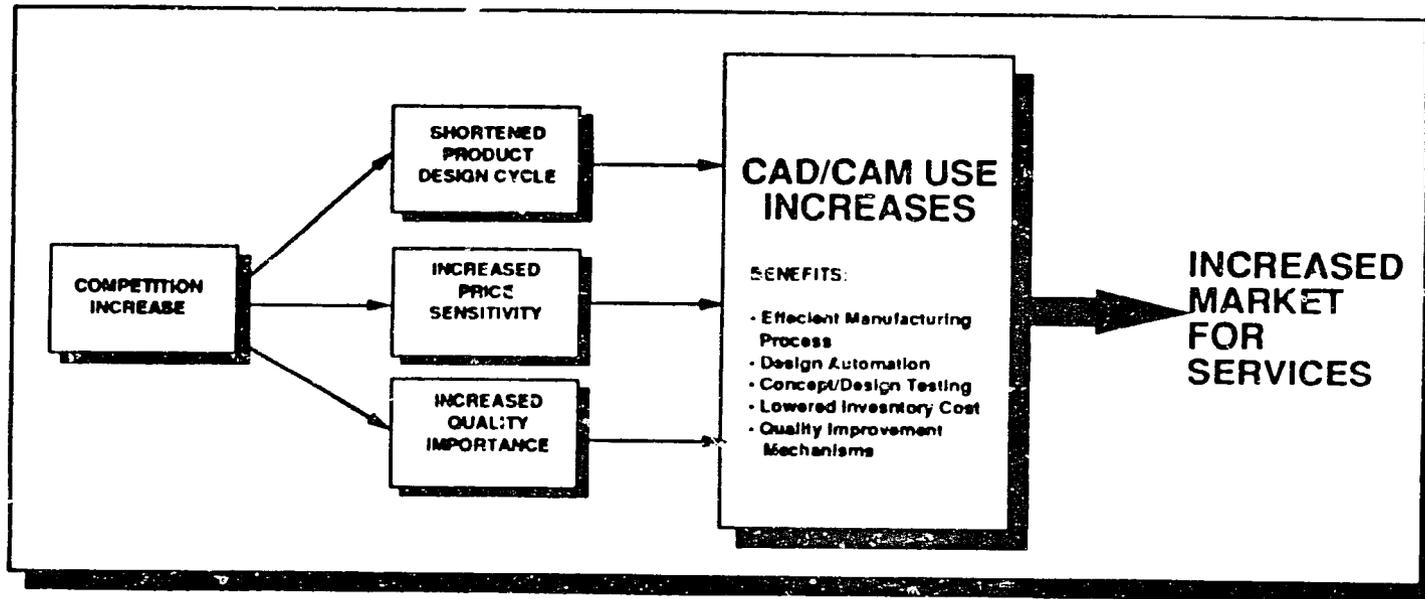
- **Technology Obsolescence:**

- The CAD/CAM market is expected to grow at a steady rate as most companies automate design and manufacturing functions.
- Lay-out design is not technically driven but is more of an "art" so it will not be easily replaced by software.

- **Distribution/Marketing Channels:**

- PCB layout service bureaus tend to maintain long-term relationships with clients.
- Major clients require assurance that their work will be completed in time and require a higher priority for their work.

MARKET INDICATORS SHOW THAT THE U.S. MARKET WILL CONTINUE TO BECOME MORE COMPETITIVE. SUBSEQUENTLY, THE CAD/CAM MARKET SHOULD CONTINUE TO GROW. THIS SHOULD FAVORABLY IMPACT BOTH CONVERSION/LAYOUT SERVICES:



COMPETITION WILL ARISE FROM COUNTRIES WITH A STRONG MANUFACTURING BASE AND TECHNICALLY TRAINED WORK FORCE.

● **STRONG MANUFACTURING BASE:**

- Brazil, India and Mexico would provide strong competition in the CAD/CAM off-shore service market place:
 - American manufacturing/Hi-tech firms have already out sourced manufacturing to firms in these countries.
 - These Off-shore manufacturing firms would be in an advantageous position in capturing off-shore data conversion.
 - Off-shore manufacturing firms can act as a channel for off-shore conversion services.
 - Established manufacturing base generates a trained work-force.

● **TECHNICALLY TRAINED WORKFORCE:**

- Brazil, India, and Mexico have a large technically trained population compared to Jamaica. In these countries, off-shore manufacturing firms:
 - Provide management for conversion jobs- establish a competitive manager to worker ratio.
 - Achieve a quality image - hard to achieve a quality image without a trained workforce.

PRESENTED TO:

JAMPRO

**A PROFILE OF THE OUTSOURCE PROGRAMMING MARKET
AS A PART OF THE INFORMATION PROCESSING SEGMENT STUDY**

DELIVERABLE 4

July 1991

Prepared by:

**International Technology Exchange Group
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intex 

Outsource Programming Market - Deliverable 4, Task 1

Information Processing Market Segment Study

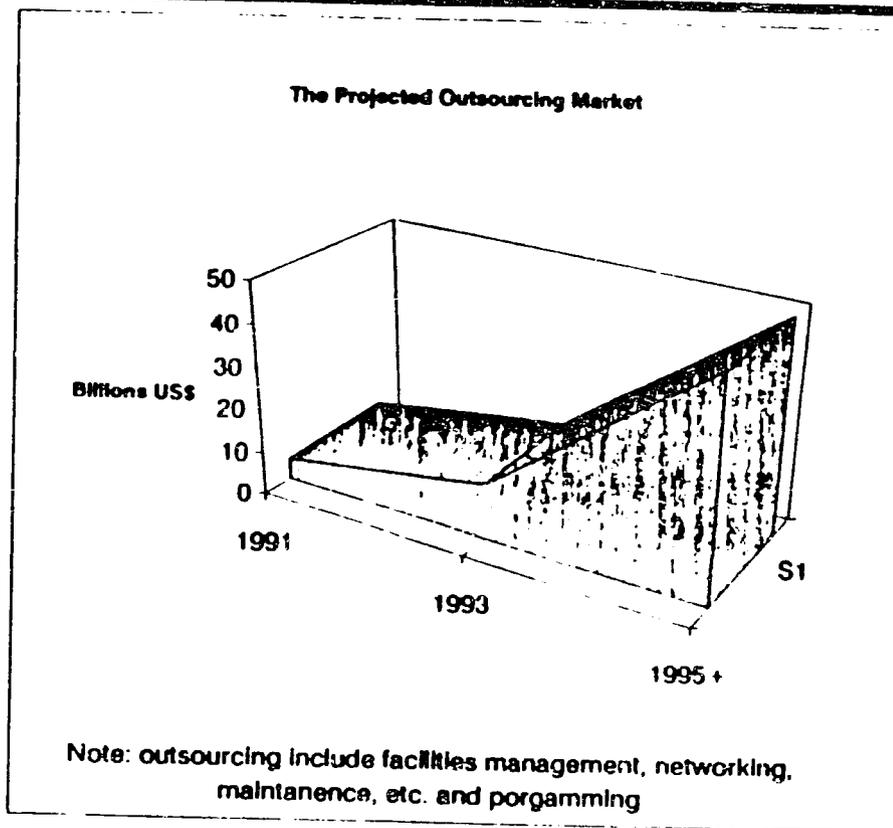
This report was prepared by INTEX for Task 1 of the information processing industry segment study and is the first of a series of reports produced by INTEX in this task. As described by the Statement of Work, the scope of this task is to provide an overview of different information processing markets in North America suitable for the development and growth of Jamaica's local industry. Hence, this report focusses on the current state of the outsource programming market in the U.S. and provides an overview of its trends and projections. Final strategies, recommendations, and conclusions will result from our analyses of tasks 1 and 2 and will be presented in our next set of deliverables.

OFFSHORE PROGRAMMING IN THE U.S. MARKET BEGAN IN 1979, AS MAINFRAME COMPANIES BEGAN THE PRACTICE TO REDUCE COSTS. MAJOR MOTIVATORS TOWARD THIS TREND INCLUDE THE FOLLOWING:

- Technically trained personnel offshore (e.g., Brazil, India).
- Reduction of U.S. in-house information systems departments.
- Shortage of technically trained personnel in the U.S.
- Growth of the software industry in both general and customized applications.

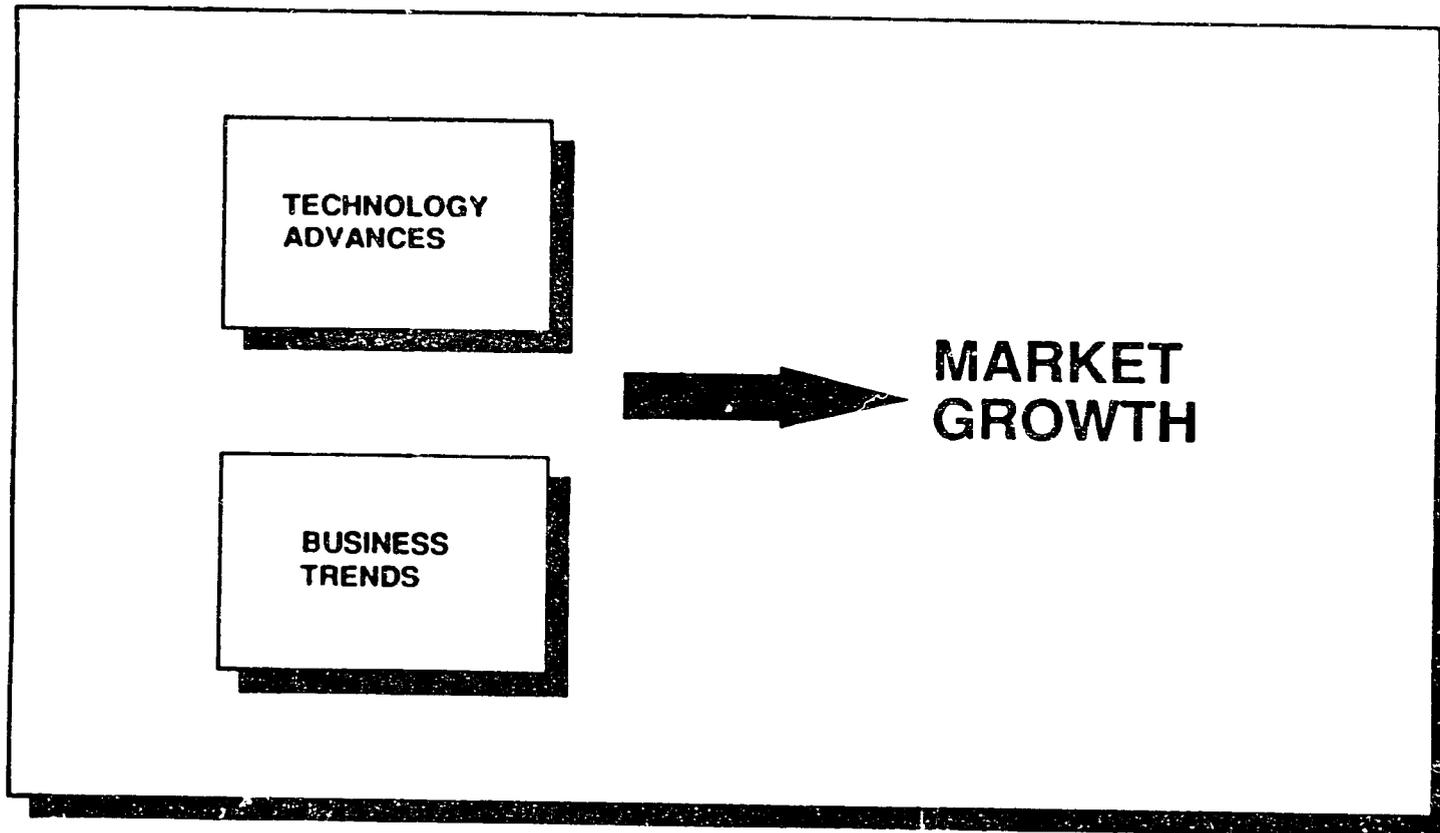
Outsourcing Market Size...Current Estimates

THE OUTSOURCING MARKET, WHICH INCLUDES PROGRAMMING AS WELL AS NON-PROGRAMMING ACTIVITIES (I.E., FACILITY MANAGEMENT, NETWORKING, SYSTEMS INTEGRATION) IS CURRENTLY ESTIMATED TO BE \$5 BILLION. THIS FIGURE IS LIKELY TO APPROACH \$13 BILLION IN THE NEXT TWO YEARS, AND REACH \$50 BILLION SHORTLY AFTERWARDS. DUE TO THE GROWTH NATURE OF THE INDUSTRY, THERE EXIST OPPORTUNITIES FOR NEW ENTRANTS INTO THE U.S. OFFSHORE PROGRAMMING MARKET.



Offshore Programming - Market Drivers, Technological Advancements

MAJOR MARKET DRIVERS FOR GROWTH IN THE U.S. OFFSHORE PROGRAMMING MARKET CAN BE BROKEN DOWN INTO TWO CATEGORIES: TECHNOLOGICAL DRIVERS, AND SHIFTING U.S. BUSINESS TRENDS.



TECHNOLOGICAL ADVANCEMENTS ARE ONE OF THE MAIN MARKET DRIVERS THAT EVOLVE FROM CHANGING AND IMPROVING COMPUTER TECHNOLOGIES. THEY WILL INCREASE THE DEMAND FOR COMPUTER PROGRAMMING.

- **TELECOMMUNICATIONS:** The increase in worldwide telecommunications networks facilitates communications and transference of data among geographic sites.
 - AT&T has spent US\$ 183 million to install a fiber optic cable linking Florida, Jamaica, Puerto Rico, Dominican Republic, and Colombia.
 - Cable and Wireless completed a US \$50 million Caribbean-Atlantic fiber optic cable.
 - Ireland and India are currently a source of systems software development

- **IMPROVEMENTS IN STORAGE AND SPEED:** Technological advancements predicate movement in the computer industry toward machines that are substantially smaller and orders of magnitude faster than computers currently on the market. These advancements reduce computer costs per unit of computing speed, and thus increase demand for computer software.

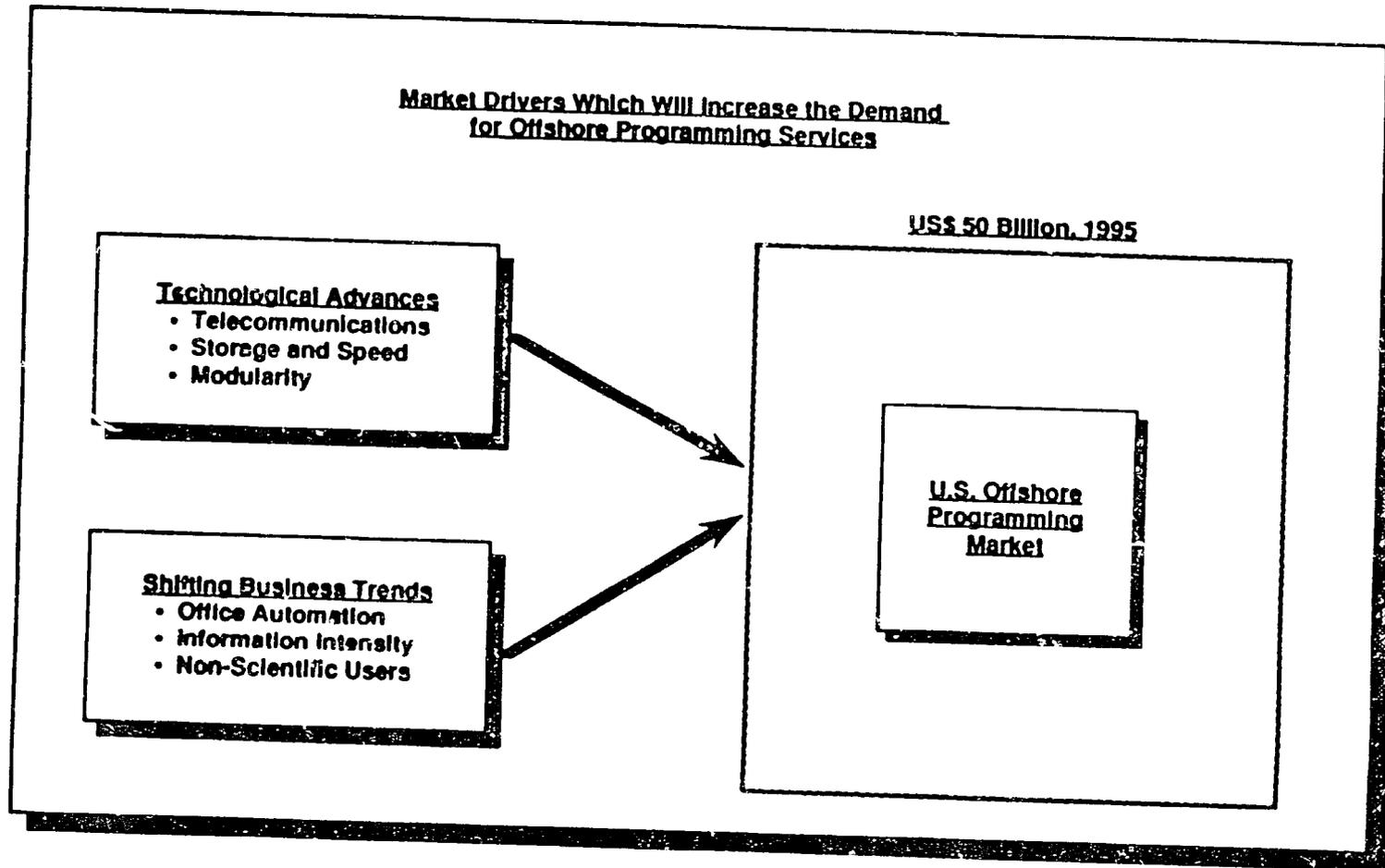
- **INCREASE IN MODULARITY OF APPLICATIONS SOFTWARE:** This increases the development of applications and the piggy-backing by third party vendors. (e.g., writing specialized software to run under Windows)

THE SHIFT IN BUSINESS PRACTICES WILL ALSO INCREASE THE DEMAND FOR COMPUTERS AND COMPUTER PROGRAMMING.

- **INCREASES IN OFFICE AND FACILITY AUTOMATION:** As companies increase office and facility automation, they will have an increased need for customized programming applications suited to their company.
- **INCREASES IN THE LEVEL OF INFORMATION INTENSITY:** Due to the increase in information accessibility and maturing U.S. markets, U.S. companies are relying on the manipulation of information as a strategic vs. simply a maintenance tool. (e.g., American Airlines Sabre System)
- **INCREASE IN COMPUTER USE BY NON-SCIENTIFIC USERS:** The increase of computer use among non-technical staff such as librarians has increased the demand for custom programming tailored toward user friendliness.

Market Drivers' Influence on Offshore Programming...

THE PREVIOUSLY LISTED MARKET DRIVERS ARE THE UNDERLYING MARKET CURRENTS WHICH CAN INCREASE THE DEMAND FOR OFFSHORE PROGRAMMING SERVICES.



Computer Programming - Market Customers...

BASED ON OUR ANALYSIS, WE SEGMENTED THE MARKET FOR COMPUTER USE INTO FIVE GROUPS. A RAPIDLY GROWING SEGMENT IS THE HOME OFFICE BUSINESSES. A FEW EXAMPLES OF EACH CUSTOMER SEGMENT ARE AS FOLLOWS: (source: The Computer Industry Almanac, 1990)

- **COMMERCIAL**
 - ACCOUNTING
 - FINANCIAL
 - MANUFACTURING COMPANIES
 - AEROSPACE
 - RETAIL

- **NON-PROFIT ORGANIZATIONS**
 - EDUCATIONAL INSTITUTIONS
 - HOSPITALS
 - LIBRARIES

- **GOVERNMENT AGENCIES**
 - DEPARTMENT OF TRANSPORTATION
 - ENVIRONMENTAL PROTECTION AGENCY
 - DEPARTMENT OF STATE

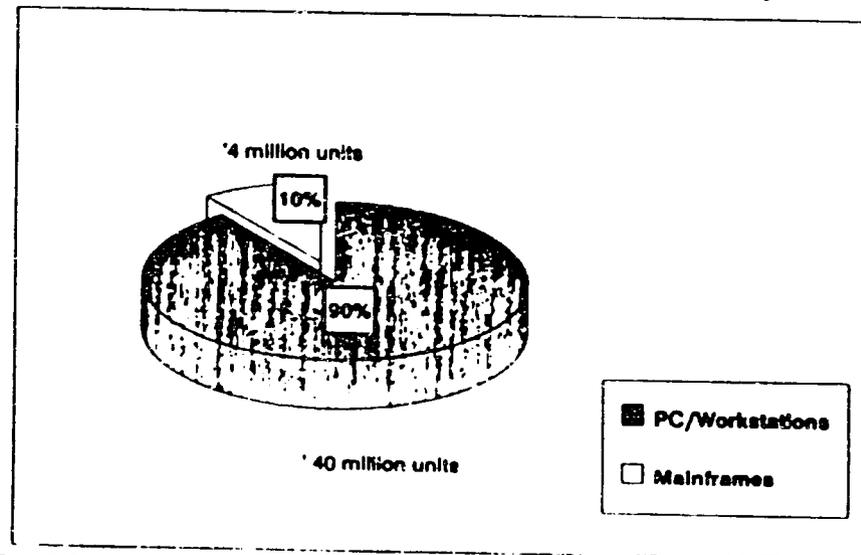
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Computer Programming - Market Customers...Continued

- **HOME OFFICES:** There is an increasing trend toward working out of the home. This is leading to an expanding market in home office computer sales.
- **CONSUMERS:** Individuals who purchase computers for personal use.

THERE ARE TWO MAIN CLASSES OF COMPUTERS: MICROCOMPUTERS AND MAINFRAME COMPUTERS. MICROCOMPUTERS ENCOMPASS PERSONAL COMPUTERS, WORKSTATIONS, AND PERSONAL SUPERCOMPUTERS. MAINFRAME COMPUTERS ARE THE LARGEST AND MOST POWERFUL COMPUTERS, AND ARE USED FOR LARGE-SCALE SCIENTIFIC CALCULATIONS.

- We divide the minicomputer market between the microcomputer market and the mainframe market within the next few years. The minicomputer market will be eventually absorbed by high-end microcomputer market and the low-end mainframe market.
- The computer market consists of 90% personal computers, or 40 million units. There are approximately 4.5 Million mainframe computers currently on the market.



Computer Programming - Major Players by Hardware Type...

THE TEN TOP MAINFRAME AND MICROCOMPUTERS COMPANIES BY MARKET SHARE ARE LISTED BELOW. THESE TEN COMPANIES COMPRISE THE MAJOR HARDWARE PRODUCERS BY MARKET SIZE OF THE MAINFRAME AND MICROCOMPUTERS INDUSTRIES, RESPECTIVELY.

MICROCOMPUTERS (PCs)

COMPANY	1988 REVENUES	MARKET SHARE
IBM	7,150	25.5
APPLE	2,950	10.5
COMPAQ	2,066	7.4
OLIVETTI	1,428	5.1
TANDY	1,232	4.4
ZENITH	1,220	4.4
NEC	1,205	4.3
TOSHIBA	1,083	3.9
UNISYS	1,050	3.7
AMSTRAD	785	2.8

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Computer Programming - Major Players by Hardware Type, continued...

MAINFRAME COMPUTERS

COMPANY	1988 REVENUES (\$M, US)	MARKET SHARE
IBM	12,139	40.1
FUJITSU	4,185	13.8
NEC	4,033	13.3
HITACHI	2,507	8.3
AMDAHL	1,225	4.0
UNISYS	1,175	3.9
GROUPE BULL	901	3.0
SIEMENS	683	2.3
STC	658	2.2
CRAY RESEARCH	633	2.1

CUSTOMIZED COMPUTER PROGRAMMING SERVICES AND PREPACKAGED SOFTWARE ARE THE TWO MAJOR MARKET SECTORS IN THE COMPUTER PROGRAMMING INDUSTRY. SOFTWARE CUSTOM PROGRAMMING MARKETS SPAN THE RANGE OF COMPUTER SYSTEM SIZES, FROM MICROCOMPUTERS TO MAINFRAME SYSTEMS. THE TOTAL SOFTWARE INDUSTRY IN THE U.S. IS CURRENTLY ESTIMATED TO BE US \$35 BILLION IN 1991.

- **PREPACKAGED SOFTWARE:** The U.S. Market for prepackaged software is currently estimated to be US \$18 billion. The most significant portion of the prepackaged software is systems Software. System software manages the operations of the computer systems or provides tools for developing software. is used for single and multi-user, single and multi tasks. Market size is estimated to be US\$17.3 Billion. Examples include: UNIX, DOS, OS/2, and Apple operating systems.
- **CUSTOM PROGRAMMING:** The custom programming market sector covers software development of new software for use by a company for a specific purpose, or the tailoring of existing software. The U.S. Market in custom programming reached US \$11 billion in 1990. Examples include:
 - Creation of customized database management, accounting, e-mail, and text processing applications.
 - Development of an expert system-based tax service by a consulting firm for a nonprofit organization to alert tax professionals to planning opportunities and deadlines.

Computer Programming - Market Sectors Overview...Custom Software

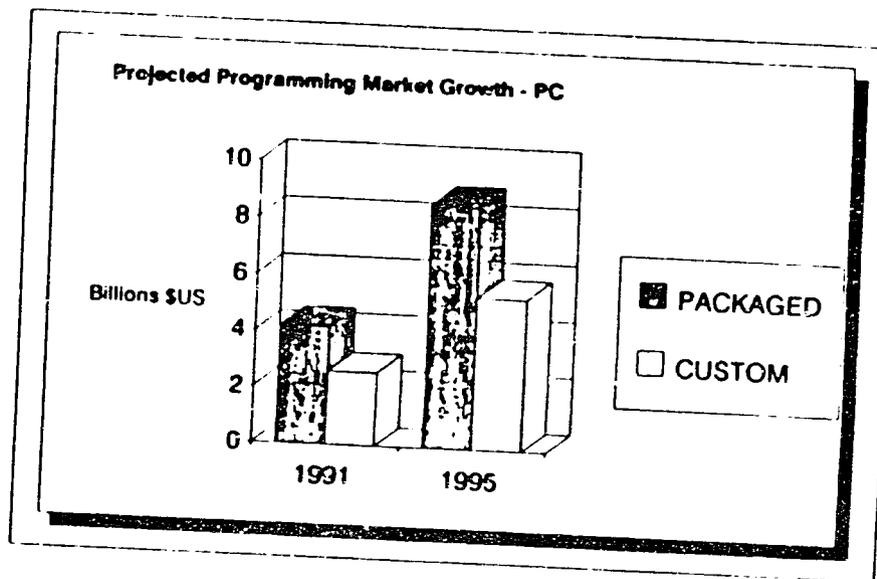
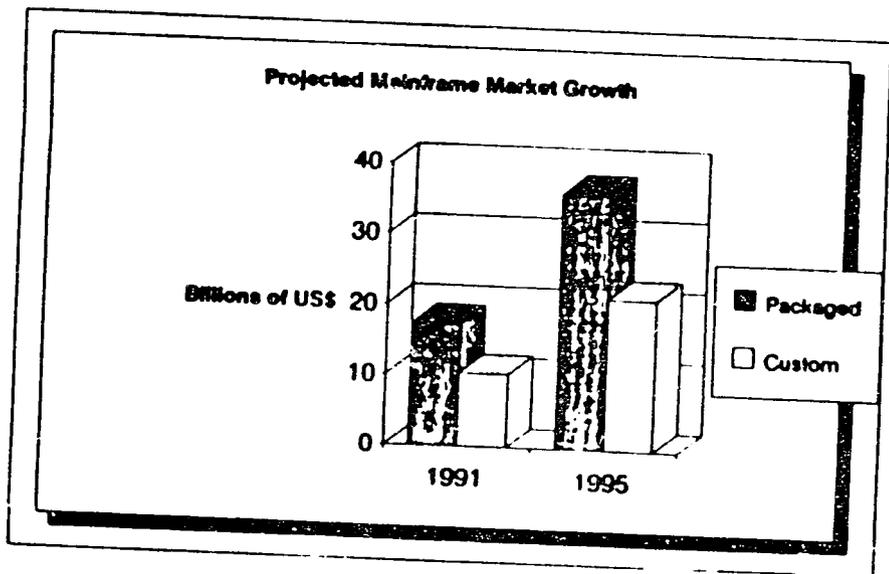
- Development of optimization systems by U.S. railroad companies to increase the efficiency of routing systems, crew scheduling, and freight monitoring.
 - Use of custom programming by the financial services sector to assess financial risks associated with loans and credit cards.
 - CPA firms manage client expense information by providing client with customized software.
 - Banks use customization of software for check cashing services.
- **Applications Software:** accomplishes the users' tasks. Components of the applications software sector and their market size include (millions \$):

RECREATION	262.6
EDUCATION	132.5
PRODUCTIVITY	354.7
LANGUAGES/UTILITIES	119.1
WORD PROCESSING	494.5
SPREADSHEETS	473.0
DATABASES	353.2
INTEGRATED	182.6
GRAPHICS	56.0
DESKTOP PUBLISHING	40.1

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Computer Programming - Market Sectors, Size, and Growth Trends...

THE U.S. SOFTWARE PROGRAMMING INDUSTRY IS THE WORLD LEADER IN SIZE, AND WILL AVERAGE 20% GROWTH PER YEAR THROUGH 1995. THE PROJECTED MARKET BREAKOUT BY SIZE FOR EACH SECTOR IS GIVEN BELOW.



Computer Offshore Programming - First Level Critical Factors...

FIRST LEVEL CRITICAL FACTORS ARE THOSE MARKET FACTORS WHICH DETERMINE WHETHER COMPUTER PROGRAMMING CAN BE OUTSOURCED IN AN OFF-SHORE MANNER. IF THESE FIRST LEVEL CRITICAL FACTORS ARE NOT MET, FURTHER MARKET ANALYSIS OF THESE SECTORS IS IRRELEVANT TO JAMAICA'S OFFSHORE MARKET CAPABILITIES. THE FIRST LEVEL CRITICAL FACTORS FOR THE OFFSHORE PROGRAMMING MARKET INCLUDE THE FOLLOWING:

- **PORTABILITY:** This factor defines whether off-the-shelf software development can be conducted remotely from the user site (i.e. off-shore), and shipped back to the customer at a later time.
- **EASE OF DISTRIBUTION:** This factor defines whether programming function can be divided into independent work segments and easily integrated into a complete system at a later time. Ease of distribution depends to a large extent on the specification of the end-product.

Offshore Computer Programming - Packaged and Customized Software

BOTH THE PACKAGED SOFTWARE AND CUSTOMIZED SOFTWARE MARKET SEGMENTS ARE PORTABLE AND DISTRIBUTABLE. THEREFORE, BOTH SEGMENTS CAN BE SUCCESSFULLY OUTSOURCED IN AN OFFSHORE MANNER TO JAMAICA.

OFF SHORE MARKET SECTORS	PORTABILITY	EASE OF DISTRIBUTION	OFF-SHORE POTENTIAL
PACKAGED SOFTWARE	+	+	YES
CUSTOMIZED SOFTWARE	+	+	YES

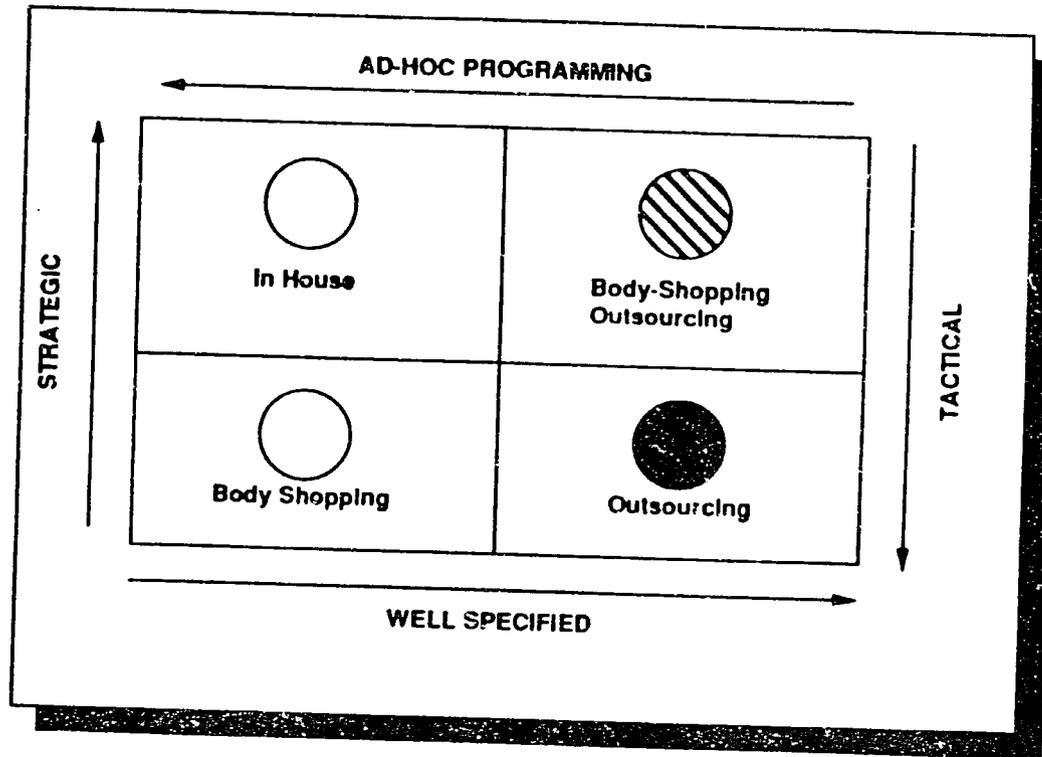
LEGEND :

- +** Passes first level critical factor test
- Fails first level critical factor test
- Potential Market For Jamaica

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Offshore Computer Programming - Strategic Implications for Business...

U.S. COMPANIES ARE MORE LIKELY TO OUTSOURCE THOSE BUSINESS FUNCTIONS THAT REPRESENT MAINTENANCE OR TACTICAL IMPACT ON THEIR COMPANIES. STRATEGIC BUSINESS FUNCTIONS THAT OFFER COMPETITIVE ADVANTAGE ARE MOST LIKELY KEPT IN-HOUSE AND NOT OUTSOURCED DUE TO THEIR SENSITIVE NATURE. IN ADDITION, COMPANIES REALIZE A HIGHER VALUE PER WORKER BY RETAINING THE KNOWLEDGE OF STRATEGIC SYSTEMS IN-HOUSE.



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MARKET REQUIREMENTS ARE THE FACTORS WHICH POTENTIAL OUTSOURCING CLIENTS SEEK WHEN IDENTIFYING AN APPROPRIATE OUTSOURCING LOCATION.

- **Cost:** The customer is usually trying to complete a programming assignment for a lower cost than would could be achieved in-house. For example, the average hourly rate of a U.S. programmer is US \$15 per hour, compared to US \$5 for India.
- **Nature of Work to be Outsourced:** A majority of user panelists surveyed by a computer user's advisory panel say they would outsource basic business operations to a third party, but are apprehensive about outsourcing strategic business applications. (source: Network World, 3/4/91) Outsourcing basic business functions as well as one-time only assignments also frees up in-house staff to focus on strategic applications.
- **Shortage of In-house Skills:** Another primary motivator for outsourcing is a shortage of programming or R&D staff or resources. Outsourcing can be used to complete assignments with a minimum of internal investment.
- **Turnaround Time:** Programming is outsourced when the turnaround time is not immediate. This usually means from 6 month to yearly assignments.

Offshore Programming - Market Requirements, continued...

- **Perception of Quality:** Does the offshore site have an adequate reputation for quality sufficient to satisfy the customer? This is particularly important for programming, due to the exponential costs of fixing a coding error in a system that has been implemented.
- **Training:** The offshore site must have sufficiently trained and experienced personnel sufficient to completing programming assignments. This usually requires, at a minimum, the equivalent of a masters degree in the U.S., and at least 2 years of system specific work experience.
- **Technological Obsolescence:** This involves both hardware and software. An offshore site must be sufficiently invested in the appropriate hardware and software technology to meet the changing demands for the outsourcing market. For example, it is predicted that outsourcing growth in the U.S. health industry will reach 9.8% in 1991 due to the pressures on this industry to keep pace with technology while responding to the U.S. government's cost-cutting pressures. However, it is currently difficult to outsource assignments requiring the OS/2 operating systems due to lack of offshore investment in this system.
- **Need for English as a Language:** Certain industries are disproportionately dependent upon industry-specific jargon, and therefore require programmers who are fluent in English to effectively communicate and implement these special needs. (e.g., the Medical Industry)

Offshore Programming - Competitive Factors...

THE NUMBER OF COMPETITORS FOR THE U.S. OUTSOURCING MARKET WILL GROW THROUGHOUT THE 1990'S AS THE GROWTH IN THE US MARKET WILL ATTRACT NEW ENTRANTS TO THE FIELD. SEVERAL FACTORS DETERMINE THE RELATIVE COMPETITIVENESS OF COUNTRIES COMPETING FOR A SHARE OF THIS MARKET. THESE INCLUDE THE FOLLOWING:

- **Cost:** The overall cost of outsourcing (primarily labor) is the prime competitive factor in offshore programming.
- **Economic Conditions:** Recessionary factors may cause excess supply of programming labor in competing countries. This will put downward pressure on the prices charged by the outsourcers.
- **Language:** Fluency in English can be a competitive advantage for offshore programming sectors due to the requirement for English that some clients have.
- **Training:** A specialized skill set must be developed to attract clients. This includes experience in a specific industry, as well as knowledge of particular systems and software. For example, India, given the size of its trained workforce, has programmers in many different areas.
- **Geographic Proximity:** Travel to and from the offshore programming site must be accessible so the client can maintain control over the project.

Offshore Programming - Competitive Factors, continued...

- **Industrial Base:** A developed manufacturing/electronic base that has a trained workforce.
- **Local Management Pool:** The importance of having trained local management who can provide a cultural understanding, and make operations as efficient as possible in the local environment.
- **Telecommunications Links:** Adequate telecommunications links must be established with the host country and the U.S. to ensure effective communications and data transfer.
- **Reputation:** An established reputation can be a defining factor for a client when choosing an offshore site.
- **International Developmental Funding:** Brings in technical expertise which the host country can later market as its own. Developmental funding also provides structure for foreign investment.
- **Joint Venture/Relationship with U.S. Service Bureau:** A relationship with a U.S. firm will provide a presence in the United States and will help establish a U.S. reputation.

Offshore Programming - Competitor Profile...

MAJOR COMPETITORS TO JAMAICA FOR THE U.S. OFFSHORE PROGRAMMING MARKET ARE INDIA, BRAZIL, THE PHILIPPINES, SINGAPORE, CHINA, BRAZIL, AND IRELAND. INDIA IS THE LARGEST COMPETITOR DUE TO THEIR LARGE MARKET SHARE US\$ 230 MILLION, AND THEIR HISTORY OF OFFSHORE PROGRAMMING.

- **India:**

- Has been in the U.S. outsourcing business since 1970's.
- U.S. market share currently \$230 million, projected at 30-40% growth annually
- 3 large industrial parks in urban areas, with plans to expand to 23 by the year 2000
- Digiports used for programming and data entry
- Training: The average Indian programmer is 29 years old, with a masters and 3-4 years experience
- The Indian workforce is used today by all major computer manufacturers, including DEC, IBM, Intel, etc

- **Brazil, China, Philippines, Singapore, Ireland:**

- These countries are competitors for the offshore programming market.
- However, language is a competitive disadvantage for China, Philippines, Brazil, and Singapore.
- Telecommunications links and geographic proximity are also problems.
- Ireland does not have the language or telecommunications problems, but their labor costs are higher.

Programming - Competitor Profile, continued...

- **Onshore bodyshopping:**

- The trend toward bringing foreign programmers to the U.S. will reduce demand for Jamaican programmers.
- India currently has 20 to 50 thousand bodyshoppers in the U.S.
- Bodyshopping is well suited for well defined products, with product specification times, and turnaround times of six months or longer
- The typical bodyshop arrangement offers a 30-day guarantee, if client is not satisfied no payment is made.
- Costing for bodyshopping is usually done on a fixed cost basis.
- Disadvantages of this option for Jamaica include a drainage of technical expertise, and a hindrance to building homegrown technical infrastructure.
- Savings range from 30-40% for companies who choose bodyshopping
- Bodyshopping is encouraged by countries such as India, China, and Singapore

JAMAICA IS A VIABLE OPTION FOR OFFSHORE PROGRAMMING DUE TO ITS GEOGRAPHIC PROXIMITY, ESTABLISHMENT OF ADEQUATE TELECOMMUNICATIONS LINKS, AND USE OF ENGLISH. ISSUES TO BE ADDRESSED INCLUDE THE FOLLOWING:

- The geographic proximity and excellent telecommunications links may be a competitive advantage over geographically dispersed sites such as Asia.
- Jamaica does not have a history of offshore programming, and does not therefore have a reputation in this area. However, the potential exists for building on the reputation of Jamaica's current offshore outsourcing in other areas such as data entry.
- Jamaica has the competitive advantage of English, which is critical to many industries, including the medical and health industries.
- The custom programming and strategic applications are usually not well defined and usually require a much faster turnaround time. These assignments are usually completed on-site at the U.S. location.
- A better market for Jamaica to pursue is the prepackaged software market. The prepackaged software market is more well defined, and exact specifications are provided with an assignment. Hence, the work is both portable and distributable.

REGULATORY TRENDS ARE ONE OF THE MAIN TRENDS LIKELY TO IMPACT THE JAMAICAN OFF-SHORE PROGRAMMING MARKET. THE MOST IMMEDIATE TREND WITH RESPECT TO PROGRAMMING IN DEVELOPING COUNTRIES IS LIKELY TO BE INTELLECTUAL PROPERTY RIGHTS. THIS AREA IS OF GREAT CONCERN TO THE U.S. AS WELL AS THE EEC MANUFACTURERS:

- Restrictions are likely to reduce India, Brazil, and China's easy access to the U.S. market place.
- This restriction will place Jamaica in a stronger competitive position. Specifically, through the use of CBI or future free trade arrangements with the U.S., Jamaica will be able to forge strategic alliances with computer manufacturers in the pre-packaged market.
- The Mexico Free Trade Agreement may attract some of Jamaica's potential clients. However, in the longer-term Jamaica will preserve its relative competitive position due to language and strong information processing, and telecommunications infrastructure.

TECHNOLOGY TRENDS WILL ALSO IMPACT THE JAMAICAN OFF-SHORE MARKET.

- Standardization of software (i.e., fourth generation languages, Windows, OS/2, etc.) will make programming in different operating systems and hardware platform environments less cumbersome. Hence, by developing a trained labor force, Jamaica will be able to reach a large segment of the programming market without the need for extensive re-training.
- Improved cost/performance of systems will enable Jamaica to invest in state-of-the-art systems for training and development in industrial parks.

THE HEALTHY GROWTH OF THE U.S. INFORMATION PROCESSING MARKET WILL CONTINUE TO PROVIDE NEW OPPORTUNITIES FOR JAMAICA

- There is a shortage of experienced programmers in the U.S. Hence, the idea of outsourcing programming to off-shore locations is more acceptable to customers. This trend is evident by the increased reliance on Indian (and other) nationals in the U.S. for programming systems.
- The declining quality of U.S. educated entry level programmers will also place an upward push on the demand for outsourcing.

Offshore Programming - Next Steps for Jamaica...

THERE ARE A NUMBER OF STEPS THAT SHOULD BE PURSUED TO FURTHER EXPAND JAMAICA'S MARKET SHARE OF THE U.S. OFFSHORE PROGRAMMING MARKET. THESE STEPS WILL BE EXPANDED UPON AS THE STUDY OF JAMAICA'S CURRENT CAPABILITIES IS COMPLETED. THIS WILL BE DONE IN TASKS 2 AND 3 OF THIS ASSIGNMENT.

- **Attract International Funding:** Pursue international funding for projects (e.g., from the World Bank, U.S. Agency for International Development, subsidized technical assistance programs from the U.S.) to increase internal training and thus build Jamaica's internal technical infrastructure. This will increase marketability of Jamaica, and thus increase the country's value as an offshore programming site.
- **Build Industry Specific Expertise:** Specifically target those industries whose critical requirements match Jamaica's competitive advantages. For example, target industries with a requirement for English and geographic proximity which develop large, prepackaged applications. Two good options are the financial services and the health care industries.
- **Avoid Exporting Programmers:** In general, the exporting of Jamaican programmers to the U.S. will represent a brain drain of technical talent. Jamaica should focus on attracting foreign investment as a way of building infrastructure.
- **Target Well-Defined Projects:** Prepackaged programs and applications are the best target market for Jamaica. Prepackage segments are well defined, have longer turnaround times, are portable, and can be distributed for assembly at a later date.

Presented to:

JAMPRO

A PROFILE OF THE DATA ENTRY MARKET

DELIVERABLE 5

November 1991

Prepared By:

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intex 

Data Entry - Deliverable 6

Information Processing Market Segment Study

This report was prepared by Intex to primarily address the issues of Tasks 1, and also analyze the main objectives of Tasks 2, and 3 of the information processing industry segment study. This is the last of a six series market overviews and analysis prepared for JAMPRO. This report examines the entire data entry market, but specifically targets the key entry segment. The other major segments of the information processing market -- CAD/CAM, document imaging, GIS, off-shore programming, and telemarketing -- are each described in detail in separate documents. In addition to evaluating the current state of the data entry market in the U.S. and describing the trends and estimating market growth projections, this report contains an elaborate set of case studies illustrating the dynamics of the information processing market, especially as they pertain to Jamaica's competitive position in this area.

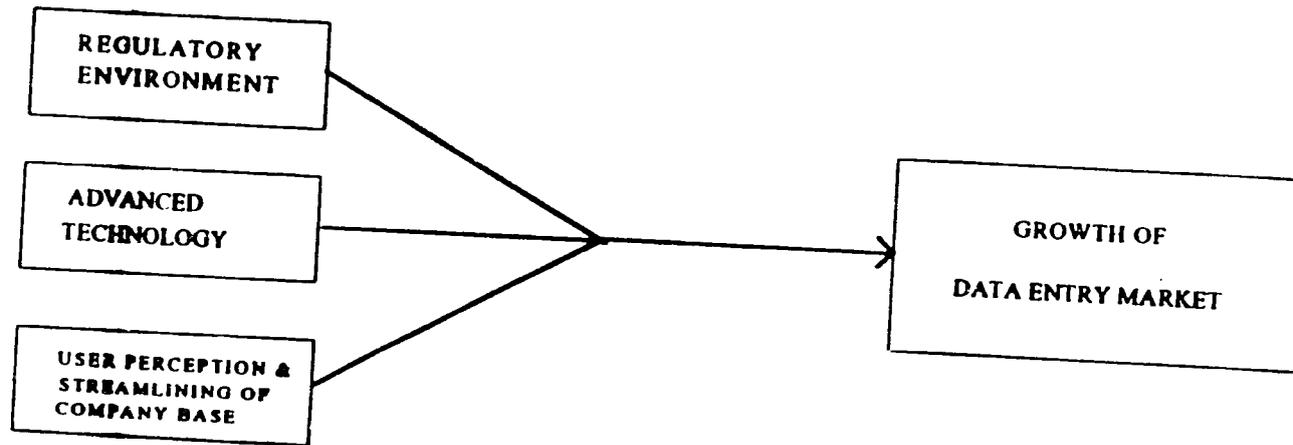
DATA ENTRY OVERVIEW...

DATA ENTRY IS THE PROCESS OF INFORMATION CAPTURE BY KEYING OR TYPING DATA INTO A COMPUTERIZED SYSTEM. IT IS AN ESSENTIAL STEP IN STORING AND PROCESSING INFORMATION, WHICH IS NORMALLY WRITTEN OR PRODUCED ON PAPER FORM.

- The first step in data entry is to key in, scan, or digitize information into computer readable files. These files are then stored in a database for further manipulation.
- Next, information is reviewed by the system, or an operator, for accuracy. Information is then indexed and arranged in a database for permanent storage as computer data and files. Computer files are stored on hard disk, tape, diskette, or optical disks.
- Finally, data is transferred either electronically to another computer system through telecommunication lines or physically transported for later upload by air freight or courier.

DATA ENTRY DRIVERS...

THE MAJOR DRIVERS FOR GROWTH OF THE DATA ENTRY MARKET ARE THE REGULATORY ENVIRONMENT, ADVANCES IN TECHNOLOGY, USER PERCEPTION AND THE STREAMLINING OF COMPANY BASE.



THESE MARKET DRIVERS WILL BE DISCUSSED IN GREATER DETAIL ON THE FOLLOWING PAGES.

DATA ENTRY DRIVERS...REGULATORY ENVIRONMENT...

IN MOST COUNTRIES, THE REGULATORY ENVIRONMENT IMPOSES SPECIFIC REQUIREMENTS FOR RETENTION, DISTRIBUTION AND ACCESS TO CERTAIN DOCUMENTS BASED ON THE PARTICULAR INDUSTRY AND SENSITIVITY OF INFORMATION.

Regulatory requirements for some of the main industries are as follows:

FINANCIAL SERVICES INDUSTRY - The retention period for most financial statements and ledgers for national and multinational corporations is from five to seven years.

- Balance sheet
- Income statement
- Monthly and daily ledgers
- Expense reports
- Budgeting statements

LAW FIRMS - All legal material is stored and/or published based on the validity and implications of a particular trial or settlement, usually within a year or less.

- Depositions
- Legal briefs
- Citations
- Case work

GOVERNMENT AGENCIES - Government agencies are under legal obligation to retain confidential data for purposes of national security and often time limits are boundless.

- Federal Bureau of Investigation
- Central Intelligence Agency
- Supreme Court
- Environmental Protection Agency

DATA ENTRY DRIVERS...ADVANCES IN TECHNOLOGY...

ADVANCES IN COMPUTER SYSTEMS AND PERIPHERAL EQUIPMENT HAS MADE DATA ENTRY MORE COST EFFECTIVE AND RELIABLE. IT HAS ALSO IMPROVED DATA CAPTURE INTEGRITY AND ACCURACY. FOR MANY USERS, SUCH TECHNOLOGY ADVANCES HAVE MADE DATA ENTRY PROFITABLE.

- **PROLIFERATION OF PERIPHERAL EQUIPMENT** - The introduction of innovative equipment (ie., Optical Character Recognition (OCR), Bar Code Readers, Voice Recognition) has decreased turnaround time and increased productivity.
- **LOWER TECHNICAL COSTS** - Increase in telecommunications efficiency and advanced productivity and error detection technology (ie., DEPERS -- a data entry software monitoring system) has decreased the cost/benefit ratio of data entry operations.
- **INCREASING DEMAND FOR TIMELY INFORMATION** - Many companies rely on on-line services (ie., LEXIS, NEXIS) and large automated libraries (ie., CD-ROM) to access strategic information. Hence, they have adopted new office automation technologies (ie., imaging, GIS, etc.) and are willing to pay for information capture.

DATA ENTRY DRIVERS...USER PERCEPTION AND STREAMLINING OF COMPANY BASE...

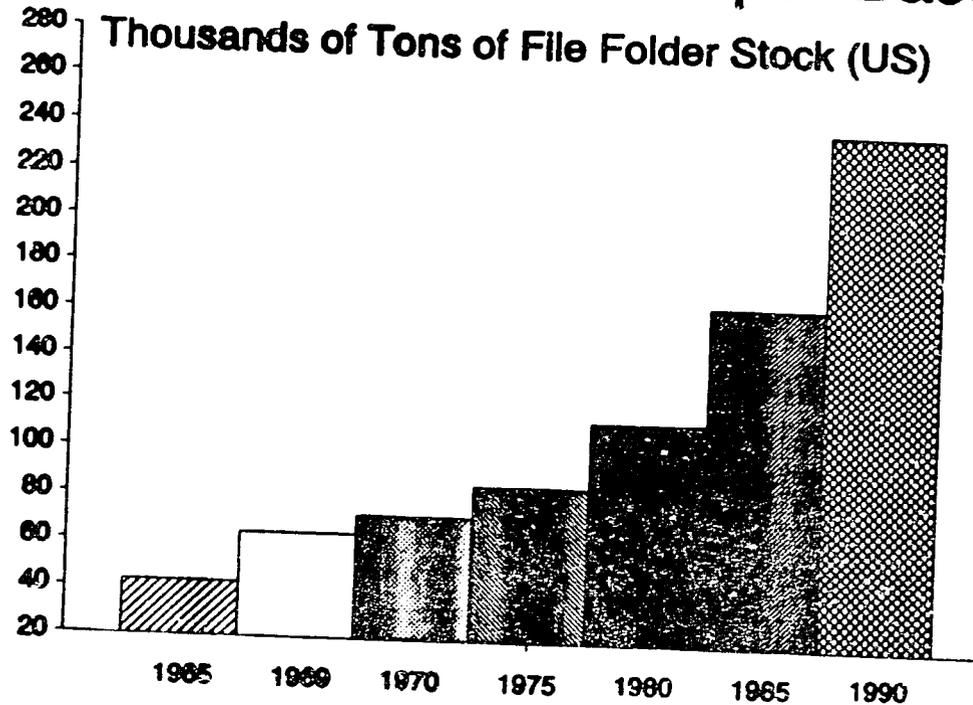
THE INEFFICIENCY OF IN-HOUSE INFORMATION PROCESSING AND HIGH STORAGE COSTS OF HARDCOPY DOCUMENTS HAVE RESULTED IN A MORE FAVORABLE USER PERCEPTION OF SERVICE BUREAUS AND A GREATER USE OF THEIR DATA ENTRY SERVICES.

- **THE HIGH COSTS OF IN-HOUSE DATA ENTRY** - The cost of maintaining and upkeeping a workable data entry system, as well as a qualified staff to operate and service the equipment, can be an unnecessary financial and managerial burden. Therefore, firms often prefer to contract large, one-time projects to data entry service bureaus. This is what is commonly referred to as off-site data entry.
- **STORAGE COSTS** - High costs of storage have forced many firms to convert their documents into computerized format. This is specifically pronounced where office space is expensive (ie., New York, Washington, D.C., Los Angeles). Hence, many of these firms use offsite data entry facilities to complete the conversion of archival material.
- **STREAMLINING OF COMPANY BASE** - Today's companies are focusing on their principal line of business to achieve their objective. Consequently, they are cutting overhead and subcontracting out many unrelated activities, such as key entry personnel, information processing, postal services and security staff. This is even more pronounced now with the ensuing recession in the U.S.

DATA ENTRY...GROWTH OF PAPER...

AN ESTIMATED 324 BILLION PAGES OF PAPER CURRENTLY EXIST IN U.S OFFICES – GROWING AT A RATE OF 22% ANNUALLY.

The Accelerating Growth of Paper-Based Filing



DATA ENTRY CUSTOMERS...OVERVIEW...

DATA ENTRY'S USAGE ACROSS ALL INDUSTRIES IS STEADILY EXPANDING. A VARIED ARRAY OF INDUSTRY SEGMENTS ARE CURRENTLY COMMITTED TO CONVERTING HARD-COPY INFORMATION INTO COMPUTERIZED FORMATS TO STREAMLINE THESE PAPER INTENSIVE OPERATIONS.

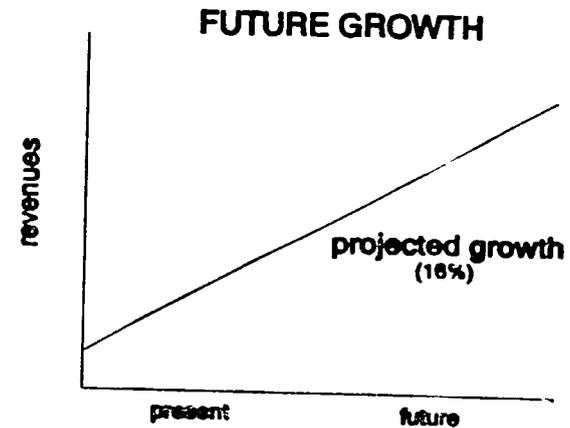
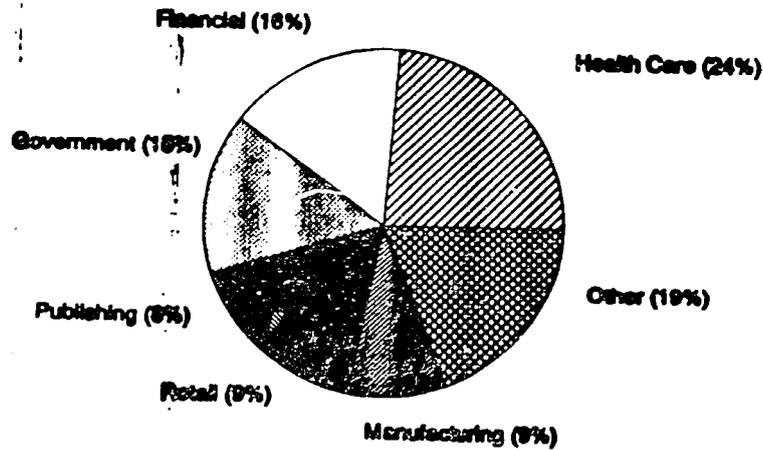
Users of data entry services are:

- Financial Services
- Manufacturing
- Health Care
- Government
- Publishing
- Retail

DATA ENTRY MARKET...

THE TOTAL REVENUES OF THE DATA PROCESSING MARKET IS ESTIMATED TO BE OVER \$31.2 BILLION. DATA ENTRY REPRESENTS 20% OF THIS MARKET, ESTIMATED AT \$624 MILLION. THE DATA ENTRY MARKET IS GROWING AT AN APPROXIMATE RATE OF 16% ANNUALLY.

TOTAL REVENUES FOR DATA ENTRY MARKET



DATA ENTRY MARKET...IN-HOUSE VS. OFFSITE SELECTION..

TURN-AROUND TIME, ACCURACY AND INFORMATION SECURITY STILL COMPEL MANY OF THE USER SEGMENTS TO PERFORM DATA ENTRY IN-HOUSE. COST PRESSURES AND OVERALL DIFFICULTIES OF SETTING UP IN-HOUSE OPERATIONS HAVE DRIVEN OTHERS TO CONTRACT OUT TO OFF-SITE SERVICE BUREAUS.

The characteristics of the overall market segment demand for offsite data entry:

- **FINANCIAL SERVICES** - Currently has a low reliance on offsite data entry operations. This is due to quality control standards, confidentiality, and the use of specialized in-house systems.
- **MANUFACTURING** - Currently has a high reliance on off-site data entry. This is due to a need for low cost information processing.
- **HEALTH CARE** - Currently has a medium to high reliance on off-site data entry. This is due to the need to effectively reduce the high volume of paper work involved with the industry.
- **GOVERNMENT** - Currently has a medium reliance on off-site data entry. This is due in part to government regulations restricting certain information from being outsourced and in part to decreasing government expenditures.
- **PUBLISHING** - Currently has a very high reliance on off-site data entry. This is due to more of an emphasis on cost-effective operations, rather than a quick turn-around time.
- **RETAIL** - Currently has a medium to low reliance on off-site data entry. This is mainly due to the relatively low volume of paper work generated and the lack of urgency for immediate information results (ie. billing, ordering, inventory).

IN-HOUSE VS. OFFSITE SELECTION

SEGMENTS:	IN-HOUSE vs. OFFSITE
Financial Services	
Manufacturing	
Health Care	
Government	
Publishing	
Retail	

 OFFSITE
IN-HOUSE

DATA ENTRY...SAMPLE OF IN-HOUSE USERS...

A NUMBER OF LARGE ORGANIZATIONS CHOOSE TO COMPLETE THEIR DATA ENTRY IN-HOUSE. THESE FIRMS ALREADY HAVE A SUBSTANTIAL INVESTMENT IN THEIR COMPUTER SYSTEMS.

A sample of firms using in-house data entry facilities are:

- New York Life Insurance Company
- The Chase Manhattan Corporation
- McGraw Hill Information Services
- Bureau of the Census
- Cigna Corporation (financial services)
- Mead Data Central (publishing)
- Information Access Corporation (publishing)
- WESTLAW Incorporated (publishing)
- Massachusetts Mutual Life Insurance Company
- Kennedy Space Center
- IBM

DATA ENTRY...SAMPLE OF OFFSITE USERS...

IN ADDITION TO THE COMPANIES WHO OPERATE THEIR OWN IN-HOUSE DATA ENTRY OPERATIONS, OTHERS FIND IT COST BENEFICIAL TO EMPLOY OFFSITE OPERATIONS TO FULFILL THEIR DATA ENTRY NEEDS.

A sample of firms using off-site data entry facilities are:

- DIALOG (financial services)
- BRS (financial services)
- Mead Data Central (publishing)
- Knight-Ridder (publishing)
- McGraw Hill Publishing Company
- American Airlines
- NPD/Nielson Inc. (research/publishing)
- Texas Instruments Inc.
- Digital Inc. (computer software company)
- GDP Business Data Services Ltd.

DATA ENTRY...SAMPLE OF MAJOR PROVIDERS...

THE LARGE DEMAND FOR OFF-SITE DATA ENTRY SERVICES IS MET BY OVER 700 COMPANIES WORLDWIDE, WHO OPERATE DATA ENTRY FACILITIES.

A sample of firms operating data entry facilities are:

Caribbean Data Services, *Barbados*

Societe Informatique, S.A., *Haiti*

SAZTEC International, *USA*

Alpha-Beta Data Services, *USA*

Mayfield Technology, *Ireland*

Technology Service Corp., *China*

Analasis, S.A., *Dominican Republic*

Computasia, Ltd., *Hong Kong*

Dataread International, *Philippines*

Servicios de Tecnologia y Teleproceso, *Mexico*

Etagro Computer, *Thailand*

Nevis Offshore Data Services, Inc., *Nevis Island*

T. A. Computer Services, *Zimbabwe*

Business Data Services, LTD., *Canada*

DATA ENTRY...MARKET SEGMENTATION...

THE DATA ENTRY MARKET IS SEGMENTED PRIMARILY BY TURN-AROUND TIME AND SECONDARILY BY NUMBER OF KEY STROKES PER PAGE.

**Market Segmentation:
Information Processing Industry**

**Minor Segmentation:
of keystrokes per page**

500+	Highest Rates per Page	Moderate Rates per page	Lowest Rates per page
100	Pricing also based on number of keystrokes per page	Diminishing price differential based on number of keystrokes per page	No distinction in keystroke: per page
50-80		Legibility and complexity of the documents important	

Fast: 1-2 days

Medium: 2-10 days

Long: 10+ days

Major Segmentation: Turn Around Time

Presented to:

JAMPRO

A PROFILE OF THE DATA ENTRY MARKET

DELIVERABLE 5

November 1991

Prepared By:

**International Technology Exchange Group
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intex 

DATA ENTRY...ANALYSIS OF FIRST LEVEL CRITICAL FACTORS...

FIRST LEVEL CRITICAL MARKET FACTORS ARE THOSE FACTORS THAT DETERMINE WHETHER A PARTICULAR SERVICE CAN BE EXPORTED IN AN OFFSHORE MANNER. THOSE SERVICES WHICH MEET THE FIRST-LEVEL CRITICAL FACTORS WILL BE EXAMINED IN MORE DETAIL AS A TARGET MARKET FOR JAMAICA.

In the case of the data entry market, first level factors are:

- **PORTABILITY:** Services which can be completed away from the user site.
- **EASE OF DISTRIBUTION:** Services which can be divided into independent work segments, completed in Jamaica, and later integrated with the rest of the system, without causing disruptions to customer activities.

DATA ENTRY...ANALYSIS OF FIRST LEVEL CRITICAL FACTORS...

OUR FIRST LEVEL CRITICAL FACTORS INDICATES THAT DATA ENTRY IS A SUITABLE MARKET FOR JAMAICA.

PORTABILITY TEST:

- Data entry can be completed remotely from the user site and later integrated into the system at the client's site in the U.S.
- Data entry requires no on-site client presence.

EASE OF DISTRIBUTION:

- Data entry is an independent work segment. The information entered by the data entry operators can be easily uploaded into the host system at the clients site on a later date.
- Data entry can be broken down into distinct functions and easily treated as distributed tasks.

DATA ENTRY...FIRST LEVEL CRITICAL FACTORS...

DATA ENTRY SERVICE MARKET SECTORS BY SELECTED TURNAROUND TIMES

<i>Data Entry Service Market Sectors</i>	<i>Portability</i>	<i>Ease of Distribution</i>	<i>Off-Shore Potential</i>
<i>1-2 Days Turn Around Time</i>	+	+	YES
<i>3-10 Days Turn Around Time</i>	+	+	YES
<i>10+ Days Turn Around Time</i>	+	+	YES

DATA ENTRY LABOR COSTS...

JAMAICA EXCELS AS A CHOICE FOR DATA ENTRY OPERATIONS SINCE IT HAS COMPETITIVE LABOR COSTS AND AN ENGLISH SPEAKING WORKFORCE.

In general, since labor costs represents up to 80 percent of the total data processing budget, there is a trend towards moving to offshore operations.

A Comparison of International Data Entry Costs are as follows:

<u>Country/region</u>	<u>Price per 1,000 verified keystrokes (US\$)</u>
Caribbean (ie.,Jamaica & Puerto Rico)	\$.80-1.75
China	\$.90-1.25
Europe (ie.,Ireland & U.K.)	\$1.60-2.00
USA/Canada	\$1.50-3.50
Philippines	\$.90-1.25
Japan	\$1.50-3.50

SOURCE: Business Review

DATA ENTRY MARKET...CONCERNS...

DESPITE THESE STRENGTHS, JAMAICA'S PRESENCE IN THE DATA ENTRY MARKET HAS BEEN RATHER MODEST. EXISTING RELATIONSHIPS WITH U.S. FIRMS, APPREHENSION ABOUT LOSS OF QUALITY CONTROL AND LABOR UNION CONCERNS CAUSE MANY U.S. USERS OF DATA ENTRY SERVICE FIRMS TO RECONSIDER OFFSHORE OPTIONS.

Major concerns of U.S. firms interviewed include:

- Established long-term relationships with their clients in the U.S.
- Some firms believe that outsourcing to a European or Asian data entry firm, as opposed to ones in Jamaica, may serve as a foothold in those regions where protectionism is a problem or may be a problem in the future.
- Overseas companies can transfer data to U.S. mainframe computers at night to minimize computer idle time. Jamaica is in the same time zone and may not be able to take advantage of this factor easily.
- The misperception of political instability in Caribbean countries still lingers in the minds of some North American firms.
- Some legal and publishing firms stated that outside contractors could not meet their demands for currency and accuracy. Hence, they do not have confidence in outside, and in particular off-shore, data entry services.
- Some of the U.S. firms limit their off-shore contracts to avoid conflicts arising over union concerns for American jobs lost to overseas companies.

JAMAICA HAS THREE DISTINCT ADVANTAGES COMPARED TO ITS NEAREST COMPETITORS.

■ **High Accuracy and Quality:**

- Due to the strong relationship between level of education and quality of work, the large pools of educated, english speaking workers are well suited for the US market.
- Jamaica has a relatively lower employee turnover.

■ **High Reliance on Transportation:**

- Jamaica is well equipped with Digiports and Fiber Cable Links to the US.
- The Jamaican Telephone company is rapidly updating the infrastructure (e.g. introduction of digital switches).
- Jamaica enjoys a lower cost of courier and air-freight shipments compared to European and Asian competitors.

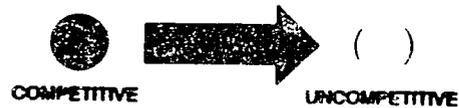
■ **Labor Intensive:**

- Due to the recent currency devaluation, Jamaica has one of the cheapest labor rates of countries that are geographically close to the US.
- Jamaica also enjoys relatively low operation set-up costs..
- Jamaica is not limited by regulations, such as limiting the number of hours a worker can spend in front of a video display terminal.

DATA ENTRY...SECOND LEVEL CRITICAL FACTORS

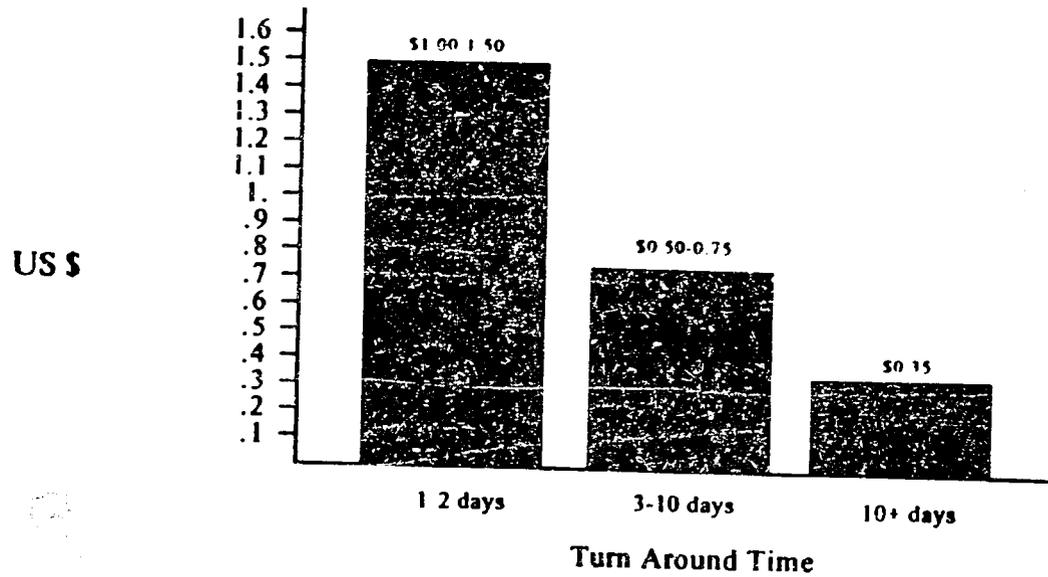
THE JAMAICAN DATA ENTRY MARKET APPEARS TO BE IN A VERY FAVORABLE POSITION COMPARED TO OTHER COMPETING COUNTRIES.

INDUSTRY REQTS. & CHARACTERISTICS	Jamaica	Mexico	India	Puerto Rico	U.S.	Philippines
High Accuracy & Quality						
High Reliance on Transport						
Labor Costs						
TOTAL						



TYPICAL RATES CHARGED PER 1000 KEYSTROKES FOR THE THREE SEGMENTS SHOW THAT THE 1-2 DAY TURN-AROUND SEGMENT COMMANDS THE HIGHEST PREMIUM.

Typical Rates Charged Per 1000 Keystrokes



DATA ENTRY...MARKET SEGMENTATION ANALYSIS...

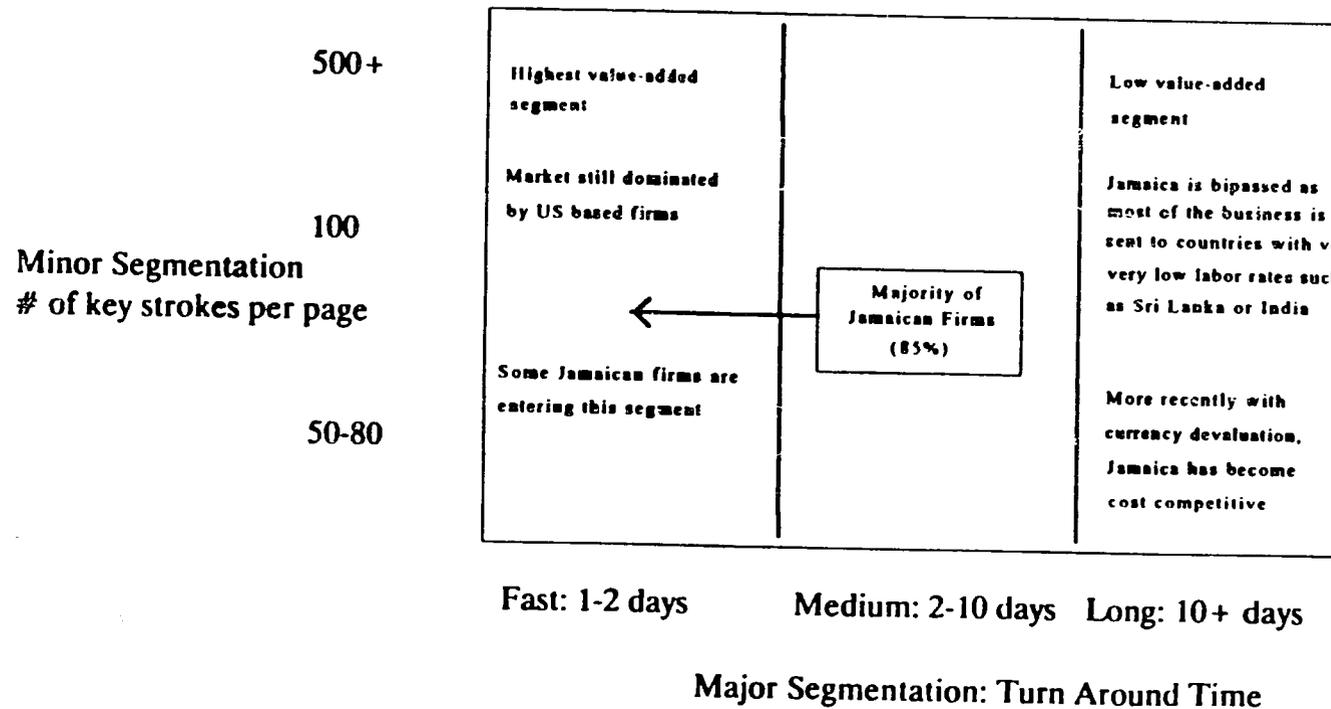
THE RATE DIFFERENTIAL IS MOSTLY DRIVEN BY THE COST OF TRANSPORT OF RAW DATA.

TURN AROUND TIME

	<u>1-2 DAYS</u>	<u>3-10 DAYS</u>	<u>10+ DAYS</u>
TYPICAL PRICES FOR 1000 KEY STROKES	\$1.00	\$0.50	\$0.35
TRANSPORT METHOD	FAX TRANSMISSION	COURIER/MODEM TRANSMISSION	MAIL
DEPENDENCY ON TELECOMMUNICATIONS	HIGH	MODERATE	LOW
TYPICAL USE OF TELECOMMUNICATIONS	HIGH SPEED DATA LINES	VOICE GRADE MODEM LINKS	VOICE LINES
COST OF TRANSPORT PER 1000 PAGES	\$ 16.60	\$ 9.00	\$ 2.00

DATA ENTRY...MARKET SEGMENTATION ANALYSIS...

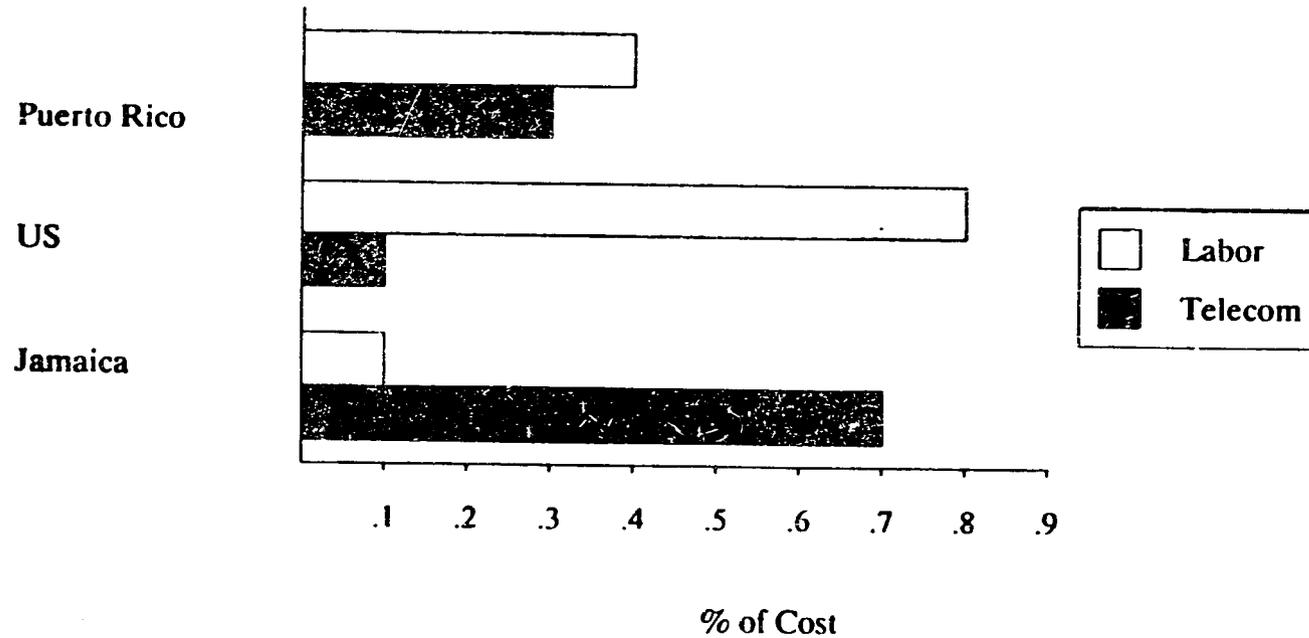
JAMAICAN FIRMS HAVE HISTORICALLY BEEN ACTIVE IN THE 3 TO 10 DAY TURN-AROUND MARKET, YET IT IS BECOMING INCREASINGLY BENEFICIAL TO ENTER THE MORE LUCRATIVE 1 TO 2 DAY TURN-AROUND MARKET.



DATA ENTRY...ANALYSIS OF TELECOMMUNICATIONS COSTS...

HOWEVER, IN THE 1-2 DAY TURN-AROUND SEGMENT, JAMAICA'S COMPETITIVE POSITIONING IS ERODED BY RELATIVELY HIGH TELECOMMUNICATIONS RATES.

- Using 1000 key strokes as a basic unit of measure, a breakdown in variable costs shows that Jamaica's low cost of labor is offset by high telecommunication costs.



DATA ENTRY...MARKET POSITION...

IT IS BECOMING EXCEEDINGLY IMPORTANT TO IDENTIFY FACTORS WHICH MAY AFFECT JAMAICA'S FUTURE POSITION.

These factors include:

■ **Technological Advances**

■ **Telecommunication Improvements**

■ **Economic Influences**

These will be discussed further on the following pages.

DATA ENTRY...NEW COMPETITION...

TECHNOLOGICAL ADVANCES, LOWER TELECOMMUNICATIONS COSTS AND A NEW EMPHASIS ON TECHNOLOGY TRANSFER IN MANY REGIONS WILL INCREASE THE NUMBER OF QUALIFIED COMPETITORS IN THE DATA PROCESSING AND DATA ENTRY MARKETS.

- Technological advances will tend to reduce the advantage of lower labor costs for Jamaica. This will, consequently, give U.S. service bureaus the ability to compete more aggressively.

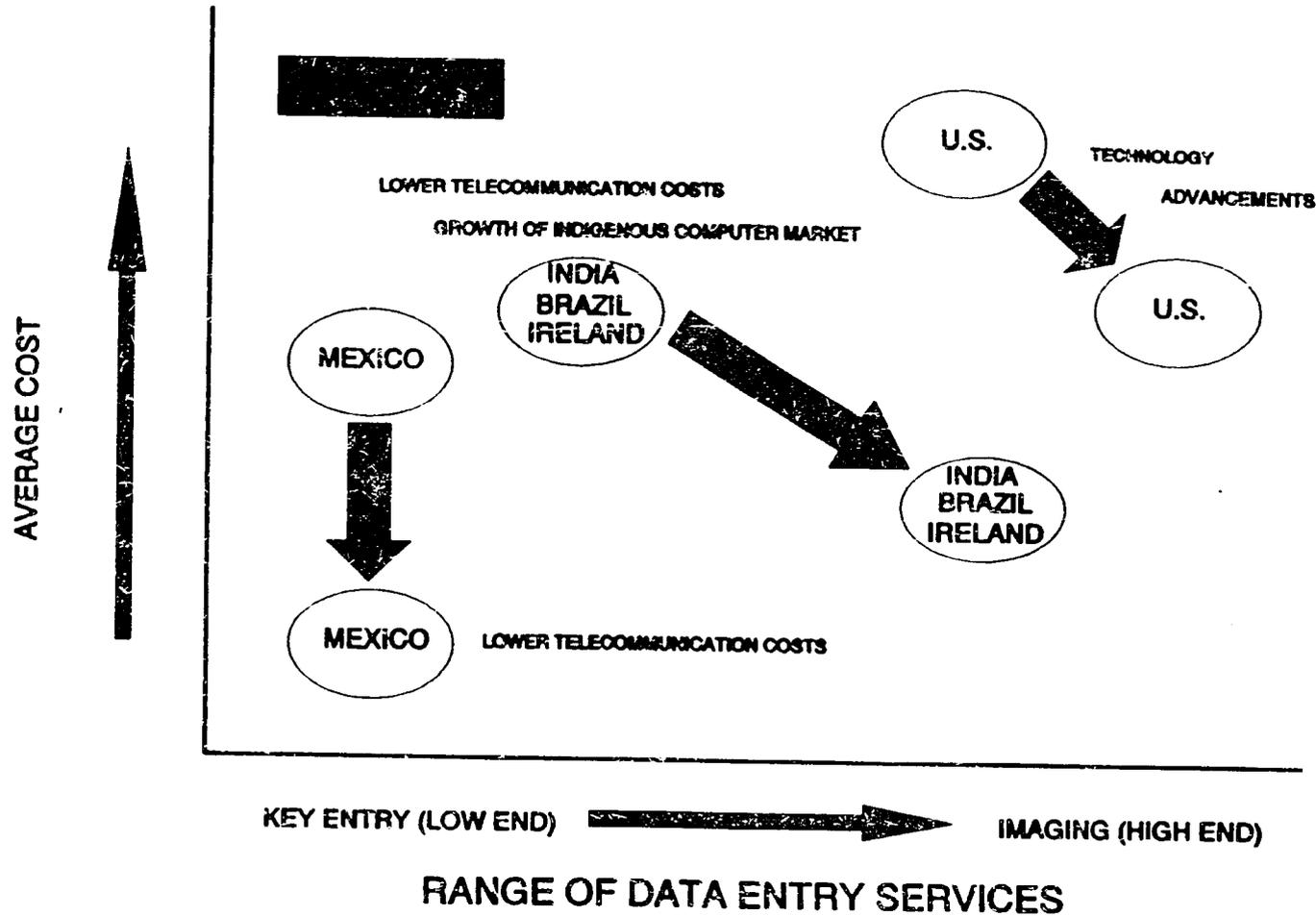
These include:

- OCR (Optical Character Recognition)
 - VDE (Voice Data Entry)
 - IFP (Intelligent Forms Processing)
 - BCS (Bar Code Systems)
 - OLTP (Online Transaction Processing)
 - EDI (Electronic Data Interchange)
 - Advanced Technology Compression Schemes
- Lower telecommunications costs are a catalyst for many technologically advanced countries (i.e. India, Brazil, and Ireland) to increase their access to the North American markets. In addition, they have a trained, low cost labor pool which is already serving their indigenous computer manufacturing and data processing markets. Hence, data entry firms are able to sustain their operations during business downturns in the North American market by relying on their own national industries.
 - Other developing nations, such as China, Mexico, Puerto Rico, as well as Latin American countries, have established aggressive technology transfer programs and telecommunications restructuring projects (i.e., digital networks, teleports, private networks, VSAT installations, etc.). Hence, they are likely to become a more significant player in the information processing market.

The case studies provided at the end of this report illustrate some of these points.

DATA ENTRY MARKET TRENDS...

LIKELY TRENDS IN THE DATA ENTRY MARKET



Data Entry Market Trends...The Changing North American Market

THE PATTERN OF INFORMATION PROCESSING USAGE AND THE OVERALL NATURE OF MANAGEMENT OF INFORMATION SYSTEMS WITHIN LARGE INSTITUTIONS AND FIRMS HAS BEEN CHANGING IN THE PAST FEW YEARS. SUCCESSFUL DATA ENTRY FIRMS HAVE ADAPTED TO THE SHIFTS IN THE MARKET PLACE.

- **Applications of Advanced Office Automation Technologies** – A larger number of firms, who were considered as traditional in their data processing usage, are employing advanced technologies to shift and expand their strategic business directions, i.e., banks, insurance firms, government offices, financial institutions, etc. Hence, their data entry requirements have evolved from simple key entry to sophisticated information capture and verification processes.

- **Streamlining Business Operations** – Many large firms have also opted to subcontract their entire data processing operations to system integrator and vendors, such as IBM, DEC, UNISYS, CSC, COMDISCO, and other computer leasing/manufacturing firms. Hence, they have also transferred the responsibility of data entry contracting to these vendors.

- **Forming Strategic Partnerships** – Most of the hardware and component manufacturers are establishing their own data entry centers or entering into joint-ventures with service bureaus to promote their own product line and services, i.e., scanner/copier vendors are getting into the conversion business, DEC and IBM are forming partnerships with select few system integrator to handle the conversion needs of their clients.

DATA ENTRY...RECOMMENDATIONS...

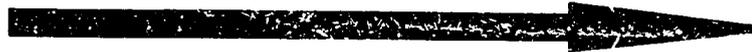
THE JAMAICAN DATA ENTRY FIRMS ALSO NEED TO ALIGN THEIR OPERATIONS WITH THE CHANGES IN THE U.S. DATA ENTRY MARKET. JAMAICA ALREADY ENJOYS A POSITIVE REPUTATION IN INFORMATION PROCESSING. PRO-ACTIVE AND SUSTAINED MARKETING WILL STRENGTHEN THIS REPUTATION, I.E., DEVELOP A "BRAND-NAME" RECOGNITION FOR JAMAICA.

- The viability and success of Jamaica's data entry market depends on several major factors:
 - Quality of service provided by the sector.
 - Improved training to retain a qualified labor pool.
 - Active vendor marketing in the U.S.
 - Use of appropriate state-of-the-art technology.
 - Efficient management of operations.
- Jamaican firms should continue their expansion in the higher-end data entry services, i.e., imaging, GIS, and CAD/CAM. Key entry alone will not be sufficient for many of the clients in the U.S.
- Jamaican firms should aggressively pursue new long-term partnerships with system integrators, computer manufacturers, and project management firms in the U.S.
- Local Jamaican operations must make sure to retain a track record and sound business/financial support to instill confidence and stability for large clients. Labor cost alone, will not be the critical success factor
- Pro-active, high quality, and strategic marketing, via system integrator and technology firms, must be directed at large data processing users, i.e., insurance firms, oil companies, the Department of Defense, manufacturing firms, etc. Such marketing must be well planned and organized to overcome possible client apprehensions and competition from other off-shore services.

DATA ENTRY...RECOMMENDATIONS...

THE FOLLOWING CHANGES WILL STRENGTHEN THE DATA ENTRY INDUSTRY IN JAMAICA

Reliance on labor cost alone



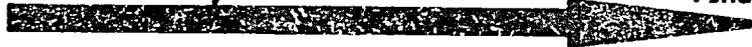
Migrates to niche, high-end, services

Traditional small scale marketing for key-entry services



Strategic marketing for high-end services

Marketing to end-users only



Vendors and sys. integrators alliances

Small scale operations



Efficient production-type operations

A GREAT DEAL OF ATTENTION IS RECENTLY BEING GIVEN TO DATA ENTRY AND ITS RELATED MARKETS.

- "Data capture" is the labor-intensive side of computer work. It is today's high-technology typing pool, and it is expensive to do in the industrialized, high wage cost countries that need it most. Like labor-intensive manufacturing, data entry has moved offshore. In Asia's more developed countries, it is difficult to find people to do such mundane tasks as basic data entry. In addition, like low-cost manufacturing, data entry is always looking for new, cheaper locations. At the very low end of the business, data entry centers can find that demand for their services is infinite, but the same is not true of the high end of the business: software work. One computer company taking advantage of offshore software work is Digital, which has much of its software written in India. This type of work requires workers with much greater skills than those necessary for basic data entry. Software is fast becoming the real field of battle for computer companies.¹

- With the new technologies of the satellite and the microchip, entire office functions can now be performed in foreign markets. For the North American client, offshore bureaus are the solution to getting less urgent volume work done at the lowest cost and with the most efficiency. Timothy Greener, president of BDP Business Data Services Ltd. pays his Canadian data entry operators a base wage of C\$7 to C\$10 an hour. Comparable workers in India are paid 80c an hour, 59c in the Dominican Republic, and 93c an hour in Jamaica. In this wage difference lies the potential for important increases in profit margin. Greener has tried going offshore, but his company does not have enough volume to make it work to his economic advantage. Even if the price is right, he has two major concerns -- political instability and questionable business ethics abroad. A few offshore companies that began with data processing are now getting backing from US and Japanese interests to offer sophisticated computer services, such as computer-assisted design.²

- With the expansion of the global economy has arisen a class of off-site workers. One type is the data processing programmer or clerk who works on a computer at home instead of going to the office. The 2nd type is an offshore data entry clerk based in a low-wage country but employed by a Fortune 1,000 company. The benefits to companies and off-site workers are very attractive, but there can be serious disadvantages. Six problems inherent in the off-site worker system are identified: 1. lack of effective controls on the employee, 2. fewer available non-cash incentives and rewards, 3. less chance at career advancement, 4. more social isolation of workers, leading them to seek traditional office environments, 5. difficulty of working at home while caring for small children, and 6. a dilution of employer-employee loyalty and commitment. Emerging trends in the US and offshore are reviewed briefly.³

DATA ENTRY...CASE STUDIES...

CASE STUDIES (CONTINUED)

- A new computer voice recognition system has solved data entry problems and increased the speed of warehousing and receiving operations at G. H. Bass & Co.'s distribution center warehouse in Atlanta, Georgia. Consequently, the system has speeded distribution to customers. As a result of an investment in the new system of roughly \$25,000 for hardware, Bass has reported annual savings of \$60,000 in clerical and indirect labor costs associated with the receiving of finished shoes from offshore vendors. Instead of using pen and paper to record data from incoming shoe boxes, the new system allows a clerk to read the data into a lightweight microphone-earpiece headset connected to a transmitter worn on a belt. The voice recognition computer accepts the inventory data, stores it, and prints bar code labels which are later attached to the boxes. Other benefits from the new system include: 1. elimination of receiving errors and 2. elimination of customer sales cancellations caused by receiving delays.⁴

- Hospitals face many challenges in the quest to be effective providers of medical care. One appropriate response to these challenges is to design hospital information systems (HIS) to solve the major problems of the industry, such as labor shortages and constrained financial reimbursement. These systems need to be designed to easily interconnect to other systems or subsystems so that much more comprehensive data management systems can be built. Systems also need to be built to eliminate the need for redundant data entry and the capture of similar data at multiple points. Finally, systems should be designed to eliminate or significantly reduce the workload of expensive, professional personnel. What is needed are support systems that optimize patient care and minimize clerical work. This would involve: 1. minimizing the resources consumed in patient treatment, 2. providing the most optimal treatment plan for substances to promote prompt patient recovery, and 3. having a system designed to reduce work.⁵

- For well over a decade, scientists have been working on speech recognition by computers. The lack of success is partially explained by the demanding goals set for the systems. A cognitive psychologist, Ivan Mimica, has unveiled a truly innovative product, the Voice Navigator, that has captured the imagination of computer users everywhere since it was unveiled in August 1990. Mimica, who founded Articulate Systems (Cambridge, Massachusetts), licensed speech recognition technology from Dragon Systems and developed a unique user interface based on speech. Voice Navigator consists of a small black box that sits next to an Apple Macintosh, a special unidirectional microphone, and related software. The software enables users to navigate their way around a variety of commonly used applications by speaking commands, instead of typing them in from a keyboard.⁶

DATA ENTRY...CASE STUDIES...

CASE STUDIES (CONTINUED)

- The US Postal Service (USPS) is automating its data entry procedures in a move that it hopes will contain the cost of postage. The USPS is currently about 20 nodes into automating the daily transfer of post office receipts from about 170 post office polling sites to 5 nationwide data centers housing IBM and Amdahl Corp. mainframes. The network involves the installation of Intel Corp. 80386-based personal computers running Interactive Systems Corp.'s UNIX System V Release 3 operating system and UNIX-to-Systems Network Architecture (SNA) connectivity software from Rabbit Software Corp. Frank Auger, an automation manager at the Postal Service's engineering and development center, said that he expects data entry errors to be drastically reduced, lessening the time necessary to turn around information. Auger believes that the system will also provide speedier tracking of lost items.⁷

- The Tile Automation System at Kennedy Space Center includes the applications of automation, robotics, and other advanced technologies to the shuttle Tile Processing System. The voice data entry system is one of the promising technologies currently under consideration. The system makes use of advances in the field of voice synthesis and speech recognition. System use requires training both the system and its user, or successful application. The system has to be trained on the recognition of all operation vocabulary, while the user needs to be trained on system operation. Training may be conducted in a simulated environment in the first few sessions, however, it needs to take place in the operational environment for the majority of the sessions. Implementation of the voice system needs to parallel the existing system for a period of time until the system is free of errors and enough users are trained on its use. This should be followed by gradual phasing out of the old system and phasing in of the voice system.⁸

- Database integrity begins with software program selection. A well-designed system assists with data entry by equipping the software with various forms of edit protection. Some ways to ensure that accurate data get into the program are: 1. alerting the user that a particular action could result in a problem, 2. preventing an erroneous type of entry, and 3. preventing the user from entering fields that are filled by the computer. A data entry procedures manual can serve as both a training manual and a reference book. The procedures manual integrates an organization's way of doing business with the software and gives directions for entering data and conducting transactions. Writing a procedures manual is a tedious business, but it is worth the effort. The manual can be especially useful when: 1. the data entry clerk leaves on short notice, 2. the system administrator leaves for another job, 3. a report is due on short notice, or 4. the new version of the software arrives.⁹

DATA ENTRY...CASE STUDIES...

CASE STUDIES (CONTINUED)

- The introduction of online and distributed data processing (DP) has made monitoring the productivity and quality of data entry operators ever more difficult. Consequently, some organizations have begun to install software monitoring systems. One such data entry productivity and error reporting system (DEPERS) was applied to a large mental health care facility. DEPERS reports here provided diagnostic information that was useful in identifying problems in operators' data entry techniques. This system monitors the productivity (number of keystrokes per hour) and quality (number of errors per million keystrokes) for each data entry operator. The DEPERS has provided information that has been useful to a systems analyst-programmer making software enhancements, which substantially increased data entry productivity and quality. The productivity and quality measures are not used directly in the performance evaluation of the data entry operators, nor have any standards been developed as a result of the reports generated by the DEPERS.¹⁰

- The automatic reading of optically scanned forms consists of 2 major components: the extraction of the data image from the form and the interpretation of the image as coded alphanumeric, or optical character recognition (OCR). IBM has implemented a method for the entry of a wide variety of forms that contain machine-printed data and that are often produced in business environments. The function, known as Intelligent Forms Processing (IFP), accepts conventional forms that call for information to be printed in designated blank areas, but in which the information may exceed boundaries because of poor registration during printing. The IFP system uses a setup phase to create a model of each form that is used to extract data fields while removing background printing intersecting data. An OCR process that reads typical monospace fonts interprets the extracted data images.¹¹

- Mobile dispatching, a new method of field data collection for utilities, enables the data collector to input data directly into a computer system. Field personnel use mobile terminals to access supporting computer software over a radio frequency (RF) network; the mobile terminals display the information provided by the supporting software application. The selection of a data terminal for mobile dispatching applications must be based on a variety of factors, including: 1. the type of work to be performed and its effect on terminal requirements, 2. the availability of alternative methods to contact the field worker, 3. the economic model used to justify the system, 4. the importance of future flexibility to the company, and 5. the magnitude of investment needed to support the various terminal options. Technology is expanding rapidly, and RF modems today are being miniaturized. Because a broad array of options will be available in the near future, utilities should carefully select today's terminals and keep in mind that options with proprietary RF connections may severely limit future choices.¹²

CASE STUDIES (CONTINUED)

- Electronic data interchange (EDI) is popularly defined as computer-to-computer interchange of business information in precise formats without human intervention. It is a critical element in meeting today's information challenge. EDI can benefit many departments within an organization, including accounting and manufacturing. EDI is becoming applicable to the engineering and construction industries. The solidification of EDI standards will make it more available. Competition in national markets, growing international trade, and deregulation in the telecommunications industry also will spur more EDI development. In the 1990s, manufacturers will focus on implementing computer-integrated manufacturing (CIM) throughout the entire enterprise. Automatic identification is being used to enhance information integration, covering such technologies as: 1. bar coding, 2. radio frequency identification, 3. optical character recognition, and 4. voice data entry.¹³

- The Borger, Texas, Petroleum Equipment Division of J. M. Huber Corp. has integrated inventory control, order entry, bill of material, and material request data via a new computer-integrated manufacturing (CIM) system. The workstation-based system streamlines manufacturing management and saves the firm nearly \$300,000 a year. The windowing environment of the Sun Microsystems workstation facilitates multitasking, thus allowing an inside sales representative to complete an order form while reviewing price information, part inventory status, and a customer's record. Sun's Network File System for sharing data among different computers and the workstation's price and performance add value. Another important benefit is the easy expandability of the networked system. J. M. Huber plans to expand the scope of the CIM network, linking its New Jersey accounting function with the Texas workstations.¹⁴

- An automatic method to convert printed documents into ASCII format is termed optical character recognition (OCR). OCR technologies can be classified into 2 major categories - multifont recognition and omnifont recognition. To facilitate document management, image systems have the following components: 1. document input system, 2. document index system, 3. document storage system, 4. communication system, and 5. image output system. Document indexing is a very crucial step, since indexes are the key for the retrieval process and an incorrect index can render the scanned document virtually untraceable and unrecoverable. Applications for imaging technology are being expanded increasingly from simple document storage and retrieval to mission-critical paper flow operations. Continuing advancements in pattern recognition techniques, neural networks, artificial intelligence, and parallel processors will result in improvements in recognition systems.¹⁵

DATA ENTRY...CASE STUDIES...

CASE STUDIES (CONTINUED)

- Database producers face multiple decision points when deciding how to transform varied input into online output. Manual data entry still is widely used, although scanning and electronic input are becoming more common. Database producers use in-house keyboarding departments, hire outside contractors, or both. Most database producers prefer an in-house scanning operation, which provides advantages of cost, quality control, and currency. Unscannable documents prevent database producers from using this technology more than they now do. Electronic submission eases 2 problems of the database production process: cost and currency. However, data must undergo their own conversion process before being loaded online. Despite the technical problem of transforming publishers' output into online database format, the trend toward electronic submission will continue because of the many advantages provided by electronic input.¹⁶

- As computer memory becomes increasingly inexpensive, more companies are transferring data to online systems. This is a labor-intensive process and has forced countries in high-priced labor markets to turn to less developed countries for these services. Centers now operate in the Caribbean, the Philippines, Mexico, and Japan. Turnaround time and support services are the things that distinguish the reputable centers from each other. Since 1987, the Peoples' Republic of China, building on a network of computers established for the census in 1981, has been actively pursuing international data entry business. Efforts to find international clients are being coordinated through a new operating center called International Business Data Ltd. (IBD). IBD's international activities are developed through Computership Ltd., a subsidiary of the China 2000 Group. Located in the Special Economic Zone in Zhuhai, IBD has moved aggressively into the marketplace. The size of China's labor pool is an advantage but lack of expertise in typing, English, and careful quality control has been a problem. Despite predictions of its demise, data entry is still a viable business and China is sure to play a role in its future.¹⁷

- With more companies pulling computer automation facilities maintenance (CAFM) services in-house, CAFM service bureaus are offering a new service: advice for companies implementing in-house CAFM programs. Although many service bureaus have proliferated in recent years, others have specialized in mass data entry. Other key services offered include: 1. plotting, which involves expensive machinery, 2. drafting, 3. data conversion, where lack of standards and labor intensiveness make CAFMs practical, 4. custom programming and report generation, 5. networking, and 6. consulting. Some CAFM service bureaus specialize in one aspect of CAFM, while others perform traditional computer-aided design development-oriented services.¹⁸

CASE STUDIES (CONTINUED)

- Automatic identification (auto ID) covers such technologies as bar coding, radio frequency identification, optical character recognition (OCR), voice data entry, machine vision, magnetic stripe, and smart cards. The development of moving beam scanners in the early 1970s and the introduction of microprocessors brought greater flexibility to material handling and sortation systems. Auto ID is gaining momentum in acceptance, development, and application. The market for bar code products is increasing at a rate of 25% to 30% a year in the US. Radio frequency data communications systems with real-time processing capability are increasing in popularity. The US Postal Service (USPS) has committed all letter mail to bar coding by 1995. The commitment has been reinforced by announcements of some contract completions and some contract awards. OCR readers will help the USPS handle expanding mail volume and improve total productivity.¹⁹

- While only a few agencies have begun to acquire geographic information systems (GIS), their experience indicates that there is no shortage of opportunities to apply GIS to transportation problem solving. By definition, the GIS database is tied to a geographical coordinate system, usually latitude-longitude, so that it contains both geocoded spatial data and attribute data. Each object is classified as either a point, a line, or a polygon, clearly related to the others according to rules of mathematical topology. Several state transportation agencies currently are conducting interesting GIS research and development. For example, Alaska's Highway Analysis System (HAS) is a collection of computer programs and a mainframe database whose files formerly resided on paper, in personal computers, or in isolation on the mainframe. The HAS is being designed to display data graphically. Idaho has formulated a policy to use GIS when it enhances cost-effectiveness or improves productivity.²⁰

- Computer-aided design (CAD) applications require special peripherals to be used most effectively. Cursor control peripherals, such as mice, trackballs, digitizers, and tablets provide for better graphics input than an ordinary keyboard. Some systems take advantage of scanning hardware to scan images on paper and convert them into an electronic raster form. CAD systems can produce output that is suitable for pen plotters, electrostatic plotters, and laser printers. Pen plotters vary in size, accuracy, resolution, and speed. Electrostatic plotters are typically used in high-volume plotting of complex drawings. Specialized graphics hardware is typically used in a CAD system to increase response time. The hardware may be a graphics processor or board, or it may be a terminal linked to a host computer. Vector displays and raster systems are commonly used. A driver is needed to interface a graphics board with a variety of applications software.²¹

CASE STUDIES (CONTINUED)

- In terms of accuracy, speed, and cost performance bar code systems are far superior to other computer data entry systems. Other automated information processing tools include: 1. keyboards, 2. punched card systems, and 3. optical character reader systems. The combinations of bars and spaces of different width in bar codes represent characters and numerics. The systems are noted for their data entry accuracy. Other advantages include: 1. inexpensive media preparation costs, and 2. easy identification of individual items. The most widely used bar code equipment are point-of-sale systems. Factors such as the contents of data and the space available for printing determine which kind of bar code symbols to use. Some on-site, real-time bar code printers include: 1. hand labelers, 2. scale printers, and 3. bar code-graphic-character printers.²²

- Control Data Corp.'s Scanning Service Center (SSC) is a scanning service bureau that offers a turnkey drawing conversion service to its customers. The OptiGraphics 3000 Drawing Conversion System is employed to process customers' manually produced engineering documents and to produce computer-aided design (CAD) drawing files that can be installed directly on their CAD systems. Following an extensive investigation into scanning technology, Control Data concluded that scanning technology has become a very attractive alternative to conventional CAD re-entry techniques and is gaining wide acceptance in the CAD user community. The OptiGraphics 3000 System was chosen as the most appropriate system for Control Data's particular service bureau environment. A service bureau offers the users of scanning technology many advantages. The expertise of a knowledgeable service bureau can be invaluable in the implementation of a successful method for transferring drawing files created by the scanning system to the target CAD system. Control Data has introduced the concept of the scanning pilot project in order to address the issue of pricing.²³

- During 1990, the worldwide market for online transaction processing (OLTP) embraced \$33.8 billion in hardware and systems software. Further, the market is growing almost 3 times faster than the overall computer industry. OLTP is the largest segment of the multiuser commercial data processing industry. While it incorporates several emerging technologies, such as database management and data-entry subsystems, it is more than any of its constituent parts has become and will remain a powerful force in the commercial data processing industry for 3 fundamental reasons: 1. operating advantages, 2. technological gains, and 3. societal pressures. IBM dominates mainframe computing and consequently mainframe OLTP, its tools, its products, and its usage, with a 70% market share. OLTP technology has enabled numerous financial services organizations to process more work, with less labor and with higher customer satisfaction levels. A successful installation requires top management attention, and business reengineering is often needed to gain a true advantage from this key information technology.²⁴

DATA ENTRY...CASE STUDIES...

CASE STUDIES (CONTINUED)

- The US market for speech-recognition hardware and software will surpass \$100 million this year. Speech-recognition programs can now run on powerful but inexpensive desktop computers. Replacing manual data entry is the leading use of speech recognition now, but 2 other forms will become more popular within 2 years: 1. automating telephone tasks, such as providing directory assistance or allowing consumers to order merchandise directly by phone, and 2. dictation, or instantly converting a person's voice into computer text. Phone companies anticipate a bonanza, both in new business and in cost-cutting. Dragon Systems Inc.'s Dragon Dictate system has the ability to recognize 30,000 words and has been a godsend for the handicapped. Kurzweil Applied Intelligence Inc.'s niche is health care. In hospitals, doctors find that talking to a computer saves time and is more accurate than jotting notes that must later be transcribed by a secretary.²⁵

- According to experts, over 30% of the paper handled in offices are forms, including expense requisitions and interoffice memoranda. Computer software has begun to address the specific problems of managing and processing forms, a small but growing market. Forms-processing software packages running on stand-alone personal computers are the easiest to use. They reduce the number of redundant forms, cut the costs of storage and printing, and allow for faster design and creation of new forms. Add-on software to a forms inventory package usually handles data entry, allowing an organization to control data integrity within the forms. Recent integrity advances in optical character recognition and imaging have made user input of information into a computerized form more practical. The use of forms software on computer networks allows forms to be routed and queued, speeding up access of information and streamlining the business process. Users even can route completed forms directly to another organization, such as to a facsimile server or through electronic data interchange.²⁶

- To provide improved information on labor costs, automated data capture is rapidly evolving as the solution to the complexities of time and attendance management and reporting. The best systems for time and attendance reporting use platform-independent technology and are integrated with magnetic stripe or bar code data entry systems. With immediate access to a personal computer (PC) through scanners, managers can process labor information online and generate reports formatted to their needs. Components of a typical system configuration will include time recorder/data collection hardware, time and attendance software, and system utilities. Leading time and attendance systems now on the market use time recording hardware in the form of a badge reader. The time and attendance software is the core of the system in that it provides the functions necessary to collect, maintain, and report on the data that has been collected. A PC-based time and attendance system on the manufacturing floor can help to determine the amount of labor required for a particular job, calculate the cost of the job, and provide the data necessary for pricing the finished product.²⁷

CASE STUDIES (CONTINUED)

- Data entry on current hand-held computers is done without a physical keyboard. Advances in understanding how people perceive and recognize what they write has enabled the development of a powerful hand-held unit that has considerable handwriting recognition capabilities. Character recognition now approaches 100% accuracy utilizing advanced handwriting recognition algorithms. The uses for hand-held units are numerous and varied. For example, receivers can use a hand-held computer with handwriting recognition and eliminate the need for paper forms. Hand-held computers must be small and rugged, have considerable functionality, and be compatible with a firm's computer system. Using internal modems, hand-held units become powerful field resources capable of relaying key information automatically to a central computer and receiving data or instructions. The wholesale and distribution industry is the most notable market in its use of hand-held computers.²⁸

- With time margins slim in the financial services industry, investors want to respond immediately and intelligently to market changes. They also want such a fast-response capability to be available at all times and in all places. This imperative is creating more innovative applications and ambitious leveraging of information systems and networks. In September 1987, the Chicago Mercantile Exchange partnered with the Reuters information and newswire service to develop the Globex electronic trading system. Globex, currently in alpha testing, will extend trading hours, operating from 6 p.m. to 6 a.m. daily. Security Pacific Merchant Bank is simplifying the difficult task of administering syndicate loans through a system that currently contains more than 300 reports, 700 menu selections, and 100 data entry screens. Using a customer service application, Fidelity Investments now is able to integrate information from a variety of mainframe applications in order to speed customer service. FNN Data Broadcasting Corp. employs FM sidebands to speed the transmission of financial data to customers.²⁹

- Forms processing software programs for personal computers can create forms and retrieve data from a database for automatic insertion in the proper location on the forms. Forms processing software represents a merger of graphics and data entry and retrieval. A wide variety of forms processing software is available to run on a range of hardware. The high end of the market includes programs with graphics capabilities for desktop publishing applications. Forms software is available for specialized applications, such as packing labels and name tags, that cannot be handled by other types of software packages. Many forms processing programs can access information from a spreadsheet, a database, or an ASCII file. As programs offer more capabilities, more memory is required; therefore, many software packages include features to conserve disk space. As forms processing software programs become more popular, many documents will never reach paper form, and those that are printed will have been designed with a forms software program.³⁰

DATA ENTRY...CASE STUDIES...

CASE STUDIES (CONTINUED)

■ As computer memory becomes increasingly inexpensive, more companies are transferring data to online systems. This is a labor-intensive process and has forced countries in high-priced labor markets to turn to less developed countries for these services. Centers now operate in the Caribbean, the Philippines, Mexico, and Japan. Turnaround time and support services are the things that distinguish the reputable centers from each other. Since 1987, the Peoples' Republic of China, building on a network of computers established for the census in 1981, has been actively pursuing international data entry business. Efforts to find international clients are being coordinated through a new operating center called International Business Data Ltd. (IBD). IBD's international activities are developed through Computership Ltd., a subsidiary of the China 2000 Group. Located in the Special Economic Zone in Zhuhai, IBD has moved aggressively into the marketplace. The size of China's labor pool is an advantage but lack of expertise in typing, English, and careful quality control has been a problem. Despite predictions of its demise, data entry is still a viable business and China is sure to play a role in its future.

■ Automatic identification (auto ID) covers such technologies as bar coding, radio frequency identification, optical character recognition (OCR), voice data entry, machine vision, magnetic stripe, and smart cards. The development of moving beam scanners in the early 1970s and the introduction of microprocessors brought greater flexibility to material handling and sortation systems. Auto ID is gaining momentum in acceptance, development, and application. The market for bar code products is increasing at a rate of 25% to 30% a year in the US. Radio frequency data communications systems with real-time processing capability are increasing in popularity. The US Postal Service (USPS) has committed all letter mail to bar coding by 1995. The commitment has been reinforced by announcements of some contract completions and some contract awards. OCR readers will help the USPS handle expanding mail volume and improve total productivity.²²

■ Many companies have been exporting low-level back-office chores, such as data entry, to the Caribbean and the Far East for several years. Lower wages, a large unemployed labor pool, and lower employee turnover are a large part of the reason service industries turn to economically depressed nations for clerical services. Some executives say that avoiding US regulations is another attraction. Other firms believe that the global office can serve as a foothold in regions where protectionism may become a problem in the future, such as the European Community. Texas Instruments Inc. opened a facility in Bangalore, India, in 1988. Establishing a presence in Asia, which is expected to become a growing market for electronic equipment, was a major reason for the move, according to company officials. However, rising telecommunications costs and the continuing low value of the dollar are cutting into the savings of lower wages abroad.²³

CASE STUDIES (CONTINUED)

- In 1990, major postal facilities will begin accepting the first deliveries of an approximately \$4.2-billion automatic identification system that includes 421 bar code sorters and 346 multiline optical character readers. This system will help move mail faster, cheaper, and more accurately. Without the system, the US Postal Service would have had to hire as many as 125,000 new workers to handle the estimated 40% increase in mail volume expected by the year 2000. Bar coding dates back to a relatively primitive beginning in 1949. Widespread use began with supermarket applications based on the uniform product code. It is estimated that, as a result of new applications, sales of bar coding equipment and systems have increased 6-fold since 1984, and penetration in major markets has just begun. Strong growth is anticipated in such areas as appliance manufacturing, electronics, telecommunications, and nonfood retailing.³⁴
- Companies are using scanner technology to reduce data entry costs, to speed forms processing, and to improve the appearance of their documents. Xerox Corp., which considers scanning an important component in its overall document processing strategy, offers a full range of scanning products. Xerox Imaging Systems, a merger of Kurzweil Computer Products and Datacopy, will provide a single source of entry-level scanning products, while other Xerox departments provide scanning products that address more sophisticated image processing needs. For instance, the feature-rich Xerox 7650 Pro Imager Scanner offers performance previously seen only in high-end, laser-based systems. The Pro Imager can be used to digitize text, line art, and continuous tone and halftone input processing images at resolutions up to 1,200 dots per inch. The Pro Imager also offers: 1. the ability to crop or blank out rectangular areas in a document, 2. programmable halftone screening, 3. a 2-dimensional filter for enhancing fine line detection and for sharpening edges and detail, 4. manual or automatic contrast control, and 5. penchromatic color sensitivity.³⁵
- With the new technologies of the satellite and the microchip, entire office functions can now be performed in foreign markets. For the North American client, offshore bureaus are the solution to getting less urgent volume work done at the lowest cost and with the most efficiency. Timothy Greener, president of BDP Business Data Services Ltd, pays his Canadian data entry operators a base wage of C\$7 to C\$10 an hour. Comparable workers in India are paid 80c an hour, 85c in the Dominican Republic, and 93c an hour in Jamaica. In this wage difference lies the potential for important increases in profit margin. Greener has tried going offshore, but his company does not have enough volume to make it work to his economic advantage. Even if the price is right, he has two major concerns - political instability and questionable business ethics abroad. A few offshore companies that began with data processing are now getting backing from US and Japanese interests to offer sophisticated computer services, such as computer-assisted design.³⁶

CASE STUDIES (CONTINUED)

■ Kurzweil Applied Intelligence Inc. (Waltham, Massachusetts) was the first to offer a voice recognition system with a vocabulary over 5,000 words. In an interview, manager of product marketing Bob Steingart stated that a one-to-2-year payback period is expected for the system. Administrators, concerned with costs and getting reports out rapidly, often are more interested in the Voice Rad and Voice Em radiology and emergency medicine applications than the doctors. Professional rather than clerical areas are targeted due to cost justification, and some applications such as voice data entry are feasible but have not taken off for the same reason. Kurzweil probably will enter the legal field next and is making the report system more robust. For doctor applications, voice training takes around 2 hours. When building an application, a list of words and a knowledge base consisting of trigger phrases and a report structure are needed.³⁷

■ According to Larry Dome of the Gartner Group Inc., the market for devices used to understand and simulate human speech is expected to grow at a compound annual rate of 50%, with sales approaching \$400 million by 1991. While voice synthesis converts digitized computer text to analog speech, in voice recognition, the spoken word is converted to computer recognizable digital form. Currently, most voice applications are in niche markets. However, voice synthesis output is unnatural, and the information to be output is complex. In addition, voice recognition is limited by vocabulary size, background noise, and contextual interpretation. Examples of the successful implementation of cost-effective systems can be found in such areas as: 1. telecommunications and marketing, 2. manufacturing quality control, 3. data entry, and 4. automation of paperwork. Steps involved in a feasibility study for voice technology include examination of potential applications, identification and quantification of benefits and drawbacks, determination of payback period, and making feasibility decisions.³⁸

■ In database management, techniques exist to preserve what is termed "data integrity." Methods of data protection fall into 3 major categories - backup, validation, and security. Outside factors affecting data integrity include: 1. the quality of storage equipment, 2. the competence of data entry personnel, and 3. the reliability of information sources. The quality of published information is affected by the skill of the producers more than by mass production; the cost of producing one of many information commodities is virtually the same. As more producers enter the electronic information services market, the quality and reliability of information may suffer. New techniques in digital recording now threaten previously reliable methods used to record facts. For example, the digital retouching of photographs cannot be detected, and synthesizers can be used to duplicate speech patterns and music. The time has arrived to think about the specific methods and procedures that can be used to avoid the corruption of vital knowledge bases.³⁹

CASE STUDIES (CONTINUED)

- Although people are still critical to the data entry process, keypunch and related entry systems could become obsolete as the market for optical character recognition (OCR) systems expands rapidly. In the past, the OCR market has been held back by the price of microcomputer scanners and their lack of document-formatting capabilities. However, a new class of equipment is becoming available with dramatically improved price-performance. For example, Saba Technologies has introduced a relatively inexpensive, full-page reader with document-formatting capabilities. In addition, Transimage now offers a handheld OCR device for the IBM Corp. personal computer family and compatibles. Transimage's 1000 Optical Data Entry System provides font independence, handles typeset material and forms, scans at 45 characters per second, and can integrate data into applications. Its optical camera scans alphanumeric text at 1,000 dots per inch and has a recognition algorithm that runs at one million instructions per second.⁴⁰

- Optical character recognition (OCR) consists of a device that deciphers letters, numbers, or coded bars on a page and converts them into digital information that can be used or stored by a computer. OCR equipment can enter data faster, cheaper, and at least as accurately as a skilled typist. To date, the most common use of OCR technology has been in reading bar codes. However, new methods of using OCR technology are emerging. For example, a handheld unit called the Handscan – usable by many kinds of personal computer programs – has been developed by Saba Technologies. The Handscan is especially useful for users whose needs are intermittent or who transfer only small amounts of data. The popularity of page scanners is due almost entirely to the success of desktop publishing systems. Although an expensive proposition for most users, OCR units capable of reading typeset originals are becoming available in the low-end market.⁴¹

- Bar code technology (BCT) has become a tool used across Canadian industry to fight diminishing returns and high production costs. Endorsed by major organizations and providing a range of advantages, the BCT market in Canada is likely to increase 30% in 1987. Of the 35 codes developed, Code 39, Codabar, Interleaf 2 of 5, and Universal Product Code are acknowledged as the overall industry best. Compared to keyboard data entry, bar coding is much faster and more accurate. Bar code systems are easy to operate, cost-effective, and efficient, as they run on existing microcomputers. The real-time data collection makes it possible for employees to base decisions and forecasts on what is happening, not what has happened already. Average system costs are between \$8,000 and \$30,000 but vary with application and existing equipment. Average payback is less than one year, with productivity improvement appearing sooner. Companies considering BCT should address: 1. placement of the bar code labels, 2. types of scanning devices, and 3. interface capability.⁴²

DATA ENTRY...SUMMARY...

A SUMMARY OF DATA ENTRY IS AS FOLLOWS:

▪ Current Market Size:

Total data processing market:	\$31.2B
Total data entry market:	\$ 0.6B

▪ Market Growth:

Market growth is projected at an annual rate of 16 percent. This growth should continue based on the 22 percent increase in paper documents in the U.S. alone.

▪ Training Requirements:

Minimal training requirement for an average data entry project entails a high school degree with 1 year computer training.

▪ Labor Intensity Cost Factor:

The average ratio of labor to system costs in the data entry market is 80% labor and 20% systems costs.

DATA ENTRY...SUMMARY...

A SUMMARY OF DATA ENTRY IS AS FOLLOWS (CONTINUED):

▪ Information Sensitivity:

Information sensitivity can be an important issue when dealing with financial or legal documents depending on the confidentiality requirements imposed by the industry or the government.

▪ Geographic Proximity:

Geographic proximity is not of major importance if a firm can prove accurate control.

▪ Average Turnaround Time:

Turn around time for existing Jamaican data entry firms averages anywhere from 3 days to 6 weeks or more. Projects that require a faster turnaround time are now either done on-site or by U.S. data entry firms.

▪ Major Customers:

Financial services and health care are among the major users in data entry. Other major users are government, publishing, retail and manufacturing.

A SUMMARY OF DATA ENTRY IS AS FOLLOWS (CONTINUED):

▪ **Quality Control Importance:**

- Data entry requires a high level of quality control to maintain accuracy.

▪ **Technology Obsolescence:**

The data entry market is expected to grow at a steady rate as more companies are forced to decrease their reliance on paper.

FOOTNOTES FOR CASE STUDIES

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Presented to:

JAMPRO

A PROFILE OF THE TELEMARKETING INDUSTRY

DELIVERABLE 6

November 1991

Prepared By:

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5913 Benfield Drive
Alexandria, VA 22310
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intex[↑]

Telemarketing - Deliverable 6

Information Processing Market Segment Study

This report was prepared by Inter primarily to address the issues of Task 1, and also to analyze the main objectives of Tasks 2 and 3 of the Information processing Industry segment study. This is the last report in a series of six market overviews and analysis prepared for JAMPRO. This report examines the entire Telemarketing Industry. It provides an analytical evaluation of the industry, measuring the size and trends in the industry according to several criteria. The report examines present and future forces in the telemarketing industry, and how these forces affect the direction of the industry and the users of Telemarketing services. Over twenty-five comprehensive interviews were conducted with providers of telemarketing services, managers of in-house telemarketing operations, managers of international telemarketing operations, recognized authorities in the telemarketing industry, publishers of telemarketing trade magazines and manufacturers of telemarketing equipment. The suitability of various segments of the telemarketing industry for the Jamaican economy are then examined, with a particular focus on the nature of the Jamaican economy. Conclusions and projections are then presented regarding the Jamaican telemarketing industry. Lastly, recommendations are presented for steps to move the Jamaican telemarketing industry from the concept stage to implementation.

Overview

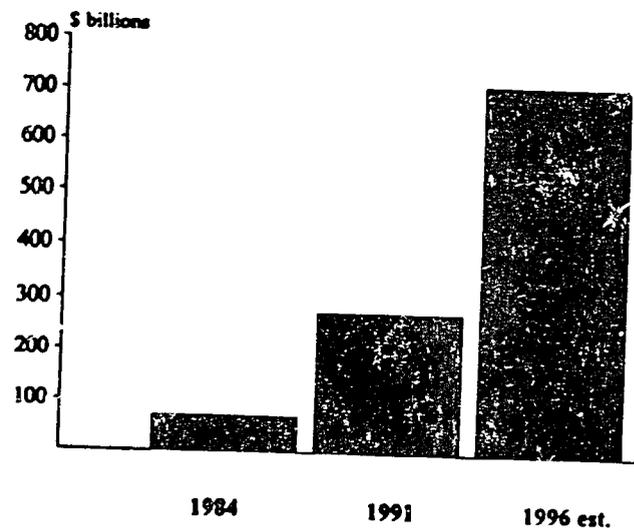
TELEMARKETING IS THE USE OF THE TELEPHONE AS A PLANNED ELEMENT OF A MARKETING STRATEGY. TELEMARKETING CAN REPLACE OR SUPPLEMENT OTHER MARKETING TECHNIQUES AT ANY STAGE OF THE MARKETING STRATEGY, FROM INITIAL CONTACTS TO CUSTOMER SUPPORT.

- Telemarketing operations are used both as a means of selling products and a means of retaining existing customers.
- Telemarketing operations are highly flexible and can meet the varied needs of businesses. Telemarketing is used to:
 - Perform surveys of potential customers
 - Sell products to populations already identified as potential customers
 - Support catalog sales operations through order taking and fulfillment
 - Answer questions about products and retail distribution points
 - Enroll consumers in various credit card, travel and buyer protection programs
 - Sell various insurance programs, and renew policies near expiration.

Telemarketing Overview...History

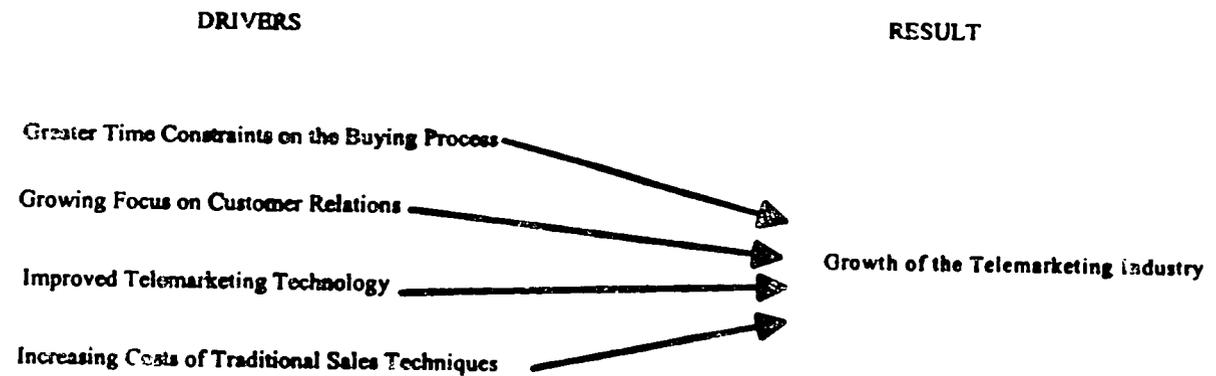
TELEMARKETING WAS FIRST USED IN THE 1960'S AS A METHOD OF CONTACTING EXISTING CLIENTS. THE HISTORY OF TELEMARKETING AS AN INDUSTRY CAN BE TRACED TO THE LATE 1970'S, WHEN IT WAS MAINLY USED AS A DIRECT SALES TOOL. IT PROVIDED USERS WITH A METHOD OF MAKING LARGE NUMBERS OF SALES CONTACTS IN A SHORT PERIOD OF TIME WITH MINIMAL CAPITAL INVESTMENT.

TOTAL SALES REVENUE RESULTING FROM TELEMARKETING OPERATIONS



Telemarketing Overview

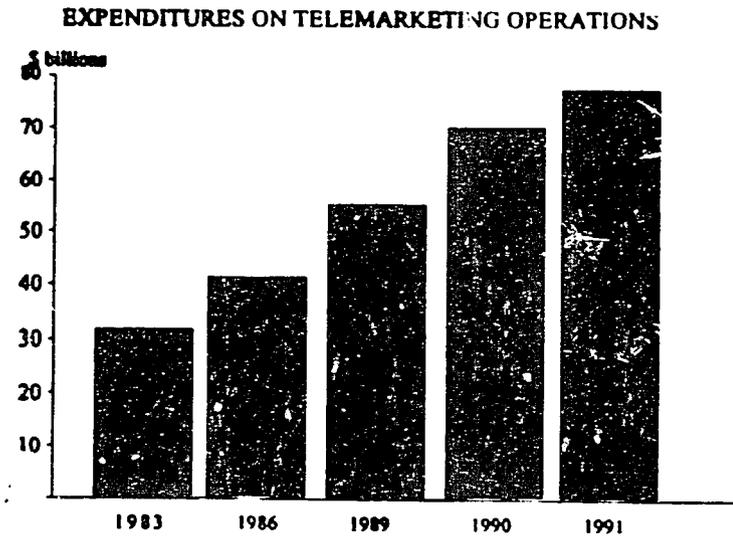
MAJOR DRIVERS FOR THE GROWTH OF THE TELEMARKETING INDUSTRY INCLUDE INCREASING COSTS OF TRADITIONAL SALES TECHNIQUES, IMPROVED TELEMARKETING TECHNOLOGY, GREATER TIME CONSTRAINTS IN THE BUYING PROCESS AND THE GROWING FOCUS ON CUSTOMER RELATIONS BY MOST COMPANIES.



THESE MARKET DRIVERS WILL BE DISCUSSED IN GREATER DETAIL ON THE FOLLOWING PAGES

Telemarketing Overview...History

**EXPENDITURES ON TELEMARKETING OPERATIONS HAVE RISEN ALMOST FIVE FOLD SINCE 1980 AS
TELEMARKETING HAS COME TO BE UTILIZED FOR ALL ASPECTS OF MARKETING. RECENT GROWTH HAS
AVERAGED 20% ANNUALLY AND IS EXPECTED TO CONTINUE.**

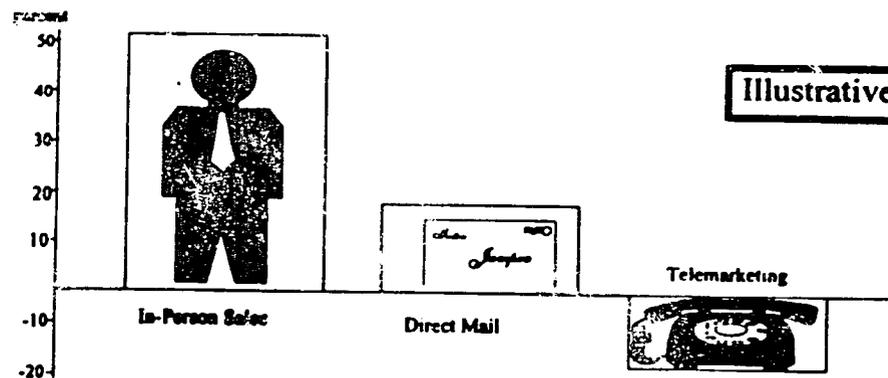


Telemarketing Drivers...Improved Cost/Effectiveness

TELEMARKETING OPERATIONS HAVE BECOME INCREASINGLY COST EFFECTIVE AS THE RELATIVE COST OF OTHER METHODS OF MARKETING HAVE BECOME MORE EXPENSIVE. IT HAS BECOME THE LEAST EXPENSIVE METHOD FOR COMPANIES TO MAINTAIN CONTACT WITH INDIVIDUAL CUSTOMERS.

- As the cost of live, in-person contact with existing customers continues to rise, telemarketing will become the method of choice for many companies to maintain relations with existing clients and establish relationships with potential customers.
- Postal costs have risen 25% in the past five years, while long distance costs, a key factor in telemarketing costs, have dropped by 35%.
- The cost of an in-person sale call has risen by 50% in the past 10 years.

Average Change in Costs for Types of Sales Methods, 1980-93

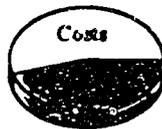


Telemarketing Drivers...Improved Cost Effectiveness

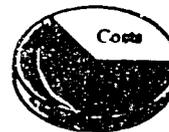
IN ADDITION, THE APPLICATION OF TECHNOLOGY TO TELEMARKETING HAS DECREASED THE COST-REVENUE RATIO FROM 55% TO 25%

Telemarketing Costs as a Portion of Sales Revenue

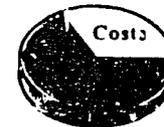
1983 SALES REVENUE



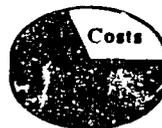
1986 SALES REVENUE



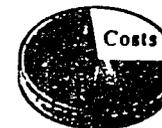
1989 SALES REVENUE



1990 SALES REVENUE



1991 SALES REVENUE



Telemarketing Drivers... Improved technology

**IMPROVED TECHNOLOGY HAS GREATLY INCREASED THE EFFICIENCY OF TELEMARKETING OPERATIONS,
PRODUCING GREATER SATISFACTION AMONG USERS.**

- Access to computer databases now provides agents with up-to-date information on product availability, customer information and promotional programs. Customers handled with a higher degree of competency have higher satisfaction levels.
- Automatic Call Distribution technology allows several operators to answer calls made to a single number. Consumer wait time is reduced, and fewer calls are lost.
- Predictive Dialing technology allows computers to dial outgoing telemarketing calls so less time is used calling busy numbers. Operators are then more productive.
- Computerized databases of demographic information now allow for highly accurate targeting of sales prospects, increases in customer service capabilities, and can increase the efficiency of telemarketing operations by up to 50%
- Computerized monitoring of telemarketing operations allows companies to gain important market information from telemarketing operations such as the concentration of potential consumers, income levels, and other information relevant to marketing programs. Technology also allows for very fast feedback on consumer reaction to the introduction of a new product or marketing program.

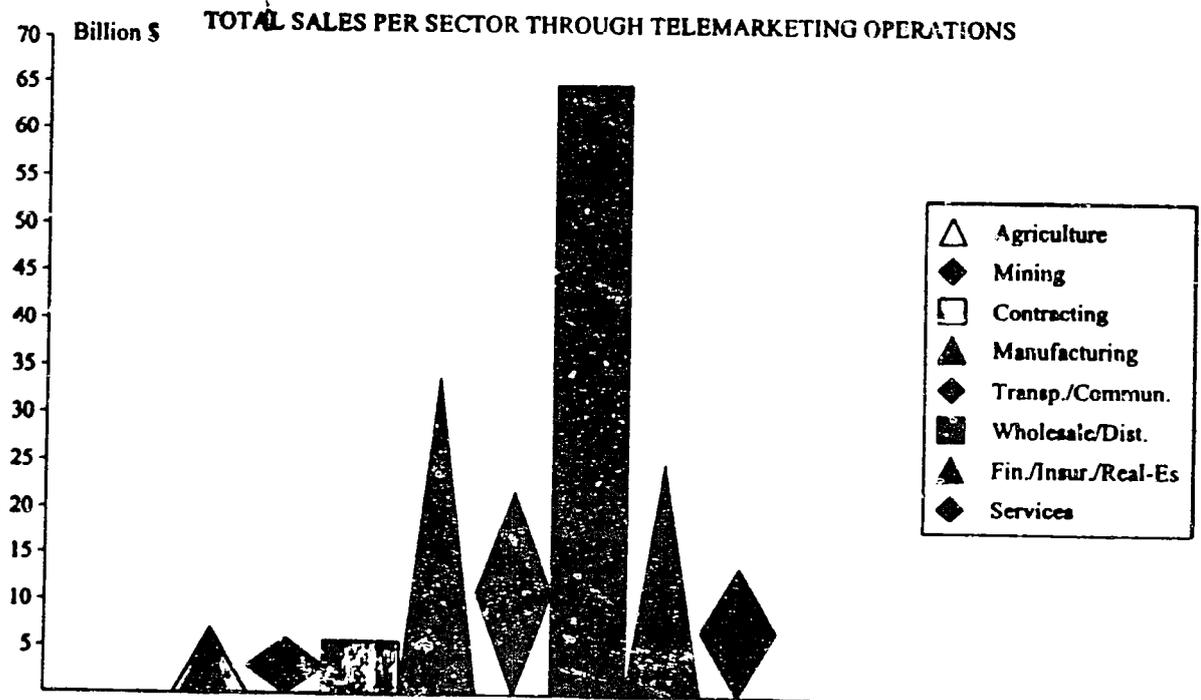
Telemarketing Drivers... Focus on Customer Retention and Expansion

CUSTOMER RETENTION HAS EMERGED AS AN IMPORTANT FOCUS IN THE MARKETING PLANS FOR MANY MAJOR COMPANIES, IMPORTANT NOT ONLY IN BUSINESS -TO-BUSINESS MARKETING, BUT ALSO IN RETAIL MARKETING.

- Most companies will not experience the significant growth in the coming decade which was possible over the past decade due to relatively slower growth of the economy.
- Many companies are seeking to deepen relationships with existing customers and expand sales through introducing customers to different product lines. For example, Smith and Hawken clothing catalogs also market home furnishings, or Chase Visa card offering disability insurance.

Telemarketing Customers... Overview

TELEMARKETING IS USED BY ALL INDUSTRIES AND ITS USE IS EXPANDING. AS THE POSITIVE RESULTS PRODUCED BY TELEMARKETING OPERATIONS CONTINUES TO INCREASE, MORE AND MORE FIRMS ARE INTEGRATING TELEMARKETING INTO THEIR MARKETING STRATEGIES.



Telemarketing Customers... Overview

INDUSTRY SEGMENTS UTILIZE DIFFERENT TELMARKETING TECHNOLOGIES TO SUIT THEIR MARKETING NEEDS

		RETAIL	AGRICULTURE	MINING	CONTRACTING	MANUFACTURING	TRANSP/COMM.	WHOLE/DIST.	FIN/INS/REAL ESTATE	SERVICES
BUSINESS-TO-BUSINESS	INBOUND	●	●	●	●	●	●	●	◐	●
	OUTBOUND	●	●	◐	◐	●	●	●	●	●
BUSINESS-TO-CONSUMER	INBOUND	●	◐	○	◐	◐	●	○	●	○
	OUTBOUND	●	◐	○	◐	○	●	○	●	◐

●
HIGH

◐
MEDIUM

○
LOW

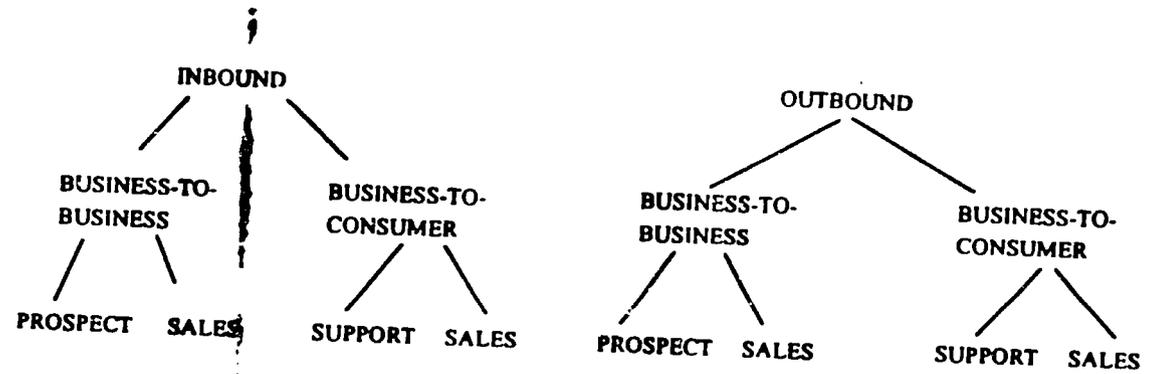
Telemarketing Customers... Overview

THE INDUSTRY CAN BE SEGMENTED INTO INBOUND AND OUTBOUND TELEMARKETING OPERATIONS

- Inbound operations receive phone calls
 - Inbound telemarketing is generally less complex since the prospect is already interested in the product.
 - Inbound operations include:
 - Dealer locators
 - Warranty service
 - Catalog orders ;
 - Banking/brokerage services
- Outbound operations make phone calls
 - Outbound operations require higher skill levels because the prospect is not necessarily expecting the call, and probably has less interest in the product.
 - Outbound operations include:
 - Product surveys
 - direct marketing
 - credit card services
 - travel services
 - product recalls

Telemarketing Customers... Overview

THE SEGMENTS OF INBOUND AND OUTBOUND TELEMARKETING ARE DESCRIBED BELOW

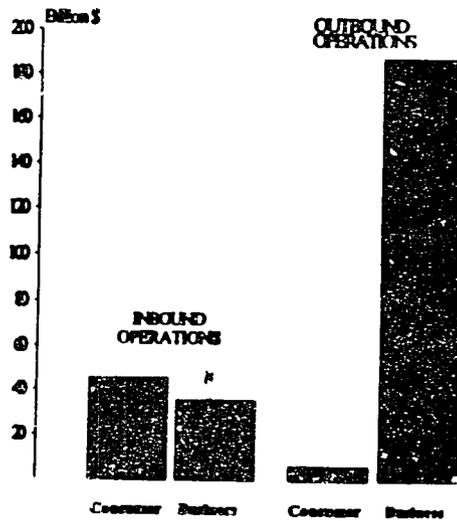


Telemarketing Customers... Overview

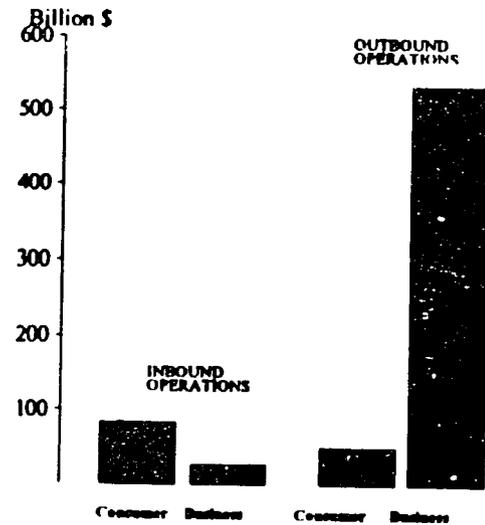
ANOTHER WAY TO EXAMINE THE TELEMARKETING INDUSTRY IS TO LOOK AT THE FUNCTION OF THE TELEMARKETING OPERATION. THE TWO FUNCTIONS OF TELEMARKETING OPERATIONS INVOLVE BUSINESS-TO-BUSINESS AND BUSINESS-TO-CONSUMER OPERATIONS.

- Since telemarketing operations are a form of marketing, it is more effective to examine the market through the type of service provided than the type of industry which purchases the service.
- Both inbound and outbound operations consist of business-to-business and business-to-consumer operations

TOTAL 1991 SALES REVENUE FOR TELEMARKETING INDUSTRY

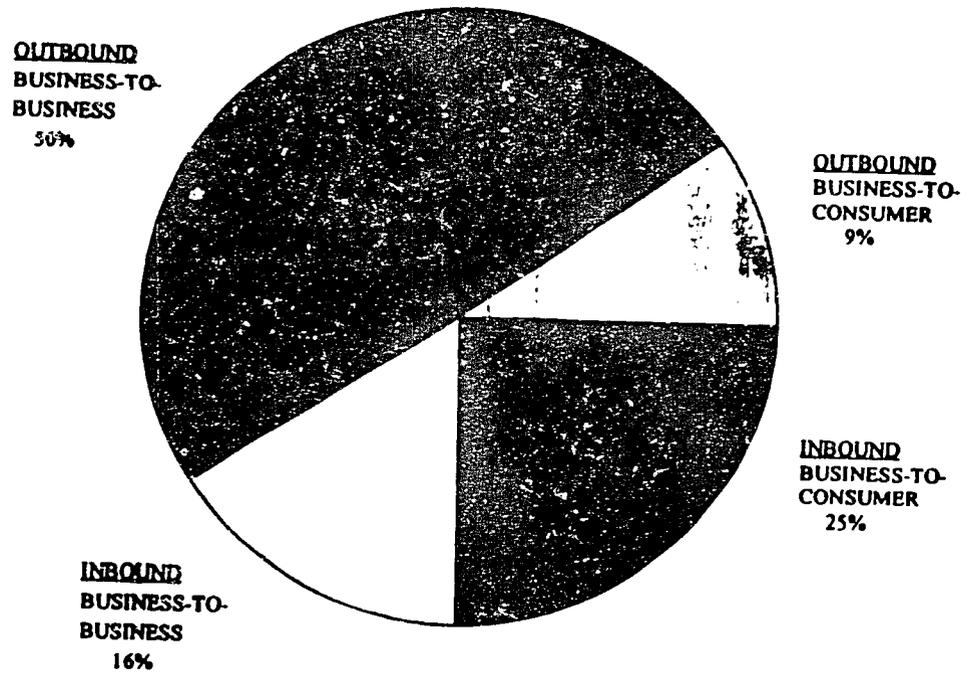


PROJECTED 1996 SALES REVENUE FOR TELEMARKETING INDUSTRY



Telemarketing Overview...Structure

TELEMARKETING EXPENDITURES ARE HEAVILY WEIGHTED TOWARDS OUTBOUND OPERATIONS



Telemarketing Overview...Structure

BUSINESS-TO-BUSINESS OPERATIONS CONSISTS OF TELEMARKETING OPERATIONS WHERE ONE BUSINESS DIRECTLY MARKETS ITS PRODUCTS TO ANOTHER BUSINESS

Examples of firms using business-to-business telemarketing include:

- American Express
- 3M
- IBM
- Digital Computer
- DuPont
- Federal Express
- U.S. Government
- Wharton Econometrics
- Valvoline - 90% of orders by phone
- Digital - order processing

Telemarketing Overview...Structure

BUSINESS-TO-CONSUMER OPERATIONS CONSIST OF TELEMARKETING WHERE A BUSINESS MARKETS ITS PRODUCTS DIRECTLY TO END CONSUMERS

Examples of firms using business-to-consumer telemarketing include:

- Sears, Roebuck
- Spiegel
- J.C. Penney
- L.L. Bean
- Sharper Image
- Garden Way
- Harvard University
- Republican National Committee
- Clairol - Product Use
- B.F. Goodrich - Marketing
- Quaker Oats - Sweepstakes promotions
- Whirlpool - Support, warranty
- GE - premier inbound service

Telemarketing Market Potential for Jamaica... Analysis of First Level Critical Factors

FIRST LEVEL CRITICAL FACTORS ARE THOSE FACTORS THAT DETERMINE WHETHER A PARTICULAR SERVICE CAN BE EXPORTED IN AN OFF-SHORE MANNER. THOSE SERVICES WHICH MEET THE FIRST LEVEL CRITICAL FACTORS WILL BE EXAMINED IN MORE DETAIL AS A TARGET MARKET FOR JAMAICA

IN THE CASE OF THE TELEMARKEETING MARKET, FIRST LEVEL CRITICAL FACTORS ARE:

- **PORTABILITY:** Services which can be completed remotely from the user site.
- **EASE OF DISTRIBUTION:** Services which can be divided into independent work segments, completed in Jamaica, and later integrated with the rest of the system, without causing disruptions to the customer activities and the operation of the larger marketing activities of the company.

Telemarketing Market...Potential for Jamaica...Analysis of First Level Critical Factors

SENSITIVITY TO CULTURAL DIFFERENTIALS AND LEVEL OF SKILLS REQUIRED FOR THE PROCESS WILL DETERMINE WHETHER A MARKET SEGMENT CAN BE SERVICED FROM AN OFF-SHORE FACILITY.

TELEMARKETING MARKET SECTORS	PORTABILITY	EASE OF DISTRIBUTION	OFF SHORE POTENTIAL
OUTBOUND	+	+	YES
INBOUND	+	+	YES

Legend:

- + Passes first level critical factor test
- Falls first level critical factor test
- Potential market for Jamaica

Telemarketing Market...Analysis of First Level Critical Factors

OUR FIRST LEVEL CRITERIA INDICATE THAT BOTH INBOUND AND OUTBOUND TELEMARKEING ARE SUITABLE MARKETS FOR JAMAICA.

PORTABILITY TEST:

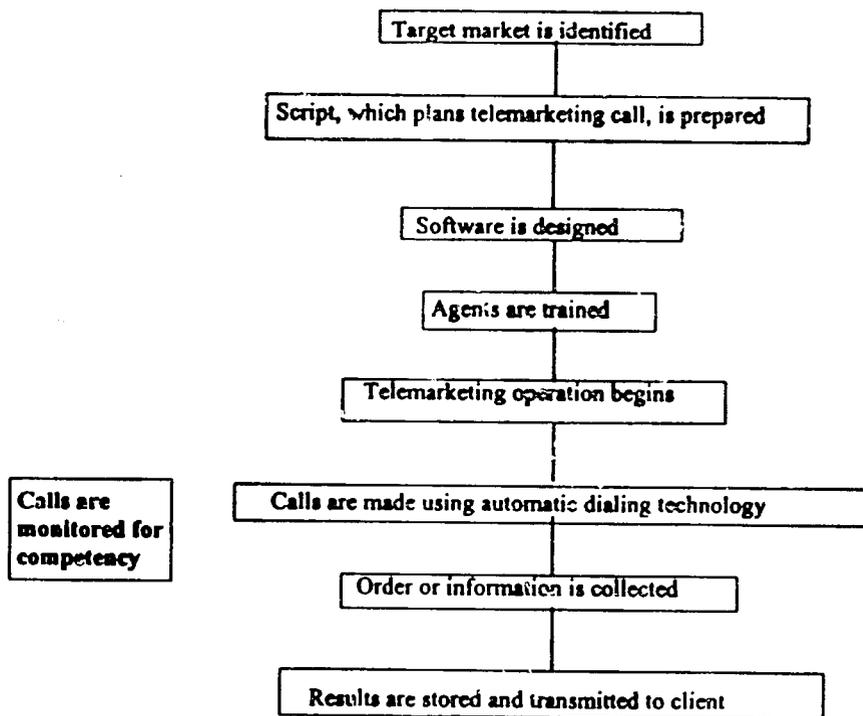
- Inbound and outbound telemarketing can be completed remotely from the user sight without disruption to the customers marketing strategy
- Inbound and outbound telemarketing do not require on-site client presence and can be monitored via long distance voice and data links

EASE OF DISTRIBUTION TEST

- Inbound and outbound telemarketing can both be completed independently, with results integrated into the complete marketing strategy of the customer

Outbound Telemarketing... Overview of the Process

THE PROCESS OF OUTBOUND TELEMARKETING INVOLVES SEVERAL STEPS



outbound Telemarketing... Overview

WE IDENTIFIED 2 MAJOR MARKET SEGMENTS IN OUTBOUND TELEMARKEING. OUTBOUND TELEMARKEING CAN BE DIFFERENTIATED INTO THE FOLLOWING FUNCTIONS.

- **Prospecting includes the following activities:**
 - **Lead Generation :** telemarketing agents determine potential interest for a product among targeted populations
 - **Surveys:** agents call targeted populations to determine receptivity to a particular product
 - **Sales support:** agents make appointments and follow up for sales calls
 - **Customer service:** agents call existing customers to ensure satisfaction with existing products and potential interest in other products
- **Sales includes the following activities:**
 - **Direct Sales:** agents utilize telemarketing with the intention of closing a sale
 - **Renewals:** agents speak with existing customers to resupply product which may have been exhausted
 - **Lead qualification:** consumers who have expressed interest in a product are contacted to determine if they would like more information

Outbound Telemarketing Prospecting

THE PROCESS OF TELEMARKETING OPERATIONS CALLING PEOPLE FOR PURPOSES OTHER THAN TO CLOSE A SALE OF A PARTICULAR PRODUCT IS REFERRED TO AS OUTBOUND TELEMARKETING PROSPECTING

- Information gathering is necessary to the productivity of sales operations
- Prospecting pre-screen sales contacts assures that all sales efforts are directed towards interested parties
- Prospecting establishes contact times for the sales staff to meet pre-screened contacts, further increasing the efficiency of the sales staff
- Response rates to other forms of market research tend to be relatively low compared to telemarketing

Outbound Telemarketing Prospecting

OUTBOUND TELEMARKETING PROSPECTING IS A COST EFFECTIVE METHOD FOR IDENTIFYING POTENTIAL CUSTOMERS AND WILL BECOME A LARGER PROPORTION OF DIRECT MARKETING BUDGETS IN THE FUTURE

- Information gathering is labor intensive
- Information gathering is necessary to the productivity of many different sales operations.
- Information gathering, by its nature, provides a low return on investment-thus, it is highly sensitive to costs.
- The cost of in person sales calls has risen by 150% in the past 15 years
- Modern cost control strategies require increased effectiveness from sales forces

Outbound Telemarketing..Sales

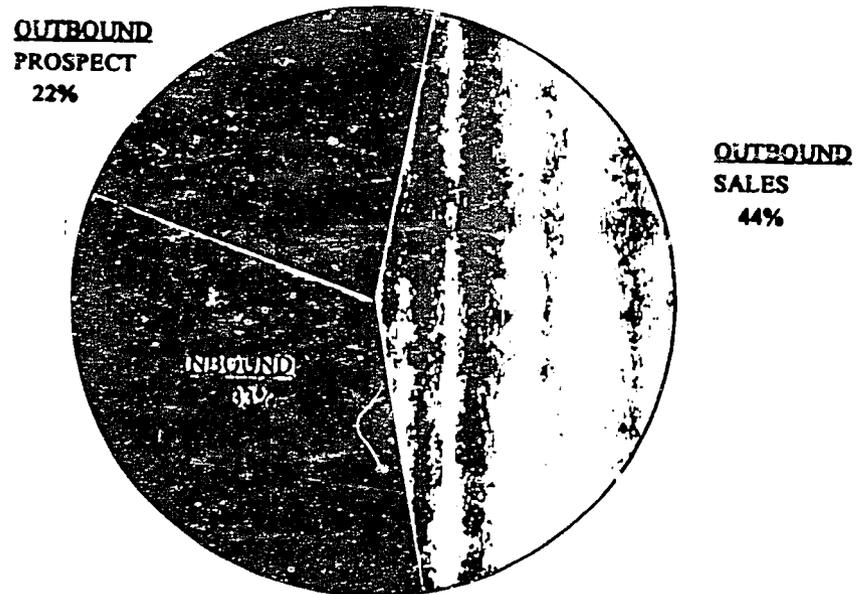
THE PROCESS OF TELEMARKETING OPERATIONS CALLING CONTACTS WITH THE PURPOSE OF SELLING A PRODUCT IS KNOWN AS OUTBOUND TELEMARKETING SALES

- Outbound sales is one form of direct sales
- Direct sales is labor intensive
- Direct sales is very costly; many contacts must be made for a single sale
- Direct sales is an important element in the marketing strategy of many firms. Some large firms market exclusively through direct sales, such as Dell Computer and Lands End clothing.

Outbound Telemarketing...Overview

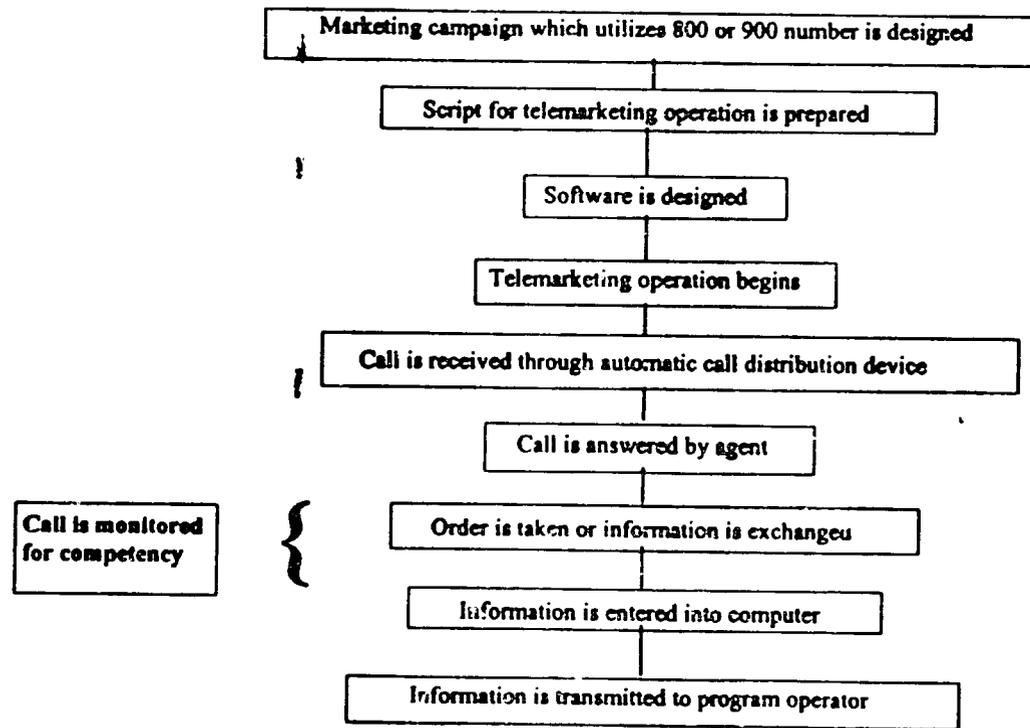
THE OUTBOUND TELEMARKETING MARKET IS CURRENTLY ESTIMATED TO BE \$59 BILLION, WHICH IS TWO-THIRDS OF THE TOTAL TELEMARKETING MARKET

TOTAL TELEMARKETING EXPENDITURES



Inbound Telemarketing... Overview of the Process

THE PROCESS OF INBOUND TELEMARKETING INVOLVES SEVERAL STEPS



Inbound Telemarketing... Overview

WE IDENTIFIED 2 MAJOR MARKET SEGMENTS IN INBOUND TELEMARKETING. INBOUND TELEMARKETING CAN BE DIFFERENTIATED INTO THE FOLLOWING FUNCTIONS:

- **Customer Support includes the following activities:**
 - Dealer locators
 - Warranty information
 - Product information and directions (help lines)
 - Distributor and wholesale support

- **Sales includes the following activities:**
 - Catalog order taking
 - Hotel and travel reservations
 - Response to direct mail, T.V. and newspaper advertising campaigns

Inbound Telemarketing...Customer Support

THE PROCESS OF TELEMARKETING OPERATIONS RECEIVING CALLS FROM POTENTIAL OR EXISTING CUSTOMERS IS KNOWN AS INBOUND CUSTOMER SUPPORT

- Customer support includes the use of the telephone to provide information both to prospective and existing customers
- Customer support is necessary for maintaining an acceptable level of customer satisfaction
- Customer support is an important element in the transmission of information between the manufacturer and consumer

Inbound Telemarketing... Customer Support

WITH THE INCREASING PERCEPTION THAT CUSTOMER SERVICE IS AN IMPORTANT ELEMENT IN THE RETENTION OF THE CUSTOMER BASE, INBOUND TELEMARKEITING CUSTOMER SUPPORT WILL BECOME A LARGER PART OF THE TELEMARKEITING MARKET

- Customers are demanding greater levels of service from suppliers
- Manufacturers increasingly use telemarketing operations to advise potential customers of product availability and locations
- Manufacturers use telemarketing operations to answer questions for existing customers
- Manufacturers use telemarketing operations to disseminate information about complementary product lines

Inbound Telemarketing...Sales

THE PROCESS OF TELEMARKETING OPERATIONS RECEIVING CALLS FROM ACTUAL CUSTOMERS WHO INTEND TO PURCHASE GOODS IS KNOWN AS INBOUND SALES

- Inbound sales includes orders through 800 numbers for items from catalog, television, and print advertisements
- Distributors and wholesalers use inbound telemarketing to replace portions of the in-person sales staff
- Manufacturers use inbound sales to allow in-person sales forces to attend to larger and more profitable clients

1

Inbound Telemarketing...Sales

INBOUND SALES WILL BECOME AN INCREASINGLY IMPORTANT STRATEGY FOR BUSINESS.

- Consumer confidence in catalog operations has increased greatly over the past ten years.
- Consumers have less and less time to devote to selecting goods.
- Catalog goods are frequently perceived as having higher quality.
- Businesses prefer ordering by phone to time consuming visits by sales reps.
- Businesses selling goods are no longer willing to bear the high cost of selling face-to face.

Inbound Telemarketing Market

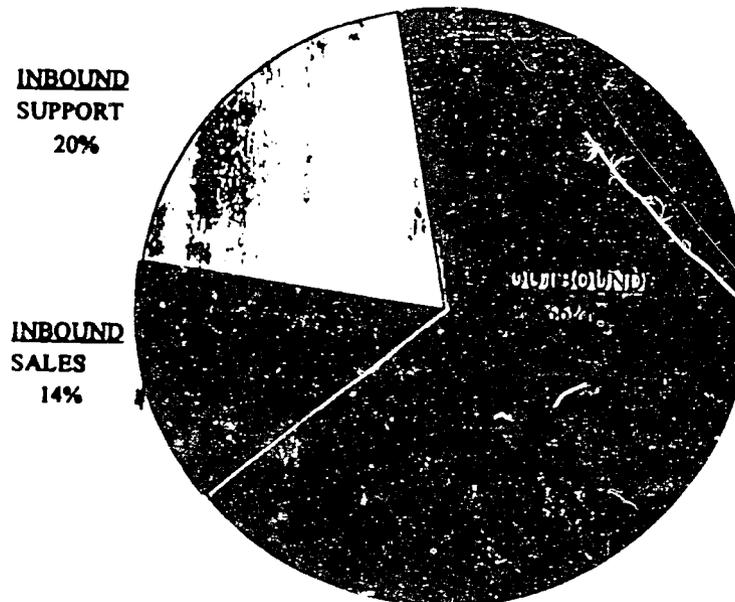
INBOUND TELEMARKEING IS LAEOR INTENSIVE BECAUSE ALL INCOMING CALLS ARE ANSWERED BY LIVE OPERATORS.

- Customer support and sales are oriented towards provision of fast and effective service to customers. No other medium can provide the response rate of the telephone.
- Telemarketing is a vital link between the company and its customer base.
- Operators gather strategic information about the caller for the client:

Inbound Telemarketing...Overview

THE INBOUND TELEMARKETING MARKET IS CURRENTLY ESTIMATED TO BE \$25 BILLION WHICH IS ONE-THIRD OF THE TOTAL TELEMARKETING MARKET

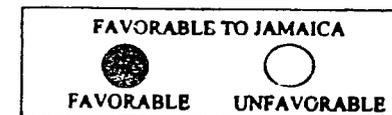
TOTAL TELEMARKETING EXPENDITURES



Business-to-Business ..Second Level Critical Factors

AS A NEXT STEP, WE RANKED PROSPECT AND SALES TELEMARKETING FOR THE BUSINESS-TO-BUSINESS SEGMENT AGAINST SECOND LEVEL CRITICAL FACTORS THAT DETERMINE WHETHER MARKET REQUIREMENTS ARE FAVORABLE FOR JAMAICA.

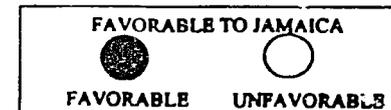
Critical Factor Segment	Cultural Affinity	Training	Labor Intensity	Agent Education	Knowledge of American Business		Total impact to entry barriers
INBOUND							
Support							
Sales							
OUTBOUND							
Prospect							
Sales							



Business-to-Consumer...Second Level Critical Factors

AS A NEXT STEP, WE RANKED PROSPECT AND SALES TELEMARKETING FOR THE BUSINESS-TO-CONSUMER SEGMENT AGAINST SECOND LEVEL CRITICAL FACTORS THAT DETERMINE WHETHER MARKET REQUIREMENTS ARE FAVORABLE FOR JAMAICA.

Critical Factor Segment	Cultural Affinity	Training	Labor Intensity	Agent Education	Knowledge of American Business		Total impact to entry barrier
INBOUND							
Support							
Sales							
OUTBOUND							
Prospect							
Sales							



Telemarketing Industry...Analysis of Suitable Sectors

ALMOST ALL BUSINESS WHICH IS OUTSOURCED IN THE UNITED STATES TODAY GOES TO AGENCIES CALLED TELEMARKETING SERVICE BUREAUS. TOTAL EXPENDITURES ON OUTSOURCING ARE ESTIMATED TO BE \$600 MILLION, DIVIDED EVENLY BETWEEN INBOUND AND OUTBOUND

- Outsourced telemarketing is expected to grow at the same rate as the industry as a whole, 12 to 15% annually
- Telemarketing service bureaus are engaged in all aspects of inbound and outbound telemarketing
- Telemarketing service bureaus provide a cost effective answer to firms unwilling or unable to invest in an in-house telemarketing operation
- Service bureaus provide a package of expertise that would not otherwise be available to firms seeking to use telemarketing.
- Service bureaus provide flexibility in hours of operation, volume of calls and range of services provided.

Telemarketing Industry...Analysis of Suitable Sectors

THE CURRENT LEVEL OF OUTSOURCED TELEMARKETING IS A GOOD BASELINE FOR ESTIMATES OF THE POTENTIAL TELEMARKETING INDUSTRY IN JAMAICA

- Telemarketing business will come from three distinct markets
 - Telemarketing business which is already outsourced
 - Telemarketing which is currently performed in-house
 - Businesses which do not currently utilize telemarketing as a part of their marketing mix
 - The current Telemarketing Service Bureau industry is small compared to the entire telemarketing industry, but it is useful to determine the potential for the Jamaican telemarketing industry

Telemarketing Industry...Analysis of Suitable Sectors

TELEMARKETING IN JAMAICA IS MOST SUITED FOR THE BUSINESS-TO-BUSINESS INBOUND SUPPORT AND SALES, AND BUSINESS-TO-CONSUMER INBOUND SALES SECTORS OF THE AMERICAN TELEMARKETING INDUSTRY.

SEGMENT	1991 OUTSOURCED EXPENDITURES	POTENTIAL JAMAICAN MARKET SHARE	PROJECTIONS FOR GROWTH - 5 YEARS (per year)
BUSINESS TO BUSINESS			
INBOUND SUPPORT	\$15 Million	\$100 Million	15%
INBOUND SALES	\$20 Million	\$100 Million	12%
BUSINESS TO CONSUMER			
INBOUND SALES	\$75 Million	\$250 Million	15%

Telemarketing Market...Market Forces

THERE ARE SEVERAL FACTORS WHICH WILL FAVOR JAMAICA IN THE TELEMARKETING INDUSTRY

- Large educated work force available.
- Low labor costs.
- The recent Jamaican currency devaluation signifies that the Jamaican telemarketing industry can be competitive even at the highest per minute line rates.
- English speaking population provides an advantage not found in most developing countries close to the U.S.
- Modern 20,000 line digital switched telecommunication facility.
- Located close enough to the United States to ensure reasonable telecommunication line charges.
- Communication infrastructure between Jamaica and the United States allow for active linkages between businesses in the U.S. and telemarketing operations in Jamaica.
- Modern telecommunications systems allow the remote monitoring of telemarketing operations. Quality controls no longer requires a geographically proximate telemarketing operation.
- Data uplinks allow for free movement of information to clients.
- Located in same time zone as many U.S. telemarketing service agencies.

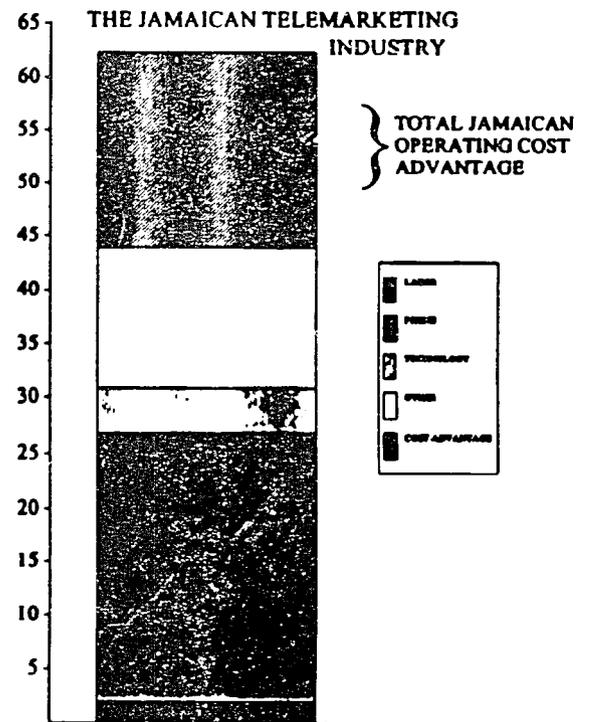
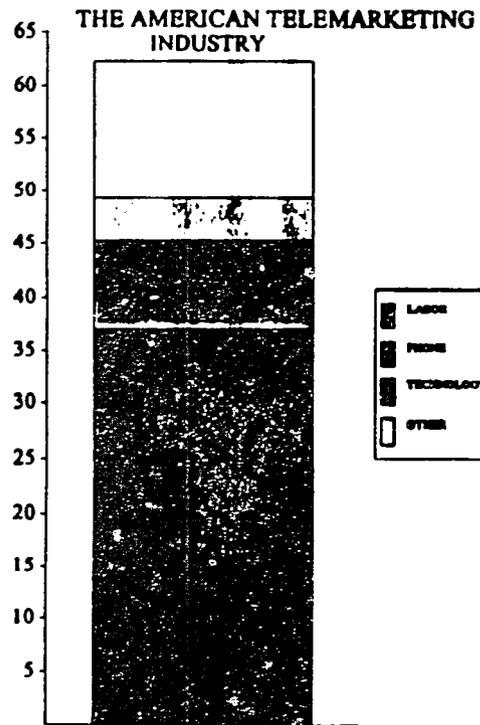
Telemarketing Market...Jamaican Experience

THE JAMAICAN TELEMARKETING INDUSTRY HAS SHOWN EXCELLENT RESULTS FROM ITS INITIAL FORAY INTO THE INDUSTRY

- Despite little investment in marketing, the industry already has close to \$1 million in billings
- Current clients include;
 - Hotel reservation systems
 - Customer service centers, including some high tech clients
 - Order fulfillment, particularly for television advertisements
- Jamaican telemarketing operations have scored high for productivity and closing sales. Both are important elements in determining market potential of a regions telemarketing industry.
- The Jamaican telemarketing industry is also servicing local industries such as crafts, foodstuffs and wholesale flower manufacturers.
- The Jamaican telemarketing industry is still nascent. A marketing campaign is necessary to educate the American telemarketing industry about the potential for location in Jamaica.

Telemarketing Market...Jamaican Experience

THE COST ADVANTAGE OF THE JAMAICAN TELEMARKETING INDUSTRY LIES PRIMARILY IN LOWER LABOR COSTS



Telemarketing Market...Summary

A SUMMARY OF THE TELEMARKETING MARKET IN THE UNITED STATES IS AS FOLLOWS:

- **Current Market Size:**
 - **Total Telemarketing Market: :\$76 B**
 - **The Inbound Market : \$26 B**
 - **The Inbound Service Bureau Market \$300 M**
 - **The Outbound Market: \$50 B**
 - **The Outbound Service Bureau Market \$300 M**
- **Market Growth:**
 - **Market growth is projected at an annual rate of 12 to 15% through the year 2000**
- **Education Requirements:**
 - **Minimal education required is completion of secondary schooling**
 - **Additional training in telemarketing techniques and the particular application is required**
- **Geographic Proximity**
 - **Geographic proximity is not a major factor**
 - **Most telemarketing operations tend to be located in rural regions of the United States which high quality telecommunications infrastructure**

- **Major Customers:**
 - **Telemarketing is used by all industries. Manufacturing, banking and retail will be most likely to outsource telemarketing activities**
- **Quality Control**
 - **Quality of the interaction is highly important for telemarketing since it involves direct contact with current or potential customers of a firm.**
- **Technology**
 - **The use of technology is very important in that it allows for better customer service, as well as more accurate summary of information gathered by the telemarketing operation.**
 - **Technology will make the most basic of inbound telemarketing obsolete in the next ten years, however, most of these operations are currently run in-house and will not have as great an effect on the outsourcing market.**
- **Distribution/Marketing Channels**
 - **Major clients require assurances of quality and the ability to monitor both individual interactions as well as total activity through computerized reports.**
- **Labor Intensity Cost:**
 - **Labor costs are 50% of total telemarketing costs**
- **Average Return on Sales:**
 - **Average return on sales ranges between 20 and 27%**

Telemarketing Market...Summary

A BASIC TELEMARKETING OPERATION STAFFED BY 100 TELEMARKETING AGENTS AND EQUIPPED WITH TECHNOLOGY FOR BOTH INBOUND AND OUTBOUND OPERATIONS WILL COST AT LEAST \$900,000

- An automated switching system which can route incoming calls to available agents and ensure efficient use of outbound telecommunication lines will cost \$140,000.
- Each agent station will cost between \$1,000 and \$1,500.
- Supervisory stations to monitor agents and operation will cost \$25,000.
- The CPU for the entire telemarketing operation will cost \$20,000
- Wiring and fit-out of the facility will cost \$35,000.
- Software and setup for the operation will cost \$50,000.
- Predictive dialing, which will permit outbound dialing in advance of agents being available to take calls, will cost \$500,000. Predictive dialing is necessary for an efficient, high volume outbound operation.

Telemarketing Market Trend

THE TELEMARKETING INDUSTRY IS SUBJECT TO THE FOLLOWING TRENDS

- **SHIFT IN THE CUSTOMER BASE**
 - The telemarketing customer base is not likely to shift drastically. What is likely is that smaller firms which do not currently utilize telemarketing services will enter the market seeking low cost alternatives to expanded marketing efforts. The overall increase in telemarketing by the more cost conscious elements of each sector will place Jamaica in a more competitive market position vis-a-vis telemarketing service bureaus located in the United States.
- **TECHNOLOGICAL ADVANCES**
 - Technological innovation will effect telemarketing in two ways:
 - Products sold and managed through telemarketing will become increasingly sophisticated. This change will require greater and greater levels of training telemarketing service agents.
 - Technology used in the telemarketing process will become more sophisticated. This will require higher levels of investment in the telemarketing operation itself. Clients will require more sophisticated levels of back end reporting, as well as more sophisticated scripting for the telemarketing service agents.
 - However, the labor cost component will probably not fall significantly, since the price of technology has traditionally dropped in real terms. Jamaican low cost labor will continue to be a competitive advantage, since labor costs in the United States continues to rise in real terms.
- **COMPETITION**
 - Competition may emerge from other English speaking Caribbean countries, particularly Barbados. The time difference between the United States and English speaking countries in other parts of the world will limit competition. Other limits on competition will be the lack of high capacity telecommunications facilities.

Telemarketing Industry...Market Forces

THERE ARE SEVERAL CAVEATS TO LOCATING THE TELEMARKETING INDUSTRY IN JAMAICA.

- Many high value telemarketing operations deal with the existing customer base of companies. The more risk there is that cultural affinity issues could effect customer retention, the less willing the company would be to outsource the business to Jamaica. This is particularly true for the largest catalog operations in the United States.
- Where customers are highly valued, or the operation is highly technical, telemarketing users normally perform the operation in-house. This not only allows strict monitoring of quality of interaction, but also allows for faster response to inquiries and links with in-house information systems
- Some marketing managers interviewed would be reluctant to outsource because of their perception of consumer reaction to Jamaican telemarketing agents. Recent success with pilot projects in Jamaica should alleviate many concerns about this issue.
- Sectors of the telemarketing industry which deal with highly technical matters, especially in the business-to-business sectors, will be more difficult to outsource until the Jamaican industry has developed a more sophisticated telemarketing skill level.
- Telemarketing service agencies in the United States already handle a large amount of the outsourced telemarketing work. They are a likely market for outsourcing work to Jamaica, in that their work has already proven to be transferable.

Telemarketing Industry...Recommendations for Jamaica

THE NEXT STEPS WILL DETERMINE THE SUCCESS OF THE JAMAICAN TELEMARKETING INDUSTRY

- It is important that the Jamaican telemarketing industry be perceived as having high standards and productivity.
 - Experienced telemarketers should be utilized to manage the start-up of the Jamaican telemarketing industry, and train agents.
 - Professional training for all levels of telemarketing staff will become even greater priority in the future as competition in the industry intensifies and telemarketing operations become more sophisticated.
 - Initial projects should be less complex. Business outsourced from existing telemarketing service bureaus would be most likely to be successful.
 - An initial investment in technology will be costly, but will be worthwhile.
 - Jamaica should focus on strategic marketing in the U.S. to educate the market and form joint-venture alliances with system integrators and major telemarketing players in the United States.

APPENDIX

SELECTED SOURCES OF TELEMARKETING TECHNOLOGY

Telemarketing Industry...Technology Sources

SELECTED SOURCES OF AUTOMATIC CALL DISTRIBUTION TECHNOLOGY

Aspect Telecommunications
1730 For Drive
San Jose, CA 95131
(408) 441-2200

AT&T
55 Corporate Drive
Room 23C62
Bridgewater, NJ 08807
(908) 658-6000

AT&T General Business Systems
99 Jefferson Road
Parsippany, NJ 07954
(800) 368-3747

Digital Transmission
889 Bendix Drive
Jackson TN 38301
(901)423-0655

Executone Information Systems
6 Thorndal Circle
Darien, CT 06820
(203) 655-6500

Fujitsu Business Communication Systems
4605 E. Elmwood Street
Phoenix AZ 92806
(602) 921-5900

Harris Digital Telephone
Digital Telephone Systems Div.
300 Bel Marin Keys Boulevard
Novato, CA 94948
(415) 382-5000

Mitel, Inc.
5400 Broken Sound Boulevard
Boca Raton, FL 33487
(407) 994-8500

Telemarketing Industry...Technology Sources

SELECTED SOURCES OF AUTOMATIC CALL DISTRIBUTION TECHNOLOGY

NEC America, Inc.
8 Old Sod Farm Road
Melville, NY 11747
(516) 753-7000

Northern Telecom, Inc.
Data Networks Division
2525 Meridian Parkway
Research Triangle park, NC 27709
(919) 992-2000

Rotm Co.
501 Merritt 7
P.O. Box 5017
Norwalk, CT 06586
(203)849-6000

Telcom Technologies
761 Corporate Center Drive
Pomona CA 97168
(714) 620-7711

Telephonic Equipment Inc.
17401 Armstrong Avenue
Irvine, CA 92714
(714) 250-9400

Telemarketing Industry...Technology Sources

SELECTED SOURCES OF HARDWARE AND SOFTWARE FOR TELEMARKETING OPERATIONS

Brock Control Systems
Atlanta GA
(404) 431-1200

Computerized Assistance Systems
Chelsea, MA
(617) 884-3510

Coffman Systems
Cerritos, CA
(800) 232-EDGE

CRC Information Systems
New York, NY (212) 620-5678

Database Systems Corp.
Phoenix AZ
(602) 265-5968

Early, Cloud & Co.
Newport, RI
(401) 849-8500

Information Management Associates
Trumbull, CT
(203) 261-4777

Marketing Information Systems
Evanston IL
(708) 491-3885

Marktrieve Company
Londonberry, NH
(603) 434-0442

NPRI
Alexandria, VA
(703) 683-9090

- These manufacturers offer integrated hardware and software packages. There are also many firms which offer software packages which will function on IBM PC compatible as well as other computing environments.

Telemarketing Industry...Technology Sources

SELECTED SOURCES OF PREDICTIVE DIALING SYSTEMS

AT&T (OCM Systems)
100 Southgate Parkway
Room 2H-31
Morristown, NJ 07960
(201) 898-8460

Davox Corp.
3 Federal Street
Billerica, MA 01821
(508) 667-4455

Digital Systems International
Redwood Science Park
7659 178th Place
Redmond WA 98052
(206) 881-7544

Electronic Information Systems
1 Barry Place
Stamford CT 06902
(800) 289-ATMS

International Telesystems Corp.
600 Herndon Parkway
Herndon VA 22070
(703) 478-9808

NPRI
602 Cameron Street
Alexandria, VA 22314
(703) 683-9090

Spectrum Systems
10100 Reunion Place
San Antonio, TX 78216
(512) 349-9933

Telesystems Source Inc.
65 Jackson Drive
Cranford, NJ 07016
(201) 709-3400

Rockwell International
1431 Opus Place
Downers Grove, IL 60515
(312) 985-9000

International Technology Exchange Group

intex

PARTNERSHIP IN APPLYING TECHNOLOGY

INTEX - USA

5913 Benfield Drive
Alexandria, Virginia 22310
USA

Telephone: 703-739-1122
Facsimile: 703-960-3145

INTEX - EUROPA

Dorpstraat 44a
4851 CM Ulvenhout
Holland

Telephone: 31 (0)76-61.00.03
Facsimile: 31 (0)76-10.14.16

**INTEX - INTERNATIONAL
DEVELOPMENT GROUP**

MARINTEX, S.A.
SPAIN, UNITED KINGDOM

Telephone: 34.52.88.52.52
Facsimile: 34.52.88.59.00