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# Building Information Communication Technology Infrastructures for Economic Development

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# Building Information Communication Technology Infrastructures for Economic Development

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**Abstract**

This paper analyzes the impact of Information Communication Technology (ICT) Infrastructures on economic development through a statistical analysis of data from Saint Vincent and the Grenadines, and a policy analysis of the Workforce Investment Act and Ben Franklin Technology Partners programs in Pennsylvania. In the analysis of Saint Vincent, significant relationships were found between all aspects of ICT programs and a variety of measures of economic development, with the extent of Internet subscribers showing the greatest impact. The analysis of the Pennsylvania programs found that technology-oriented workforce education programs are only successful when there is a demand for related labor skills in the job market. The overall recommendation of this paper is to continue ICT development initiatives while also developing policies that promote collaboration between the public and private sectors, promote development of new technology-based businesses, and assess technology-oriented labor needs.

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## Introduction

A common perception held by development agencies is that a solution to economic disparity exists with the building of technology infrastructures. Private-sector corporations, governments, non-governmental organizations, international governmental and international non-governmental organizations have provided billions of dollars world wide to assist in the creation of information communication technology (ICT) infrastructure-building programs. The goal of these programs is to help bridge the proverbial digital divide.

The number of agencies and levels of funding for initiatives designed to bridge this technology literacy gap have grown exponentially in recent years. In the year 2003, the United Nations Educational Scientific and Cultural Organization's technology literacy budget for the Americas was approximately $60 million US, a 50% increase over the previous year. In 2001, The United Nations Development program created an ICT development program titled UNITES which places information communication technology development workers in impoverished nations. In 1999, the United States Peace Corps created the volunteer assignment description (VAD) of ICT volunteer, a role which has now expanded into a worldwide presence. In the Southwest Pennsylvania region, non-profit agencies and academic institutions such as the Pittsburgh Technology Council, Three Rivers Connect, the Hill House, the YMCA, Hosanna House, Duquesne University, the University of Pittsburgh, and Carnegie Mellon University have taken active involvement in building ICT literacy strategies, integrating technology into school curriculums, and promoting the development of community technology centers.

The concerns of this study are to help determine the effectiveness of ICT-related training programs, and to measure the impact of such ICT development policies. Is there a correlation between levels of funding for such development initiatives, and dependent factors such as jobs created, unemployment rates, and average per capita income levels? If there is a correlation, do these programs create economic stimulation, and if so, what features characterize the most effective initiatives?

From 1996 to 2001, the information technology industry experienced an economic boom. Jumping onto the IT bandwagon was seen as the clear path to financial prosperity. Unfortunately, this growth was short-lasting, and economies endured the distressing collapse of the ICT dot.com bubble. IT businesses have gone into bankruptcy, and hundreds of thousands of technology workers have lost their jobs through layoffs or outsourcing. Several questions remain as to why this occurred. Is there truly a need for such highly developed ICT infrastructures, or are we merely witnessing the effect of the market rebounding from over-saturation? Perhaps there will always be a need for such infrastructures, thus justifying the development initiatives. Furthermore, the fallout in the IT industry might only be a reflection of the state of the global economy. Despite the problems facing technology industries, spending on ICT development initiatives continues to rise and a persistent view has remained that such development programs offer solutions to economic disparity.

A major fear in the US and a hope within developing countries is that as IT development initiatives increase in developing countries, sectoral-specific jobs in the United States and Europe will migrate to poorer countries with lower wage standards.

On August 29th, 2003, the World Trade Organization held a low-key summit in Mexico to discuss liberalizing regulations on the outsourcing of information technology jobs from the United States and the European Union to entrepreneurs in developing countries. Will such training programs help the economy of the United States? According to the US Department of Commerce, nearly 660,000 information technology jobs were lost in 2003 to overseas IT outsourcing houses.

Field experts claim that the outsourcing phenomenon does not equate to a loss of jobs, but rather a "job transfer" or economic restructuring. The IT job losses tend to concentrate in the low-skill areas of the tech work force such as data entry, low-level help desk technical support, programming, Web site development, and database maintenance. The demand for higher skilled jobs that require an on-site presence such as network management, voice-over IP technology, information security, and customized application development, will continue to rise in the US. Will this shift help raise the standard of living in those targeted developing countries, while in turn bolstering the United States economy?

Policy development based on this study can be focused with two goals in mind. The first goal is to develop strategies for effective information communication technology development programs, which will foster job creation and economic activity. The second goal is to determine the impact of information communication technology development programs on economic stimulation and restructuring. The underlying question when studying programs that attempt to bridge the digital divide is "how can these initiatives best be implemented to maximize stimulation of economic activity?"

**Literature Review**

The purpose of this study is to analyze the impact of information communication technology programs on economic growth. Do these programs work? The belief that infrastructure-building technology policy can improve economy continues to thrive despite today's current recession. Advancing technologies, which apparently simply sprang unaided from the human imagination, are essentially viewed as all that is required for economies to grow. Jeff Madrick asserts that the principal danger of the mythology of technological preeminence and faith in a new economy is that it misleads us about how to sustain economic growth. In past analyses of economic growth, technology was habitually and frustratingly treated as a simple "manna from heaven" (Madrick 22-29). Unfortunately, fostering economic development through information technology programs is not simple, and several perspectives need to be analyzed.

Unfortunately, there is not an abundant amount of information available to measure the impact and effectiveness of such programs. According to Michael James, no studies currently exist to aid policy makers who are confronted with the related question of what will result from the adoption of technology programs. James cites a need to evaluate the impact of such programs in terms of a the economic restructuring and loss of export markets that could follow with the few jobs created from ICT development policies (James 159).

The core components of information technology development initiatives fall under the scope of education, and infrastructure-building. Education initiatives can be defined as programs that attempt to boost information technology literacy levels in

schools, as well as fostering education programs that lead to specialization in the technology sector workforce (Solomon 25). Infrastructure initiatives have been defined as programs that include standards settings institutions, telecommunications development, public sector computerization programs, and the promotion and financing of promising technology-oriented industries (James 95).

The overall goals of such programs are to foster economic growth. How can this economic growth be defined and measured? Economic growth can be directly measured by growth in a nation's gross domestic product (GDP). When more goods and services are produced, more income is generated in the form of profits and wages (Madrick 32). Conversely, UNESCO, a key player in information communication technology development programs in developing countries, prefers to measure economic growth in terms of per capita GDP (Pippa 54).

A key indicator of the relationship between information technology education programs and infrastructure development to economic activity is the existence of today's "digital divide." Information communication technology infrastructures and education programs tend to be more institutionalized in regions considered economically developed in comparison to poorer, less developed regions. According to the United Nations 2000 Annual Development Report, "The network society is creating parallel communications systems: one for those with income, education, and literally connections, giving plentiful information at low cost and high speed; the other for those without connections blocked by high barriers of time, cost, and uncertainty are dependent upon outdated information" (Pippa 21).

Internet access and availability is most commonly used to measure the extent of a digital divide, both in terms of socio-economic stratification, and regional stratification. The Department of Commerce reported that in the year 2000 households with less than a $15,000 US in income had a 12.7 percent Internet penetration rate, as compared to 77.7 percent rate for those households with incomes over $75,000 US (Solomon 4). Globally speaking, the Internet population surged from 3 million worldwide users in 1994 to more than 400 million in late 2000. Despite the increase, access remains available to only 7 percent of the world's population (Pippa 38). The United States contains an estimated 75 percent of all e-commerce sites worldwide, 79 percent of the world's Internet hosts, 59 percent of the world's electronic mailboxes, 54 percent of online buyers, and 38 percent of Internet users (Solomon 16).

A study for the International Telecommunications Union, using the United Nations Human Development Index, measuring the rate of adult literacy, education, life expectancy, and per capita GDP, found that the number of Internet hosts per country was significantly related to the general levels of socioeconomic development. Research by Rodriquez and Wilson for the World Bank also arrived at similar conclusions. The results of the World Bank's regression analysis confirm that the positive relationship between Internet use and economic development, measured by per capita GDP in 1997, is both strong and significant (R=0.77, sig-=.000) The critical threshold shows that online populations expand exponentially once countries rise above the $9,000 US level of per capita income (Pippa 55).

The first step in promoting information technology access is through the development of information technology literacy initiatives. These initiatives generally lead to what is called "self empowerment." Self empowerment can best be defined as the ability of individuals and local groups to make something happen – to bring positive change to schools, communities, and people's lives. Being empowered facilitates the acquisition of knowledge and can expand the development of attitudes and habits for the effective use of that knowledge; the result is an increase in the individual's capacity for learning. Mere acquisition of information, knowledge, or new technologies alone will not necessarily empower unless that new knowledge is liberating and relevant to the lives of end users. However, success of such programs is often measured in lowered student-to-computer ratios and higher percentages of school classrooms with Internet access (Solomon 15).

Some of the major literacy programs in the United States include the Technology Innovation Challenge Grant program, the Technology Literacy Challenge Fund program, and the E-rate program. These programs have supplied states and school districts with federal funding for both technical and human infrastructures. Solomon states that "Each of these programs have given states an opportunity to provide school districts – especially those with high poverty rates – with funds to help meet their most important technology needs" (Solomon 118). These programs are in action, focusing primarily on providing computers to schools, and integrating technology into education curriculum. The question remains, do they truly "empower" students?

The second step in development after education is the promotion of economic growth, the growth of businesses, and the use of information technology in business and major institutions. Global information infrastructures have become more important than transportation in the conduct of trade in our knowledge-based global information economy. Access to fixed-line and mobile telephones is important not only in its own right as an influence on a developing country's degree of integration into the global economy, but also because of the limits it sets on the country's access to data communications technologies (James 108-110). Development of a communications infrastructure is a prerequisite for the development and integration of a technology infrastructure.

The level of dependence on these infrastructures is expected to face a continual rise; a region's strategy for promoting economic development should be to place itself in the forefront of communication demands. Forty percent of the world's organizations are expected to be virtual by the year 2010, compared to a current level of 3 percent. Currently, the organizations based in United States dominate online presences, with 70 percent of the US firms on-line compared to 10 percent in Europe. In several studies involving leaders of multinational enterprises (MNEs), technology is considered to be the most significant driver of business location and activity; other important drivers included globalization, competition, and increasing demands of customers. 88 percent of MNE managers believe that up-to-date technology is important for their business competitiveness, and 64 percent of managers believe that small organizations can compete with the large ones through the innovative use of technology. (Roche 106-108)

If investment in digital technologies has the capacity to boost productivity, advanced economies such as Sweden, Australia, and the United States at the forefront of the technological revolution may well be placed to pull even farther ahead, maintaining their edge in future decades. A few middle-level economies like Taiwan, Brazil, and South Korea may manage to leverage themselves profitably into niche markets within the global marketplace, servicing international corporations based elsewhere by providing software development or manufacturing silicon chips (Pippa 5).

Does directing funding towards this problem result in an immediate solution? Before technology infrastructures can be developed, there are four pre-existing conditions that must be met. First and foremost, there must be a developed transportation and communication system in place. Second, there must be an institutionalized system of specialized education and high literacy standards. Third, a rational legal structure must be in place to protect economic rights. Fourth, and most importantly, there must be a source of financial capital. Financial capital in developing regions is traditionally available from direct investment of foreign MNEs, government programs, and international development agencies (Madrick 43).

In the popular view, which holds technological advances as the primary sources of economic growth, a nation's primary task should remain focused on encouraging investment in technological research and education. Technological opportunity is thus the principal stimulant of capital investment, and when the capital investment occurs, productivity growth results. Some economists who advocate this point of view argue that

government has an important part in subsidizing such research and education (Madrick 150).

This research determined that there is a direct correlation between economic development and efforts to develop information technology infrastructures. The question remains, is the information technology infrastructure the independent variable or dependent variable – does the economy create the infrastructure, or does the infrastructure create the economy? Is there evidence to show a direct correlation (before and after effects) of information communication technology development programs and economic growth? The presence of education initiatives, communication initiatives, and government policy is necessary to implement such programs successfully, but how can they be measured?

**Conceptual Framework**

The underlying theory behind the thesis is that manipulating social, governmental, and educational institutions can affect the market economy of a region. The specific manipulation of these institutions involves the creation of information communication technology programs, manipulations that will ultimately foster economic growth. The institutions in question include primary schools, secondary schools, vocational schools, universities, corporations, multinational enterprises, regional government agencies, national government agencies, non-profit organizations, international governmental organizations, and international non-governmental organizations.

Information Communication Technology development programs, the independent variables in this study, consist of information communication technology literacy

initiatives and information communication technology infrastructure-building programs. Information communication technology literacy initiatives consist of three key areas. The first area includes general literacy training programs that teach basic use of computers and commonly used operating systems (Microsoft Windows, Linux, and Apple OS), Internet literacy, e-mail, instant messaging, and voice and video communication. Another area of literacy initiatives includes education and certification programs that promote training for vocational sectors of technology. Such sectors include office administration, computer hardware repair and maintenance, network administration and management, information security, database administration and development, programming and software development, computer-aided drafting and modeling, graphic and multimedia design, audio and video production, Internet presence development, e-commerce, and telecommunications. The final area of technology literacy initiatives includes the development of technology integration programs to utilize the above technologies in the general operations of the institutions involved in this study.

Information Communication Technology (ICT) infrastructure initiatives cover four key areas. The first area is the acquisition of technology by previously mentioned institutions, including institutionalized computerization efforts. The second area is the development of telecommunication infrastructures. These infrastructures include the expansion and use of analog (voice) telephone access, analog and digital voice wireless access, Internet access including broad band (high speed coaxial cable, DSL, frame relay, T1, E1, T3, E3, ATM, Fiber Optic, broad band over power grid) and thin net (dial-up digital over analog line), wireless broad band Internet access, geosynchronous bi-

directional satellite Internet access, voice over IP technologies (voice communication provided over Internet telephone lines), and deregulation of telecommunication industries.

The third area involves the establishment and acknowledgement of standard-setting institutions. These standard-setting institutions develop universal guidelines for the use of existing technologies, and promote guidelines for the development of future technologies. Such international institutions include the Institute of Electrical and Electronic Engineers (IEEE), The Internet Engineering Task Force (IETF), and International Standards Organization (ISO). The fourth area involves government promotion and financing of specialized technology industries. This promotion includes financing industrial and science parks, promoting alliances with foreign firms and multi-national enterprises, influencing corporate strategy and rivalry by promoting mergers and favoring conglomerates, directing credit and incentives to promising industries, and jointly participating in enterprises and joint-ventures.

The dependent variable in this study is economic growth. Economic growth can be measured by five key indicators. The first indicator, GDP growth rate, is the overall annual change in the total amount of revenue generated in a national economy, or in other cases, a regional domestic product. The second area, the per capita gross domestic product growth rate, is the change in average income of a citizen of a national study, or resident of a regional study. The third area, change in the unemployment rate, is the number of individuals actively seeking jobs within a region on an annual basis. The

fourth area is the change in sectoral wages for specific professions. The fifth area is the change in exports for a particular country or region.

By measuring the dependent variables, before and after the implementation of regional and national information communication technology development programs, one can determine the correlation between ICT development programs and economic growth. The hypothesis of this study is that there is a positive relationship between ICT development programs and economic growth.

## Methodology

The study focuses primarily on a statistical analysis of ICT development initiatives in Saint Vincent and the Grenadines, and an analysis of technology development policies in the State of Pennsylvania. The original intent of this research was to conduct a statistical analysis for both populations, but the amount of data required to conduct such study for Pennsylvania was beyond the scope of this framework. As an alternative, two major economic development policies related to technology in Pennsylvania were chosen for analysis.

*Population Sample*

Saint Vincent and the Grenadines is an independent nation located in the South Eastern Caribbean with a population of approximately 115,000 people. The 2002 per capita income was $2,900 US, and the gross national product was $339 million US (US Central Intelligence Agency). The Government of Saint Vincent employees 22.1% of the labor force, a percentage making it the largest employer in the country (Saint Vincent Department of Statistics, 2004).

According to the Pennsylvania State Data Center, the 2002 population of Pennsylvania was approximately 12 million, with a per capita income of $20,880 US, and a gross state product of $403 billion US. Politically, both regions have democratic governments, and legal systems that support capitalist markets; these are conditions defined as prerequisites for successful economic development programs. The primary differences within the two regions of study are that Saint Vincent and the Grenadines is a considered an impoverished developing country facing economic growth, while

Pennsylvania is considered to be a developed region facing a current economic recession.. Exposure to technology programs in Saint Vincent is relatively new, while Pennsylvania holds a historical implantation of such programs.

*Variable Definitions*

The variables measured in the analysis of Saint Vincent and the Grenadines consist of the expansion of information communication technology (ICT) development programs, and measurements of economic growth. ICT development programs are the independent variables, while economic growth indicators are the dependent variables. ICT development programs fall under three categories: ICT literacy initiatives, IT infrastructure development, and communication technology development.

ICT literacy development is measured by collecting the following indicators: (1) The annual amount of direct government funding in a region for ICT literacy programs. This is a ratio variable. (2) The annual amount of direct government spending on vocational technical training in a region. This is a ratio variable. (3) The annual amount of funding spent by government for education and technology integration initiatives. This is a ratio variable.

IT infrastructure development is measured by the following variables: (1) Annual regional government funding on public computerization programs. This is a ratio variable. (2) Annual regional government internal ICT budgets. This is a ratio variable. (3) The total value of imported IT equipment. This is a ratio variable.

Communication technology development was measured by the following variables: (1) The annual amount of Internet subscribers. This is a ratio variable. (2)

The total number of fixed telephone line subscribers. This is a ratio variable. (3) The total number of wireless telephone subscribers.

The dependent variables measured in this study are historical changes in regional economic growth. These factors consist of the following: (1) Annual Gross Domestic Product in constant prices. This is a ratio variable. Annual change will be expressed as a positive or negative percentage. (2) Annual Regional per capita incomes in constant prices. This is a ratio variable. (3) Annual value of regional imports. This is a ratio variable. (4) Annual value of regional exports. This is a ratio variable.

*Data Collection Methods*

This research used existing studies and data, rather than attempting to create new data. Statistical data from 1992 to 2002 related to information technology development and economic development in Saint Vincent and the Grenadines was obtained from Ms. Jenel Lewis, statistician for the Ministry of Education, Youth and Sports; Ms. Zinnee Frederick, chief telecommunications officer of the Ministry of Telecommunications, Science, Technology and Industry; the Statistics Department of Saint Vincent and the Grenadines; Budgets from the Government of Saint Vincent and the Grenadine's Annual Register; and annual reports from the International Telecommunications Union. Qualitative data for Saint Vincent was collected from personnel related to ICT programs in both the public and private sector, including program directors, government officials, business owners, and program participants.

Data obtained covering the Pennsylvania economy, Pennsylvania labor force statistics, the Workforce Investment Act and the Ben Franklin Technology Partners

programs was obtained from the Pennsylvania Department of Labor and Industry, the Pennsylvania Data Center, the Ben Franklin Technology Partners Program, and interviews with program directors of Innovation Works, and the Southwest Pennsylvania representatives of the Ben Franklin Technology Partners Program.

*Data Analysis Methods*

Data collected from Saint Vincent was entered into an SPSS (Statistical Package for Social Scientists) data set. This data represented a time span of 1992 to 2002, and was divided into quarterly cases to provide approximately 40 degrees of freedom. A lag time of one year was used to link ICT development data to economic data of the following year. Linear regression analysis was used to determine significant relationships between variables from the three categories of ICT development (IT infrastructures, IT education, and Communications Infrastructures) and economic growth indicators. Significant relationships were determined for paired variables which had correlations demonstrating less than 5% probability. Slopes were analyzed to determine the actual level of impact that ICT development variables had upon economic growth within a year's time span. Qualitative data was used to develop a rationale for the study's findings. All numbers are reported in Eastern Caribbean Dollars. (1 USD = 2.7169 EC)

Data obtained from the Pennsylvania Workforce Investment Act and the Ben Franklyn Technology Partners Program was analyzed on a cost/benefit format. The total economic costs of the programs were compared to the total economic output (or benefits)

of the programs. Policy analysis was then determined based upon fiscal gain and political feasibility.

**Saint Vincent and the Grenadines**

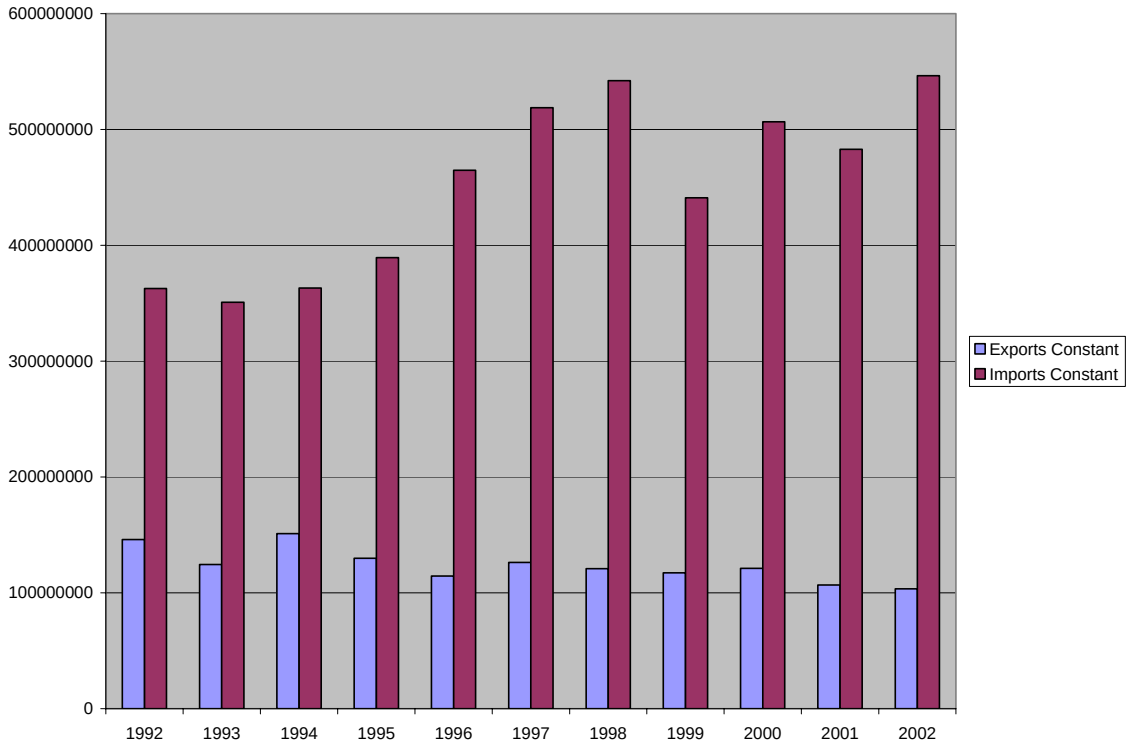
Public policy directed towards the development of information communication technology in Saint Vincent is a relatively new phenomenon. The Ministry of Telecommunications, Science, Technology and Industry, the ministry officially responsible for directing such affairs, was only recently formed in 2002. Other ICT development initiatives have been led by the Ministry of Education, Youth and Sports, which began a National Computerization of the Schools program in the year 2000, ultimately computerizing 49 primary, secondary, vocational, and tertiary institutions. Telecommunications licensing and operations fall under the authority of the National Telecommunications Regulatory Commissions (NTRC), a body which was formed as part of the Saint Vincent and the Grenadines Telecommunication Act of 2001.

*Saint Vincent Economic Trends*

From 1992 to 2002, Saint Vincent endured a dramatic drop in exports, while also experience a rise in economic productivity. The total volume of exports decreased from $146,010,000 EC to $103,490,000 EC in 10 years (Saint Vincent Department of Statistics, 2003). Much of this drop is attributed to the World Trade Organization's 1997 ruling which abolished the European Union's guaranteed access of Caribbean agricultural products to European markets. (BBC News, 7 April 1999). Before this ruling, the 48 ex-European colonies had established preferential trade arrangements with the European Union under the Lome agreement of 1975. The Lome agreement permitted duty-free access to the European economy (Banana Link, November 2002). Despite the fallout from the WTO's ruling against the agreement, bananas continue to make up 39% of Saint

Vincent's total exports (Nationmaster, 2005). Although total exports have consistently dropped on an annual basis, Saint Vincent's overall volume of imports has increased from 362,719,000 in 1992 to 546,367,000 in 2002.

Figure 1: Saint Vincent Imports and Exports




At the same time of the agricultural fallout, Saint Vincent continued to experience economic growth. The gross domestic product in constant prices rose from $631,000,000 EC in 1992 to $947,000,000 EC in 2002. Per capita income in constant prices rose from $6,516 EC in 1992 to $8,768 EC in 2002. Much of this economic growth is attributed to Saint Vincent's process of economic restructuring, while low-value agricultural exports have been on the decrease, new market sectors such as banking and finance, tourism, and industry have been on the rise. 64% of Saint Vincent's GDP is now generated through

the service sector, with 26% originating from industry, and 10% originating from agriculture (Nationmaster, 2004).

Figure 2: Saint Vincent Gross Domestic Product

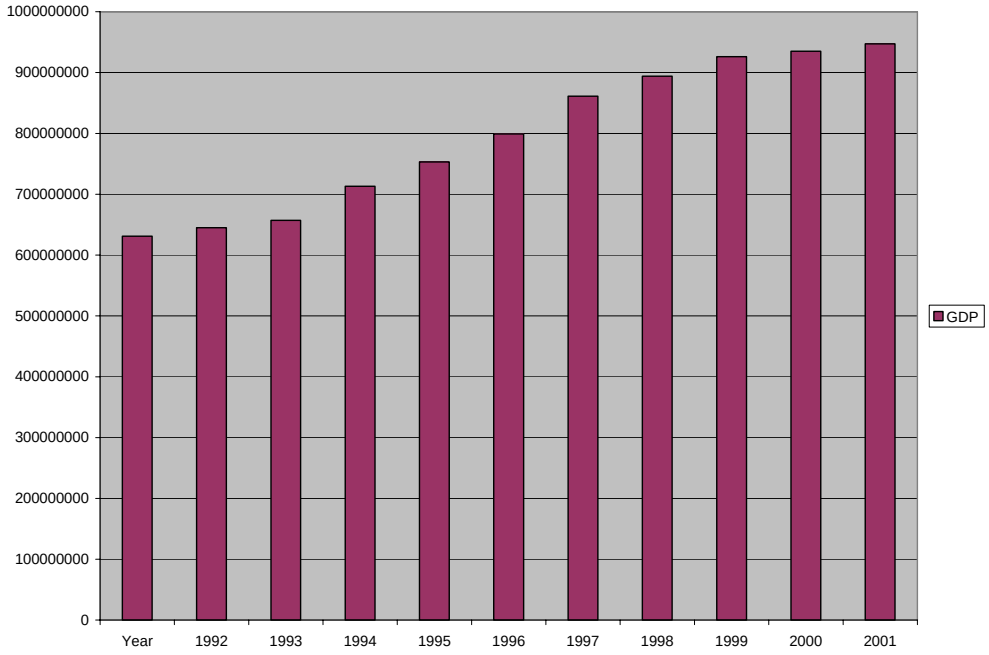
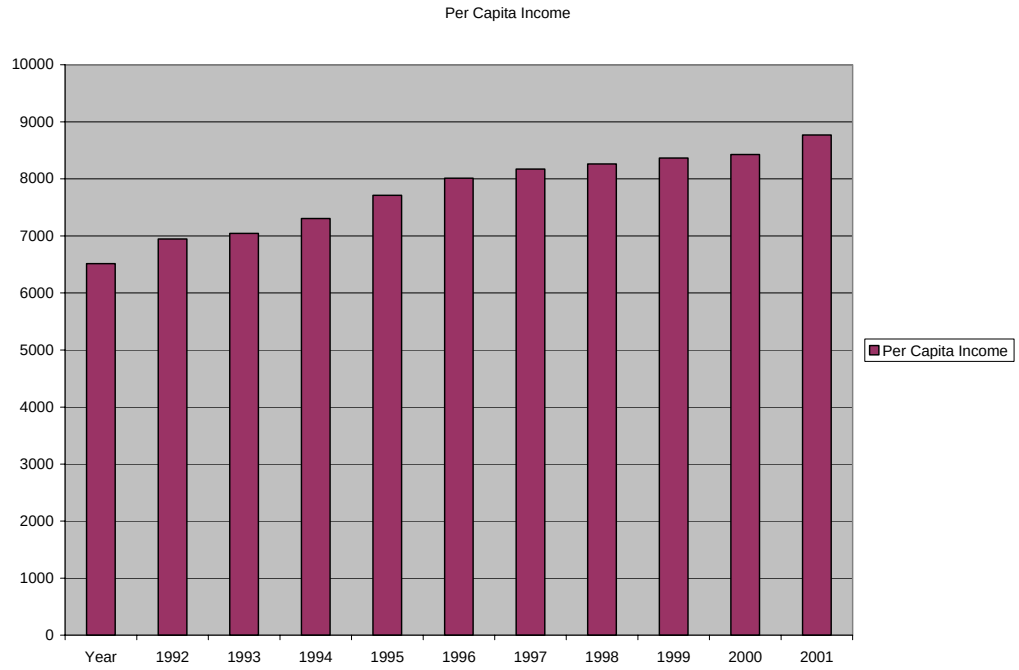


Figure 3: Saint Vincent per Capita Income

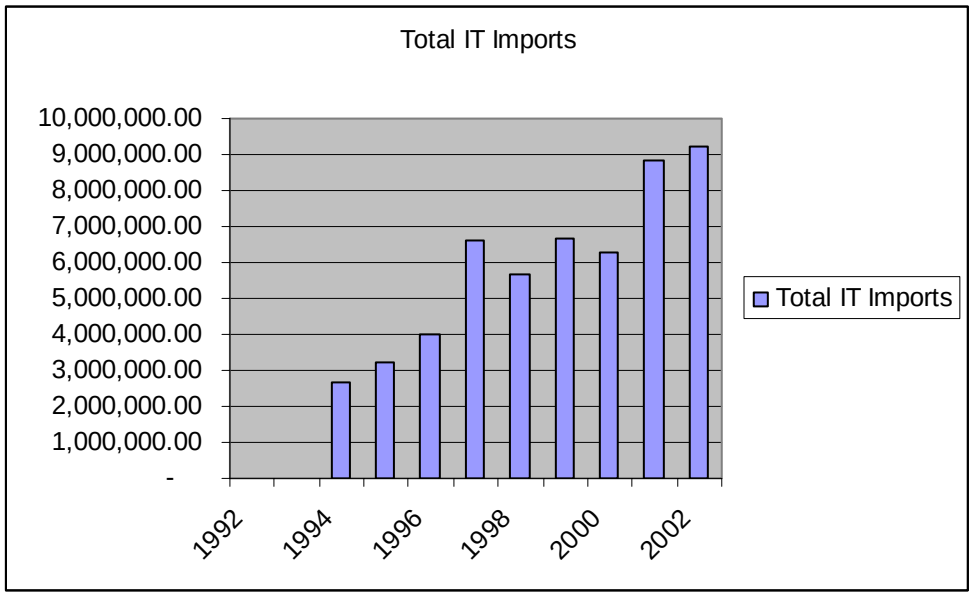



*Saint Vincent - Information Technology Infrastructure Initiatives*

The overall economic impact of IT infrastructure-building appears positive. Strong correlations found between IT infrastructure indicators with the GDP, per capita income, and economic growth rate, reflect that there is a link between a growing economy and the development of IT infrastructures. The Government of Saint Vincent first began reporting costs related to their IT infrastructure in 1994. The Customs and Excise department also first set up a classification of computer equipment for importation in 1994. Between 1994 and 2002, the total value of IT equipment imports increased from $2,646,840.00 EC to $9,233,600.00 EC. The total value of all imported IT equipment over those 10 years was $53,150,191.20 EC. In terms of government spending, the total IT budget for all Ministries increased from $1,344,900 EC in 1994 to

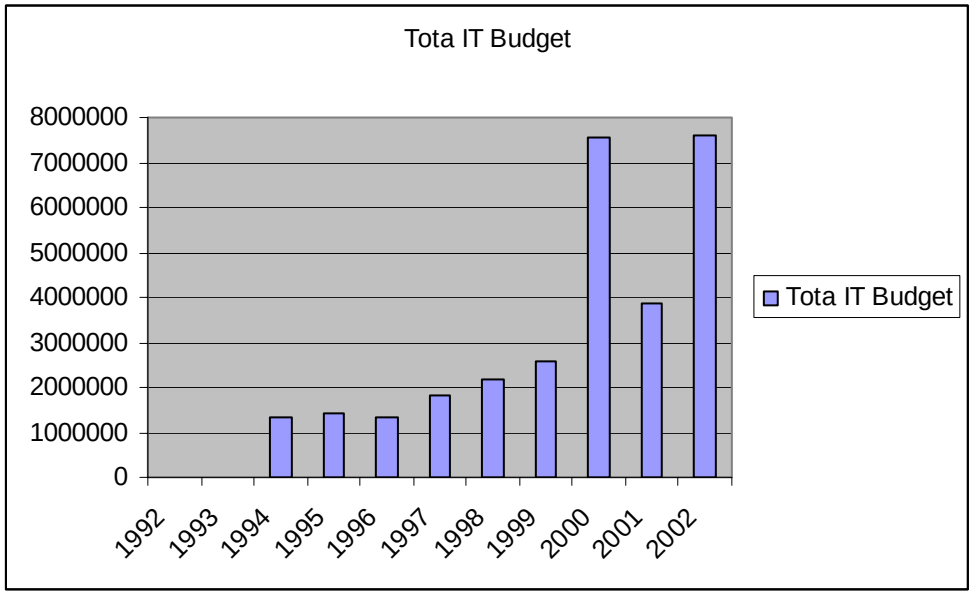
$7,607,264 in 2002, with a total amount of $29,700,507.20 EC being allocated for IT needs over 10 years.

Figure 4: Total IT Imports




Perhaps the largest infusion of capital into one single program related to Saint Vincent's IT infrastructure policies originated from the Ministry of Education's computerization of the schools initiatives. Under these programs, the Ministry of Education, Youth and Sports received a total of $7,002,221.00 EC from the Republic of China (Taiwan) to computerize every primary and secondary school in Saint Vincent and the Grenadines. Under the three phases of this program, 41 schools received new computers and fully functional computer labs.

Figure 5: Total Government of Saint Vincent and the Grenadines IT Budget




Most of section's findings are contradictory to the emerging philosophy that "sustainability building should replace infrastructure-building," which is held among development agencies. The direct infusion of capital into an economy resulting from developing ICT infrastructures clearly has a positive impact. Furthermore, emerging business sectors must also arise to support these growing infrastructures. Examples of such growth are evident in the creation of IT departments to support organizational operations, and the visible increase in technology-related businesses, which provide both sales and service to the consumer and users of ICT infrastructures. An increase in organizational operations efficiency can also be attributed to the growth in ICT infrastructures.

Perhaps the most visible impact of infrastructure-building policy in Saint Vincent was the Ministry of Education's computerization of the schools program. Cuthbert

James, Associate Peace Corps Director in Saint Vincent and the Grenadines, notes that "the assistance given by Taiwan, in terms of providing computers for primary and secondary schools has made the major impact. Computers are expensive, and the donation involved thousands of computers. The construction of all the computer centers at the schools have also assisted" (James, 2004). Before the program, only a small number of select schools had computer labs or IT-related curriculum. Cammie Mathews, an administrator at the Ministry of Education, observed that before these initiatives, there were only "one or two computers in the principal's offices, and no labs or student access to these computers" (Matthews, 2004).

With the development of major physical infrastructures comes the need for administrative support. Curtis Greaves, an IT instructor from Emmanuel High School in Mesopotamia, finds that building infrastructures alone is not the answer to development. "You can't just throw computers in the labs without having an administrative and personnel infrastructure in place." The growing need of specialized personnel to support computerized schools has led to the formation of a national IT unit in the Ministry of Education, which will make selected educators responsible for maintenance and repair of computers within schools in the region (Greaves, 2004).

In personal interviews with Vincentians, the overall economic impact of these infrastructures has not been directly visible; however many people did note a rise in IT-related businesses and services. La Fleur John, Secretariat General of the UNESCO national commission, noted that "quite a few people are making adventurous moves, definitely through the provision of technical services related to IT. Technicians,

engineers, computer supplies, importing computers and computer-related supplies. We have people designing Web pages, and using their computers for graphic design services. This will all add up as the dependence on information technology spreads here" (John, 2004).

One concern is the lack of observed economic impact within the private sector. Although IT equipment can be imported tax free into Saint Vincent, private sector members do not observe much of an impact from government policies. Lamonto White, a network administrator for the National Commercial Bank of Saint Vincent and the Grenadines, states, "I haven't seen any major initiatives. Some years ago I have seen computer donations to schools, but nothing to make you say 'Wow!' I don't think that these programs have really benefited the private sector. The only people that would benefit are the school kids" (White, 2004).

It appears as if the building of IT infrastructures has a direct visible effect on the economy through the infusion of capital, but the long-term developmental effects depend on the development of a professional IT workforce. As these infrastructures grow, the demand for qualified support personnel will also increase. Furthermore, new areas of the economy appear to be opening up as a result of these infrastructures. These areas are not only limited to equipment sales and support, but the provision of other services such as Web page design, graphic services, and e-commerce. In terms of productivity, the overall impact of these infrastructures is expected to improve the operational efficiencies of organizations; however, this phenomenon has not been measured or quantified.

*Statistical Analysis - Computerization of the Schools and Per Capita Income.* The Ministry of Education's Computerization of the Schools initiative has a relationship with the per capita income, producing an R value of .742. 74.2% of variability in the per capita income can be explained by the national computerization initiatives. The slope for the relationship is .001, indicating that for every dollar spent on the computerization program, per capita income increased by $.001 EC. The t value for this correlation is 6.451. A strong correlation is visible between the two variables, however the slope is minimal. Such a small slope can be explained by either a polarized economic distribution, or too short of a lag time between the economic indicators and the policy initiatives.

Table 1 –Per Capita Income and Computerization of the Schools

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .742(a) | .550 | .537 | 362.46266 |

a Predictors: (Constant), Budget - Total Internal

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 5468088.107 | 1 | 5468088.107 | 41.621 | .000(a) |
| | Residual | 4466892.123 | 34 | 131379.180 | | |
| | Total | 9934980.230 | 35 | | | |

a Predictors: (Constant), Budget - Total Internal
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 7473.805 | 102.357 | | 73.017 | .000 |
| | Budget - Total Internal | .001 | .000 | .742 | 6.451 | .000 |

a Dependent Variable: Per Capita Income

1. H0 = There is no linear relationship between Saint Vincent's Computerization of the Schools initiative and the per capita income in constant prices, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .742, the value for F is 41.621, the slope is .001, and the value for t is 6.451.
4. The probability of obtaining the observed correlation is 0, the probability for obtaining the observed slope is 0.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 74.2% of variability in the per capita income can be explained by the computerization of schools initiative. The observed slope for the relationship between per capita income and the computerization of the schools initiative is .001, which indicates that for every dollar spent on computerizing schools, the per capita income increases by .001. There appears to be a positive relationship between national computerization efforts and the GDP.
7. Although there is a strong correlation between the computerization of the schools program and per capita income, the slope is minimal. This low slope can be due to either a polarizing effect of economic distribution, or that the lag time between the economic indicator and the computerization initiatives is too short.

*Statistical Analysis - Computerization of the Schools and GDP Constant.* The Ministry of Education's Computerization of the Schools initiative has a relationship with GDP in constant prices, producing an R value of .335. 33.5% of variability in the GDP can be explained by the from the national computerization initiative. The slope for the relationship is 23.071, indicating that for every dollar spent on the computerization program, the GDP increased by $23.071 EC. The t value for this correlation is 2.070. This relationship indicates increased economic activity as a result of this program. The phenomenal level of growth can also be attributed to the direct infusion of over $7 million EC dollars into the local economy. Funds from this project not only went into purchasing computers, but also towards hiring local contractors to construct computer

labs, consultants to advise the schools and governments, as well as the establishment of specialized IT instructor positions in every school.

Table 2 - Computerization of the Schools and GDP Constant

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .335(a) | .112 | .086 | 24171397.01845 |

a Predictors: (Constant), Budget - MOE Phase 123

**ANOVA(b)**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 2502781250000000.000 | 1 | 2502781250000000.000 | 4.284 | .046(a) |
| | Residual | 19864718750000010.000 | 34 | 584256433823529.000 | | |
| | Total | 22367500000000000.000 | 35 | | | |

a Predictors: (Constant), Budget - MOE Phase 123
b Dependent Variable: GDP - Constant Prices

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 204968750.000 | 4272939.686 | | 47.969 | .000 |
| | Budget - MOE Phase 123 | 23.071 | 11.147 | .335 | 2.070 | .046 |

a Dependent Variable: GDP - Constant Prices

1. H0 = There is no linear relationship between Saint Vincent's Computerization of the Schools initiative and the national GDP in constant prices, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .335, the value for F is 4.284, the slope is 23.071, and the value for t is 2.070.
4. The probability of obtaining the observed correlation is .046, the probability for obtaining the observed slope is .046.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 33.5% of variability in the GDP constant prices can be explained by the computerization of schools initiative. The observed slope for the relationship between the GDP constant and the computerization of the schools initiative is 23.071, which indicates that for every dollar spent on computerizing schools, the GDP increases by 23.071. There appears to be a positive relationship between national computerization efforts and the GDP.
7. The computerization of the schools project not only involved purchasing of IT equipment, but also the construction of computer labs, hiring of technical consultants and IT teachers. The slope in this case is so large due to ripple effect of such a large scale national infrastructure-building project.

*Statistical Analysis - Total Non Educational Internal IT Budget and Total Imports.*

The total non educational IT budget has a relationship with the total value of imports, producing an R value of .445. 44.5% of variability in the total value of imports can be explained by the total non educational IT budget. The slope for the relationship is 22.596, indicating that for every dollar spent on the non educational IT budget, the total value of imports increased by $22.596 EC. The t value for this correlation is 2.901. This relationship can indicate the overall increase in imports in Saint Vincent and the Grenadines, and the fact that all IT equipment purchased in Saint Vincent must be imported.

Table 3 - Total Non Educational Internal IT Budget and Total Imports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .445(a) | .198 | .175 | 14084045.27413 |

a Predictors: (Constant), Budget - Non Ed Total

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1669003102575613.000 | 1 | 1669003102575613.000 | 8.414 | .006(a) |
| | Residual | 6744251263646610.000 | 34 | 198360331283723.700 | | |
| | Total | 8413254366222220.000 | 35 | | | |

a Predictors: (Constant), Budget - Non Ed Total
b Dependent Variable: Total Imports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 113750680.167 | 2802274.609 | | 40.592 | .000 |
| | Budget - Non Ed Total | 22.596 | 7.790 | .445 | 2.901 | .006 |

a Dependent Variable: Total Imports

1. H0 = There is no linear relationship between Saint Vincent's non educational IT budget and the total value of imports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .445, the value for F is 8.414, the slope is 22.596, and the value for t is 2.901.
4. The probability of obtaining the observed correlation is .006, the probability for obtaining the observed slope is .006.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 44.5% of variability in the total value of imports can be explained by the non educational IT budget. The observed slope for the relationship between the total value of imports and the non educational IT budget is 22.596, which indicates that for every dollar spent on the non educational IT budget, the total value of imports increases by 22.596. There appears to be a positive relationship between the total non educational IT budget and the total value of imports.
7. The total non educational IT budget and the total value of imports show a positive relationship. This can be due to the fact that imports in Saint Vincent have been increasing on a whole, and the fact that all purchased IT equipment must be imported into the country.

*Statistical Analysis - Total Non Educational Internal IT Budget and Total Exports.* The total non educational IT budget has a relationship with the total value of exports, producing an R value of .492. 49.2% of variability in the total value of imports can be explained by the total non educational IT budget. The slope for the relationship is -5.405, indicating that for every dollar spent on the non educational IT budget, the total value of exports decreased by $5.405 EC. The t value for this correlation is 53.140. This relationship reflects Saint Vincent's transition of moving from an exporting agricultural economy to a non exporting service based economy.

Table 4 - Total Non Educational Internal IT Budget and Total Exports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .492(a) | .242 | .219 | 2968007.82519 |

a Predictors: (Constant), Budget - Non Ed Total

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 95493769741617.300 | 1 | 95493769741617.300 | 10.840 | .002(a) |
| | Residual | 29950839531393 8.200 | 34 | 88090704504 09.940 | | |
| | Total | 39500216505555.500 | 35 | | | |

a Predictors: (Constant), Budget - Non Ed Total
b Dependent Variable: Total Exports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 31381353.922 | 590538.642 | | 53.140 | .000 |
| | Budget - Non Ed Total | -5.405 | 1.642 | -.492 | -3.292 | .002 |

a Dependent Variable: Total Exports

1. H0 = There is no linear relationship between Saint Vincent's non educational IT budget and the total value of exports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .492, the value for F is 10.84, the slope is -5.405, and the value for t is -3.292.
4. The probability of obtaining the observed correlation is .002, the probability for obtaining the observed slope is .002.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 49.2% of variability in the total value of exports can be explained by the non educational IT budget. The observed slope for the relationship between the total value of exports and the non educational IT budget is -5.405, which indicates that for every dollar spent on the non educational IT budget, the total value of exports decreases by 5.405. There appears to be a negative relationship between the total non educational IT budget and the total value of exports.
7. The negative relationship can be an indication of Saint Vincent's transition from an exporting agricultural economy to a non exporting service based economy.

*Statistical Analysis - Total Non Educational Internal IT Budget and GDP Constant.*

The government's total non educational IT budget and the GDP in constant prices have a strong relationship. The relationship between the IT budget the GDP in constant prices produces an R value of .762. 76.2% of variability in the GDP can be explained by the total IT budget. The slope for the relationship is 31.478, indicating that for every dollar allocated to IT infrastructures, the GDP increased by $31.478 EC. The t value for this correlation is 6.855. It appears as if the direct infusion of capital into the local economy to support and build physical ICT infrastructures has a positive impact.

Table 5 - Total Non Educational Internal IT Budget and GDP Constant

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .762(a) | .580 | .568 | 16617924.52622 |

a Predictors: (Constant), Budget - Total Internal

**ANOVA(b)**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 12978215870985880.000 | 1 | 12978215870985880.000 | 46.996 | .000(a) |
| | Residual | 9389284129014120.000 | 34 | 276155415559238.900 | | |
| | Total | 22367500000000000.000 | 35 | | | |

a Predictors: (Constant), Budget - Total Internal
b Dependent Variable: GDP - Constant Prices

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 181946585.852 | 4692769.244 | | 38.772 | .000 |
| | Budget - Total Internal | 31.478 | 4.592 | .762 | 6.855 | .000 |

a Dependent Variable: GDP - Constant Prices

1. H0 = There is no linear relationship between the Government of Saint Vincent's internal IT budget and the national GDP in constant prices, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .762, the value for F is 46.996, the slope is 31.478, and the value for t is 6.855.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 76.2% of variability in the GDP constant can be explained by the total internal non educational IT budget of the government. The observed slope for the relationship between the GDP constant and the internal budget is 31.478, which indicates that for every dollar spent on computerizing schools, the GDP increases by 31.478. There appears to be a positive relationship between national IT budget and the GDP.

7. The total government non educational IT budget has a strong impact on the GDP. Expenditures include not only purchases of equipment from local computer based businesses, but also the direct hiring of local consultants, the creation of IT-related positions within the governments, and the creation of jobs in supporting businesses to meet the government's purchase requirements.

*Statistical Analysis - Total Non Educational Internal IT Budget and Per Capita Income.* The government's total non educational IT budget and the per capita income have a strong correlation but a minimal slope. The relationship produces an R value of .742, indicating that 74.2% of variability in the per capita income can be explained by the total IT budget. The slope for the relationship is .001, indicating that for every dollar spent on building physical infrastructures, the per capita income changes by $.001 EC. The t value for this correlation is 6.451. Although there is a strong relationship between the IT budget and per capita income, observable changes are minimal. The minimal slope could be explained by the fact that only those working in specialized positions would benefit directly from such programs, while not making an overall impact on the general standard of living.

Table 6 - Total Non Educational Internal IT Budget and Per Capita Income

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .742(a) | .550 | .537 | 362.46266 |

a Predictors: (Constant), Budget - Total Internal

**ANOVA(b)**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 5468088.107 | 1 | 5468088.107 | 41.621 | .000(a) |
| | Residual | 4466892.123 | 34 | 131379.180 | | |
| | Total | 9934980.230 | 35 | | | |

a Predictors: (Constant), Budget - Total Internal
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. |
| 1 | (Constant) | 7473.805 | 102.357 | | 73.017 | .000 |
| | Budget - Total Internal | .001 | .000 | .742 | 6.451 | .000 |

a Dependent Variable: Per Capita Income

1. H0 = There is no linear relationship between the Government of Saint Vincent's non education IT budget and the per capita income, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .742, the value for F is 41.621, the slope is .001, and the value for t is 6.451.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 74.2% of variability in the per capita income can be explained by the total internal IT budget of the government. The observed slope for the relationship between the per capita income and the internal budget is .001, which indicates that for every dollar spent on non education IT budgets, per capita income increases by .001. There appears to be a positive relationship between national IT budget and the per capita income.
7. The total non education IT budget has a strong correlation on per capita income, however the slope is minimal. The minimal slope could be due to either a polarizing effect where new high ranging incomes are balanced out by low unskilled positions, or because the lag time used to measure significance between per capita income and IT spending is too narrow.

*Statistical Analysis - Total Imports of IT Equipment and Total Imports.* The total value of imported IT equipment and the total value of imports have a positive relationship. The correlation has an R value of .733, indicating that 73.3% of the variability in imports can be explained by IT imports. The slope for the relationship is 20.633, indicating that for every dollar's worth of IT imports, the total volume of imports increases by $20.633 EC. The value for T of this correlation is -6.277. The relationship

between the importation of IT equipment and overall imports can be a result of increased purchasing power by Vincentians, and the increasing ability to purchase goods from overseas.

Table 7 - Total Imports of IT Equipment and Total Imports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .733(a) | .537 | .523 | 10706391.78127 |

a Predictors: (Constant), Imports - IT Equipment

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 4515942317108090.000 | 1 | 4515942317108090.000 | 39.397 | .000(a) |
| | Residual | 3897312049114123.000 | 34 | 114626824973944.800 | | |
| | Total | 8413254366222220.000 | 35 | | | |

a Predictors: (Constant), Imports - IT Equipment
b Dependent Variable: Total Imports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 87728518.830 | 5170828.357 | | 16.966 | .000 |
| | Imports - IT Equipment | 20.633 | 3.287 | .733 | 6.277 | .000 |

a Dependent Variable: Total Imports

1. H0 = There is no linear relationship between the total value of imported IT equipment and the total value of imports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .733, the value for F is 39.397, the slope is 20.633, and the value for t is 6.277.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.

6. When running a regression on 35 cases, 73.3% of variability in the total value of imports can be explained by the total value of IT imports. The observed slope for the relationship between the IT imports and total imports is 20.633, which indicates that for every dollar spent on imported IT goods, the value of imported goods increases by 20.633. There appears to be a positive relationship between IT imports and total imports.
7. The positive relationship between IT imports and the total value of imports can reflect an increase in purchasing power of Vincentians, and the growing ability to purchase goods from overseas.

*Statistical Analysis - Total Imports of IT Equipment and Total Exports.* The total value of imported IT equipment and the total value of exports have a negative relationship. The correlation has an R value of .806, indicating that 80.6% of the variability in exports can be explained by IT imports. The slope for the relationship is -4.919, indicating that for every dollar's worth of IT imports, the total volume of exports decreases by $4.919 EC. The value for T of this correlation is -7.944. Although the slope for exports is negative, it is more than likely another indicator of economic restructuring. As Saint Vincent makes the transition from an agricultural economy to a service based economy, we are bound to see a drop in exports.

Table 8 - Total Imports of IT Equipment and Total Exports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .806(a) | .650 | .640 | 2016779.16953 |

a Predictors: (Constant), Imports - IT Equipment

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 25671062562 1641.100 | 1 | 25671062562 1641.100 | 63.114 | .000(a) |
| | Residual | 13829153943 3914.300 | 34 | 4067398218644.541 | | |
| | Total | 39500216505 5555.500 | 35 | | | |

a Predictors: (Constant), Imports - IT Equipment
b Dependent Variable: Total Exports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 37582184.423 | 974036.737 | | 38.584 | .000 |
| | Imports - IT Equipment | -4.919 | .619 | -.806 | -7.944 | .000 |

a Dependent Variable: Total Exports

1. H0 = There is no linear relationship between the total value of imported IT equipment and the total value of exports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .806, the value for F is 63.114, the slope is .-4.919, and the value for t is 7.944.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 80.6% of variability in the total value of exports income can be explained by the total value of IT imports. The observed slope for the relationship between the IT imports and total exports is -4.919, which indicates that for every dollar spent on imported IT goods, the value of exported goods decreases by 4.919. There appears to be a negative relationship between IT imports and total exports.
7. Although IT imports appear to have a negative impact on total exports, this finding highlights the economic restructuring that the country is currently undertaking. As the agricultural economy shifts towards an information and service based economy we are likely to see a decrease in overall exports without the creation of new production oriented industries.

*Statistical Analysis - Total Imports of IT Equipment and GDP Constant* The total value of imported IT equipment and the GDP in constant prices have a positive relationship. The correlation has an R value of .910, indicating that 91% of variability in the GDP can be explained by IT equipment imports. The slope for the relationship is

41.801, indicating that for every dollar's worth of imported IT equipment the GDP increases by $41.801 EC. The value for T of this correlation is 12.825. By general logic, this relationship could have reverse causality, meaning that as the economy grows, so will the level of IT imports. However, due to a lag time of 1 year between the GDP and the reported value of IT imports, the influx of equipment does demonstrate an economic impact.

Table 9 - Total Imports of IT Equipment and GDP Constant

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .910(a) | .829 | .824 | 10615544.54052 |

a Predictors: (Constant), Imports - IT Equipment

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 18536047279678430.000 | 1 | 18536047279678430.000 | 164.487 | .000(a) |
| | Residual | 3831452720321576.000 | 34 | 112689785891811.000 | | |
| | Total | 22367500000000000.000 | 35 | | | |

a Predictors: (Constant), Imports - IT Equipment
b Dependent Variable: GDP - Constant Prices

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 146201469.532 | 5126952.185 | | 28.516 | .000 |
| | Imports - IT Equipment | 41.801 | 3.259 | .910 | 12.825 | .000 |

a Dependent Variable: GDP - Constant Prices

1. H0 = There is no linear relationship between the total value of imported IT equipment and the GDP in constant prices, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .910, the value for F is 164.487, the slope is 41.801, and the value for t is 12.825.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 91 % of variability in the GDP constant can be explained by the total value of IT imports. The observed slope for the relationship between the IT imports and total exports is 41.801, which indicates that for every dollar spent on imported IT goods, the GDP constant increase by 41.801. There appears to be a positive relationship between IT imports and the GDP constant.
7. The slope for the GDP in constant prices gives us a more accurate portrayal of the true impact of IT imports. By measuring annual data in terms of constant fixed prices, we eliminate the possibility of inflation being interpreted as GDP growth. The increase in imports has clearly impacted economic growth in the country, most likely due to emerging technology based businesses, technology based professions, and increased productivity through the use of technology.

*Statistical Analysis - Total Imports of IT Equipment and Per Capita Income.* The total value of imported IT equipment and per capita income has a significant correlation, however the slope is minimal. The correlation has an R value of .931, indicating that 93.1% of variability in the per capita income can be explained by the total value of IT imports. The slope for the relationship is .001, indicating that for every dollar's worth of IT equipment that is imported, the per capita income changes by $.001 EC. The t value for this slope is 11.945. Although a strong correlation is visible between these two indicators, the measurable impact is miniscule. Perhaps as new IT infrastructures infuse the economy with economic development, we also experiencing a balancing effect in income as employment shifts from one sector to another.

Table 10 - Total Imports of IT Equipment and Per Capita Income

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .931(a) | .866 | .860 | 227.50613 |

a Predictors: (Constant), Imports - IT Equipment

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 7385573.548 | 1 | 7385573.548 | 142.691 | .000(a) |
| | Residual | 1138698.859 | 22 | 51759.039 | | |
| | Total | 8524272.407 | 23 | | | |

a Predictors: (Constant), Imports - IT Equipment
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 6060.781 | 146.960 | | 41.241 | .000 |
| | Imports - IT Equipment | .001 | .000 | .931 | 11.945 | .000 |

a Dependent Variable: Per Capita Income

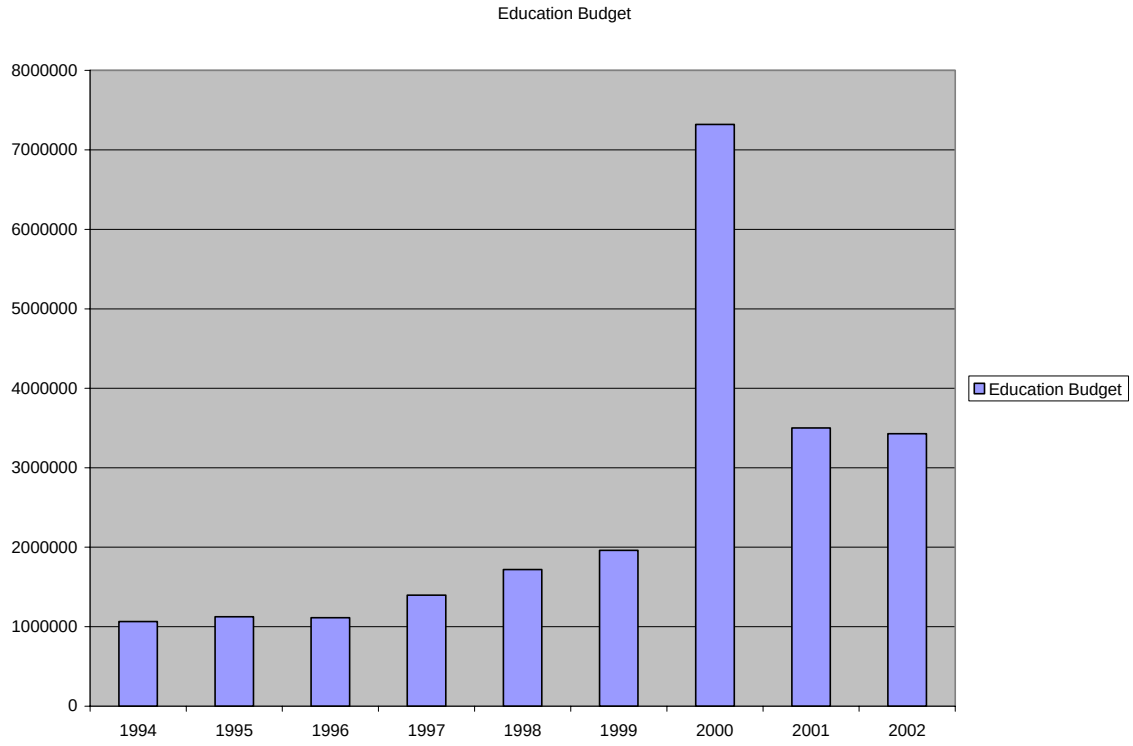
1. H0 = There is no linear relationship between the total value of imported IT equipment and the per capita income, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .931, the value for F is 142.691, the slope is .001, and the value for t is 41.241.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 93.1 % of variability in per capita income can be explained by the total value of IT imports. The observed slope for the relationship between the IT imports and total exports is .001, which indicates that for every dollar spent on imported IT goods, per capita income increases by .001. There appears to be a positive relationship between IT imports and per capita income.
7. There is clearly a strong significance between IT imports and per capita income. The slope is minimal as per capita income measurements do not account for variations or stratification in income levels.

*Saint Vincent Technology Education Initiatives*

The Government of Saint Vincent and the Grenadines first began funding of IT education initiatives in 1994. The largest funded agency for IT training initiatives in Saint Vincent is the Service Commission, which provides technology-related training to government employees from all ministries. The second largest agency is the Ministry of Education, which recently began national IT programs following economic assistance from Taiwan in 1999. Just recently in 2003, the Ministry of Telecommunications, Science and Technology formed the National Institute of Technology to provide specialized IT-related training to the public.

Between 1994 and 2003, the Government of Saint Vincent and the Grenadines spent a total of $33,188,702.4 EC dollars on IT-related training. The total reported IT education budget increased from $1,064,000 EC in 1994 to $3,428,405 in 2002. Although the data obtained from the Government represents a large portion of the funding spent on IT education programs, it clearly does not include the entire picture. Data from contributing agencies such as the United States Peace Corps, US AID, the Canada Fund, the Organization of the American States, and the United Nations Educational Scientific and Cultural Organization were either not available or miniscule. Nevertheless, these agencies continue to make a large impact towards the development of IT education initiatives through policy directives, and in country programs.

Figure 6: Total IT Education Budget




The overall economic impact of IT education programs appears to be positive. Strong correlations between IT Literacy programs with the GDP, and per capita income, reflect that there is a link between a growing economy and specialized technology training programs. Reverse causality can be eliminated due to the 1 year lag time created between the economic indicators and IT education variables in the regression analysis. It is likely that even a stronger economic impact would be apparent if the lag time was increased.

IT training programs clearly present economic stimulation; however these policies are still in their infancy throughout Saint Vincent and the Grenadines. Considerable time will be required to accurately measure the true product of such policy efforts. La Fleur

John, Secretariat General for the UNESCO National Commission notes that the "the training will probably not impact in the short term, but certainly in the long term. We need a more sustained intervention to have that sort of impact on the economy, possibly over a 3 to a 5 year program" (John, 2004). Although strong visible economic results are not immediate, it is the opinion of many that such education prepares the work force for growing and emerging markets.

A relatively new program for Saint Vincent and the Grenadines has been the establishment of the National Institute of Technology (NIT). Founded in 2003, the NIT has already trained over 300 people in skill areas ranging from general computer literacy, hardware and software maintenance, to advanced systems engineering and administration. According to Charles Burke, director of the NIT, "about 30 percent of people who train at the NIT and were not previously working obtain some sort of employment based on the training" (Burke, 2004). In an interview with the Minister of Telecommunications, Science, Technology and Industry, Dr. Jerrol Thompson asserted that "we [the Government of Saint Vincent and the Grenadines] aim to train 1000 persons over the next five years" (Thompson 2004). Those 1000 persons will equate to roughly 1% of the entire population of Saint Vincent and the Grenadines.

Aside from education programs offered by the government, there has been very little development from the private sector in terms of IT training. Curtis Greaves, an IT instructor from Emmanuel High School notes that there is "a severe shortage of qualified institutions and qualified trainers who can deliver the material we need" (Greaves 2004). Some programs in general computer literacy have been offered by the Otley Hall Call

Center, which provides off shore telemarketing services, and a handful of private businesses offer courses Microsoft Office to paying customers. However, these programs are far from becoming established as educational institutions – the majority are neither accredited nor offer certification.

The true impact of such vocational training and IT literacy programs will be felt with the onset of the Caribbean Community (CARICOM) single market economy (SME) in 2006. With the SME, citizens of Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, St. Kitts and Nevis, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago, will be able to travel freely, work freely and perform business without duty amongst member nations (CARICOM, 2004). With such a broad market opening up, it is essential that member nations maintain a competitive, skilled workforce. NIT director Charles Burke notes that "the focus will not be on Saint Vincent, as anyone with skills will be able to work here. That is why it is so critical now to start focusing on our own human resource development. We need to cushion whatever impact that single market economy will have" (Burke 2004). In short, IT vocational training will be critical in preparing for the new market. With the growth of a multi-site single market economy, we are likely to see an increasing demand for specialists in information management, telecommunications, wide area networking, and enterprise level systems administration.

*Statistical Analysis - IT Education Budget and Total Imports.* Positive correlations were found between IT Education programs and the total value of imports. The value for R was .414, indicating that 41.4% of changes in the total value of imports

can be explained by the total education budget. The slope was 13.199, indicating that for every dollar spent on IT education, the total value of imports increased by $13.199 EC. The t value for this relationship was 2.651. This positive relationship can be representative of an increase spending power among Vincentians, and an easier ability to purchase goods from overseas.

Table 11 - IT Education Budget and Total Imports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .414(a) | .171 | .147 | 14319783.40465 |

a Predictors: (Constant), Budget - Total Education

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1441343676514447.000 | 1 | 1441343676514447.000 | 7.029 | .012(a) |
| | Residual | 6971910689707770.000 | 34 | 205056196756111.000 | | |
| | Total | 8413254366222220.000 | 35 | | | |

a Predictors: (Constant), Budget - Total Education
b Dependent Variable: Total Imports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 109894657.773 | 3935342.857 | | 27.925 | .000 |
| | Budget - Total Education | 13.199 | 4.978 | .414 | 2.651 | .012 |

a Dependent Variable: Total Imports

1. H0 = There is no linear relationship between Saint Vincent's total education budget and the value of imports, and the slope equals zero.
2. Linear regression is the test.

3. The value for R is .414, the value for F is 7.029, the slope is 13.199, and the value for t is 2.651.
4. The probability of obtaining the observed correlation is .012, the probability for obtaining the observed slope is .012.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 41.4% of variability in the total value of imports can be explained by the total IT training budget. The observed slope for the relationship between imports and the IT training budget is 13.199, which indicates that for every dollar spent on IT training, the total value of imports increases by 13.199. There appears to be a positive relationship between IT training budgets and the total value of imports.
7. The increase in imports related to the total IT training budget can be related to an increase in spending power among Vincentians, and the ease of purchasing goods from overseas.

*Statistical Analysis - IT Education Budgets and Total Exports.* Correlations were found between IT Education programs and the total number of exports, however the slope was negative. The value for R was .350, indicating that 35% of changes in total exports can be explained by the total education budget. The slope was -2.2417, indicating that for every dollar spent on IT education, total exports decrease by $2.2417 EC. The t value for this relationship was -2.178. This negative relationship could possibly be explained by the fact that Saint Vincent is a non manufacturing nation, and the majority of its exports are agricultural. By creating a specialized, professional workforce, less focus has been placed on the export of agricultural goods.

Table 12 - IT Education Budgets and Total Exports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .350(a) | .122 | .097 | 3193057.89360 |

a Predictors: (Constant), Budget - Total Education

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 48351128851481.200 | 1 | 48351128851481.200 | 4.742 | .036(a) |
| | Residual | 34665103620407 4.200 | 34 | 10195618711884.530 | | |
| | Total | 39500216505555 5.500 | 35 | | | |

a Predictors: (Constant), Budget - Total Education
b Dependent Variable: Total Exports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 31838783.653 | 877511.707 | | 36.283 | .000 |
| | Budget - Total Education | -2.417 | 1.110 | -.350 | -2.178 | .036 |

a Dependent Variable: Total Exports

1. H0 = There is no linear relationship between Saint Vincent's total education budget and the value of exports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .350, the value for F is 4.742, the slope is -2.417, and the value for t is -2.178.
4. The probability of obtaining the observed correlation is .036, the probability for obtaining the observed slope is .036.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 35% of variability in the total number of exports can be explained by the total IT training budget. The observed slope for the relationship between exports and IT training budget is -2.417, which indicates that for every dollar spent on IT training, the total amount of exports decreases by 2.178. There appears to be a negative relationship between IT training budgets and the total number of exports.
7. Based on the regression, it appears as if total national exports decrease as IT literacy funding increases. Although finding this does not indicate economic growth, it is a sign of economic restructuring. Agricultural production has served as the primary industry for exports in Saint Vincent. As the nation develops, we are likely to see a shift in economic production to other industries which are non-exporting.

*Statistical Analysis - Total Education and GDP Constant.* The total IT education budget has a relationship with GDP in constant prices, producing an R value of .659. 65.9% of variability in the GDP can be explained by the education budget. The slope for the relationship is 21.940, indicating that for every dollar spent on IT education, the GDP increases by $21.940 EC. The t value for this correlation is 5.102. This relationship

indicates increased economic activity, and perhaps the development of IT-related businesses, and increased efficiency in commerce.

Table 13 - Total Education and GDP Constant

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .659(a) | .434 | .417 | 12368533.01703 |

a Predictors: (Constant), Budget - Total Education

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 3982548183118757.000 | 1 | 3982548183118757.000 | 26.033 | .000(a) |
| | Residual | 5201340705770130.000 | 34 | 152980608993239.100 | | |
| | Total | 9183888888888880.000 | 35 | | | |

a Predictors: (Constant), Budget - Total Education
b Dependent Variable: GDP - Constant Prices

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 203765825.152 | 3399102.953 | | 59.947 | .000 |
| | Budget - Total Education | 21.940 | 4.300 | .659 | 5.102 | .000 |

a Dependent Variable: GDP – Constant Prices

1. H0 = There is no linear relationship between Saint Vincent's total education budget and the GDP in constant prices, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .659, the value for F is 26.033, the slope is 21.94, and the value for t is 59.947.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.

6. When running a regression on 35 cases, 65.9% of variability in the GDP can be explained by the total IT training budget. The observed slope for the relationship between the GDP constant and the IT training budget is 21.94, which indicates that for every dollar spent on IT training, the total GDP increases by 21.94. There appears to be a positive relationship between IT training budgets and the GDP in constant prices.
7. The increase of $21.94 EC dollars for every dollar spent on IT training is likely due to the development of a specialized workforce, the increase of online commerce, and the growth of ICT related businesses.

*Statistical Analysis - Total Education and Per Capita Income*. The total IT budget has a relationship with per capita income, producing an R value of .347. 34.7% of variability in the per capita income can be influenced by the total IT education budget. The slope for the relationship is .001, indicating that for every dollar spent on IT training programs, per capita income increases by .001. The t value for this correlation is 4.249. Although there is a correlation, the impact appears miniscule. Such a weak slope could be explained by the fact that IT-related training concentrates on a specialized workforce and therefore would not have an across the board impact which would influence an indicator such per capita income.

Table 14 - Total Education and Per Capita Income

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .589(a) | .347 | .328 | 436.88053 |

a Predictors: (Constant), Budget - Total Education

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 3445583.935 | 1 | 3445583.935 | 18.053 | .000(a) |
| | Residual | 6489396.295 | 34 | 190864.597 | | |
| | Total | 9934980.230 | 35 | | | |

a Predictors: (Constant), Budget - Total Education
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 7601.266 | 120.063 | | 63.311 | .000 |
| | Budget - Total Education | .001 | .000 | .589 | 4.249 | .000 |

a Dependent Variable: Per Capita Income

1. H0 = There is no linear relationship between Saint Vincent's total education budget and the per capita income, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .589, the value for F is 18.053, the slope is .001, and the value for t is 63.311.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 35 cases, 58.9% of variability in the per capita income can be explained by the total IT training budget. The observed slope for the relationship between the per capita income and the IT training budget is .001, which indicates that for every dollar spent on IT training, per capita income increases by .001. There appears to be a positive relationship between IT training budgets and the per capita income.
7. Although there is a strong correlation between IT education training and per capita income, the impact on per capita income is miniscule. IT training creates a specialized workforce, however in Saint Vincent, the training tends to concentrate on those who are already in professional positions. Per capita income does not reflect on stratification between upper, middle and lower incomes.

*Saint Vincent Communication Technology Initiatives*

Until 2002, the sole telecommunications provider in Saint Vincent and the Grenadines was Cable and Wireless, LTD. Cable and Wireless offers fixed telephone line access, prepaid and postpaid wireless telephones, dialup Internet service, DSL Internet service, and frame relay Internet service. The International Telecommunications Union (2004) estimates that between 1993 and 2002, the number of fixed line subscribers in Saint Vincent increased from 16,746 to 27,232. Between 1992 to 2002, the number of wireless line subscribers increased from 83 to 9,982, and between 1995 to 2002, the number of Internet subscribers increased from 139 to 7,000.

Under much controversy and dispute from Cable and Wireless, Saint Vincent's parliament passed a bill in 2002 to deregulate the telecommunications industry, allowing for a wide range of providers to enter the market. All licenses for communications are now granted through the National Telecommunications Regulatory Commission. In terms of wireless telephone access, the two largest providers to obtain licenses and enter the market were Digicel Limited on September 12, 2002 and Wireless Ventures, a subsidiary of AT&T, on October 29, 2002 (NTRC, 2004). Although subscriber data is not yet available for 2003 and 2004, the wireless telephone industry has visibly boomed in Saint Vincent. No longer are wireless telephones communications devices luxuries for wealthy individuals and large businesses, nearly every single person in the country can now afford wireless telephones.

Marketing promotions were offered by competing Wireless companies, with providers giving away telephones at prices as low as $15 EC dollars. Prepaid cellular

rates dropped significantly, moving from $2.60 EC dollars per minute for local telephone calls in 2002 to $0.40 EC per minute in 2004 (Glasgow, 2004). Telecommunications manager for Cable and Wireless, Jenilee Glasgow, estimates the number of Cable and Wireless wireless subscribers in 2004 was 40,000 – nearly 36% of the population, and an increase of 30,018 (Interview, Glasgow). Figures from Digicel and AT&T were not available but it is estimated that the numbers are comparable. Despite the growth in the wireless market, Cable and Wireless remains as the sole provider for fixed line telephones.

Figure 7 – Fixed Line Subscribers

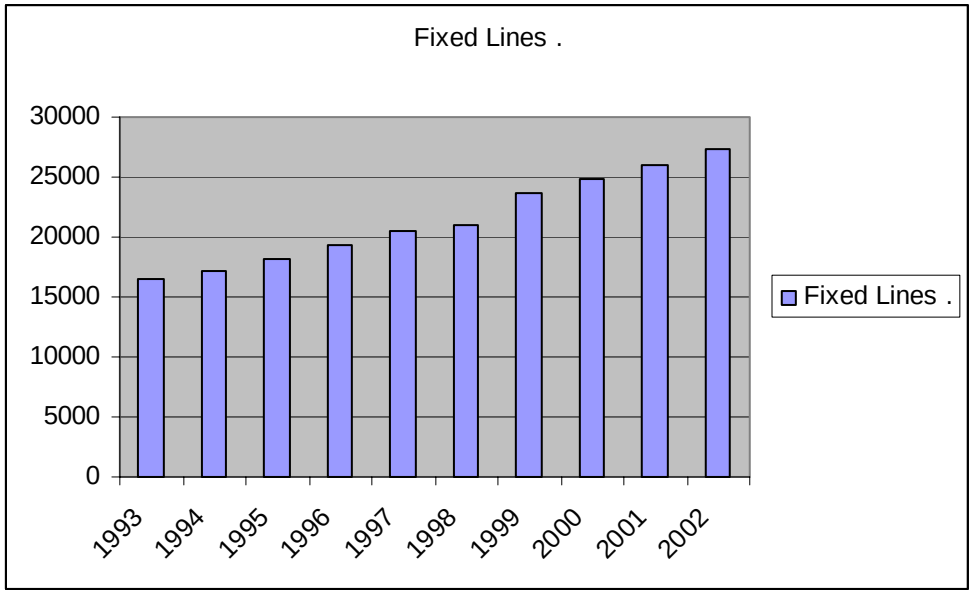
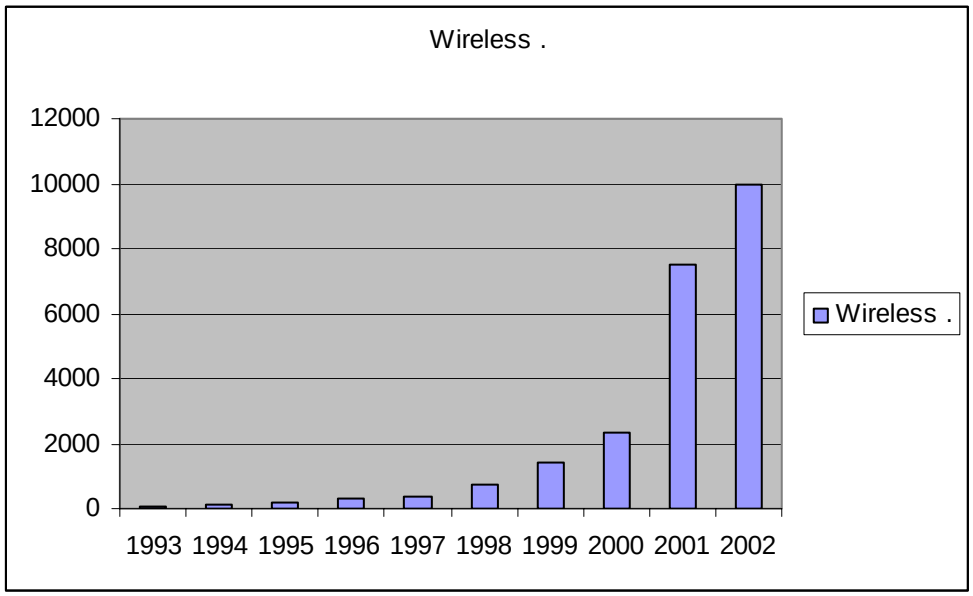
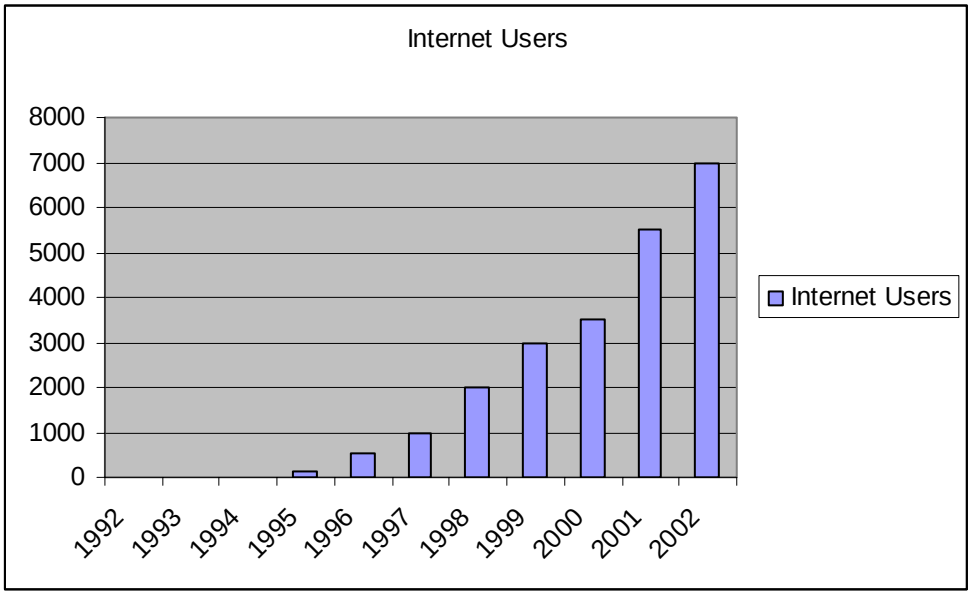


Figure 8 – Wireless Subscribers




Before deregulation in 2002, Internet access was also considered a service only available to the privileged. Cable and Wireless subscribers were offered 10 hours of Internet access per month at a rate of $49 EC dollars. A fee of $5.95 EC was charged for every additional hour of Internet use above the 10 hour limit. The first competitor to enter the Internet market was Kelcom International Limited, a cable TV provider which began offering cable Internet access in 2002. Kelcom now offers unlimited broadband access at a monthly fee of $49.00 EC. In response to the new competition, Cable and Wireless began offering unlimited broadband DSL access at a rate of $139 EC per month. Unfortunately, broadband Internet access is still not available in the rural areas of North Leeward and North Windward (NTRC, 2004).

Figure 9 – Internet Users




All aspects of communication technology development demonstrated strong correlations with indicators of economic growth. The variable with the largest impact on economic indicators is clearly the number of Internet subscribers. The Internet subscriber variable had the highest slopes for total import values (4,769.54), export values (-1,019.354), the gross domestic product in constant prices (10,489.952), and per capita income (.594). Unlike the growing presence of telephone subscribers, the increasing number of Internet subscribers also reflects Saint Vincent's development as an information society, an indicator that the United Nations holds as a key aspect of socio-economic development.

Perhaps the single largest act impacting the development of communication infrastructures in Saint Vincent was the deregulation of communication service providers in 2002. Cuthbert James (2004), Associate Peace Corps Director of Saint Vincent and

the Grenadines notes that "the loosening of the noose around our necks by deregulating the telecommunications industry has made telecom more available. Phones are more accessible and cheaper. Today the ordinary person on the street has a cellular phone; ten years ago this wasn't possible." Through deregulation, Saint Vincent experienced a dramatic increase in availability of cellular telephones and Internet access, all at lower costs to consumers. The opening up of the telecommunications market in Saint Vincent has clearly increased communications accessibility to the public as a whole.

With the increase in communications mediums also comes an increase in commerce and tax revenue. Curtis Greaves (2004), IT instructor and member of the Ministry of Education's national IT unit, notes that "businesses have gained from their ability to purchase goods as well as send items overseas in a day or two. 10 years ago, it took nearly 3 months to purchase goods overseas." Through the increase in call volumes and online commerce, the Government of Saint Vincent and the Grenadines has gained tremendously in terms of taxes collected from telephone calls, as well as import duties. Cuthbert James (2004) observed that "people have been using the Internet to order goods, and when these goods come in, they still pay the duty, helping government revenue." Although the increasing level of imports might not be the most beneficial phenomenon to a developing country, it certainly has helped the government's revenue.

Some changes resulting from the deregulation are not quite quantifiable. Through competition, businesses such as Karib Cable, Digicel and Cable and Wireless have sponsored sporting events, and non-profit organizations in order to gain favoritism amongst the public. Cuthbert James (2004) states that "there is more competition and

telephone companies are giving more to the communities in terms of grants and funding to win favoritism." Such donations and sponsorships to youth organizations, non-profit organizations, and even sporting events can help develop the overall socioeconomic level of Saint Vincent in terms that can't always be measured by dollar figures.

*Statistical Analysis - Fixed Line Subscribers and Total Imports.* The number of fixed telephone subscribers has a relationship with total imports, producing an R value of .731. 73.1% of variability in the total value of imports can be explained by the number of fixed line subscribers. The slope for the relationship is 3,456.430, indicating that for every fixed line subscriber, the value of imports increased by $3,456.43 EC. The t value for this correlation is 6.599. This relationship indicates increased economic activity as a result of growing fixed telephone line subscribers. This increase in imports can be a direct result of an increasing ability of Vincentians to conduct trade, and order goods from overseas instantaneously rather than in a matter of days. The high level of imports also reflects an increase in local buying power.

Table 15 - Fixed Line Subscribers and Total Imports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .731(a) | .534 | .522 | 12010002.79194 |

a Predictors: (Constant), Fixed Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 628025336 2654650.000 | 1 | 62802533626 54650.000 | 43.540 | .000(a) |
| | Residual | 548112634 8370340.000 | 38 | 14424016706 2377.600 | | |
| | Total | 117613797 11025000.000 | 39 | | | |

a Predictors: (Constant), Fixed Line Subscribers
b Dependent Variable: Total Imports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 40924358.326 | 11406645.454 | | 3.588 | .001 |
| | Fixed Line Subscribers | 3456.430 | 523.820 | .731 | 6.599 | .000 |

a Dependent Variable: Total Imports

1. H0 = There is no linear relationship between the number of fixed line subscribers and total imports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .731, the value for F is 43.54, the slope is 3456.43, and the value for t is 6.599.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 73.1 % of variability in total imports can be explained by the number of fixed line subscribers. The observed slope for the relationship between fixed line subscribers and total exports is 3456.43, which indicates that for every fixed line subscriber, import volumes increase by $3456.43 EC. There appears to be a positive relationship between fixed line subscribers and total imports.
7. The increase in imports due to fixed line subscribers reflects the increasing ability of inhabitants to conduct trade through telecommunications. Although a high level of imports is not necessarily good for an economy, it does reflect an increase in buying power.

*Statistical Analysis - Fixed Line Subscribers and Total Exports.* The number of fixed telephone subscribers has a negative relationship with the total value of exports, producing an R value of .750. 75% of variability in the total value of exports can be explained by the number of fixed line subscribers. The slope for the relationship is -651.775, indicating that for every fixed line subscriber, the value of exports decreased by

$651.775 EC. The t value for this correlation is -6.983. This negative relationship could also be reflective of the overall decrease in agricultural exports, economic restructuring, and the development of new non exporting service based economic sectors.

Table 16 - Fixed Line Subscribers and Total Exports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .750(a) | .562 | .551 | 2139987.00922 |

a Predictors: (Constant), Fixed Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 223314622413661.900 | 1 | 22331462241 3661.900 | 48.764 | .000(a) |
| | Residual | 174022687186338.000 | 38 | 4579544399640.470 | | |
| | Total | 397337309600000.000 | 39 | | | |

a Predictors: (Constant), Fixed Line Subscribers
b Dependent Variable: Total Exports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 44394815.245 | 2032478.553 | | 21.843 | .000 |
| | Fixed Line Subscribers | -651.775 | 93.336 | -.750 | -6.983 | .000 |

a Dependent Variable: Total Exports

1. H0 = There is no linear relationship between the number of fixed line subscribers and total exports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .750, the value for F is 48.764, the slope is -651.775, and the value for t is 6.983.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.

6. When running a regression on 39 cases, 75% of variability in total exports can be explained by the number of fixed line subscribers. The observed slope for the relationship between fixed line subscribers and total exports is -651.775 which indicates that for every fixed line subscriber, export volumes decrease by $651.775 EC. There appears to be a negative relationship between fixed line subscribers and total exports.
7. The decrease in exports is likely due to the fact that agricultural based exports have been on a decrease from economic restructuring and development of new service based sectors.

*Statistical Analysis - Fixed Line Subscribers and GDP Constant Prices.* The number of fixed telephone subscribers has a positive relationship with the GDP constant, producing an R value of .969. 96.9% of variability in the GDP can be explained by the number of fixed line subscribers. The slope for the relationship is 7347.416, indicating that for every fixed line subscriber, the GDP increases by $7,347.416 EC. The t value for this correlation is 6.903. This relationship reflects the phenomenon of economic activity increasing as a result of developing communications infrastructures. As trade and commerce becomes faster and easier to conduct, we are likely to see an increase in economic activity.

Table 17 - Fixed Line Subscribers and GDP Constant Prices

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .969(a) | .939 | .938 | 6937516.16792 |

a Predictors: (Constant), Fixed Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 28378593037953000.000 | 1 | 28378593037953000.000 | 589.634 | .000(a) |
| | Residual | 1828906962046992.000 | 38 | 48129130580184.000 | | |
| | Total | 30207499999999990.000 | 39 | | | |

a Predictors: (Constant), Fixed Line Subscribers
b Dependent Variable: GDP - Constant Prices

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 45486285.837 | 6588989.914 | | 6.903 | .000 |
| | Fixed Line Subscribers | 7347.416 | 302.582 | .969 | 24.282 | .000 |

a Dependent Variable: GDP - Constant Prices

1. H0 = There is no linear relationship between the number of fixed line subscribers and GDP, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .969, the value for F is 589.634, the slope is 7347.416, and the value for t is 24.282.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 96.9% of variability in GDP can be explained by the number of fixed line subscribers. The observed slope for the relationship between fixed line subscribers and GDP is 7347.416, which indicates that for every fixed line subscriber, GDP increases by 7347.416. There appears to be a positive relationship between fixed line subscribers and total exports.
7. Clearly as telecommunication infrastructures develop within the country, trade and commerce becomes faster and easier to conduct. This appears to have a direct effect on economic productivity.

*Statistical Analysis - Fixed Line Subscribers and Per Capita Income.* The number of fixed telephone subscribers has a relationship with the per capita income, producing an R value of .908. 90.8% of variability in the per capita income can be explained by the number of fixed line subscribers. The slope for the relationship is .155, indicating that

for every fixed line subscriber, the per capita income increases by $0.155 EC. The t value for this correlation is 19.364. This significant, although small effect on per capita income, reflects that the development of fixed line telecommunications infrastructures has some impact on the overall income levels of Vincentians.

Table 18 - Fixed Line Subscribers and Per Capita Income

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .953(a) | .908 | .906 | 184.08259 |

a Predictors: (Constant), Fixed Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 12706575.390 | 1 | 12706575.390 | 374.976 | .000(a) |
| | Residual | 1287683.249 | 38 | 33886.401 | | |
| | Total | 13994258.639 | 39 | | | |

a Predictors: (Constant), Fixed Line Subscribers
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 4562.382 | 174.835 | | 26.095 | .000 |
| | Fixed Line Subscribers | .155 | .008 | .953 | 19.364 | .000 |

a Dependent Variable: Per Capita Income

1. H0 = There is no linear relationship between the number of fixed line subscribers and per capita income, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .953, the value for F is 374.976, the slope is .155, and the value for t is 19.364.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.

6. When running a regression on 39 cases, 95.3% of variability in per capita income can be explained by the number of fixed line subscribers. The observed slope for the relationship between fixed line subscribers and per capita income is .155, which indicates that for every fixed line subscriber, per capita income increases by .155. There appears to be a positive relationship between fixed line subscribers and per capita income.
7. Findings indicate that an increase in economic productivity resulting from telecommunications infrastructures has a significant, although small effect on per capita income.

*Statistical Analysis - Wireless Line Subscribers and Total Imports.* The number of wireless telephone subscribers has a positive relationship with the total value of imports, producing an R value of .502. 50.2% of variability in the annual value of imports can be explained by the number of wireless line subscribers. The slope for the relationship is 2584.864, indicating that for every wireless line subscriber, the annual value of imports increases by $2584.864 EC. The t value for this correlation is 3.579. This relationship can indicate both the increase usage of wireless phones to order goods from overseas, and also an increase in buying power of local consumers.

Table 19 - Wireless Line Subscribers and Total Imports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .502(a) | .252 | .232 | 15214748.28204 |

a Predictors: (Constant), Wireless Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 2964814230158842.000 | 1 | 2964814230158842.000 | 12.808 | .001(a) |
| | Residual | 879656548086615 0.000 | 38 | 2314885652859 51.500 | | |
| | Total | 1176137971102 5000.000 | 39 | | | |

a Predictors: (Constant), Wireless Line Subscribers
b Dependent Variable: Total Imports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 10917521 6.631 | 2926758.160 | | 37.302 | .000 |
| | Wireless Line Subscribers | 2584.864 | 722.277 | .502 | 3.579 | .001 |

a Dependent Variable: Total Imports

1. H0 = There is no linear relationship between the number of wireless subscribers and total imports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .502, the value for F is 12.808, the slope is 2584.864, and the value for t is 3.579.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .001.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 50.2% of variability in total imports can be explained by the number of wireless line subscribers. The observed slope for the relationship between wireless line subscribers and total imports is 2584.864, which indicates that for every wireless line subscriber, total imports increase by 2584.864. There appears to be a positive relationship between wireless line subscribers and per total imports.
7. This finding is indicative both of increased spending power and increasing use of wireless phones to conduct commerce.

*Statistical Analysis - Wireless Subscribers and Total Exports.* The number of wireless telephone subscribers has a negative relationship with the total value of exports, producing an R value of .699. 69.9% of variability in the annual value of exports can be explained by the number of wireless line subscribers. The slope for the relationship is -

661.320, indicating that for every wireless line subscriber, the annual value of imports decreases by $661.320 EC. The t value for this correlation is -6.023. This negative relationship indicates both the drop in agricultural exports, and also the economic restructuring as Saint Vincent expands into non exporting service based markets.

Table 20 - Wireless Subscribers and Total Exports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .699(a) | .488 | .475 | 2312853.46103 |

a Predictors: (Constant), Wireless Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 194064246576071.400 | 1 | 194064246576071.400 | 36.278 | .000(a) |
| | Residual | 203273063023928.500 | 38 | 5349291132208.640 | | |
| | Total | 397337309600000.000 | 39 | | | |

a Predictors: (Constant), Wireless Line Subscribers
b Dependent Variable: Total Exports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 31926160.840 | 444907.968 | | 71.759 | .000 |
| | Wireless Line Subscribers | -661.320 | 109.796 | -.699 | -6.023 | .000 |

a Dependent Variable: Total Exports

1. H0 = There is no linear relationship between the number of wireless subscribers and total exports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .699, the value for F is 36.278, the slope is -661.320, and the value for t is 6.023.

4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 69.9% of variability in total exports can be explained by the number of wireless line subscribers. The observed slope for the relationship between wireless line subscribers and total exports is -661.320, which indicates that for every wireless line subscriber, total exports decrease by 661.320. There appears to be a negative relationship between wireless line subscribers and per total imports.
7. The decrease in exports is also reflective of economic restructuring.

*Statistical Analysis - Wireless Subscribers and GDP Constant.* The number of wireless telephone subscribers has a positive relationship with the GDP constant, producing an R value of .707. 70.7% of variability in the gross domestic product can be explained by the number of wireless line subscribers. The slope for the relationship is 5834.44, indicating that for every wireless line subscriber, the gross domestic product increases by $5,834.44 EC. The t value for this correlation is 6.165. The development of wireless infrastructures, and the increased availability of wireless phones appear to have a positive impact on the economy. This positive impact can be due to increased commerce conducted using wireless phones, and the growing market of providing wireless phone service.

Table 21 - Wireless Subscribers and GDP Constant

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .707(a) | .500 | .487 | 19935746.26181 |

a Predictors: (Constant), Wireless Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 15105008797427090.000 | 1 | 15105008797427090.000 | 38.006 | .000(a) |
| | Residual | 15102491202572900.000 | 38 | 397433979015076.300 | | |
| | Total | 30207499999999990.000 | 39 | | | |

a Predictors: (Constant), Wireless Line Subscribers
b Dependent Variable: GDP - Constant Prices (Millions)

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 189784685.933 | 3834904.592 | | 49.489 | .000 |
| | Wireless Line Subscribers | 5834.444 | 946.393 | .707 | 6.165 | .000 |

a Dependent Variable: GDP - Constant Prices

1. H0 = There is no linear relationship between the number of wireless subscribers and GDP, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .707, the value for F is 38.006, the slope is 5834.444, and the value for t is 6.165.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 70.7% of variability in GDP can be explained by the number of wireless line subscribers. The observed slope for the relationship between wireless line subscribers and GDP is 5834.444, which indicates that for every wireless line subscriber, the GDP increases by 5834.444. There appears to be a positive relationship between wireless line subscribers and per total imports.
7. The increase in wireless communication infrastructures appears to promote economic productivity.

*Statistical Analysis - Wireless Subscribers and Per Capita Income.* The number of wireless telephone subscribers has a positive relationship with the per capita income, producing an R value of .714. 71.4% of variability in the per capita income can be explained by the number of wireless line subscribers. The slope for the relationship is .127, indicating that for every wireless line subscriber, the per capita income increases by $0.127 EC. The t value for this correlation is 6.279. The increase in wireless infrastructures appears to have a positive relationship with the per capita income, although miniscule. It appears that perhaps the economic growth resulting from these infrastructures remains stratified.

Table 22 - Wireless Subscribers and Per Capita Income

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .714(a) | .509 | .496 | 425.12628 |

a Predictors: (Constant), Wireless Line Subscribers

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 7126429.339 | 1 | 7126429.339 | 39.431 | .000(a) |
| | Residual | 6867829.300 | 38 | 180732.350 | | |
| | Total | 13994258.639 | 39 | | | |

a Predictors: (Constant), Wireless Line Subscribers
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 7608.210 | 81.779 | | 93.034 | .000 |
| | Wireless Line Subscribers | .127 | .020 | .714 | 6.279 | .000 |

a Dependent Variable: Per Capita Income

1. H0 = There is no linear relationship between the number of wireless subscribers and per capita income, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .714, the value for F is 39.431, the slope is .127, and the value for t is 6.279.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 71.4% of variability in per capita income can be explained by the number of wireless line subscribers. The observed slope for the relationship between wireless line subscribers and per capita income is .127, which indicates that for every wireless line subscriber, per capita income increases by .127. There appears to be a positive relationship between wireless line subscribers and per capita income.
7. The increase in wireless communication infrastructures appears to have a significant, yet small impact on per capita income.

*Statistical Analysis - Internet Subscribers and Total Imports. T*he number of Internet subscribers has a positive relationship with the value of total imports, producing an R value of .649. 64.9% of variability in the total value of imports can be explained by the number of Internet subscribers. The slope for the relationship is 4769.54, indicating that for every Internet subscriber, the total value of imports increases by $4,769 EC. The t value for this correlation is 5.258. An increase in the level of imports as a result of increasing Internet subscribers can be a result of either increased spending power among consumers, or the increasing ability to make transactions online.

Table 23 - Internet Subscribers and Total Imports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .649(a) | .421 | .406 | 13384682.80858 |

a Predictors: (Constant), Estimated Internet Users

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 4953689823344620.000 | 1 | 4953689823344620.000 | 27.651 | .000(a) |
| | Residual | 6807689887680370.000 | 38 | 179149733886325.600 | | |
| | Total | 11761379711025000.000 | 39 | | | |

a Predictors: (Constant), Estimated Internet Users
b Dependent Variable: Total Imports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 104332570.389 | 2950164.199 | | 35.365 | .000 |
| | Estimated Internet Subscribers | 4769.540 | 907.027 | .649 | 5.258 | .000 |

a Dependent Variable: Total Imports

1. H0 = There is no linear relationship between the number of Internet subscribers and total imports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .649, the value for F is 27.651, the slope is 4769.54, and the value for t is 5.258.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 64.9% of variability in total imports can be explained by the number of Internet subscribers. The observed slope for the relationship between Internet subscribers and total imports is 4769.54, which indicates that for every Internet subscriber, total imports increase by 4769.54. There appears to be a positive relationship between Internet subscribers and total imports.
7. The increase in imports due to an increase in Internet subscribers can be a result of increased spending power, and the ability to make transactions online.

*Statistical Analysis - Internet Subscribers and Total Exports.* The number of Internet subscribers has a negative relationship with the value of total exports, producing an R value of .755. 75.5% of variability in the total value of exports can be explained by the number of Internet subscribers. The slope for the relationship is -1019.354, indicating that for every Internet subscriber, the total value of exports decreases by $1,019 EC. The t value for this correlation is -7.090. A decrease in exports related to an increase in Internet subscribers can be a reflection of the overall decrease in Saint Vincent's agricultural exports, or the economic restructuring that the nation's economy has been undertaking.

Table 24 - Internet Subscribers and Total Exports

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .755(a) | .569 | .558 | 2121742.38007 |

a Predictors: (Constant), Estimated Internet Users

**ANOVA(b)**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 226269261959347.100 | 1 | 226269261959347.100 | 50.262 | .000(a) |
| | Residual | 171068047640652.900 | 38 | 4501790727385.603 | | |
| | Total | 397337309600000.000 | 39 | | | |

a Predictors: (Constant), Estimated Internet Users
b Dependent Variable: Total Exports

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 32709857.248 | 467660.571 | | 69.944 | .000 |
| | Estimated Internet Users | -1019.354 | 143.782 | -.755 | -7.090 | .000 |

a Dependent Variable: Total Exports

1. H0 = There is no linear relationship between the number of Internet subscribers and total imports, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .755, the value for F is 50.262, the slope is -1019.354, and the value for t is 7.090.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 75.5% of variability in total exports can be explained by the number of Internet subscribers. The observed slope for the relationship between Internet subscribers and total exports is -1019.354, which indicates that for every Internet subscriber, total imports decrease by 1019.354. There appears to be a positive relationship between Internet subscribers and total exports.
7. The decrease in exports due to Internet subscribers can be a reflection of the economic restructuring currently taking place in Saint Vincent.

*Statistical Analysis - Internet Subscribers and GDP Constant.* The number of Internet subscribers has a positive relationship with the GDP constant, producing an R value of .891. 89.1% of variability in the total GDP can be explained by the number of Internet subscribers. The slope for the relationship is 10,489.952, indicating that for every Internet subscriber, the total value of exports increases by $10,489.952 EC. The t value for this correlation is 12.075. The number of Internet subscribers is also a representation of the pervasiveness of an information society. The dramatic impact of Internet use on the GDP is perhaps a reflection on the overall influence on ICT infrastructures in Saint Vincent's economy.

Table 25 - Internet Subscribers and GDP Constant

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .891(a) | .793 | .788 | 12820123.37310 |

a Predictors: (Constant), Estimated Internet Users

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 23961988594543090.000 | 1 | 23961988594543090.000 | 145.794 | .000(a) |
| | Residual | 6245511405456900.000 | 38 | 164355563301497.500 | | |
| | Total | 30207499999999990.000 | 39 | | | |

a Predictors: (Constant), Estimated Internet Users
b Dependent Variable: GDP - Constant Prices (Millions)

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 179478718.741 | 2825727.703 | | 63.516 | .000 |
| | Estimated Internet Users | 10489.952 | 868.769 | .891 | 12.075 | .000 |

a Dependent Variable: GDP - Constant Prices (Millions)

1. H0 = There is no linear relationship between the number of Internet subscribers and the GDP, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .891, the value for F is 145.794, the slope is 10489.952, and the value for t is 12.075.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 89.1% of variability in the GDP can be explained by the number of Internet subscribers. The observed slope for the relationship between Internet subscribers and the GDP is 10489.952, which indicates that for every Internet subscriber, the GDP increases by 10489.952. There appears to be a positive relationship between Internet subscribers and the GDP.
7. The number of Internet subscribers also represents the pervasiveness of an information society. Although the slope is high, it is more likely a reflection on the impact of ICT infrastructures as a whole.

*Statistical Analysis - Internet Subscribers and Per Capita Income.* The number of Internet subscribers has a positive relationship with the per capita income, producing an R value of .887. 88.7% of variability in the per capita income can be explained by the number of Internet subscribers. The slope for the relationship is .594, indicating that for every Internet subscriber, the per capita income increases by $.594 EC. The t value for this correlation is 9.795. Although the slope for change in per capita income is small, it is perhaps the largest slope amongst the relationships between ICT related variables and economic indicators. Although an expanding presence of Internet subscribers causes economic growth, it does not appear to alleviate stratification in income ranges.

Table 26 - Internet Subscribers and Per Capita Income

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .887(a) | .787 | .779 | 342.14541 |

a Predictors: (Constant), Estimated Internet Users

**ANOVA(b)**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 11230525.502 | 1 | 11230525.502 | 95.935 | .000(a) |
| | Residual | 3043650.505 | 26 | 117063.481 | | |
| | Total | 14274176.007 | 27 | | | |

a Predictors: (Constant), Estimated Internet Users
b Dependent Variable: Per Capita Income

**Coefficients(a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 6975.947 | 86.676 | | 80.483 | .000 |
| | Estimated Internet Users | .594 | .061 | .887 | 9.795 | .000 |

a Dependent Variable: Per Capita Income

1. H0 = There is no linear relationship between the number of Internet subscribers and per capita income, and the slope equals zero.
2. Linear regression is the test.
3. The value for R is .887, the value for F is 95.935, the slope is .594, and the value for t is 9.795.
4. The probability of obtaining the observed correlation is .000, the probability for obtaining the observed slope is .000.
5. We must reject the null hypothesis.
6. When running a regression on 39 cases, 88.7% of variability in per capita income can be explained by the number of Internet subscribers. The observed slope for the relationship between Internet subscribers and per capita income is .594, which indicates that for every Internet subscriber, per capita income increases by .594. There appears to be a positive relationship between Internet subscribers and per capita income.
7. The slope for change in per capita income is small, but notable. Again, per capita income does not measure income stratification, or the development of professionalized employment.

*Analysis of Technology Development in Saint Vincent*

All three aspects of technology development: physical information technology infrastructures, IT-related education programs and policy, and communication infrastructures, have proven strong relationships with economic development. These three categories all had strong correlations with annual imports, annual exports, the Gross Domestic Product in constant prices, and the Per Capita Income. Reverse causality can be ruled out because a lag time of one year was used when comparing the economic indicators to the various variables related to ICT development.

The positive slopes related to imports and negative slopes related to exports appear to be a reflection of the changing economy in Saint Vincent. As stated before,

this trade deficit should be expected as the nation makes the transition from an agricultural exporting economy to a non-exporting service-based economy. The overall increase in imports can be due largely to increasing buying power, and a dependence on foreign goods. In terms of local manufacturing, very few goods are produced locally and therefore imports for many types of non-agricultural goods are a necessity.

The relationship of all three ICT categories to the GDP shows that the development of ICT infrastructures has promoted growth in economic activity. This economic activity can be a result of capital directly infused into the economy, increased efficiency in commerce and organizational operations, as well as new income created through related services that support these infrastructures. Per capita income held a strong relationship with all three categories; however the slope was minimal. It is more than likely that the minimal slope is due to short lag time. As La Fleur John (2004) noted, we are more likely to see an overall rise in the standard of living in the long term.

Saint Vincent's policies towards development of physical technology infrastructures have been based out of need rather than economic development. National efforts to computerize schools, governments, and non-profit organizations were made out of a simple need to raise education standards to competitive levels, and bring the nation on board with the information age. Despite the progress that has already been achieved in building these infrastructures, there always seems to be a need for more development. Curtis Greaves (2004) pointed out that "a problem with the ICT integration programs is that we do not have enough resources. Labs are run under strenuous conditions, where

more than 600 students are using the same lab throughout the week, with little or no free periods."

Despite the continued perceived shortage of physical infrastructures, the developments which have already taken place contributed significantly to the economy. The visible impact on the GDP can be a result of the direct infusion of capital into the economy to purchase necessary related goods. Although IT-related goods are granted tax-free status from the government, local businesses continue to profit through the assembly of computer systems, and the resale of related equipments. The growing infrastructure in Saint Vincent has also created a demand for services to install and support these systems. This non visible aspect of physical infrastructures has led to creation of businesses which provide systems support, and new IT-related job categories within organizations.

The policy directions of IT education programs have encompassed several areas. The first and most visible has been education in the school systems. The first major policies related to IT education were directed towards programs pushing school teachers and education personnel to become computer literate. We have also witnessed newly forming technology integration initiatives to motivate teachers to integrate technology into all classroom activities. The second aspect of IT education policy has been focused towards vocational training. These vocational training programs have been aimed at providing unemployed workers with skills to obtain jobs, to train personnel to work in multinational corporations that conduct business in Saint Vincent and the Grenadines, and to enhance the skills of those who are already employed in the IT workforce.

Aside from training potential workers for employment in telemarketing and medical transcription centers, the philosophy behind IT education training in Saint Vincent is that once individuals are trained, they will find jobs (Thompson, 2004). There appears to be little coordination between the government and private sector in terms of job creation and meeting existing employment needs of organizations based in Saint Vincent. An IT education policy direction based upon a perceived shortage of skilled labor tends to function best in a market with low unemployment rates. Perhaps when the Caribbean Single Market Economy (CSME) opens up in 2006, these trained and skilled workers will be able to compete in the new international market. As for now, more progress and direction in the coordination between the government of Saint Vincent and the private sector is needed.

The communication market boom took place almost immediately after parliament's deregulation of communication service providers in 2002. The policy directives behind the deregulation were focused towards increasing communications accessibility, rather than creating jobs and promoting economic growth. The desired impact of accessibility has been achieved with an ever-expanding number of Internet subscribers, cellular phone subscribers, and decreased consumer costs. The latent impacts following the deregulation have also been economic stimulation and job creation. Increased profits of telecommunication providers have provided tax revenue to the government, increased telecommunication usage has improved operational efficiencies of businesses and organizations, and industry growth has created jobs for skilled workers to support the communications infrastructures.

In terms of Saint Vincent's future communication's policy plans, the government would like to see an increased availability of faster communications infrastructures, as well as a further increase in competition. The National Telecommunications Regulatory Commission recently granted a license to a Trinidadian company to roll out a fixed telephone network; although no physical infrastructures have been put in place, this promises to be the first stage of competition in fixed telephone service provision. There is also a proposed development to bring submarine fiber optic cables into Saint Vincent, linking the country with Trinidad, members of the Organization of Eastern Caribbean States (Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Christopher and Nevis, and Saint Lucia), along with the United States Fiber optic Network. Such projects would boost Saint Vincent's overall broadband Internet and communications capabilities as a whole (Thompson, 2004).

One final policy development to note in terms of communications infrastructures in Saint Vincent is the concept of universal access. Dr. Jerrol Thompson, Minister of Telecommunications, Science, Technology and Industry, led the drive for the government of Saint Vincent to create a mandatory universal service access fund. This fund requires communications service providers to put 1% of their revenues towards providing Internet access in schools, and developing Internet and fixed-line access in remote areas of the country (Thompson, 2004). Through the universal access policy, the government has recognized the need for an expanding communication infrastructure to promote the development of the country as a whole and as a crucial component to poverty eradication.

**Pennsylvania: An Alternative Analysis**

Pennsylvania has also faced a severe economic crisis, comparable to the collapse of the banana industry in Saint Vincent and the Grenadines. Between July 2000 and October 2003, Pennsylvania lost 149,200 manufacturing jobs, a 20% loss, bringing the total number down to 718,500 from 867,700 (National Association of Manufacturers, 2003). There are many hopefuls who feel that manufacturing can be revived in the region, but will that be the right solution for Pennsylvania? For manufacturing, international competition is stronger and trade barriers are weaker. Lawrence J. Rhoades, president and chief executive officer of Extrude Hone Corporation, an international manufacturing corporation headquartered in Irwin, Pennsylvania, said, "America is well on its way to losing its productivity advantage. Not only is the direct labor used in manufacturing less expensive; massive new investment has equipped China and Brazil and Hungary with some of the world's newest and most modern plants (Hammonds, 2003).

From a policy perspective, what can be done to address these major losses of both jobs and industry? Does Pennsylvania hold a future in manufacturing, or must we bear down and take the fallout from economic restructuring. Despite a national recession, capital and technology-intensive businesses have managed to retain their holdings in the market. The traditional approach to this situation has been the promotion of job retraining programs. The question remains: what if there are no sustainable industries to provide alternative employment? What Pennsylvania needs is to infuse itself with new sector-specific industries, and streamline existing industries so that they can maintain a global competitiveness.

*Innovative Courses of Action*

The non-traditional approach taken by Pennsylvania has been to create new niche markets through state policies that promote technology incubation programs. These programs help build and attract high technology business ventures into the region by providing three major functions: (1) Investing high-risk capital into technology-based businesses. This capital originates from federal funding and venture capital investors. Returns on this capital are both invested back into technology incubation funds, and reported to supporting investors. (2) Providing hands-on technical support to optimize operational activities of startups, and existing manufacturing corporations. These activities can include technical streamlining strategies, marketing strategies, and overall business processes. (3) Providing resources that depend on extensive networks of public and private organizations. The overall goal of this strategy is to provide capital and technical empowerment to both existing industries and new sectoral markets in Pennsylvania.

In the development of such policy, incubation programs are subsidized by Pennsylvania on a statewide level. In an interview with Terri Glueck, communications director of Innovation Works, a tandem of state and federal policies that provide funding for technology incubators and tax credits to venture capital "angels" who invest in new start up businesses could provide tremendous assistance in creating new sectoral businesses. Glueck also noted that current small-scale programs have proven a 10:1 payoff from initial investment funds to the gross payroll of jobs created (Gleuck, 2004).

The status quo policy to alleviate rising unemployment rates in Pennsylvania has been job training programs originating from the Workforce Investment Act of 1998. The Workforce Investment Act provides federal block grants to states for the creation of workforce education and development programs. In 2003, The Pennsylvania Department of Labor and Industry spent $109,493,743 on workforce development initiatives (Pennsylvania Department of Labor and Industry, 2004). The most prevalent program in Pennsylvania is the Career Link workforce retraining program, which provides vocational training to displaced workers. The ultimate goal of the program has been to empower individuals for employment transition into new fields such as information technology and engineering.

Although workforce education programs are ideal in nature, they depend upon the premise that there are existing labor shortages in a wide range of economic sectors. One of the primary areas targeted by Workforce PA is the information technology (IT) field, however IT-related jobs have been on the decline. In Pennsylvania, IT employers have been more busy firing than hiring. In 2004 alone, the number of employed IT workers in Pennsylvania decreased from 121,800 to 120,700 (Pennsylvania Department of Labor and Industry, 2004).

In the Pennsylvania's Department of Labor and Industry annual report to the US Department of Labor, workforce education programs are noted as ineffective during times of economic decline. "Slow economic growth has also negatively affected the ability of WIA participants to obtain and retain sustainable living wage jobs." In the first seven months of 2004, the labor force participation rate was 83.5 percent compared to 85

percent in the first seven months of 2001. This means that a smaller percentage of people are either working or looking for work because of the frail economy (Pennsylvania Department of Labor and Industry, 2004).

Because Pennsylvania is in a state of economic decline, policies that seek to develop new industries while enhancing the performance of existing industries are more suited for economic development. Through the creation and development of new industries in a depressed region, we are likely to see an increase in the creation of new jobs. Such programs also work effectively in tandem with existing workforce education programs, utilizing vocational training programs to assist in filling new vacancies.

Pennsylvania's most successful technology investment program is The Ben Franklin Technology Partners (BTFP) program. The BTFP program was created in 1982 by the Pennsylvania General Assembly to provide technological innovation in order to spur economic growth and prosperity in the state. Since its inception, the BFTP has invested in more than 2,500 companies and provided 480 million dollars in funding (Nexxus Associates, 2003).

The BFTP program functions through three major activities: financial investment, business and technical assistance, and regional infrastructure-building. Financial investments are primarily made in technology-based companies, providing capital used to cover the costs of research and development efforts and associated commercialization activities. These investments are either debt or equity based, with proceeds being returned to the BTFP program for reinvestment. Business and technical assistance spans a wide range of services, including technical problem solving and

business counseling over an extended period of time. Regional infrastructure-building efforts include the establishment of university-based centers of excellence, business incubators and research parks, linkage to venture capital funds and individual (angel) investors.

Although this analysis recommends a tandem operation of workforce development programs and technology incubation programs, a cost/benefit analysis will be used to determine effective economic impact of each program. For workforce development, economic impact is measured in the amount of funding invested per participant, and the amount of economic output per participant. Economic output can be measured in terms of salary gains, and the number of displaced workers successfully placed into new jobs. For technology incubation programs, economic impact is measured in terms of job-years created in client firms, the total number of job-years created in Pennsylvania, the contribution to gross state product of Pennsylvania, and tax return based on program investments.

In 2003, the Pennsylvania Department of Labor and Industry spent an average of $3,251 per person in workforce education programs. Although 33,674 participants entered the program, only 13,986 successfully reached completion of training, with 19,688 participants dropping out. The dropout rate created a gross loss of $64,005,668. Of the 13,986 participants who completed programs, employment retention rate remained at 83.7 percent, for a total of 11,706, with an average earnings change of $2,853. The net economic gain in increased earnings totals $33,398,022. Based on an income tax rate

of 3.07%, the state received a total tax revenue of $10,252,934 from successful participants (Pennsylvania Department of Labor and Industry, 2004).

Table 26 – Cost/benefit Ratio of Pennsylvania Workforce Education

| 2003 Pennsylvania Workforce Education | | | |
|---|---|---|---|
| | **Cost / Benefit** | **Total** | **Ratio** |
| Cost Per Participant (n=33,674) | ($3,251) | ($109,474,174) | |
| Gains per participant (n=11,706) | $2,853 | $33,397,218 | -0.305069376 |
| Tax Receipts Per Person | $875.87 | $10,252,934.22 | -0.093656192 |
| **Total** | | ($65,824,022) | 0.601274432 |

Between 1989 and 2001, $311 million in funding was provided to the Ben Franklyn Technology Program, with an overall cost/benefit ratio of 1:29. On average, client firms receiving BFTP funding and assistance created an additional 3 jobs per year, generating a total of 35,570 additional job-years (Nexxus Associates, 2004). Considering that the average annual wage in Pennsylvania is $35,808 (United States Department of Labor, 2002), we can estimate the net impact to be $1,273,654,752, at a cost per job-year of $8,743. There is roughly a 4:1 gain in new income for every dollar invested in BFTP programs.

Adjusted for inflation, the BFTP boosted the Pennsylvania gross state product by $7.9 billion (Nexxus Associates, 2004). There is roughly a 25:1 gain in economic activity for every dollar invested into BFTP programs. It is important to note that additional economic activity spawned by the BFTP spawned $402 million (nominal) or

$397 million (real) in additional state tax receipts[i]. For every dollar invested, $1.27 was returned in new taxes.

Table 27 – Cost/benefit Ratio of Ben Franklyn Technology Partners Program

| Ben Franklyn Technology Partners Program 1989-2001 | | | |
|---|---|---|---|
| | **Cost / Benefit** | **Total** | **Ratio** |
| Total Funding | ($311,000,000) | ($311,000,000) | |
| Job Years Created @ $35,808 | 35,570.00 | $1,273,690,560 | -4.095468039 |
| PA GSP Boost | $7,900,000,000.00 | $7,900,000,000.00 | -25.40192926 |
| Tax Recepits | $397,000,000.00 | $397,000,000.00 | -1.276527331 |
| **Total** | | $9,259,690,560 | -29.77392463 |

The overall recommendation for technology-related development in Pennsylvania is to retain workforce education programs, while increasing funding to state technology incubation programs. As observed, technology incubation programs provide a 1:29 cost/benefit ratio. Contributions to the state economy will be through the creation of new jobs and businesses, ultimately raising the gross state product and increasing overall state tax revenues. If technology incubation programs achieve such desired results, we will eventually see the labor shortage which has been used to justify workforce education programs. Technology incubation programs and workforce education programs could function together in a complementary manner, with benefactors of education programs filling new positions created by technology incubation programs.

*Likely Obstacles to Pennsylvania Investment Programs*

The primary obstacle to the expansion of technology incubation programs is political infeasibility due to the lag time required for an observed impact. As noted by Innovation Works Communications Director, Terri Glueck, there is up to a 10-year latency between program investment and visible participant growth (Gleuck, 2004).

Policy makers prefer immediate results that are visible to the affected public. A secondary obstacle is funding sources. Although technology incubation investments are considered either debt or equity which is ultimately returned to the state budget, initial funding is still required through state and federal programs.

**Conclusions and Recommendations**

Contrary to Madrick's assertions that ICT development is not a "manna from heaven," development of information communication technology infrastructures in Saint Vincent and the Grenadines has clearly demonstrated a tremendous economic impact. Because the programs are still in their infancy, there still remains room for policy and improvement. Only now are we witnessing Parliamentary discussions on recognizing the legality of electronic transactions. Minister Thompson (2004) emphasized this direction, noting that "we still need a legal framework."

Building physical infrastructures should be seen as a 21st century necessity rather than optional directive to foster economic growth. As part of the budgetary process, Parliament in Saint Vincent and the Grenadines should allocate funds specifically towards the continued development of these physical infrastructures, rather than continue with covering IT-related expenses through general funds. The deregulation of the telecommunication industry created a boom much larger than expected. Nearly every Vincentian now has access to telephones, and with duty-free status on computers and lowering Internet access rates, we should see a continued expansion of Internet accessibility from 2002's. Considering that only 6.4% of the population were Internet subscribers in 2002, there is a continued need for development in the area of Internet

accessibility. Continuing this trend of deregulation of telecommunications to allow for increased accessibility is a requirement for social and economic development.

The outcomes of IT education policy have been effective in providing skilled labor to existing organizations, as well as refining the skills of those already employed in the field; however, there needs to be more coordination and cooperation with the private sector to promote further technology-related employment. When a region faces a dramatic increase in unemployment due to economic restructuring, it is difficult to measure the creation of jobs solely through vocational training programs.

As noted in the analysis of Pennsylvania's Ben Franklin Technology Partners Program, a policy directed towards the creation of technology-oriented businesses can work in tandem with technology-related vocational programs. Job training and job retraining programs promoted by policies such as the Workforce Investment Act only work when there is an existing labor shortage in a particular field. Policies directed towards promoting technology-oriented businesses and development pose a greater promise to create jobs.

St. Vincent's approach to creating jobs as been to attract investment and local operations of foreign-based multi-national enterprises. Minister Thompson (2004) envisions Saint Vincent as being the next hub for outsourced technology services. "The Caribbean is English-speaking, easier to reach, has a similar culture, greater safety, no threat of terrorism, and is closer to access. This will make the Caribbean a similar or more attractive place than India, which has been able to corner the market." To attract further investment and operations from multi-national corporation, Thompson (2004)

sees vocational training as a necessity to "beef up our human resources to handle high end types of services that are required by companies that are committed to outsourcing." Saint Vincent's policy towards attracting foreign investment will more than likely prove beneficial, but policy directives also need to be taken to foster development of local technology-based businesses.

In conclusion, building ICT infrastructures is beneficial to economic development. Changes in GDP are almost immediate, and changes in per capita income are likely to be seen over a longer span of time. By continuing to refine policies directed towards physical infrastructures, communication infrastructures, and education training, sustainable economic growth is certain to follow. Perhaps the most beneficial aspect of technology development is expanding the level of coordination and communication between the public and private sectors, as well as the promotion of private sector industries within developing regions.

## Appendix A - Saint Vincent Statistical Summary – Economic Indicators

| Year | Exports Constant | Imports | GDP | Per Capita Income |
|---|---|---|---|---|
| 1992 | 146010000 | 362719000 | 631000000 | 6516.09 |
| 1993 | 124499000 | 350776000 | 645000000 | 6945 |
| 1994 | 151164000 | 363136000 | 657000000 | 7044.11 |
| 1995 | 129907000 | 389350000 | 713000000 | 7304.66 |
| 1996 | 114554000 | 464743000 | 753000000 | 7709.84 |
| 1997 | 126199000 | 518819000 | 799000000 | 8011.51 |
| 1998 | 120924000 | 542159000 | 861000000 | 8171.93 |
| 1999 | 117325000 | 440931000 | 894000000 | 8260.67 |
| 2000 | 121174000 | 506608000 | 926000000 | 8364.43 |
| 2001 | 106760000 | 482744000 | 935000000 | 8426.15 |
| 2002 | 103490000 | 546,367,000.00 | 947000000 | 8768.57 |

## Appendix B - Saint Vincent Statistical Summary – IT Indicators

| Year | Education Budget | Tota IT Budget | Non Ed | Total IT Imports |
|---|---|---|---|---|
| 1992 | 0 | 0 | 0 | - |
| 1993 | 0 | 0 | 0 | - |
| 1994 | 1064000 | 1344900 | 280900 | 2,646,840.00 |
| 1995 | 1125200 | 1410000 | 284800 | 3,223,751.20 |
| 1996 | 1112430 | 1331202 | 218772 | 3,990,676.00 |
| 1997 | 1396961.2 | 1808361 | 411400 | 6,638,720.00 |
| 1998 | 1718300 | 2190400 | 472100 | 5,666,116.00 |
| 1999 | 1960970 | 2580070 | 619100 | 6,658,888.00 |
| 2000 | 7320624 | 7576456 | 255834 | 6,254,428.00 |
| 2001 | 3500004 | 3851854 | 351850 | 8,837,172.00 |
| 2002 | 3428405.2 | 7607264 | 4178860 | 9,233,600.00 |

## Appendix C - Saint Vincent Statistical Summary – Communications Indicators

| Year | Fixed Lines | Wireless | Internet Users |
|---|---|---|---|
| 1992 | . | . | 0 |
| 1993 | 16476 | 83 | 0 |
| 1994 | 17176 | 150 | 0 |
| 1995 | 18236 | 215 | 139 |
| 1996 | 19351 | 280 | 522 |
| 1997 | 20498 | 346 | 1000 |
| 1998 | 21045 | 750 | 2000 |
| 1999 | 23631 | 1420 | 3000 |
| 2000 | 24906 | 2361 | 3500 |
| 2001 | 26078 | 7492 | 5500 |
| 2002 | 27323 | 9982 | 7000 |

## Appendix D - National Telecommunications Regulatory Commission, Saint Vincent and the Grenadines - Licenses Granted

| Type of Service | Name of Company | Address & Telephone | Effective Date |
|---|---|---|---|
| **Fixed Public Telecommunications** | Cable and Wireless (West Indies) Limited | PO Box 103 Kingstown (784) 457-1901 | October 9, 2001 |
| **Public Mobile Telecommunications** | Cable and Wireless Caribbean Cellular (Saint Vincent and the Grenadines ) Limited | PO Box 103 Kingstown (784) 457-1901 | October 9, 2001 |
| | Wireless Ventures (Saint Vincent ) Ltd. | Suite K031, Grenville Street, Kingstown (784) 452-5498 | October 29, 2002 |
| | Digicel Limited | Cnr. Granby & Sharpe Street Kingstown (784) 453-3000 | September 12, 2002 |
| **Internet Networks/Services** | Cable and Wireless (West Indies) Limited | PO Box 103 Kingstown (784) 457-1901 | October 9, 2001 |

**CLASS LICENCES GRANTED**

| | | | |
|---|---|---|---|
| **Value Added Services** | Carlisle Ryan & Almus McDowall | Campden Park PO (784) 457-7459 | August 9, 2002 |
| | Trevor Erickson Sayers | | April 20, 2003 |
| | Caribbean Business Machines Centre | PO Box 1350 Kingstown (784) 451-2717 | August 9, 2002 |
| **Internet Service Provider** | Cariaccess Communications (Saint Vincent) Limited | PO Box 126 Kingstown (784) 457-4755 | March 1, 2002 |
| | Kelcom International Limited | PO Box 1684 Kingstown (784) 457-1600 | February 25, 2002 |
| | Digicel SVG Limited | Cnr. Granby & Sharpe Street Kingstown (784) 453-3000 | November 24, 2003 |
| | Wireless Ventures (Saint Vincent ) Ltd. | Suite K031, Grenville Street, Kingstown (784) 452-5498 | July 16, 2004 |

| | | | |
|---|---|---|---|
| **Private Networks / Services** | Blue Skye Communications (SVG) Ltd | PO Box 78 Kingstown (784) 485-6966 | May 30, 2002 |
| | Loyal Bank Limited | PO Box 1825 Kingstown (784) 485-6705 | September 27, 2002 |
| | BT Broadcast Service | pp3.C.12 Angel Centre, 403 St. Johns Street, London ECIV 4PL UK 020 7843 7284 | June 15, 2002 |
| | Canouan Resorts Development Ltd. | Carenage Bay Canouan (784) 458-8773 | March 20, 2004 |
| **International Simple Voice Resale Service** | Carlisle Ryan and Almus Mc Dowall | Campden Park PO (784) 457-7459 | May 16, 2003 |
| | Vincy Communications Ltd. | Suite K744, Granby and Sharpe St (784) 456-8910 | May 16, 2003 |
| | Caribbean Business Machine Centre | PO Box 1350 Kingstown (784) 451-2717 | May 16, 2003 |
| | PAC's Telecommunications Ltd. | PO Box 1639 Kingstown (784) 458-3527 | October 14, 2003 |
| | Kelcom International Limited (Karib Cable) | PO Box 1684 Kingstown (784) 457-1600 | March 20, 2004 |

**Appendix E- Interviews covering ICT development in Saint Vincent and the Grenadines**

**Interview:** Charles F. Burke, 8 August 2004

**Please state your position:**

Director, National Institute of Technology

**What is your responsibility in terms of ICT development in SVG?**
I run the NIT with the role of coordinating training programs, facilitating training for the general public.

**What are some of the major projects you have worked on?**
In terms of training, we have done courses like A+ certification, ICDL, CIW, Basic computer literacy, telemarketing, keyboarding, MCSE. In terms of facilitation, we have expanded by coming on screen with the community resource centers, basic computer literacy training and ICDL courses in the rural communities.

**Explain areas we are going to ask about: ICT Infrastructure, Technology Integration / ICT Literacy / ICT Vocational Training, Telecom Infrastructure,?**

**What are some major ICT infrastructure development projects that have taken place here over the years? (In terms of "computerization" initiatives, network initiatives, ect.?) What kind of impact have the above projects had on the development of the economy here?**

1. Computers have more or less evolved, there is a program where the government has computerized all of the schools. ICT has become part of the curriculum in the secondary schools. Children in primary schools are now given the opportunity to use computers through the establishment of the labs in the schools. A lot of businesses now are getting into computer related training, in that they want to ensure that the staff is computer literate; in fact most of the businesses in the country now use computers for their accounting and general operations. The schools project is a young project in its early stages, you might not see the results until the next couple years. The thing is that they are giving the young people a foundation to get into the different aspects of ICT. In terms of the impact on the economy itself, I'm not sure if it is obvious now.

2. One of the biggest project is the National Institute of Technology which exposes a wide cross section of people to technology training. This includes people from the lower end to the upper level, from both beginners to advanced stages. People are being trained, these are people who already in the work place. On the other hand, we have some persons who are employed and receive training. I would say that about 30 percent who train at the NIT who were not previously working obtain some sort of employment based

on the training. The major placements have been through the telemarketing industry and call centers.

3. The freeing up of the telecommunications market, taking away the monopoly from Cable and Wireless has reduced costs considerably. Quite a few people who had fixed lines had to pay expensive monthly bills. Now one can have a cell phone, pay for what they use, and not have to pay a monthly bill with rent for the phone and the line. Government revenue has increased because of the taxes on calls. Calls have increased in frequency. People have more access to different aspects of communication now. We have text messaging and email.

**How has ICT development impacted the development of direct investment and multinational enterprises?**

It depends on the type of business that comes in. The call center business is relatively new, but has drawn quite a bit of revenue. The telephone companies would also observe a bit of direct investment. Any e-commerce or e-business would benefit as well. Traditionally people have been using faxes quite a bit to order inventory, but now we use email to purchase international goods.

**What does Saint Vincent need to do to develop the economy in the future?**

In a couple years, Saint Vincent will not be an entity within itself. In 2005, we will have the Caribbean Single Market Economy where nationals will be able to work and move within any island. The focus will not be on Saint Vincent, as anyone will skills will be able to work here. This will have a dramatic impact on Saint Vincent and the Grenadines. That is why it is so critical now to start focusing on our own human resource development. We need to cushion whatever impact that single market economy will have, it could be bad for us if we are not prepared for us – if all the other island nationals take our ICT jobs, we will be left with nothing working as laborers. I would ensure to prepare for this new market by preparing the people here.

**How has ICT development benefited you personally?**

There are a lot of venues for myself, being someone who can deal with all issues of computer hardware, software, and networking issues. With a wide range of knowledge, it has placed me in a position where I could at least survive with a higher standard of living. According to the general public I would be considered a specialist in the field and I still see possibility for advancement.

**Interview:** Curtis T. Greaves, 29 July, 2004

**Please state your education:**

O Levels in CXC, CompTIA A+ Certified, Christian Pastor

**Please state your position:**

IT Teacher, Emmanuel High School, Mesopotamia

**What is your responsibility in terms of ICT development in SVG?**

I am responsible for the IT development at Emmanuel High School. I have worked on teaching, and computerizing the administrative division of the school. We have 40 computers in the lab, and 5 in the main office. We have approximately 650 students overall.

**What exactly do you teach?**

Word, Access, Excel, and Qbasic. The CXC program is 3 years, but we start IT training from Form 1.

**What are some of the major projects you have worked on?**

We were setting up a national IT unit with the Ministry of Education, to take a team of educators and make them responsible for the maintenance and repairs in the schools of their region. At Emmanuel High School, we networked the whole school, and I also set up the teachers lab.

**Explain areas we are going to ask about: ICT Infrastructure, Telecom Infrastructure, Technology Integration & ICT Literacy, ICT Vocational Training.**

**What are some major ICT infrastructure development projects that have taken place here over the years? (In terms of "computerization" initiatives, network initiatives, ect.?)**

1. The computerization of the schools was the biggest effort. The government computerized all of the primary and secondary schools on the island.

2. Some of the biggest changes have been from no Internet connection, to dialup, and finally dsl and cable. Broadband. Dialup was very expensive at first, but prices dropped after broadband came out. Cable and Wireless held a monopoly on the market and kept

prices high, but once Karib Cable entered the market, prices dropped. Now more people can afford Internet.

3. The government is trying to promote technology development on a whole This has been through the establishment of the National Institute of Technology. These courses include computer programming. This kind of training adds certificates to the resume. Now most secondary schools offer Information Technology for CXC is offered in the curriculum, through the Ministry of Education. Recently the MOE has been hosting training workshops for teachers to integrate information technology into different subject areas. This involves using the technology to teach math, English, ect.

4. The NIT. Some private institutions offer courses at a nominal charge, covering subject matters such as Microsoft Office, A+, and Web Design. I have not seen any policy efforts by the government to encourage IT vocational training.

**What kind of impact have the above projects had on the development of the economy here?**

1. The computerization project helped in the development of the country by making more people technology friendly. The Internet has been opened up to everyone, and people have become more efficient and effect. These efforts helped the economy by training more people to work in the job market, to go overseas and send back money, and to make the people of Saint Vincent employable in the world economy.

2. In telecom, a lot of people are now getting in touch with the Internet. Online shopping is now available to provide cheaper prices, and we now have the ability to communicate around the world. Business have gained from their ability purchase goods as well as send items overseas in a day or two. 10 years it took nearly 3 months to purchase or sell goods overseas, now it is a matter of days.

3. Now teachers are more equipped to use computers. Computer literacy probably doesn't have an impact on the economy.

4. These programs have prepared people for the job market. Individuals are now working on different businesses as a result of the training.

**What have been some of the major setbacks.**

1. The schools project was not prepared in managing labs, running programs, and to assist in the personal development of those responsible to run the labs. You can't just throw computers in the lab without having an administrative and personnel infrastructure in place.

2. The major setbacks were caused by a monopoly in the market. The liberalization of the telecommunications market took place in 2001, causing rates for telephone access to drop dramatically. Today nearly every Vincentian can now walk with a cellular telephone. Ten years ago, people couldn't afford a cellular phone. Even the fixed lines were very expensive. Today we can call the US for $1, while 10 years ago it was nearly $5 to $6 a minute.

3. A problem with the ICT integration programs, is that we do not have enough resources. Labs are run under strenuous conditions, where more than 650 students are using a lab throughout the week, with little or no free periods. This is difficult because resources are not available for teaching other programs using technology.

4. Right now there are not enough resources for vocational training. Even in the private sector there is a shortage of computers. There is a need for more places that can provide quality training. Some of the facilitators are not trained to be trainers and do not perform an adequate job. There is not a wide variety of subject matter available. There is a shortage of qualified institutions and personnel.

**How has ICT development impacted the development of direct investment and multinational enterprises?**

I don't think these development efforts have brought investment into the country. These are "toys of today" which have created a market for repair and purchase. Call centers were set up (telemarketing), but I do not know how much they have impacted the economy.

**What does Saint Vincent need to continue its development in the future?**

1. We need to train personnel for repairs and repairing, and train teaching of the various programs. This is the biggest need in the country – especially in the schools. The schools are going to prepare people for life, if the schools are not prepared, how can we prepare people for life.

**How has ICT development benefited you personally?**

1. I am now trained in computers in repairing of computers. My focus has turned from accounting to Information Technology. Financially, I have side jobs besides my teaching job, where I repair computers. I have benefited from the communication aspect, in terms of cheaper rates in communicating with friends and family.

**Interview:** Lamonto White, 9 August 2004

**Please state your position:**
IT Assistant, National Commercial Bank.

**What is your responsibility in terms of ICT development in SVG?**
Manage systems for a National Bank. I check pcs, set up basic networks, create accounts. I manage servers basically. Overall I manage about 65 PCs and 6 servers at 8 locations.

**What are some of the major projects you have worked on?**
We moved an IT room from one location to another, setting up servers.

**Explain areas we are going to ask about: ICT Infrastructure, Telecom Infrastructure, Technology Integration / ICT Literacy / ICT Vocational Training?**

**What are some major ICT infrastructure development projects that have taken place here over the years? (In terms of "computerization" initiatives, network initiatives, ect.?)**

I haven't seen any major initiatives. Some years I have seen computer donations to schools. Nothing mainly to say "wow." I don't think that these programs have benefited the private sector. The only people that would benefit would be the school kids. We are not totally computerized in Saint Vincent, we are getting literate, but not utilizing the full benefits.

We have had big changes in telecom. Before we wanted information, we had to go to news and encyclopedia. Since Internet has arrived, business has increased. People now make purchases on their own, research for projects is conducted independently, and the economy has grown. We can buy our vehicles and goods online. Basically we have more information. In terms of phones, the big changes I have seen is the rapid expansion of the telecommunications market. Before it was costly to own a cell phone, but today everyone has cell phones. The only impact to the business sector has been the impact on the costs of calls, the impact – how can I put it this way – if you can tell from a business point of view, if I'm on the go, it is easier to find me. If I'm at one place 24/7 its only a convenience. Deregulation has given us more choice and freedom, no more monopoly. The next thing too, phones are more affordable. Before you were paying a lot more with the phone bill, charges were high. Since competition came, Cable and Wireless reduced their rates. Another benefit of the cell phones is control, you can determine how often you use your phone, how much you pay on your phone. You can manage the costs of your usage. Overall we save money.

The training provided by Duquesne is the only sector specific training I know of, most of the training is how to use Microsoft Word,, Microsoft Works. There is definitely a need

for specific training in the terms of business, computer literacy training is definitely lacking. If you have a computer who has a computer in your house, you are better off than the person who doesn't have one. People who do not have computers are left in the dark. Computer skills are necessary in the job market today, a lot of that is in demand. Most applications have these skills listed as mandatory. These programs don't create jobs, they just help people catch up.

**How has ICT development impacted the development of direct investment and multinational enterprises?**

That's another question. The only thing I could say, has been the establishment of offshore document processing. I haven't heard figures as of yet, I know some people that have benefited from jobs, and put food on the table.

**What does Saint Vincent need to continue its development in the future?**

Saint Vincent needs to invest in schools. I know how it is, basically from when I was younger, I admired that in the States everyone was exposed to computers before they ever got to high school. They get a bigger knowledge base from such a young age. Here you aren't exposed until after you leave school or until you go to a friend's house. If we are to excel, we need to start at the primary schools, that is the age of learning.

**Interview: Cuthbert James,** 3 August 2004

**Please state your position:**
APDC, US Peace Corps, Saint Vincent and Grenada

**What is your responsibility in terms of ICT development in SVG?**
Assisting in strengthening institutions and building capacity among locals. Capacity building is providing the technical assistance that would increase the ability of locals to do the job themselves.

**What are some of the major projects you have worked on?**
Over the past five years I have worked with over 100 schools, institutions, community groups, the police, school of nursing. A major project was utilizing volunteers to train the island's police force in computer literacy. The projects that have made the biggest impact involved training teachers at the secondary schools and preparing students for external CXC ICT exams.

**Explain areas we are going to ask about: ICT Infrastructure, Telecom Infrastructure, Technology Integration / ICT Literacy / ICT Vocational Training?**

**What are some major ICT infrastructure development projects that have taken place here over the years? (In terms of "computerization" initiatives, network initiatives, ect.?)**

1. The assistance given by Taiwan, in terms of providing computers for primary and secondary schools have made the major impact. Computers are expensive, and the donation involved thousands of computers. The construction of all the computer centers at the schools have also assisted. Not so much from the private sector.

2. The loosening of the noose around our necks by deregulating the telecommunications industry has made telecom more available. Phones are more accessible and cheaper. Today the ordinary person on the street has a cellular phone. Ten years ago this wasn't possible. We now have three companies providing cellular phones. Fixed land lines need to be a little cheaper because it is very expensive to call a cellular phone from a land line. With broadband ADSL now coming on mainstream, we have some possibilities, but it is too costly and not available to the rural areas. Cable TV is also only available to half of the island. Ten years ago, Internet access was poor and very slow. It was available, but very slow and expensive.

3. Some of the major training programs have involved training professionals. The National Institute of Technology and the Ministry of Education has focused on training educators specific to their field, and people in the private sector have received specialized training. The Peace Corps and the Police have worked to ensure that every single police

officer receive computer training. A new program is going to put a computer in every police station and create a national database.

**What kind of impact have the above projects had on the development of the economy here?**

1. The purchase of these computers has created certain jobs that certain jobs that students from secondary schools would not have been able to access at all levels. Now almost every job, down to a store clerk, is required to have basic computer skills. There is one downside to the whole increasing use of technology, there is less use of the post office, and less revenue generated from the post office. A lot of people have been using the Internet to order goods, when the goods come in they still pay a duty, helping government revenue. The amount of vehicles have increased dramatically due to Internet orders. Vehicle companies have been losing money because vincentians are now ordering vehicles directly rather than purchasing them through a distributor here.

2. Changes in broadband technology and deregulation of the telecom industry has prompted people to spend a lot more money on telephones. There is more competition and telephone companies are giving more to the communities in terms of grants and funding to win favoritism. There are a lot more donations taking place because of the competition. I'm not sure if the broadband access has had any impact on the economy, but I don't see how. Information as a faster speed, decreases time needed to get the job done. We have benefited in the Peace Corps because we spend less time on the computer retrieving information.

3. These training programs create more efficient work forces. Efficient work forces waste less time. Before it would take two days to produce a document. It now only takes the ministry a few minutes to send a document from one ministry to the other, and time costs money. Emailing counterparts also costs less than making telephone calls. We can send more information over the Internet locally and overseas. Before it would cost an average $5 to make an overseas call, and now it is virtually free over the Internet.

**How would you compare the economy from 10 years ago to today?**

**How has ICT development impacted the development of direct investment and multinational enterprises?**

When companies come in, they expect to have trained personnel on the ground. They do not want to invest in training or bring their own employees from another country. Call centers have been moving here because we have a workforce that has already been trained in computer literacy and the use of the keyboard.

**What does Saint Vincent need to continue its development in the future?**

We need to continue training the human resource at all levels. People need to bring up to date with the change in technology all around. We need to create more vocational training opportunities related to the uses of appropriate technologies, not just computers. We need to look at alternative energy, we have so much available here but we lose out because we aren't taking advantage of our resources.

**How has ICT development benefited you personally?**

Today I can do more job more efficiently. Most of the training I have had has been on the job training. I'm interested in grasping training opportunities, but I'm now a more efficient type of person. I'm more comfortable today not because of computers, but because of me. As technology improves, you want to aspire for more and more. Keeping up with all the different kinds of new technology is more and more expensive. I can communicate with everyone, everywhere, anytime.

**Interview:** La Fleur John, 9 August, 2004

**Please state your position:**
Secretariat General, UNESCO National Commission

**What is UNESCO's responsibility in terms of ICT development in SVG?**

ICT is one of the UNESCO major program areas internationally. Therefore, I would say UNESCO would be very interested in ICT in Saint Vincent as well as all the other member states. In fact, there is an international project, cross cutting, on the use of ICT in poverty alleviation and eradication. There is a project Radio Multimedia and Internet for social inclusion, in indigenous communities. I had a call from the field office in Jamaica, inviting me to submit some names of potential contractors to do a baseline survey as a preparatory intervention before the commencement of that project.

**What are some of UNESCO's major accomplishments?**

The intervention made by UNESCO last biennium in South Rivers. The major output of that project consisted of certification of 18 persons in A+. Provision of ICT supplies to the South Rivers learning resource centre. Provision of training to the people in south rivers, teachers, nurses, school children in IT. The training of about 18 teenagers in Microsoft Works. The project was valued at $20,000 US. With the surplus we also supplied the Colonaire resource centre with printers, paper, and other materials.

For this current biennium, UNESCO has already approved a project for $20,000 US, for ICT for sustainable livelihood. We hope to empower young people to earn a livelihood from IT-related training modules. The funds should also supply the learning resource centres with computer related supplies and software.

**What kind of impact have the above projects had on the development of the economy here?**

Maybe not a solid impact yet, apart from the direct sales and revenues through the supplies. The training will probably not impact in the short term, but certainly in the term. We need a more sustained intervention to have that soft of impact on the economy. Possibly over a 3 to 5 year period, when people become more aware of job opportunities in the IT field.

**How has ICT development impacted the development of ICT in the private sector?**

I see quite a few people making adventurous moves, definitely through the provision of technical services related to IT. Technicians, engineers, computer supplies, importing computers and computer related supplies. We have people designing Web pages, and even using the computers for graphic design services. This will all add up as the

dependence on information technology spreads here. The use of ICT will penetrate the economy. Even in ticketing at the airlines.

**What does Saint Vincent need to continue its development in the future?**

ICT in the delivery of education is very focused on UNESCO's agenda. I think Saint Vincent, the Ministry of Education, needs to take on board at the policy level and pursue programes to ensure that education is transformed through the delivery and integration of technology. That will create a base for future development. Eventually, everything must filter through the economy but we start at the school level, moving towards a knowledged based society.

**Interview:** Cammie Matthews, 29 July, 2004

**Please state your position:**
Administrator, Ministry of Education

**What is your responsibility in terms of ICT development in SVG?**
n/a

**What are some of the major projects you have worked on?**
n/a

**Explain areas we are going to ask about: ICT Infrastructure, Telecom Infrastructure, Technology Integration / ICT Literacy / ICT Vocational Training?**

**What are some major ICT infrastructure development projects that have taken place here over the years? (In terms of "computerization" initiatives, network initiatives, ect.?)**

1. I haven't really seen any big programs. There has been some improvement over the last few years. The government has provided computers for the schools – this was done in phases to cover a national level. Before the program, there were only one or two computers in the principals offices, no labs or student access to computers. Only a few schools in the capital had access to computers.

2. One major change over the last year and half or so is the new competition against Cable and Wireless. Cable and Wireless was the only telephone company here, they were killing us with high rates. Mobile phones were very expensive. With the introduction of the competition, things have gotten much cheaper and we have more choices. Because of that, Digicel is now the sponsor of West Indies Cricket, while Cable and Wireless was the sponsor for years. We now have cricket scores available on our cell phone. In the last year, Karib Cable purchased a license to provide Internet access, and they are actually faster, more reliable, except for the fact that when electricity goes, they go. They are much cheaper.

3. Over the past few years, the private sector has been involved in teaching people to use the computer. A few businesses charge a fee to provide literacy training. As for training in the schools, changes have been made since I left school so I'm not too familiar with that.

**What kind of impact has the above projects had on the development of the economy here? (Jobs, business, money.)**

1. I don't feel the computerization of the schools has had any impact on the economy. Even though we have the computers, we haven't had any proper

instructors. Some of those labs are just collecting dust and not being used. I would not say it has impacted that greatly.

2. Internet access and phone availability has helped a lot. People now have choices in the companies they are using, we are spending less money. Because of the competition, we are spending more money on mobiles, local calls. Even the international rates have dropped because of the competition. It is actually cheaper to have a mobile phone than a fixed line. The companies themselves don't employ much people, but they make life easier.

3. The technology training in Saint Vincent could have had a greater impact if people who have gone through training would be placed in positions related to their skills. Some people have been trained in IT, through government programs, and they are teachings maths. Most people who have been trained are not being utilized. Technology training has led to entrepreneurships, where people tend to go into business for themselves, that also includes a lot of side jobs.

*Continue with the other 5 areas.*

**How has ICT development impacted the development of direct investment and multinational enterprises?**

I think the impact is great because these companies see that we are making a move to develop our countries. They see potential and most business want to invest in that potential. We are getting more response from international businesses than before. Just recently AT&T began business in Saint Vincent, largely in part to our development efforts and de-regulation of the telcom industry.

**What does Saint Vincent need to continue its development in the future?**

I would like to see more companies competing, especially in terms of fixed lines. In terms of the Internet, I would like to see wireless Internet access, and I think we will come to that in the near future. In terms of the schools and infrastructure, at this moment they are trying to train as much teachers as possible with at least the basics, so that will help with more development. At least in the next 5 or 10 years, every student would have some basic training. If I was a minister, I would make technology training mandatory in school, right now it is only optional. Not all of the schools provide computer education, maths and English are mandatory, but not computers. All government workers should be trained in basic literacy. Each ministry should have a team of their IT staff. The vocational schools accommodate people who could not get accepted into secondary schools, these schools should put a greater focus on technology training for the career.

**How has ICT development benefited you personally?**

It has had a great impact on me personally. The training I received in computers made me much more interested in the field. I was trained in operating systems, software, and hardware maintenance through UNESCO. Because of that training, I want to pursue greater studies in the field, and it has helped me to get side jobs working in the field. Because of my knowledge of the software, I am able to do provide services such as graphic design (post cards, invitations, programmes) services for people.

**Interview:** Jerrol Thompson, PhD, 4 August, 2004

**Please state your position:**
Minister of Telecommunications, Science, Technology and Industry

**Explain areas we are going to ask about: ICT Infrastructure, Telecom Infrastructure, Technology Integration / ICT Literacy / ICT Vocational Training?**

**What are some major ICT infrastructure development policies that have taken place here over the years? (In terms of "computerization" initiatives, network initiatives, ect.?) What kind of impact have the above projects had on the development of the economy here?**

I would say that one we have seen the roll out of the mobile cellular networks. Two, we have seen the expansion of cable and the ability to embrace the concept of convergence using cable to provide both cable, Internet, broadband, and fixed line telephony. A license has been given to the cable company to roll out its fixed line telephone, but hasn't started that process yet. We have also seen two proposed developments. One is of a submarine cable linking Trinidad with the OECS, and Jamaica and the US Fiber Optic network. That essentially will help to boast our broadband ability and reduce the cost of doing business and the whole development of ecommerce. We have a new telecommunications act, which gave out a license to a new entity, but they have not been able to obtain the financing.

There is a big project to make a Caribbean knowledge network that will utilize satellite and ICA (Interconnectivity of the Americas) which has funds and connections with satellite companies to use unused bandwidth and provide broadband access amongst the islands of the Caribbean. The pre feasibility studies are being conducted by the World Bank and it is hoped that EU funding will provide for development.

Within the schools there is the computerization of the schools, and the government level initiative for a government wide intranet.

In terms of training, we had a major project of $3 to $4 million with the EU, however they withdrew funding. It was were we were going to provide resources where people could access training at any institution of their choice. Since that time we have developed a business plan for the NIT, and accessed other funds where we can provide broad based training in computer literacy, and certified training. We aim at training 1000 persons, I am hoping to launch this plan in September.

Right now we are about to start a program of medical transcription training, whereby we are training persons in association with a company here to outsource medical transcription. We are funding the pilot phase of the training, but what is hoped that the individuals are going to be linked with the private sector. There is another training

program taking place funded by the private sector for medical transcription. There are two, one government, one non government. We hope to outsource these services and make this a cottage industry. I would like to use my constituents to provide these services.

This will require broadband access.

We also look to become a Cisco Learning academy and offer higher level training in general computer literacy.

Cost of license?

*Continue with the other 3 areas.*

**How has regulation of the telecommunication industry changed in SVG?**

**What kind of policies has government enacted to foster the growth of ICT industry in the private sector?**

We have call centers in Saint Vincent that were subsidized, they may not have worked from a business point of a view but the operations continue. Overall there have been three call centers. There are a number of other data processing centers, Omidocs. The government has only put money into the center at Arnos Vale, although there are tax concessions and fiscal initiatives offered to these entities for the importation of their equipment, vehicles, accessories, more duty free.

**What does Saint Vincent need to continue its development in the future?**

We need a legal framework. We are just in the process of completing our electronic transactions act which I hope will go to Parliament soon. The electronic transactions act involves the ability to recognize digital signature, this dovetails into the development of e commerce. I think also that the whole policy related to the provision of broadband so that we can take advantage of information and look at video streaming, audio.

We have to make some major policy decisions over voice over IP. We cannot hold it back. We recently went to Canada as guests of Canada and Nortell. We have observed the impact of VOIP and the current trends. We have to make some major policy decisions on that. Major decisions have to be made on universal service. The telecommunications providers are putting away 1 percent of their revenue to a fund for universal access. This is part of their universal service obligation. This money will be used to help off set the costs of providing Internet to schools and to further build out Internet and fixed line telephony (not mobile) to remote areas of the country.

We are now planning a new broadcast act, and we are still conscious of the role of radio, and have seen the development of Internet radio of information to a diaspra and has been very successful so far. People all over the world have been listening to the radio.

Policies in relation to Internet use, computer use, that could be circulated through the public sector and encouraged in the private sector. (Usage policies)

The direct investment, there are persons who are still looking at the labor side, for outsourcing to be possible. You have to have the technological ability to be there, but the cost is still high. With the provision of broadband and the submarine cable, will bring the cost down in the Caribbean. The Caribbean is English speaking, easier to reach, has a similar culture, greater safety, no threat of terrorism, and is closer to access. This will make the Caribbean a similar or more attractive place as India, which has been able to corner the market in the terms of outsourcing telecommunications services. We feel the Caribbean is now ready, we have to beef up our human resources to handle al aspects, not just the labor intensive aspects, but more of the knowledge worker aspects to be able to do back end work, to do research, and high end types of services that are required by companies that are committed to outsourcing. That aspect of us being nearby, no terrorism, that's what I'm working. The Electronic Transaciton Act and the provision of broadband are really important.

**Appendix F – Pennsylvania State Labor Force Statistics**

**Pennsylvania Current* Labor Force Statistics**
Seasonally Adjusted
(in thousands)

| | October 2004 | September 2004 | October 2003 | Change from September 2004 | | Year-to-Date Change | | Change from October 2003 | |
|---|---|---|---|---|---|---|---|---|---|
| PA | | | | *volume* | *percent* | *volume* | *percent* | *volume* | *percent* |
| Civilian Labor Force | 6,299 | 6,295 | 6,141 | 4 | 0.1% | 165 | 2.7% | 158 | 2.6% |
| Employment | 5,951 | 5,957 | 5,812 | -6 | -0.1% | 135 | 2.3% | 139 | 2.4% |
| Unemployment | 348 | 338 | 329 | 10 | 3.0% | 30 | 9.4% | 19 | 5.8% |
| Rate | 5.5 | 5.4 | 5.4 | 0.1 | --- | 0.3 | --- | 0.1 | --- |
| U.S. | | | | *volume* | *percent* | *volume* | *percent* | *volume* | *percent* |
| Civilian Labor Force | 147,850 | 147,483 | 146,892 | 367 | 0.2% | 972 | 0.7% | 958 | 0.7% |
| Employment | 139,778 | 139,480 | 138,095 | 298 | 0.2% | 1,299 | 0.9% | 1,683 | 1.2% |
| Unemployment | 8,072 | 8,003 | 8,797 | 69 | 0.9% | -326 | -3.9% | -725 | -8.2% |
| Rate | 5.5 | 5.4 | 6.0 | 0.1 | --- | -0.2 | --- | -0.5 | --- |

**November's labor force statistics will be released December 20*

## Appendix G – Pennsylvania Nonagricultural Wage and Salary Employment Data

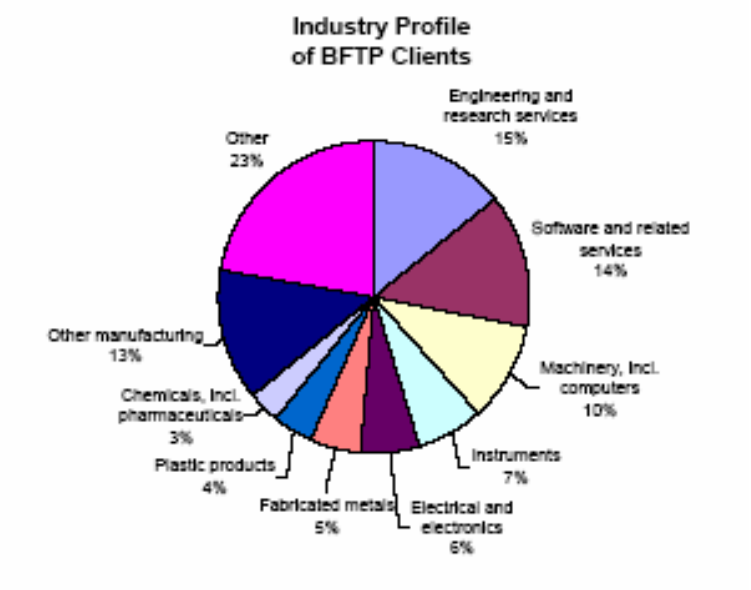
**Pennsylvania Nonagricultural Wage and Salary Employment**
Seasonally Adjusted
(in thousands)

| | October 2004 | September 2004 | October 2003 | Change from September 2004 | | Year-to-Date Change | | Change from October 2003 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *volume* | *percent* | *volume* | *percent* | *volume* | *percent* |
| Total Nonfarm Jobs | 5,652.7 | 5,646.6 | 5,599.5 | 6.1 | 0.1% | 67.7 | 1.2% | 61.3 | 1.1% |
| Goods Producing Industries | 961.3 | 962.0 | 968.4 | -0.7 | -0.1% | -0.9 | 0.1% | -7.1 | -0.7% |
| Natural Resources & Mining | 18.2 | 18.3 | 18.3 | 0.1 | 0.5% | 0.4 | 2.2% | 0.1 | -0.5% |
| Construction | 253.1 | 252.3 | 244.9 | 0.8 | 0.3% | 11.1 | 4.6% | 8.2 | 3.3% |
| Manufacturing | 690.0 | 691.4 | 705.2 | -1.4 | -0.2% | -12.4 | -1.8% | -15.2 | -2.2% |
| | | | | *volume* | *percent* | *volume* | *percent* | *volume* | *percent* |
| Service Providing Industries | 4,691.4 | 4,684.6 | 4,623.0 | 6.8 | 0.1% | 68.6 | 1.5% | 68.4 | 1.5% |
| Trade, Transportation and Utilities | 1,129.1 | 1,124.2 | 1,114.7 | 4.9 | 0.4% | 14.7 | 1.3% | 14.4 | 1.3% |
| Information | 120.7 | 121.2 | 121.8 | -0.5 | -0.4% | -0.5 | -0.4% | -1.1 | -0.9% |
| Financial Activities | 339.9 | 340.5 | 338.2 | -0.6 | -0.2% | 1.5 | 0.4% | 1.7 | 0.5% |
| Professional and Business Services | 611.2 | 607.4 | 595.8 | 3.8 | 0.6% | 16.6 | 2.8% | 15.4 | **2.6**% |
| Education and Health Services | 994.0 | 993.0 | 978.1 | 1.0 | 0.1% | 12.9 | 1.3% | 15.9 | **1.6**% |
| Leisure and | 484.8 | 486.5 | 470.7 | -1.7 | -0.3% | 13.5 | 2.9% | 14.1 | **3.0**% |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Hospitality | | | | | | | | | |
| Other Services | 265.8 | 265.8 | 260.9 | 0.0 | 0.0% | 5.2 | 2.0% | 4.9 | **1.9**% |
| Government | 745.9 | 746.0 | 742.8 | -0.1 | 0.0% | 4.7 | 0.6% | 3.1 | **0.4**% |

*Note: November's nonfarm job statistics will be released December 20*

## Appendix H – Ben Franklyn Technology Partner's Program Clients by Sector




## Appendix I – Pennsylvania Workforce Investment Act Employment and Retention Rates

**Table B – Adult Program Results At-A-Glance**

| | Negotiated Performance Level | Actual Performance Level | |
|---|---|---|---|
| Entered Employment Rate | 73.4 | 81.0 | 2772 / 3422 |
| Employment Retention Rate | 82.0 | 83.7 | 2893 / 3458 |
| Earnings Change In Six Months | 3100 | 2853 | 9864694 / 3458 |
| Employment and Credential Rate | 61.2 | 73.5 | 2247 / 3056 |

## Appendix J – Pennsylvania Workforce Investment Act Participant Levels

**PA Workforce 2003 Participation Levels**

| Total Participants Served | | Total Exiters |
|---|---|---|
| Adults | 9,328 | 4,397 |
| Dislocated Workers | 10,441 | 4,765 |
| Older Youth | 1,911 | 803 |
| Younger Youth | 11,994 | 4,021 |

## Appendix K – Job-years Created from Ben Franklyn Technology Partners Program

| | Estimate | 95% confidence interval |
|---|---|---|
| Additional job-years in client firms | 35,579 job-years | 22,806 to 48,352 job-years |

## Appendix L – Gross State Product Created from Ben Franklyn Technology Partners Program

| | Estimate | 95% confidence interval |
|---|---|---|
| Total additional GSP (nominal) | $8.0 billion | $5.1 billion to $10.9 billion |
| Total additional GSP (real $1996) | $7.9 billion | $5.1 billion to $10.8 billion |

## Appendix M – Gross Tax Revenues Created from Ben Franklyn Technology Partners Program

| | Estimate | 95% confidence interval |
|---|---|---|
| Additional state tax receipts | $402 million | $257 to $547 million |
| Present value of additional state tax receipts | $263 million | $168 to $359 million |
| Present value of additional state tax receipts per dollar of state investment | $1.15 | $0.73 to $1.56 |

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