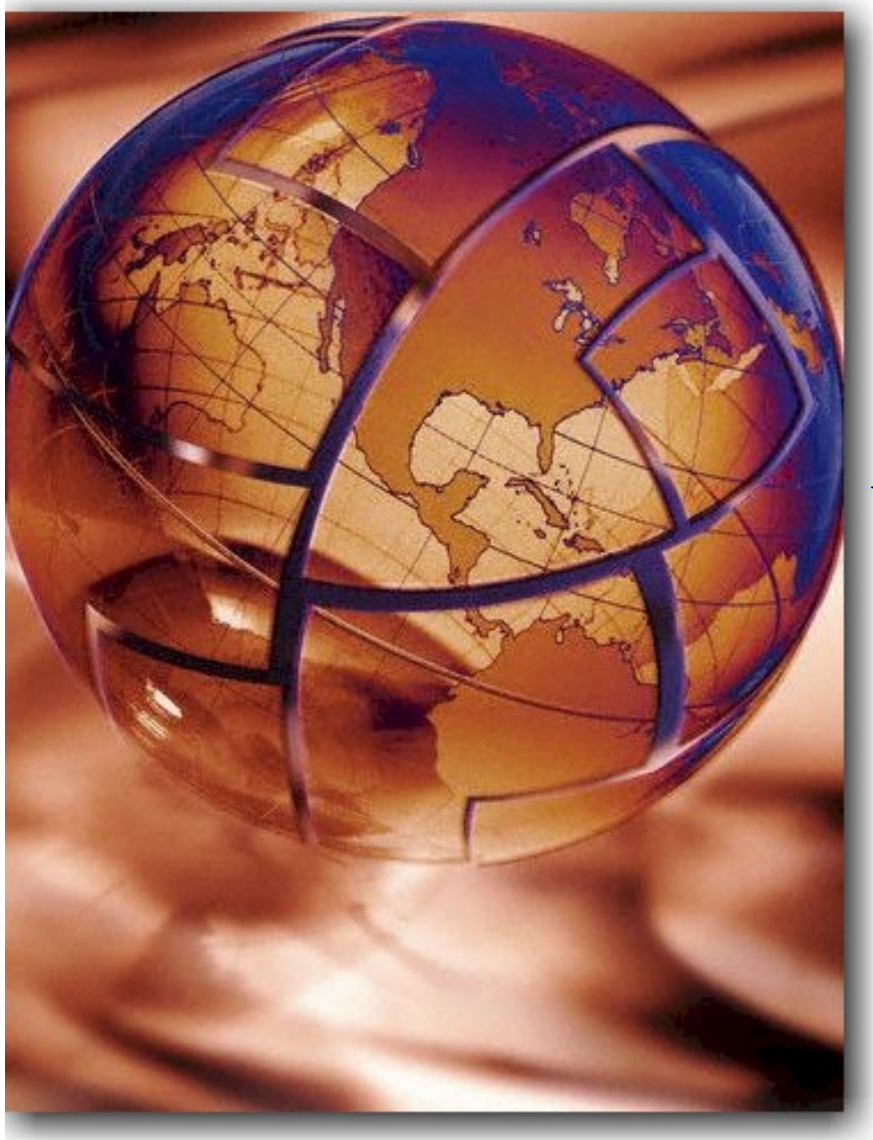

National ICT Benchmarking Study

Trinidad and Tobago versus
Selected Comparator Countries

Final Version
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Ministry of Public Administration and Information

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The information contained in this document represents the current view of the Ministry of Public Administration and Information on the issues discussed as of the date of publication.

Executive Summary

Study Objectives

The objective of the Benchmarking Study is to understand the level of ICT development in Trinidad and Tobago relative to other countries. When combined with the "e-Readiness Report", which examines in absolute terms Trinidad and Tobago's progress in five key areas of ICT development, a comprehensive picture of the "current state" of ICT emerges. The study does not seek to identify absolutes such as "most connected country". Rather, the intent is to gain a better understanding of Trinidad and Tobago's performance in ICT development relative to selected comparator countries, as well as to the broader international community. Documenting the current level of development accomplishes two things. First, it allows for the design of initiatives that are tailored to Trinidad and Tobago's specific needs, focusing effort on those areas that need it most, and that will provide the greatest impact. Additionally, it identifies a starting point against which development progress can be measured.

Comparator Countries

Costa Rica Population: 3.9 million GNI/capita:US$4,040	Through low customs tariffs, tax holidays And reinvestment incentives, Costa Rica has attracted investment from Intel Motorola, and Microsoft corporations, spurring development of local ICT industries.
Ireland Population: 3.8 million GNI/capita:US$23,060	Heavy Government spending in technical and tertiary education in the 1980s produced a highly skilled workforce and elevated income levels.
Jamaica Population: 2.7 million GNI/capita: US$2,740	Continuing economic problems, bandwidth shortages, and high telecommunication costs have hampered Jamaica's ICT planning efforts.
Malta Population: 395,000 GNI/capita: US$9,210	With a small but connected population, advanced e-Government services and a plan for electronically linking all schools, Malta has achieved considerable progress through the use of ICT.

Mauritius Population: 1.2 million GNI/capita: US$3,830	Similar to T&T in terms of population, income, geography and cultural diversity, Mauritius has recently begun developing a national ICT plan.
Singapore Population: 4.1million GNI/capita: US$26,710	One of the most ICT-savvy societies in the world, there are many reasons for Singapore's development success, including its small and literate population, historically heavy investment in ICT infrastructure, innovative and efficient public sector, favourable legal environment, stable politics and strategic location.
Trinidad & Tobago Population: 1.3 million GNI/capita: US$5,970	Having derived economic benefits in the past through the exploitation of its oil and gas resources, Trinidad and Tobago has embarked on a national ICT planning process in order to spur the next wave of social and economic development.

Executive Summary

Benchmarking Results – 2003

Infrastructure

Trinidad and Tobago's telephone usage is comparatively high for both business and residential customers, Relatively affordable connection and service fees are a contributing factor. In sharp contrast, Internet access and usage statistics for T&T are near the bottom of countries surveyed, and among the lower tier of countries worldwide. Poor affordability of Internet service is one reason for this, although several factors are at play (e.g. lack of familiarity with technology in general, lack of Internet education and awareness, lack of compelling reasons to get online, and frustration at slow speed).

National ICT expenditure is fairly consistent among surveyed countries, averaging approximately 6.5% of GDP. This figure is around the 50th percentile worldwide. Only Singapore, which spends nearly 10% of GDP on ICT, stands out in this category. Similarly, in terms of overall infrastructure Trinidad and Tobago compares fairly well among the sample countries, but is mediocre in the global context (39th out of 82[1]). Telecommunication sector competitiveness and broadband availability rankings rate very poorly (78th and 80th worldwide, respectively), although Jamaica and Mauritius face similar struggles. Survey respondents strongly believe that the lack of competition has a strong impact on price and availability.

Human Resources

Based on the data collected, it appears that the population of Trinidad and Tobago is not being adequately prepared for ICT development. While other countries are investing in education and training required to enable people to take advantage of ICT for social and economic development, T&T is slipping behind. The educational system is fairly well developed, (ranking 32nd in the world in terms of public school quality), but in 2002 Trinidad and Tobago spent only 3.25% of GDP on public education, compared with 6.05% for Costa Rica and 6.34% for Jamaica. From the information collected, it is difficult to ascertain the effect of lesser spending. What is clear is that in two areas of ICT education, "school Internet access" and "quality of math and science education", Trinidad and Tobago is firmly in the middle of the pack, both within this study and globally (46th and 40th, respectively). Singapore, a country known for its ICT innovation, ranks 2nd and 1st in the world in these categories.

In the area of IT training quality, Trinidad and Tobago ranks 43rd. Of perhaps greater concern is the country's inability to retain IT talent. In terms of the "IT Brain Drain", Trinidad and Tobago ranks last in this study, and 50th overall – a source of concern for a country embarking on a path of ICT development.

[1] Data are drawn from a number of sources, and include the World Economic Forum's annual survey of the 82 largest countries in the world. Rankings shown range from one to 82, with one being the best in the world.

Executive Summary

Economy and Finance

Trinidadian and Tobagonian companies have been slow to adopt corporate web page usage, ranking 60th in the world. However, this seems to be the norm among the less developed countries in the survey, as Costa Rica (55), Jamaica (63) and Mauritius (80) all rank poorly in corporate web page pervasiveness. Similarly, neither "B2B" (52) nor "B2C" (49) e-commerce applications have been widely implemented in Trinidad and Tobago. Based on this information, it is hardly surprising that in terms of buyer-supplier Internet coordination – a more sophisticated application of ICT to business – Trinidad and Tobago has missed the boat ranking, in a virtual tie with Mauritius, among the worst of 80 countries surveyed.

There is little in the way of ICT cluster development within any of the less developed countries. Trinidad and Tobago (53) is essentially on par with Costa Rica (51) and Mauritius (49). Only Jamaica is left behind at 71st in the world.
The prospects for ICT development in the economy and finance area are bolstered by Trinidad and Tobago's ability to attract venture capital (32), which exceeds by a large margin neighbour states Costa Rica (68) and Jamaica (70).

Government

Based on 2001 research findings, the Trinidad and Tobago Government's prioritisation of ICT ranked 58th in the world – far behind peer countries such as Jamaica (10th) and Mauritius (7th). This is perhaps why the prevalence of online Government services in this country was rated 72nd for the same period – last among the benchmarking study countries, and near the lowest in the world. The Government's National ICT Plan must address significant shortcomings in the area of e-Government service delivery.

It is noteworthy that in Trinidad and Tobago, the Government is seen as an effective promoter of ICT (39th), which could help ICT planning efforts to quickly gain widespread acceptance.

Executive Summary

Legal and Policy

The data for these two charts is based on survey responses. That is, they reflect the perception of the effectiveness of the legal framework for ICT specifically, and the effectiveness of law-making bodies in general. Based on these perceptions, Trinidad and Tobago's legal framework was ranked 38th in the world, ahead of all countries surveyed save Ireland (14) and Singapore (2). Similarly, law-making bodies in Trinidad and Tobago are judged to be fairly effective, 44th globally, but trailing all countries surveyed except Costa Rica (72). Singapore was thought to have the most effective law making bodies in the world.

Study Conclusions

Trinidad and Tobago has much in common with a number of small-island developing states that have recently embraced the challenge of ICT development. ICT is not pervasive in these societies as it is in more developed countries. However, certain building blocks are undeniably present. In Trinidad and Tobago these are:

- High GNI per capita for a country in this geographic region
- Strong use of fixed line and cellular telephone service
- High quality of public schools
- High availability of venture capital
- Adequate overall infrastructure quality

Conversely, there are a number of areas that undermine Trinidad and Tobago's ability to successfully create an information society:

- Low general Internet usage, mirrored by low availability of business and government online services
- No definitive bandwidth policy
- Telecommunications sector characterised with poor access, bandwidth and affordability
- High incidence of IT "brain drain"

In future, as ICT plans unfold, ongoing measures of tracking development progress must be implemented, and regularly updated. While referencing the findings of this initial study, these measures will hopefully indicate steady and sustainable advancement toward developed country status for Trinidad and Tobago.

National Information & Communication Technology (ICT) Plan

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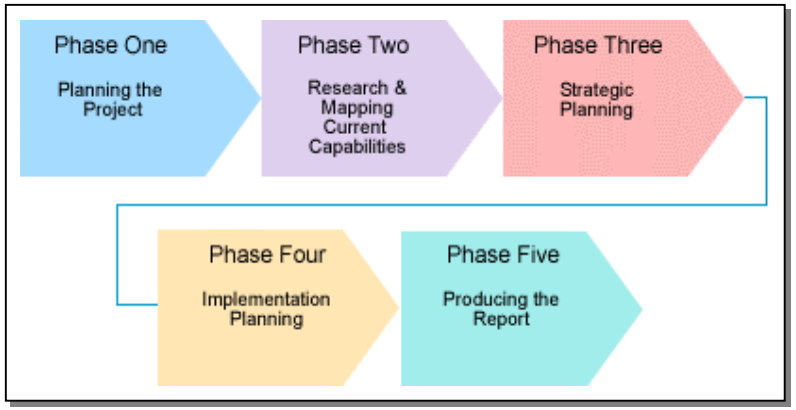
Introduction

The National Information and Communication Technology (ICT) Plan

The Government' s Vision to bring Trinidad and Tobago to Developed Nation Status by 2020 recognises that development in the ICT sector is critical to achieving this goal. Thus in order to foster ICT development, the Government commissioned the creation of a National ICT Plan, the intent of which is to provide real, lasting improvements in social, economic and cultural development through the development and use of information and communication technology, and to establish Trinidad and Tobago in a prominent position in the global information society.

The National ICT Plan will be produced using a five-phase process (see diagram at right). Phase One saw the creation of the project working structure, and confirmation of the project plan. Phase Two is concerned with the identification of Trinidad and Tobago's current ICT capabilities, which represents the "starting point" for developmental planning.



Phase Two is comprised of two major components:

1. An assessment of the country's state of electronic readiness.
2. A benchmarking study comparing Trinidad and Tobago's e-readiness with other nations.

Study Objectives

The objective of the Benchmarking Study is to understand the level of ICT development in Trinidad and Tobago relative to various comparator countries. When combined with the "e-Readiness Report", which examines in absolute terms Trinidad and Tobago's progress in five key areas of ICT development, a comprehensive picture of the "current state" of ICT emerges. The objective of this study is not to identify absolutes such as "most connected country". Rather, the intent is to gain a better understanding of Trinidad and Tobago's performance in ICT development relative to selected comparator countries, as well as the broader international community. Documenting the current level of development accomplishes two things. First, it allows for the design of initiatives that are tailored to Trinidad and Tobago's specific needs, focusing effort on those areas that need it most, and that will provide the greatest impact. Additionally, it identifies a starting point against which developmental progress can be measured.

Introduction

Approach Used

The Benchmarking Study began with the selection of countries whose ICT characteristics were to be compared with those of Trinidad and Tobago. Generally speaking, ICT development can be examined in five key categories:

- Infrastructure
- Human Resources
- Economy and Finance
- e-Government
- Policy and Legal.

These categories are consistent with those used for the e-Readiness assessment, and for the development of the National ICT Plan. Within each category are key indicators of ICT progress, e.g. within Infrastructure, "broadband availability" is a key indicator; within Human Resources, "public spending on education". (For more information on these categories, please see the "e-Readiness Assessment Questionnaire.")

Using a variety of reliable international data sources (see box at right) an array of objective and subjective data were collected within each category. The data for each country were charted and compared against one another, and analysed for any insights, correlations, or implied causation. The results reveal each country's level of ICT development in each category relative to the selected comparator countries. The data collected also include world rankings in ICT from recently published international studies.

The results of this draft study were validated with stakeholders from the five key categories (see above) prior to being published. The final results of the Benchmarking Study can be combined with the findings from the e-Readiness assessment to present a comprehensive view of the "current state" of Trinidad and Tobago's ICT development progress. This information identifies the areas of greatest need (and greatest accomplishment) at this point in time, enabling the prioritisation of initiatives, and providing a baseline against which future development progress can be measured.

Sources Used

The sources used in this Benchmarking Study include the following:

1. The World Economic Forum's "Global Information Technology Report: Readiness for the Networked World (2002 and 2003 editions).

These reports represent the most comprehensive study of global ICT development attempted to date. They feature ICT development data on over sixty key indicators for every country in the world (with greater than 1 million population). Data include survey results from global Executive Opinion Surveys conducted in 2001 and 2002, and hard data collected from a variety of sources, including the ITU database, the World Bank *World Development Indicators*, the IMF *World Economic Outlook*, UNESCO Institute for Statistics, the International Telecommunication Union (ITU), and the World Information Technology and Services Alliance (WITSA).

2. The World Bank's "Worldbank.org" website, featuring "Country at a Glance" and "ICT at a Glance" tables (2001)

3. The International Telecommunications Union's "World Telecommunication Indicators Database" (2003).

4. CIA World Factbook (2002).

A full listing of the data used in this study is available in the Appendix.

General Country Information

Selecting appropriate countries to compare with Trinidad and Tobago is a difficult task. All but one of the countries included in this study – Costa Rica, Ireland, Jamaica, Mauritius, Malta and Singapore – are small island nations. All have populations between one and roughly four million people. Two of these countries are Trinidad and Tobago's Caribbean and Central American neighbours. Others are separated by geography, as well as socio-economic development progress. There are various reasons for selecting these countries for inclusion in the Benchmarking Study:

Costa Rica is a small, Central American country with development challenges similar to Trinidad and Tobago's. In recent years, Costa Rica has become well known for its progressive policies toward high-tech investment. However, its appeal as a base for technology companies belies internal challenges such as lagging telecommunications policies and substandard ICT access.

Through low customs tariffs, tax holidays, and reinvestment incentives Costa Rica has attracted investment from several foreign-owned ICT companies. Intel, Microsoft, Motorola and other international firms have Costa Rican facilities. There are several objectives behind these policies, such as increasing opportunities for local ICT industries, and improving overall economic development.

Ireland is regarded as one of the recent success stories of Europe. Historically a relatively poor economy, Ireland has achieved significant growth by investing in education, and utilising appropriate information and communication technology. Heavy government spending on technical and tertiary institutions in the early 1980s led to a steady supply of highly skilled workers. Tax and trade regulations have created a welcoming environment for ICT companies.

Benchmarking Study Comparator Countries:

While our sample of seven countries are all similar in terms of population, income disparities separate them into groups of more developed (Singapore and Ireland) and less developed countries. The effects of this disparity may be realised in other areas of the study.

In 2001, Ireland completed a rollout of a national fibre-optic network to more than 120 towns. They also recently liberalised Eircom, the incumbent state-owned telecommunications provider. Furthermore, the e-Business Act was passed in 2001, creating legal support for online transactions and digital signatures.

General Country Information

While **Jamaica** began ICT planning two years ago, continuing economic problems have hampered its overall development. With low levels of per capita income, in-home Internet connectivity is impossible for the majority of citizens. Jamaica has set in motion the liberalisation of its telecommunications sector, and they are well into Phase 3 of their effort. Currently, high costs of local and international long-distance telephone service, as well as Internet access, are inhibiting usage by citizens and businesses. A shortage of local and international bandwidth stifles private sector ICT growth. Recent turmoil and violence in Jamaica have had the effect of deterring foreign investment in the island.

With similar population, income, geographic and cultural features to Trinidad and Tobago, **Mauritius** is often used for comparison purposes in benchmarking studies. The growth and stability of the economy over the past two decades has had a remarkable effect on the society. The government is trying to accommodate the needs of foreign ICT companies. A Green Visa concept for ICT professionals has had some success in attracting ICT workers from other countries. Interestingly, IBM has established a regional headquarters in the country.

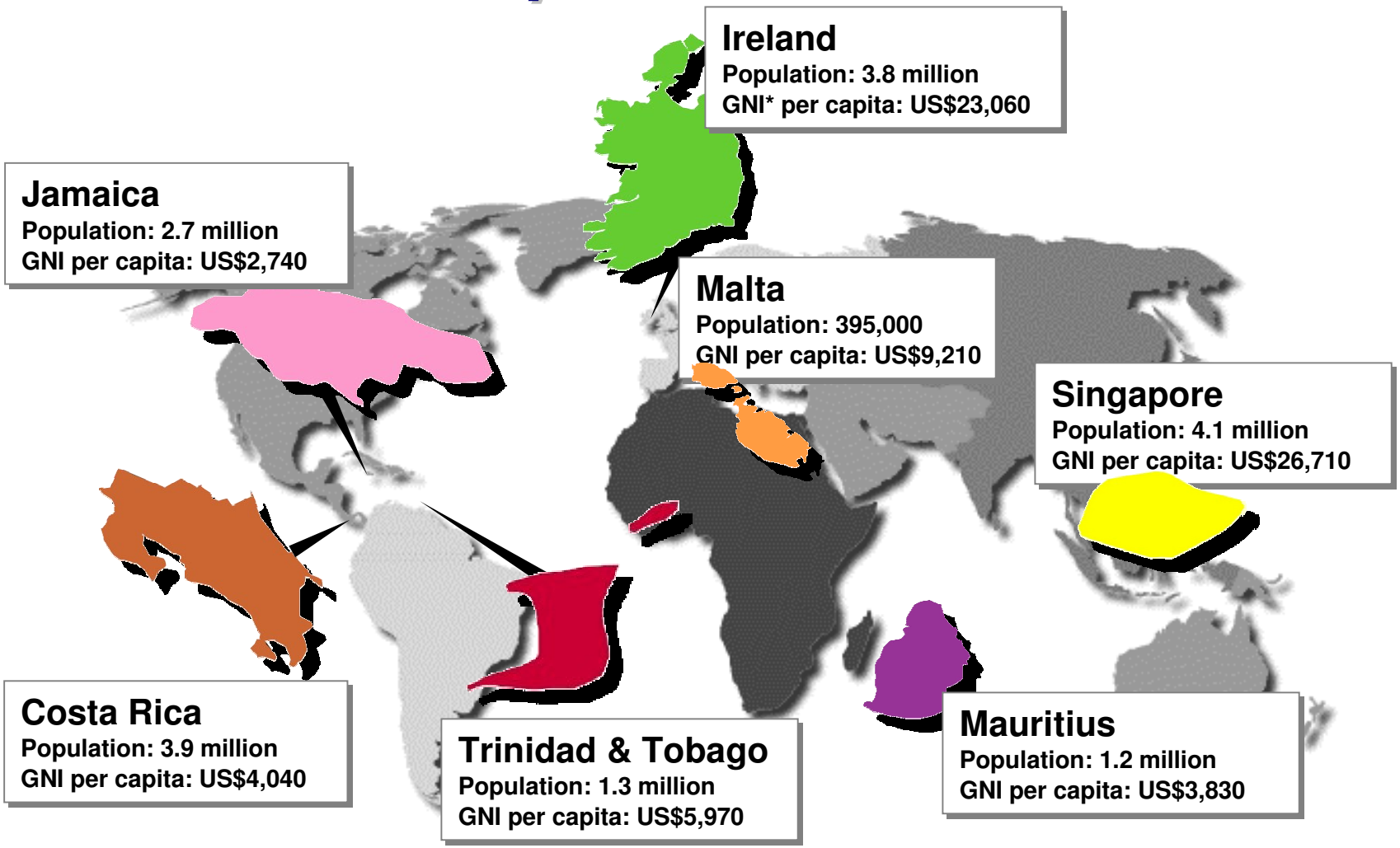
Singapore, although a small island with no appreciable natural resources, has achieved remarkable wealth through innovation and technology development. It has been able to exploit its small and literate population, innovative private sector, and efficient government to make ICT a key stimulus to economic growth. Foreign ICT companies are attracted by Singapore's favourable legal environment, stable politics, and strategic location. Heavy investment in ICT infrastructure has been the hallmark of the Singapore government since the mid-1970s. Singapore remains one of the most ICT-savvy societies in the world.

On the following page, it is revealed that Ireland and Singapore have significantly higher levels of income than Trinidad and Tobago, as measured by Gross National Income (GNI) per capita. This does not exclude them from the remainder of the study. However, it should be noted that, in previous studies, income has been found to be a strong predictor of ICT development levels. It should not be surprising then, if Trinidad and Tobago is found to lag behind these countries in general terms. It is important that the benchmarking study be realistic in assessing Trinidad and Tobago's relative level of development. It is also important to look beyond macro indicators to consider how well Trinidad and Tobago is doing in specific areas. This will allow for the creation of a detailed, pragmatic plan that addresses Trinidad and Tobago's specific needs.

The Republic of Malta

The island nation of Malta was originally considered for inclusion in this Benchmarking Study. Its size, proximity to major markets, and cultural diversity makes it an interesting comparison to Trinidad and Tobago. Additionally, Malta is known for having achieved considerable success in ICT development. However, with a population of only 400,000 Malta is sometimes excluded from global ICT studies. Lacking complete data in the five areas of ICT analysis, it was necessary to omit Malta from direct comparison with the other benchmarking countries. Instead, where information is available, a profile of Malta's progress in ICT development is presented.

General Country Information



Ireland
Population: 3.8 million
GNI* per capita: US$23,060

Jamaica
Population: 2.7 million
GNI per capita: US$2,740

Malta
Population: 395,000
GNI per capita: US$9,210

Singapore
Population: 4.1 million
GNI per capita: US$26,710

Costa Rica
Population: 3.9 million
GNI per capita: US$4,040

Trinidad & Tobago
Population: 1.3 million
GNI per capita: US$5,970

Mauritius
Population: 1.2 million
GNI per capita: US$3,830

Source: Worldbank.org "Country at a Glance" tables, 2001

Note: Country representations not to scale
* GNI – Gross National Income

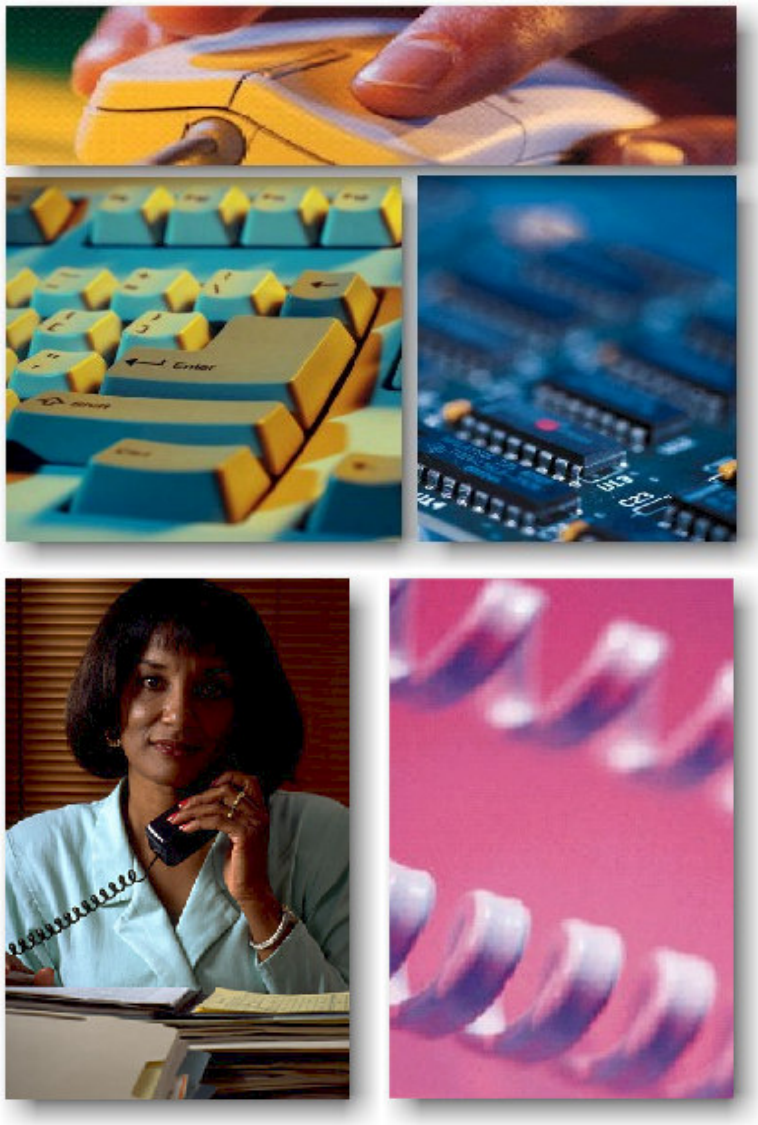
Infrastructure Comparison

About Infrastructure

The minimum necessary condition for connectivity is access to adequate network infrastructure. Without access to global communications networks, no community can participate in the Networked World. Access is determined by a combination of the availability and affordability of using the network itself, as well as of the hardware and software needed for network interface. The quality and speed of the network are also important in determining how the network is used. The customer service orientation of access providers is a major factor in network application adoption and usability. Because of the growing importance and unique character of the Internet, which provides a global platform for both data and (increasingly) voice services, the assessment of network access should be carried out in the context of Internet access, rather than access to either voice or data. The significance of the Internet will only continue to grow in terms of global trade and communication.

Key Measures:

- Telephone Cost and Usage
- Internet Usage
- Internet Access Cost
- National ICT Expenditure
- Infrastructure Quality
- Broadband Availability
- Telecommunications Sector Competition
- Telecommunications Competition and Price



Infrastructure Comparison

Telephone Cost and Usage

	Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore	Malta
Source: International Telecommunication Union (ITU) "World Telecommunication Indicators Database" (2003)							
Business telephone connection charge (US$)	22	50	112	18	69	17	102
Business telephone monthly subscription (US$)	28	6	16	16	3	7	10
Residential monthly telephone subscription (US$)	5	5	16	7	2	5	4
Residential telephone connection charge (US$)	11	50	112	13	34	17	51
Total telephone subscribers per 100 inhabitants	44	31	126	45	48	120	114

Figure 1. Telephone Cost and Usage

For most people, the telephone is the simplest and most affordable means of communicating interactively over long distances. For this reason, the affordability and accessibility of telephone technology is an important measure of a country's ICT development. In addition to being a tool for voice communication, telephone networks can also be used for the transmission of data over the Internet.

Trinidad and Tobago has an average number of telephone subscribers per capita, based on its income and general development level, being roughly on par with all surveyed countries except Ireland and Singapore. It is not surprising that telephone usage is fairly widespread in Trinidad and Tobago, as both residential and business connection charges seem affordable when compared with others, especially since its GNI per capita is higher than Costa Rica, Mauritius and Jamaica. Monthly residential subscription charges are also affordable, although business rates seem relatively expensive.

On the whole, telephone usage in Trinidad and Tobago is equal to or above that of its nearest competitors, but far below that of more developed countries (Ireland and Singapore).

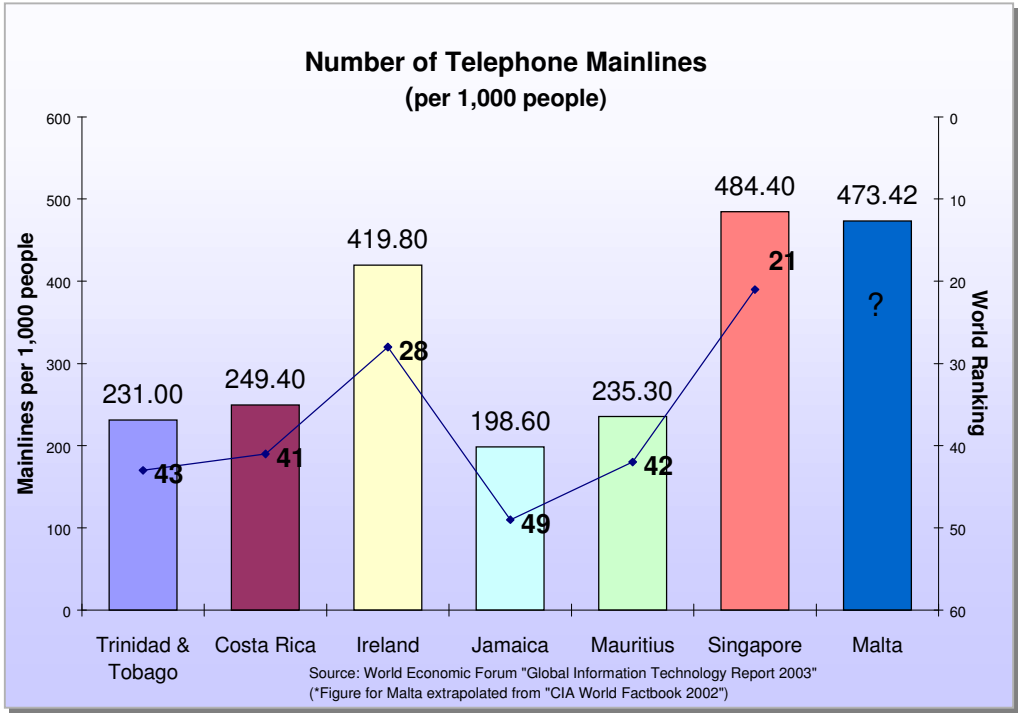


Figure 2. Number of Telephone Mainlines

Infrastructure Comparison

Internet Usage

Singapore has a much greater number of total Internet users than the other countries. This is not surprising, considering it has the largest population, and the highest per capita income. When we examine the number of Internet users per capita, the scenario hardly changes. More developed countries like Singapore and Ireland have realised a much greater take-up rate of Internet use among the population. As a result, any Web-based initiatives that are introduced have a much broader impact, (and chance of success), as they are accessible by a greater proportion of the population.

How do these figures compare in the global context? In terms of public access to the Internet, which includes post offices, libraries and community access centres, Trinidad and Tobago ranks 55th out of roughly 82 surveyed countries*, ahead of only two of the benchmarked countries, Jamaica and Mauritius. If Trinidad and Tobago hopes to include more of its population in the ICT revolution, clearly public Internet access needs to be extended.

Source: ITU "World Telecommunication Indicators Database" (2003)

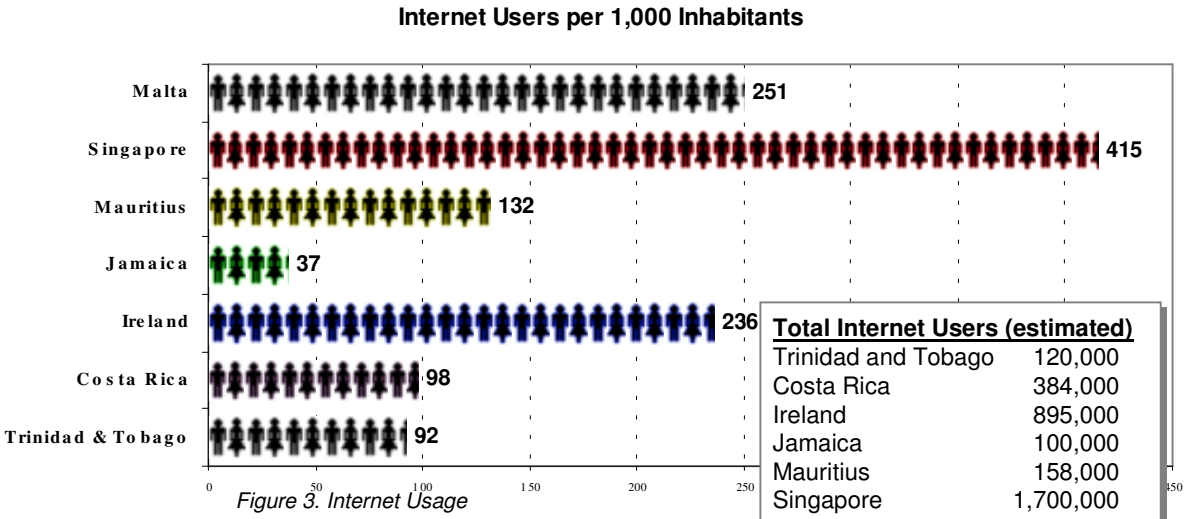


Figure 3. Internet Usage

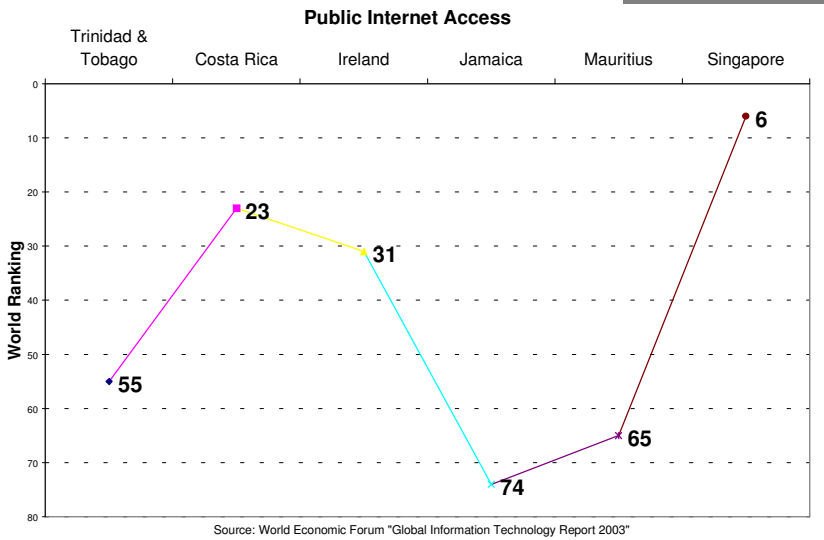


Figure 4. Public Internet Access

* The World Economic Forum survey examines countries of greater than one million population, plus Iceland. Thus for the 2002 survey, 75 countries were sampled; for the 2003 survey, 82 countries.

Infrastructure Comparison

Internet Access Cost

Cost is frequently identified as a major determinant of Internet accessibility and usage. The chart at right indicates that Trinidad and Tobago is in the middle tier of countries in terms of the *affordability* of Internet access. Although Internet access is not exorbitantly priced (approximately $125TT for 50 hours), it is expensive in relation to the country's per capita income levels.

National ICT Expenditure

This measure refers to the expenditure associated with acquiring the ownership of telecommunication equipment infrastructure, including supporting land and buildings, and intellectual and non-tangible property such as computer software. In terms of national spending on information and communication technology, most countries included in this study fell within a fairly narrow band, spending between 6.22% and 6.70% of GNI. However Singapore, already a world leader in connectivity, invested 9.70% approximately US$400 million, in order to ensure it remains at the forefront of ICT development.

	National ICT Spending, 2002
Trinidad and Tobago	US$110,112,000
Costa Rica	$233,062,000
Ireland	(figures not available)
Jamaica	$137,370,000
Mauritius	$66,323,000
Singapore	$370,112,000
Malta	$31,111,000

Figure 6. National ICT Spending

Source: International Telecommunication Union (ITU) "World Telecommunication Indicators Database" (2003)

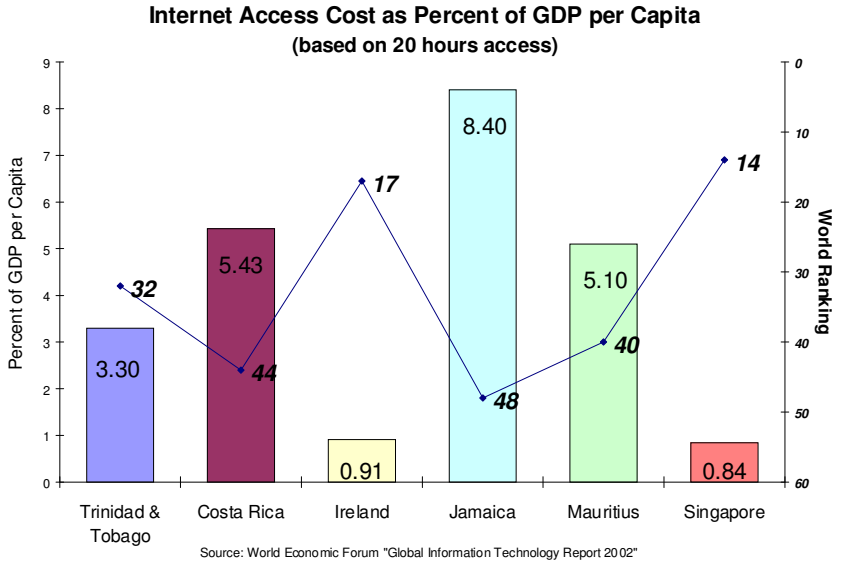


Figure 5. Internet Access Cost as Percent of GDP per Capita

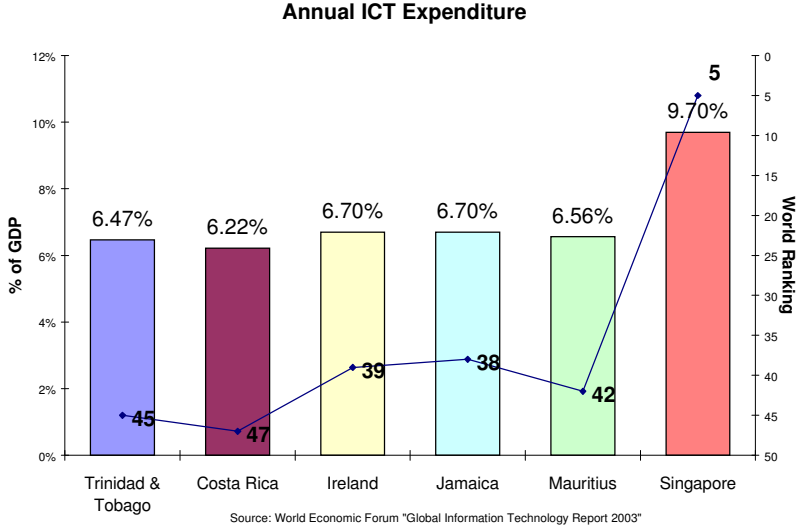


Figure 7. Annual ICT Expenditure

Infrastructure Comparison

Infrastructure Quality

In terms of overall infrastructure quality, (a fairly broad term), Trinidad and Tobago ranks highly compared with local countries (Costa Rica and Jamaica), and competitively with certain others (Ireland and Mauritius). Only Singapore has made greater efforts to ensure the quality of their infrastructure. This is an encouraging indicator of Trinidad and Tobago's preparedness to advance with its ICT agenda.

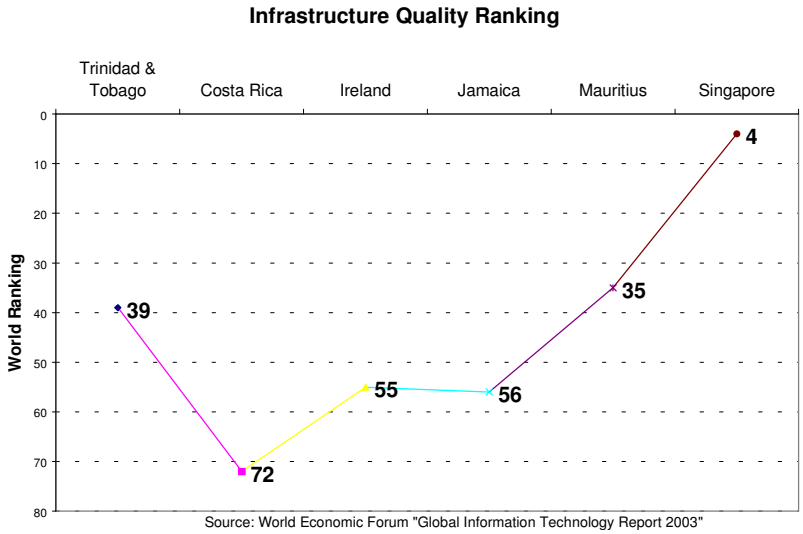


Figure 8. Infrastructure Quality

"Infrastructure Quality" is a broad term encompassing telephone, Internet, wireless and computing technologies.

Broadband Availability

If overall infrastructure quality as a generic whole is quite high, broadband availability as a specific measure shows Trinidad and Tobago lagging behind not only the other comparator countries, but the rest of the world. Only Mauritius, with the lowest broadband availability of all countries surveyed by the World Economic Forum, ranks lower. While broadband is not a prerequisite for delivering simple Web access, more advanced Internet services involving video or other complex data will require the greater through-put of broadband. Simply put, the timing of broadband availability will determine the implementation approach of Trinidad and Tobago's National ICT Vision.

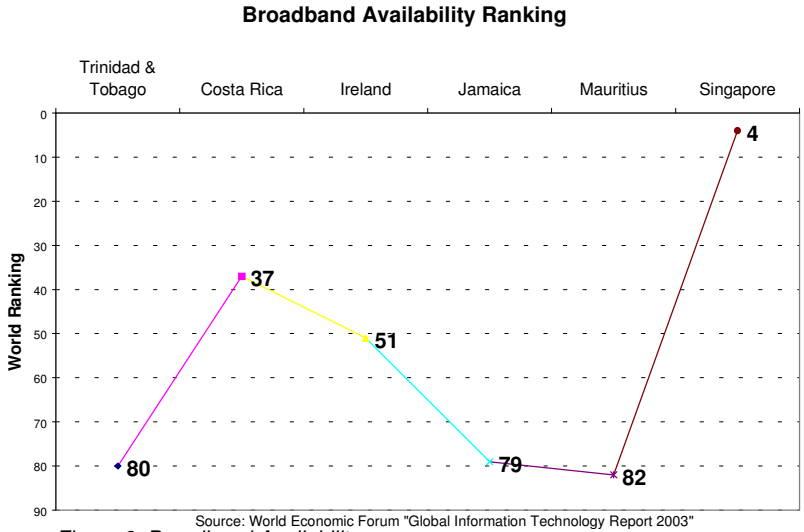


Figure 9. Broadband Availability

Broadband Internet access is required in order to promptly deliver all but the simplest of Internet services.

Infrastructure Comparison

Telecommunications Sector Competition

Based on the survey data, there is a notable correlation between broadband availability and telecommunications sector competition.

	Broadband Ranking	Telcom Comp'n Ranking
Trinidad & Tobago	80	78
Costa Rica	37	73
Ireland	51	41
Jamaica	79	52
Mauritius	82	82
Singapore	4	12

While Costa Rica and Jamaica seem to defy the trend (interestingly, in opposite directions) in other countries the rankings appear very similar. This does not imply direct causation, i.e. that greater competition necessarily leads to increased broadband access, but it is reasonable to consider it as a contributing factor.

Telecommunications Competition and Price

If this ranking were based on empirical data its findings would be more revealing. As it is, this survey question probes the *perception* of telecommunications sector competition on price and quality. The rankings closely mirror those of the previous question, suggesting that respondents believe that competition, or the lack thereof, is directly related to price.

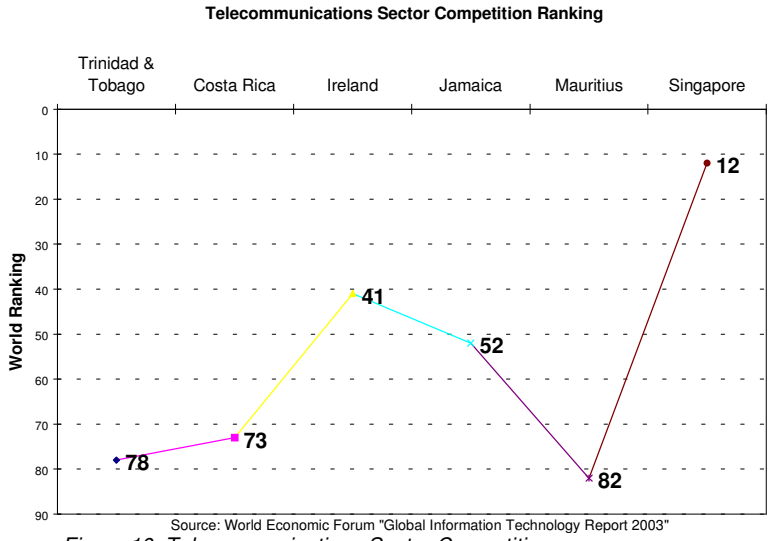


Figure 10. Telecommunications Sector Competition

The trend line for telecommunications sector competition and the perception of competition on price appear similar.

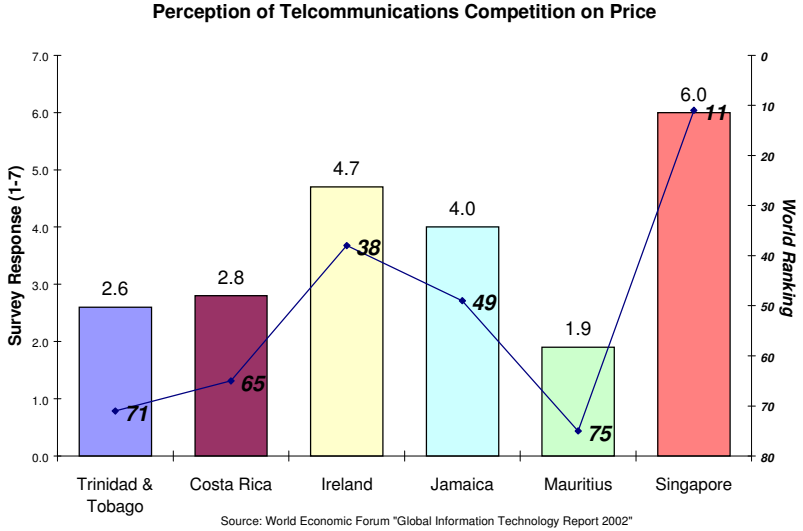


Figure 11. Perception of Telecommunications Competition on Price

Infrastructure Comparison

Summary

- Trinidad and Tobago's telephone usage is comparatively high for both business and residential customers. Relatively affordable connection and service fees are a contributing factor. Despite connection charges for residential and business customers that are five times those in Trinidad and Tobago, Malta has telephone density and usage rates comparable to Singapore, which are among the highest in the world.
- In sharp contrast, Internet access and usage statistics for Trinidad and Tobago are near the bottom of countries surveyed, and among the lower tier of countries worldwide. Poor affordability of Internet service is one reason for this, although several factors are at play (e.g. lack of familiarity with technology in general, lack of Internet education and awareness, lack of compelling reasons to get online, and frustration at slow speed). Per capita Internet usage in Malta is roughly two-and-a-half times that of Trinidad and Tobago.
- National ICT expenditure is fairly consistent among surveyed countries, averaging approximately 6.5% of GDP. This figure is around the 50th percentile worldwide. Only Singapore, which spends nearly 10% of GDP on ICT, stands out in this category.
- Similarly, in terms of overall infrastructure Trinidad and Tobago compares fairly well among the sample countries, but is average in the global context (39th out of 82).
- Trinidad and Tobago's telecommunication sector competitiveness and broadband availability rankings rate very poorly (78th and 80th worldwide, respectively), although Jamaica and Mauritius face similar struggles. Survey respondents strongly believe that the lack of competition has a strong impact on price and availability.

Human Resources Comparison

About Human Resources

Without an educated, ICT-savvy populace, no community can fully participate in the Networked World. To foster this resource, information and communication technologies must be incorporated into the learning system. Lamentably, although the use of ICTs in education is one of the most powerful catalysts to Networked Readiness, it is an opportunity that is often squandered, misunderstood or underestimated.

Connectivity depends upon the community' s incorporation of information and communication technologies into the fabric of its activities in order to maximise the gains of joining in the Networked World. In society-at-large, ICTs can have a profound effect upon people' s professional and personal lives by providing easier access to information, more efficient ways to communicate and powerful organisational tools. To understand how a community is using ICTs, it is important to assess not only how many members of the community have access to the technologies, but also how they are using them.

Key Measures:

- Public Schools Quality
- Public Spending on Education
- School Internet Access
- Quality of Math and Science Education
- IT Training Quality
- IT “Brain Drain”

Human Resources Comparison

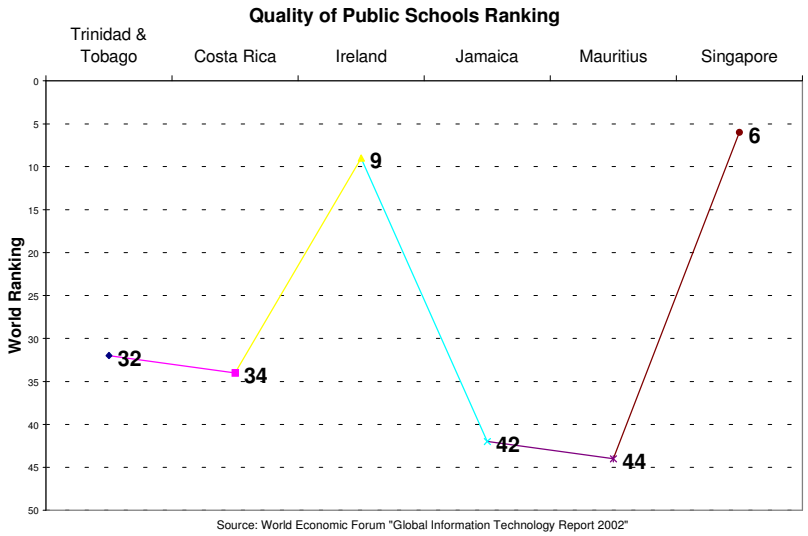


Figure 12. Quality of Public Schools

Public Schools Quality

The education of its people should be one of the highest priorities for all countries, but especially so for countries seeking to improve their level of development. This statistic indicates that Trinidad and Tobago's education system is fairly well regarded. It is somewhat behind more developed countries, but superior to local competitors.

Public Spending on Education

If increased spending can lead to increased quality, it would appear that Costa Rica and Jamaica are making efforts to improve their educational systems. Based on these 2003 results, both countries appear to have made educational spending a priority, outspending by far (as a percentage of GNI) the other countries presented here. In comparison, Trinidad and Tobago is seeming to lag. However, this statistic presents an incomplete picture of the state of investment in education. Until more revealing statistics become available, such as "education spending per student", firm conclusions in this area cannot be reached.

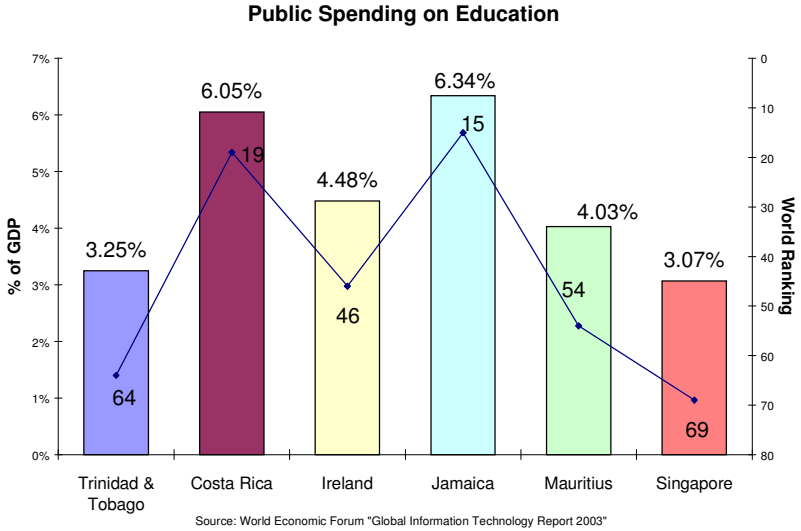


Figure 13. Public Spending on Education

Human Resources Comparison

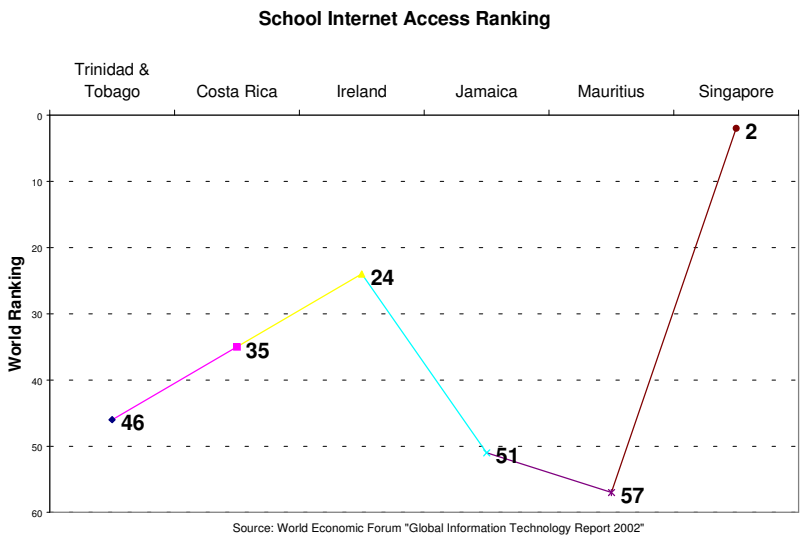


Figure 14. School Internet Access

School Internet Access

In recent years the Internet has proven to be an invaluable education tool, allowing teachers and students to access an entire world of learning materials. Countries that lead in ICT development have made Web-based learning a core component of their educational curricula. After several years of development, considerable educational content is readily available, while countries continue to develop content specifically relevant to their needs. However, without pervasive school-based access, the benefits of this revolution cannot be realised.

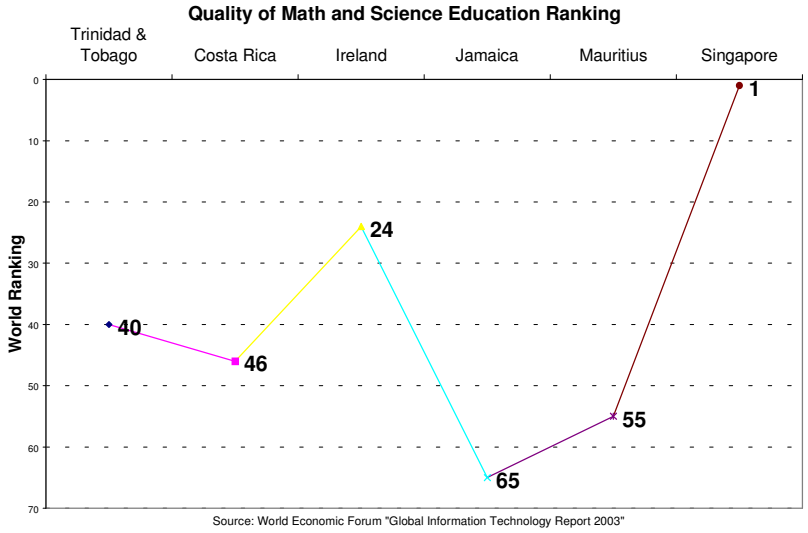


Figure 15. Quality of Math and Science Education

Math and Science Education Quality

Education in math and the sciences can help give students a foundation in the usage and development of information and communication technology. From these disciplines come the skills required for more advanced ICT training. Singapore leads the world in this type of education – just one of the many factors that have led to its place at the top of the ICT hierarchy. At number forty, Trinidad and Tobago is essentially on the median of countries surveyed. The future will tell if it climbs into the ranks of the upper tier, or falls to the lower tier.

Human Resources Comparison

IT Training Quality

If the quality of math and science education helps contribute to the population's readiness for the electronic world, then specialised IT training helps it develop and utilise ICT in more advanced ways. Quality IT training is a pre-requisite for the development of a thriving ICT sector. Again, Trinidad and Tobago finds itself in the middle tier worldwide, and inferior to all but one of the comparator countries. If Trinidad and Tobago cannot develop a sufficiency of ICT talent, it will have to meet its resource needs abroad.

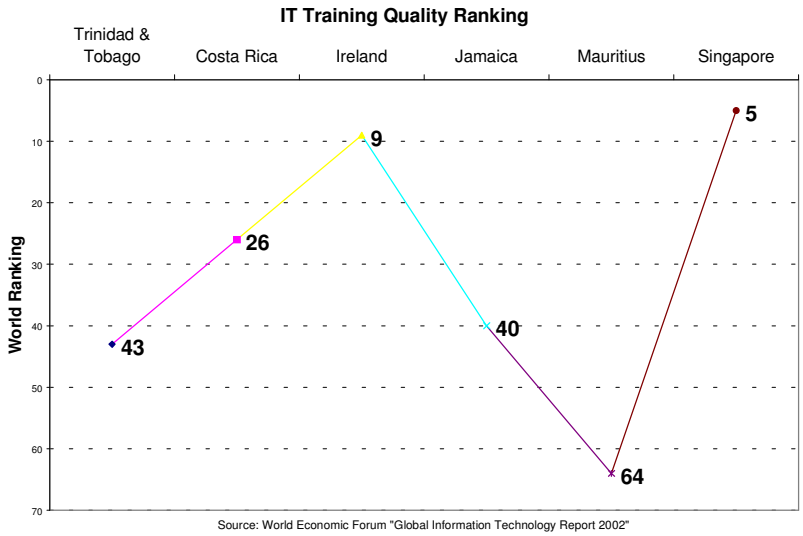


Figure 16. IT Training Quality Ranking

IT "Brain Drain"

Of course, a country must do more than provide its people with quality education. It must provide them with incentives and conditions to remain in the country, so that their skills can help benefit the rest of the population. This statistic is no more reassuring than the quality of IT training. As the lowest ranked country shown, 50th in the world, Trinidad and Tobago must do more to create a climate where IT professionals are welcomed, challenged and rewarded.

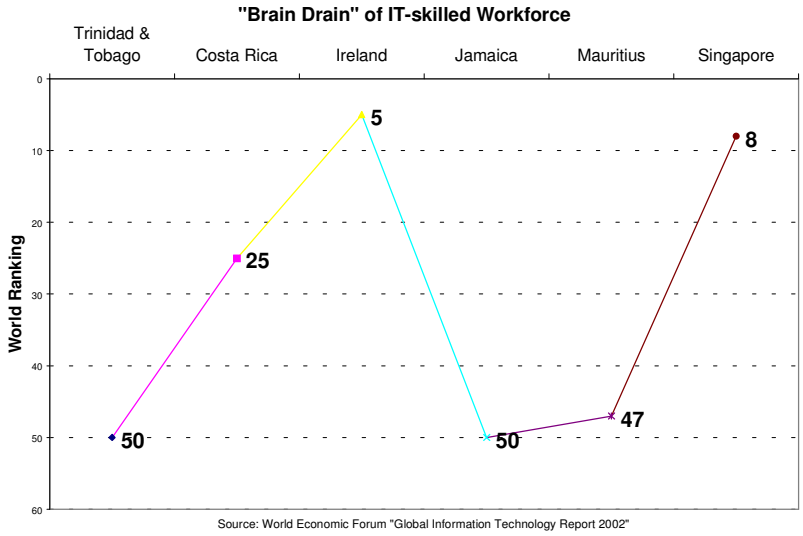


Figure 17. "Brain Drain" of IT-skilled Workforce

Human Resources Comparison

Human Resources: Malta*

The Education Division has been advancing the use of information and communication technology at the primary and secondary school levels. Through a partnership with Malta Information Technology and Training Services Ltd. (MITTS), it is planned that all secondary schools, and a large part of the primary schools, will be connected to the Internet this year. The schools will make up a network of over 5,000 computers – 845 in secondary school labs, and over 4,000 in primary school classrooms – connected via ADSL and cable technologies. Each school will be allotted 25Mb of data to be used for creating a school Website, while individual students will have 5Mb for their own personal Web pages. 150,000 student e-mail accounts will be provided.

Providing child-safe Internet access was a concern in Malta. After considering various options, a "walled garden" approach to safe browsing was selected, whereby students can access over 60,000 pre-defined sites. Users may request the addition of sites to the access list at any time.

A schools portal designed to help inexperienced users quickly access a number of sites has been set up (http://schoolnet.magnet.mt/).

Teachers are receiving training in the use of ICT in the classroom, including learning how to create content for the Internet. Courses available include:

- *Basic computer and Internet awareness*
- *Common business applications (Word, Excel, etc.)*
- *Website creation and graphics*
- *European Computer Driving License (7 modules, encompassing 75 hours of instruction)*

For more information on the training resources available to teachers, please see http://curric.magnet.mt/courses/.

According to a 2002 survey on national ICT usage, 30.5% of the general population has undergone basic computer training. Among this group are 82.8% of students age 15 and above. Only 10% of those 55 years of age and over have received instruction in computer usage.

** Source: "ComputerWise – Official Newsletter of the Information and Communications Technology Learning Centre", Department of Curriculum, Implementation and Review – Education Division, Malta, Issue 6 – November 2001*

Human Resources Comparison

Summary

Based on the benchmarking data collected, it appears Trinidad and Tobago is not adequately preparing its people for ICT development. While other countries are investing in education and training required to enable people to take advantage of ICT for social and economic development, Trinidad and Tobago is slipping behind.

Trinidad and Tobago's educational system is fairly well developed, ranking 32nd in the world in terms of public school quality. Among countries studied, this trails only the more developed Singapore (6th) and Ireland (9th). However, there are indications that this level of performance may be deteriorating. In 2002, Trinidad and Tobago spent only 3.25% of GDP on public education, compared with 6.05% for Costa Rica and 6.34% for Jamaica. Only Singapore spent proportionally less, but it can be reasoned that, with its much higher GDP per capita, spending on education is not inadequate. A more revealing statistic might be "spending on education per student", but this information was not available.

Malta has embarked on an ambitious "ICT in education" program that will eventually connect each school in the country, and incorporate ICT training into the core educational curriculum.

From the information collected, it is difficult to ascertain the effect of lesser spending. What is clear is that in two areas of ICT education, "school Internet access" and "quality of math and science education", Trinidad and Tobago is firmly in the middle of the pack, both within this study and globally (46th and 40th, respectively). Singapore, a country known for ICT innovation, ranks 2nd and 1st in the world in these categories. In order to advance in the global rankings, Trinidad and Tobago must focus additional attention on these key indicators of ICT development.

A similar story is repeated in the area of IT training quality, where Trinidad and Tobago ranks 43rd – not exemplary by any means. Of perhaps greater concern is the country's inability to retain IT talent. In terms of the "IT Brain Drain", Trinidad and Tobago ranks last in this study, and 50th overall – a source of concern for a country embarking on a path of ICT development.

The objectives of the National ICT Plan include "focusing on the development of our children, and adult skills to ensure a sustainable solution and a vibrant future" and developing a knowledge-based society. Clearly, much work needs to be done in the area of human resource development in order to achieve these objectives.

Economy and Finance Comparison

About Economy and Finance

Businesses and governments that are able to effectively employ important information and communication technologies find more sophisticated and efficient ways of managing their external relationships and communications. This growing ICT usage helps form the critical mass of electronic transactions which supports a networked economy, both in terms of the network size and the demand for associated goods, services, labour and policy reform.

Key Measures:

- Company Web Page Pervasiveness
- Internet-based Payment System Usage
- "B2C" e-Commerce
- "B2B" e-Commerce
- Buyer-Supplier Internet Coordination
- Venture Capital Availability
- Cluster Development
- Capacity for Innovation.

Economy and Finance Comparison

Company Web Page Pervasiveness

One of the most straightforward measures of an economy's acceptance of ICT tools and systems is the pervasiveness of corporate Web sites. Not having a Web presence signals to customers, suppliers, investors and competitors that advanced communication techniques are not on the corporate agenda. Trinidad and Tobago ranks near the bottom in terms of company Web page pervasiveness. This could be attributed, in part, to the nature of the country's traditional industries, i.e. the energy sector, where the usefulness of Internet technologies may not have been as apparent. However, considering the severity of the rating (60th worldwide), it would seem that there is considerable room for improvement.

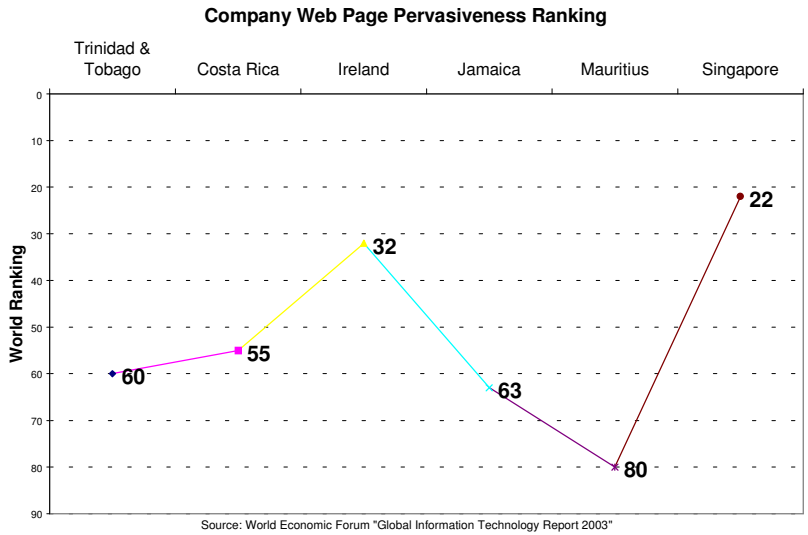


Figure 18. Company Web Page Pervasiveness

Internet-based Payment System Usage

Internet-based payment systems are at the heart of e-commerce. Without electronic payments of some sort, business transactions cannot take place. Thus, a country's usage of these systems essentially determines its e-commerce capabilities. According to these statistics, Trinidad and Tobago has made respectable efforts to promote the acceptance and usage of electronic payment systems. However, these findings are inconsistent with information on the state of electronic payments recently collected in-country. Nonetheless, if the World Economic Forum information is accurate, it should have a positive effect on the development of consumer- and business-oriented e-business.

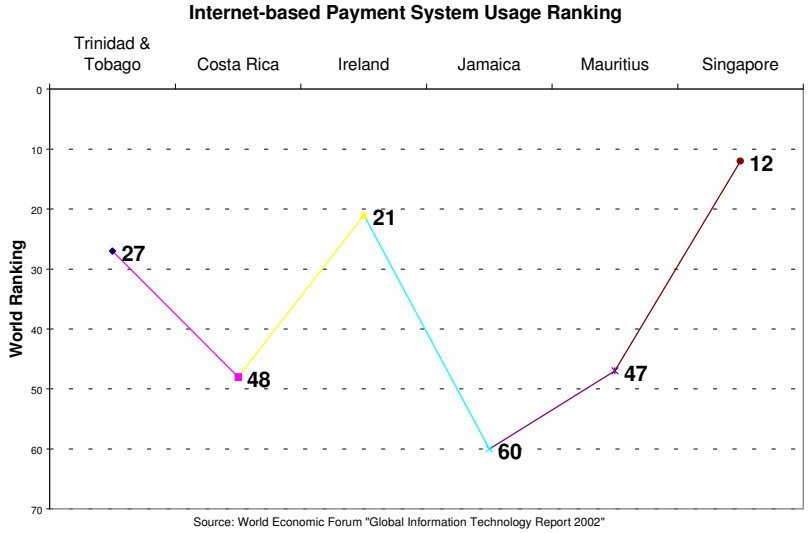


Figure 19. Internet-based Payment System Usage

Economy and Finance Comparison

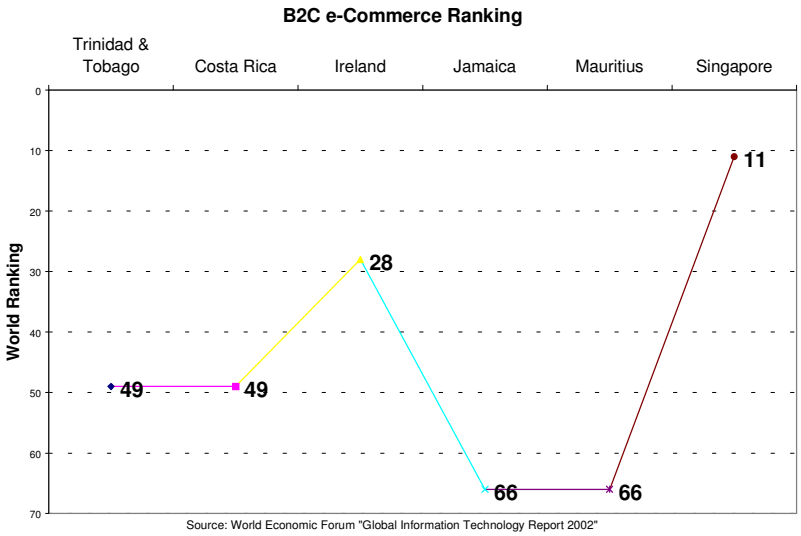


Figure 20. "B2C" e-Commerce

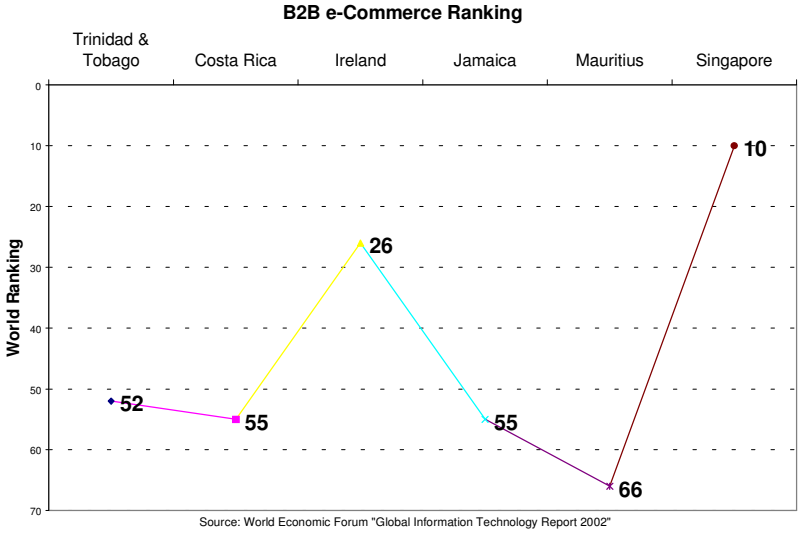


Figure 21. "B2B" e-Commerce

Business-to-Consumer (B2C) and Business-to-Business (B2B) e-Commerce

It is quite surprising then that in Trinidad and Tobago, B2C and B2B e-commerce has been slow to gain acceptance. Clearly, the prevalence of e-payment systems has not jumpstarted these segments of the economy. Is "e-payment" an overrated predictor of e-commerce development?

	e-Payment	B2C	B2B
Trinidad and Tobago	27	49	52
Costa Rica	48	49	55
Ireland	21	28	26
Jamaica	60	66	55
Mauritius	47	66	66
Singapore	12	11	10

Not really. For most countries, there is a direct relationship between e-payment usage and e-commerce development. Not so in Trinidad and Tobago and Mauritius where, despite relatively pervasive e-payment availability, e-commerce has not taken hold with businesses or consumers. It is imperative that these economies identify the other factors that contribute to the lack of e-commerce usage, so that planning efforts can address the shortfall.

Economy and Finance Comparison

Buyer-Supplier Internet Coordination

In many countries where e-commerce has taken off, the first priority was to ensure the ease of use and "seamlessness" of the customer experience. Less attention was paid to the streamlining of the back-office processes and systems that supported the customer transactions. For organisations that had to support electronic and traditional service delivery channels, e-commerce was a tremendous burden.

However, firms soon learned to leverage the capabilities of Web-based communications. Process automation, buyer-supplier coordination, and customer relationship management techniques ushered in a new era of efficient e-commerce.

Buyer-supplier Internet coordination is often seen as a more advanced form of e-commerce (not that this needs to be true, but the perception remains). Therefore, those countries that scored poorly in B2C and B2B e-commerce rankings, including Trinidad and Tobago, are even further behind in terms of buyer-supplier coordination. There are significant benefits to be realised from innovation in this area – firms should be encouraged to increase their adoption of the principles and technologies of buyer-supplier coordination.

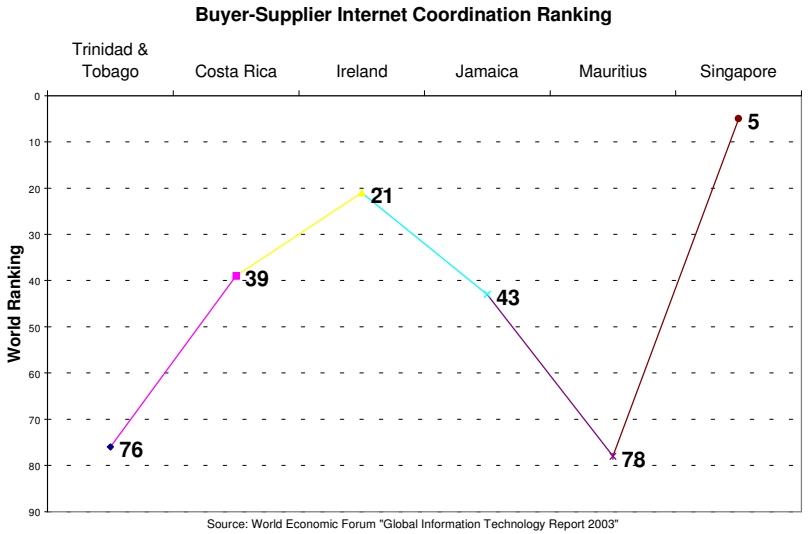


Figure 22. Buyer-Supplier Internet Coordination

Venture Capital Availability

The availability of capital helps foster economic development, irrespective of the presence of ICT. For a smaller economy, Trinidad and Tobago seems to have considerable access to venture capital, ranking ahead of local competitors Costa Rica and Jamaica. This could be considered an asset when planning National ICT development efforts.

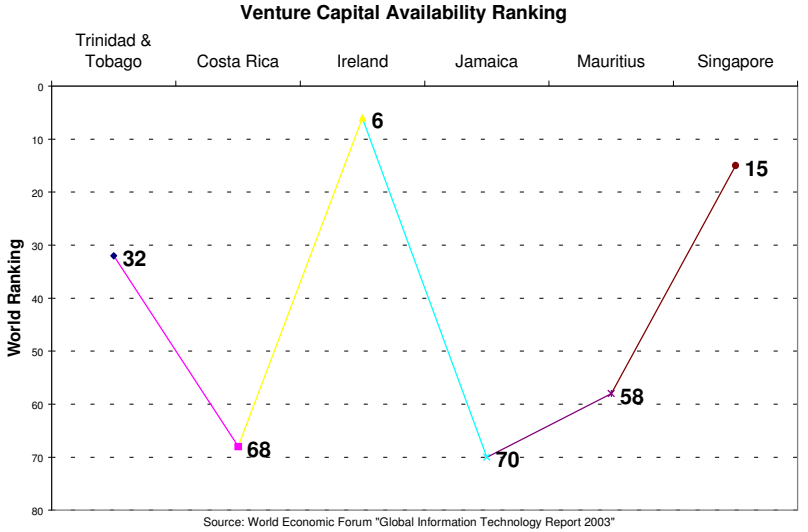


Figure 23. Venture Capital Availability

Economy and Finance Comparison

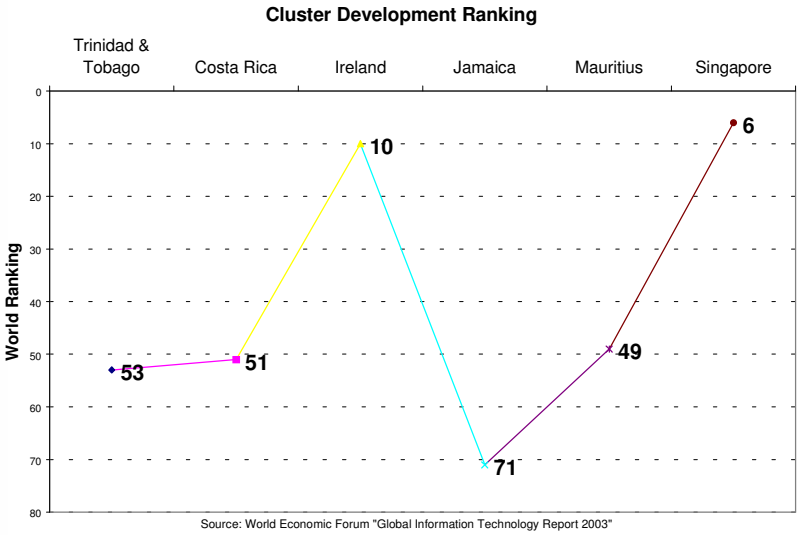


Figure 24. Cluster Development Ranking

Cluster Development

In recent years the nurturing of industry "clusters" –geographic concentrations of interdependent firms in related industries – has been touted as a recommended path to economic development. Silicon Valley in California, U.S.A. is one such example, where world-class clusters have sprung up around the computer, semiconductor, and software industries. Even less-developed countries such as India (software) have fostered successful ICT industry clusters. Whether the cluster-development route is one that Trinidad and Tobago wishes to take remains to be seen. At this point however, Trinidad and Tobago has very little experience with clusters, not unlike its local competitors.

Capacity for Innovation

This measure examines countries' propensity to obtain technologies by conducting formal research and pioneering their own new products and processes. Countries like Trinidad and Tobago, Jamaica, and Mauritius tend to obtain technologies exclusively through licensing or imitating foreign companies.

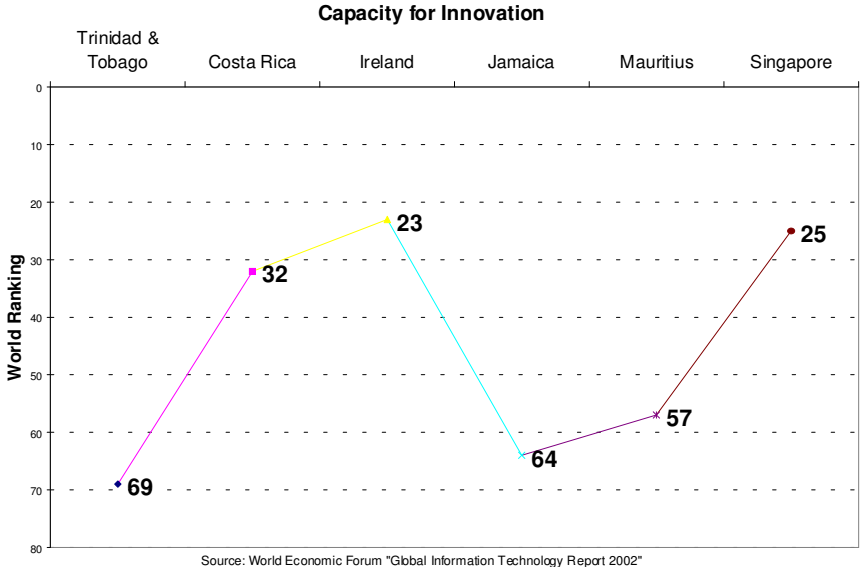


Figure 25. Capacity for Innovation

Economy and Finance Comparison

Summary

- Trinidadian and Tobagonian companies have been slow to adopt corporate web page usage, ranking 60th in the world. However, this seems to be the norm among the less developed countries in the survey, as Costa Rica (55), Jamaica (63) and Mauritius (80) all rank poorly in corporate web page pervasiveness. Similarly, neither "B2B" (52) nor "B2C" (49) e-commerce applications have been widely implemented in Trinidad and Tobago. Based on this information, it is hardly surprising that in terms of buyer-supplier Internet coordination – a more sophisticated application of ICT to business – Trinidad and Tobago has missed the boat. It ranks in a virtual tie with Mauritius, among the worst of 82 countries surveyed.
- There is little in the way of ICT cluster development within any of the less developed countries. Trinidad and Tobago (53) is essentially on par with Costa Rica (51) and Mauritius (49). Only Jamaica is left behind at 71st in the world.
- It does not seem intuitive then that, according to the survey data, Internet-based payment systems are fairly commonly used. Trinidad and Tobago's global ranking of 27 is well ahead of the less-developed economies, and only slightly behind Ireland (21).
- The prospects for ICT development in the economy and finance area are bolstered by Trinidad and Tobago's ability to attract venture capital (32), which exceeds by a large margin its closest rivals Costa Rica (68) and Jamaica (70).

Economy and Finance: Malta*

Primary drivers of the Maltese economy include manufacturing (e.g. electronics and textiles) as well as tourism. Direct production contributed to approximately 34 per cent of GDP, while market services accounted for just above 49 per cent.

Malta's manufacturing sector is faced with a number of challenges including:

- *Need to penetrate foreign markets (i.e. EU) in order to achieve economies of scale;*
- *Need to develop technological centres of excellence in technologies which are vital to their region;*
- *The "two economies" effect – the almost total absence of linkages between the low technology, small scale local Maltese companies and the high technology, large scale foreign enterprises.*

The Malta Tourism Authority helps promote tourism through its tourism portal (www.visitmalta.com). In addition to basic tour information and photos, e-brochures are available for many tourist destinations. An interactive map allows visitors to find information on all attractions and destinations. Certain tour operators offer online travel booking (www.maltadirect.com).

** Source: Malta' s National Development Plan for Economic and Social Cohesion 2003 - 2006*

e-Government Comparison

About e-Government

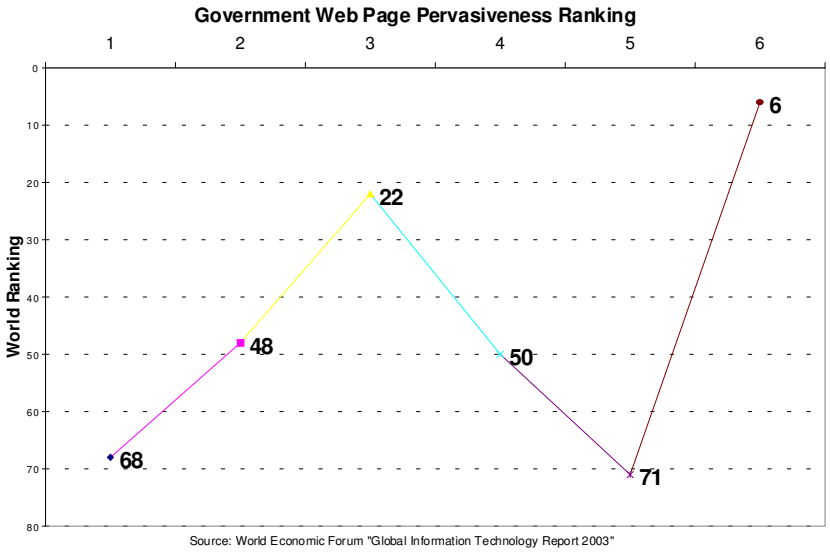
Governments can take advantage of information and communication technologies to improve connections with their constituents, including using the Internet to post information online and to offer interactive services for the public. Governments can also lead by example and become a catalyst for the networked economy by investing in information and communication technologies for their internal use, leading to more efficient operations and the creation of a local market for ICT equipment and services. Relationships with government contractors and procurement mechanisms can be streamlined by putting them online. ICTs can make government activities more transparent to citizens and other observers. They can also enable the government to signal to foreign investors that the country is modern, efficient, and worthy of investment.

Key Measures:

- Government Web Page Pervasiveness
- Government ICT Prioritisation
- Government Success in ICT Promotion
- Internet-based Transactions
- Online Government Service Availability.

e-Government Comparison

Figure 26.
Government Web Page Pervasiveness



In Trinidad and Tobago only about half of government ministries feature Web sites. These tend to feature basic, static information that is not updated frequently. Trinidad and Tobago's rank of 68 is among the lowest of countries surveyed.

Figure 27.
Government ICT Prioritisation

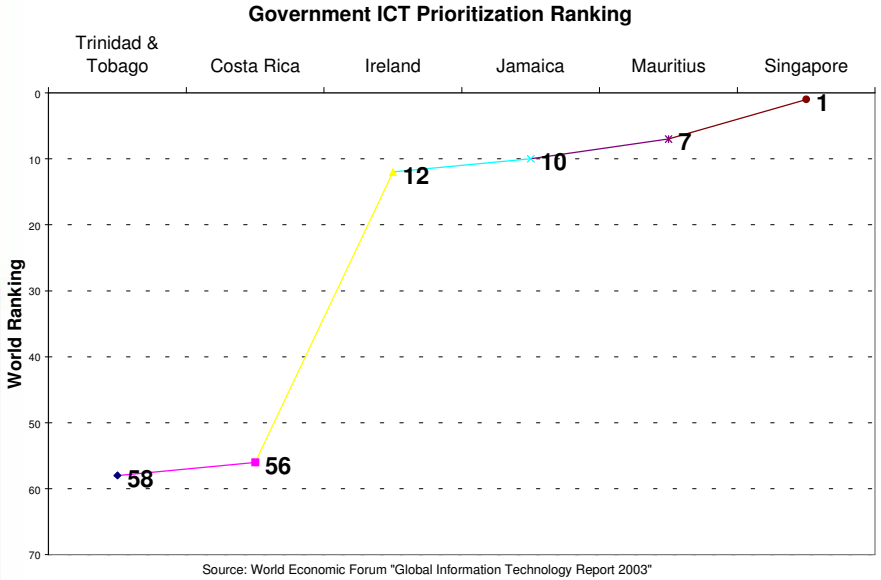
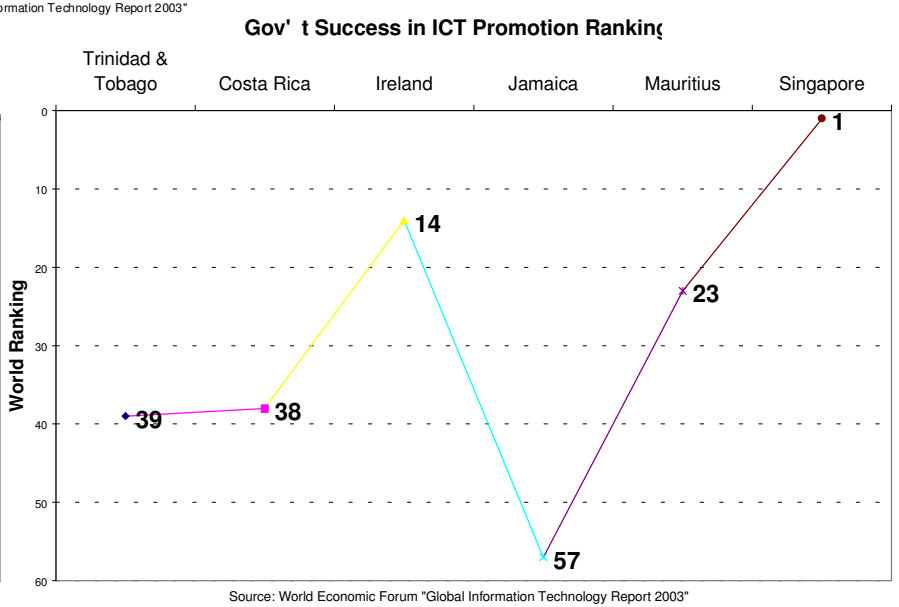


Figure 28.
Government Success in ICT Promotion



According to survey data collected in 2002, Trinidad and Tobago's government prioritisation of ICT is very low. Recent initiatives, such as the National ICT Plan, are a big step forward in correcting this situation.

A huge gap exists between the Jamaican government's prioritisation of ICT and its promotion. However Trinidad and Tobago, like Costa Rica, has been an effective promoter of ICT even when it has not been the top priority of government.

e-Government Comparison

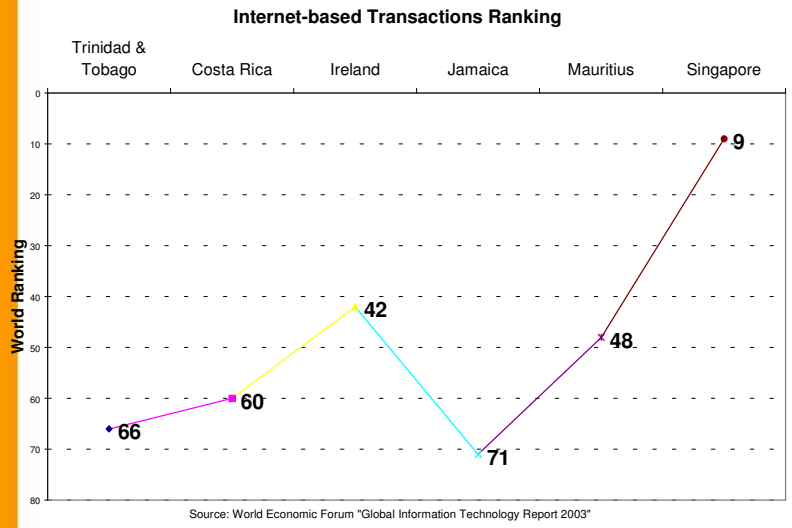


Figure 29. Internet-based Transactions Ranking

A familiar pattern is emerging. Trinidad and Tobago's National ICT Plan and Public Sector Reform must address shortcomings in the delivery of government services. Additionally, Trinidad and Tobago's rating of 66th in the 2003 study is a decline from its 2002 ranking of 58th.

In the 2002 study, Trinidad and Tobago's ranking of 72 was third-lowest in the world after Zimbabwe and Romania. In the 2003 study most countries, including Trinidad and Tobago, declined in the rankings, although the larger survey size (74 countries to 82) generally accounts for this.

Singapore remained constant at number one.

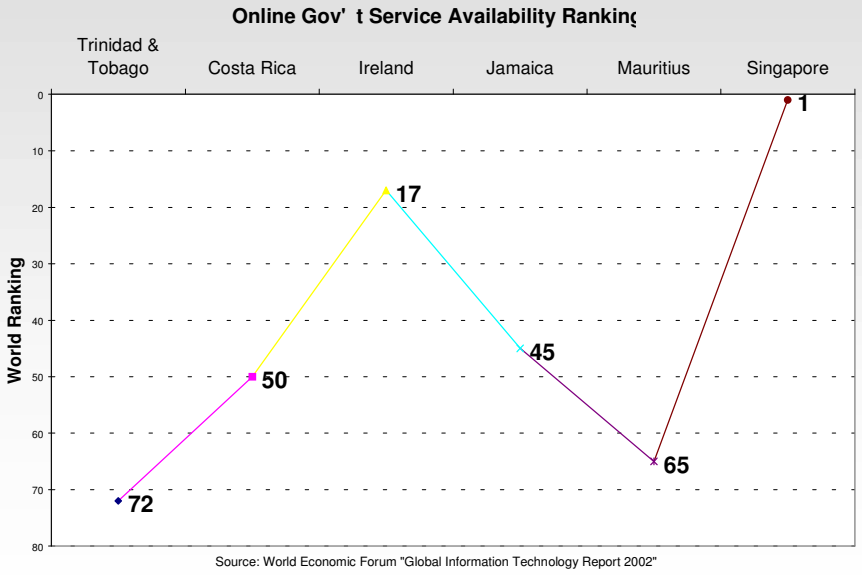


Figure 30. Online Government Service Availability (2002)

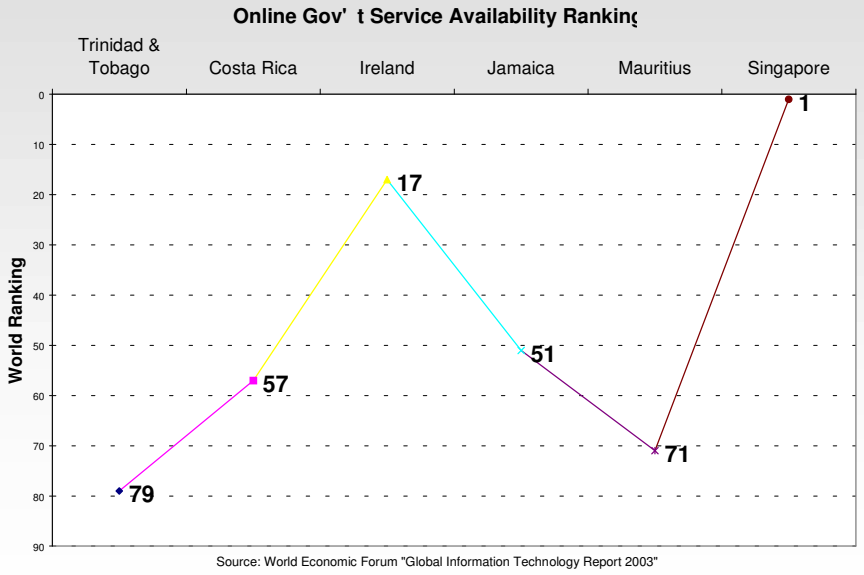


Figure 31. Online Government Service Availability (2003)

e-Government Comparison

e-Government: Malta*

In striving for its goal of raising the quality of life of the Maltese, the Government will actively promote and utilise Information and Communication Technology to the widest possible extent. The strategy to attain this mission, as expressed in the White Paper on the Vision and Strategy for the Attainment of eGovernment (October 2000), is based on the following principles:

> *"All Maltese will have the opportunity and the means to participate in the Information Society and the Information Economy irrespective of their financial, social or educational circumstances.*
>
> *The Government will actively promote the creation of the Information Society and the Information Economy via the provision for transactional on-line eGovernment Services.*
>
> *The Government will provide the necessary policy, institutional and regulatory framework that is required for the successful proliferation of electronic commerce.*
>
> *Businesses will be encouraged to adopt electronic commerce.*
>
> *The achievement of computer literacy by all sectors of the population will be actively pursued.*
>
> *The necessary measures will be taken to build up a critical mass of Information Technology specialists that will be required to sustain the growth of the Information Society and the Information Economy.“*

Other objectives of the e-Government Strategy are outlined as follows:

“Through these measures, citizens will benefit from convenient electronic services provided by both the public and private sector. The communications infrastructure will be of the highest standards, giving users high-bandwidth, low cost, reliable and secure access to the Internet, via a host of access channels. The liberalisation process relative to the telecommunications sector will bring about a more competitive service, lowering prices and increasing quality to the benefit of consumers. The benefits of increased competition are already very visible in the mobile telephony sector.

It is expected that setting up and running of eGovernment will require the acquisition of substantial services from the private sector and will therefore provide the significant impetus to the development of the local IT community. In addition, the adoption of eCommerce solutions in such activities as public procurement is widely recognised as being a trigger for the widespread adoption of eCommerce in the business community. Also, on-line Government services will fuel consumer demand for Internet usage. It is also believed that having the security infrastructure handled by Government will increase consumer confidence in the safety of electronic transactions.”

** Source: “Prosperity in Change – The Way Forward”, National Industrial Policy, Ministry for Economic Services (2003)*

e-Government Comparison

e-Government: Malta *(continued)*

On May 17, 2002 Malta launched its Internet portal (www.gov.mt). Services for various constituent groups are available, including businesses, families, the elderly, and visitors, and are organised into 15 "clusters". The site, which is managed by the Central Information Management Unit (CIMU), also features an "A-to-Z" Directory that includes links to Ministries, departments, and other organisations.

Each government Ministry has established an online presence consistent with the government's Web standards and guidelines. As of today, a number of Government services are available, including transactional services such as the application for a birth/marriage and death certificate, the submission and payment of an income tax return and the application for an examination.

Other e-Government initiatives include:

- *An electronic payment gateway that enables Government to receive payments in a secure electronic form, which will enable the implementation of services that require secure on-line payment;*
- *A registration and authentication service that will provide an accessible and secure digital signature mechanism, enabling citizens to uniquely identify themselves when dealing with government online;*
- *A Central Data Repository, which by providing a single location for information, will act as a central reference point for e-Government services*

The Maltese e-Government Portal

e-Government Comparison

Summary

Even the latest survey results are one or two years out of date, which may be a caveat in considering the Government benchmarking results. However, as recently as 2001, the Trinidad and Tobago government's prioritisation of ICT ranked 58th in the world – far behind peer countries such as Jamaica (10th) and Mauritius (7th). This is perhaps why the prevalence of online government services in this country was rated 72nd for the same period – last among the benchmarking study countries, and near the lowest in the world. The government's National ICT Plan must address significant shortcomings in the area of e-Government service delivery.

It is worth mentioning that in Trinidad and Tobago, the government is seen as an effective promoter of ICT (39th), which could help ICT planning efforts to quickly gain widespread acceptance.

Legal and Policy Comparison

About Legal and Policy

Public policy can be a help or a hindrance to the networked economy. The favourable climate that public policy can create for Internet use and e-commerce encourages communities, organisations and individuals to invest and use information and communication technologies. Important aspects of networked readiness such as Internet availability, and ICTs in schools, are all influenced by public policy. For a community to become ready for the networked world, the appropriate policy-makers must realise the implications of their decisions upon ICT adoption and use.

Key Measures:

- Legal Framework for ICT Development
- Law-making Bodies Effectiveness.

Legal and Policy Comparison

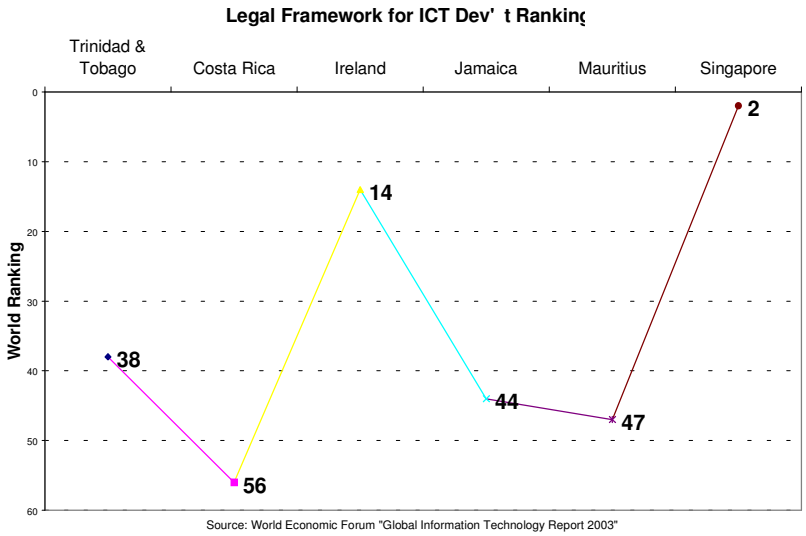


Figure 32. Legal Framework for ICT Development

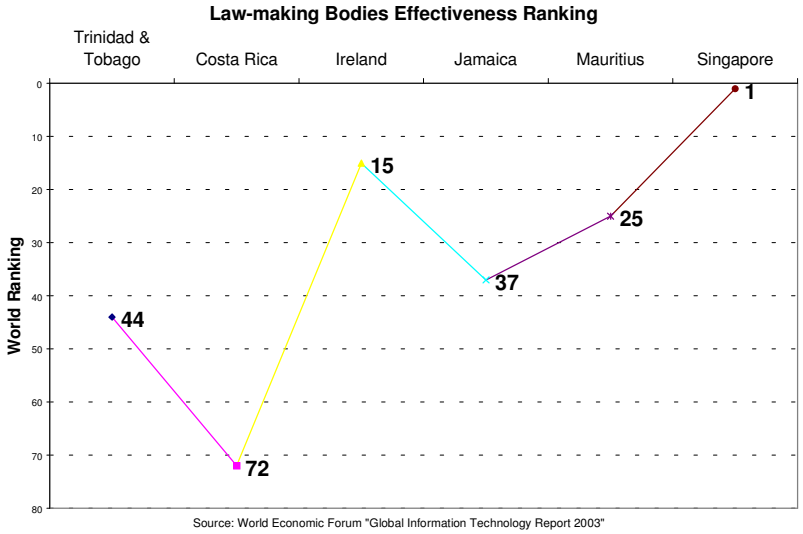


Figure 33. Law-making Bodies Effectiveness

Legal Framework for ICT Development

Law-making Bodies Effectiveness

The data for these two charts is based on survey responses. That is, they reflect the *perception* of the effectiveness of the legal framework for ICT specifically, and the effectiveness of law-making bodies in general. It would be difficult to identify a wholly objective measure of the ability of a nation's legal mechanisms to support ICT transformation. Clearly, respondents are confident in Singapore's ability to address emerging ICT legal issues, while that confidence is lacking elsewhere. Are these conclusions justified?

It is impossible to answer this question fully with survey responses. An in-depth investigation of Trinidad and Tobago's current legal framework must be undertaken. At issue is the ability of the law to support a number of ICT initiatives*. While these initiatives are still being formulated, it is recommended that policy and law-makers consult with ICT planners to better understand the legal implications, and to determine the challenges posed by Trinidad and Tobago's current legal framework. Only this will produce an understanding of Trinidad and Tobago's legal e-readiness, and if the comparisons with other nations are valid.

* See "NICT Legal Working Group Session v2.0, May 2003", for more information on relevant legal issues pertaining to ICT.

Legal and Policy Comparison

Legal and Policy: Malta*

As part of its national ICT planning, Malta has been considering some of the legal and policy challenges related to ICT development:

Intellectual Property and Data Protection

The efficiency of the generation and application of knowledge depends on the degree and reliability of the protection of intellectual property — patents, copyrights, and trademarks. Effective intellectual property protection is an essential cornerstone for creating an attractive investment climate. Firms planning to develop and market innovative products will not invest without assurance that their trademarks are protected. Accordingly, intellectual property rights will be rigidly protected. Local legislation concerning intellectual property rights has been recently updated to reflect current practice within the European Union.

Of similar significance is the need for effective data protection. Worldwide Internet use is growing very fast. Estimates of the value of global Internet commerce range from 1.3% to 3.3% of global gross domestic product in 2001 — equivalent in size to the economies of Australia and the Netherlands combined. This international phenomenon is also affecting trade practice within Malta, where use of the Internet, as well as electronic commerce, is growing too. This creates the need for a regulatory framework that is suited to this technology. For example, any personal information citizens electronically communicate to government is kept within gov.mt itself in accordance with the Data Protection Act 2001. Meanwhile, specific regulations on e-commerce that will protect both suppliers and consumers are still being considered.

** Source: "Prosperity in Change – The Way Forward", National Industrial Policy, (2003)*

Legal and Policy Comparison

Summary

Reliable data on the effectiveness of legal bodies in facilitating ICT development are difficult to acquire. Instead we must rely on survey questions that probe the perception of legal body effectiveness. Perhaps this is why the responses for this section tend to reinforce findings from other sections of the study, namely that more developed countries tend to be more advanced in each aspect of ICT development – law-making and policy reform included. In contrast, Trinidad and Tobago is doing average at best, typically slightly ahead of or slightly behind comparator countries in various respects. The Legal and Policy comparison is no different. In ranking countries' legal frameworks for ICT development, Trinidad and Tobago comes in 38th, its law-making bodies effectiveness 44th. Both rankings are far below those for Singapore and Ireland. In one criterion, Trinidad and Tobago surpasses Jamaica and Mauritius, in the other it trails them. More detailed analysis is required before the true state of legal and policy preparedness for ICT in Trinidad and Tobago is understood.

Benchmarking Study Conclusions

The Benchmarking Study represents a snapshot of how Trinidad and Tobago is currently faring in terms of ICT development. It is not intended to be a detailed investigation. It examines a sampling of key indicators of ICT development, with the goal of providing the reader with a general impression of ICT progress relative to various other countries. It also provides insight into certain areas that should be addressed in the National ICT Plan, either as assets to be leveraged, or as liabilities to be mitigated. Along with the e-Readiness Report, this document is a crucial part of the ICT planning process: knowing where you are today. Overall, the Benchmarking Study findings support and enhance the results of the e-Readiness Assessment. Together they present a clear picture of the current state of ICT development in Trinidad and Tobago.

Trinidad and Tobago has much in common with a number of small-island developing states that have recently embraced the challenge of ICT development. ICT is not as pervasive in these societies as it is in more developed countries. However, certain building blocks are undeniably present. In Trinidad and Tobago these are:

- High GNI per capita for a country in this geographic region
- Strong use of fixed line telephone service
- High quality of public schools
- High availability of venture capital
- Adequate overall infrastructure quality.

Conversely, there are a number of areas which undermine Trinidad and Tobago's ability to successfully create an information society:

- Low general Internet usage, mirrored by low availability of business and government online services
- No definitive bandwidth policy
- Low telecommunications sector competition resulting in poor access, bandwidth and affordability
- High incidence of IT "brain drain".

In future, as ICT plans unfold, ongoing measures of tracking development progress must be implemented, and regularly updated. While referencing the findings of this initial study, these measures will hopefully indicate steady and sustainable advancement toward developed country status for Trinidad and Tobago.

Appendix

– *Data Tables by Topic*

Data Tables by Topic – General

General Benchmarking Statistics

	Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore	Malta
Source: Worldbank.org "Country at a Glance" tables, 2001							
Population in millions	1.3	3.9	3.8	2.7	1.2	4.1	0.395
Adult literacy rate (% ages 15 and over)	94%	96%	N/A	87%	85%	93%	92%
Urban population (% of total population)	75%	60%	59%	57%	42%	100%	91%
GNI per capita - Atlas method (US$)	5960	4060	22850	2800	3830	21500	9210
Source: World Economic Forum - "Global Information Technology Report" 2001/2002 and 2002/2003							
Overall Networked Readiness (2002)	46	45	19	56	51	8	?
Overall Networked Readiness (2003)	58	49	21	60	56	3	?

Data Tables by Topic – Infrastructure

Infrastructure Benchmarking Statistics

Source: World Economic Forum - "Global Information Technology Report" 2001/2002 and 2002/2003

			Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore
2002 Report:								
1.4	Cellular subscribers per 100 inhabitants	Hard data	10.29	5.19	66.75	14.24	15.08	68.38
1.4	Cellular subscribers per 100 inhabitants	Rank	50	60	13	43	42	10
4.1	Internet access cost	Hard data	3.30	5.43	0.91	8.40	5.10	0.84
4.1	Internet access cost	Rank	32	44	17	48	40	14
4.2	Perceived effect of telecommunications competition on quality and price	Survey data	2.6	2.8	4.7	4.0	1.9	6.0
4.2	Perceived effect of telecommunications competition on quality and price	Rank	71	65	38	49	75	11
2003 Report:								
1.3	Competition in the telecommunications sector	Survey data	2.56	2.79	4.65	3.98	1.94	6.00
1.3	Competition in the telecommunications sector	Rank	78	73	41	52	82	12
1.9	ICT expenditure (% of GDP)	Hard data	6.47%	6.22%	6.70%	6.70%	6.56%	9.70%
1.9	ICT expenditure (% of GDP)	Rank	45	47	39	38	42	5
3.1	Overall infrastructure quality	Survey data	4.34	2.56	3.37	3.32	4.41	6.62
3.1	Overall infrastructure quality	Rank	39	72	55	56	35	4
3.2	Local availability of specialized IT services	Survey data						
3.3	Number of telephone mainlines (per 1000 people)	Hard data	231.00	249.40	419.80	198.60	235.30	484.40
3.3	Number of telephone mainlines (per 1000 people)	Rank	43	41	28	49	42	21
3.4	Number of telephone faults (per 100 main lines)	Hard data	75.00	65.10	4.95	48.00	56.42	0.02
3.4	Number of telephone faults (per 100 main lines)	Rank	75	74	16	68	72	1
4.3	Availability of broadband access	Survey data	2.31	4.11	3.88	2.53	2.20	5.83
4.3	Availability of broadband access	Rank	80	37	51	79	82	4
4.4	Public access to the Internet	Survey data	3.30	4.25	3.93	2.69	2.94	5.68
4.4	Public access to the Internet	Rank	55	23	31	74	65	6
7.7	Number of narrowband subscriber lines (per 100 people)	Hard data	56.25	65.00	84.97	51.32	56.91	127.20
7.7	Number of narrowband subscriber lines (per 100 people)	Rank	45	41	28	47	44	6
7.8	Number of broadband subscriber lines (per 100 people)	Hard data	1.00	0.00	9.99	0.04	0.06	15.40
7.8	Number of broadband subscriber lines (per 100 people)	Rank	26	44	14	43	37	6

Data Tables by Topic – Infrastructure continued

Infrastructure Benchmarking Statistics

	Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore	Malta
Source: International Telecommunication Union (ITU) "World Telecommunication Indicators Database" (2003)							
Annual telecommunication investment (US$)	$110,112,360	$233,061,696	..	$137,369,568	$66,323,376	$370,111,744	$31,111,112
Business telephone connection charge (US$)	22	50	112	18	69	17	102
Business telephone monthly subscription (US$)	28	6	16	16	3	7	10
Cellular mobile telephone subscribers per 100 inhabitants	20	8	77	24	23	72	61
Households	346,847	..	1,305,000	722,000	308,000	983,600	131,341
Internet users (' 000s - estimated)	120	384	895	100	158	1,700	99
Internet users per 1000 inhabitants	92	98	236	37	132	415	251
ISDN subscribers	158	1,878	..	..	1,412	22,567	864
Personal computers	90,000	700,000	1,500,000	130,000	130,000	2,100,000	90,000
Population	1,300,000	4,113,000	3,838,900	2,599,334	1,200,170	4,131,200	392,000
Residential monthly telephone subscription (US$)	$5	$5	$16	$7	$2	$5	$4
Residential telephone connection charge (US$)	$11	$50	$112	$13	$34	$17	$51
Staff (Total full-time telecommunications staff)	3,128	4,137	16,300	2,599	1,859	8,804	1,970
Television equipped households	296,000	800,000	1,225,000	469,000	276,000	830,659	..
Total telecommunication service revenue (US$)	$298,876,416	$400,367,936	$2,857,142,784	$524,760,864	$144,181,264	$2,748,603,392	$113,333,336
Total telephone subscribers per 100 inhabitants	44	31	126	45	48	120	114

Data Tables by Topic – Human Resources

Human Resources Benchmarking Statistics

			Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore
Source: World Economic Forum - "Global Information Technology Report" 2001/2002 and 2002/2003								
2002 Report:								
1.3	Estimated Internet users per 100 inhabitants	Hard data	3.30	6.21	27.88	2.34	7.34	46.05
1.3	Estimated Internet users per 100 inhabitants	Rank	45	40	19	51	35	6
1.5	Public Internet Access	Survey data	3.30	4.20	3.90	2.70	2.90	5.70
1.5	Public Internet Access	Rank	49	23	30	66	59	6
4.4	Public access to the Internet	Survey data	3.30	4.25	3.93	2.69	2.94	5.68
4.4	Public access to the Internet	Rank	55	23	31	74	65	6
6.1	Investment in employees' development of IT skills	Survey data	4.0	4.7	5.5	3.9	4.9	5.5
6.1	Investment in employees' development of IT skills	Rank	54	40	10	55	27	10
6.2	Quality of IT training and educational programs	Survey data	4.0	4.8	5.6	4.1	3.3	6.1
6.2	Quality of IT training and educational programs	Rank	43	26	9	40	64	5
6.3	Internet access in schools	Survey data	2.9	3.5	4.5	2.8	2.5	6.1
6.3	Internet access in schools	Rank	46	35	24	51	57	2
7.1	Brain drain of IT-skilled workforce	Survey data	4.1	5.3	6.4	4.1	4.2	6.2
7.2	Brain drain of scientists and engineers	Survey data	50	25	5	50	47	8
8.5	Quality of public schools	Survey data	4.6	4.4	6.3	3.9	3.8	6.4
8.5	Quality of public schools	Rank	32	34	9	42	44	6
2003 Report:								
1.6	Public spending on education (% of GDP)	Hard data	3.25%	6.05%	4.48%	6.34%	4.03%	3.07%
1.6	Public spending on education (% of GDP)	Rank	64	19	46	15	54	69
4.4	Public access to the Internet	Survey data	3.30	4.25	3.93	2.69	2.94	5.68
4.4	Public access to the Internet	Rank	55	23	31	74	65	6
4.6	Total adult literacy rate (%)	Hard data	6.23	4.41	2.00	13.13	15.47	7.68
4.6	Total adult literacy rate (%)	Rank	44	39	28	61	67	49
4.7	Quality of math and science education	Survey data	4.62	4.41	5.11	3.37	4.08	6.38
4.7	Quality of math and science education	Rank	40	46	24	65	55	1

Data Tables by Topic - Economy & Finance

Economy & Finance Benchmarking Statistics

			Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore
Source: World Economic Forum - "Global Information Technology Report" 2001/2002 and 2002/2003								
2002 Report:								
9.1	Business to consumer e-commerce transactions	Survey data	2.1	2.1	2.5	1.8	1.8	2.9
9.1	Business to consumer e-commerce transactions	Rank	49	49	28	66	66	11
9.2	Business to business e-commerce transactions	Survey data	2.1	2.0	2.5	2.0	1.8	2.8
9.2	Business to business e-commerce transactions	Rank	52	55	26	55	66	10
9.4	Commercial websites	Survey data	4.2	4.3	5.7	4.0	2.5	6.0
9.4	Commercial websites	Rank	52	49	26	57	26	20
9.5	Domestic venture capital investment in e-commerce	Survey data	4.3	3.4	5.4	4.1	2.9	5.3
9.5	Domestic venture capital investment in e-commerce	Rank	36	58	11	41	73	12
9.8	Use of Internet-based payment systems	Survey data	4.00	3.2	4.3	2.8	3.9	4.7
9.8	Use of Internet-based payment systems	Rank	27	48	21	60	47	12
2003 Report:								
1.1	Venture capital availability	Survey data	3.50	2.36	4.81	2.34	2.9	4.31
1.1	Venture capital availability	Rank	32	68	6	70	58	15
1.2	State of cluster development	Survey data	2.89	2.91	4.33	2.55	2.97	4.82
1.2	State of cluster development	Rank	53	51	10	71	49	6
1.8	Domestic manufacturing of IT hardware	Survey data	60	25	3	68	75	14
4.1	Sophistication of local buyers' products an processes	Survey data	4.67	4.57	5.26	4.53	4.16	5.62
4.1	Sophistication of local buyers' products an processes	Rank	39	41	19	43	52	12
5.1	Firm-level technology absorption	Survey data	5.01	5.21	5.44	4.68	4.61	5.86
5.1	Firm-level technology absorption	Rank	39	28	18	51	55	9
5.3	Capacity for innovation	Survey data	69	32	23	64	57	25
5.5	Quality of local IT training programs	Survey data	4.04	4.84	5.55	4.08	3.31	6.06
5.5	Quality of local IT training programs	Rank	46	27	10	44	70	5
5.6	Cost of business telephone subscription (US$ per month)	Rank	74	33	27	61	8	5
8.1	Use of Internet for coordination with customers and suppliers	Survey data	3.08	3.68	4.02	3.61	2.93	4.63
8.1	Use of Internet for coordination with customers and suppliers	Rank	76	39	21	43	78	5
8.8	Pervasiveness of company Web pages	Survey data	4.17	4.31	5.65	4.00	2.94	6.01
8.8	Pervasiveness of company Web pages	Rank	60	55	32	63	80	22

Data Tables by Topic – Government

Government Benchmarking Statistics

			Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore
Source: World Economic Forum - "Global Information Technology Report" 2001/2002 and 2002/2003								
2002 Report:								
10.2	Availability of online government services	Survey data	1.5	3.2	5.1	3.3	2.1	6.4
10.2	Availability of online government services	Rank	72	50	17	45	65	1
10.3	Extent of Government websites	Survey data	2.80	4.1	5.7	4.0	2.4	6.6
10.3	Extent of Government websites	Rank	68	48	22	50	71	6
10.4	Business Internet-based interactions with government	Survey data	1.80	1.9	2.2	1.7	2.1	2.7
10.4	Business Internet-based interactions with government	Rank	58	53	36	63	44	9
2003 Report:								
6.1	Government prioritization of ICT	Survey data	4.03	4.19	5.38	5.50	5.69	6.24
6.1	Government prioritization of ICT	Rank	58	56	12	10	7	1
6.4	Government online services	Survey data	1.55	3.15	5.09	3.29	2.13	6.36
6.4	Government online services	Rank	79	57	17	51	71	1
9.1	Use of Internet-based transactions with government	Survey data	1.77	1.87	2.18	1.7	2.11	2.74
9.1	Use of Internet-based transactions with government	Rank	66	60	42	71	48	9
9.2	Government online services	Survey data						
9.2	Government online services	Rank	79	57	17	51	71	1
9.3	Government success in ICT promotion	Survey data	3.83	3.84	4.69	3.42	4.31	5.76
9.3	Government success in ICT promotion	Rank	39	38	14	57	23	1

Data Tables by Topic – Legal & Policy

Legal and Policy Benchmarking Statistics

			Trinidad & Tobago	Costa Rica	Ireland	Jamaica	Mauritius	Singapore
Source: World Economic Forum - "Global Information Technology Report" 2001/2002 and 2002/2003								
2002 Report:								
4.1	Internet access cost	Hard data	3.30	5.43	0.91	8.40	5.10	0.84
4.1	Internet access cost	Rank	32	44	17	48	40	14
4.2	Perceived effect of telecommunications competition on quality and price	Survey data	2.6	2.8	4.7	4.0	1.9	6.0
4.2	Perceived effect of telecommunications competition on quality and price	Rank	71	65	38	49	75	11
2003 Report:								
1.3	Competition in the telecommunications sector	Survey data	2.56	2.79	4.65	3.98	1.94	6.00
1.3	Competition in the telecommunications sector	Rank	78	73	41	52	82	12
2.1	Effectiveness of law-making bodies	Survey data	3.39	2.03	4.41	3.61	4.08	6.00
2.1	Effectiveness of law-making bodies	Rank	44	72	15	37	25	1
2.2	Legal framework for ICT development	Survey data	4.38	4.03	5.35	4.29	4.25	6.18
2.2	Legal framework for ICT development	Rank	38	56	14	44	47	2