TOURISM AND THE FUTURE OF THE ICELAND ECONOMY

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The importance of Tourism

Tourism is the industry that allowed Iceland to recover from the consequences of its financial crisis. According to Landsbankinn Economic Research, it was responsible for between 40 percent and 50 percent of the 18.9 percent increase that occurred in Iceland' real gross domestic product (GDP) from 2010 to 2016.[1] As a result of that growth, the country's unemployment rate fell from 7.6 percent to 3.0 percent and the index of real wages in the country increased by 28.2 percent.[2]

Even before the financial crisis, tourism in Iceland was growing rapidly. In each of the four years between 2004 and 2007, the percentage increase in tourist arrivals was in double digits. Growth slowed in 2008 and arrivals actually declined in 2009 and 2010. But thereafter, tourist arrivals sky-rocketed.

Table 1

Tourist Arrivals 2003-2016

Year	Arrivals	Change in Arrivals	Percentage Change in Arrivals
2003	320000		
2004	360,400	40,400	12.6
2005	374,100	13,700	3.8
2006	422,300	48,200	12.9
2007	485,000	62,700	14.8
2008	502,000	17,000	3.5
2009	493,900	-8,100	-1.6
2010	488,600	-5,300	-1.1
2011	565,600	77,000	15.8
2012	672,900	107,300	19.0
2013	807,300	134,400	20.0
2014	998,600	191,300	23.7
2015	1,289,100	290,500	29.1
2016	1,782,200	493,100	38.3

Source: Icelandic Tourist Board, *Tourism in Iceland in Figures*, April 2015 and June 2017

[1] Landsbankinn Economic Research, "Growth Seeking Balance – Economic Analysis of Tourism in Iceland," 11 October, 2017, p. 3

[2] Statistics Iceland, Statistical Data Base.

Between 2011 and 2016 tourist arrivals increased more than threefold, from about 566,000 to almost 1,800,000. As the International Monetary Fund put it, "the number of foreign visitors to Iceland has shot up like a pyroclastic flow in recent years."[3]

It was not until 2015, however, that it was possible to identify tourism's contribution to Iceland's gross domestic product (GDP). In that year Cristi Frent, prepared Iceland's first Tourism Satellite Account (TSA) for 2009-2013 using the method set down by the United Nations in collaboration with the World Trade Organization. The time series prepared by Frent has subsequently been extended to 2016.

The problem that the TSA method was intended to solve was that conventionally estimated national income and product accounts make it impossible to measure the unique contribution made by the tourist industry. This is because no distinction is made between purchases by tourists and by other consumers. That omission is solved in the TSA framework. With it, visitor expenditures are estimated from what are called tourist-characteristic sectors. The summation of those sales is considered the contribution made by the tourist industry to a country's GDP. The TSA for Iceland includes sales of the following: accommodation services, food and beverage serving services, road passenger transportation, water passenger transportation, air passenger transportation, transport equipment rental, travel agencies and other reservation services, and sport and recreational services. In addition, estimates are made of the extent to which wholesale trade, and retail sales are made to tourists.[4]

Though the TSA framework makes it possible to identify the importance of tourism, it does not indicate tourism's indirect effects, that is, the extent to which there is an impact on the economy over and above direct sales to visitors. To cast light on those effects, The World Travel and Tourism Council

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[3] International Monetary Fund, *Iceland Selected Issues*, IMF Country Report No. 17/164 (June 2017), p. 4

[4] Cristi Frent, *The New Compilation of the Tourism Satellite Account in Iceland for 2009-2013: Data Sources, Methodology and Results* (Borgum v/ Noroursloo: Icelandic Tourism: Research Centre, 2015)

(WTTC) in association with Oxford Economics extended the TSA method. Included in the WTTC approach are estimates of expenditures that were made in support of the tourist industry, but that are not made directly by visitors. Included is investment spending such as the purchase of new aircraft, and the construction of new hotels, government spending on tourism marketing and promotion, resort area security services, and "supply chain" spending – for example, the purchase by hotels of food and cleaning services, and airline purchases of fuel and catering services.[5]

Table 2

Tourism's Direct and Total Percentage Contribution Iceland's Gross Domestic Product 2009-2016

Year	Direct	Total
2009	3.6	NA
2010	3.5	19.7
2011	3.8	20.9
2012	4.3	23.5
2013	4.9	25.8
2014	5.6	27.3
2015	6.7	29.6
2016	8.4	33.9

Source: Direct Contribution:, Statistics Iceland Database; Total Contribution: World Data Atlas, "Travel & Tourism Contribution to GDP." https://knoema.com/atlas/topics/Tourism/Travel-and-Tourism-Total-Contribution-to-GDP-/Contribution-of-travel-and-tourism-to-GDP-percent-of-GDP.

In Table 2 the TSA estimates are referred to as the "Direct" contribution to GDP, and the WTTC estimates as the "Total" contribution. Consistent with the trend in tourist arrivals, the direct contribution of tourism declined in 2009. Both of these measures steadily increased between 2009 and 2013, and then experienced accelerated increases in the years thereafter. Each measures stood at their highest levels in 2016. The TSA "direct" estimate is that tourism contributed 8.4 percent of the GDP; the WTTC estimate of the "total" contribution is that slightly more than one-third of the country's output in 2016 directly or indirectly was dependent on tourism.

[5] WTTC/Oxford Economics 2017, *Travel and Tourism Economic Impact Research Methodology* (March 2017) p. 3-4

As valuable as the TSA framework is in identifying the relative importance of the tourist industry, it shares two of the weaknesses that are present with traditional national income and product accounts. On one hand, they fail to identify externalized costs. They are narrowly constructed and fail to consider the costs of production that are not fully borne by the firms responsible for the output. They do not take into account external costs. At the same time, they provide no insight into whether the growth that has been experienced is the result of the increased use of inputs or alternatively result from increased factor productivity. Because the latter is the principle source of long-term economic growth, this omission means that TSA estimates, as is the case with more conventional measures, provide little insight with regard the sustainability of growth.

Tourism's Costs

Tourism's unique characteristic – its deep immersion in society as a service supplier – sets it off from all other foreign exchange earning sectors. The Director General of the Iceland Tourist Board, Olaf Yrr Atladottir, recently captured it distinctive nature when she noted that "we are just realizing what tourism is. It's a totally different industry from all others." She went on "you can go out and fish and you go and get your fish and then come back. There's somebody in the factory that prepares it, and then it's sold. That, of course, is a tremendous economic impact, but then everybody goes home. The fish aren't bothering you out in the streets, asking where the restaurants are, and aren't using your buses or utilizing a lot of the public goods. They aren't sitting in your swimming pools."[6] What is at issue here is that industries other than tourism do not require that overseas buyers be present in the producing country. But the fact is that Iceland's tourism is available only in Iceland, and is purchased only if citizens of other nations come to the country. That locational requirement means that the interaction between consumers and the Iceland population is altogether different and more intense than when the country

[6] Quoted in Malek Murison, "The Challenges of Mass Tourism in the 21st Century," Travelshift, August 9, 2017, https://travelshift.com/challenges-mass-tourism-21st-century/#top

sells its marine products or aluminum to overseas buyers. The risks that lie in the difference are obvious. An influx of visitors can be disruptive to a society. Such disruptions cost be particularly costly when, as has occurred in Iceland tourism grows rapidly.

Available data suggest that Iceland has encountered four such costs: those associated with increased crime, deteriorating roads and highways, damaged scenic attractions, and the reallocation of much of the country's housing stock to the tourist industry. The first three of these involve tourism's impact on public goods, while the fourth – the reduced availability of private housing – is a market phenomenon. I know of no way the costs of each can be estimated to in a way that would allow them to be included in TSA estimates. Yet they are of obvious importance and should be included – even if only imprecisely – in discussions of the role played by tourism in the country.

Crime

A growth in tourist arrivals from overseas typically increases the incidence of crimes in host countries. Visitors tend to engage in more anti-social activity abroad than they do at home. As C. Ryan explains, "an important component of the tourism culture is the loosening of a sense of responsibility and the opportunity for self-indulgence." He explains that away from home, tourists often engage in behavior they would reject in their home countries.[7]

There is evidence that this has occurred in Iceland. Table 3 records the number of criminal reports made to the Iceland police concerning assault/violence, drug crimes, crimes involving the illegal use of alcoholic beverages, and sexual offenses. Because the annual number of these reported crimes varies greatly from year to year, the table reports their mean for the three year periods, 2009-2012 and 2013-2016. The table shows there has been a substantial increase in the reporting of each of these crimes in the years of the tourist boom – 2013-16 – compared to the prior period. This increase was

[7] C. Ryan, "Crime, Violence and Terrorism: An Accidental or Intrinsic Relationship," *Tourism Management*, Vol. 14, 3, June 1993, pp. 178

especially marked for sexual offenses, but the rise in the other crimes was also substantial. As of 2016 however, there had been no additional government appropriations for police services to respond to these increases in criminal behavior. Indeed, after adjusting for inflation, there was a 12.6 percent decline in such expenditures. What this suggests is that, to date, the cost of increased crime in Iceland has been shouldered by its victims. As yet the society as a whole has not taken on the burden of an increased police response to counter the upward trend in crime.

Table 3

Reported Offenses of Selected Crimes and Government Expenditures on Police Services at 2016 Prices (Billion ISK) 2009-12 and 2013-2016

	2009-2012	2013-2016	Percent Change
Assault/Violence	720	943	+31.0
Drug Crimes	1177	1528	+29.8
Alcoholic Beverage Act	344	437	+27.0
Sexual Offenses	219	310	+41.6
Government Expenditures on Police Services	18,697.6	16,345.1	-12.6

Source: Computed from Statistic Iceland Statistical Database.

Roads

Though about 40 percent of the rooms available in hotels and guest houses in Iceland are located in the capital region, tourists who come to the country do not typically confine themselves to Reykjavik. The scenic attractions that the country has to offer are widely distributed geographically. To gain access to them, visitors must travel by car or bus. What that means is that with the tourist boom, the use of the country's highway system has dramatically increased. As shown in Table 4 passenger kilometers in the 2013-16 period were 13.6 percent higher than in 2009-13. This increase was enabled by a very large growth in the availability of rental cars in the country. Rental car registration in 2013-16 was 78.6 percent high than it had been in 2010-12. The increased road usage that these data represent must have accelerated the pace of road and highway depreciation, seemingly requiring a step up of road

maintenance and repair. But what Table 6 also shows is that at least through 2016, no such increase has occurred. Indeed, adjusted for inflation, government expenditures on road transport actually declined by 4.6 percent. As was the case with crime, the fact that there was not an increase in government spending in response to the growth in road usage means that the costs of decreased highway quality were borne by motorists who were increasingly inconvenienced by declining road quality.

Table 4

Millions Passenger Kilometers, Car Rental Registrations and Government Expenditures on Road Transport Billion ISK at 2016 prices

	2009-2012	2013-2016	Per Cent Changes
Passenger Kilometers	5522	6275	+13.6
Rental Car Registrations	9204*	16440**	+78.6
Government Expenditures on Road Transport	28,546***	27247	-4.6

* 2011-13; ** 2015-16; ***billion ISR
Source: Kilometers PECD (2017) Passenger Transport (indicator) doi: 10.1787/463da4d1 – en; Rental Car Registration, and Government Expenditures on Road Transport Statistics Iceland, Statistical Database;

Environment

It is not only the roads and highways that visitors degrade. Damage is inflicted on the very scenic attractions that bring tourists to the country. The OECD economic survey of Iceland reports, "the pristine state of nature in Iceland is a major attraction for tourists, but the development of tourism has put nature under additional pressure." It goes on, "as tourism has surged more recently, some popular sites have suffered environmental degradation." Even as the OECD called upon Iceland to preserve "the attraction of nature," it acknowledged that already "environmental damage in some spots will likely be irreversible, particularly in areas where anthropogenic impacts can persist for hundreds of years."[8]

As seen in Table 5, the Iceland government has acted in response to the environmental damage caused by tourism. After adjusting for inflation overall expenditures on environmental protection and

[8] OECD, *OECD Economic Survey: Iceland 2017* (Paris: OECD Publishing, 2017) p. 74

the protection of biodiversity and landscapes, increased by 6.7 percent between 2009-12 and 2013-16. Only the relatively small allocation for research and development experienced a reduction.

The Iceland statistical service does not provide detail concerning how environmental protection funds were used. The concern in this case therefore is not that government has neglected the problem. Rather the issue is whether the enhanced level of expenditure is sufficient and whether it is used where it is most needed. The OECD report is not reassuring. It worries that the "initial effort to protect the environment and manage congestion have encountered some difficulties." It goes on that "protecting the environment in the areas under greatest pressure and preserving the attraction of the the most popular sites remains a concern." It further warns that "stresses on the environment need to be monitored and policy adapted to preserve areas of wilderness and meet tourist expectations…." Failing that, it concludes, means "risking Iceland's unique attractiveness."[9]

Table 5

Public Expenditures on Protection of biodiversity and Landscape, 2009-12, 2013-16, 2016 Billion ISK at 2016 Prices

	2009-12	2013-16	Percent Change
Protection of Biodiversity and Landscape	3565.1	3704.4	+3.9
Research & Development Environmental Protection	122.3	94.2	-23.0
Environmental Protection n.e.c.	613.5	788.4	+28.5
Total	4300.9	4587.0	+6.7

*2013-2015
Source: Statistics Iceland, Statistical Database

[9]Ibid., p. 76

Housing

With the surge in tourism, the demand for short-term accommodations has grown rapidly. With the supply of new hotels and guest houses inelastic at least in the short run, many home owners have converted private homes into lodgings for tourists, though a lack of data makes it difficult to estimate precisely the number involved.[10] These conversions, however, in turn reduced the supply of long-term residences available to Icelandic apartment seekers, with the result that the cost of housing in Iceland rose steeply. Table 8 uses the price indices provided by Statistics Iceland to compute percentage price change in housing for 2009/12 and 2013/16. What is clear is that during the latter period the prices for all kinds of housing throughout the country experienced a dramatic increase, an increase that resulted from the influx of tourists.

During these same years, the percentage of young people ages 25-29 who were living with their parents steadily grew. As also shown in Table 8, that percentage averaged 16.3 during 2009-2012, but increased to an average of 20.0 during the 2013-2015 period (peaking at 21.5 percent in 2015, the last year for which data are available). It is of course possible that influences other than the cost of housing were of importance in driving this increase. But that it occurred during years of economic growth when the opposite trend would be expected, raises the question of whether the country's housing-seeking young people (and likely their parents as well) have been the victims of tourism's success.

[10] According to Landsbankinn Economic Research this problem stems from the fact that part of the accommodation markets is unregistered, in particular "the growing market share of Airbnb, and other lodging facilities operating out of private homes and to a lesser extent to small rental cars with sleeping facilities called campers." Landsbankinn Economic Research, "Growth Seeking Balance, p. 5

Table 6
Percentage Change Housing Price Index by Type and Location of Housing, 2009-12 and 2013-16

	2009-2012	2013-2016
Multi-Flat Houses, Capital Area	8.9	33.0
Single Flat Houses, Capital Area	2.5	21.4
All House Types Outside of Capital Area	8.5	26.0
All Housing	8.5	28.8
Percentage of Age Group 25-29 Living with Parents	16.3	20.0

Source: Statistics Iceland database

Tourism and Long Term Growth

There is an extensive, though not unanimous, econometric literature that casts doubt on whether an economy dominated by tourism can sustain long-term economic growth. For example, Adamou and Clerides report that "at high levels of specialization the independent contribution of tourism to economic growth becomes minimal and tourism can even become a hindrance to further growth." They conclude that if tourism's contribution to growth declines sufficiently, "countries may be better off diverting their resources to other areas of economic activity."[11] De Vita and Kyaw similarly find that at high levels of specialization, the contribution of tourist growth turns negative. They therefore agree that tourism should be promoted, but "only up to the point at which the contribution of specialization to growth begins experiencing diminishing returns."[12]

[11] Adamos Adamou and Sofronis Clerides, "Prospects and Limits of Tourism-Led Growth: The International Evidence," *Review of Economic Analysis*, Vol. 3 (2010), p. 299
[12] Glauco De Vita and Khine S. Kyaw, "Tourism Specialization, Absorptive Capacity and Economic Growth," *Journal of Travel Research*, Vol. 56, no. 4 (2017), p. 432

The hypothesis that tourism's dominance militates against long term growth is founded on the fact that the principle source of secular growth is advances in productivity. In turn, those advances require the presence of sectors of economic activity in which technological changes drives productivity growth. Where growth occurs principally because of the increased use of inputs and not productivity advances, diminishing returns will act as a brake. That is the worry associated with tourism's dominance. The personal services the industry supplies are only to a limited extent amenable to the productivity advances associated with technological change.

Table 7 calculates labor productivity in Iceland's tourist sector relative to that of all of the country's industries for the years 2009-2016. What emerges is that even though tourism's relative productivity grew during the 2013-16 period, its level still was only about three-fifths of the level for the economy as a whole in 2016. With that the case, the industry's increasing importance

Table 7

Iceland Tourism Relative Labor Productivity 2009-2016

Year	Tourism Percent Contribution to GDP	Tourism Percent Labor Force*	Tourism Labor Productivity 2016
2009	3.6	7.9	45.6
2010	3.5	8.6	40.7
2011	3.8	9.3	40.9
2012	4.3	10.4	41.4
2013	4.9	10.7	45.8
2014	5.6	11.4	49.1
2015	6.7	12.7	52.8
2016	8.4	14.4	58.3

* August of each year.

Source: Computed from Statistics Iceland, Statistical Database

has exerted a heightened downward pressure on the economy's overall productivity. The index of total factor productivity that is reproduced from the Penn World Tables in Table 8 unfortunately does not

extend beyond 2014. But it does indicate that the total factor productivity of Iceland's economy was about 2.4 percent lower in 2014 than it had been in 2009. This is a trend to be expected when the relative importance of tourism grows as much as it has in Iceland. In this perspective, the structural change Iceland has experienced was a set-back, not an advance.

Table 8

Index of Total Factor Productivity, 2011 = 1.00000

2009	1.03800
2010	1.00391
2011	1.00000
2012	1.00808
2013	1.02041
2014	1.01339

Source: University of Groningen and University of California, Davis, Total Factor Productivity at Constant National Prices for Iceland [RTFPNAISA632NRUG], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/RTFPNAISA632NRUG, December 28, 2017.

The Threat of a Brain Drain

Tourism can, as it has in Iceland, provide valuable support when an economic shock is experienced. And it plays a valuable role as a foreign exchange earner, a role that is of importance in small nations such as Iceland whose standard of living is heavily dependent on imports. But there is long-term growth penalty associated, not so much with tourism, but with tourist dominance. As it grows in relative importance, steady advances in productivity becomes increasingly difficult.

The logic of this argument therefore is not that tourism should be dismantled, but rather that, as has occurred in other developed countries, new highly productive economies should be nurtured alongside of it. Whether this occurs to a large extent on the presence of Icelandic entrepreneurs who possess the capability of bringing such industries to life. At the moment Iceland stands relatively well positioned in this regard. According to the Global Competitiveness Report, the country's tertiary enrollment rate is the eighteenth highest in the world, and the quality of its education system comes in

at number thirteen.[13] The human capital needed to advance long-term growth is produced in the country.

The issue that the country will to face however is the possibility, perhaps even the likelihood, that there will be a growing mismatch between the kinds of employment opportunities created in the tourist sector and the financial and professional opportunities sought by the country's labor force. The risk is that Icelanders with high levels of human capital will eschew employment in tourism and instead seek work outside of the country. If such a drain of highly skilled Icelanders were to become a reality, the resulting loss of valuable personnel will deprive the country of precisely the skills needed to diversify and in that way offset tourism's low level of productivity.

There is some evidence that the beginning of a perverse emigration flow is already underway. Table 9 provides information on the net migration experience of Iceland citizens and of foreign citizens ages 25-34. This age cohort is strategic with regard to development because its members are relatively new entrants into the labor force, and have attained a higher level of educational attainment than older cohorts.[14] These are the individuals who are best able to participate in technologically advanced and

Table 13
Net Migration Icelandic Citizens and Foreign Citizens, Ages 25-34

Year	Iceland	Foreign
2009	-722	- 1,115
2010	-535	-265
2011	-331	-204
2012	-273	+153
2013	-128	+ 546
2014	-256	+488
2015	-418	+962
2016	-230	+1,604

Source: Statistics Iceland, Statistical Database

[13] Karl Schwab (ed.) *The Global Competitiveness Report, 2017-2018*, (Geneva: World Economic Forum, 2017), p. 145

[14] OECD Country Note, Education at a Glance, 2014, p. 3

highly productive industries.

What the table reveals is that, between 2009 and 2011, the experiences of Icelanders and foreign citizens with regard to migration were similar. But thereafter they diverged. In the earlier years, the years of severe economic recession, both groups experienced net emigration. But later, with the economic recovery though there was still a greater outflow of Icelanders than an inflow, the pattern changed for foreign citizens. More foreign citizens started to come to the country than those who departed.

The timing of the divergence in the migration experiences of foreign and Iceland citizens corresponds to the years in which tourism growth shifted from moderate levels to a torrent. What this suggests is that foreign citizens responded positively to the growth in employment opportunities by coming to Iceland to seek work, but Icelanders did not. A similar change among the latter would have seen a reduction in emigration. But that did not occur. In the absence of information on wage rates, it is not possible to be definitive about the reasons for this contrasting response, in particular why Icelanders continued to choose to leave the country.[15] But in light of what is known about the presence of low wages in the tourist sector generally, and the quality of the employment opportunities that are created in it, it is reasonable to conjecture that many of the Icelanders who chose to leave the country did so in order to secure work abroad rather than to accept employment in tourism. If this conjecture is valid, the inference to be drawn is not optimistic with regard to the consequences of tourist-dominance for Iceland's economic future. Iceland is losing the personnel it will need if it is to move to a growth process that is technologically driven.

[15] Statistics Iceland provides no information on wage rates by economic sector. EuroStat data are available, but for Iceland information on wages in "accommodation and food service activities" is marked with an indicator signifying "confidential data." http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Hourly_labour_costs_by_selection_of_NACE_industries_compared_to_the_national_level_-_LCS_2012.png

Conclusion

Tourism possesses a comparative advantage in Iceland. The country is well endowed with the resources that attract large numbers of visitors. But though that is the case, it does not follow that it is an industry in which the country should therefore continue to specialize. The Nobel Prize winning economist Joseph Stiglitz on many occasions has noted that in the aftermath of the Korean War, South Korea possessed a comparative advantage in the production of rice. But if South Korea had allowed that comparative advantage to dictate its structure of production, Stiglitz writes "the country might today have been among the most efficient rice farmers, but would still be a poor country."[16] Rather than permitting that to happen, the South Korean government undertook policies that allowed its firms and labor force to learn to efficiently produce new outputs using advanced technology. Instead of remaining trapped in its comparative advantage in low productivity rice, it changed the industries for which it was an efficient producer and became a successful modern economy.

As it was with South Korea, so it is with Iceland. Rice is still an important part of South Korea's agricultural sector, but it no longer dominates the economy. Tourism in Iceland will and should remain part of the country's service exports. As in the past, its scenic attractions and amenities will continue to act as a magnet for visitors. And as in the past, Iceland will benefit from the foreign exchange which it earns in this way, though it will have to cope with the increased crime, scenic degradation, and the stress on housing and infrastructure that accompanies the industry. But as was the case with South Korean rice, if Iceland is to prosper the government will have to undertake policies to diminish the

[1616] Joseph E. Stiglitz, "Comments," in Justin Yifu Lin, *New Structural Economics: A Framework for Rethinking Development and Policy*, (Washington DC: The World Bank, 2012), p. 80

relative importance of tourism. It will have to nurture new industries for which it will have a comparative advantage in the future.

Iceland needs to cultivate new high productivity industries in order to provide the resources that will allow it to offset the problems of crime, infrastructure deterioration, environmental degradation, and housing shortages that tourism has brought with it. It also needs new industries to reverse the downward pressure on productivity for which tourism also is responsible. But most importantly of all, it needs modern industries in order to retain its most valuable resource – young well educated Icelanders.

The loss of its best-educated people is a prospect that no country should look upon with equanimity. Staunching that outflow will have to become a priority. To do that, the government will have to purposefully adopt policies to provide its private sector with the incentives and resources to create high productivity employment opportunities. This is not an issue of nationalism nor a call to preserve Iceland for Icelanders. It is entirely likely that tourism will continue to attract labor from abroad, and that the country will be the beneficiary of the cultural diversity that results. But a well-educated labor force will be necessary to effectuate the economic turn-around that the country will need. If emigration is not reversed or at least slowed, there might not be enough skilled and educated people available to accomplish the economic transformation that a move away from tourist domination will require.