JIORS

Journal of Indian Ocean Rim Studies

INDIAN OCEAN RIM ASSOCIATION

Journal of Indian Ocean Rim Studies

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Contact details: vn.attri@iora.int
                 hq@iora.int

AIMS AND SCOPE OF THE JOURNAL OF INDIAN OCEAN RIM STUDIES

The Journal of Indian Ocean Rim Studies (JIORS) is aimed at strengthening research and academic findings within the Indian Ocean Region (IOR). The overall aim is to enhance the understanding of the issues involved related with the six priority areas as well as Women Economic Empowerment and the Blue Economy of the Association. The JIORS aims at providing a platform for researchers, academics, scholars, resource persons and practitioners to share their research findings which would enrich and enhance stock of knowledge within IORA.

The JIORS is currently seeking research articles, discussion papers or policy papers on the following six priority areas of IORA:
- Maritime Safety & Security;
- Trade & Investment Facilitation;
- Fisheries Management;
- Disaster & Risk Management;
- Academic, Science & Technology Cooperation;
- Tourism & Cultural Exchanges; and;

The Association focuses on two special cross-cutting areas namely:

- Women's Economic Empowerment; and

- The Blue Economy

In keeping with the Charter of IORA, the JIORS would be established to promote research in:

Understanding of sustained growth and balanced development of the region and of the Member States;

Ensuring Capacity Building in the six IORA priority areas of the Association;

Capacity building to create common ground for regional economic cooperation;

South-South Cooperation and issues related to the global economy; and

Matters related to the IORA focus areas of Women's Empowerment and the Blue Economy.

JOURNAL OF INDIAN OCEAN RIM STUDIES

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CONTENT

JIORS ARTICLES

FOREWORD

I am honoured and grateful and I take pride that the Chair in the Indian Ocean Studies (CIOS), Prof. V. N. Attri, in collaboration with the Indian Ocean Rim Association (IORA) Secretariat has continued to champion and has successfully ensured that we have a regular publication of the Journal of Indian Ocean Rim Studies (JIORS) in May, 2017 despite challenges. Much of this success is also attributed to behind the scene efforts of our tireless committed learned professionals who have provided their expertise by reviewing and providing guidance to ensure that the JIORS content is comprehensive, credible, current, and accessible.

Further it is very much appreciated that the Committee of Senior Officials (CSO), during its last meeting in Durban, South Africa in June 2019, recognised and formally incorporated into the Secretariat structure CIOS to be included to serve as its research unit, which will thereby will greatly enhance and strengthen the research capacity of the IORA Secretariat to be more evidence based. The combination of publication of the JIORS in the long-term would, lead to improved organizational visioning, empowerment,

learning, and problem-solving processes, through an ongoing, collaborative management of the organization culture using the consultative /facilitative role of the CIOS. His services on the day-to-day basis, will be to provide guidance on an ongoing of carefully thought and planned efforts by all staff at the Secretariat to improve how we operate and serve the Member states together with other stakeholders.

The size of IORA is growing and becoming inclusive with the entry of Maldives as the 22nd Member States of IORA. South Korea and Turkey have joined IORA as the 8th and 9th Dialogue Partners of IORA and soon if endorsed by the 9th Biannual CSO/COM in Abu Dhabi (5-7the November 2019)will be Italy as new Dialogue Partner which will make the organization more dynamic and important in new and emerging global scenarios, contributing more effectively to regional cooperation and development in the Indian Ocean Region. We take cognisance that the population living in the 22 member states of IORA consisting of men, women, youth have different levels of education and living standards and live in areas of economic, social and cultural diversity. However, IORA Member States are blessed with a great diversity of untapped resources and assets that if explored and exploited would contribute to the a successful and sustainable development of the region.

We also seize this opportunity to pay tribute to Former President Nelson Mandela, a great visionary, positive thinker and a global symbol of resistance to racial inequality and injustice, behind the establishment of the IORA as testified by his own words in 1995: "the natural urge of the facts of history and geography should broaden itself to include the concept of an Indian Ocean Rim for socio-economic co-operation." In this regard, with the approval of all the

formalities from the host Member State, Mauritius, regarding the Secondment of the Nelson Mandela Internship Programme, it is hoped that the entrance will be joining IORA Secretariat sometime in July 2020.

This issue contains articles Trade and Investment Facilitation; Tourism and Cultural Exchange; Blue Economy; Academic, Science and Technology and the reports of IORA events on Disaster Risk Management, Maritime Safety and Security. The main objective of JIORS is to contribute to the academic debate on issues related with IORA's six priority areas and two cross-cutting focus areas.

I hope that this first issue of Volume 2 of the JIORS will be useful and productive to the readers in IORA and the wider audience, and will motivate the policy makers, researchers and scholars in the Member States to contribute more enthusiastically and regularly in the forthcoming issues of the Journal. I understand that in the establishment of a new Journal, there are challenges such as getting adequate number of articles as the contributors do wait for the credibility of the Journal to be well established.

The next edition of the JIORS will be a Special Edition focussing the concept of 'Indo-Pacific which is likely to go online in the first week of December 2019 and the Special Issue on the Blue Economy will be uploaded in January-March 2020. We are, therefore, inviting contributions in these areas from academicians and scholars.

I wish to hereby congratulate the Chair of the Indian Ocean Studies, Prof V.N. Attri, the editorial team and contributors for their efforts in bringing the second issue of the Journal and wish them the very best in this endeavour.

H.E. Ambassador Dr. Nomvuyo N. Nokwe
Secretary-General,
Indian Ocean Rim Association
hq@iora.int

MANAGING EDITOR FOREWORD

I am happy to inform that the Journal of Indian Ocean Rim Studies (JIORS) is getting momentum and regularity in its publication within a short span of two years- which is a great achievement. This has been possible due to growing interest shown by the young researchers around the Indian Ocean Region (IOR) preparing their research articles related with six priority areas and two cross-cutting focus areas of IORA for publication in the JIORS. As per tradition, we are uploading the first issue of Volume 2 on the IORA website on the eve of forthcoming Committee of Senior Officials/Council of meetings of IORA to be held in Abu Dhabi, UAE from 05 to 07 November 2019.

As a result of consistent and tireless efforts, the Office of the CIOS has been able to create a widespread network and awakening among the academicians, researchers, and policy makers in the Indian Ocean Region (IOR) and even beyond. Forthcoming will be a special issue of the JIORS on the fast-growing concept of Indo-Pacific which is gaining momentum as a realistic regional concept as a way to link Indian and Pacific Oceans to bring peace and prosperity globally.

In this issue, there are seven articles covering Tourism and Cultural Exchange, Trade and Investment Facilitation, Blue Economy,

Academic, Science and Technology. The first paper entitled "Economic Impact of Tourism on IORA Countries: The Case Study of India and Mauritius" investigates the economic contributions of tourism to Indian Ocean Region economies by developing a multi-simultaneous equation model, incorporating gravity theory and classical consumer demand theory. The findings are significant and suggest that a common vision and a plan of action of the tourism sector as an engine of economic growth can be developed for the Indian Ocean Region (IOR).

The second paper entitled "Foreign Direct Investment (FDI)- led Growth in India: Co-Integration Analysis" establishes the causality relationship between Foreign Direct Investment and economic growth in India, which has liberalized foreign capital inflows especially after 1991, by applying Johansen Co-Integration test and Granger Causality Analysis, and concludes that India's share in world's Foreign Direct Investment (FDI) rose to 2.7% in 2017 as compared to 0.05% in 1991; and that FDI has significantly contributed to economic growth of the Indian economy during post-reform era.

The third paper entitled "Conceptualisation and Emerging Classification of Blue Economy" applied "descriptive-analytic method" for making a critical review of the existing literature on Blue Economy and seeks to clarify existing ambiguities in the definition and classifications in Blue Economy. This has been attributed due to a lack of consensus on definition of Blue Economy as well as standardized classification of sectors/industries; and this is due to complexity of Blue Economy in terms of space and place; scale and connection; proximity and distance; governance and power relations.

The fourth paper entitled "The Role of Regional Centre for Science and Technology Transfer (RCSTT) in promoting Science and Technology (S&T) in IORA" aims at assessing the role of the RCSTT as a Specialized agency of IORA in promoting Science and Technology (S&T) in IORA, by providing an ex-port evaluation with a future focus on building capacities, structures and conditions for the creation and co-

evaluation of policies of Sustainable Development in Indian Ocean Region (IOR) through IORA Action Plan 2017-2021.

The fifth paper entitled "Bioactive Potential of Turbo Brunneus, collected from Mumbai Coast, India" identifies the bioactive potential of crude acetonic extract of turbo brunneus, collected from west coast of India (Mumbai Coast). The paper testifies the bioactive potential of inter-tidal molluscs turbo brunneus, providing a baseline data for isolation and characterization of the active constituents. There seems to be a presence of a number of bioactive compounds. The paper recommends the rapid investigation of all available inter-tidal fauna as a prime necessity.

The sixth paper entitled "Culture and Heritage Tourism Competitiveness within the Indian Ocean Rim", adopting a qualitative design, shows that natural resources need supporting resources such as tourist services, efficient air transport infrastructure as well as price competitiveness etc. The study concludes that Indian Ocean Region (IOR) is endowed with unique cultural and heritage resources which make it a competitive destination. Thailand, Australia, the United Arab Emirates, Singapore, Malaysia, India, Iran, South Africa, and Indonesia are among the competitive destinations whereas Yemen, Bangladesh, Mozambique and Madagascar falls under least competitive destinations in IORA.

The last paper entitled "An Economic Analysis of Sri Lanka's Indian Ocean Opportunity" provides economic analysis of Sri Lanka's Indian Ocean opportunities by way of economic and geo-strategic arguments. The paper provides latest analysis of economic growth of the countries of the Indian Ocean Region (IOR) in terms of GDP, and the growth of container traffic in the region. Highlighting the five major policy challenges, the paper concludes that gradually reducing trade barriers along with trade adjustments and improving the quality of ports and customs etc., Sri Lanka can achieve lasting economic and security gains along with other regional economies of the Indian Ocean Region (IOR).

The JIORS encourages contributions that make rigorous use of variety of theoretical perspectives and methodological approaches. The Journal welcomes critical debates between different and opposing perspectives to lead to a realistic policy frame inputs (based on theoretical and empirical research). The JIORS welcomes and encourages the policy briefs, countries' case studies, experiences, best practices in all the priority and focus areas of IORA and beyond that establishing their inter-relatedness with the similar issues being faced globally. The Journal specifically focusses on designing of Marine Spatial Planning; enablers of the Blue Economy; perspective on Women Empowerment and its linkage to Blue Economy as well as the initiatives undertaken by the Member States for achieving Sustainable Development Goals (SDGs) by 2030.

The JIORS strives to attract and engage an international readership that is primarily academics, and researchers in universities/research institutions and individual academics/policy makers are the primary target group for the Journal. The objective is to create a pool of theoretical and empirical knowledge based on sharing of best practices – critical for promoting evidence-based policy frame beneficial for uplifting the socio-economic conditions of the people of the Indian Ocean Region (IOR).

We are also in the process of bringing out a Special Issue of the JIORS focussing on the concept of 'Indo-Pacific which is likely to be put online in the first week of December 2019 and another Special Issue on recent, theoretical and practical developments in the Blue Economy, which is likely be uploaded in January-March 2020.

It is hoped that this issue will provide an insight to the readers by bringing out new facts related with tourism, trade and investment and Blue Economy in Indian Ocean Region (IOR).

Prof V.N Attri
Editor in Chief and Managing Editor
Chair in Indian Ocean Studies
Indian Ocean Rim Association
vn.attri@iora.int

ECONOMIC IMPACT OF TOURISM ON IORA COUNTRIES: THE CASE OF INDIA AND MAURITIUS

Prof Tran Van Hoa[a]

ABSTRACT

The paper investigates the economic contributions of tourism to Indian Ocean Region economies with a focus at this stage to two important members: the world's second most populous country, India, and the most regional attractive destination, Mauritius, to support strategic international policy analysis. Significantly, the study is carried out from an economic integration growth framework, which is also the expenditure (as opposed to production or income) perspective of the United Nations System of National Accounts 1993/2008. A multi-simultaneous equation model of endogenous growth and Indian and Mauritian tourism determination is developed. The model novelly incorporates gravity theory and classical consumer demand contributors, Ironmonger-Lancaster commodity attributes and Johansen policy impact add- and sub-factors explicitly in the economic integration framework. The model is estimated by system methods with official economic and tourism 1996-2017 data from the World Tourism Organisation. The findings will provide appropriate and much needed evidence-based inputs on the contributors of tourism to India's and Mauritius's growth and to key stake-holders such as tourism policy-makers, analysts and operators for international strategic policy analysis and practical implementation.

Keywords: Tourism, India's and Mauritius's growth, economic integration theory, econometric modelling, strategic tourism policy, economic and trade policy.

JEL: C54, F15, F62, Z32, Z38

[a]Tran Van Hoa is a Professor, College of Business, Victoria University, and Wollongong University, Australia, Email: jimmy.tran@uow.edu.au, Website: staff.vu.edu.au/CSESBL/

1.   INTRODUCTION

The current state of tourism in the Indian Ocean Region and its priority focus can be summarised as follows. The United Nations World Tourism Organization (UNWTO), in its Tourism 2020 Vision: Volume 1 Africa, states that the destinations of the Indian Ocean Region are forecasted to receive 179 million inter-national tourist arrivals in the year 2020, thus recording an annual growth rate of 6.3% over the period 1995-2020.

Consequently, the Indian Ocean region is gaining in the market share of worldwide tourist arrivals and by 2020 one in every nine (or around 11%) tourist arrivals would be from an Indian Ocean country. The tourism sector has also tremendous potential in the Indian Ocean region. Substantial benefits could be accrued by Member States through the enhancement of tourist and marketing linkages within the region. In addition, cultural exchanges contribute to the development of mutual understanding and goodwill, and open channels of communication that could serve the interests of Member States (IORA, 2019).

The paper is a rigorous quantitative study on the region's priority area of tourism and cultural change in the form of the economic impact of tourism on the Indian Ocean Region (IOR) countries in general and with a special focus on a major and most populous BRIC country, namely India, and an internationally most attractive tourism destination, Mauritius. The objective is to provide a serious analysis of the impact to academics, analysts, researchers and policymakers for appropriate evidence-based policy development and implementation for optimal economic benefits for this important trend, growth and priority area in the IOR region.

The plan of the paper is as follows. Section 2 describes the recent trends of growth and tourism in India and Mauritius, their growth-generated economic integration activities, namely openness, FDI and services, and their major associated tourism-related determinant characteristics such as real exchange rates, inflation, population and tourism support facilities. Section 3 develops a simultaneous system of endogenous growth and tourism determination equations incorporating economic integration theory (WTO, 2019), Ironmonger (1972)-Lancaster (1966) commodity demand attributes, and Johansen (1982) policy-impact add- and sub-factors. Section 4 describes the data and estimation by a system method such as the 3SLS and the performance of the modelling as measured by Friedman (1953)-Kydland (2006) and Theil-MSE decomposition criteria. Section 5 interprets the findings and describes some major policy implications. Section 6 concludes.

2.   TRENDS IN GROWTH AND TOURISM IN INDIA AND MAURITIUS

The trends in annual growth and tourism (in million) in India (i.e., IYC, ITO) and Mauritius (MYC and MTO) during 1996-2017 are given in Charts 1 and 2. In these charts, we note the moderately fluctuating pattern of India's growth peaking at 10.26 per cent in 2010 and its declining trend since to 6.62 per cent in 2017, and the highly volatile pattern of Mauritius's growth peaking at 9.03 per cent in 2000 and 8.54 per cent in 2006, and its continuing decline since to 3.8 per cent in 2016 and 2017. Average annual growth was 6.98 per cent for India and 4.43 per cent for Mauritius. Tourism to India rose modestly from 2.288m in 1996 to the post euro crisis high level of 13.107m in 2014 and 15.543m in 2017. In contrast, tourism to Mauritius was small and fairly stable starting at 487,000 in 1996 and peaking at 1,342m in

2017. Average annual tourism was 5,880m for India and 841,000 for Mauritius during the period. We also note that while tourism in India and Mauritius appeared unaffected by the global financial crisis (GFC), their growth was noticeably impacted by this turmoil.

Chart 1: India's Growth and Tourism, 1996-2017
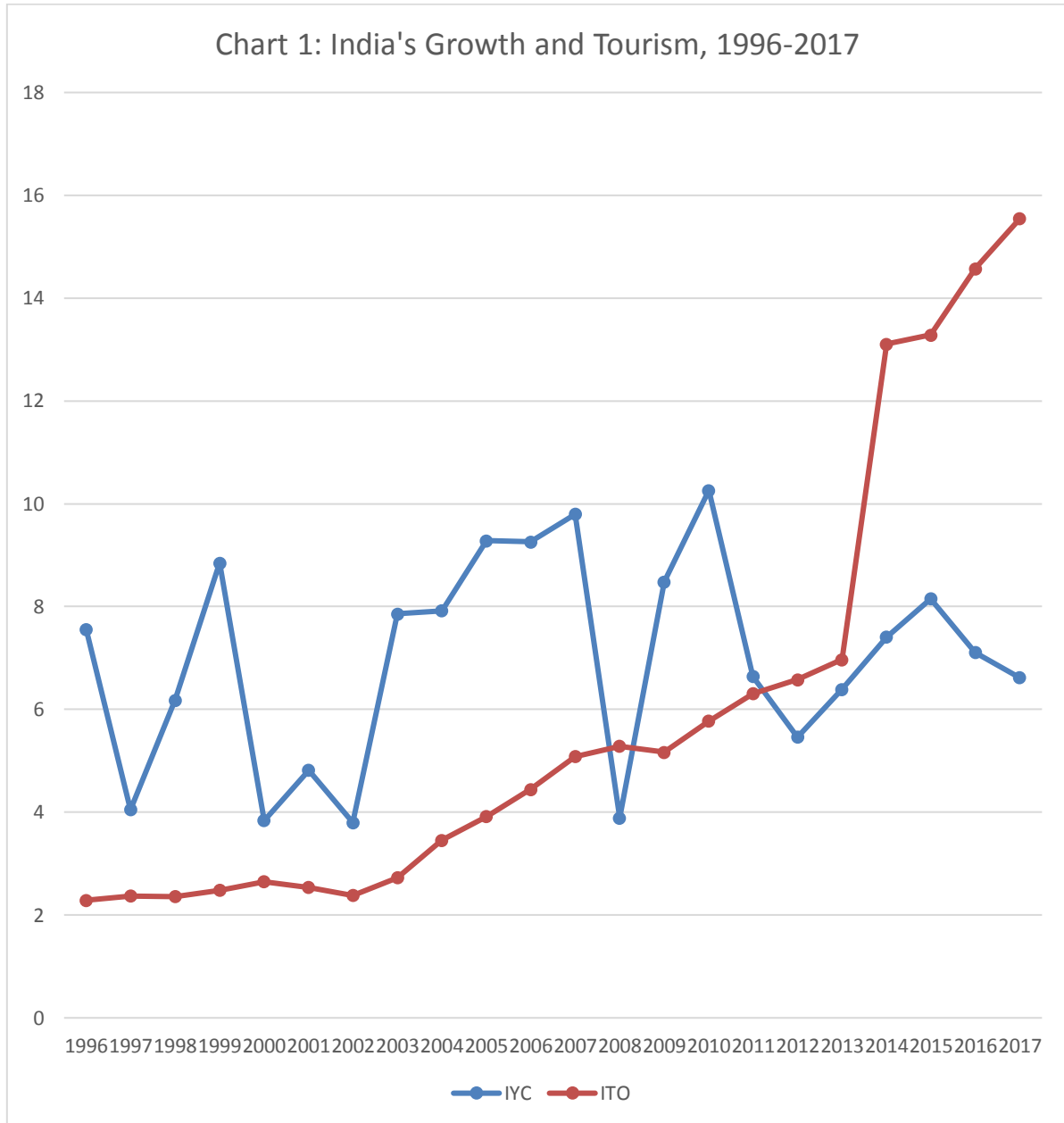
Sources of data for Charts 1 and 2: UNWTO (2019), USDA-ERS (2019).

Chart 2: Mauritius's Growth and Tourism, 1996-2017
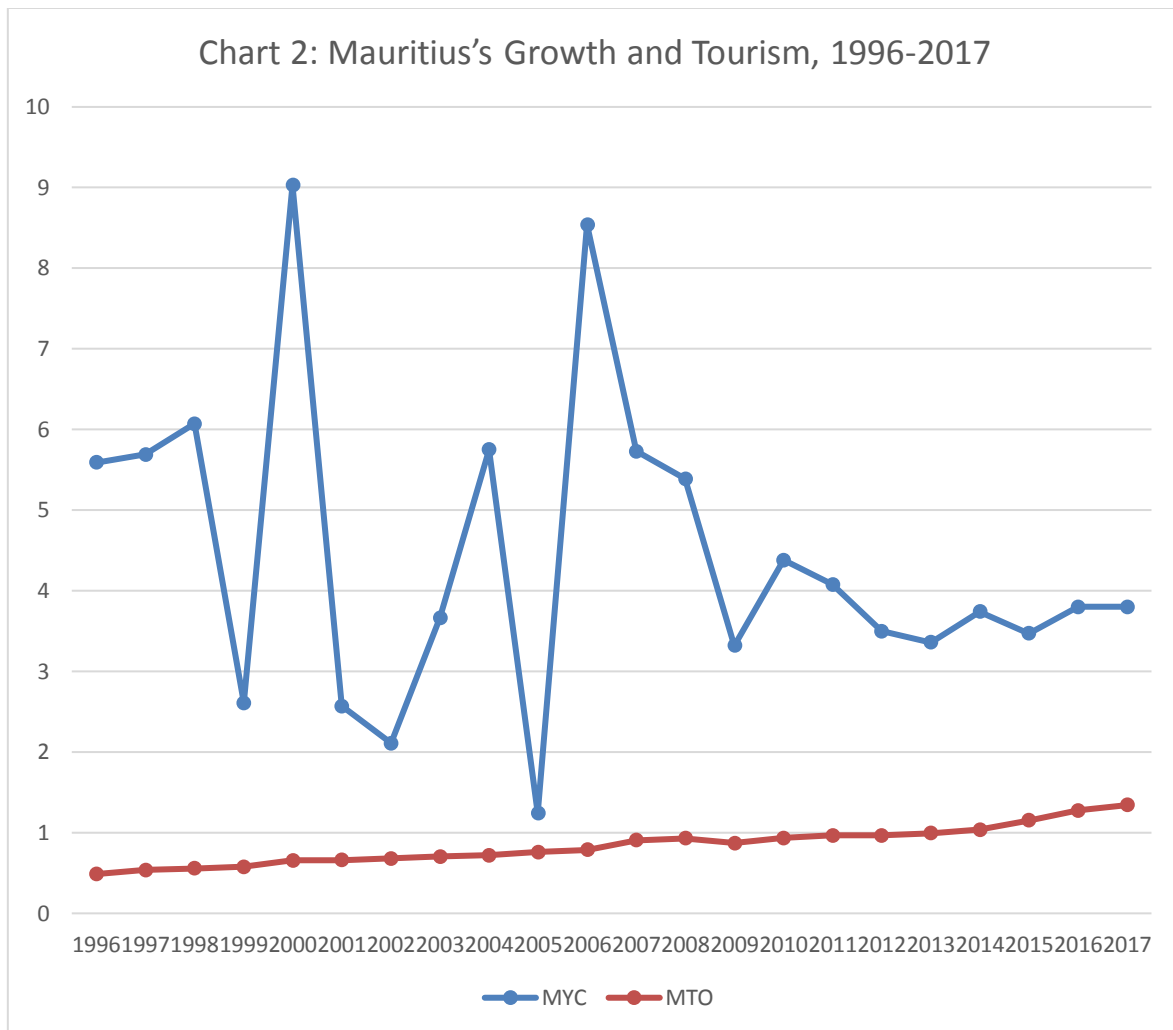
The trends of what are known as the growth (rates of change, see justification for its uses below) of the economic integration growth determinant factors for a destination country (denoted by a prefix .), namely openness (.TY=total commodity trade/GDP), .FDIY (FDI/GDP) and services (.SY=services/GDP) (WTO, 2019) in India (ITY, IFDI – primary axis, ISY – secondary axis) and Mauritius (MTY, MSY – primary axis, MFDIY – secondary axis) are given in Charts 3 and 4. For India (Chart 3), we note trade openness was fairly stable but FDI (with various policy reforms since the early 1990s) and services (India's well-known prominent activity) were highly fluctuating from 1996 till the GFC. All three factors show more stability since, however. For Mauritius (Chart 4), the fluctuations were highly fluctuating for all three factors during the whole period. The average growth rate during 1996-2017 for openness, FDI/GDP and services/GDP was 2.81, 12.98 and 5.24 per cent respectively for India, and -1.43, 22.33 and 1.07 per cent respectively for Mauritius, showing the dominance of FDI for Mauritius. For both India and Mauritius however, all three economic integration factors appeared affected by the GFC in 2008.

Chart 3: India's Economic Integration Trends, 1996-2017
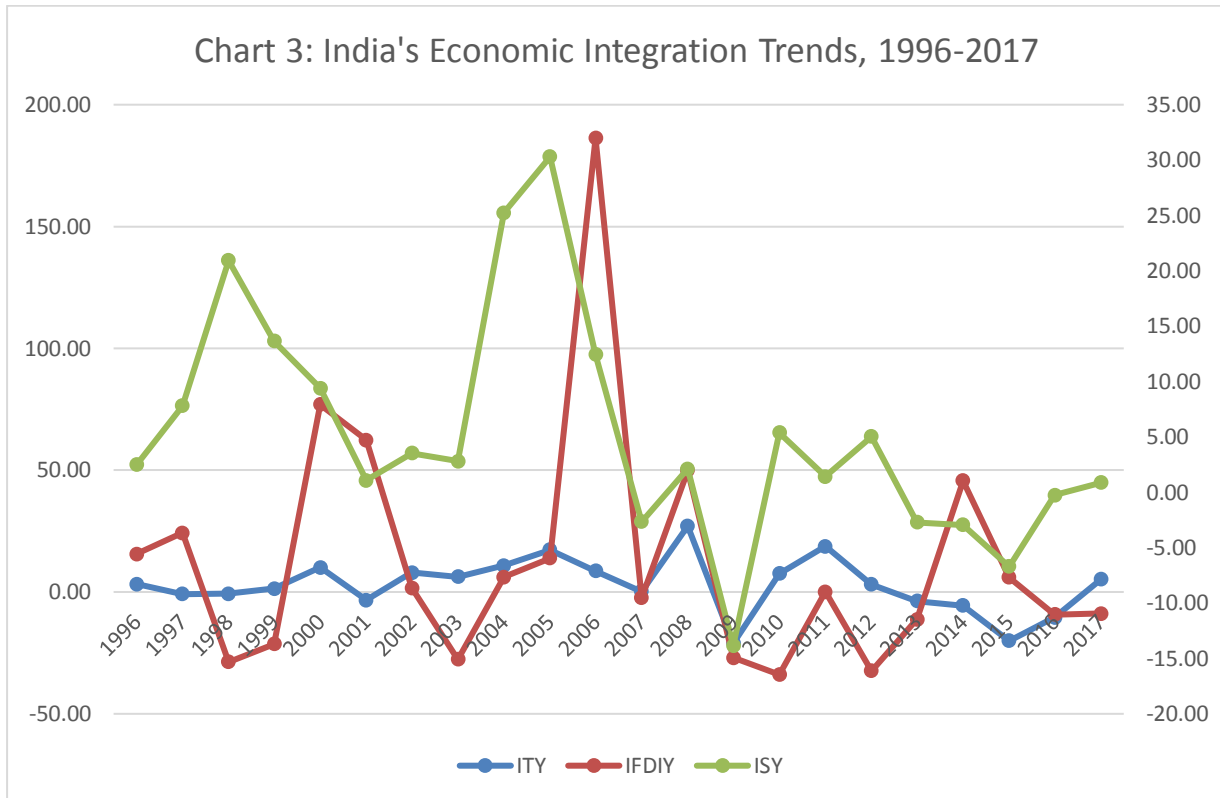
Sources to data in Charts 3 and 4: ADB (2019).

Chart 4: Mauritius's Economic Integration Trends, 1996-2017
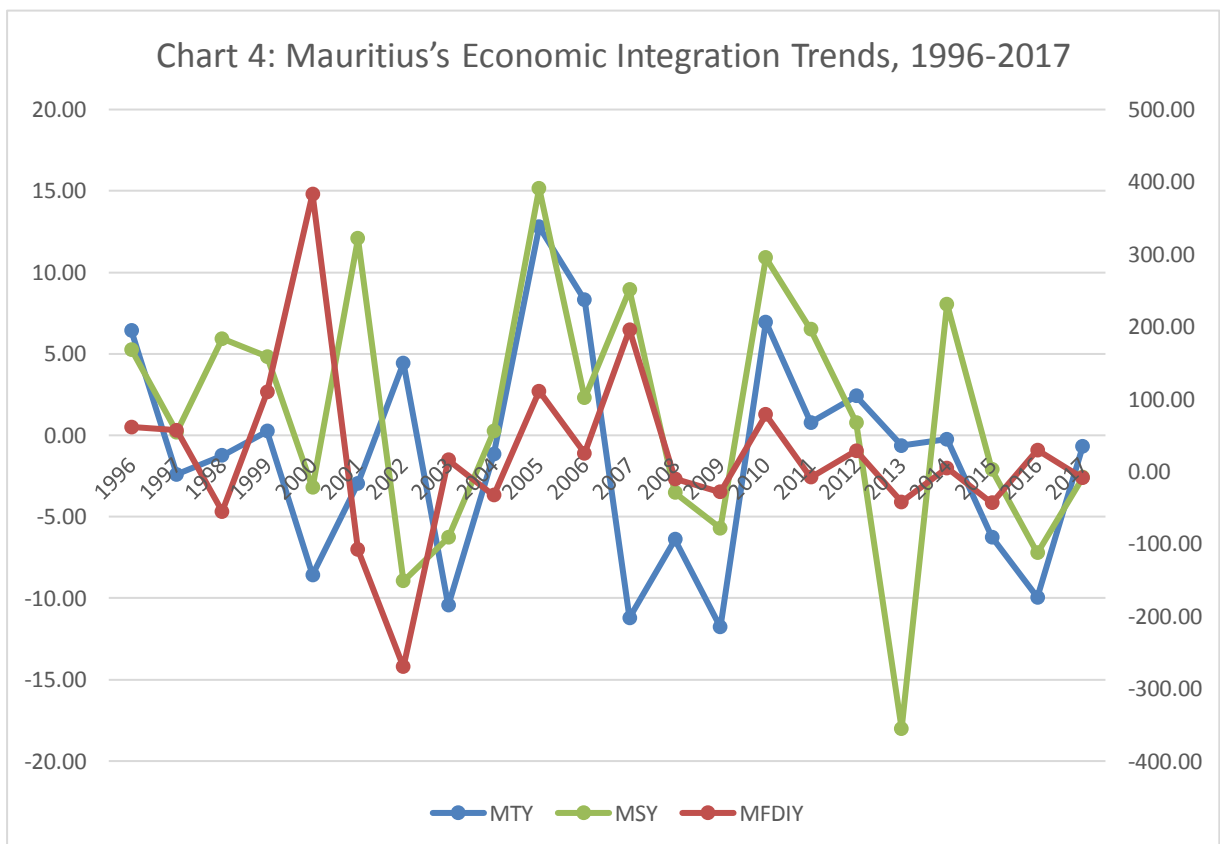
As a special feature of our study, the growth of the five variables with major tourism-impact characteristics for India and Mauritius are given in Charts 5 and 6. These variables are, for the destination country (denoted by the prefix .), real exchange rates (.RXR), population (.POP), inflation (.CPI), hotel room availability (.RM), and tourism openness (.TOP= inbound + outbound tourism expenditures/GDP). They are considered important attributes for tourism determination in the context of the Ironmonger (1972) and Lancaster (1966) new consumer demand theory. They are included in our study as conceptually testable hypotheses (see Tran et al., 2018; Tran and Vu, 2018). As noted from these charts, India's tourism characteristics were generally more fluctuating and Mauritius's more stable for the period under observation 1996-2017. This difference between the two countries reflects their economic structure, development priorities and policy reforms. As a result, it is expected to have different impact on growth and tourism in the two countries. The severe impact of the GFC was noted particularly for tourism openness in both India and Mauritius. However, hotel room availability showed also high fluctuations for India, and real exchange rates were noted volatile for Mauritius. On average, the annual rate of growth over 1996-2017 for real exchange rates (.RXR), population (.POP), inflation (.CPI), hotel room availability (.RM) and tourism openness (.TOP) was -1.13, 1.52, 6.85, 3.29 and 4.39 per cent respectively for India, and 0.55, 0.86, 5.12, 3.86 and 0.72 per cent respectively for Mauritius.

Chart 5: India's Tourism Characteristics, 1996-2017
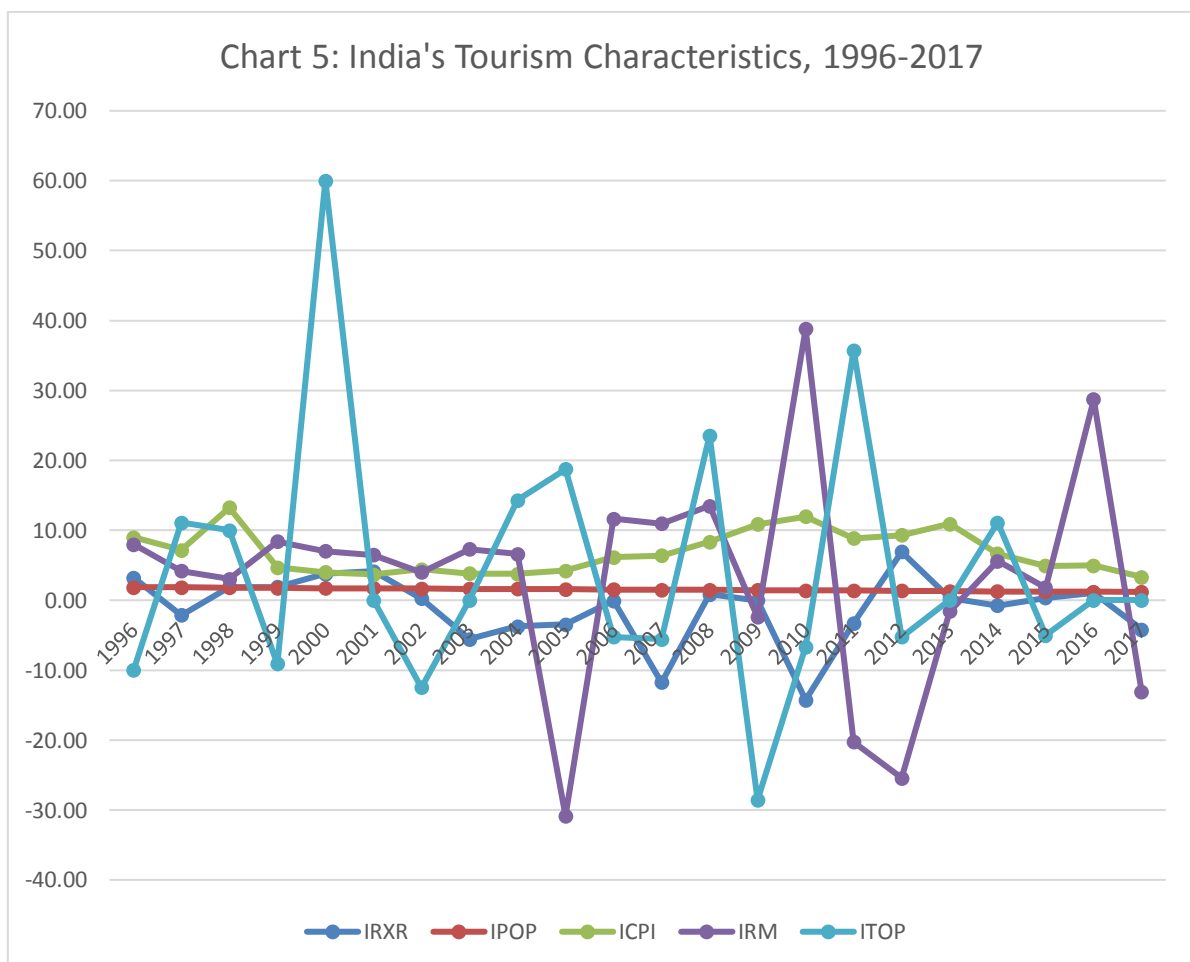
Sources of data for Charts 5 and 6: UNWTO (2019), USDA-ERS (2019).

Chart 6: Mauritius's Tourism Characteristics, 1996-2017
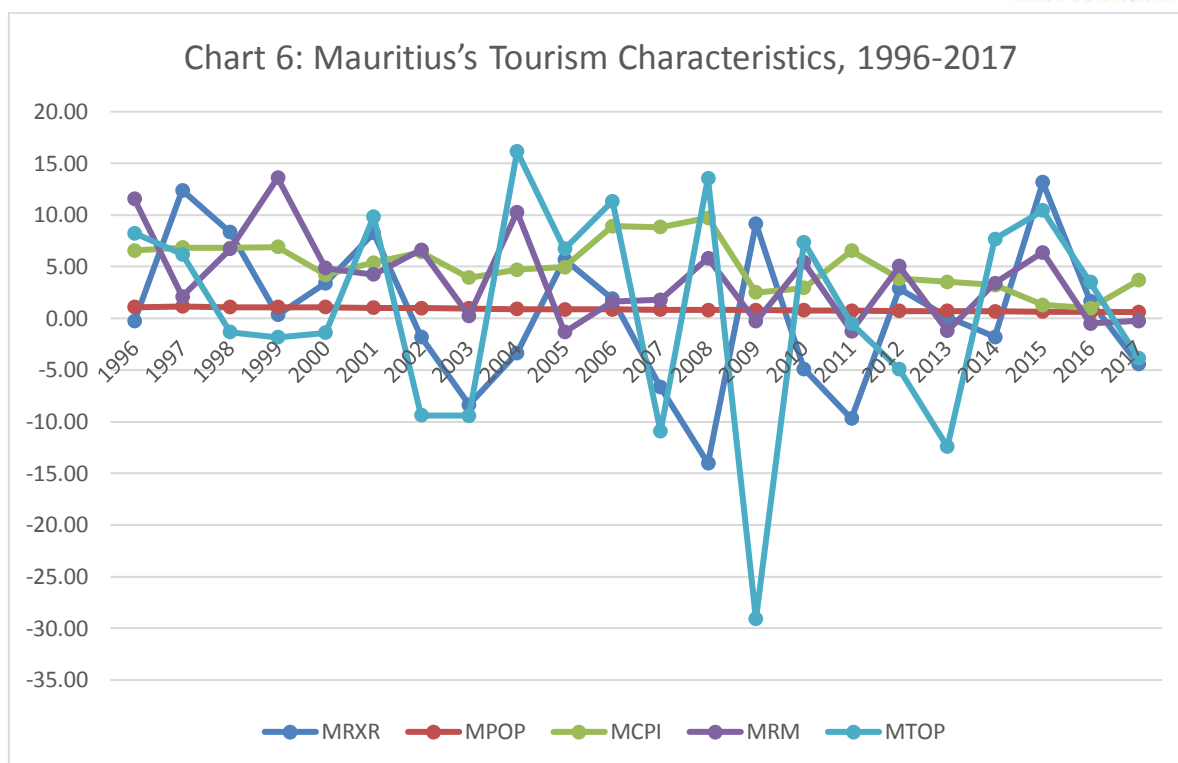
The above indicators or variables in Charts 1-6 describe the key variables that, in addition to other influencing determinants (described below), are relevant conceptually (Tran et al., 2018; Tran and Vu, 2018; WTO, 2019) to our model of endogenous growth and tourism determination for India and Mauritius. At face value, they graphically describe a complex system of possible interrelationships between growth and tourism and their key determinant variables addressing especially the research questions: what is the contribution of tourism to India and Mauritius as it is in the period 1996-2017? what makes the causal difference if any and their possible substantive policy implications? and what kind of findings by extrapolation would be expected from a comprehensive study involving 22 IOR countries if the necessary data are available? To unravel this complex interrelationship and policy implications from the available UNWTO and other data during the period 1996-2017 in a rigorous and credible way, we propose to investigate it by econometric analysis using the so-called Marshall-Haavelmo approach to simultaneous economic modelling and especially in an economic integration framework (WTO, 2019).

3.   A MODEL OF ENDOGENEOUS GROWTH AND TOURISM DETERMINATION FOR POLICY ANALYSIS

As described earlier (see Tran et al., 2018; Tran and Vu, 2018), the development of a simultaneous-equation model for a growth-tourism causal study and policy analysis and under an economic integration framework (or equivalently in the System of National Accounts 1993/2008 expenditure perspective) is conceptually based on three theories: (a) the basic growth-determination postulates of economic integration and regional trade agreements (WTO, 2019), namely, commodity trade, FDI and services (including tourism), (b) gravity theory (including growth in origin and destination countries) (Frankel and Romer 1999) and the extended Ironmonger (1972)-Lancaster (1966) new consumer demand theory where potential factors affecting tourism via its characteristics or attributes are considered, and (c)

Johansen (1982) policy-impact add- and sub-factors, such as domestic reform and external crises, that may affect simultaneously growth and tourism. This class of models has also been successfully applied and implemented as measured by modelling reliability criteria, such as that proposed by Friedman (1953) and Kydland (2006) where good prediction-reality compatibility or 'empirical fit' is a crucial credibility criterion (e.g., Tran 2002a, 2002c, 2004, 2005; Tran and Limskul 2013; Tran et al., 2018; Tran and Vu, 2018). For a survey of other existing approaches in tourism research, see Song et al., (2012).

Thus, to provide substantive answers to our specific research questions, for India and Mauritius separately, we propose to develop a model of two simultaneous equations in implicit form for endogenous growth, and tourism determination in the framework of deep economic integration theory (see Tran and Limskul, 2013; Tran et al., 2018; Tran and Vu, 2018) for a sampling size of N as follows:

$$Y_t = F1\ (a, O_t, FDI_t, SE_t, T_t, I_t, W_t, S_t), \qquad t=1,…,N \qquad (1)$$
$$T_t = F2\ (b, Y_t, YP_t, I_t, RXR_t, FDI_t, W_t, S_t), \qquad t=1,…,N \qquad (2)$$

where F1 and F2 are two implicit functions linking simultaneously a destination country's income (Y) and its incoming tourists (T) to their theoretically plausible and empirically testable determinants (variables), and a and b two vectors of parameters. In this model, Y may be defined as GNP (gross national product) or, by more popular convention real GDP, or income per head of population (Easterly 2007). T is defined as short-term arrivals (tourists) from IORA countries, O=commodity exports or imports or, more conventionally, openness (exports plus imports/GDP). FDI denotes foreign direct investment and I represents the destination country's inflation or costs of visiting. SE=trade in services. RXR refers to real exchange rates. S is a vector representing shocks or policy reforms. YP represents the general economic or demand conditions of origin countries influencing the supply of tourists. W denotes other economic (fiscal, monetary, trade and tourism policy – see Sala-i-Martin 1991), and S represents non-economic variables (e.g., country size or population, policy reforms and external shocks – see Johansen, 1982; Blake and Sinclair, 2003; Tran, 2005; and Smeral, 2009 for justification) relevant to a country's growth and tourism policy. Importantly for our feasible empirical study, in addition to Y, YP, T, O, FDI, SE, RXR, I and S, data for W must be available and consistent with published time-series data in a standard Kuznets-type accounting framework (e.g., System of National Accounts, SNA93/08), or the accounting system of Stone (1988), or the recent World Bank tables.

As (1)-(2) are in implicit form they assume no specific functional form, and therefore are not statistically estimable, and our purpose is ultimately to derive elasticities for their economic variables. Thus, for our empirical implementation, we use planar approximations (thus ignoring higher-order differentials) and invariant transformations (e.g. see Allen, 1960, and derivation in Tran, 1992) for (1)-(2). The 2-simultaneous equation model (1)-(2) in planar approximations can be written more explicitly in stochastic form and in terms of the rates of change for the continuous economic variables (denoted by *y, yp, o, fdi, se, t, i, rxr, and w*) and binary S of all the included econometrically exogenous and endogenous variables as (for t=1,…,N)

$$y_t = a1 + a2o_t + a3fdi_t + a4se_t + a5t_t + a6i_4 + a7w_t + a8S_t + u_{1t}, \qquad (3)$$
$$t_t = b1 + b2y_t + b3yp_t + b4i_t + b5rxr_t + b6fdi_t + b7w_t + b8S_t + u_{2t}. \qquad (4)$$

In (3)-(4), y is growth (the rate of change in real GDP) and the equations are simply linear and interdependent or simultaneous, while a1 and b1 are constant terms, a2-a7 and b2-b7 are the elasticities, and a8 and b8 are impact parameters. The u's represent other unknown contributing factors not included the model (Frankel and Romer, 1999) and are usually designated as the error terms with standard statistical properties.

The model belongs to a class of economic integration models with a number of important and general features that can be summarised as follows (see details in Tran, 2007). First, it incorporates testable instantaneous causality in the sense of Granger (1969) or Engle-Granger (1987). Second, it can generate the basic form of the computable general equilibrium/global trade analysis project (CGE/GTAP) models in the Johansen class. Third, as specified in (1)-(2), the model is flexible functionally to deal with any nonlinear or other relationships as no explicit form is nominated (Minier, 2007). Fourth, as formulated in (3)-(4), the model is econometrically identified by the order criterion for consistent estimation by such a suitable instrumental-variables (IV) system method as the three-stage least-squares (3SLS) for appropriate policy analysis. In this case, the usual diagnostic tests for ordinary least-squares (OLS) estimation except R-squared and Durbin-Watson statistics on the estimated residuals in these IV estimation cases are not applicable. Finally, the model, expressed as linear in the rates of change of economic and demographic variables, has a dynamic construct (Morley 2009), the empirical findings may in this case be interpreted as long run in the context of Engel-Granger (1987) co-integration or long run causality, if all variables in the equations are integrated by degree one I(1), or as short run causality in the context of Granger (1969) causality if they are all integrated by degree zero I(0).

4. EMPIRICAL IMPLEMENTATION AND SUBSTANTIVE FINDINGS

4.1. DATA

Data sources

In addition to the key economic and tourism variables mentioned in Section 2 earlier, W in the tourism equations (3) and (4) includes conventional demand - theoretically India's and Mauritius's cost of living and real exchange rates, and FDI (Tang et al., 2007). Data for the estimation were obtained from the UNWTO (2019), ADB (2019), UNCTAD (2019) and USDA-ERS (2019) databases. All economic and trade data are in real values or equivalent. In our study, all original data are obtained or derived as annual, and then transformed to their ratios (when appropriate). The ratio variables include merchandise trade, FDI and services. Other non-ratio variables include population (a gravity factor proxy for time-series models, Frankel and Romer, 1999), inflation, real exchange rates, and qualitative variables representing the occurrence of the economic, financial and other major crises, policy shift or reforms over the period 1996 to 2017.

Variables definition, data processing and stationarity tests

The qualitative binary variables reflect, in a conventional manner, the major domestic, regional and global event dates, with the assumption of long-term non-decaying effects on growth and tourism. All non-binary variables are then converted to their percentage rates of change. The use of this percentage measurement (which is equivalent to log-difference for small changes) is a main feature of our policy modelling and impact approach, as it deals with empirical implementation of the implicit functions (1)-(2) and avoids the problems of restrictive and potentially unsuitable *a priori* known functional forms (see above), and also of logarithmic transformations for negative data (such as budget (fiscal) deficits, and real interest rates or current account deficits). In addition, in the model, we assume a unidirectional direction of commodity trade, FDI, services, and endogenous tourism to growth in a 'causal' context. That is, the model deals with trade (in goods, FDI, services and endogenous tourism) and their causal impact on India's and Mauritius's growth and not vice versa. Major reforms and crises and economic variables that have been identified or assumed as exogenous or acceptable instrumental variables, affecting India's and Mauritius's growth and tourism, are listed in the empirical findings table in the next section.

The p-values for the ADF/weighted-symmetric unit root test for all non-binary variables in the model are as follows. For India, growth=0.692, partner's growth=0.917, tourism=0.014, openness=0.729, FDI/GDP=0.939, services/GDP=0.127, RXR=0.834, inflation=0.547, hotel room availability=0.841, tourism openness=0.897, population=0.997. For Mauritius, growth=0.777, partner's growth=0.917, tourism=0.494, openness=0.164, FDI/GDP=0.324, services/GDP=0.678, RXR=0.626, inflation=0.477, hotel room availability=0.719, tourism openness=0.012, population=0.744. Showing the variables used in the estimation are stationary at the 1% significance level.

4.2.   THE ESTIMATED MODEL AND MODELLING PERFORMANCE

To provide insights into India's and Mauritius's tourism determination, and the various key contributing factors to their growth and endogenous tourism, the model (3)-(4) has been appropriately estimated, as mentioned earlier, by the 3SLS using the available data for the period 1996-2017. The basic findings are reported in Table 1 below. As indicated, the model is identified according to the order identification tests, and all included (non-binary) variables have been found to be statistically stationary according to the usual unit root tests.

On the statistics reported in the table, the two estimated equations are acceptable in terms of their high R-squared value, and lack of evidence on autocorrelation.

Table 1: Endogenous Tourism Determination in India and Mauritius and its Impact on Growth. 3SLS Estimates. 1996-2017

Variables	India's Growth	India's Tourism	Mauritius's Growth	Mauritius's Tourism
Const	10.721	-1.164	-6.987	29.882
Trade/GDP	-0,084**		0.072	
FDI/GDP	0.005	0.000	0.005	0.029***
Services/GDP	0.143***		0.013-0.051	
Tourism	0.025*		0.096	
Inflation	-0.115	-1.633***	-0.176	0.351
Population	-2.763	39.413	11.201**	7.967
Tourism Openness	-0.064***		0.017	
Post-AFC 1999	0.363			-14.087**
2000		-3.866	0.982	11.799**
2002	-0.125	3.660	-0.450	
2004		24.152***	2.354*	-307.188***
2005			-4.980**	
2006		-7.012	7.211**	
2007	2.637			2.669
GFC 2008/2009	-1.011		-1.938	-9.238
2010	2.456**			
2012	-4.719***			-0.761
2014		76.901***		
2015		-86.739***		7.253**
Growth		-1.123*		-0.267
Partner Growth		-87.411**		-60.462
Hotel Room		0.207***		0.302
Real Exchange Rate		-0.438*		-0.038
RSQ	0.697	0.942	0.747	0.695
DW Statistics	2.293	2.413	2.948	2.235
ADF Test on Residuals	0.017	0.118	0.920	0.007

Notes: GFC=Global Financial Crisis, AFC=Asian Financial Crisis, RSQ=R-squared, *=Significant at the 10 per cent level. **=Significant at the 5 per cent level, ***=Significant at the 1 per cent level, ADF=p-value of the Augmented Dickey-Fuller Unit Root Test. Software used for estimation=TSP-Oxmetrics6.

The modelling performance of the estimated equations as measured by Friedman (1953) 'fruitful outcomes' and Kydland (2006) data-model compatibility or simply 'empirical fit' criterion, is displayed further graphically in Charts 7-8 for India's growth and tourism and in Charts 9-10 for Mauritius's growth and tourism.

Chart 7: Modelling Performance of India's Growth, 1996-2017

Chart 8: Modelling Performance of India's Tourism, 1996-2017

Chart 9: Modelling Performance of Mauritius's Growth, 1996-2017

Chart 10: Modelling Performance of Mauritius's Tourism, 1996-2017
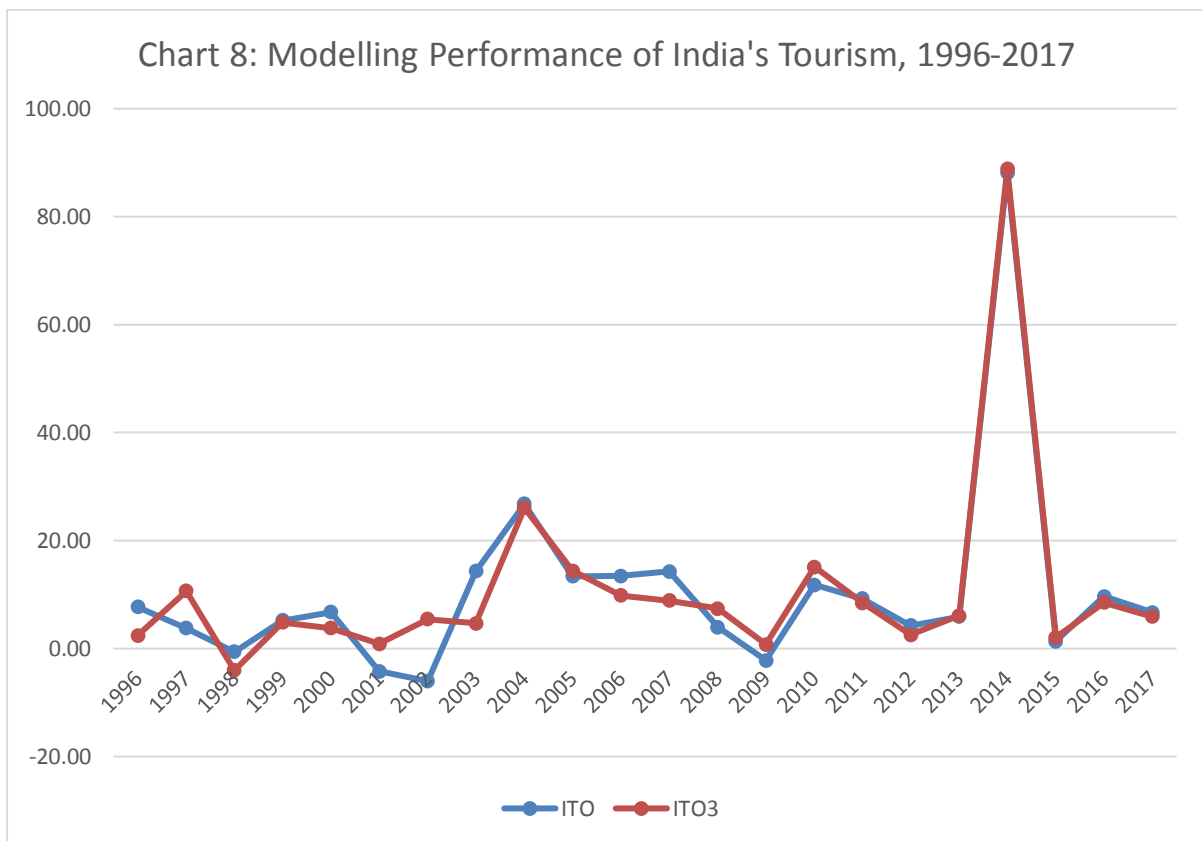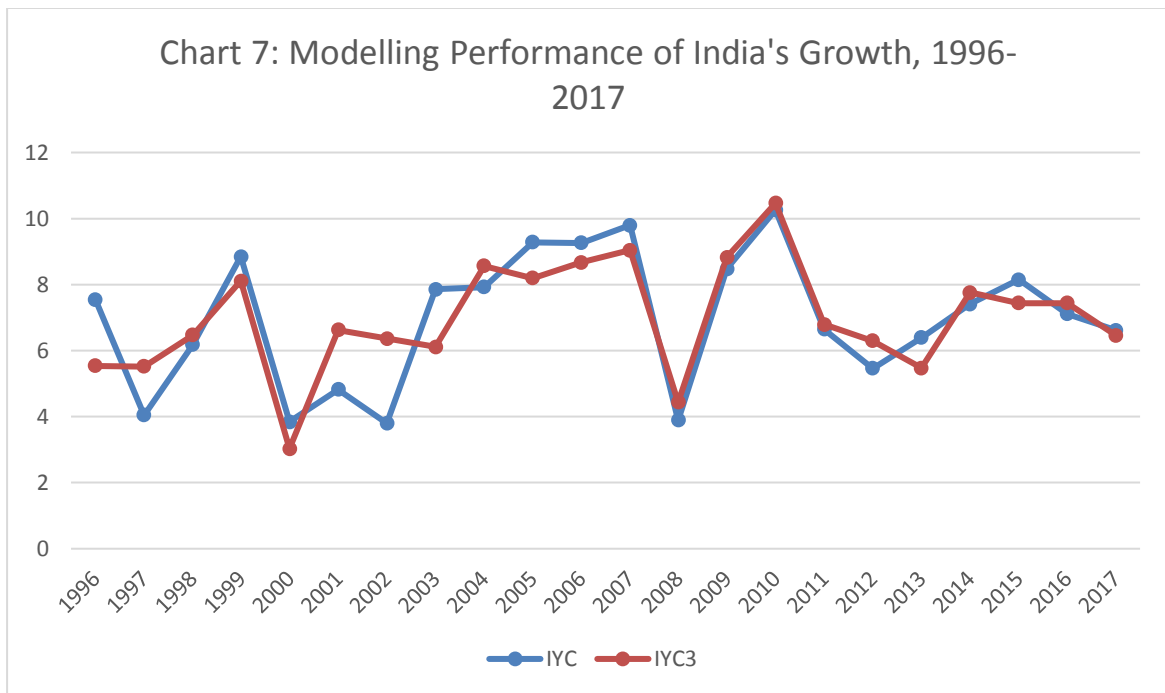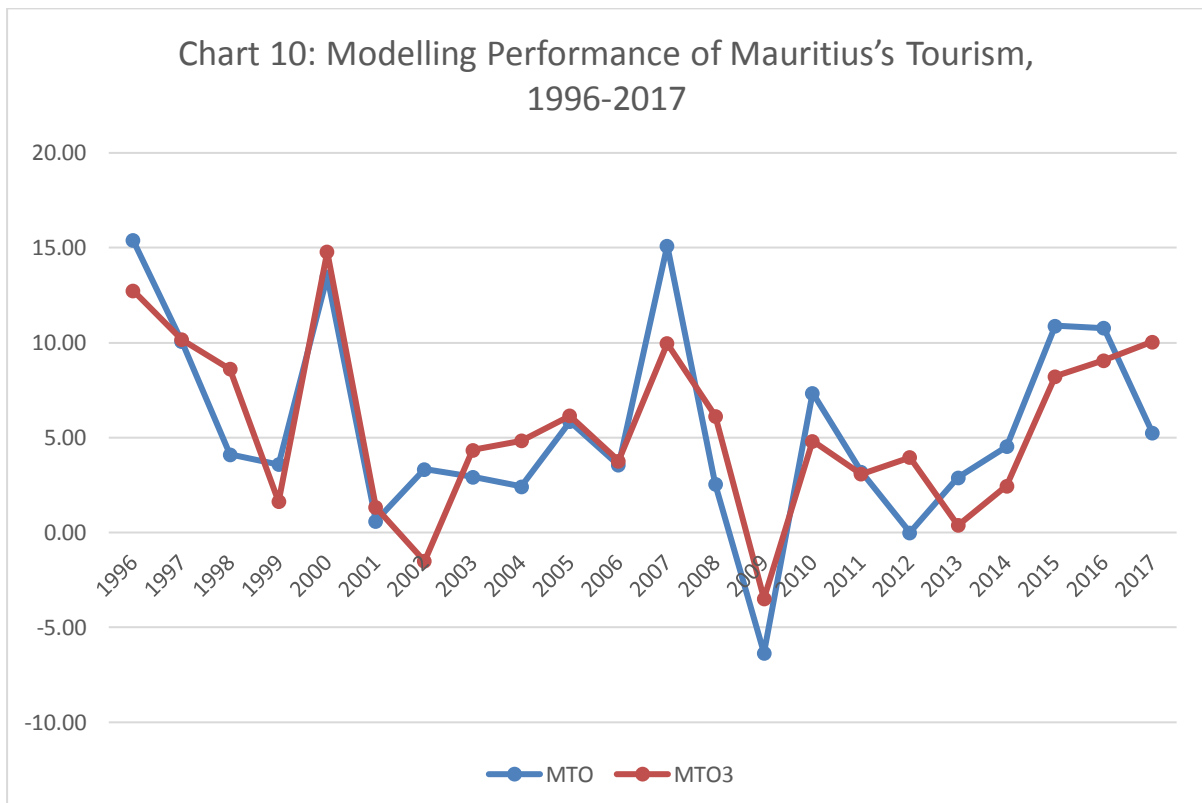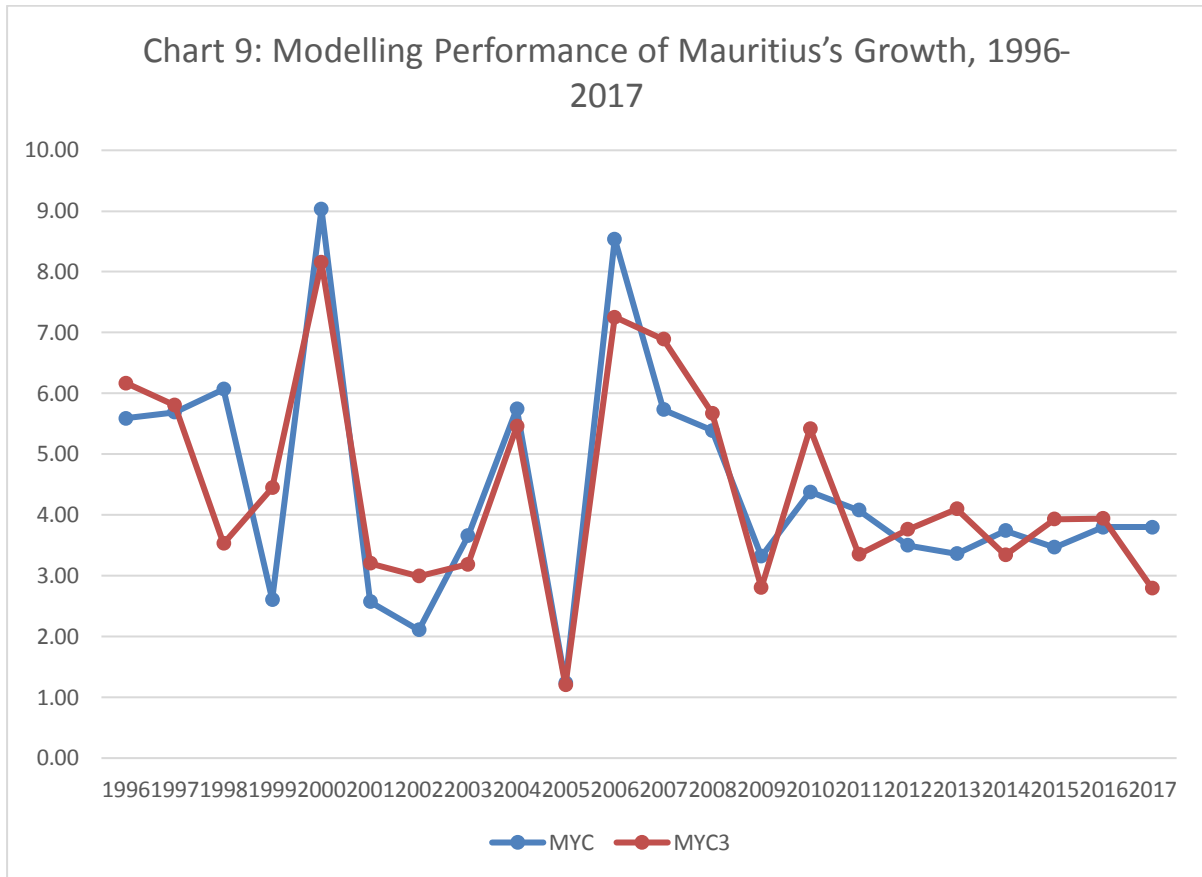
In addition, modelling performance is measured by their empirical statistical characteristics, using Theil-MSE decomposition (Pindyck and Rubinfeld, 1998), and given in Table 2.

Table 2: Friedman-Kydland Modelling Performance
Statistical Characteristics of the Estimated Models of Growth and Tourism, 1996-2017
Theil-MSE Decomposition

	India's Growth		India's Tourism		Mauritius's Growth		Mauritius's Tourism	
	Data	Model	Data	Model	Data	Model	Data	Model
Mean	6.983	6.983	10.617	10.617	4.429	4.428	5.523	5.525
Stand Dev	2.010	1.687	18.783	18.536	1.909	1.710	5.262	4.593
RSQ		0.697		0.942		0.949		0.747
MSE		1.169		19.450		10.048		0.885
Mean Error		0.000		0.000		0.000		0.000
Bias		0.000		0.000		0.000		0.000
Variance		0.085		0.003		0.027		0.043
Covariance		0.915		0.997		0.973		0.957

Note: RSQ=R-squared, MSE=mean-squared error, Bias+Variance+Covariance=1 (See Pindyck and Rubinfeld, 1998).

Other standard diagnostic tests available for OLS estimation and residuals are not appropriate for 3SLS residuals. As assessed by the various modelling diagnostics available and reported in Tables 1-2 and Charts 7-10, the estimated model first performs very well in emulating the volatile movements, peaks and troughs, especially the turning points of India's and Mauritius's growth and tourism data over the sample period. Second, the Theil-MSE findings show the closeness of data, and the model first two moments, and the especially high covariance of 0.915 and 0.997 for India's growth and tourism and 0.973 and 0.957 for Mauritius's growth and tourism. The model's residuals have also been tested for evidence of unit roots, with a p-value of 0.017 and 0.118 for India's growth and tourism and 0.920 and 0.007 for Mauritius's growth and tourism. In addition, in the estimated model, the values for R^2 (0.697 and 0.942 for India's growth and tourism, and 0.747 and 0.695 for Mauritius's growth and tourism), and DW (2.293 and 2.413 for India's growth and tourism, and 2.948 and 2.235 for Mauritius's growth and tourism) appear acceptable and show no evidence of first-order autocorrelation problem.

The discussions of the findings and policy implications for India's and Mauritius's growth and tourism, and their impact on these two IOR countries are based on these empirical findings and given in Section 5.

5.   GENERAL FINDINGS AND POLICY IMPLICATIONS

As mentioned earlier (Tran et al., 2018; Tran and Vu, 2018), the literature on tourism and its impact and contribution to economic growth since the early 1960s has been extensive with diverse empirical and simulation findings (see Song et al., 2012). However, in recent years, fast rising globalisation and widespread economic integration (WTO, 2019) have focussed the sources of growth on international trade (or openness), FDI flows, and services (in which tourism is the major component), rather than the traditional production sector of the economy. This requires new directions in research and policy analysis that better reflects these recent global developments.

This paper makes use of this contemporary focus to develop a new approach to address these developments, the so-called economic integration or System of National Accounts (SNA) expenditure approach (Tran, 2004; Tran, 2007; Tran and Limskul, 2013; Tran et al., 2018; Tran and Vu, 2018)), to provide substantive evidence for policy analysis in the specific case of two important IOR members, namely, India and Mauritius. The findings by 3SLS estimation using 1996-2017 UNWTO and other relevant data of the model (3)-(4) with reported results in Table 1, show interesting results and insights for the impact of globalisation, demand conditions, and regional and global crises and reforms on tourism and growth in India and Mauritius. And, importantly, how these findings can be used to develop effective policies by tourism policymakers to improve the countries' economic and tourism beneficial outcomes.

It should be noted that, as these findings are derived from an endogenous and simultaneous multi-equation econometric study with acceptable empirical fit (see above), these time-series data-based findings represent another perspective of macro-economic modelling and real-life data, and may not be consistent with expectations or with other findings from alternative approaches such as input-output analysis, CGE simulation, Granger short-term causality, Engle-Granger long-term co-integration, or regression analysis (see details of these approaches in Song et al., 2012; Pham et al., 2017).

First, during the period of mainly high growth in India and Mauritius to 2007 and its slow decline especially since the GFC of 2008 (see Charts 1 and 2), the growth findings in Table 1 show that, in the age of increasing globalisation, services are the only economic integration component with significant contribution (elasticity=0.143) to India's growth, as expected. FDI shows some positive impact on growth in both India and Mauritius (elasticity=0.005 for both), but the impact is very weak statistically. Trade openness is either statistically weak (0.072) with Mauritius or even negative (-0.084) with India. The general implication from these findings is that both India and Mauritius have not managed to benefit fully as expected from the process of globalisation in the period under study. A corollary is that the two countries or other IOR economies by extrapolation could undertake more appropriate reforms on trade, FDI and services to improve the attainment of the globalisation benefits.

Second, significantly to our main focus of tourism impact, the findings given in Table 1 show that tourism has contributed significantly to India's growth (0.025) and the contribution is only statistically weak to Mauritius's (0.096). On the other hand, the rising costs of living have, as expected, the effects of hampering inbound tourism in both India and Mauritius (-0.115 and -0.176 respectively), but the effects are statistically negligible. In contrast, population growth appears contributing significantly (11.201) to Mauritius's growth due partly to the resulting expansion of the service labour force, it has however no statistical impact (-2.763) on India's growth. The concept of tourism openness (UNWTO, 2019) is found to severely adversely affect (-0.064) India's growth but to positively contribute to Mauritius's growth (0.017).

Third, on the question of tourism determination, our findings in Table 1 show that both gravity factors (namely, domestic and partner growth) reduce tourism in India and Mauritius. This implicates potentially that as income increases in the two countries and their tourism origin countries, the inbound tourists to India and Mauritius would decline as they look for other attractive or more competitive destinations. As an important tourism supply condition, hotel room availability is found to affect significantly India's tourism

(0.207) but only weakly Mauritius's (0.302). FDI inflows potentially to improve tourism infrastructure appears to affect tourism in Mauritius (0.029) but not in India (0.000). Population is also found to have no impact on tourism in both India and Mauritius, but India's tourism significantly falls as a result of a rise in its real exchange rates (-0.438) and inflation (-1.633) but Mauritius's tourism does not.

Fourth, as an important exogenous determinant feature of our study which has been neglected in the literature, growth in India and Mauritius is seen to be significantly affected by such major events as the Iraq War and its aftermath (for Mauritius), and recent global turmoils in 2010 and 2012 (for India). The two countries' tourism is also significantly impacted by the Iraq War, recent global slowdowns in 2014 and 2015 (India), and the post Asian Financial Crisis in 1999 and 2000 and the recent global slowdown in 2015 (Mauritius).

6.   CONCLUSION

The paper addresses the current important regional issue, namely, the economic impact of tourism on two major IOR members, India and Mauritius, and their tourism determination. As its special features, the paper is based on the structural framework of economic integration theory, gravity theory, Ironmonger-Lancaster new demand attributes and exogenous regional and global events. Empirical findings are obtained by statistical system estimation, using recent UNWTO and other international data for the period 1996-2017. The new approach introduced in the paper, which is particularly consistent with contemporary global economic and international trade policy developments and modelling methodological advances, has provided a number of interesting practical results.

These results are useful for further scholarly analysis and also of policy relevance for tourism and economic policymakers. The main conclusions are: Both India and Mauritius have not developed policies and reforms sufficiently to benefit fully the globalisation process, and their tourism has been determined by a complex set of conventional and new demand theory, and, importantly, also regional and global crisis factors. In addition, as both countries have been developed according to their own specific culture, history, endowment, and economic and tourism policies, their growth and tourism determination have become distinct and should be studied separately to accommodate these appropriate economic and tourism policies. In spite of this discrepancy, the 22 IOR member states can strive towards regional cooperation in the area of their tourism priority, especially to achieve sustainable tourism growth in the region, and can develop, based on these and similar findings, a common vision and a plan of action of the tourism sector as an engine of economic growth. The findings and policy implications reported are data based and supported by rigorous economic-theoretic considerations and advanced robust econometric modelling analysis.

Further research on an enlarged multi-equation economic integration model of endogenous growth and tourism, and extended data, for all IOR members would be desirable to provide further useful insights for scholarly study, and for appropriate policy analysis in this important priority field in the region.

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FOREIGN DIRECT INVESTMENT (FDI) LED GROWTH IN INDIA: CO-INTEGRATION ANALYSIS

Dr. Priyanka Sahni and Dr. Preeti Sharma[b]

Abstract

India introduced economic reforms explicitly in 1991. Prior to this FDI in India remained in background. Hence, it is justified to analyze the relation between FDI and Economic Growth in India during post-reform era. The study tries to find out how FDI seen as an important economic catalyst of Indian economic growth by stimulating domestic investment, increasing human capital formation and by facilitating the technology transfers. The aim of this study is to explore the causality relationship between Foreign Direct Investment and economic growth in India, which has liberalized foreign capital inflows especially after 1991. Johansen Co-integration test and Granger Causality analysis will be used in order to test the hypotheses about the presence of Long-run relationship and causality between the FDI and economic growth measured by Gross Domestic Product in Case of Indian economy during the Post-Reform era.

Keywords: Foreign Direct Investment, Economic Growth, Granger Causality.

[b]Dr. Priyanka Sahni is Assistant Professor, Department of Economics, Hindu Kanya Mahavidayalya, Jind. Email address: priyanka.sahni52@gmail.com. Dr. Preeti Sharma Assistant is Professor, Department of Economics, SNRL Jairam Girls College, Kurukshetra. Email address: preetisharma2388@gmail.com

1.   INTRODUCTION

According to International Monetary Fund (IMF), FDI is defined as " an investment that is made to acquire a lasting interest in an enterprise operating in a economy other than that of the investor" The investor's purpose is to have an effective voice in the management of the enterprise (IMF,1977). FDI is the process by which the residents of one country (the source country) acquire the ownership of assets for the purpose of controlling the production, distribution and other productive activities of a firm in another country (the host country).There is competition among developing countries to attract FDI since it is an important source of technology transfer, export development, job creation, labor skill creation, upgrading of management and improved productivity in local firms (World Bank, 2013). The role of FDI in the growth process has been a burning topic of debate in several countries including India. Foreign Direct Investment (FDI) which is a vital ingredient of the globalization efforts of the world economy plays a pivotal role in the process of economic development particularly in the capital scarce country, where the domestic base of created assets like technology, skills and entrepreneurship are quite limited. It provides financial resources for investment in a host country and thereby augments domestic saving efforts. It also plays an important role in accelerating the pace of economic growth. FDI provides the much-needed foreign exchange to help the bridge the balance of payment or trade deficit. FDI brings complementary assets such as technology, management and organizational competencies and there are spill-over effects of these assets on the rest of the economy. FDI is treated as a main engine of economic growth and technological development which provides ample opportunities in accelerating economic development. There are various empirical studies which show that there is a positive relationship between FDI and Economic Growth and FDI is a key component of world's growth engine; hence countries try to create favourable conditions to attract more FDI inflow into their economies (Adhikary 2011; Bhavan et.al 2011; Azam 2010). FDI not only raises the level of investment or capital stock but increases employment by creating new production capacity and jobs; transfer intangible assets such as technology and managerial skills to the host country and provide a source of new technologies, processes, products, organizational technologies and management skills, Backward and Forward linkages with the rest of the economy (Ho and Rashid 2011).

In developing countries, there has been a remarkable shift in attitude towards FDI. Capital flows in the form of FDI have been widely believed to be an important source of economic growth in recent years. Soon after the independence, India embarked on a strategy of industrialization with active Government intervention. Domestic enterprises accumulated considerable capacity in this process which has influenced not only the pattern of inward FDI in the country in the subsequent period but has also led to investments made by Indian enterprises abroad. This change in Government policy had also an important bearing on the FDI position of India.

2. SURVEY OF LITERATURE

Many theoretical and empirical studies have been undertaken to analyse the relationship between Foreign Direct Investment (FDI) and economic growth, few of them are as follows:-

Khan and Leng (1997) analysed the relationship among inward-FDI, exports and economic growth for Singapore, Taiwan and South Korea at the aggregate level during the period from 1965 to 1995 by using Granger Causality test. They claim that there is no evidence to support the causal relationship between FDI and exports in Taiwan and South Korea. Moreover, a one-way causal relationship which flows from exports to inward FDI is found in Singapore.

Khor Chia Boon (2001) analysed the causal relationship between FDI and economic growth in case of Malaysia. The findings of the study reveal that bidirectional causality exists, between FDI and economic growth in Malaysia i.e. while growth in GDP attracts FDI, FDI also contributes to increase in output. FDI has played a key role in the diversification of Malaysian economy.

Charkraborty and Basu (2002) explore the co-integration relationship between net inflows of FDI, real GDP, unit cost of labour and the proportion of import duties in tax revenue for India with the method developed by Johansen (1990). They find two long-run equilibrium relationships. The first relationship is between net inflow of FDI, real GDP and the proportion of import duties in tax revenue and the second is between real GDP and unit cost of labour. They find unidirectional Granger Causality from real GDP to net inflow of FDI.

Raj (2003) discusses the trends in FDI in India in the 1990s and compares them with china. The study raises some issues on the effects of the recent investments on the domestic economy. Based on the analytical discussion and comparative experience, the study concludes by suggesting a realistic foreign investment policy.

John Andreas (2004) discusses the potential of FDI inflows to affect host country economic growth. The study argues that FDI should have a positive effect on economic growth as a result of technology spill-overs and physical capital inflows. Performing both Cross-section and panel data analysis on a dataset of 90 countries during the period 1980 to 2002, the empirical part of the study finds that FDI inflows enhance economic growth in developing countries but not in developed economies.

Hooda (2011) analysed the impact of FDI on economic growth of Indian economy for the period 1991-92 to 2008-09. She used OLS method for this purpose. The empirical results found that Foreign Direct Investment (FDI) is a vital and significant factor influencing the level of growth in Indian economy. She also estimated the determinants of FDI inflows and found that trade GDP, Research and Development GDP, Financial position, exchange rate, Reserves GDP are the important macroeconomic determinants of FDI Inflows in India.

Sarbapriya (2012) analysed the causal relationship between FDI and economic growth in India using the co integration approach for the period, 1990-91 to 2010-11. The co integration test confirmed an existence of long run equilibrium relationship between the two as confirmed by the Johansen co

integration test results. The Granger Causality test finally confirmed the presence of uni-directional causality which runs from economic growth to Foreign Direct Investment.

Shawa and Shen (2013) examined the casual relationship between FDI, export and GDP growth of Tanzania over the period 1980 to 2012. The results of their study show that though there exists a long run relationship between the variables in question, no causality was confirmed between GDP and FDI.

Gopalakrishnan and S. Kumar (2018) investigated the relationship between FDI and economic growth in India for the period 1991 to 2016. The Co-integration analysis suggested that there is a long-run equilibrium relationship. The results of Granger causality test showed that there is a causal relationship between the examined variables. Economic growth and FDI appear to be mutually reinforcing under the open-door policy.

3. OBJECTIVES OF THE STUDY

i) To study the trends of FDI in Indian economy from the period 1991-2017
ii) To check the share of India's FDI inflows in World FDI inflows.
iii) To analyse the impact of FDI on Indian economy.

4. TRENDS & PATTERN OF FDI IN INDIA

At the time of its independence in 1947, India was a host to a significant stock of Foreign Direct Investment (FDI) largely owed to her erst while colonial master: the UK. Soon after the independence, India embarked on a strategy of industrialization with active Governmental intervention. Domestic enterprise accumulated considerable capability in the process of industrialization, which has influenced not only the pattern of inward FDI in the country in subsequent period but has also led to investments made by Indian enterprises abroad. The changes in Government policy have also had an important bearing on the FDI position of India. Foreign investment plays on important role in the long-term economic development of a country by:

a) Augmenting availability of capital

b) Enhancing competitiveness of the domestic economy through transfer of technology

c) Strengthening infrastructure

d) Raising productivity

e) Generating new employment opportunities

f) Boosting exports.

Foreign investment, therefore, is a strategic instrument of development policy. The initial policy stimulus to Foreign Direct Investment (FDI) in India came in July 1991 when the new industrial policy provided, inter alia, automatic approval for projects with foreign equity participation up to 51 percent in high priority areas. In the wake of economic liberalization policy initiated in 1991, the Government of India has taken several measures to encourage foreign investment both Direct and Portfolio, in almost all

sectors of the economy. However, the emphasis has been on Foreign Direct Investment (FDI) inflows in the:

   a)   Development of infrastructure

   b)   Technological up gradation of Indian industry

   c)   Projects having the potential for creating employment opportunities on a large-scale and.,

   d)   Setting up Special Economic Zones (SEZs) and establishing manufacturing units therein.

India has consistently been classified as one of the most attractive investment destinations by reputed international rating organizations. With a vast reservoir of skilled and cost-effective manpower, India offers immense opportunities for Business Process Outsourcing (BPO), Knowledge Process outsourcing (KPO) and Engineering Process Outsourcing (EPO). In recent years, the Government has initiated the second-generation reforms under which measures have been taken to further facilitate and broaden the base of FDI in India. The policy for FDI allows freedom of location, choice of technology, repatriation of capital and dividends. As a result of these measures, there has been a strong surge of international interest in the Indian economy. The rate at which FDI inflows has grown during the post-liberalization period is a clear indication that India is fast emerging as an attractive destination for overseas investors.

INDIA'S SHARE IN WORLD FOREIGN DIRECT INVESTMENT (FDI)

Trend in value of India's Foreign Direct Investment inflows against the background of trends in world's FDI inflows are presented in following table (1.1)

TABLE 1.1: INDIA'S PERCENTAGE SHARE IN WORLD FDI INFLOWS (1991-2017)

Year	WORLD FDI INFLOWS (MILLIONS OF DOLLARS)	INDIA'S FDI INFLOWS (MILLIONS OF DOLLARS)	% SHARE OF INDIA IN WORLD FDI INFLOWS
1991	153973	75	0.05
1992	162924	252	0.15
1993	220110	532	0.24
1994	254920	974	0.38
1995	341515	2151	0.63
1996	388816	2525	0.65
1997	481491	3619	0.75

1998	690694	2633	0.38
1999	1076319	2168	0.2
2000	1358613	3588	0.26
2001	772662	5478	0.71
2002	589836	5630	0.95
2003	550633	4321	0.78
2004	692598	5778	0.83
2005	948933	7622	0.8
2006	1403548	20328	1.45
2007	1893815	25350	1.34
2008	1485205	47102	3.17
2009	1179064	35634	3.02
2010	1371919	27417	2
2011	1567677	36190	2.31
2012	1574712	24196	1.54
2013	1425377	28199	1.98
2014	1338532	34582	2.58
2015	1921306	44064	2.29
2016	1867533	44481	2.38
2017	1429807	39916	2.79

SOURCE: UNCTAD Statistical Yearbook (Various Issues)

FIG 1.1: INDIA'S PERCENTAGE SHARE IN WORLD FOREIGN DIRECT INVESTMENT (1991-2017)
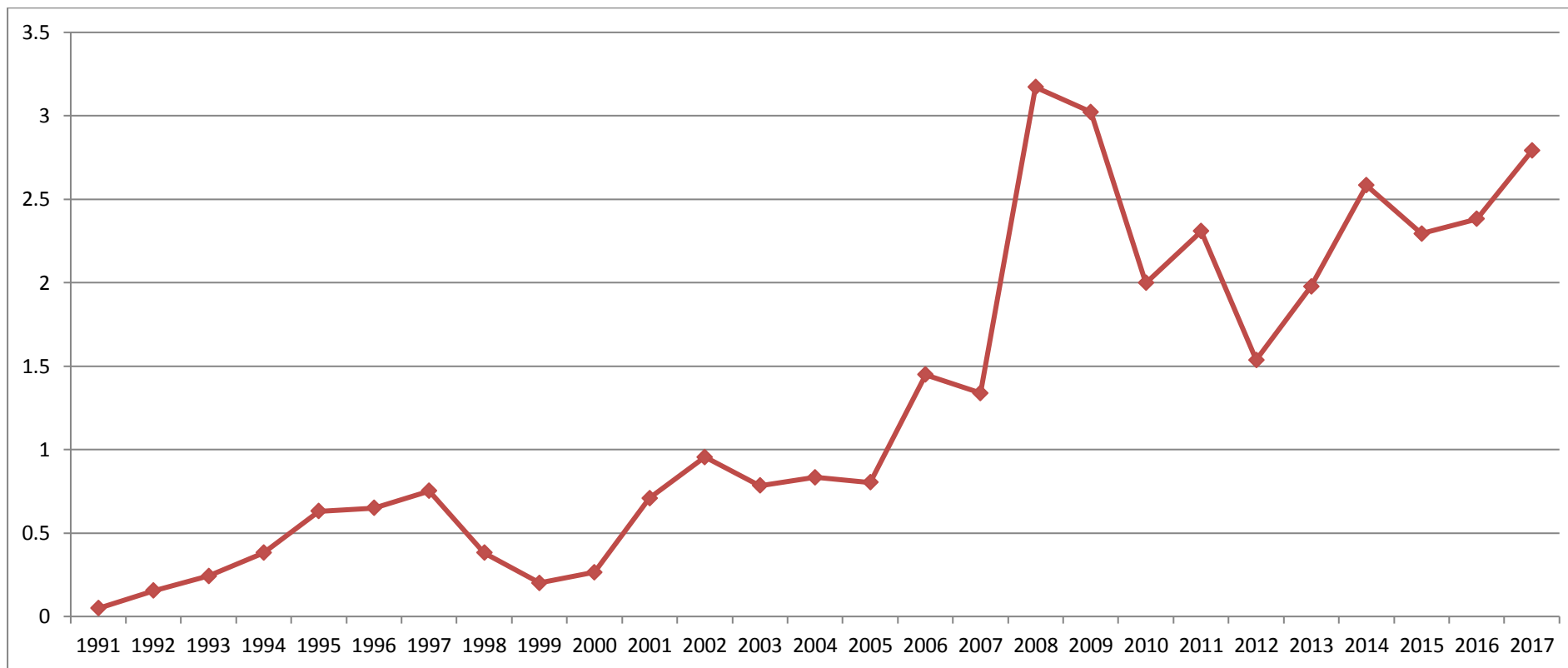
The above table (1.1) & Fig. (1.1) shows that India's share in world FDI inflows has been rising continuously since 2006. The share was only 0.05 percent in 1991 and rose to 1.45 percent in 2006 and the share was highest in the year 2008. India's share in world FDI inflows was very high due to reform in policies, better infrastructure, and more vibrant financial sector. But because of post global crisis its share fell to 1.54% in2012. Since 2012 there is reverse trend and the share rose to 2.79 percent in 2017.

FIG1.2: TRENDS IN FDI INFLOWS IN INDIA (1991-2017)
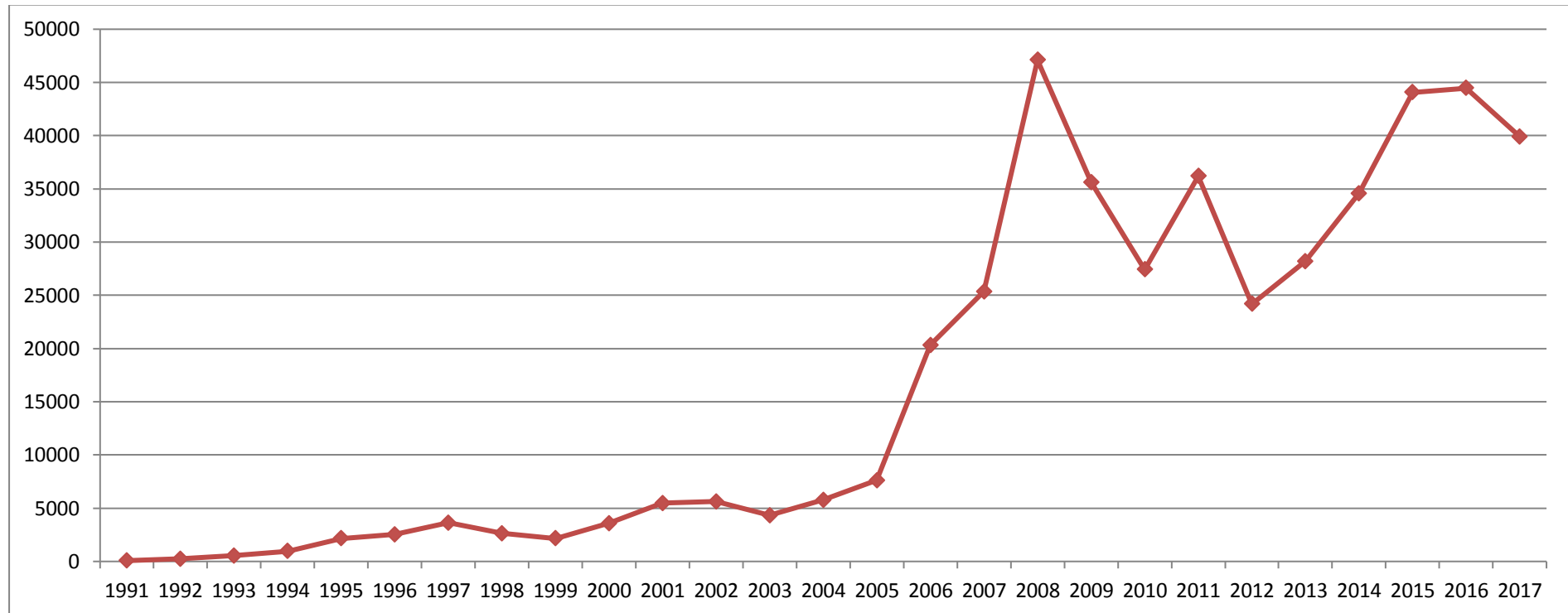
The above graph (1.2) shows that Foreign Direct Investment (FDI) inflows have gone up significantly in post-reform era undoubtedly due to radical changes in the policies that have increased the confidence of the investors. As for FDI growth, it is not a smooth one. There are ups and down in the growth percent of FDI during 1991 to 2017. In the four years 1998, 1999 and 2002 & 2003 the growth rate is found to be negative. The reduction in FDI inflows in the Indian economy after 1997-98 is due to the effect of East Asian Crisis. However, the growth rate become positive from the year 2004 and during 2006, it was very high. It again decreases in the subsequent years due to economic crisis

SOURCES OF FDI IN INDIA

India has broadened the sources of FDI in the period of reforms. There were 120 countries investing in India in 2008 as compared to 15 countries in 1991. Thus, the number of countries investing in India increased after reforms. After liberalization of economy Mauritius, South Korea, Malaysia and many more countries predominantly appears on the list of major investors apart from U.S., U.K., Germany, Japan, Italy, and France which are not only the major investor now but during pre-liberalization era also.

TABLE 1.3: MAJOR SOURCES OF FDI IN INDIA, 2017

COUNTRY	PERCENT SHARE
Mauritius	37.3
Singapore	24.8
Netherlands	7.5
United States	5.0
Japan	4.0
Germany	2.7
Hong Kong	2.3
United Kingdom	2.1

Source: DIPP, Ministry of Commerce & Industry

The above table (1.3) shows that Mauritius is the largest investor in India in 2017. FDI inflows from Mauritius constitute about 37.3 percent of the total FDI in India and enjoying the top position on India's FDI map from 1995. This dominance of Mauritius is because of the Double Taxation Treaty i.e. DTAA- Double Taxation Avoidance Agreement between the two countries, which favors routing of investment through this country. This (DTAA) type of taxation treaty has been made out with Singapore also. Singapore is the second largest investing country in India. While comparing the investment made by both (Mauritius and Singapore) countries one interesting fact comes up which shows that there is a huge difference (between FDI inflows to India from Mauritius and the Singapore) in the volume of FDI received from Mauritius and the Singapore. The other major countries are Netherlands with a relative share of 7.5 percent followed by United States, Japan, Germany, Hong Kong and United Kingdom.

Fig:- 1.3 MAJOR SOURCES OF FDI IN INDIA, 2017 (Percentage Share)
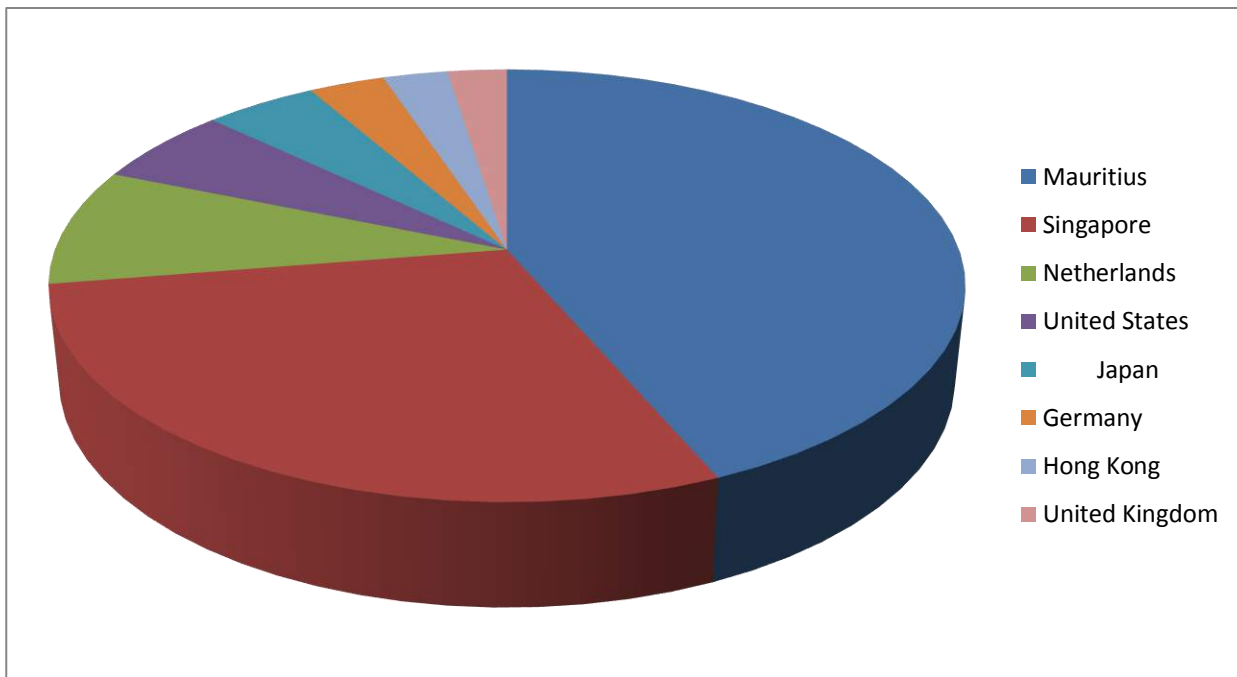
5. RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH (1991 TO 2017)

India has introduced many policy reforms to attract FDI since independence. Soon after the independence, India embarked on a strategy of industrialization with active Government intervention. Domestic enterprises accumulated considerable capacity in this process which has influenced not only the pattern of inward FDI in the country in the subsequent period but has also led to investments made by Indian enterprises abroad. This change in Government policy had also an important bearing on the FDI position of India. In response to macro-economic instability, the sweeping structural reforms were brought in by the Government of India in 1991. These liberalization measures embodied in the 'New Economic Policy' were followed in later years by a series of measures further liberalizing the inward-looking policy regime towards FDI. Since 1991, a virtual sea change has taken place in the economic policy framework in India. The new economic policy is giving importance to privatization, liberalization and globalization with a definite view to make the Indian economy progressively market oriented and integrating it with the emerging global economic structure.

FDI has played a significant role in the growth and development of world economy particularly in the developing countries like India because it links the host economy with the globalised market and foster's economic growth. Inflow and outflow remarkably increased in the past few decades all over the world. But to India it is a new phenomenon which came with the wake of economic reforms in 1991. It is not like that before this no foreign investment came to India, but they came in some other forms like debt, loan, borrowing, institutional investment etc. Since 1985, this situation has been changed in favor of FDI. Some studies (Kumar, 1998; Sena and Pan, 2004)

revealed that India has sought to increase inflows of FDI with a much liberal policy since 1990 after four decades of cautious attitude to it. One of the objectives of the current reforms of the policies is to remove impediments for export- oriented manufacture in general and to attract MNEs to locate efficiency seeking FDI in the country. In a developing country like India that seeks FDI as a development resource, the focus of the FDI policy should be on maximization of the magnitude of inflows by itself. While in general it is admitted that host Government's policies may play an important role in extracting the benefits for development**.**

5.1   DATA AND METHODOLOGY

The objective of this paper is to explore the causal nexus between FDI (Foreign Direct Investment) Economic Growth in India using the annual data for the period, 1991 to 2017 which includes 27 annual observations. The study depends on secondary data which has been collected from UNCTAD statistical yearbook (various issues) etc. All the variables are taken in their natural logarithms to reduce the problems of heteroscedasticity to maximum possible extent.

5.2   HYPOTHESIS OF THE STUDY

The present paper is based on the following hypotheses for testing the causality and co integration between FDI and GDP in case of Indian economy for the period 199-2017.:-

FDI and GDP are co integrated?

FDI Granger causes GDP or vice versa?

5.3   ECONOMETRIC METHODOLOGY

While conducting an econometric study, the direction of the causal relationship among variables is determined according to the information obtained from the theory. Classical Regression analysis is based on the assumption that method used is correct and direction of causality is determined in the model. Therefore, in the present study we will use Granger-Causality test in order to test the hypothesis regarding the presence and direction of causality between FDI and economic growth (GDP). In Order to apply Granger-Causality test, the series that belongs to variable should be stationary because Regression of a non-stationary time series on another non-stationary time series may produce spurious regression. Macro-economic time series data are usually not stationary. Such series are made stationary by taking the first or second differences. We have also converted the variables into its log natural form to avoid the problem of heteroscedasticity.   There are many tests used to check the stationary of the variable. In the present paper, we have used the Augmented Dickey Fuller (ADF) test in order to determine the stationary of variables.

The standard Augmented Dickey Fuller (ADF) [Dickey and Fuller 1979] Unit root test has been used to check the stationary of the series. Once the unit roots are confirmed for data series, the next step is to examine whether there exists a long-run equilibrium relationship among the

variables. This calls for co integration analysis which is significant so as to avoid the risk of spurious regression. Co integration analysis is important because if two non-stationary variables are co integrated, a VAR model in the first difference is mis-specified due to the effect of a common tend. In this stage, the Johansen (1988) co- integration test is used to identify a co integrating relationship among the variables. In our present research study, we have used Johansen test to assess the co integration of the interest variables. We have applied two maximum likelihood tests, the Trace test and Maximum Eigen value tests, advocated by Johansen (1988) and Johansen and Juselius (1990). If a co integration relationship is identified, the model should include residuals from the vectors (lagged one period) in the dynamic Vector Error Correcting Mechanism (VECM) system.

A Vector Error Correction Model (VECM) is a restricted VAR designed for use with non-stationary series that are known to be co integrated. Once the equilibrium conditions are imposed, the VECM describes how the examined model is adjusting in each time period towards its long-run equilibrium state. Since the variables are supposed to be co integrated, then in the short-run, deviations from this long-run equilibrium will feedback on the changes in the dependent variables in order to force their movements towards the long-run equilibrium state. Hence, the co-integrated vectors from which the error correction terms are derived are each indicating an independent direction where a stable meaningful long-run equilibrium state exists. The VECM has co integration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge on their co integrating relationship while allowing for short-run adjustment dynamics. The co integration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The dynamic specification of the VECM allows the deletion of the insignificant variables, while the error correction term is retained. The size of the error correction term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium state. The error correction term represents the long-run relationship. A negative and significant coefficient of the error correction term indicates the presence of long-run causal relationship. Granger causality test as proposed by Granger (1969) has also been used in order to determine the direction of causal relationship among variables.

6.   EMPIRICAL RESULTS AND DISCUSSION

The present paper tries to empirically examine the causal relation between Foreign Direct Investment (FDI) and economic growth measured by GDP of Indian economy for the period 1991-2017. We employ co integration technique to investigate the causality between FDI and economic growth. If the two variables are found to be integrated of same order, only then we can apply the co integration analysis. There are three steps involved in VECM analysis:-

1. Lag selection
2. Johansen Test of Co-integration
3. Vector Error Correction Mechanism (VECM)

TABLE: 1.4 VAR LAG LENGTH CRITERION

VAR Lag Order Selection Criteria
Endogenous variables: GDP FDI
Exogenous variables: C
Date: 03/19/19 Time: 12:28
Sample: 1991 2017
Included observations: 25

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-40.06414	NA	0.099208	3.365131	3.462641	3.392176
1	20.70685	106.9569*	0.001059	-1.176548	-0.884017*	-1.095412*
2	25.20799	7.201831	0.001027*	-1.216639*	-0.729089	-1.081413

 * indicates lag order selected by the criterion
 LR: sequential modified LR test statistic (each test at 5% level)
 FPE: Final prediction error
 AIC: Akaike information criterion
 SC: Schwarz information criterion
 HQ: Hannan-Quinn information criterion

The lag order selection criterion shows that one lag should be chosen as lower the value, better the model. We have taken one lag in our model as three criterions recommended one lag. Now, second step is Johansen test of co-integration. The pre-condition is that variables must be non-stationary at level but when we convert all the variables into first difference, they become stationary i.e. integrated of same order.

H_0:- Variable is stationary
H_1:- Variable is not stationary.

TABLE 1.5: AUGUMENTED DICKY FULLER TEST

VARIABLES	WITH CONSTANT	WITH CONSTANT & TREND
FDI	-4.113415**	-4.348965**
CRITICAL VALUES		
5% level	-2.986225	-3.603202
10% level	-2.632604	-3.238054
ECONOMIC GROWTH (GDP)	-4.312325**	-4.231262**
CRITICAL VALUES		
5% level	-2.986225	-3.603202

10% level	-2.632604	-3.238054

*&** denotes significance at 5% and 10% level of significance. The lag length was determined using Schwartz Information Criteria (SIC)

The above table (1.5) shows that series belonging to FDI and GDP is not stationary at level value. It becomes stationary only when first difference is taken. The table further reveals that as the calculated ADF statistics exceed the tabulated critical values at 5% and 10% level of significance, therefore we reject the null hypothesis of unit root and non-stationary and conclude that variables are stationary only at the first difference. Strong evidence emerges that all the time series are I (I) at the 5% and 10% Level of significance.

TABLE 1.6: JOHANSEN COINTEGRATION TEST RESULTS

Hypothesized Number of Co integrating Equations	Eigen Value	Trace Statistics	Critical Value at 5% (p-value)	Maximum Eigen statistics	Critical Value at 5% (p-value)
None*	0.497579	17.63750	15.49471 **(0.0234)**	17.20791	14.26460 **(0.0166)**
At Most 1	0.017037	0.429595	3.841466 **(0.5122)**	0.429595	3.841466 **(0.5122)**

Source: Author's own Calculation

* denotes rejection of the hypothesis at the 0.05 level

The above table (1.6) shows that first hypothesis i.e. no co integration among variables can be rejected as p-value (2.34%) is less than the critical value (15.49%) at 5% level of significance on the basis of trace statistics. The second null hypothesis i.e. there is at most one co integrating equation, cannot be rejected as p-value (51.22%) is greater than the critical vale (3.84%) at 5% level of significance. Therefore, we accept this null hypothesis i.e. there is at least one co integrating equations. This implies that both the variables i.e. FDI and GDP are co integrated. It implies that FDI and GDP have long run association. And the Maximum Eigen test statistics makes the confirmation of this result. After analysing that there is significant co integration in the sample series we employ Granger causality test to know the causality between the two variables. Granger causality is a statistical concept of causality that is based on prediction. The results of Pair-wise Granger causality test done for 1 Time lags between the two variables for which unit root test is carried out are shown in the following table (1.7):

TABLE 1.7: GRANGER CAUSALITY FOR THE PERIOD 1991-2017

Pair wise Granger Causality Tests			
Sample: 1991-2017			
Lags 1			
Null Hypothesis	Obs.	F-statistics	Probability
FDI does not Granger Cause GDP	26	**2.19873**	0.1517
GDP does not Granger cause FDI	26	**5.86285***	0.0238

The results of the Granger causality tests show that it can be rejected that the FDI does not Granger Cause GDP at the 5% level (F-statistic is 2.19873, p-value is 0.1517), but it cannot be rejected that GDP does not Granger Cause FDI (F-statistic is 5.86285, p-value is 0.0238) as the probability value exceeds the calculated value of F-statistics. Therefore, it can be concluded that there is a one-way causality between GDP and FDI in case of Indian economy for the period 1991-2017.

Vector Error Correction Model:

The coefficients of Error Correction Term (ECM) contain information about whether the past values affect the current values of the variable under study. A significant coefficient implies that past equilibrium errors play a role in determining the current outcomes. The information obtained from the ECM is related to the speed of adjustment of the system towards long-run equilibrium. The short-run dynamics are captured through the individual coefficients of the difference terms. The results of VECM analysis are given in the following table 1.8:

TABLE 1.8: ESTIMATES FOR VECM REGRESSION

Dependent Variable: D(GDP)
Method: Least Squares
Date: 03/19/19   Time: 12:31
Sample (adjusted): 1994 2017
Included observations: 24 after adjustments
D(GDP) = C(1)*(GDP(-1) - 0.585464830422*FDI(-1) - 8.28290206276) +
    C(2)*D(GDP(-1)) + C(3)*D(GDP(-2)) + C(4)*D(FDI(-1)) + C(5)*D(FDI(
    -2)) + C(6)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.073813	0.096296	-0.766524	0.4533
C(2)	-0.013239	0.274428	-0.048244	0.9621

C(3)	-0.191999	0.347713	-0.552176	0.5876
C(4)	-0.023997	0.060098	-0.399304	0.6944
C(5)	0.037705	0.052322	0.720629	0.4804
C(6)	0.105688	0.039940	2.646152	0.0164

R-squared	0.070747	Mean dependent var	0.093333
Adjusted R-squared	-0.187379	S.D. dependent var	0.092674
S.E. of regression	0.100984	Akaike info criterion	-1.535399
Sum squared resid	0.183558	Schwarz criterion	-1.240885
Log likelihood	24.42478	Hannan-Quinn criter.	-1.457264
F-statistic	0.274078	Durbin-Watson stat	1.727191
Prob(F-statistic)	0.921357		

The above table (1.8) shows that the coefficient C_1 and C_2 which shows the speed of adjustment towards long run equilibrium has negative sign which confirms that there is long run causality from our independent variable i.e. FDI. This implies that our independent variable has influence on dependent variable. The individual coefficients are not found to be statistically significant which indicate the absence of short-run causality running from GDP to FDI. In order to check the short-run causality running from GDP to FDI, we have also applied Wald test:

$$H_0:- \quad C(4)=C(5)=0$$
$$H_1:- \quad C(4)=C(5) \neq 0$$

TABLE 1.9: SHORT RUN CAUSALITY (WALD TEST)

HYPOTHESIS	CHI-SQUARE	P-VALUE	DECISION AT 5% LEVEL OF SIGNIFICANCE
H_0 = GDP doesn't Granger Cause FDI	0.551754	0.7589	Accept H_o

Source: Author's calculation

The above table (1.9) clearly indicates that there is absence of short run causality running FDI to GDP as p-value is found to be greater than Chi- square value at 5% level of significance.

7.   CONCLUSIONS:

This study tries to examine empirically the direction of the relationship between economic growth and FDI in India using annual data over the period 1991-2017. The study shows that India's share in world Foreign Direct Investment (FDI) rose to 2.79 percent in 2017 as compared to 0.05 percent in 1991. This can be attributed to economic reform process of the country. There has been a generous flow of FDI in India since 1991 and its overall direction remained the same over the years irrespective of the ruling party. Foreign Direct Investment (FDI) inflows have gone up significantly in

post-reform era undoubtedly due to radical changes in the policies that have increased the confidence of the investors. According to the results of the study, there is one-way causality relationship between economic growth and FDI in India for the period 1991-2017. The results of Johansen Co integration test confirm the existence of long run equilibrium relationship between FDI and GDP, but short run causality is found to be absent as indicated by Wald test statistics. Lastly, it can be concluded that FDI has significantly contributed to economic growth of Indian economy during post-reform era. Still there is need For FDI to be a noteworthy provider to economic growth, India would do better by focusing on improving infrastructure, human resources, developing local entrepreneurship, creating a stable macroeconomic framework and conditions favourable for productive investments to augment the process of development.

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CONCEPTUALISATION AND EMERGING CLASSIFICATION OF BLUE ECONOMY

Prof. Neera Verma and Ms. Vasudha Jolly[c]

Abstract

The paper aims at making a critical review of the existing literature on Blue Economy and clarifying the ambiguity in the definition and emerging classifications in Blue Economy. The paper concludes that there seems to be a trend towards a common and universal definition on Blue Economy; though, it may still take time. Similarly, there are different classifications related with Blue Economy and it varies from country-to-country and this is also true in terms of popular terminologies related with Blue Economy. The paper concludes that there is lack of consensus on definition of Blue Economy as well as standardized classification of sectors/industries; and this is due to complexity of Blue Economy in terms of space and place; scale and connection; proximity and distance; governance and power relations.

Keywords: Blue Economy, Emerging Classification, Ocean Economy, Green Economy, Accounting Framework, Conceptualization.

[c]Prof. Neera Verma is the Chairperson, Department of Economics and Dean of the Faculty of Social Sciences at Kurukshetra University, Kurukshetra, Haryana, India. Ms. Vasudha Jolly is the Guest Assistant Professor and PhD Scholar in the Department of Economics, Department of Economics, Kurukshetra University, Kurukshetra, Haryana, India.

1. Introduction

The oceans which cover 72 percentage of the surface of our blue planet and establish more than 95 percentage of the biosphere play a major role in sustainable economic development. Coastal and island developing countries have started taking positive steps regarding preservation of Blue Economy. Cutting edge technologies and rising commodity prices are opening up new dimensions of opportunity for sub-marine exploitation. The High Seas constitute the last global commons and urgent attention is required to enable the sound management of ocean resources for the realization of sustainable development. Where Ocean Economy, Sustainability and Environment come together, this system is known as Blue Economy. We can see it in Fig. 1.

Figure 1: Blue Economy
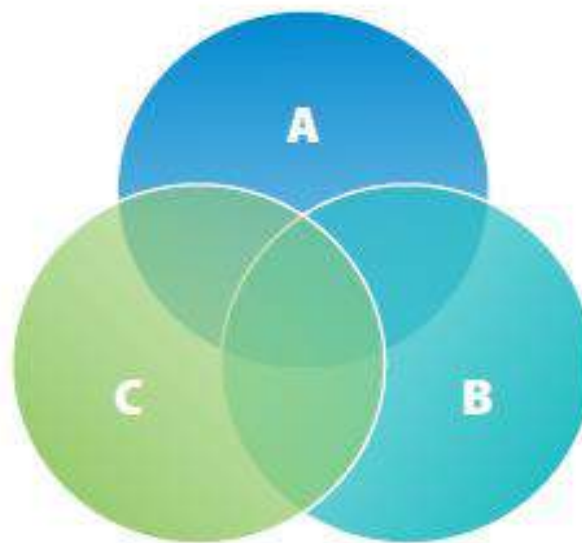
Source: V.N. Attri (2018)
A, B and C represent the ocean economy, sustainability, and the environment respectively.

The potential of inclusive growth and sustainable development in ocean economy is tremendous and of great importance for both coastal and non-coastal nations. The ocean economy has been approximated at millions of different species constituting both living and non-living resources which are linked with various industries and different forerunners of growth so as to relate this to different Sustainable Development Goals (SDGs). There exists a link between various industries, forerunners of growth and SDGs which is well explained by and marine biotechnology are some of the examples of living resources of the ocean economy. The "Rio +20" United Nations Conference on Sustainable Development (UNCSD, 2012) focused on two key themes- further development and refinement of the institutional framework for Sustainable Development and the advancement of the "Green Economy" concept.

2. Green Economy Versus Blue Economy:

Green Economy, which has been in focus for more than 30 years, heavily relies on increasing funds; subsidies and tax cuts which continue to be its primary drawbacks. Further, Green Products are

still categorized as luxury products which low- and middle-income population cannot afford (Pauli, 2010). Pauli argued that "sometimes environmentally sound products only succeed in the market when a marginal group of consumers is prepared to pay the premium" (Pauli, 2010), as shown in Figure 2. Thus, The Blue Economy provides ways, strategies and alternatives which could overcome the current environmental problems and existing drawbacks.

Figure :2 Comparisons between The Green Economy and The Blue Economy

The Green Economy
○ Costly implementation.
○ Expensive products.

The Blue Economy
○ Utilize by-products and create new cash flow.
○ Generate revenues rather than expenses.
○ Affordable and beneficial to human being.
○ Sustaining the ecosystem.
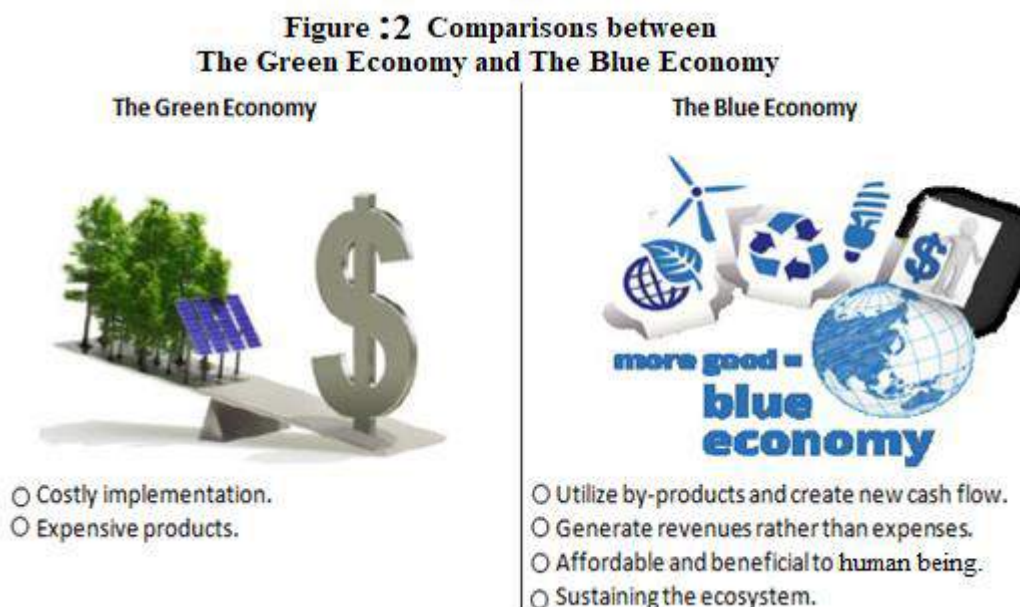
The concept of Blue Economy has been largely popularized in recent times by Gunter Pauli in his book (2010), "The Blue Economy: 10 years- 10 innovations- 100 million jobs." The fundamental principle of the Blue Economy is that society can shift from scarcity to abundance for all by following the Blue business model. This model prioritizes sustainability and people involvement in the local economy. As Green Economy is not limited to the terrestrial sphere, similarly Blue Economy is not limited to the marine.

3. Defining Blue Economy

Though, there seems to be lack of consensus on universal or common definitions of Blue Economy; yet sustainability; climate changes, health of the oceans and ocean governance have emerged as the commonalities of Sustainable Blue Economy across the countries. Over the period 2010-2019, despite the ambiguity in standard definitions, practical aspect of blue economy has been clear and non-controversial. The perspectives related with economy, society and politics as well as environment have gained momentum during the last decade. Some of the important definitions of the Blue Economy are as follows:

"Blue Economy" is marine-based economic development that leads to improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. **SIDS Concept Paper (2012)**

"…the improvement of human well-being and social equity, while significantly reducing environmental risks and ecological scarcities…The concept of an ocean economy also embodies economic and trade activities that integrate the conservation and sustainable use and management of biodiversity, including marine ecosystems, and genetic resources." **(UNCTAD 2014)**

"A SUSTAINABLE BLUE ECONOMY is a marine-based economy that:
- Provides social and economic benefits for current and future generations by contributing to food security, poverty eradication, livelihoods, income, employment, health, safety, equity, and political stability.
- Restores, protects, and maintains the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems—the natural capital upon which its prosperity depends.
- Is based on clean technologies, renewable energy, and circular material flows to secure economic and social stability over time, while keeping within the limits of one planet.
    - Is governed by public and private processes that are:
    - Inclusive
    - Well-informed, precautionary, and adaptive
    - Accountable and transparent
    - Holistic, cross-sector and long-term
    - Innovative and proactive

To create a SUSTAINABLE BLUE ECONOMY, public and private actors must:
- Set clear, measurable, and internally consistent goals and targets for a Sustainable Blue Economy.
- Assess and communicate their performance on these goals and targets.
- Create a level economic and legislative playing field that provides the Blue Economy with adequate incentives and rules.
- Plan, manage, and effectively govern the use of marine space and resources, applying inclusive methods and the ecosystem approach.
- Develop and apply standards, guidelines, and best practices that support a Sustainable Blue Economy.
- Actively cooperate, sharing information, knowledge, best practices, lessons learned, perspectives, and ideas, to realize a sustainable and prosperous future for all." (**Blue Economy & World Wildlife Fund, 2015**)

The theoretical system of new emerging interdisciplinary science of Blue Economy which focuses on sustainability as one of its core principle, linked with climate change and accelerated technological change, is the mix of natural sciences [as proclaimed in the 21 Principles of Gunter Pauli (2010)] as well as social sciences which help in making the Blue Economy inclusive by focusing on economics, management, sociology and other relevant social sciences. **(Attri, 2019)**

"…comprising the range of economic sectors and related policies that together determine whether the use of oceanic resources is sustainable. The 'blue economy' concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas" **(World Bank/UN 2017)**

"The new emerging development paradigm of the Blue Economy which is inclusive of the Ocean Economy, Green Economy, Coastal Economy and Marine Economy has a great potential for higher and faster GDP growth scale in the Indian Ocean Region (IOR)." **(Attri, 2016)**

Thus, the conceptualization of Blue Economy has multi-dimensional analytical framework consisting of spatial scale and connection, distance and proximity, related thinking and governance and power relations as emphasized in various scholarly studies on Blue Economy during 2012-2019. (Attri, 2019)

3.1 Common terms related to Blue Economy

It is difficult to compare the Blue Economy among different countries because the definition, classification, criterion and scope of the Blue Economy differ across countries. Even the terminology used in different areas to represent the concept of Blue Economy varies, such as ocean economy, ocean industry, marine economy, marine industry, blue economy, coastal economy and so on. 'Ocean' is usually used in the USA and Ireland, but 'Marine' is widely used in the UK, France, Australia, Canada, New Zealand and EU. 'Maritime' is commonly used in Spain. Similarly, the ocean economy in the USA is categorized into 6 main sectors but it is classified into 16 sectors in the UK. UK does not include seafood processing in the ocean economy, while France includes electricity generation such as thermal power and nuclear power in it. In short, we cannot compare ocean economies exactly across countries because of the differences in its meaning and scope.

Table 1 shows the different terminology most commonly used by some major economies of the world to refer to "Blue Economy". As is clear from the table, different phrases are being used within/ across countries to refer to more or less similar concept. Though 'marine' is a commonly used term along with 'economy', but as a development paradigm the phrase 'Blue Economy' is being increasingly accepted and slowly replacing others.

Table 1: Blue Economy: Popular Terminologies

Sr. No.	Countries	Terminology related to "Ocean"					Terminology related to "Economy"			
		Ocean	Marine	Maritime	Coastal	Blue	Economy	Industry	Activity	Sector
1	Australia		✓					✓		
2	Canada	✓	✓					✓		
3	China					✓		✓		
4	EU		✓				✓			
5	France		✓				✓			
6	India			✓		✓	✓			
7	Ireland	✓					✓			
8	Japan							✓		
9	Mauritius					✓	✓			
10	New Zealand		✓				✓			
11	South Africa					✓	✓			
12	South Korea				✓	✓		✓		
13	Spain			✓						✓
14	UK		✓						✓	
15	USA	✓					✓			

4. Sectors of Blue Economy:

The Blue Economy is relatively a new concept which is taking its shape through undertaking global responsibilities to protect marine ecological environment, strengthening international communications and sharing development achievements and promoting the establishment of global partnerships. There is enough room for further development in terms of its scope and our collective understanding and analysis of the Blue Economy.

In fact, it is a new paradigm in the development discourse which gives equal weightage to economic growth and environmental sustainability. Blue Economy covers a wide canvas of economic activities including fisheries and aquaculture, trade and investment with countries connected via the oceans, ports and shipping, coastal infrastructure development, renewable energy, banking, insurance, financial services, tourism and capacity building and newer sectors such as marine biotechnology, marine ICT, deep-sea exploration of hydrocarbons and rare earth metals. Table 2 and Figure 3 give an overview of the major sectors included in Blue Economy across the world.

Table 2: Activities included in the Blue Economy

Group	Sector
Living Resources	Fisheries and Aquaculture
	Blue Biotechnology
Non-Living Resources	Extraction of aggregates
	Extraction of oil and gas
	Extraction of salt
	Seabed mining
	Desalination
Shipping	Maritime transport
	Ports (including dredging)
Shipbuilding	Shipbuilding
	Ship repair
Coastal Tourism	Coastal Tourism
Equipment	Equipment
Renewable Energy	Wind energy
	Other renewable energy
Other	Public sector

Figure 3: Activities included in Blue Economy

4.1 Fisheries and Aquaculture

Fishery accounts for a significant fraction of marine based economy output in many coastal nations of the world. With advancement in fishing technology, the dependence on fishery for food and livelihood is growing rapidly. Trade in fish products has also increased. Fish farming meets the growing demand for raw and processed fish products. However, this is taking place at the cost of environmental pollution. Rising consumption combined with stagnant capture production sends worrying signals in view of the faster depletion of biological stock of major fish species.

Moreover, aquaculture is unlikely to be substituted for capture fishery as natural endowment of fish species and aquatic plants is not only a source of subsistence and commercial fishing but contributes to the health of ocean habitat also. Better processing facilities, harmonization of food safety standards and effective legal and governance mechanisms would enable value addition and make fish trade more remunerative.

In the Blue Economy paradigm, both raw and processed sectors in aquaculture would require greater application of modern technology. It is therefore necessary to establish suitable mechanisms for technology transfer in fisheries as well as combating the issues involved in irregular, unreported and unregulated fishing (IUU) among the IORA countries.

India, China, Indonesia, Thailand, Bangladesh and Japan are the leading nations of the world for fish production and trade. Pelagic fishes are mostly demanded in the USA, EU and Japan. For food and livelihood security, processed fish industry would play a big role. Investment in processing technology and integration to the fish value chain would promote fishing and fishing-related services in the costal nations.

4.2   Offshore and Deep-Sea Mining

Marine minerals in the coastal areas and in the seabed would play key role in development of the Blue Economy. Offshore minerals particularly placers are sources of important metals like titanium, tin, retile, limonite and monazite. Placer minerals are used for various industrial applications in electronics, aerospace, petroleum, paint, bio-medical and refractory industries. There are plenty of placer deposits along the Indian Ocean rim region. Indian and Australian & South Africa companies are exploring joint collaborative initiatives with foreign companies to utilize the huge reserve of placers in its coasts. On the seabed, three different types of mineral deposits such as seafloor massive sulphides (SMS), poly metallic nodules and cobalt crusts are found. SMS deposits that include copper, zinc, lead, gold, silver, etc are largely found in the Mid-Atlantic Ridge, Indian Ocean Ridges and the South West Pacific. Poly metallic nodules comprising of manganese, nickel, copper, cobalt and others are found in Clarion-Clipper ton Zone, Peru Basin, Penyrlyn Basin and Central Indian Ocean. On technology front, marine submersible and mining technology is advancing fast in many mining nations of the world. While UK, China and other countries are thinking of up-scaling activities for deep-sea mining, the Pacific Islands including Fiji, Papua New Guinea, the Solomon Islands, Tonga and Vanuatu have granted permits to global mining companies for deep-sea exploration. In terms of regulations, the International Seabed Authority (ISA) is still working on regulations for commercial mining on the seabed even though it has issued licenses to many countries for exploration in deep-sea. Till date, there is no commercial deep-sea mining in the world even though various agencies have estimated its potential. Nautilus Minerals- a leading company of deep-sea mining (DSM) of UK will be the first commercial venture to begin commercial operations in the Papua Guinea national waters in the year 2019, though it involves legal and political issues to be resolved.

4.3   Marine Manufacturing

Marine manufacturing covers several sectors including marine engineering and instrumentation, deep-sea mining technology, marine biotechnology, ship making and repairing, boat making, and related activities. USA, EU and some other countries have achieved remarkable progress in development and commercialization of drug molecules, nutraceuticals and functional foods. Despite strong commercial interests in this sector factors like longer gestation period for understanding the structure of compounds, uncertainty over extraction and fermentation of marine organisms, financing of R&D and commercialization of drugs act as disincentives for large-scale investments by the private companies. Small and Medium Enterprises (SMEs) dominate this sector even in European countries that are at more advanced stages of product innovation, networking and marketing. Moreover, most of those companies focus on a few products in one of three segments of blue biotechnology industry- pharmaceuticals, nutraceuticals and functional foods. Many of them switch from drug development to production of food additives, proteins, enzymes, etc on grounds of high risk of returns to investment. As of date, drugs developed from marine organisms are primarily anticancer and anti-inflammatory. Marine organisms that are the sources of most marine compounds are microalgae, sponges, fungi and bacteria. Harvesting of marine organisms has improved with better underwater exploration technology, innovations in scuba diving and introduction of Remotely Operated Underwater Vehicle (ROVs), unmanned vehicles and gliders. Likewise, significant potential exists in other sectors of marine manufacturing as mentioned above.

4.4   Offshore Ocean Energy

The commercial exploitation of renewable offshore ocean energy sources is expected to bring transformation in the global energy scenario. As per estimates, the world can develop 337 GW of ocean energy and create 300,000 jobs in this sector by 2050. Unlike other sources of renewable energy, ocean energy technologies are not yet fully tested for commercialization. For instance, despite a number of pilot and demonstration projects in the wave energy sector, a few cases of commercialization are observed. Among other sources, tidal energy technologies are more mature and commercially viable. The new technologies developed for tidal range power generation are tidal lagoons, tidal reefs, tidal fences and low-head tidal barrages. Likewise, 40 new devices are also introduced in tidal stream technologies during 2006-13. The leading countries for technology development in tidal energy are Canada, China, France, Ireland, Japan, South Korea, Spain, UK and USA. It is believed that offshore solar could be a leading source of renewable energy. Financing of offshore wind farms could be a potential hurdle for technology development and installation. By examining the financing pattern of wind farms in EU, EWEA (2013) provides alternative funding models which involve project finance, project bonds, recycling and re-financing of debt and equity investments by the power producers, and so on. In order to develop these sources as sources of household and industrial energy consumption, emphasis should be placed on development of cost-effective ocean energy technologies and sustained flows of investment for commercialization.

4.5   Marine Services

Along with growth in services sectors worldwide, the interest in marine services is also growing particularly in the Blue Economy-driven economies. Marine services include diverse sub-sectors such as port & shipping, coastal and eco-tourism, marine ICT, marine banking & insurance, marine commerce and so on. Most of those sub-sectors possess enormous potential for innovation, growth and occupational diversification. Rise in seaborne trade and commercial shipping along with a host of other factors such as demand for raw materials, rapid industrialisation, trade liberalization, urbanization and competitive international ore prices provide impetus for the growth of port and shipping services. The activities of this sector include transportation of goods and passengers, pilot age, towing, tug assistance, repairs, anchorage berth and berthing services, storage and warehousing, maritime cargo handling services and custom clearance services. During the global boom (2003-07) tonnage demand doubled from 3 per cent in 1990s to 6.5 per cent in the 2000s (Mitroussi,2013). Some IORA countries including India, Indonesia, Malaysia, Iran, UAE, Singapore, Australia, Thailand, South Africa and Oman have registered robust performance in container port traffic. IORA countries exhibit strong growth in trade of shipping services covering sea transport freight, sea transport passenger and other sea transport. Globally, coastal tourism is viewed as an emerging segment of the Blue Economy. According to European Parliament (2008), coastal areas are preferred most among the tourist destinations. The universe of coastal tourism covers a range of activities including sea angling, bird watching, boating at sea, dolphin watching, scuba diving, swimming in the sea, cruise and others. Cruise travel is a promising activity in the Indian Ocean, Baltic Sea, Mediterranean and other oceans. There are a number of special interest cruising which include wellness at sea, freighter cruises, river cruises, etc. Hotel & restaurants and transport sector expand along with the spurt in tourist arrivals in the coastal cities and eco-tourism spots. By implementing suitable site development, peripheral development plans for urban fringe areas and innovative financing schemes the potential of coastal and marine tourism can be harnessed fully. Marine information and

communication technology (ICT) sector covering satellite monitoring, analysis of big data for biodiversity, pollution, weather pattern, ecosystem evolution, fishing zone advisory services, ocean state forecast, storm surges, cyclones, monsoon variability, tsunami, R&D services including validation of satellite sensors, parameterization of key processes for models and verification of model simulations is an emerging sector of the Blue Economy. It may expand further depending upon the emphasis given to ocean data recording, analysis and simulations. Marine commerce is a pivotal segment of the Blue Economy comprising of business services, marine retail services, marine financial services, maritime insurance, ship leasing, support activities, wholesale trade, maritime legal service and other marine services. Maritime insurance businesses have registered growth over time. Ship finance is another potential sector for expansion in the Indian Ocean region. Marine conservation finance is also emerging worldwide as a separate category of marine financial services.

In addition to this, the Blue Economy is responding to the basic needs with what is locally available and encourage people to utilize by-products and waste to benefit the ecosystem. Pauli (2010) suggests "introducing more innovative technologies to the market based on the Blue Economy concept because innovative technologies will generate new cash flow, which will create jobs and build social capital".

5   Classification of the Blue Economy

Different economies around the world have adopted classification of Blue Economy suitable to the nature of activities carried out in their respective economies. It will be useful to look at classifications adopted in some major blue economies in order to appreciate the diversity and expanse of relevant economic activities.

5.1   USA

The concept of the ocean economy and the coastal economy has been provided by National Ocean Economics Program (NOEP) in USA which provides full range of the economic information and data across the country. In USA, the ocean economy involves all economic activity that derives all or part of their inputs from Great Lakes or Oceans (Colgan, 2007).

The ocean economy according to NOEP has been divided into 6 sectors as shown in Table 3. These sectors are marine construction, living marine resources, offshore minerals, ship and boat building and maintenance, coastal tourism and recreation, and marine transportation.

Table 3: Classification of the Ocean Economy in the USA

Sr. No.	Sector	Categories
1	Construction- Marine	Marine-related construction
2	Living Resources- Marine	Fisheries, Fish hatcheries and aquaculture
3	Minerals- Offshore	Limestone, sand and gravel, oil and gas exploration, oil and gas production
4	Ship & Boat Building	Boat building and repair, Ship building and repair
5	Tourism & Recreation- Coastal	Amusement and recreation services, Boat dealers, Eating & drinking places, zoos, aquaria
6	Transportation-Marine	Deep sea freight transportation, marine transportation services, search and navigation equipment

Source:-(Park,2014)

5.2   UK

The economic and employment statistics for marine activities in the UK economy were estimated in 2008 by three organizations namely, Crown Estate, Associated British Ports, and Oil and Gas UK. Their report (2008) underlines the important economic contribution to output and employment made by this sector within the UK. The report also highlights the diversity of marine-related activities and it provides a guide to their relative contribution. The marine activities of the UK as per this report are divided into 18 sectors as shown in Table 4. There are some special characteristics of the classification of marine activities in the UK. For example, the fishing sector includes traditional sea fishery activities, fish farming, and fish processing. Oil and gas is separated from aggregates unlike in the USA. Similarly, Offshore wind is included in marine renewable energy, but construction of offshore wind farms is included in construction. Business services related to shipping are separated from the shipping industry.

Table 4: Classification of the Marine Activity in the UK

Sr. No.	Sector	Activities
1	Fish	Sea fisheries, Farm fisheries, Fish processing
2	Oil and gas	Offshore extraction of oil and gas
3	Aggregates	Marine dredged sand and gravel
4	Ship & boat building and repairs	Ship building and boat building
5	Marine Equipment and materials	Supply to the offshore oil and gas industry, supplies to shipbuilding and repairs, Supplies to boat building
6	Marine renewable energy	Offshore wind, wave and tidal stream power
7	Construction	Harbour development, coastal works against erosion and flooding, construction of offshore wind farms
8	Shipping operations	Transport of goods by sea
9	Ports	Strong of freight, vessel salvage, cargo handling, stevedoring, bunking passenger handling and services
10	Navigation and safety	Lighthouse authorities, The hydrographic office, Maritime and coastguard agency, Health and safety executive, Royal national lifeboat institution
11	Cables	Submarine telecommunications, Power cables
12	Business services	Marine insurance, Ship chartering, Shipping finance, Ship classification, Legal services, Dispute resolution and accountancy services
13	License and rental	License and rental marine aggregates, Potash mining, Oil and gas pipelines, Telecommunication and power cables, Aquaculture, Renewable energy, Moorings, Wildfowling and ports marinas
14	Research and development	Industry sector, University (Higher Education Institutions), Public sector
15	Marine environment	Decommissioning, Conservation and environment, Wastewater treatment
16	Defence	Navy
17	Leisure and recreation	Cruising, Leisure craft services
18	Education and training	Higher education

Source:-(Park,2014)

5.3   France

The objective of the French Marine Economic Data Report (2010) was to assess the significance of the French marine economy, its position with respect to international competition and its role within public services in France. This report presents a survey of marine related activities in France and explains their economic significance in terms of value added and employment.

The report includes 10 commercial sectors and 4 non-commercial sectors in the marine economy which are then further classified into sub-sectors. For example, the activity related to seafood sector, has been divided into 5 subsectors i.e. Marine fishery, Marine aquaculture, Production of seaweed, Fish markets and fish trade, Seafood product processing industry as shown in Table 5.The most important sector which is included in the marine economy of France is electricity generation like conventional fossil fuel power plants, nuclear power plants and wind turbines. France is perhaps the only country which includes Electricity generation sector in the Blue Economy. It is because they assume that the electricity generation units are located on the coasts. Further, maritime insurance is another unique sector included in the Blue Economy in this country. National defence is the main sector of non-commercial ocean economic activity which is included in French navy sector.

Table 5: Classification of the Marine Economy in France

Sr. No.	Sectors	Categories
Industrial Sector		
1	Seafood products	Marine fishery, Marine aquaculture(fish farming and shellfish farming), Production of seaweed, Fish markets and fish trade, Seafood product processing industry
2	Extraction of marine aggregates	Silica sands and gravels, Calcareous sands and sediment
3	Electricity generation	Conventional fossil fuel power plants, Nuclear power plants, Wind turbines
4	Shipbuilding and repair	Construction and repair of merchant and military ships, Naval outfitting and boat building
5	Marine and river civil engineering	Construction of ports, dams, dykes, navigable canals, water supplies, locks and other water course regulation installations / Execution of work: in water(construction of coffer dams, construction of the piles of bridges), dredging, underwater(by diver or other means) / Cleaning of trenches and development of river banks and cutting of water weeds
6	Submarine cables	Manufacturing, laying and maintenance of submarine cables immersed at depth and, generally buried, intended to carry communications or electrical power
7	Offshore oil and gas- related industry	Supply of oil and gas-related services and equipment in the fields of exploration and production, refining and petrochemicals
8	Coastal tourism	Spending of resident and non-resident tourists in characteristic tourist activities : spending on accommodation, catering, and all-in packages (for the non-residents), spending associated with the stays: spending on food, miscellaneous purchases, travel on site (taxi or public transport), services to private citizens, fictive rent
9	Maritime and river transport	Exploitation and general organization of ports, Port services to vessels and goods
10	Maritime insurance	Maritime insurance and banking
Non-commercial public sector		
11	French Navy	National defence
12	Public intervention	Economic and social (seafarer labor schemes, social protection), Regulation and education
13	Coastal and marine environmental protection	Prevention, Reduction and elimination of pollution; the repair of damage and the acquisition, processing and circulation of information on environment
14	Marine research	Activities of French public bodies in the field of marine research and operational oceanography

Source:- (French Marine Economic Data 2009)

5.4   Australia

Allen Consulting Group's Report (2004) presents the estimates of the economic contribution of marine industries in Australia for the period 1995-96 to 2002-03. There is no statistical classification for marine industries as a distinct category in Australia. Therefore, the method applied to measure the economic contribution of marine industries is to compile data on those industries which have been categorized as the marine industry on the basis of the following 3 aspects: 1) relationship between the marine environment through the use of a marine resource like fish, offshore oil and gas, 2) the provision of services through marine transportation like shipping and port based industries, 3) use of the positive attributes of the marine environment like marine tourism.

There are 6 sectors in Australia's marine industry, namely marine tourism, offshore oil and gas, fisheries and seafood, shipping, ship building and port-based industries as shown in Table 6.

Table 6: Classification of Marine Industry in Australia

Sr. No.	Sector	Categories
1	Marine tourism	Travel agency and tour operator services, taxi transport, air and water transport, accommodation, cafes, restaurants and food outlets, clubs, pubs
2	Refining of petroleum from offshore sources	Offshore oil and gas extraction, Offshore petroleum refining, Exploration and services
3	Fisheries and Seafood	Marine fishing, aquaculture, seafood processing
4	Shipping	Water transport
5	Shipbuilding	Ship building and boat building
6	Port-based industries	Stevedoring, water transport terminal, port operators

Source:- (Park,2014)

5.5 China

The Ocean Economy Accounting System (OEAS) of China was introduced in 2006, with the aim of furnishing data related to marine activities to the marine policy makers. Its main objective is to collect data to meet the practical needs of ocean economic management at the regional and national levels. This standard assigns unique two-, three- and four-digit codes to each industry. The whole ocean economy is divided in 28 two-digit codes, 106 three-digit codes and 390 four-digit codes. It should be noted that navy activities are not included in this standard.

The main characteristic of China's ocean economy is that its emerging oceans industries are divided into several independent industries. Table 7 presents these sectors in detail.

Table 7: Classification of the Blue Industry in China

Sr. No.	Ocean sectors	Industry
Major ocean industries		
1	Marine Fishery 01	Marine Culture 011
		Marine Fishing 012
		Fishery Service Industry 013
		Seafood Processing 014
2	Offshore oil and gas industry 02	Offshore oil and gas exploration and production 021
		Support activities for oil and gas 022
3	Ocean mining industry 03	Sea beach placer mining and quarrying 031
		Sand & stone mining and quarrying 032
		Submarine geothermal power and coal mining 033
		Deep sea mining 034
		Other ocean mineral resources mining 035
4	Marine salt industry 04	Salt industry of seawater 041
		Salt processing 042
5	Shipbuilding industry 05	Ship & boat building and repairing 051
		Offshore fixed and floating devices manufacturing 052
6	Marine chemical industry 06	Sea salt chemical industry 061
		Seaweed chemical industry 062
		Sea water chemical industry 063
		Offshore oil & gas chemical industry 064
7	Marine biomedicine industry 07	Marine medicine producing 071
		Ocean health products 072
8	Marine engineering building industry 08	Ocean engineering building 081
		Offshore engineering building 082
		Submarine engineering building 083
9	Marine electric power industry 09	Oceanic energy 091
		Offshore wind 092
10	Seawater utilization industry 10	seawater desalination 101
		Direct seawater utilization 102
		Other seawater utilization 103
11	Marine communications and transportation industry 11	Marine cargo transportation 112
		Submarine pipeline transportation 113
		Sea ports 114
		Marine transportation service 115
12	Coastal tourism 12	Hotels and loading places 121
		Amusement and recreation 122
		Coastal tourism services 123
		Coastal tourism and cultural services 124

		Other coastal tourism services 125
13	Marine information services 13	
	Marine environment monitoring and prediction services 14	
	Marine insurance and social security industry 15	
	Marine science research 16	
	Marine technology services 17	
	Marine geologic exploration industry 18	
	Marine environmental protection industry 19	
	Marine education 20	
	Marine management 21	
	Marine social and international organizations 22	
	Marine agriculture, forestry industry 23	
	Marine equipment industry 24	
	Ocean related products and materials manufacturing 25	
	Ocean related construction and installation industry 26	
	Marine wholesale and retail industry 27	
	Ocean related services 28	

Source:- (Wang,2016)

5.6   Japan

Nomura Research Institute (NRI), Japan published a report in 2005 which explained the economic contribution of ocean Industries in Japan. They have divided the ocean industries into 3 types.1) Ocean space activity which includes the use of the ocean energy, ocean space and seabed like mining and extraction of resources, marine environmental protection and safety management. Hence this sector includes fishing, transportation, salt, offshore oil and gas.2) Marine resource utilization activities which produce goods and services by using minerals, energy resources and living things which exist in the ocean. It includes seafood products, salt products etc. 3) Material and services supply, activities which provide goods and services to the ocean space activity. This includes ship building and repair, ice making and marine equipment like ropes and nets. Table 8 explains these three sectors and their categories in detail.

Table 8: Classification of Ocean Industry in Japan

Sr. No.	Sectors	Categories
1	Ocean space activity	Coastal fishing, Offshore fishing, deep-sea fishing
		Aquaculture, salt
		Open ocean transport, port transport, water transport and other transport services, coastal transport
		Gravel and quarrying, crude oil and natural gas, public works of rivers, sewer
		Fixed telecommunications
		Civil engineering and construction services
2	Marine resources utilization	Frozen seafood, products of salt
		Fisheries bottles, canned, other aquatic food
3	Material and services supply	Ice making, rope, net
		Heavy oil, steel ship, ship repair, other communication services

Source :- (Park,2014)

5.7   South Korea

South Korea has no official agency in charge of accounting for the ocean economy. It has been estimated through individual attempts, and different estimates have used different classification systems. For example, Kwak et al. (2005) have used 5 divisions, namely shipping, ports, fisheries, ship building, and other marine sectors. Shin and Yoo (2009) have also classified it into 5 sectors, which are marine transportation, harbor, fisheries and marine products, shipbuilding, and other marine sectors. Hwang et al. (2011) whose work is regarded as a representative research, was entirely dedicated to estimation of the total production of ocean industries in South Korea. They have divided the ocean industry into 3 sectors.

1) **Marine-based industries**: - It consists of 5 industries, such as fisheries, marine mining, ocean renewable energy, marine construction and shipping etc.
2) **The forward marine-related industries**: - The activities that support the marine based industry as an input. It includes 5 sectors, i.e. marine equipment and materials industry, ship and offshore plant building, marine technical services, marine research and development and marine public administration and education.
3) **The backward marine related industries**:-The activities that use outputs from the ocean. It includes 4 activities, which are seafood processing, marine bio industry, port and marine tourism and leisure.

Offshore plant building is also included in Korea's ocean economy which is the major point in this country. They classify marine technical services also in ocean industry. Table 9 presents the detailed classification as per Hwang et al. (2011).

Table 9: Classification of the Ocean Economy in South Korea

Sr. No.	Sectors	Categories
Marine-based industry		
1	Fisheries	Capture fisheries, aquaculture, fisheries related services
2	Marine mining	Oil and gas, sands and gravels, seabed mining, salt
3	Ocean renewable energy	Tidal, offshore wind power, offshore cables
4	Marine construction	Harbour development, coastal works against erosion and flooding, cables and bridge
5	Shipping industry	Marine passenger and freight transportation, shipping related services
Marine associated industry(Forward)		
6	Marine equipment and materials industry	Marine equipment manufacture
7	Ship and offshore plant building industry	Ship, boat, offshore plant building and repair
8	Marine technical services	Engineering, investigation, certification, analysis
9	Marine research and development	R&D
10	Marine public administration and education	Marine public administration, navy, coast guard, marine education and training
Marine related industry (Backward)		
11	Seafood processing	Seafood processing, transportation, sale
12	Marine bio industry	Marine bio food, drugs
132	Port industry	Stevedoring, frozen and chilled warehouse, port related services
14	Marine tourism and leisure industry	Museum, beach, park, hotel

Source :- (Park, 2014), (Attri,2017)

5.8   Mauritius

Ocean is one of the main pillars of the economy of Mauritius which has helped in transforming the country into an "ocean state". Mauritius has a total economic zone of 1.96 million square kilometres, a maritime zone of 2.3 million square kilometres and a continental shelf of 396,000 square kilometres co-managed with the Republic of Seychelles. The government of Mauritius has a dedicated ministry related to marine resources, fisheries, shipping and outer dedication to ocean related activities.

Main opportunities from the Blue Economy in this country include the development in fisheries, aquaculture, energy, transport and trade, tourism and marine biotechnology. The Fisheries Training and Extension Centre (FITEC), invests in training programmes to educate local fishermen in various fields such as fish handling. Investment projects such as good fishing practices, sustainable tourism, cleaner ports and increased aquaculture are a priority. Mauritius adopted a greener approach in the beginning of 2016 whereby "a plastic bag-free Mauritius" was adopted, amending the Environment Protection Regulations at the end of 2015.

The Mauritius Ports Authority (MPA) launched a project named "Tree Planting Month" in December 2016, to make the harbour in the capital city of Port Louis a Greener Harbour. This initiative is

focused towards the "Embellishing and Greening Mauritius, Africa and Planet Earth" Campaign of the Ministry of Environment, Sustainable Development, and Disaster and Beach Management. Table 10 shows the classification of the Blue Economy in Mauritius.

Table 10: Classification of the Blue Economy in Mauritius

Sr. No.	Sectors	Categories
1	Fisheries	Seafood processing, aquaculture
2	Seabed exploration	Hydrocarbons, minerals
3	Marine services	Transport, shipping
4	Deep Ocean Water Application (DOWA)	Sale and production of green cooling and production technologies, seaweed culture, agrochemicals and cosmetic, pharmaceutical products

Source: (Attri, 2017)

Deep Ocean Water Application (DOWA) is aimed at procuring valuable resources through the deep-sea waters by making use of the coldness and nutrient rich properties to develop commercial activities which can be classified as upstream and downstream. Upstream refers to the extraction of deep-sea water for the sale and production of green cooling and production technologies. Downstream activities include exceptional aquaculture developments such as seaweed culture, agrochemicals & cosmetic and pharmaceutical products. There are currently two DOWA projects in Mauritius based near the airport and port.

5.9   South Africa

To harness the Blue Economy, South Africa launched "Operation Phakisa" in 2014, identifying four key sectors for developing Blue Economy as new growth sources. These ocean-driven activities are: transport and manufacturing, offshore oil and gas, aquaculture, and protection and governance. The high importance of this initiative is evident from the fact that the office of the President works as a special purpose vehicle for implementation and coordination. The thrust activities include: developing new and more sustainable capacities for storage and warehousing, shipbuilding and repairs, rig repairs and modernization, boats, aquaculture linked fish processing and marketing, creation of enabling environment for boosting offshore gas and oil sector and addressing the legislative and skill gaps in a comprehensive manner. Operation Phakisa is a priority and its progress is monitored at the top level. Given Indian capacities in all the identified sectors, experience of working in South Africa and availability of concessional credits should open attractive opportunities for Indian business in ship and boat building, food processing, and training capacity building. Table 11 shows the classification of the Blue Economy in South Africa.

Table 11: Classification of the Blue Economy in South Africa

Sr. No.	Sector	Sub Sector
1	Martine Transport and Manufacturing	Coastal shipping, trans-shipment, boat building, repair refurbishment
2	Offshore	Oil and gas exploitation
3	Aquaculture	Aquaculture
4	Marine Services	Marine protection services and ocean governance

5.10 New Zealand

The marine economy is a function of both industry and geography. It is the sum of the economic activities that take place in, or use, the marine environment, or produce goods and services necessary for those activities, and make a direct contribution to the national economy.

New Zealand's Marine Economy: 1997–2002 Report (2006) identifies nine broad categories of direct activities that take place within the marine economy. Table 12 shows the classification of marine economy in detail.

Table 12: Classification of Marine Economy in New Zealand

Sr. No.	Sector	Sub sector
1	Offshore Minerals	Oil & natural gas extraction, oil shale mining, petroleum gas extraction
2	Fisheries & Aquaculture	Rock lobster & crab, potting, saltwater, crayfish fishing, pawn fishing, offshore aquaculture, caged aquaculture, seafood processing, fish & seafood wholesaling
3	Shipping	Shipbuilding & repair service, boatbuilding, water, freight transport, water passenger transport, stevedoring service, port & water transport terminal operation
4	Marine Tourism & Recreation	Marine equipment retailing, boat retailing, boat trailer retailing
5	Marine service	Navigation service, Pilot age service, Salvage service, Water vessel towing service
6	Government & Defence	Defence Service
7	Marine Construction	Construction of Wharves & port facilities, coastal defence & restoration
8	Marine Manufacturing	Medicines & health products
9	Research & Education	Research & Development, education relevant to marine environment

The foregoing country specific analysis of classification of the Blue Economy makes it clear that the scope of the ocean economy is considerably different among each country. It is observed that the number of categories in the Blue Economy ranges from 6 sectors in the case of the USA to 33 categories in the case of Japan. This results in different classification sectors and categories among countries. In other words, one industry in one country is divided into several industries in another country and it

happens in the opposite direction as well. Also, some industries may be excluded from the ocean economy in one country and not in another. This lack of uniform classification limits our attempts to make any meaningful inter-country comparison related to the Blue Economy.

6. Conclusion

On the basis of the above analysis, the following conclusion can be inferred:

- Lack of consensus on definition of Blue Economy as well as standardized classification of sectors/industries related with Blue Economy may remain an issue even in the next decade. Complexity of Blue Economy in terms of space and place; scale and connection, proximity and distance, governance and power relations need to be understood and evolved.

- The best practices of Blue Economy in EU, USA and China etc. do indicate the linking of ocean governance and maritime security in order to make Blue Economy driven for development and growth. The effective sustainable ocean management is a necessary condition for Sustainable Blue Economy.

- The classification of Blue Economy is likely to remain country specific though there may be a possibility of region-specific standard classification in future.

- There is a great scope for future research in the area of conceptualisation of the Blue Economy in terms of its definition and standard classification.

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IORA Events Gallery

Arrival of the IORA Secretary General H.E Dr Nomvuyo N. Nokwe at the IORA High Level Panel on Enhancing Maritime Cooperation for Inclusive Growth in Indian Ocean Region, 7-8 December 2018, Bali Indonesia

IORA High Level Panel on Enhancing Maritime Cooperation for Inclusive Growth in Indian Ocean Region, 7-8 December 2018, Bali Indonesia

IORA Workshop on Financial Inclusion for Women Entrepreneurs, 10-11 December 2018, Abu Dhabi, UAE

Meeting of IORA Cluster Group on Disaster Risk Management, 5-6 February 2019, New Delhi, India

Second IORA Familiarization Visit for Media Practitioners and Journalists from IORA Member States, 8-12 April 2019, Pretoria & Durban, South Africa

First IORA Strategic Planning Workshop, 9-10 April 2019, Flic-en-Flac, Mauritius

Second Workshop on the Institutional Strengthening of the IORA Secretariat, 11 April 2019, Flic-en-Flac, Mauritius

IORA Training on Sustainable Development for Ports and Shipping in the Indian Ocean for Maritime Connectivity, 22-26 April 2019, Maritime Institute of Malaysia (MIMA), Malaysia

IORA Workshop on Improving Knowledge for Research on Blue Carbon in the Western Indian Ocean: Focus on Seagrass and Mangrove Ecosystems, 29 April – 4 May 2019, Toliara, Madagascar

Modernising Trade in the Indian Ocean Rim Conference, 17-18 June 2019, Durban, South Africa

Ninth Bi-annual Meeting of the Committee of Senior Officials (CSO), 19-20 June 2019, Durban, South Africa

Ninth Bi-annual Meeting of the Committee of Senior Officials (CSO), 19-20 June 2019, Durban, South Africa

Troika Visit to the IORA Secretariat, 5-6 August 2019, Ebene, Mauritius

Troika Visit to the IORA Secretariat, 5-6 August 2019, Ebene, Mauritius

First Meeting of the IORA Maritime Safety and Security Working Group, 8-9 August 2019, Colombo, Sri Lanka

Delhi Process V South South and triangular Cooperation: Exploring New Opportunities and New Partnerships, 22-23 August 2019, New Delhi, India

Delhi Process V South South and triangular Cooperation: Exploring New Opportunities and New Partnerships, 22-23 August 2019, New Delhi, India

Delhi Process V South South and triangular Cooperation: Exploring New Opportunities and New Partnerships, 22-23 August 2019, New Delhi, India

Delhi Process V South South and triangular Cooperation: Exploring New Opportunities and New Partnerships, 22-23 August 2019, New Delhi, India

Professor V.N Attri sharing his views during the Delhi Process V South South and triangular Cooperation: Exploring New Opportunities and New Partnerships, 22-23 August 2019, New Delhi, India

Senior Officials gathered The 3rd IORA Blue Economy Ministerial Conference (BEC-III) on "Promoting Sustainable Blue Economy- making the best use of opportunities from the Indian Ocean", 4-5 September 2019, Dhaka, Bangladesh

The 3rd IORA Blue Economy Ministerial Conference (BEC-III) on "Promoting Sustainable Blue Economy- making the best use of opportunities from the Indian Ocean", 4-5 September 2019, Dhaka, Bangladesh

Prime Minister of the People's Republic of Bangladesh, H.E Sheikh Hasina with IORA Secretary General, H.E Dr Nomvuyo N. Nokwe at BEC-III

Tsunami Early Warning Systems - Lessons-learnt from the 2018 Tsunamis in Indonesia 26-28th September 2019 Jakarta, Indonesia

THE ROLE OF THE REGIONAL CENTER FOR SCIENCE AND TECHNOLOGY TRANSFER (RCSTT) IN PROMOTING SCIENCE AND TECHNOLOGY (S&T) IN IORA

Dr. Tahereh Miremadi[d]

Abstract

Science, technology and innovation (STI) activities are facing various disruptive forms of change which are namely a continuous deceleration in the growth in productivity even in an era of accelerated technological change; old people experiencing fast rates of ageing; the negative consequences of climate change; the increasing importance of emerging economies on the global landscape. These are drivers which generate both opportunities and challenges for STI and they shape in various ways the activities of STI. They are also very often the agent for the emergence of great societal issues like healthy ageing, clean energy and food security which are key and prominent issues in STI policy agendas. Social innovation and policy reforms if blended with well-controlled and managed use of science and technological advances, can provide great opportunities to address effectively some of these challenging issues.[4] The objective of this paper is to assess the role of the Regional Centre for Science and Technology Transfer (RCSTT) in promoting Science & Technology (S&T) in IORA. To what extent it has led to the capacity building in in S&T as well as promote science-based policy frame in Indian Ocean Region (IOR). The paper has been divided in 4 sections. Section I, the introduction, present a short history of the establishment of the RCSTT. Section II explores the ways to build a regional innovation system. In Section III, an appraisal of current status of innovation rates in the Indian Ocean Rim region was developed, and finally Section IV provides the conclusion.

Keywords: IORA-RCSTT, Regional Innovation System, STI policy, Technology Transfer, Coordination Centres.

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1.   Introduction; Establishment of IORA-RCSTT:

The IORA RCSTT was established on 28 October 2008 and is a specialized Agency of IORA based in Tehran, the Islamic Republic of Iran. IORA-RCSTT plays an important. Its role in enhancing cooperation within the science and technology priority area of the Association and its activities include implementing human resource development programs, supporting the development of new technologies and trying to enhance joint cooperation and transfer of technology among IORA Member States. It was mandated to connect the Member States by knowledge sharing and technology diffusion in order to shift technological divide and to reduce the disparity in terms economic growth and social welfare among the region.

In the occasion of its decennial anniversary, RCSTT established a Policy Research Unit to evaluate the past ten years of the activities of the Centre. The study answered two distinguished questions; what the past path is it has pursuit and what is the preferred path ahead.

Answering the first question; the study illustrated that the Centre as an evolving organization surpassed three phases, from 2008-2010, the primitive phase which its activities contained mostly workshops and capacity building events, the second phase, during 2011-2015, was the phase of networking and clustering. In this phase the web-based network in medicinal plant was started. The third phase from 2015- up till now. The characteristic trait of this phase is institutionalization which means establishing coordinating centres under the aegis of different Member States. During the last phase, RCSTT was succeeded to sign three MOU with three centres of excellence in three countries of China, India and South Africa and is in the course of establishing the fourth in Germany. The details are a. The Institute of Seawater Desalination and Multipurpose Utilization (ISDMU) of the State Oceanic Administration (SOA) of the People's Republic of China on technical cooperation, technology transfer and commercialization. (The MOU focuses on desalination technologies.) b. The Council of Scientific and Industrial Research, Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), a research institute with its headquarters in Lucknow, India. And C. The WRC of South Africa in Water and Sanitation innovation.

The evaluation report shows a strong mark for the Centre which has acquired strengths and gradually gained momentum in building regional institutions, adding more integrity to the region which diversity is its strong feature.

RCSTT's Path of Institutional Building towards a Regionalized Innovation system:
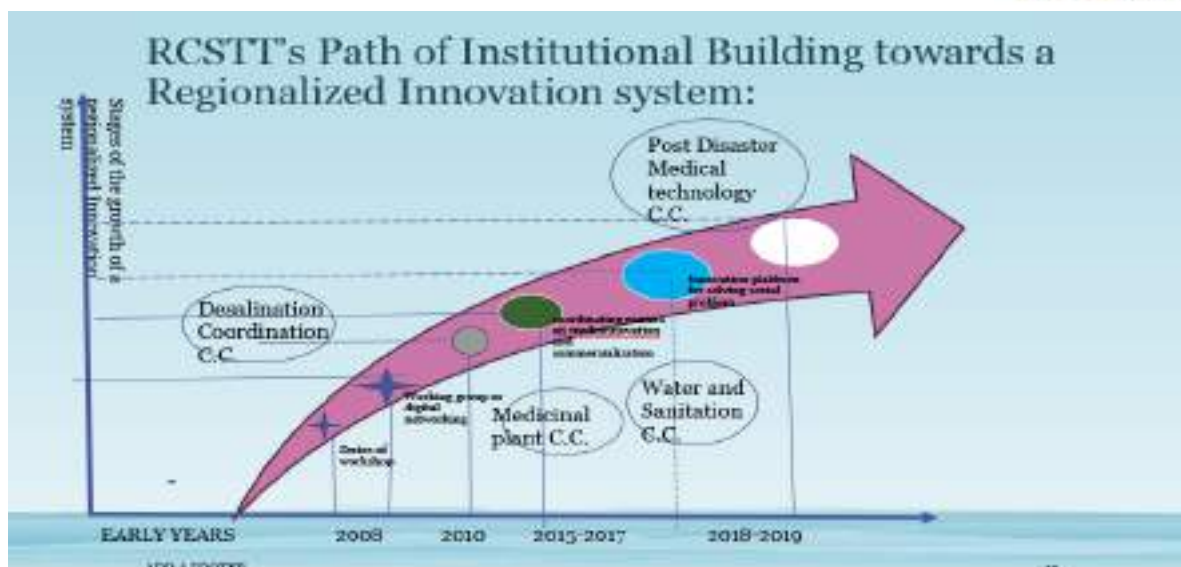
To attain the second answer regarding its preferred future, the report looked into the mandates (mission and functions) of RCSTT enshrined in its founding MOU between IORA secretariat and the Government of Iran. Then, it came up with a table with eleven missions, each consisting with different functions; for example, the first mission is supporting technology transfer, development and management. The tools the Center has in hand were holding conferences, workshops. This objective was reached by more than 40 events during these 10 years. The second mission was supporting the formulating of a strategic development plan for technology enhancement. The function would be designing strategic planning and roadmaps for Member States.

	Mission	Indicators	Past performance
1	Supporting technology transfer, development and management;	Holding conferences, capacity building workshops, network and establishing coordination centre.	100%
2	Supporting the formulation of a strategic development plan for technology enhancement.	Design and devise strategic planning for Member States	0%
3	Assisting for acquisition, dissemination, assimilation and generation of new technologies;	Technology platforms to optimizing discovery and transfer iterations	10%
4	Promoting commercialization of technology and competitiveness;	anchor the technological development in the local economy, endeavouring to couple it to an industrial dynamic	10%

5	Supporting technology business mission;	Designing technological and innovation platforms-research on Intellectual property rights-commercialization	10%
6	Carrying out related analytical research on technology policy,	Annual report –analytical note-research paper	0%
7	Marketing opportunities, and possible joint venture among the Member States;		0%
8	Providing advisory services;	Consultancy Contracts	0%
9	Disseminating information and good practices;	Conferences- Seminars-Annual reports	100%
10	Networking among key stakeholders;	Workshops-Networks-Coordination centre	100%
11	Providing training to senior officials and policy makers.	Workshops-planning to exchange researcher, faculties	100%

At the end, the evolution report illustrated a mix results regarding the performance of the Centre against its mandate. Some of its missions and functions gained high marks while others were weak or absent. The Centre has come very strong regarding its functions of holding conferences, training courses and establishing coordinating centres etc. Yet, the other missions like carrying out related analytical research on technology policy and providing advisory services were almost absent at least in the official form in the calendar of the activities of RCSTT.

2. Building a Regional Innovation System:

The unbalanced performance of the Centre's activities shows the evolving the RCSTT has passed different phases of infancy and early growth as the result of hard works of a dedicated teamwork, yet, approaching to its second decade of its existence, the pursuit of the same path sounds inappropriate.

The Centre has to be prepared to step out from its infancy into another phase during which it can fulfil other functions.

To this end, the Policy Research Unit was tasked to explore different theoretical and applied frameworks upon which the Centre can be provided with its possible future vision and the roadmap.

Accordingly, the Policy Research Unit provided a preliminary Foresight report. In fact, according to funding MOU, the preferred future of RCSTT is a scenario in which this Centre focuses more balanced way on all its objectives and missions. Addressing the weakness of the Centre in fulfilling the forgotten objectives, the report attributed this problem to the narrowness definition of the "Technology Transfer". This report explained that the end purpose of national policies is not to achieve successful transfer of technology per se, but to support a process of innovation that creates values – most often economic values, but also social values – through the successful application of technology to productive activities or social endeavours", that is why the Centre should focus not only on the effectiveness of various

channels of transfer of technology but also on the policies that Member States may implement to ensure that technology transfer contributes to more effective innovation in their economies. In the light of this recommendation, the Unit was tasked to examine the conceptual interrelations between technology transfer mechanisms and dynamisms and various (national, regional, technological and sectoral) levels of innovation system approach (Lundvall, 1992; Edquist, 2002; Hekkert and Robert van den Hoed 2017; Asheim, 2017 and Coenen, L., Campbell, S., & Wiseman, J. (2018). The final policy advice was the creation of STI Policy networks region wide in order to build a regional innovation system.

In order to build a regional innovation system, we have to define the innovation system first and then know what means regional innovation system. A system of innovation is constituted by elements and relationships which interact in the production, diffusion and use of new knowledge (Lundvall,1992, p. 2). This knowledge is exploited for practical, including commercial use (Cooke,et al. 1997, p. 478). Thus the knowledge created, diffused and used is not always in the form of commercial products or services but can have practical and social effects. More specifically knowledge may take the form of new ideas and concepts, new skills or competencies, or technological and organizational advances.

An innovation system is a social and dynamic system (Lundvall,1992, p.2). The system is social because a central activity in the system, learning, is asocial activity. Innovation in the system involves positive feedback and reproduction which makes it a dynamic system. Thus, innovation is not a linear, but a recursive process and the system is recursive by nature (Hämäläinen & Schienstock, 2001, p. 78). Moreover, in the evolutionary approach, novelty streams from new knowledge. Innovation systems approach can have different levels of analysis, national, regional, sectoral and technological.

The agenda for the theoretical development of the regional innovation system approach has been influenced by different theories. The major contributions to this approach have come from evolutionary, institutional and regional economics, economics of learning, economics of innovation and network theory (Doloreux 2002, p. 244). Regional innovation system is defined by Cooke and Asheim as a theoretical concept and policy objective. The regional innovation system can be considered as supra-national and sub-national scale. In our case, a regional innovation system in the IORA region is a mega –supranational innovation system with a diverse range of innovation performance, economic resiliency, political structures and cultural tradition.

3.   An appraisal of Innovation status in the Indian Ocean Rim region:

In order to have the vision of RCSTT's future and design its roadmap, one should first understand how Member States and Dialogue partners rank in terms of innovation. The below Graphs which are based on the data provided by The Global Innovation Index Report (2018), depict the position of each Member State (blue circles) and Dialogue Partners (orange circles) in terms of innovation index ranking. According to the Global Innovation Index report (2018), in the below, one can see the position of each Member States (Blue Circles) and Dialogue partner innovation ranking and the gap among them. The size of circles indicates the size of population. According to this data, national innovation scores in the region are quite diverse: we have Singapore with the 5th and Yemen with the 122nd rankings among Member States of IORA. However, there are some distinct patterns: the first pattern is the direct relationship between the innovation index score of each country and the GDP per capita in terms of PPP. The second visible pattern is the gap existing between Member States and Dialogue partners' rankings with some

exceptions (Singapore and Australia, among Member States and Egypt among Dialogue Partners). This pattern illustrates the technological divide and consequently, the welfare divide among the nations in the region and beyond the region. These two patterns highlighted the importance of technology transfer among Member States and the Dialogue Partners as a powerful to reduce the technological gap among and beyond the region. IORA-RCSTT aims to play the role of connecting agent to facilitate exchanging knowledge, sharing information and diffusing technology in order to increase homogeneity of this regional innovation system. It also aims to manage capacity building and empowerment of Member States in order to facilitate knowledge flow from Dialogue Partners' highly sophisticated universities, firms, infrastructures and governmental bodies to Member States with weak absorptive capacity.

In this way, IORA-RCSTT hopes to increase the institutional thickness (Chaminade, 2012) of the regionalized innovation system of IORA region by establishing working groups, digital networking, coordination centres, technological innovation platforms and linking businesses, universities and government bodies RCSTT has been mandated to strengthen the regional technology and innovation agenda through the roles of a think tank, policy adviser and convener. In this current year which marks its decennial anniversary, RCSTT finds itself achieving three milestones; organizing capacity building events such as workshops and building digital networking and the third; establishing coordinating centres for S&T transfer and innovations.

In below, the paper presents seven graphs each shows an aspect of innovation system according to its functions (Alkemade, F., Hekkert, M. P., & Negro, S. O., 2011; Bergek, 2008) and based on Global Innovation index in 2018. The aspects are 1-institutions, infrastructure, human capital, knowledge output, market sophistication, business sophistication and creative output. The overall result shows a huge gap between the dialogue partners and the Member States and among the member States themselves. This innovation divide implies the opportunity for learning and transfer of knowledge and technology among the members and dialogue partners.

That is possible only if a conscious effort would be made to incentivize this knowledge transfer and spill-over.

Graph 1: The positions of member States and Dialogue Partners in terms of "institutions"

Source: Author based on the statistics of Global Innovation Index (2018)
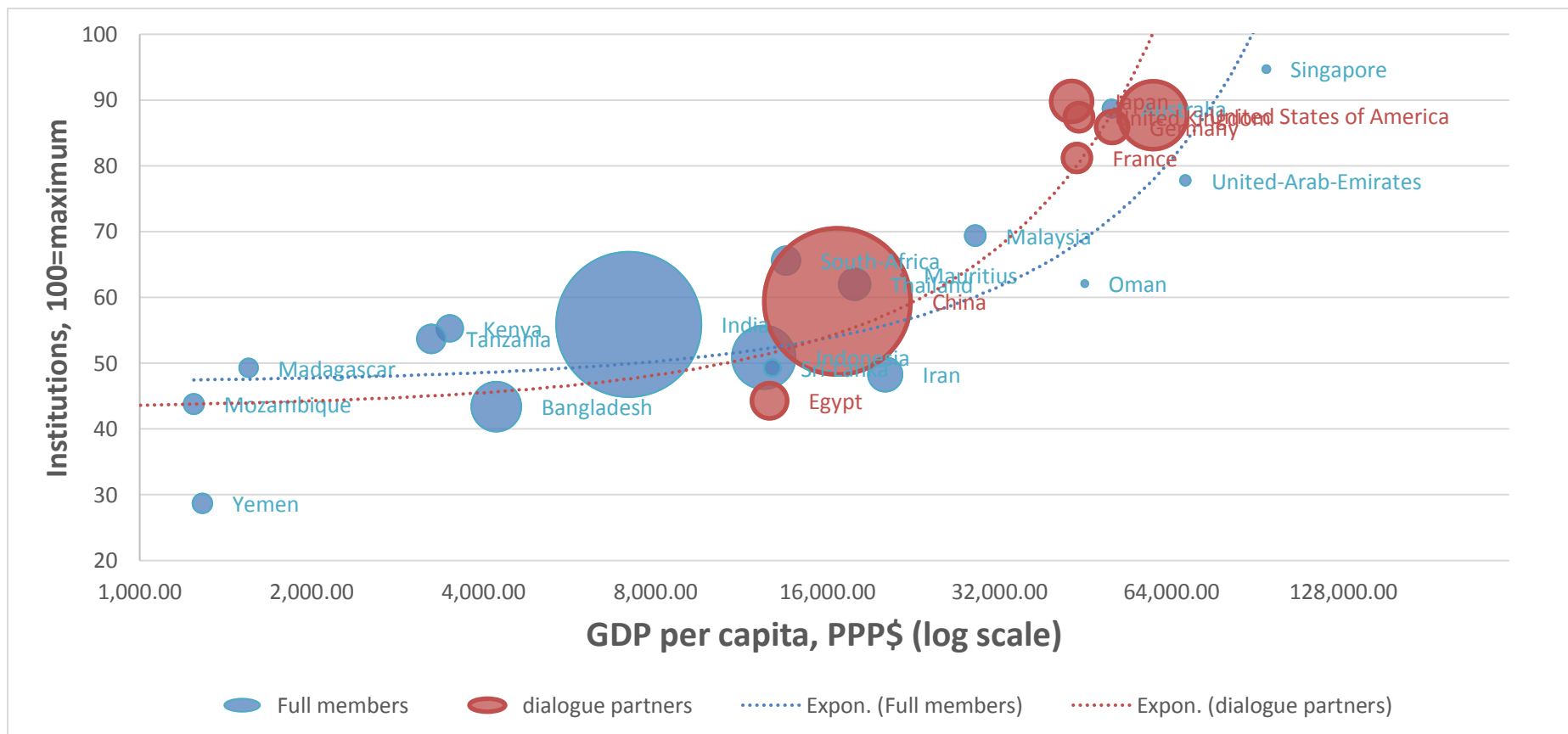
Graph 2: The positions of IORA Member States and Dialogue Partners in terms of their human capital

Source: Author's based on the data presented in Global Innovation Index (2018)
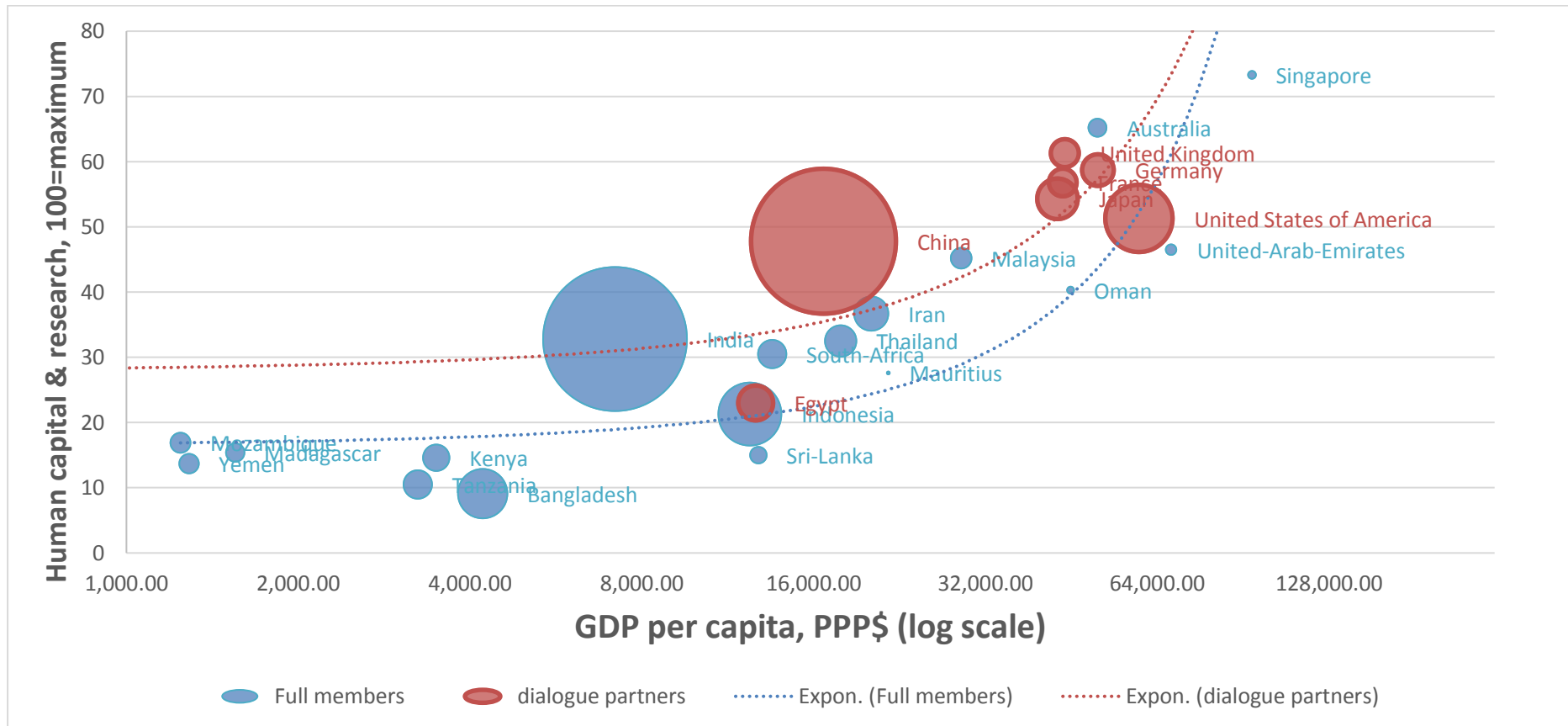
Graph 3: The positions of IORA Member States and Dialogue Partners in terms of their Infrastructures

Source: Author's illustration based on the data presented in Global Innovation Index (2018)
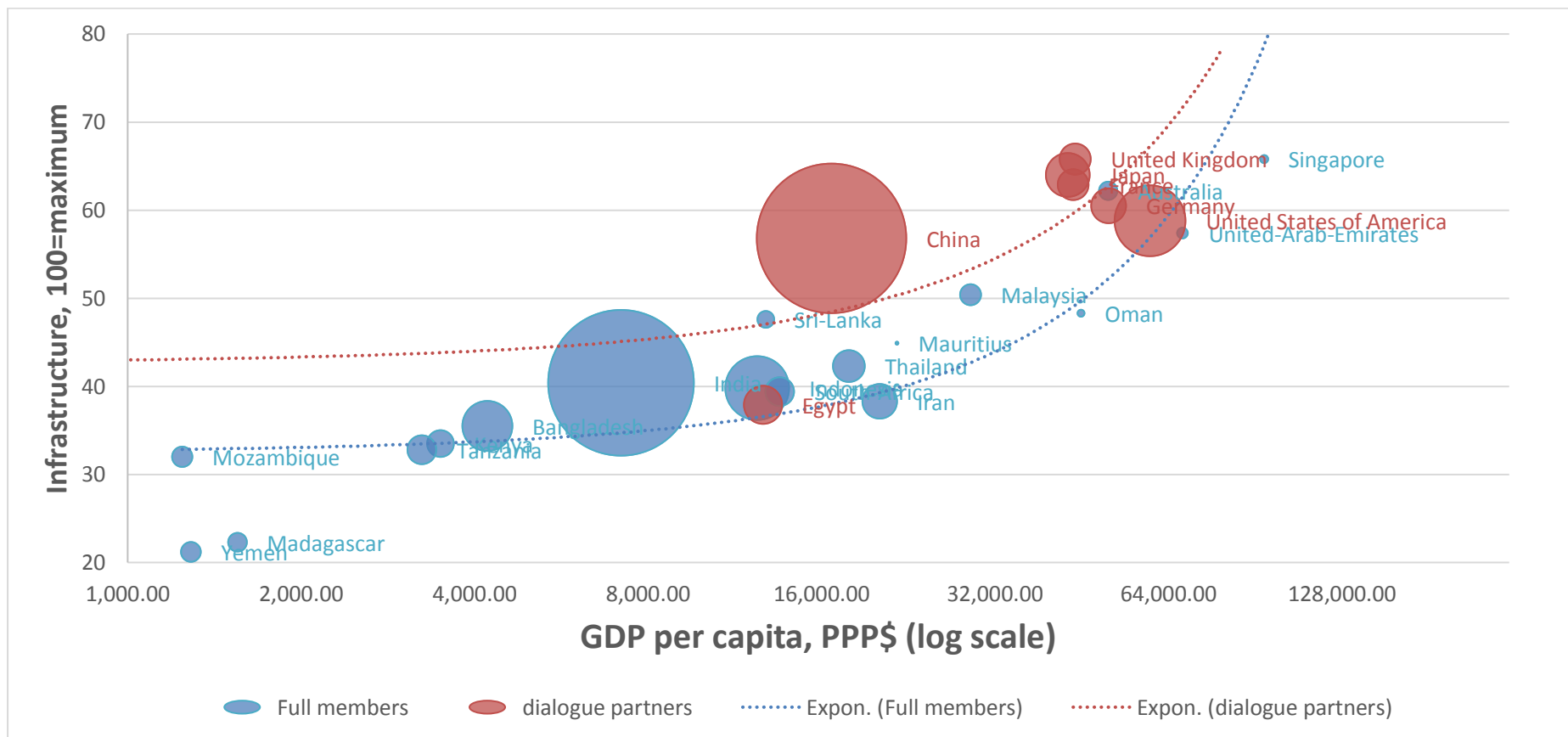
Graph 4: The positions of IORA Member States and Dialogue Partners in terms of their market sophistication

Source: Author's illustration based on the data presented in Global Innovation Index (2018)

Graph 5: The positions of IORA Member States and Dialogue Partners in terms of their business sophistication

Author's illustration based on the data presented in Global Innovation Index (2018)

Graph 6: The positions of IORA Member States and Dialogue Partners in terms of their technology outputs

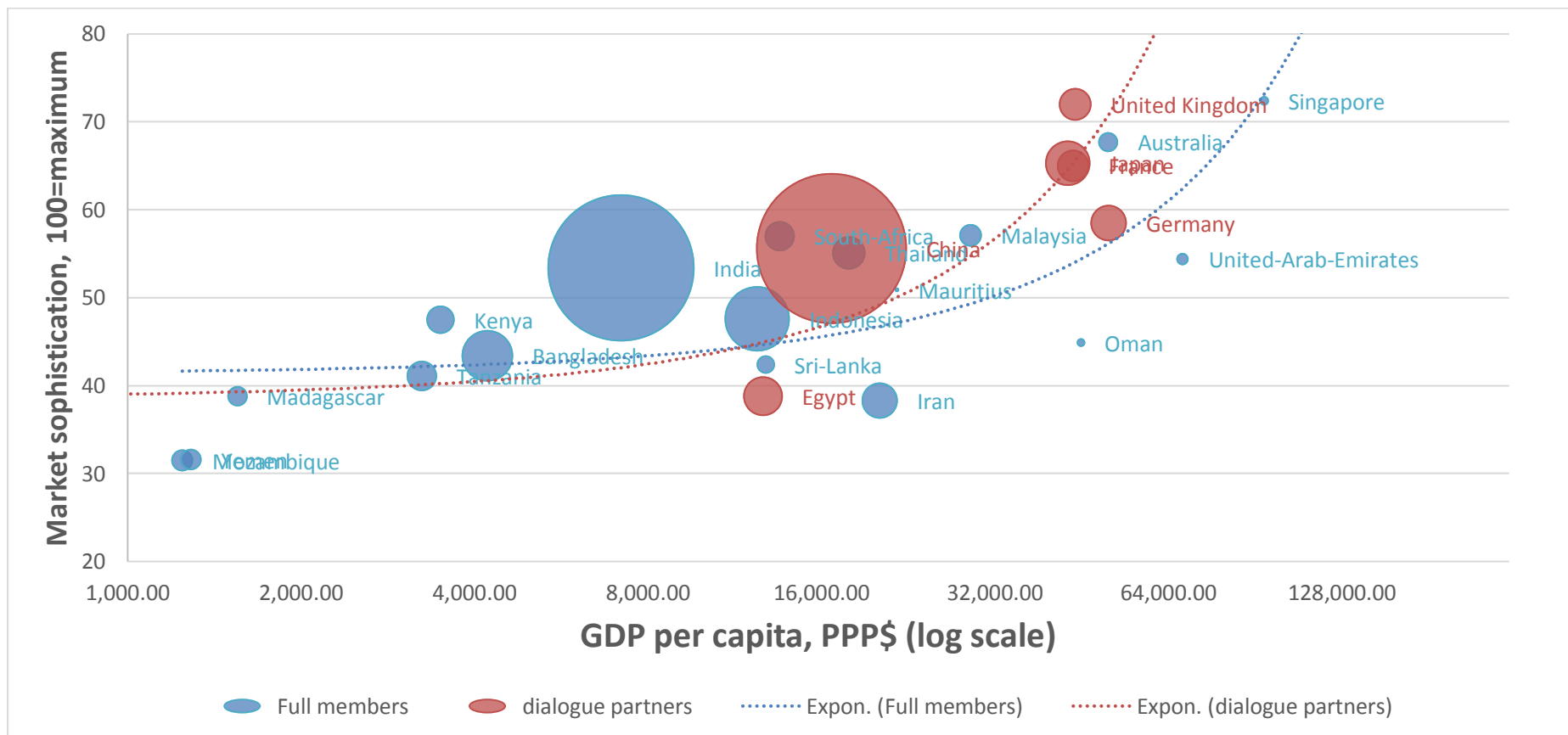Source: Author's illustration based on the data presented in Global Innovation Index (2018)

Graph 7: The positions of IORA Member States and Dialogue Partners in terms of their creative outputs

Source: Author's illustration is based on the data presented in Global Innovation Index (2018)
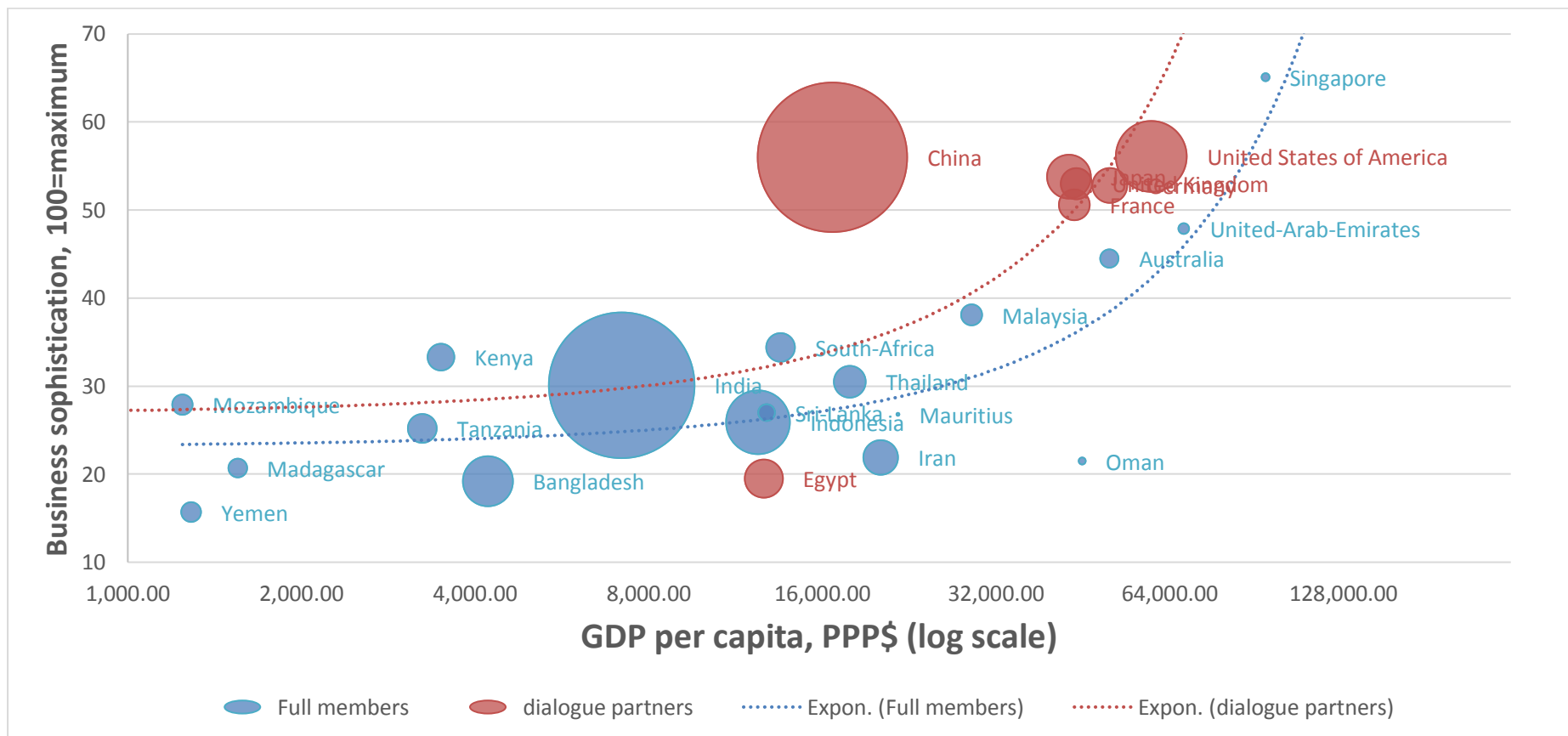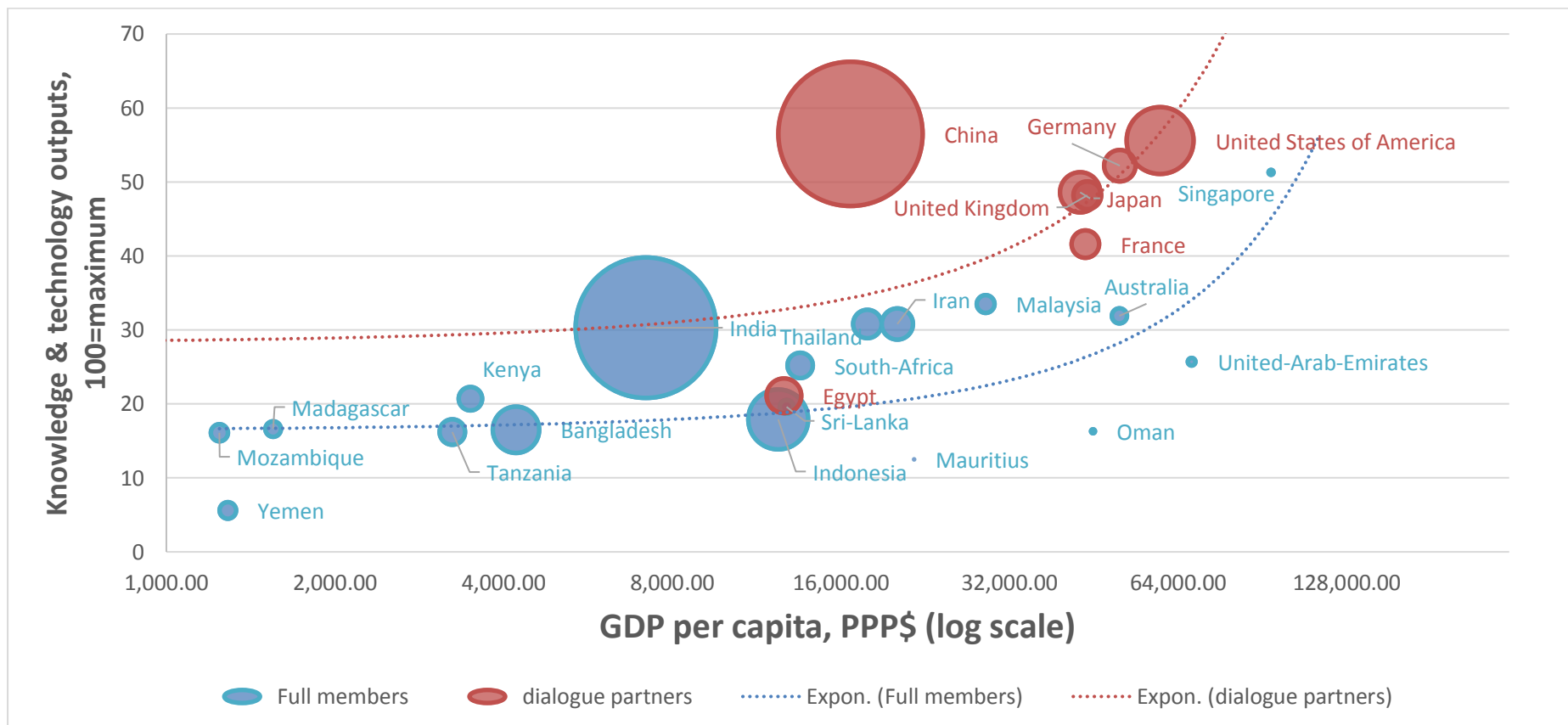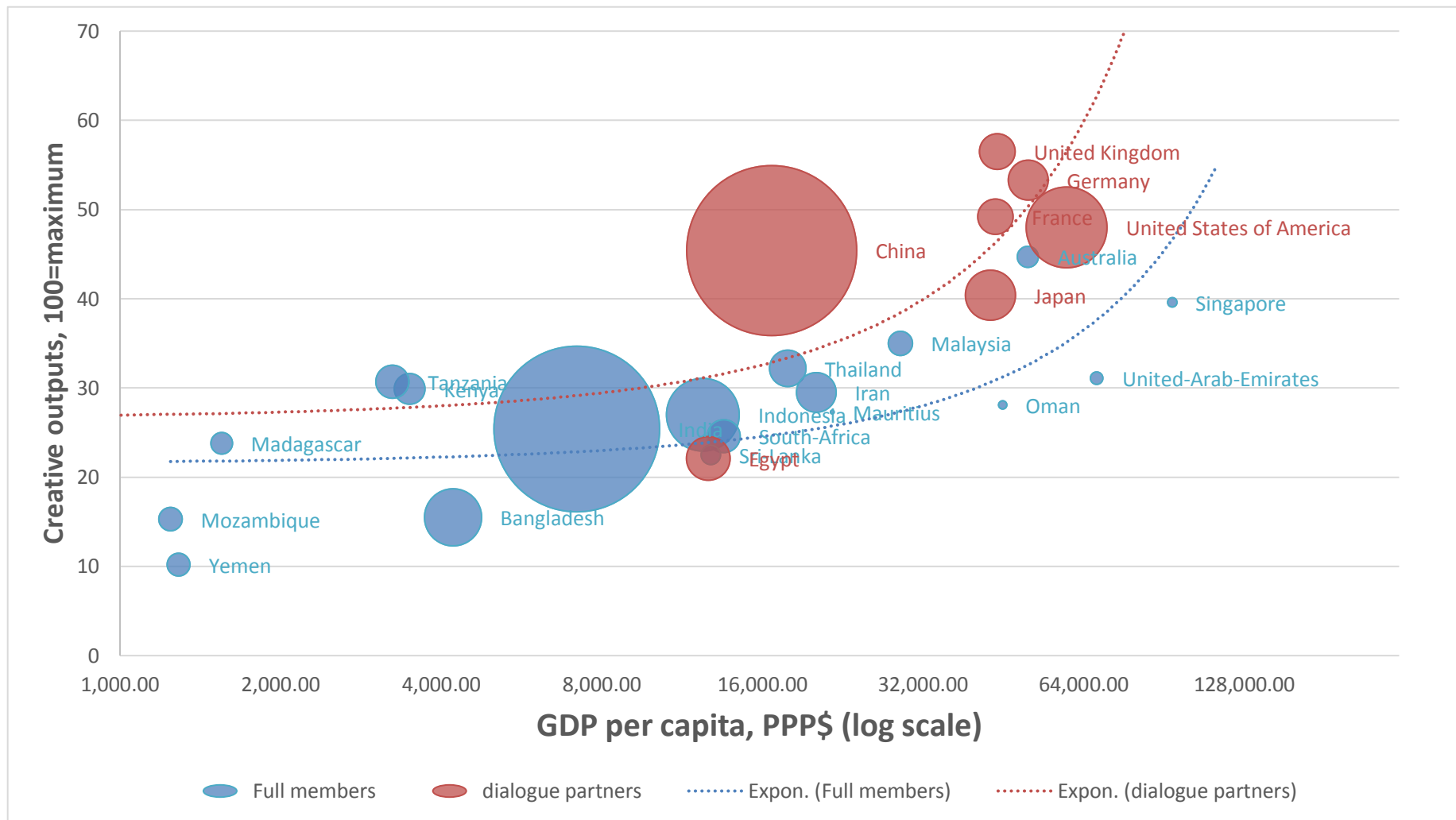
4.   Conclusion: The way ahead,

On the threshold of starting new decade, RCSTT presents a new vehicle for collective learning region wide in the form of STI Policy Studies, a regional research and training network supporting policy research to leverage science, technology and innovation as powerful engines for sustainable development. RCSTT hopes this new initiative functions as an innovation policy hub and bridges all the research centres and higher education institute together. That hopefully, will facilitate building a platform for collective learning and co-creating a regionalized innovation system supporting the Member States in their efforts to harness technology and innovation in pursuit of the Sustainable Development Goals.

This network will bring together leading academics from around the region to produce research, to hold conferences and disseminate knowledge on how to devise science and technology policies for social and economic good and how best to reduce the risks and concerns of grand environmental challenge such as global warming. It will also be a forum for these academics to discuss their research with government, civil society and the private sector at the regional level to serve better the global innovation network (Howells, J. 2019).

It is aimed to build a collective partnership sharing best practices in technology transfer policies and identifying innovative solutions for sustainable development and blue economy. This partnership builds on STI Policy Network which is basically a regional research and training network supporting policy research to leverage science, technology and innovation as powerful engines for sustainable development in IORA region. "The partnership will focus on developing cutting-edge research and policy advice on Science, technology and innovation policy for sustainable development".

The IORA-RCSTT calls for researchers, private sector actors, policymakers and the civil society to improve the understanding and functioning of science, technology and innovation (STI) processes and systems to strengthen the learning capacity, social responses, and governance of STI for addressing IORA different development challenges, with a specific focus on the Millennium Development Goals (MDG), especially water and sanitation, food security and women empowerment in ST fields.

This focus is designed to build capabilities, structures and conditions for the co-creation and co-evaluation of policies for sustainable development. Foresight and visioning for future in the IORA region by building capabilities and structures and conducting collaborative scientific knowledge and STI policy research programs, addressing specific policy priorities in the identified research themes; including energy systems, food security, water and sanitation, women empowerment in ST fields.

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BIOACTIVE POTENTIAL OF *TURBO BRUNNEUS*, COLLECTED FROM MUMBAI COAST, INDIA

Teena D. George, Atul G. Babar, Balasaheb G. Kulkarni[e]

Abstract

Objective: To identify the bioactive potential of crude acetonic extract of *Turbo brunneus* collected from the west coast of India (Mumbai coast). **Methods**: Disc diffusion assay was used to test the bioactive potential of the mollusc against five pathogenic bacteria. GC-MS carried out to find about the various constituents of the crude extract. **Results**: The crude acetonic extract of the mollusc showed significant activity against one or more bacteria tested. Minimum inhibitory concentration of crude acetonic extract was found in the range of 0.20–0.40 mg/mL against human pathogenic bacterial strains. Acetonic extract showed strong and maximum activity against *E.coli, S. typhi* and *K. Pneumonia*. GC-MS results showed fifteen peaks indicating the presence of fourteen compounds. **Conclusion**s: Mollusc *Turbo brunneus* screened exhibited potential activity against one or more bacterial strain. Further work is in progress to isolate the active constituents of the extracts.

[e]Teena D. George*, Atul G. Babar, Balasaheb G. Kulkarni are in the Department of Zoology, The Institute of Science, 15 Madame Cama Road, Mumbai- 400032, Maharashtra, India

1. Introduction

The ocean is the powerhouse of diverse unique chemical compounds commonly known as Natural Products (NP), which holds tremendous pharmaceutical potential. Many studies have been conducted on the potential of these compounds. (Fattorusso et al 2012). As marine organisms thrive in various niche of varied ecological parameters, they develop certain adaptive   mechanisms which help them to sustain well in marine environment.   Secretion of bioactive metabolites by intertidal invertebrates   is one to the adaptations, which is used as weapons by them against predators. A number of biologically active compounds with varying degrees of action, such as anti-tumour, anti-cancer, anti-microtubule, anti-proliferative, cytotoxic, as well as antibiotic and antifouling properties, have been isolated to date from marine sources. It is globally accepted that natural products play a crucial role in drug discovery.

Most of these studies have restricted to sponges and other soft-bodied organisms for the search of bioactive compounds. The emergence of antibiotic resistant microbial strains with each passing day is becoming a concern. This, coupled with a swarm of newer diseases entering into the environment, there is urgent need to search for newer and better avenues as far as isolation of bioactive compounds is concerned (Baker and Satish, 2012). Therefore, in need of finding newer and novel compounds have pushed scientists all over the world towards other phyla which have great bio- potential. One such phylum is Mollusca.

The majority of research on natural products from Mollusca has been focused on primarily soft bodied or shell-less molluscs, particularly nudibranchs and opisthobranchs (Karuso, 1987; Faulkner, 1992). However, studies have reported biological activity from shelled molluscs (Kumaran et al. 2011, Babar et al 2014) contrary to the general assumption that presence of a shell provides all the required protection from predation (Faulkner, 1992). Antimicrobial potential of gastropods commonly found on Indian coast have been reported   (Anand et al 1997,Ramasamy et al., 2011; Vimala, 2012; Kiran et al., 2014). In spite of coastal pollution in and around Mumbai, it boasts high diversity of molluscs, especially gastropods. (Kulkarni et al 2017) Therefore, it is rational to search for novel antimicrobial agents in these gastropods, as these benthos survive amidst high density of microorganisms. During present investigation the acetonic extract of *Turbo brunneus* (Roding) which available moderately at some part of intertidal areas in Mumbai was screened for bioactivity against clinical isolates of five bacteria. The crude acetonic extract was also analysed by Gas Chromatogram – Mass Spectroscopy (GC-MS).

2. Materials and Methods

2.1 Sampling

Turbo brunneus (Roding) were collected manually during low tide at the shore located   near Tata Institute of Fundamental Research of South Mumbai.   The samples were brought to the laboratory and immediately frozen at -20^0. The shell was cracked open using a hammer; whole body of all the animals was removed and subsequently washed with distilled water to remove any attached debris.

2.2. Extract preparation

The whole-body tissue sample was chopped and soaked in 100% acetone for a minimum of 24 hrs. The supernatant was then filtered and concentrated under vacuum on a Rotary Evaporator at low temperature

and reduced pressure to get crude acetonic extract. This procedure was repeated two more times to get the maximum yield.

2.3 Antibacterial Assay

Antimicrobial activity of each extract was tested against five bacterial strains viz. *Escherichia coli*, *Klebsiella pneumoniae*, *Bacillus subtilis*, *Salmonella typhi* and *Proteus mirabillis.* Antimicrobial activity testing was carried out using standard agar disc-diffusion assays (El-Masry et al., 2000). Each microorganism was inoculated on the surface of a nutrient agar plate at a concentration of $1.2 \times 10^8 – 1.5 \times 10^8$ CFU/ml using a sterile glass spreader. Previously sterilized Whatman No. 1 filter paper discs (6 mm in diameter) were impregnated with 0.5 mg/ml solution of each crude extract and were placed on the surface of inoculated plate. Disc of Streptomycin of concentration 0.1 mg/ml were used as positive control. The plates were incubated at 37 °C for 24 hours. All the assays were carried out in triplicates. The bioactivity of the extracts was measured by calculating the diameter (mm) of the growth inhibition halos. Zones of growth inhibition greater than 7 mm were considered susceptible to crude extracts (Seleghim et al. 2007).

2.4 Minimum Inhibitory Concentration (MIC)

The acetonic extract of *T. brunneus* which showed significant antibacterial activity was selected for the Minimum Inhibitory Concentration (MIC). MIC of crude extract was determined using its serially diluted concentrations (0.05-0.5mg/ml) against each individual microbial strain. About 0.5 mL of each dilution of different concentrations was transferred into a sterile test tube containing 2 mL of nutrient broth. A set of test tubes containing broth alone was used as a control. All the test tubes and control were then incubated at 37 °C for 24 hrs. After the period of incubation, the tube containing the least concentration of extract showing no visible sign of growth was taken as the minimum inhibitory concentration. The end result of the test was the minimum concentration of the gastropod extract which gave clear solution i.e. no visual growth. Streptomycin of concentration ranging from 0.001 - 0.1 mg/ml respectively was used as a positive control and acetone was used as negative control. MIC of Streptomycin was also carried out with respective microbes (Ramasamy et al., 2011).

2.5 GC-MS (Gas Chromatography- Mass Spectroscopy)

GC-MS analysis of the extract was performed using GC SHIMADZU QP 2010 system and gas chromatograph interfaced to a Mass Spectrometer (GC-MS) equipped with Elite-1 fused silica capillary column. For GC-MS detection, an electron ionization energy system with ionization energy of 70eV was used. Helium gas (99.999%) was used as the carrier gas at a constant flow rate of 1.51ml/min and an injection volume of 2 µl was employed (split ratio: 20). The column temperature was maintained initially at 400°C for 3.5 min followed by increase to 600°C at a rate of 50°C/min from 60° to 120°C at a rate of 60°C/min and from 120 to 2300°C. The electron impact energy was 70ev and the ion source temperature was set at 2300°C. Electron impact (EI) Mass spectra were recorded in the range of 10-600 m/z at 1second intervals. Total GC running time was 35 min. The identification of compounds was carried out using GC-MS library National Institute of Standards and Technology (NIST08s) by comparing the spectrum of unknown component with the spectrum of known components stored in the NIST08s.

3. Results

3.1 Antimicrobial Assay

Figure 1 compares the inhibition zones of acetonic extract against each bacterial strain. Distinct antibacterial activity was observed against *E. coli, S. typhi and K. pneumoniae*. Acetonic extract showed strong and maximum activity against *E.coli* with an inhibition zone of 10.67±0.58 mm. Considerable activities were shown against *S. typhi* and *K. Pneumonia* with zone of inhibition of 9.67±0.58 mm and 7.33±1.55 mm observed against the organisms respectively. Positive control, Streptomycin produced inhibition zones of 17 mm, 15 mm and 14 mm, 14 mm and 15mm against *E.coli, S.typhi, K. pneumonia, B. subtilis* and *P. mirabillis* respectively (Figure 1).

Crude acetonic extract demonstrated lowest Minimum Inhibitory Concentration (MIC) value of 0.2 mg/ml against *E. Coli* strain and highest MIC value of 0.4 mg/ml against *B subtillis*. Streptomycin showed lowest MIC value of 0.005 mg/ml against *K. pneumonia* and highest MIC value of 0.08 mg/ml against *P. mirabillis*. For other bacterial pathogens namely; *E.coli, S. typhi and B. subtilis* Streptomycin showed MIC values of 0.008, 0.006, and 0.008 mg/ml respectively.
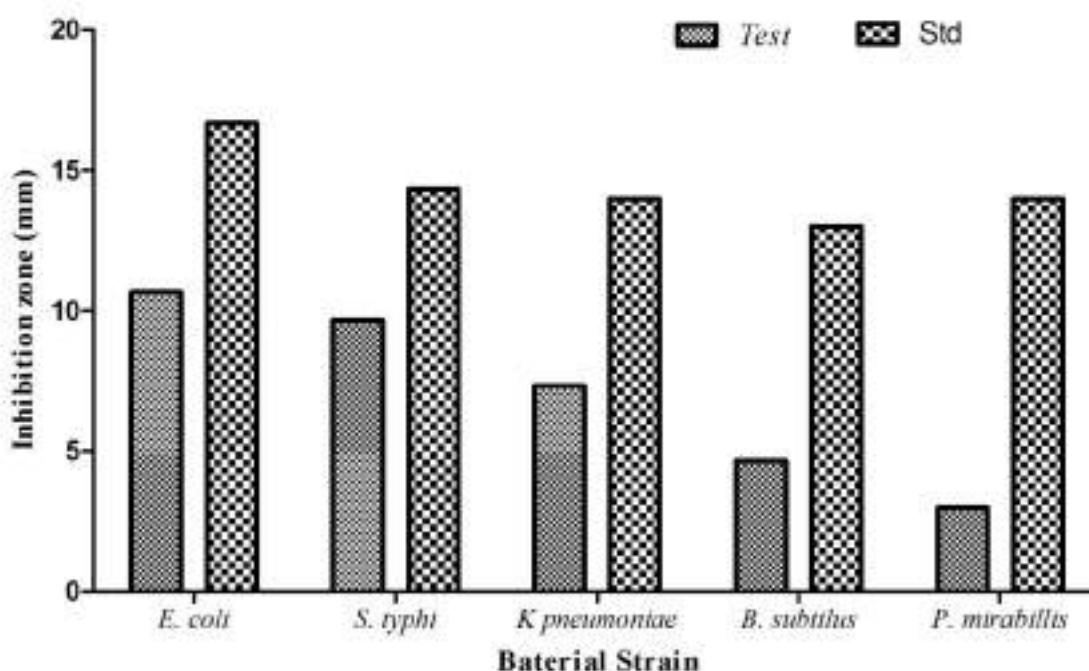

Figure 1: Antibacterial activity of the crude acetonic extract (0.2 mg/ml) compared to the positive control of Streptomycin (0.01 mg/ml)

3.2 GC-MS

The chromatogram obtained by crude acetonic extract of *T brunneus* is presented in Figure 2. Fifteen peaks representing fourteen bioactive compounds were detected in Gas Chromatography. Fourth and seventh peaks indicating same compound 2- Cyclopentene-1-tridecanoic acid. Total ionic chromatogram obtained from GC-MS library showing active compounds, peak area, Concentration (%), Retention Time (RT) is presented in Table 1.

2-Cyclopentene-1-tridecanoic acid was the most abundant compound (28.10%) present in the extract. It was followed by gamma Sitosterol (24.60 %), D:A-Friedooleanan-7- one, 3-hydroxy- (14.03 %), 2-Pyrazolin-5-ol, 1-acetyl-5-perfluoroctyl-3-methyl- (7.18%), 9,19-Cyclolanostan-3-ol, 24-methylene-, (3.beta.)-(4.09%), Stigmasterol (3.94%), l(+)-Ascorbic acid 2,6-dihexadecanoate (3.53%), 6-Tridecenoic acid, 13-(2-cyclopenten-1-yl)-, methyl ester (3.44%), Campesterol (2.83%), Fucosterol (2.55%), Pregnan-20-one, 3,11,17-tris[(trimethylsilyl)oxy] (2.10%), 6-Octadecenoic acid (1.73%), Rhodoviolascin (1.05%) and Squalene (0.83%).

4. Discussion

Crude acetonic extract of *T. brunneus* found active against *E.coli, K. pneumoniae* and *S.typhi* with varying degree of activity. This specificity and variation in activity may be due to the chemical composition of the outer cellular layers and differences in stress responses of microorganism (Russell, 2003). Positive control Streptomycin is significantly effective against all the selected bacterial strains. Typically, commercial antibiotics are in pure form and hence significantly effective against all the pathogens. Whereas crude extracts contain many impurities including non-bioactive compounds that enter during extraction. Hence, the MIC of crude bioactive extracts required higher concentration as compared to the pure antibiotics

The list of possible compounds present in crude acetonic extract and their currently identified bioactive potential is presented in Table 2. The first eluted compound is carotenoid Rhodoviolascin. Its synonym is spirilloxanthin which is found in photosynthetic bacteria *Rhodospirillum rubrum,* an excellent source of this compound. Tetrahydrospirilloxanthin is found to have antioxidant, anti-inflammatory, antiarthritic properties. It also lowers hypertension, is effective against Cancer and eye problems. It is also a natural colour pigment (Komalavalli and Packia, 2014). Carotenoids are tetraterpenoids synthesized in plants and microorganisms. However, animals and humans cannot synthesize carotenoids and their level in body depends on dietary supply. Carotenoids are considered as important to humans as precursors of vitamin A and retinoids (Britton and Khachik, 2009; Olsen and Krinsky, 1995).

The third eluted compound 1-(+)- Ascorbic acid,2,6-dihexadecanoate has been reported to have antioxidant, anti-inflammatory, anti-bacterial, increases sperm motility and anti-nociceptive properties (Okwu and Emenike, 2006; Sridevi et al., 2014). Natural ascorbic acid is important for the body as it possesses anti-scorbutic activity and is required for connective metabolism especially the tissue, bones and teeth. It also accounts for its requirement for normal wound healing (Okwu and Emenike, 2006).

The fourth and seventh eluted compound is 2-Cyclopentene-1-tridecanoic acid. It was the most abundant compound (38.10 %), which is also known as Chaulmoogric acid. It is often found in plants and may have entered the gastropod body through its planktonic diet. A study has showed that Chaulmoogric acid can inhibit the multiplication of *Mycobacterium leprae* in a mouse model (Levy, 1975). Chaulmoogric acid is a Protein phosphatase 5 (PP5) activator. PP5 is an important protein phosphatase that is abundantly expressed in the central nervous system. Recent studies showed that PP5 activity in the neocortex from patients with Alzheimer's disease (AD) is decreased significantly, suggesting that small molecule PP5 activator may have therapeutic potential for AD (Cher et al., 2010).

The fifth eluted compound is 6-Octodecanoic acid is known to exhibit anti-cancer and fungicidal activities (Vijisaral et al. 2014). Squalene is the eighth eluted compound. Squalene is a structurally unique triterpene compound that is one of the main components (about 13%) of skin surface lipids. Squalene is also used as a material or additive in topically applied vehicles such as lipid emulsions and nano structured lipid carriers (NLCs) (Huang et al., 2009). The tenth eluted compound is Campesterol. Campesterol inhibited the basic fibroblast growth factor (bFGF) -induced proliferation of human umbilical vein endothelial cells (HUVECs) in a concentration-dependent manner and significantly suppressed bFGF induced capillary-like tube formation (Choi, 2004).

Eleventh eluted compound is Stigmasterol. It is used as a precursor in the manufacture of semisynthetic progesterone (Sundararaman and Djerassi, 1977). It is a valuable human hormone that plays an important physiological role in the regulatory and tissue rebuilding mechanisms related to estrogen effects, as well as acting as an intermediate in the biosynthesis of androgens, estrogens, and corticoids. It is also used as the precursor of vitamin D3 (Kametani and Furuyama, 1987). The Upjohn pharmaceutical company used Stigmasterol as the starting raw material for the synthesis of cortisone (Hogg, 1992). Research has indicated that Stigmasterol may be useful in prevention of certain cancers, including ovarian, prostate, breast, and colon cancers. It also possesses potent antioxidant, hypoglycaemic and thyroid inhibiting properties (Panda et al, 2009). Being a steroid, stigmasterol is precursor of anabolic steroid boldenone. Boldenoneundecylenate is commonly used in veterinary medicine to induce growth in cattle, but it is also one of the most commonly abused anabolic steroids in sports. This led to suspicion that some athletes testing positive for boldenone didn't consume the steroid itself, but rather consumed foods rich in Stigmasterol (Gallina et al, 2007; Ros et al, 2007; Draisci et al, 2007)

The thirteenth eluted compound is gamma. Sitosterol. Gamma-sitosterol is C-24 isomer of beta-sitosterol. Beta-Sitosterol is androgenic, antiadenomic, anticancer (Cervix), antiinflammatory, antimutagenic, antioxidant and antiprostatitic (Gnanambal et al., 2011) is the next compound. The fourteenth eluted compound is Fucosterol. It has been shown to be antioxidant, antidiabetic, antifungaland cytotoxic. Fucosterol is a phytosterol, abundantly found in brown alga. There are evidences that some phytosterols have antioxidant activity (Khanavi et al., 2012).

Some of the eluted compounds do not exhibit any reported bioactivity. They are: second eluted compound -2-Pyrazolin-5-ol,1-acetyl-5-perfluorocetyl-3-methyl, sixth eluted compound - 6- Tridecanoicacid, ninth eluted compound - Pregnan-20-one,3,11,17- tris[(trmethylselyl)], twelfth eluted compound - D:A –

Friedooleanan-7-one,3-hydroxy and fifteenth eluted compound - 9,19-Cyclolanostan-3-ol,24-methylene,(3-beta).

5. Conclusion

The current work testifies the bioactive potential of intertidal mollusc *Turbo brunneus*, providing a baseline data for isolation and characterization of the active constituents. The GC-MS analysis shows the presence of a number of bioactive compounds. The marine organism tested here for antibacterial activity is under detailed investigations with the goal of finding seasonal variation in antimicrobial activity. The antimicrobial activity seen in the preliminary experiments reveals the bioactive potential of intertidal molluscs, so the rapid investigation of all available intertidal fauna is a prime necessity

Conflict of interest statement
We declare that we have no conflict of interest.

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Figure 2: Gas chromatography chromatogram of crude acetonic extract of *T. brunneus*
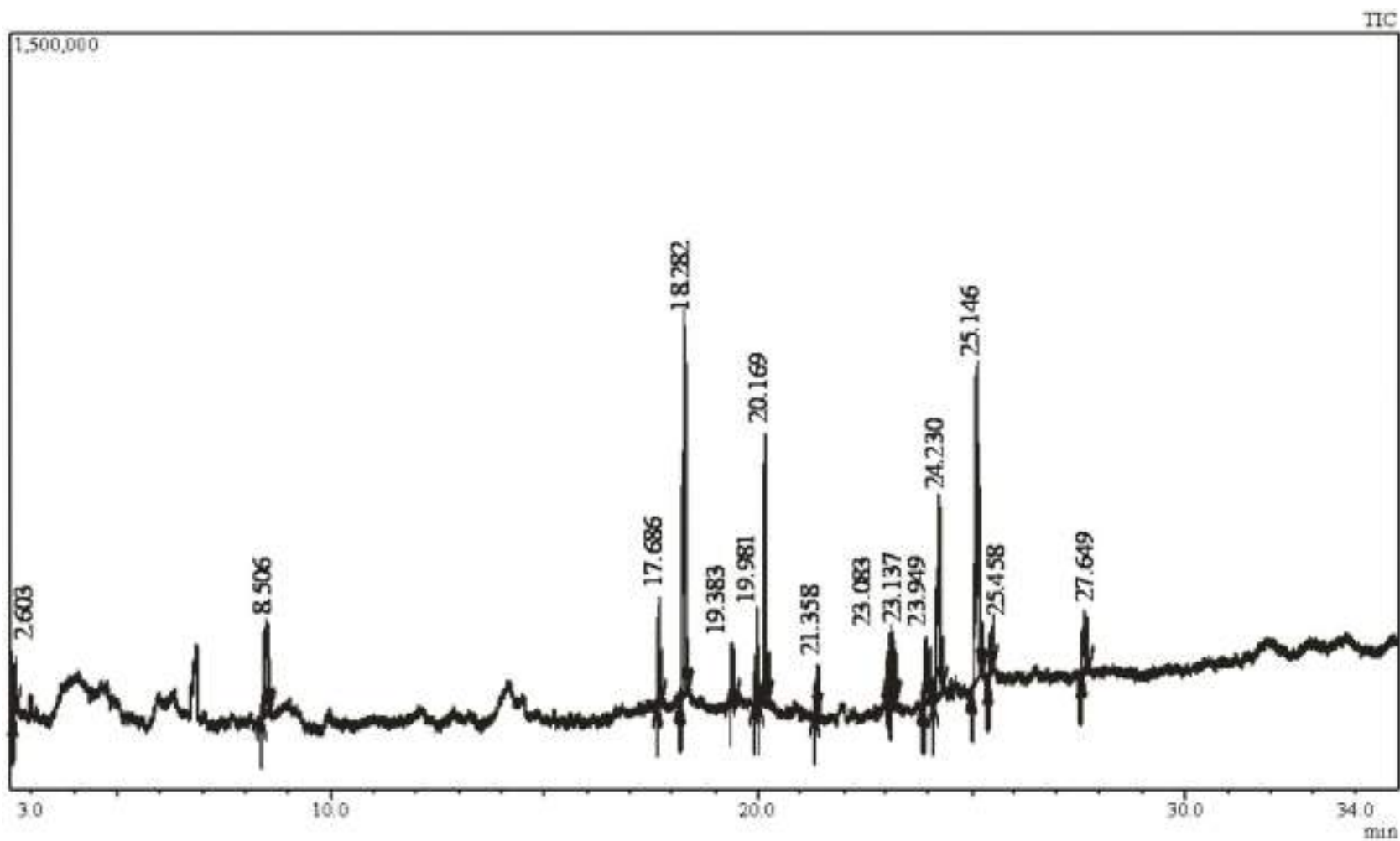
Table 1: Total ionic chromatogram showing the compound present in crude acetonic extract of *T. brunneus* obtained from NIST08

Peak#	R.Time	Area	Area%	Height	Name
1	2.603	46374	1.05	27736	Rhodoviolascin
2	8.506	318332	7.18	58363	2-Pyrazolin-5-ol, 1-acetyl-5-perfluoroctyl-3-methyl
3	17.686	156668	3.53	65068	l-(+)-Ascorbic acid 2,6-dihexadecanoate
4	18.282	761512	17.18	243351	2-Cyclopentene-1-tridecanoic acid
5	19.383	76784	1.73	32578	6-Octadecenoic acid
6	19.981	152567	3.44	57548	6-Tridecenoic acid, 13-(2-cyclopenten-1-yl)-, meth
7	20.169	483913	10.92	169653	2-Cyclopentene-1-tridecanoic acid
8	21.358	36688	0.83	20665	Squalene
9	23.083	93212	2.10	27765	Pregnan-20-one, 3,11,17-tris[(trimethylsilyl)oxy]-
10	23.137	125357	2.83	40356	Campesterol
11	23.949	174677	3.94	39458	Stigmasterol
12	24.230	622059	14.03	126321	D:A-Friedooleanan-7-one, 3-hydroxy-
13	25.146	1090452	24.60	199974	gamma.-Sitosterol
14	25.458	113209	2.55	27765	Fucosterol
15	27.649	181167	4.09	37209	9,19-Cyclolanostan-3-ol, 24-methylene-, (3.beta.)
		4432971	**100.00**	**1173810**	

Table 2: Compounds present in crude acetonic extract and their bioactive potential

Sr. No.	IUPAC Name of compound	Bioactive Potential
1	Rhodoviolascin	Antioxidant, anti-inflammatory, antiarthritic properties, lowers hypertension, effective against Cancer and eye problem (Komalavalli & Packia, 2014)
2	1-(+)- Ascorbic acid,2,6-dihexadecanoate	Antioxidant, anti-inflammatory, anti-bacterial, increases sperm motility (Sridevi et al., 2014) Anti-nociceptive properties (Akinmoladun et al, 2007; Okwu and Emenike, 2006).
3	2-Cyclopentene-1-tridecanoic acid	Inhibits multiplication of *Mycobacterium leprae* (Levi, 1975). Protein phosphatase 5 (PP5) activator, useful for treatment of Alzheimer's disease (Cher et al., 2010).
4	6-Octodecanoic acid	Anti-cancer and fungicidal activities (Vijisaral and Arumugam, 2014).
5.	Squalene	Additive in topically applied vehicles such as lipid emulsions and nanostructured lipid carriers (NLCs) (Huang et al., 2009).
6.	Campesterol	Inhibits basic fibroblast growth factor (bFGF) -induced proliferation of human umbilical vein endothelial cells (HUVECs) (Choi, 2004).
7.	Stigmasterol	Raw material for the synthesis of cortisone (Hogg and John, 1992), Antioxidant, hypoglycemic and thyroid inhibiting properties (Panda et al., 2009)

8.	gamma. Sitosterol	Androgenic, antiadenomic, anticancer (Cervix), antiinflammatory, antimutagenic, Antioxidant and antiprostatitic (Devi et al., 2011)
9.	Fucosterol.	Antioxidant, antidiabetic, antifungaland cytotoxic (Khanavi et al., 2012).
10.	2-Pyrazolin-5-ol,1-acetyl-5-perfluorocetyl-3-methyl	Not known
11.	6- Tridecanoic acid	Not known
12.	Pregnan-20-one,3,11,17-tris[(trmethylselyl)]	Not known
13	D:A – Friedooleanan-7-one,3-hydroxy	Not known
14.	9,19-Cyclolanostan-3-ol,24-methylene,(3-beta).	Not known

CULTURAL AND HERITAGE TOURISM COMPETITIVENESS WITHIN THE INDIAN OCEAN RIM COUNTRIES

Prof Haretsebe Manwa[f]

Abstract

Economic impacts associated with tourism have resulted in many countries focusing on improving their competitive position in comparison to other destinations. The Indian Ocean Rim is made up of 21 countries that are all jostling to attract tourists to their individual countries. Little is known, however, of how each country fares in comparison to other members of the Indian Ocean Rim. This study used Ritchie and Crouch's (2003) competitive framework to assess tourism competitiveness among the Rim countries as cultural and heritage tourist destinations. The study adopted a qualitative design whereby secondary sources were reviewed and interpreted. The Indian Ocean Rim countries are endowed with vast heritage and cultural tourism resources, which are the main pull for tourists to visit the Rim. However, natural resources need supporting resources such as tourist services, efficient air transport infrastructure, safety and security of tourists as well as price competitiveness, which are important for tourists to visit a destination. Countries that are competitive tourist destinations are Thailand, Australia, the United Arab Emirates, Singapore, Malaysia, India, Iran and South Africa. The least competitive countries are Tanzania, Bangladesh, Mozambique, Madagascar and Yemen. The study concludes by making recommendations on how countries can improve their competitiveness by, among other things, improving local communities' participation and benefitting from tourism resources.

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[f]Haretsebe Manwa is Professor, School of Tourism Management, North-West University, South Africa, Private Bag X2046, Mmabatho, Mahikeng South Africa, 2735, Email: hmanwa@gmail.com or 23815310@nwu.ac.za

1. Introduction

Tourism is acclaimed to be one of the fastest growing industries in the world, making a significant contribution to many economies world-wide (United Nations World Tourism Organisation, 2011). For example, the World Travel and Tourism Council (WTTC, 2018) states that tourism contributed US$8.3 trillion to the global economy and supported 313 million jobs in 2017. In addition, in the same year, global visitor exports reached a record high, totalling US$1.5 trillion, and accounted for approximately 30% of total world services exports and 6.5% of total world exports (WTTC, 2018). Because of these economic impacts associated with tourism, more destinations are focusing on ways in which they can improve their competitive position in comparison to other destinations (Heath, 2003; Manwa, 2011). The Indian Ocean Rim countries are also promoting tourism as an economic driver in the region.

The Indian Ocean Rim Association (IORA) is made up of 21 countries spread across Africa, Asia, the Middle East and Australia. The region has prioritised tourism and cultural exchanges as focus areas that must be further explored by academics in the region. At the IORA Workshop held in Mauritius in May 2017, member states recommended the implementation of the sustainable tourism indicators endorsed by the United Nations World Tourism Organization (UNWTO), and Global Sustainable Tourism Council. These indicators would enhance the quality of tourism in the IORA region by making it more competitive, sustainable and attractive as a destination of the future. In addition, UNWTO (2016) states that the destinations of the Indian Ocean Region are forecast to receive 179 million international tourists in 2020, thereby recording an annual growth rate of 6.3% over the period 1995 to 2020.

The Indian Ocean Region Association is culturally rich, diverse and multi-layered, with great future potential for the development of sustainable cultural heritage tourism that can facilitate growth and development of the region as a competitive cultural and heritage tourism destination. Already, many governments in the region have been at the forefront of promoting cultural and heritage tourism as a way of reviving regional cultures (see Ivanovic & Saayman, 2013; Saarinen, Moswete & Monare, 2014; Richards, 2007), and as a local economic development strategy (see Visser & Rogerson, 2004). Very little is known about competitiveness within the IORA region as a cultural heritage tourist destination. This study is therefore timely in trying to assess the competitiveness within the IORA countries and to suggest ways in which those countries that are not competitive can improve their competitiveness. The study was guided by the following objective:

- To assess the competitiveness within IORA as a cultural heritage tourist destination.

Competitiveness is associated with the seminal work of Michael Porter (1980) whose work focused on individual firms' ability to produce superior value; that is, in terms of products and services offered in comparison to other firms. Porter and Van der Linde (1995, p.97) argued that competitiveness at industry level arises from superior productivity, either in terms of lower costs than rivals or the ability to offer products with superior values that justify premium prices. The competitiveness of destinations has also been extended to tourism studies (Heath, 2003; Hall, 2005;

Ritchie & Crouch, 2003; Dwyer & Kim, 2010). However, despite this growing interest, tourism researchers have not yet agreed on the definition of tourism destination competitiveness. The definition that is adopted for this study is the one provided by Ritchie and Crouch (2003, p.2), which states that tourism destination competitiveness is the

> "ability to increase tourism expenditure, to increasingly attract visitors while providing them with satisfying memorable experiences and to do so in a profitable way, while enhancing the well-being of destination residents and preserving the natural capital of the destination for future generations".

1.1. The next section briefly explains cultural and heritage tourism and its importance, followed by the methodology of the study. This is followed by an analysis of competitiveness of IORA using Dwyer and Kim's (2003) framework. Conclusions and recommendations form part four of the paper.

Cultural heritage tourism

Cultural heritage tourism is based on intangible and tangible cultural heritage resources. Dwyer and Kim (2003) define culture and heritage as consisting of history, institutions, customs, architectural features, cuisines, traditions, artwork, music, handicrafts and dance.

Intangible resources

The list of intangible cultural heritage resources provided by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in the Convention for the Safeguarding of the Intangible Cultural Heritage, includes "the practices, representations, expressions, knowledge, and skills. It also includes the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognise as part of their cultural heritage" (UNESCO, 2003). Intangible cultural heritage resources also include belief, language, songs, religious practice, dances, tales, rituals, literature, ideas, and history associated with a community (Kamamba, 2003; Theron, 2013).

Tangible resources

On the other side, the list of tangible cultural heritage features places, built environments, roads, bridges, graveyards, museums, archaeological sites, other human constructions and the landscapes they affect (Kamamba, 2003; Theron, 2013). Although cultural heritage resources are available in each country or region, some countries and regions have more and richer cultural heritage resources than others.

Cultural heritage tourism is a multi-million-dollar industry, which accounts for over 35% of international tourism and is growing at a rate of 15% per annum (WTO, 2005). In addition to its economic impacts, cultural tourism is promoted for its political and socio-cultural impacts on both the hosts and guests. At a political level, cultural heritage tourism can be used to positively influence how the international community views a particular nation to create a positive image of the country

visited (Frías, Rodríguez, Castañeda, Sabiote & Buhalis, 2012). Cultural heritage tourism is seen as promoting cultural exchanges between hosts and guests leading to cultural understandings where the guests learn about the cultural past and end up seeing the present from another viewpoint (Borowiecki & Castighone, 2014).

Glasson, Godfrey and Goodey (1995) noted that, without tourists, local cultures and traditions may have been lost. Communities are therefore motivated to produce artefacts depicting traditional cultural products because tourism provides a market for such products. Similar conclusions are also made by Saarinen (2011) in the study of Ova-Himba in Namibia, and Mbaiwa (2005) and Mbaiwa and Sakuze (2009) in the XaiXai village in the Okavango Delta in Botswana. Their results confirm that cultural tourism is instrumental in valuing culture and therefore helps to revitalise the custom.

Methodology

The study adopted a qualitative design where secondary sources were reviewed and interpreted in order to assess the competitiveness of the Indian Ocean Region as a cultural and heritage tourism destination. The competitiveness of IORA was assessed using Dwyer and Kim's (2003) competitiveness framework. The framework has the following elements, as shown in Figure 1: resources, destination management, situational conditions, demand, destination competitiveness indicators and quality of life. These elements are briefly explained below.

Resources

Dwyer and Kim (2003, p.378) identified three types of resources, i.e. endowed resources, created and supporting resources. The endowed resources are attractors or pull factors for a tourist to visit a destination. These are the natural attractions that are the main reason why tourists visit a particular destination. The second type of attractions reflected in the model are the created resources. Created resources refer to activities that can be undertaken at a destination such as events, festivals, shopping, etc. Dwyer and Kim's model adds the supporting resources as an important element in destination competitiveness. They argued that a destination can be endowed with natural and cultural resources and still not be competitive if it does not have supporting resources. The supporting resources are enabling factors for a tourist to enjoy their experience at a destination. Examples of supporting resources are infrastructure development, quality of service, accessibility of the destination, hospitality and markets. For this study, supporting services that were evaluated were tourist service infrastructure (hospitality) and air transport infrastructure services (accessibility). Data was obtained from the World Economic Forum (2017). The World Economic Forum uses a 1- to 7-point scale to evaluate the competitiveness of countries. Information for endowed resources was sourced from published literature, individual country websites and United Nations Educational, Scientific and Cultural Organisation's (UNESCO) world heritage list.

Destination management

According to Dwyer and Kim, destination management refers to all factors that can enhance the appeal of the core resources and attractors, strengthen the quality and effectiveness of the supporting factors and resources, and best adapt to the constraints imposed by the situational conditions (Dwyer & Kim, 2003, p.379). There are two players in the destination management, namely the public and the private sectors. Policymakers play a key role in influencing demand through sustainable management of the resources. Policymakers promulgate laws and regulations that promote sustainability and create enabling environments for local communities to benefit from cultural heritage tourism. The tourism industry, on the other hand, manages, and uses, resources sustainably. The private sector is also responsible for educating tourists on responsible tourism as well as monitoring the behaviour of tourists.

Situational factors

Situational factors refer to macro-factors in the environment in which the tourist industry operates. The factors that are evaluated in this study are safety and security, and price competitiveness. Tourists will visit places where their security and safety are guaranteed. Again, the World Economic Forum (2017) competitiveness ranking was adopted for this study.

Demand

Demand conditions comprise tourism awareness, perceptions and preferences of product offerings. Demand conditions are influenced by resources and management. The study assessed tourism demand by reviewing the WTTC annual arrival statistics and receipts (2017).

Destination competitiveness indicators

A destination will be judged competitive if it results in socio-economic prosperity of local communities. In addition, Dwyer and Kim cautioned that there are subjective measures that can be used as competitive indicators; there are also objective indicators such as employment level, per capita income, and rate of economic growth. The study did not measure this aspect.

Figure 1: Destination competitiveness

Source: Dwyer and Kim (2003:378)
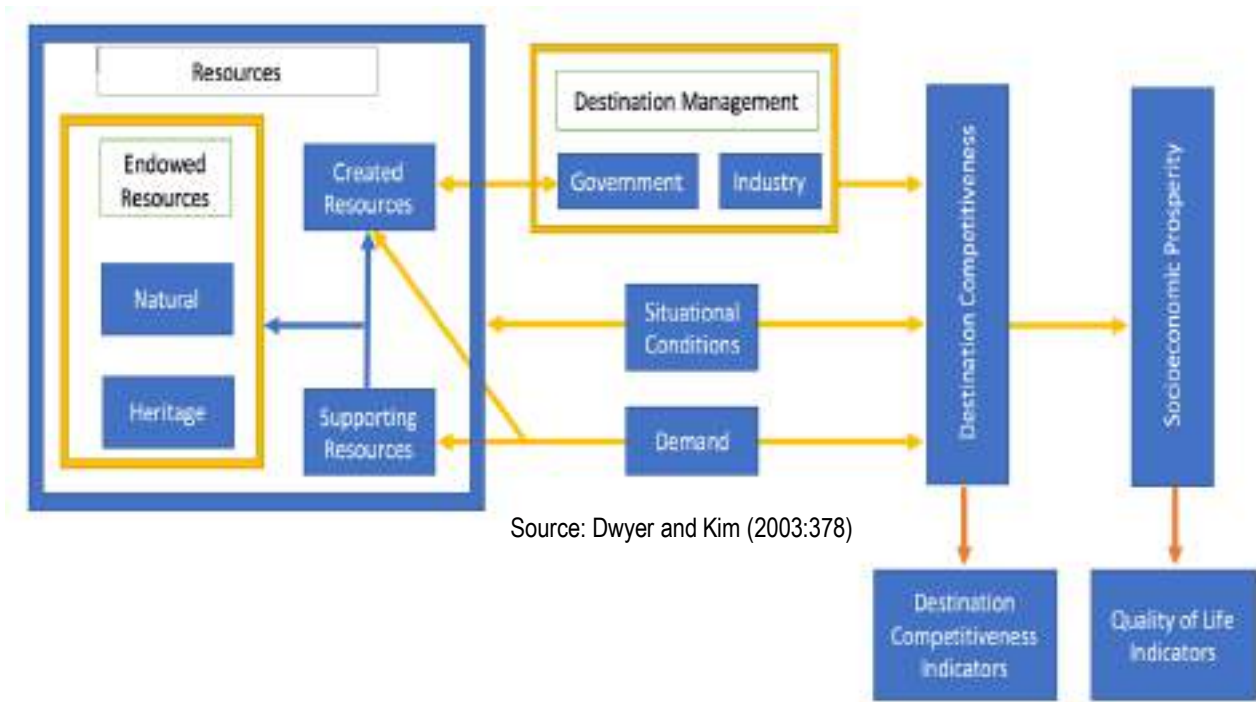
Competitiveness of IORA as a cultural heritage destination

Dwyer and Kim's (2003) model was applied to each IORA country, and countries were then ranked.

Endowed resources

The Indian Ocean Rim is endowed with both natural and heritage resources (IORA, 2017). The region has diverse resources, ranging from archaeological sites such as Laetoli footprints and Olduvai Gorge in Tanzania (Mabulla, 2000; Njau & Losaru, 2017), Sibudu and Blombos Cave in South Africa (University of Witwatersrand, 2015), Laas Gaal cave paintings in Somaliland (Price, 2013), Ajanta Caves and Ellora Caves in India, Ayutthaya in Thailand, Gedong Songo and Borobudur in Indonesia (Skyscanner, 2015), and underwater cultural heritage sites found in Malaysia (UNESCO, 2001). The region also has religious-related sites such as Shait-Gumbad Mosque in Bangladesh (Bangladesh High Commission, 2016); historic buildings and places such as prisons and sites for slave trade (Salim & Mwaipopo, 2016); mining sites; military sites such as Castle of Good Hope; the South African Naval Museum in South Africa (South African Military History Society, 2001); townships in South Africa; museums; battlefield sites such as the Battle of Isandlwana, Rorke's Drift and Battle of Blood River in South Africa (Moeller, 2005; Venter, 2011) among others. Some of these cultural heritage sites have been marketed as tourist destinations and are receiving tourists. Salim and Mwaipopo (2015) also argue that major cultural heritage resources have not been marked as tourist destinations in the past few decades.

The IORA region is home to 141 United Nations Educational, Scientific and Cultural Organisation (UNESCO) world heritage sites (WHS) (see Figure 2). To be on the UNESCO world heritage site list gives the region a competitive advantage. The UNESCO 1972 convention

concerning the protection of the World Cultural and Natural Heritage recognises that certain places on earth are of "outstanding universal value and should form part of the common heritage of humankind." A WHS listing is a seal of approval of WHS brands known both nationally and internationally, and guarantees authenticity and quality of the site (Jimura 2010; Ryan & Silvanto, 2009). In addition, designation of such sites is a pull factor for tourists to visit a site (Li, Wu & Cai, 2008; Yang, Lin & Han, 2010). According to Figure 2, India is the most competitive with 36 world heritage sites, followed by Iran, which has 22 sites. Australia is third with 19 world heritage sites. The least competitive countries are Comoros (0), Somalia (0), Mozambique (1), Singapore (1) and United Arab Emirates (1).

FIGURE 2: WHS RANKING IOR
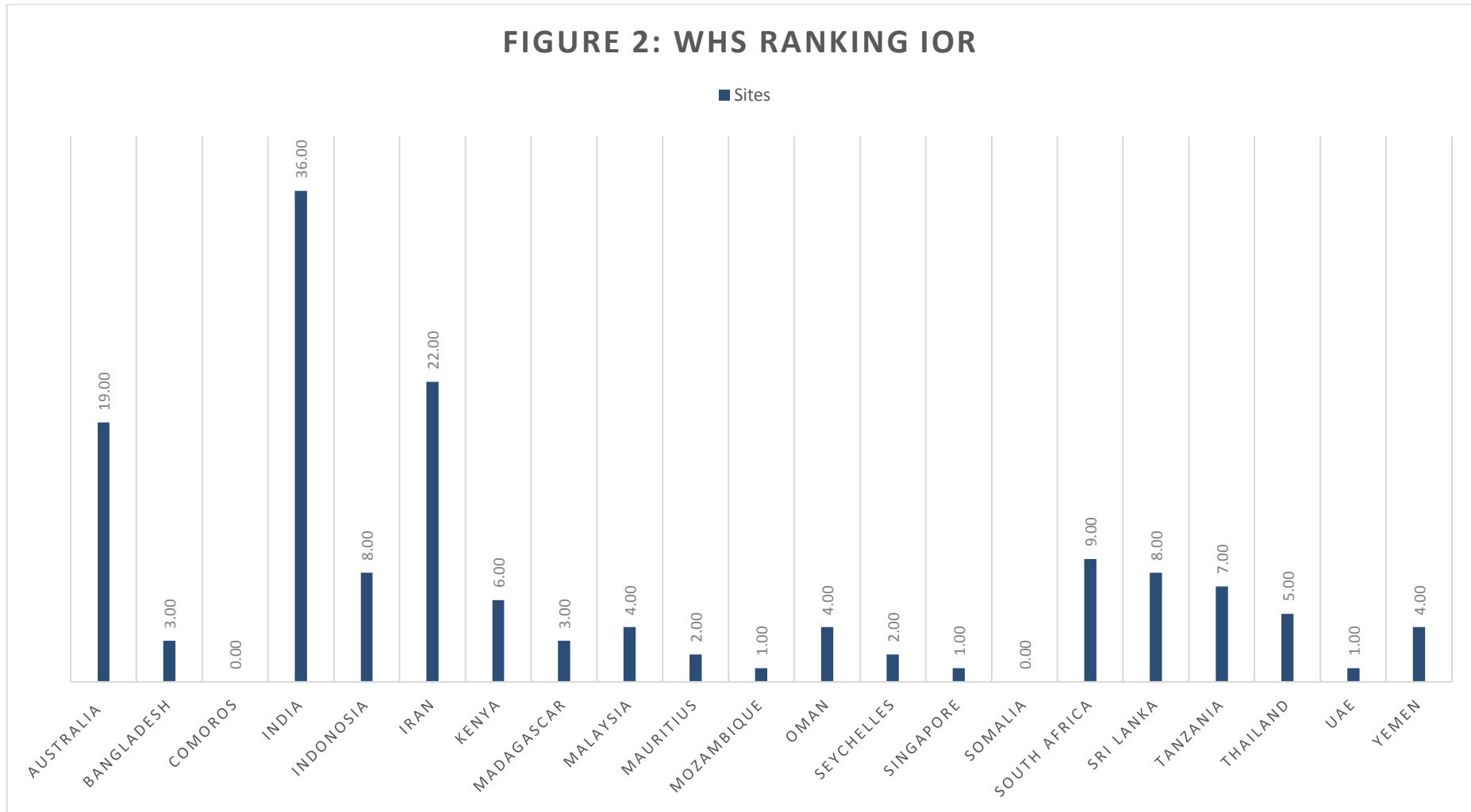
Source: UNESCO World heritage list

Supporting resources

Figure 3 shows regional ranking in terms of tourist services and air transport infrastructure. The best performing countries are Australia, Thailand, the United Arab Emirates, Singapore and Mauritius, which are in the top five best ranked in both tourist service infrastructure and air transport infrastructure. Tanzania, Bangladesh, Mozambique, Madagascar and Yemen are consistently performing poorly in both tourism service infrastructure and air transport infrastructure.

Figure 3: Ranking according to Supporting Services
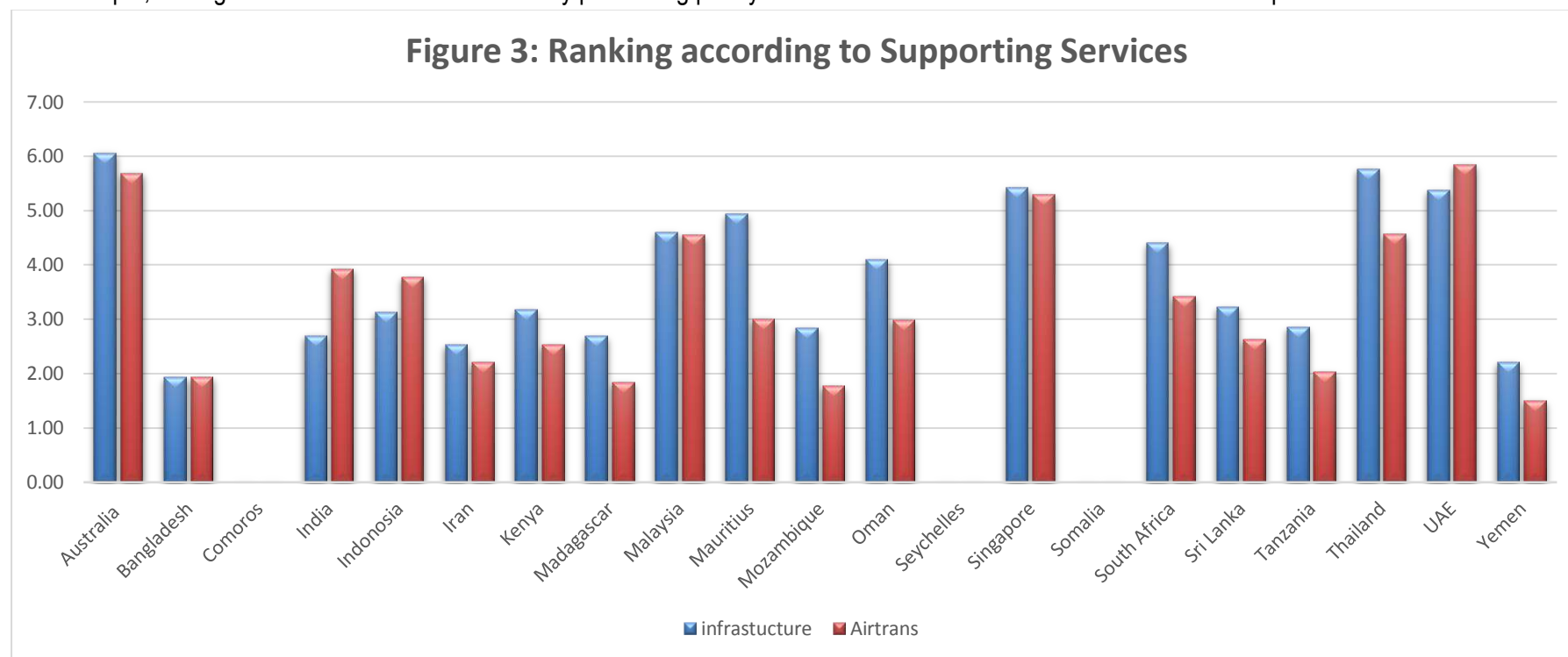
Source: Competitiveness index (2017: 43, 45)

Ranking of situational conditions in IORA

Figure 4 is a ranking of IORA countries on situational factors. Countries that perform well in terms of safety and security of tourists are the United Arab Emirates, Oman, Singapore, Australia and Mauritius. Countries where security and safety of tourists are poor are Thailand, Kenya, South Africa, Yemen and Bangladesh.

Most IORA countries perform very well in terms of price competitiveness. The cheapest destinations are Iran, Malaysia, Indonesia, Yemen and India. The most expensive destinations, according to Table 4, are Bangladesh, Singapore, Mozambique, Mauritius and Australia.

Figure 4: Ranking of situational factors (price & safety)
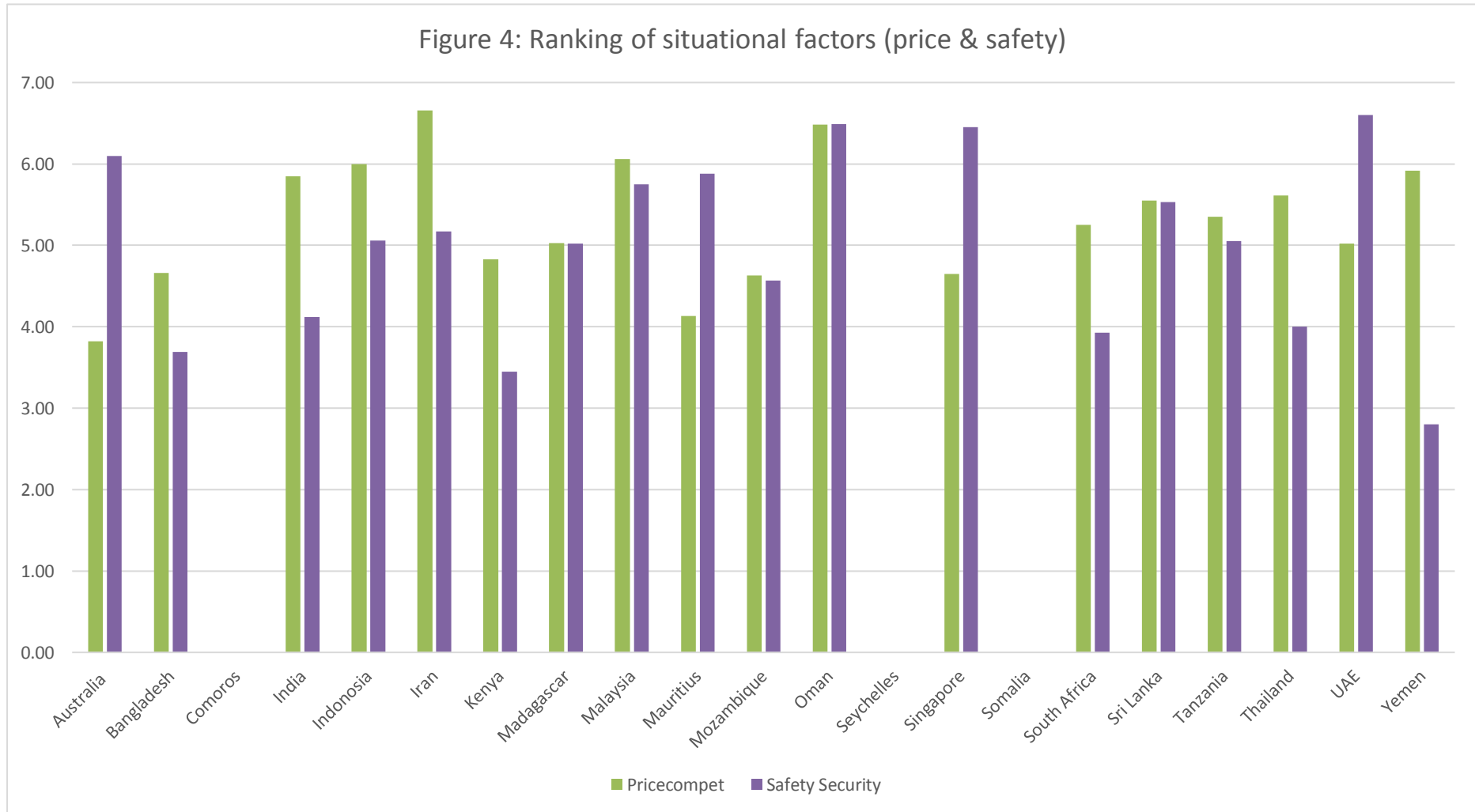
Sources: Competitiveness index (2017: 41)

Demand

Figure 5 shows the demand for tourism which can be demonstrated by the number of international tourists who travelled to IORA countries in 2017. Thailand, Malaysia, the United Arab Emirates, India, and Singapore received the most international visitors. The countries that received the fewest international visitors were Comoros, Bangladesh, Madagascar, Yemen and Seychelles. Destination competitiveness indicators in IORA

The second part of Figure 5 shows the money tourists spent at a destination which is reflected as receipts. The countries with high tourist spending in the descending order are Thailand, Australia, India, United Arab Emirates, Singapore and Malaysia. Countries with lowest receipts are Yemen, Comoros, Mozambique and Bangladesh.
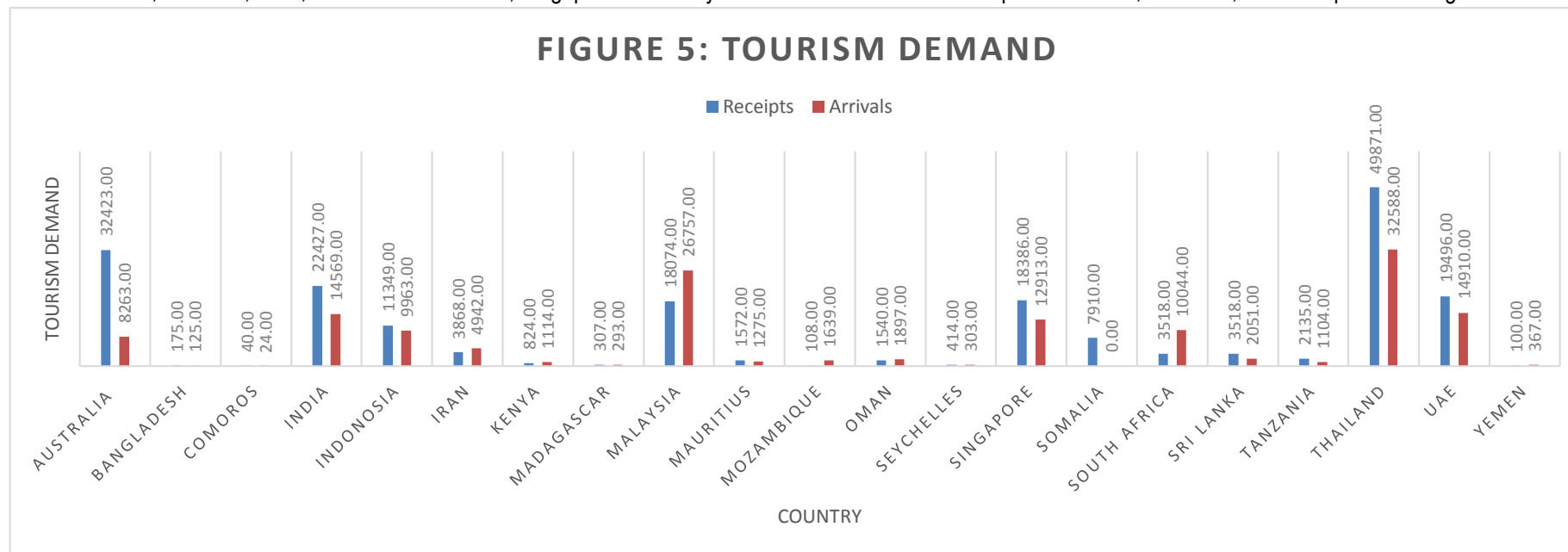
Source: World Travel and Tourism Council (www.WTTC.tourismimpacts.pdf)

Management of cultural heritage resources in the Indian Ocean Rim

Although countries are encouraged to exploit this growing niche of cultural heritage tourism, countries have to invest heavily in the management of cultural heritage sites due to their fragility and susceptibility. Cultural heritage-based attractions are the most fragile and susceptible to human activities compared to other tourist attractions. To ensure the sustainability of cultural heritage resources, there is a need for effective and vibrant management of cultural and heritage resources. Cultural heritage attractions are non-renewable. Therefore, the protection and conservation of cultural heritage assets have to be at the core of the management of cultural and heritage resources. This argument is in line with the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage adapted on 16 November 1972. Article 4 of the Convention states that parties to the Convention are requested to take effective measures to protect, conserve, and present cultural and natural heritage assets found on their territories. Furthermore, state parties are encouraged to take the necessary and appropriate measures, including legal, administrative, technical and financial to identify, protect, conserve, present and rehabilitate cultural and heritage resources (UNESCO, 1972). Related to this call, many countries across the world, including countries in the Indian Ocean region, have developed legal or policy frameworks in an attempt to guide and consolidate the management of cultural heritage resources.

Almost every country in the Indian Ocean region has laws concerning the management of cultural heritage resources. For example, in South Africa, the management of cultural heritage resources is guided by the National Heritage Resources Act, 25 of 1999 (Van der Merwe, 2016) and the National Heritage and Cultural Tourism Strategy of 2012. In Mauritius, cultural heritage resources are managed according to the National Heritage Trust Draft Amendment Bill 2002, which replaced the National Heritage Trust Fund Act of 1997 (Munjeri, 2009). The preservation and conservation of cultural heritage assets in Tanzania are guided by the Antiquities Act of Tanzania as amended in 1979 (Kamamba, 1964), while in Zanzibar, which is part of Tanzania, cultural resources are under the Ancient Monuments Preservation Act of 1948 (Karume, 2009). The management of cultural heritage resources in Indonesia is supported by the Law of Cultural Properties No.11/2010 (Fitri, Ahmad & Ahmad, 2015).

Countries such as Sri Lanka, however, have different laws related to the management of cultural and heritage resources. Some of these laws include the Antiquities Ordinance No. 9 of 1940, which was later amended and became the Antiquities (Amendment) Act No. 24 of 1998, National Environmental Act No. 47 of 1980 as amended in 1988 and in 2000, Central Cultural Fund Act, No 57 of 1980, and Cultural Property Act No.73 of 1988. The Constitution of 1978 of Sri Lank enshrines the promotion of individuals' cultures (Gamalath, n.d.).

With these few examples of countries in the IORA region with legal frameworks on the management of cultural heritage resources, it was observed that some countries already had laws related to the management of cultural and heritage resources decades before the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage of 1972. Mauritius had promulgated its first cultural heritage law in 1938, known as the 1938 Ancient Monument Act (Munjeri, 2002), and Zanzibar had passed the Ancient Monuments Preservation Act in 1948 (Karume, 2009). However, Tanzania and Kenya's laws that protect human-made objects were established more than 100 years ago (in 1867 and 1897, respectively) (Kamamba, 2009).

Despite the promulgation of the relevant laws, however, the protection and conservation of cultural heritage resources remain questionable and problematic in some countries in the Indian Ocean region. Various obstacles, including lack of interest from the Indian government and non-governmental organisations in preserving cultural heritage sites, have been reported in the Muktainagar Region (Premsagar, 2014). Mauritius and Tanzania have also shown some weaknesses in the implementation of heritage laws, which has resulted in poor conditions of cultural and heritage resources (Mabulla, 2000; Munjeri, 2009). The Tanzanian government is accused of neglecting cultural and heritage sites such as Olduvai Gorge, which led to vandalism and looting (Mabulla, 2000). In addition to poor management of cultural and heritage sites due to ineffective law enforcement, some cultural and heritage sites in South Africa also face serious threats of land claims lodged by people whose land was dispossessed before and during the apartheid regime (Kemp, 2016).

The effective management of cultural and heritage sites requires the participation of local communities living around the cultural heritage resources. Cultural and heritage laws in some countries, however, disregard the role of local communities in safeguarding their cultural heritage. Instead, a great deal of attention is paid to technical aspects of protection and conservation (Kamamba, 2009). Cases are noted in the literature where laws prevent local communities from accessing their cultural heritage, or practising their cultural traditions. In some instances, one culture is promoted more than the other. Australia is an example where colonial heritage values are more favoured than Aboriginal cultural heritage values, and the continuation of Aboriginal cultural practices is restricted (Wilson & Pearce, 2016). Preventing indigenous peoples from practising their cultural traditions or denying them access to their cultural heritage sites may be regarded as disrespecting their rights. It violates the United Nations (UN) Declaration on the Rights of Indigenous Peoples. Article 11 of the Declaration stipulates that "indigenous people have the right to practise and revitalise their cultural traditions and customs" (UN, 2007).

Quality of life indicators

Dwyer and Kim (2003) emphasised that competitive tourist destinations are those that can improve the livelihoods of their communities. It was therefore important to establish the impacts that cultural heritage tourism has on communities in the region. Existing literature shows that cultural heritage tourism in the Indian Ocean region has had both positive and negative impacts on communities. The most cited positive impacts of cultural heritage tourism on communities include: income generation, job creation, improved social services, and improved infrastructure in surrounding communities (Becker, 2015; Gnanapala & Sandaruwani, 2016; Hettiarachchi, 2013; Njau & Losaru, 2017). The study carried out by Njau and Losaru (2017) in two cultural heritage sites in Tanzania, for example, found that a number of community residents were earning income from handmade crafts they sell to tourists, and 21% of the respondents had been employed in the tourism sector as tour guides, security guards, handcraft sellers, dancers, and even managers. A study conducted in Malaysia revealed that cultural heritage tourism provides opportunities to members of indigenous communities to learn other languages, including English. Knowledge of foreign languages increased chances for members of indigenous communities to secure decent jobs in the tourism industry. More interestingly, this study found that cultural heritage tourism encourages indigenous

communities to conserve their indigenous culture and tradition because of the economic benefits they derive from tourism (Becker, 2015).

Common negative impacts of cultural heritage tourism on communities in the Indian Ocean Rim countries include cultural commodification (Becker, 2015; Njau & Losaru, 2017). Cultural heritage tourism has the potential to promote culture commodification where music, ceremonies, dances and handcrafts lose their traditional value because they are transformed for the benefit of tourists. There are also instances where communities accommodate and copy tourists' cultures. A study conducted in Tanzania discloses that the Maasai people are copying the culture of tourists (Njau & Losaru, 2017).

Tosun (2000) identified barriers to community participation in tourism. He classified the barriers into three, namely structural, operational and cultural barriers. Operational barriers include centralisation of decision-making and lack of coordination. Structural barriers include attitudes of professionals towards communities, where they make decisions for communities; it also includes laws that do not favour community participation. This point was elaborated under the management of cultural heritage tourism. According to Tosun, cultural barriers are one of the most taunting barriers to community participation in cultural heritage tourism. It includes a community's lack of social capital to be able to run community-based cultural heritage tourism.

Research undertaken in selected IORA countries shows that most local communities in IORA countries encounter the barriers identified by Tosun (Mustapha, Azman & Ibrahim, 2013; Aref & Redzuan, 2008; Omondi & Kamau, 2010; Dogra & Gupta, 2012; Salazar, 2012). In Malaysia, Mustapha, Azman and Ibrahim's (2013) research in Tioman Island in Malaysia noted the prevalence of structural, cultural and operational barriers to community participation in tourism development. Similar conclusions were reached by Omondi and Kamau (2010) in Tanzania, where all three types of barriers were prevalent (Omondi & Kamau, 201, cited in Mustapha, Azman & Ibrahim, 2013: 105). In Iran, the main barrier to community participation in tourism development was structural barriers (Aref & Redzuan, 2008, cited in Mustapha, Azman & Ibrahim, 2013: 105). Similarly, in Tanzania, structural barriers were also identified by Salazar (2012).

Conclusion

Competitive destinations in the Indian Ocean

The study has indeed confirmed that the Indian Ocean region is endowed with unique cultural and heritage resources, which make it a competitive destination. In general terms, all destinations in the Indian Ocean region are competitive if endowed resources were the only measurement of competitiveness. They have the natural and cultural resources to attract tourists to the region. However, as explained by Dwyer and Kim (2003), supporting and situational conditions are an added advantage. For example, tourists travel to destinations that are easy to access and provide them with accommodation, internet services and transport, and offer competitive prices (see Figure 6 for a summary of most competitive IOR countries). In this regard, the most competitive destinations in the Indian Ocean Rim in their rankings are

Thailand, Australia, the United Arab Emirates, Singapore, Malaysia, India, Iran, South Africa, and Indonesia. The least competitive destinations are Yemen, Bangladesh, Mozambique and Madagascar.

Figure 6: Competitiveness within IORA

	Austra lia	Bangla desh	Comor os	India	Indon osia	Iran	Kenya	Madag ascar	Malay sia	Maurit ius	Moza mbiqu e	Oman	Seyche lles	Singap ore	Somali a	South Africa	Sri Lanka	Tanza nia	Thaila nd	UAE	Yemen
infrastucture	6.06	1.93	0.00	2.70	3.12	2.53	3.18	2.69	4.60	4.93	2.83	4.10	0.00	5.42	0.00	4.40	3.22	2.85	5.76	5.37	2.20
Airtrans	5.69	1.93	0.00	3.92	3.77	2.20	2.53	1.84	4.55	3.00	1.77	2.99	0.00	5.29	0.00	3.41	2.62	2.03	4.56	5.84	1.50
Pricecompet	3.82	4.66	0.00	5.85	6.00	6.66	4.83	5.03	6.06	4.13	4.63	6.48	0.00	4.65	0.00	5.25	5.55	5.35	5.61	5.02	5.92
Safety Security	6.10	3.69	0.00	4.12	5.06	5.17	3.45	5.02	5.75	5.88	4.57	6.49	0.00	6.45	0.00	3.93	5.53	5.05	4.00	6.60	2.80
Arrivals	8263.0	125.00	24.00	14569.	9963.0	4942.0	1114.0	293.00	26757.	1275.0	1639.0	1897.0	303.00	12913.	0.00	10044.	2051.0	1104.0	32588.	14910.	367.00
Sites	19.00	3.00	0.00	36.00	8.00	22.00	6.00	3.00	4.00	2.00	1.00	4.00	2.00	1.00	0.00	9.00	8.00	7.00	5.00	1.00	4.00
Receipts	32423.	175.00	40.00	22427.	11349.	3868.0	824.00	307.00	18074.	1572.0	108.00	1540.0	414.00	18386.	7910.0	3518.0	3518.0	2135.0	49871.	19496.	100.00

The study has shown mixed results as far as the improvement of quality of life of the local communities was concerned. There is, therefore, a need to develop these resources both for the growth of the industry and for the improvement of the livelihoods of communities in the region. Sustainability, as stated in IORA communication, is the ultimate goal of tourism development. This can only be realised if tourism leads to meaningful improvements in the livelihoods of local communities. Barriers to community participation are serious obstacles to local community participation in tourism development. IORA governments can mitigate these barriers. For example, governments can capacitate communities through skill development training and financial help. Secondly, education about tourism can play a meaningful role in tourism management and development. The private sector can also play a meaningful role in capacitating the local community through internships, so they can acquire the necessary skills to enable them to run a tourism business. Giampiccoli and Hayward (2012) also note that tourism in the IORA region is at the early stages of development and cannot therefore be the main livelihood for communities in the region.

The study is the beginning of academic discussions on competitiveness of IORA as a cultural and heritage tourism destination. Joint studies across the region should be undertaken that continuously explore the factors outlined in Dwyer and Kim's framework to inform policymaking in the region.

Limitations of the study

The study is not a comprehensive study of the region as not all countries are included because of lack of access to published work. Two countries, Somalia and Seychelles, do not appear in the World Economic Forum's tourism competitiveness monitor. This makes it difficult to have a clear picture of the competitiveness of the region.

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An Economic Analysis of Sri Lanka's

Indian Ocean Opportunity

Ganeshan Wignaraja[g]

Executive Director,

Lakshman Kadirgamar Institute of International Relations and Strategic Studies, Sri Lanka

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Abstract

Maritime trade – which shaped the global rise of the Indian Ocean economy – has slowed since the global financial crisis with profound economic implications for regional economies. This paper analyses the macroeconomic outlook of the Indian Ocean economy and policy implications for Sri Lanka, which aspires to become a regional trading hub. It concludes that even a slower growing post-crisis regional economy is likely to continue as an important global growth pole in the future. Sri Lanka's aspiration is partly being realised with its trade flows tiling towards the Indian Ocean economy, the increasing dynamism of its ports and its support for a regional rules-based maritime order. But the regional outlook is beset by mounting global risks and policy challenges like maritime security, ports and customs quality, trade barriers and nascent regional cooperation. Sri Lanka's growth outlook and its diplomacy are also tinged by domestic political uncertainty. Patience and perseverance at national economic reforms, quiet diplomacy and regional cooperation offer a way forward.

Keywords: Maritime Trade, transformation, global financial crisis, Small Open Economies, non-traditional security threats

[g]Ganeshan Wignaraja, Executive Director, Lakshman Kadirgamar Institute of International Relations and Strategic Studies, Sri Lanka

Introduction

This paper analyses the macroeconomic outlook of the Indian Ocean economy, consisting of twenty-eight countries of the Indian Ocean Region (IOR), and traces policy implications for Sri Lanka, which aspires to become a trading hub in the Indian Ocean. A by-product of Asia's rise is the transformation of the Indian Ocean into one of the world's busiest East West sea lanes, carrying two-thirds of global oil shipments and a third of its bulk cargo. However, the global financial crisis of 2008-2009 dampened global maritime trade and heralded a slower new "normal" world economy. These important economic issues have received scant attention in the growing literature on the Indian Ocean. Mostly from an international relation or defence studies perspective, this literature has focused on geo-political rivalries between major powers (e.g. Brewster, 2019; Cooper, 2018; Khurana, 2018; Stavridis, 2018) or the blue economy (for a survey see Doyle, 2018). After briefly defining the Indian Ocean economy and Sri Lanka's engagement through trade and diplomacy, the remainder of the paper focusses the regional macroeconomic outlook and policy challenges.

Sri Lanka's Engagement with the Indian Ocean Economy

Despite its importance in international relations and security studies, the macroeconomic significance of the Indian Ocean remains below the radar. This is partly the result of the units of analysis that are generally employed by macroeconomic studies and the novelty of research on Asia-Africa economic integration. While the International Monetary Fund (IMF) and the World Bank provide regular country and regional macroeconomic analysis, this has been confined to more traditional geographic groupings typically based on shared land borders.[1] As such, there is little literature on the outlook of Indian Ocean littoral economies as a grouping or accounting for the importance of economic links between its economies. When considered as a single unit, the 28 economies listed under the heading of the Indian Ocean in Table 1 have a substantial weight in the global economy. These economies presently make up 35.0% of the world's total population, 18.0% of its land area and 19.0% of its GDP (at PPP exchange rates).

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[1] For example, the IMF produces a bi-annual World Economic Outlook report as well as several Regional Economic Outlook reports, including for the Asia-Pacific, Sub-Saharan Africa, the Middle East and Central Asia. IMF (2018a), *World Economic Outlook 2018*, International Monetary Fund: Washington DC. IMF (2018b) *Regional Economic Outlook 2018: Sub-Saharan Africa*, International Monetary Fund: Washington DC.

*Table 1. Key Indicators for Indian Ocean Economies* (a)

	Population (2017)		Land Area		GDP (2018)	
	In Millions	*% of World*	*(Thousand Sq. Km)*	*% of World*	*in PPP Terms*	*% of World*
Indian Ocean	2,643.2	35%	22,648.8	17.5%	25,457.5	19%
	In Millions	*% of Indian Ocean*	*(Thousand Sq. Km)*	*% of Indian Ocean*	*in PPP Terms*	*% of Indian Ocean*
Singapore	5.7	0.2%	0.7	0.003%	565.8	2.2%
UAE	9.4	0.4%	83.6	0.4%	723.7	2.8%
India	1339.2	50.7%	2,973.2	13.1%	10,505.3	41.3%
Sri Lanka	20.9	0.8%	62.7	0.3%	290.6	1.1%
Bangladesh	164.7	6.2%	130.2	0.6%	761.7	3.0%
Kenya	49.7	1.9%	569.1	2.5%	177.3	0.7%
Tanzania	57.3	2.2%	885.8	3.9%	175.8	0.7%

Note: (a) *Indian Ocean Countries include: Comoros, Iran, Kenya, Madagascar, Mauritius, Mozambique, Oman, Seychelles, Somalia, South Africa, Tanzania, UAE, Yemen, Bangladesh, India, Maldives, Pakistan, Sri Lanka, Australia, Brunei, Cambodia, Indonesia, Malaysia, Myanmar, Singapore, Thailand, Timor-Leste, Vietnam*

Sources: *Compiled by LKI based on data from UN DESA, Available at: https://esa.un.org/unpd/wpp/, Accessed on May 2019; World Bank, Food and Agriculture Database, Available at: https://data.worldbank.org/indicator/AG.LND.TOTL.K2, Accessed on May 2019; IMF, World Economic Outlook Database, Available at: https://www.imf.org/external/pubs/ft/weo/2017/01/weodata/index.aspxd, Accessed on May 2019*

Sri Lanka is a classic small economy in the Indian Ocean. It has 0.8% of the region's population, 0.3% of its land area and 1.1% of its GDP. But a strategic geographical location means that many consider Sri Lanka's role to be a prime example of a small economy punching above its weight class (de Silva, 2017). The country is about ten nautical miles off the main East-West maritime trade route which sees some 60,000 ships passing through annually and only 34 nautical miles off the Southern coast of a rapidly growing giant Indian economy which makes up as much as 50.7% of regional population and 41.3% of regional GDP. The effects of a favourable economic geography and the early adoption of economic reforms in 1977 have facilitated rising Sri Lankan trade with Indian Ocean economies. As Figure 1 illustrates, the Indian Ocean region's share of Sri Lanka's total trade increased significantly before the global financial crisis from 24% annually in 1985-2000 to 33% annually in 2001-2004. It rose further in the post-crisis period to 39% annually in 2015-2018.

Figure 1. The Indian Ocean Region's Share of Sri Lanka's Total Trade
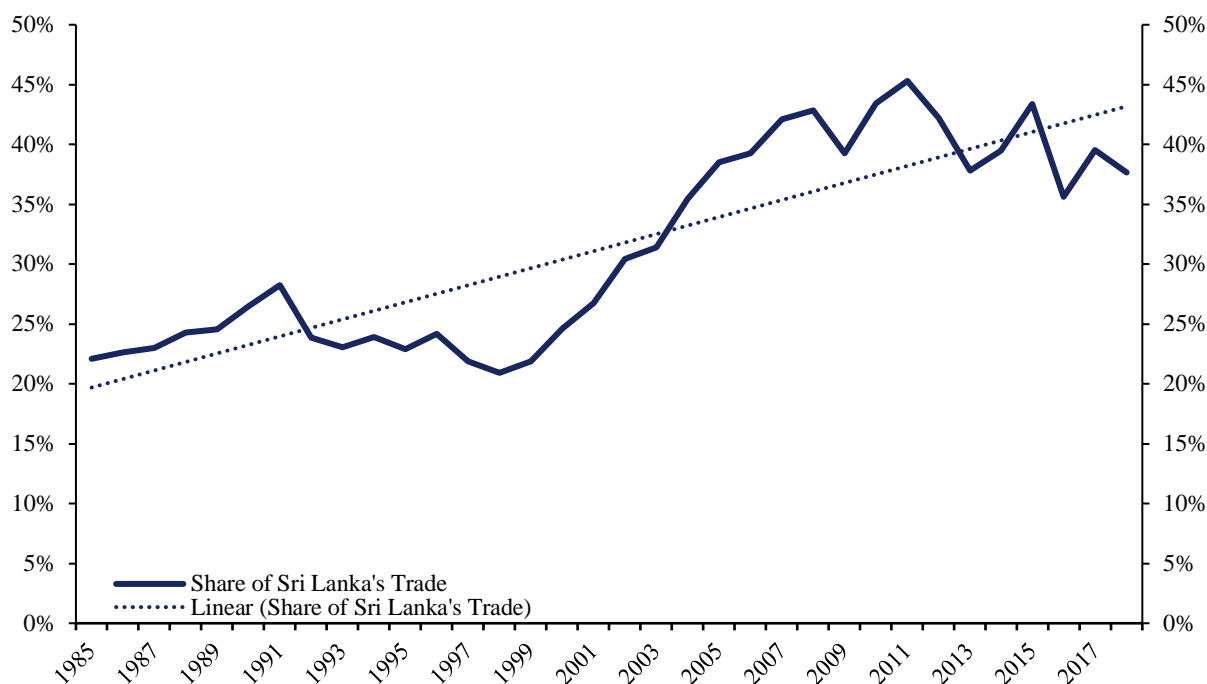
Source: LKI Calculations using IMF WEO Data. Accessed May 2019

Sources: See Wignaraja, Collins and Kannangara P. (2018) and Wignaraja, Tyson, Prizzon and te Velde (2018).

Sri Lanka has also been actively supporting a rules-based maritime order in the Indian Ocean. This is rooted in the country's commitment to membership of the Non-Aligned Movement (NAM). An increase in Soviet and United States naval activities in the Indian Ocean since the late 1960s saw the region becoming a theatre of rivalries between great powers. Sri Lanka, together with India, sought to mitigate regional maritime tensions and proposed the Indian Ocean as a zone of peace at the 26th United Nations General Assembly in 1971. But great power rivalries meant that this was not possible (Kumar, 1984). Subsequently, Sri Lanka supported multilateral efforts to develop a global maritime order. The country played a key role in formulating the 1982 United Nations Convention on the Law of the Sea (UNCLOS) which provides customs and rules to maintain order and peaceful relations on the sea.

In late 2018, Sri Lanka convened a track 1.5 dialogue on the future of the Indian Ocean (see Ministry of Foreign Affairs and LKI, 2019) highlighting the need to maintain freedom of navigation; as well as freedom of digital connectivity for the region to prosper.

As a country located in the Indian Ocean, Sri Lanka cannot afford to ignore challenges to regional maritime security, trade and environmental sustainability (Wignaraja and Panditaratne, 2019). As a small state which lacks resources- economic, political and as well as geo-strategic, it may adopt a cooperative and collaborative policy like Singapore in ASEAN, New Zealand in the Pacific and the Netherlands in Europe - that have faced similar challenges.

Regional Macroeconomic Outlook

Maritime trade in goods has fundamentally shaped the Indian Ocean economy and increasingly the world economy throughout history, but this has been especially true since the 2000s (see Pandya, Hebert-Burns and Kobayashi, 2011). This is linked to China's rise as a global manufacturing and trading hub, the strategic location the region holds along East-West shipping lanes, the relatively low costs of container shipping as a means of transporting goods internationally, and the efficiency of world class ports like Singapore and Dubai. As Table 2 shows, between 2000 and 2018 container traffic through Indian Ocean ports increased nearly fourfold to 174.1 million Twenty-Foot Equivalent Units (TEUs), that is a fifth of global container traffic. Our projection suggests that this figure could increase to 194.2 million TEUs in 2021 if past growth continues.

Table 2. Growth of Indian Ocean Container Traffic

	Million TEUs			Growth Rate	
	2000	**2018**	**2021^F**	**2001-08**	**2011-18**
Indian Ocean	46.4	174.1	194.2	11.9	5.0
Of Which:					
Singapore	17.1	34.4	40.6	7.9	2.2
UAE	5.1	20.4	23.7	14.5	3.9
India	2.5	13.4	15.0	14.5	5.3
Bangladesh	0.5	2.9	3.7	11.6	10.3
Sri Lanka	1.7	6.3	8.2	10.2	7.1
Kenya	n/a	1.4	1.5	5.2	9.3
Tanzania	n/a	0.8	0.8	3.5	6.4

Source: UNCTAD, Maritime Transport Indicators. Accessed September 2019. Available at: https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx

However, the global financial crisis disrupted regional maritime trade in two ways. First, the growth of container traffic through Indian Ocean ports has slowed since the crisis to 5.0% annually in 2011-2018 compared with pre-crisis growth of 11.9% in 2001-2008. As Table 3 shows, this has translated into slowing trade volume growth in the region and in several economies. However, Sri Lanka (up to 5.7% from 4.7%) and Bangladesh (up to 9.5% from 6.7%) bucked the regional trend.

Second, smaller ports have become a more important driver of regional maritime traffic since the crisis (see Table 2). While larger regional ports - Singapore, Dubai and the India - grew more slowly, container traffic through Sri Lanka's Colombo Port grew at 7.1% in 2011-2018, Tanzania's Dar es Salaam Port at 6.4%, Kenya's Mombasa Port at 9.3%, and Bangladesh's Chittagong Port at 10.3%.[2] Container traffic through Colombo Port tripled over two decades to 6.3 million TEUs in 2018 and could reach 8.2 million TEUs by 2021.

The region's trade slowdown since the crisis is also visible in relation to GDP growth – referred to as the income elasticity of trade – which suggests that trade has become less of an engine of growth. The ratio of regional trade growth to regional GDP growth fell to 1.0 in 2011-2018 compared with 1.7% in 2000-2008 (see Table 3). Interestingly, the decline in the regional ratio and in several economies is similar to that of the global ratio underlining the link between the global and regional economies. But slight improvements in the ratios for Sri Lanka and Bangladesh suggests that trade was somewhat more of an engine of growth in these economies.

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[2] The growth rate of container traffic based on data from the International Association of Ports & Harbors. Available online: https://www.iaphworldports.org/statistics.

Table 3. Trade and Growth in the Indian Ocean

	Trade Volume Growth			Real GDP Growth Rate			Ratio of Trade to GDP Growth (a)		
	2000-08	**2011-18**	**2019-21F**	**2000-08**	**2011-18**	**2019-21F**	**2000-08**	**2011-18**	**2019-21F**
World	6.9	4.0	3.4	4.3	3.6	3.4	1.6	1.1	1.0
Indian Ocean	9.7	5.0	4.9	5.6	5.1	5.0	1.7	1.0	1.0
Singapore	10.1	4.2	3.2	5.9	4.0	2.4	1.7	1.1	1.3
UAE	14.5	5.8	1.3	6.2	3.9	3.1	2.3	1.5	0.4
India	13.4	5.3	8.0	6.8	7.0	6.8	2.0	0.8	1.3
Bangladesh	6.7	9.5	6.2	5.8	6.8	7.1	1.2	1.4	0.9
Sri Lanka	4.7	5.7	4.5	5.4	5.2	3.3	0.9	1.1	1.4
Kenya	7.8	4.6	9.7	3.4	5.5	6.0	2.3	0.8	1.6
Tanzania	9.2	3.5	7.1	6.3	6.6	4.2	1.5	0.5	1.7

Sources: *LKI calculations based on IMF, World Economic Outlook Database, Available at: http://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx, Accessed May 2019.*

(a) Trade Growth Elasticity

With regional growth being projected at 5.0% per year in 2019-2021 on the back of a stable regional ratio of trade to GDP growth and reasonable Indian growth, the region's outlook seems stable. But downside global risks have increased including the escalating trade conflict between the US and China, volatile oil prices, and waning investor confidence in emerging markets. Small relatively open economies like Sri Lanka with small domestic markets are typically more vulnerable to global economic risks than large more inward-oriented economies like India. Sri Lanka's annual growth is expected at about 3.3% in 2019-2021 which is below the regional projection for the same period. Sri Lanka's projection is an upper bound

estimate which assumes a modest global and domestic economic downturn in 2020 and 2021. A lower bound figure of just under 3.0% for Sri Lanka may be mentioned if the dampening effect of the Easter Sunday attacks on tourism revenues, foreign investment flows and business confidence is worse than expected in 2019 and 2020.

Assuming the continuation of the trends since 2011, the region seems to continue to play a notable role in the world economy by 2025. This 'business as usual' scenario projects several key indicators for the Indian Ocean economy (see Wignaraja, Collins and Kannangara, 2019). First, the region's share of global GDP (at PPP exchange rates) is expected to rise from 18.5% to 22.1% between 2017 and 2025. Second, the region's per capita GDP (current US$) is likely to almost double from $3,200 to $6,150 in 2025. Third, disparities in per capita incomes between the region's economies are likely to continue. Between 2017 and 2025 Sri Lanka's GDP per capita could rise from $4,176 to $5,591, India's from $1,927 to $3,207, Kenya's from $1600 to $3,209, Bangladesh's from $1,592 to $2,511 and Tanzania's from $904 to $1,754.[3] Meanwhile, Singapore continues as the region's richest economy with its per capita GDP rising from $56,737 to $73,468 while UAE's GDP per capita is expected to increase from $40,152 to $54,510.

Policy Challenges Facing the Indian Ocean Economy

However, the continued economic dynamism of the Indian Ocean economy is not guaranteed and automatic. It requires relevant and comprehensive policy initiatives. The following five key policy challenges could affect the region's peace and prosperity; failing to address these challenges could mean the region underperforming relative to its potential:

i.   *Growing Maritime Security Threats*

The Indian Ocean has become an ungoverned space with economies like Sri Lanka confronting growing traditional and non-traditional maritime security threats. Fueled by a navel arms race, the Indian Ocean is at risk of strategic competition between the big powers (like the US, China and India) similar to what is occurring in the South China Sea (Brewster, 2019). This competition is fueled by freedom of navigation exercises as well as competition to access the Indian Ocean's vast undersea mineral resources, fish stocks and network of commercial ports. Worryingly, there is a heightened risk of a skirmish at sea between increasing numbers of naval vessels which could spiral into a crisis and disrupt regional trade including Colombo Port.

Among non-traditional security threats, maritime crime seems on the rise. For instance, annual drug seizes in the Indian Ocean as a whole rose from 1.1 million Kgs to 2.4 million Kgs between 2015 and

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[3] The figures for the region and for non-Asian economies are from Wignaraja, Collins, and Kannangara (2019) while the figures for Asian economies are from Wignaraja, Tyson, Prisson, and te Velde (2018). Sri Lanka's projection could be lower due to political uncertainties since the 2019 Easter Sunday terror attacks as well as Presidential and Parliamentary elections in 2019-2020.

2017.[4] This is equivalent to a rise in the Indian Ocean region's global share from 6% to 18% over the same period. Furthermore, fish stocks - which are taken for granted in Sri Lanka - are being depleted at unsustainable rates. There are worries about large fishing trawlers from neighbouring countries illegally overfishing in Sri Lankan waters which could affect marine ecosystems and fisherman's livelihoods. Sri Lanka ranks 58th out of 152 countries, and is slightly above the world average according to Poseidon's IUU Fishing Index which is a composite index measuring, IUU fishing vulnerability, prevalence and response.[5] While Sri Lanka does better than India (which is ranked 17th globally), Kenya (which is ranked 98th globally) has much lower levels of vulnerability and prevalence and a faster response system in place.

Issues relating to maritime safety and security area in the Indian Ocean has become an important area for regional dialogue among the navies of Indian Ocean economies and extra-regional economies through fora like the Indian Ocean Naval Symposium hosted by India and the Galle Dialogue hosted by Sri Lanka (Khurana, 2018). Meanwhile, global frameworks like the UN Convention on the Law of the Sea (UNCLOS) exist but some aspects may not effective for the present day and need updating (see Klein, 2011 and 2019 for a comprehensive review of UNCLOS). There are several emerging legal issues on the high seas (e.g. freedom of the high seas, flag state responsibilities and maritime security), on the exclusive economic zone (EEZ) and the continental shelf (e.g. fisheries, continental shelf and military activities in the EEZ), ports and settlement of disputes. But while gaps exist, UNCLOS remains an important element in effective governance of the Indian Ocean. Soft law solutions improved regional diplomacy and multilateral cooperation can supplement UNCLOS to mitigate security threats to the Indian Ocean economy.

ii. *Ports and Customs Quality*

Gaps in port infrastructure and onerous customs procedures impede trade as they increase the cost of moving products across borders (De, 2009). While intercountry comparison of infrastructure quality and customs procedures are difficult, some indicators provide insights. As Table 4 shows, Colombo Port's efficiency (in terms of vessel turn-around times, average waiting times and idle times) is better than those of major Indian ports (like Mumbai and Kolkata) and Chittagong Port but less than that of Singapore. Furthermore, the World Bank's Trading Across Borders indicator shows that it takes an average of 98 hours in the Indian Ocean for border compliance for imports (see Table 5).[6] Sri Lanka (72 hours) is reasonable by regional standards. Singapore (33 hours) is the fastest while Tanzania (402 hours) is the slowest.

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[4] Estimated from United Nations Office on Drugs and Crime, Database on Annual Drug Seizures. Available at: https://dataunodc.un.org/drugs/seizures-2017. Accessed August 2019.

[5] The Index has been developed by Poseidon Aquatic Resource Management Ltd., a fisheries and aquaculture consultancy company, and the Global Initiative Against Transnational Organized Crime, a Geneva-based NGO network. http://www.iuufishingindex.net/profile/sri-lanka.

[6] World Bank, Doing Business Database, Available at http://www.doingbusiness.org/data/exploretopics/trading-across-borders, Accessed August 2018

Table 4: A Comparison of Colombo and Other Regional Ports

	Colombo Port, Sri Lanka	JNPT (Mumbai) Port, India	Kolkata Port, India	Chittagong Port, Bangladesh	Singapore Port
Maximum Depth of Berth *Metres*	18.0	15.0	11.5	9.2	18.0
Container Port Capacity *TEU Millions*	7.1	9.9	0.6	1.7	50.0
Vessel Turn Around Time* *Days*	0.9	2.2	3.9	3.2	0.5
Average Waiting Time* *Hours*	0.1	0.7	0.4	0.6	7.0
Average Idle Time* *% of total time at berth*	6.9	28.7	22.6	8.6	n/a

Sources: *Herrera Dappe, Matías, and Ancor Suárez-Alemán. 2016. Competitiveness of South Asia's Container Ports: A Comprehensive Assessment of Performance, Drivers, and Costs. Directions in Development. Washington, DC: World Bank.*

Port Specifics were taken from the following:

https://www.itfoecd.org/sites/default/files/do cs/dp201408.pdf

https://openknowledge.worldbank.org/bitstream/handle/10986/24333/9781464808920.pdf?seq uence=4&isAllowed=y

https://www.singaporepsa.com/our-business/terminals

http://www.slpa.lk/

http://eresources.nlb.gov.sg/infopedia/articles/SIP_577_200 5-01-27.html

https://www.joc.com/port-news/asian-ports/port-nhava-sheva/jnpt-looking-attract-larger-ships-deeper-draft_20190513.html

http://www.kolkataporttrust.gov.in/index1.php?layout=2&lang=1&level=1&su blinkid=56&lid=92

https://dlca.logcluster.org/display/public/DLCA/2.1.1+Bangladesh+Port+of+Chittagong#id-2.1.1BangladeshPortofChittagong-BerthingSpecifications

https://www.thehindubusinessline.com/economy/logistics/with-a-new-15-meter-draft-jnpt-to-allow-bigger-container-ships-from-february/article26080105.ece#

https://www.joc.com/port-news/asian-ports/port-chittagong

http://www.maritimegateway.com/kolkata-port-aims-million-teus-throughput-fiscal/

Notes:

*Most Recent Estimates

To maintain the future competitiveness of its transhipment trade, Sri Lanka needs to implement measures to reduce costs and enhance productivity at Colombo Port as well as improve national port capacity by getting Hambantota Port fully on-stream in a cost-efficient manner. Colombo's transformation into an important container port in South Asia is linked to major investments to handle containerized cargo since the early 1980s including four new container terminals and a deepening of the main channel to 15-18 meters to accommodate larger container ships. [7] Additionally, a strategic location along global shipping routes has made Sri Lanka a transhipment centre - around 75% of container traffic through this port is transhipment. Furthermore, the introduction of private sector operators enabled consolidation of Colombo Port as a regional transhipment hub in the late-1990s. Finally, there has been technology transfers from abroad into port operation and systems such as the Chinese managed Colombo International Container Terminal set up in 2013.

With a chequered history, Hambantota Port has become a case study of unprofitable infrastructure investment and China's debt trap diplomacy.[8] A decision was taken by a previous Sri Lankan government to construct a major transhipment port at Hambantota in the early 2000s. Financed by commercial loans from the Export Import Bank of China, state-owned enterprises (SOEs) from China constructed the port. Taking longer than expected to come on stream, the project incurred financial losses and put a strain on

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[7] For a comprehensive study of South Asian ports, see Dappe, and Suarez-Aleman, 2016 while Kannangara (2019) examines the implications of India's Sagamala initiative on its ports and Colombo Port.
[8] Thorne and Spevack (2017) explore the link between China's investment in the Hambantota Port and geopolitical strategy. They argue that the terms of 99-year lease on Hambantota Port favour China, that the investment generated political influence and that Chinese debt constricts Sri Lankan policy.

Sri Lanka's public finances. In 2017, a different Sri Lankan government signed a risk sharing agreement with another Chinese SOE to manage the port for 99 years for a sum of $1.12 billion. The silver lining is that Hambantota Port is now being managed by one of China's best run SOEs - China Merchant Port Holdings Company Limited. This global port operator is not only developing Hambantota Port and the adjacent industrial zone but also working to diversify the range of port related services (e.g. ship repairing and bonded warehousing and distribution). Once Hambantota Port becomes fully operational over the next few years, container traffic through Sri Lanka may double to some 16 million TEUs. Furthermore, the Industrial zone is expected to attract new foreign investment and create jobs.

China's Belt and Road Initiative (BRI) and similar initiatives like Japan's Enhanced Partnership for Quality Infrastructure (PQI) have provided commercial loans or a mix of commercial loans and grants for port investments. Such competing mega infrastructure initiatives risk creating an "Asian Noodle Bowl" phenomena usually associated with free trade agreements and can present unintended development challenges to recipients (Wignaraja, 2019a). These include the large financial requirements raising public debt to unsustainable levels, potential negative social and environmental issues with infrastructure projects, strains to national project implementation capacity, and incentives for rent-seeking behaviour (Yoshimatsu, 2017; Hurley, Morris and Portelance, 2018). Accordingly, regional economies need to balance the need for large port and customs investments with the increased development challenges they create through comprehensive infrastructure master planning, careful infrastructure financing strategies and capacity building.

iii. Barriers to Goods and Services Trade

Average tariffs in the Indian Ocean have fallen significantly to low levels in line with global trends, but murky non-tariffs measures (NTMs) impede the expansion of goods trade. The numbers of NTM's initiated and notified to the World Trade Organization (WTO) by Indian Ocean economies rose from 128 to 751 between 2000 and 2018 (see Table 5). Furthermore, the World Bank's Services Trade Restrictiveness Index[9] which includes restrictions on foreign companies in certain sectors and entry of professionals suggests that services trade in the Indian Ocean economy (36.7) is more restricted than the OECD (19.5). Another problem is behind the border regulatory barriers – it can take as many as 22 days to complete the procedures required to start a business in the Indian Ocean economy compared with 9 in the OECD.

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[9] World Bank, Services Trade Restrictions Database, Available at: http://iresearch.worldbank.org/servicetrade/, Accessed on June 2018

Table 5. Barriers to Trade and Investment in the Indian Ocean Economy

	Weighted Avg. MFN Tariffs		Number of Non-Tariff Measures Imposed		Services Trade Restrictiveness Index	Border Compliance, Time to Import, days	Days to Start a Business
	2000	**2016**	**2000**	**2018**	**MRE**	**2019**	**2019**
Indian Ocean	7.6	2.8	128	751	36.7	98	22.3
Singapore	0.04	0.2	7	9	n/a	33	1.5
UAE	4.4	3.1	0	72	n/a	54	4
India	23.4	7.6	21	38	65.7	97	16.5
Bangladesh	18.1	12.3	n/a	n/a	44.2	216	19.5
Sri Lanka	7.0	5.0	13	3	38.2	72	9
Kenya	16.5	10.6	0	233	29.5	180	23
Tanzania	13.1	10.2	0	104	30.7	402	27.5

Source: Trade Solution (WITS), Available at: https://wits.worldbank.org/, Accessed May 2019; World Bank, Services Trade Restrictions Database, Available at: http://iresearch.worldbank.org/servicetrade/, Accessed May 2019: WTO, Trade and Tariff Database, Available at: https://www.wto.org/english/res_e/statis_e/statis_e.htm , May 2019; World Bank, Doing Business Report, Available at http://www.doingbusiness.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2018-Full-Report.pdf, Accessed May 2019

Sri Lanka's claim to be South Asia's most open and business friendly economy, having begun liberalizing early in 1977, is supported by the data. Sri Lanka had low average tariffs of 5.0% in 2016, imposed only 3 NTM in 2018 and business start-up took 9 days. These figures are favourable compared to Bangladesh and India. Nonetheless Sri Lanka's services trade remains quite restricted and some room exists for tariff reform.

Gradually reducing trade barriers will support trade expansion in the region and Sri Lanka. However, to benefit from liberalisation, factors of production needs to be reallocated between and within sectors. This structural change is a key source of the gains from trade, but brings with it costs of adjustment (Francois, Jansen and Peters, 2011). Some workers face temporary unemployment and income losses through jobs lost to international competition. Accordingly, the speed, stages, and sequencing of trade reforms need to be tailored to individual national circumstances. This should be accompanied by trade adjustment programmes to retrain workers in sectors displaced by foreign competition along with better financial access for small firms.

iv.   Middle-Income Country (MIC) Challenges

Foreign aid to Indian Ocean economies doubled to $25.1 billion between 2000 and 2016, but is concentrated in a few countries suggesting that aid allocation has been driven more by politics than economics. Glaringly, aid remains low in others which have large trade costs and low per capita incomes. Another challenge is that some like Sri Lanka may become stuck in the 'missing middle' of development finance, when total resources available fall as a country reaches middle-income country (MIC) status (see Wignaraja, Tyson, Prizzon and te Velde, 2018). Sri Lanka also lacks the requisite technical knowledge to build world class ports and customs bodies. A case, thus, exists for aid and knowledge transfer to support the MIC transition of Sri Lanka and other regional economies. Fostering public-private sector partnerships (PPPs) for port development[10] and better targeting countries with rising inequality are essential to more effectively utilise scare aid. Sri Lanka has also called for setting up an Indian Ocean Development Fund to provide loans, grants and technical assistance to enhance economic development in regional economies (Wickremesinghe, 2016).

v.   Nascent Regional Cooperation Institutions

Regional cooperation in the Indian Ocean economy occurs within a classic hub and spoke network of some 11 regional institutions and 21 bilateral and regional free trade agreements (FTAs) (see Wignaraja, Collins and Kannangara, 2018). The hub of this network is the 21-member Indian Ocean Rim Association (IORA) which does not cover all the region's major economies. Multiple spokes include mostly smaller sub-regional institutions like the South Asian Association for Regional Cooperation (SAARC) with Indian Ocean economies among their members.

Sri Lanka faces two problems. First, this network is at a nascent stage of institutional development compared to those elsewhere. Many have limited delegated powers from members, lack formal rules or legal structures, have inadequate financial resources and lack permanent secretariats. IORA's secretariat has less than 20 staff members working on six priority areas, of which promoting trade and investment is just one (Waidyatilake, 2017). SAARC is largely inactive due to long-standing tensions between India and Pakistan. The South Asia Free Trade Area (SAFTA) which came into force in 2006 is a glaring example of a partial FTA. While the stated objectives of these institutions all make some reference to pursuing economic prosperity, in practice, they have overlapping agendas with differing emphasis on promoting regional economic cooperation.

Second, Sri Lanka has limited opportunities for effective regional dialogue within this nascent network. As Table 6 shows, the country has membership of only four of the 11 regional institutions (36%) spanning the Indian Ocean. Sri Lanka is not a member of arguably the most developed regional institution – the Association of Southeast Asian Nations (ASEAN) - which is considered the conduit for Asian economic regionalism. The ten relatively small ASEAN members are collectively a party to on-going negotiations on a mega-regional FTA – the Regional Comprehensive Economic Partnership (RCEP) which includes

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[10] One such PPP project is the planned terminal for cruise ships at Colombo Port.

China, Japan, Korea and Singapore. Sri Lanka lacks a formal East Asia policy and is excluded from the RCEP talks (Wignaraja, 2019b). Nonetheless, once concluded RCEP is expected to have an open accession clause. Sri Lanka has expressed interest in joining RCEP and was hoping to use the recent Sri Lanka Singapore (SLSFTA) as a steppingstone to this end. This process may take some time as the conclusion of the RCEP negotiations are taking longer than envisaged and professional groups in Sri Lanka have expressed opposition to the SLSFTA.

Table 6. Sri Lanka's Membership of Regional Institutions in the Indian Ocean Economy

Name of Institution	Date Established	Total No. Members	Members from the Indian Ocean Region
Colombo Plan	July 1951	27	(11) Australia, Bangladesh, Brunei, India, Indonesia, Iran, Malaysia, Maldives, Singapore, Thailand, Vietnam
South Asian Association for Regional Cooperation (SAARC)	December 1985	8	(3) Bangladesh, India, Maldives,
Indian Ocean Rim Association (IORA)	March 1997	22	(22) Australia Bangladesh, Comoros, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Oman, Seychelles, Singapore, Somalia, South Africa, Tanzania, Thailand, UAE, Yemen, Maldives
Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)	June 1997	5	(3) India, Bangladesh, Thailand

Source: ADB, Asia Regional Integration Centre Database. Accessed May 2019

While Indian Ocean regionalism is likely to remain 'institution light' for the foreseeable future, the hub and spoke network around IORA could be strengthened.[11] One step would be to appoint an Eminent Persons Group (EPG) from member states tasked with developing a plan to strengthen IORA's role in regional economic governance. The EPG's review should provide a vision for IORA's role in regional economic governance, as well as delegated powers from members, formal rules and legal structures, financial

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[11] Brewster (2019) suggests that IORA attracted little interest from its extra-regional dialogue partners, which played a largely passive role but that is changing as growing big-power competition in the Indian Ocean spurs increased interest in the institution. China in particular has provided some funding and hosted events for IORA members.

resources. Apart from engaging to strengthen IORA, Sri Lanka should pursue obtaining observer status of ASEAN as a route to closer engagement with ASEAN and eventual membership of RCEP.

Conclusion

This paper examined implications of the Indian Ocean economy for Sri Lanka since the crisis. Maritime trade, particularly container traffic, has shaped the Indian Ocean economy in recent decades. That said, the global slowdown since the crisis has slowed the region's maritime trade expansion and passed through into slower regional growth. Projections suggest that a slower growing Indian Ocean seems set to play a notable role in the world economy with improved prosperity in the future.

Sri Lanka occupies a strategic location near East-West trade routes in the Indian Ocean and aspires to be a notable regional trading hub through an outward-oriented development strategy. Its ambition is party being realized with trade flows shifting towards the Indian Ocean economy as well as Colombo Port and other smaller ports seeing increasingly signs of dynamism since the crisis. Once Hambantota Port ramps up under a new port operator, Sri Lanka's competitive advantage in regional ports seems set to strengthen with the possibility of spill overs for the domestic economy. However, the outlook for a rising Indian Ocean economy could be tilted to the downside by various global risks and policy challenges. Reflecting these issues and domestic political uncertainty, Sri Lanka could have a tepid growth outlook in the near term. The road ahead for Sri Lanka's diplomatic initiative for a regional rules-based maritime order will also not be easy and may take some time.

Patience and perseverance at national economic reforms, quiet diplomacy and regional cooperation is needed. Key policy implications include: (1) relying on UNCLOS as a key framework for regional maritime governance, supplemented by soft law and improved regional diplomacy; (2) gradually reducing trade barriers along with trade adjustment; (3) continuing to improve the quality of ports and customs through investment and PPPs guided by comprehensive infrastructure master planning; (4) better aid targeting, addressing MIC challenges and establishing an Indian Ocean Development Fund; and (5) strengthening nascent regional institutions particularly IORA. Success in this venture can bring lasting economic and security gains for Sri Lanka, other regional economies and users of the Indian Ocean.

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Establishment of the IORA Working Group on Maritime Safety and Security
Maritime Safety and Security

The Initial Workshop on the establishment of the IORA Maritime Safety and Security Working Group was held by Sri Lanka as the current Coordinating Country for Maritime Safety and Security (MSS) in IORA on 4 – 5 September 2018, with Australia as co-host.

The Workshop saw an impressive gathering of participants and speakers from 17 IORA Member States (Australia, Bangladesh, India, Iran, Indonesia, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, South Africa, Sri Lanka, Seychelles, Tanzania, Thailand, UAE and Yemen), and IORA Secretariat officials.

During the two days of this Workshop, active discussions were held on the formulation and finalization of the Terms of Reference (TORs) of the Working Group on Maritime Safety and Security (WGMSS). The TORs addressed greater regional cooperation, sharing of best practices, improved coordination among relevant stakeholders, and enhancement of capability and capacity building, among other possibilities. The meeting also discussed the initiation of a draft WGMSS Work Plan, thereby signalling the serious intent of IORA Member States to build on the momentum of the Workshop through concrete actions.

Building on the momentum of the IORA Leaders' Summit in 2017 and further to the IORA Action Plan 2017 – 2021, this Workshop provided an insightful and stimulating program of events. This Workshop resulted in a historic milestone towards building a suitable MSS architecture in the Indian Ocean region based on inclusive and consensus-based cooperation among the IORA Member States.

IORA Secretariat
05 September 2018

Delegates of the IORA Maritime Safety and Security Working Group interacting on the issues of Maritime Safety and Security, 4-5 September 2018, Sri Lanka

On-going meeting among 17 IORA Member States at the IORA Maritime Safety and Security Working Group, 4-5 September 2018, Sri Lanka

2nd IORA Renewable Energy Ministerial and Experts Meetings
IORA News

Hon'ble Renewable Energy Ministers at the 2nd IORA Renewable Energy Ministerial

1.2. **The 2nd IORA Renewable Energy Ministerial and Experts Meetings, 1st International Solar Alliance General Assembly and 2nd Global Renewable Energy Investment Meeting and Expo (REINVEST- 2018) were hosted by the Ministry of New and Renewable Energy, Government of India from 2 – 4 October 2018 in Delhi NCR, India.**

The three events were jointly inaugurated by the Hon'ble Prime Minister of India, Mr. Narendra Modi, in the presence of Mr Antonio Guterres, Secretary General of the United Nations on 2 October 2018 in New Delhi. Addressing the gathering, the Indian Prime Minister said that the aim of all three events is to create the alternative of clean energy for a green future. The UN Secretary General said that climate change is an existential threat for all. Pointing out that the world is witnessing a global renewable energy revolution, he raised the hope that the age of fossil fuels will end with a replacement for them.

The combined inaugural for the 2nd IORA Renewable Energy Ministerial Meeting was also graced by the presence of the Hon'ble Prime Minister of India, Mr. Narendra

The Indian Minister for External Affairs, Ms. Sushma Swaraj said that the high level of participation in the Second IORA Renewable Energy Ministerial Meeting and the spotlight on the ISA and REINVEST is an affirmation of collective desire to take the message of renewable energy forward. She mentioned that the Indian Ocean is at the centre of the emerging age of Asia and that India considers IORA as an important

vehicle for furthering peace and security in the region, while also supporting the invigoration of IORA activities including blue economy, renewable energy, maritime safety and security, besides the development of regional HADR capacity to tackle mutual interest.

Marking yet another milestone for 2018, IORA and ISA signed a Memorandum of Understanding on 3 October 2018. Recognising renewable energy as an efficient solution to address challenges of energy access, energy security and climate change, this MoU is aimed at enhancing sustainable development and deployment of solar energy within the region.

Signature of the IORA and ISA Memorandum of Understanding on Renewable Energy by H.E Dr. Dr Nomvuyo Nokwe, Secretary General of IORA and H.E. Mr. Upendra

The Second IORA Renewable Energy Experts Meeting held on 3 October 2018 provided a platform for experts to discuss energy needs within the region, identifying challenges in cooperation and coordination among concerned agencies and potential avenues of collaboration. The Experts Meeting included sessions on energy needs for IORA, renewable energy vistas, challenges in renewable energy implementation (G2B) and possibilities and opportunities for international collaboration and resulted in an outcome document entitled "Key Takeaways". Experts highlighted the need for capacity building and conceptualised the way forward for renewable energy in IORA through this document.

The Second IORA Renewable Energy Experts Meeting held on 3 October 2018

The "Key Takeaways" were read out and adopted at the IORA Renewable Energy Ministerial held on 4 October 2018. 17 Member States represented by Energy Ministers and Senior Officials and Experts participated in the event and adopted the Delhi Declaration on Renewable Energy to move forward on the path of sustainable development.

IORA Secretariat
04 October 2018

Meeting of IORA Cluster Group on Disaster Risk Management
Disaster Risk Management

1.3. **The Meeting of the IORA Cluster Group on Disaster Risk Management concluded successfully today, 6 February 2019. The Meeting resulted in the development of a draft Work Plan for DRM in IORA which includes a proposal to establish a DRM Core Group, among other objectives.**

The two-day workshop was organised by the Ministry of External Affairs, Government of India in collaboration with the National Disaster Management Authority (NDMA) and the National Disaster Response Force (NDRF) and the Indian Ocean Rim Association (IORA) at Pravasi Bhartiya Kendra, NewDelhi, India.

Although in principle a meeting of only the four DRM Cluster Group Members, the event was attended by 8 IORA Member States. Participants included senior diplomats, experts, special invitees, high ranking officials of the navy, coast guard, NDRF, NDMA and IORA Secretariat officials.

Discussions were held on various topics including strengthening of regional cooperation, building international collaborations, research and information exchange, capacity building and capability enhancement, sharing of best practices, data and early warning technologies, among others.

The draft Work Plan is to be circulated among all IORA Member States for additional inputs, to pool into the finalization of the document.

IORA Secretariat
06 February 2019

On-going meetings among the 8 Member States of the Cluster Group on Disaster Risk Management, 5-6 February 2019, New Delhi, India

"..the natural urge of the facts of geography should broaden itself to include the concept of an Indian Ocean Rim for socio-economic co-operation...

- Late President Nelson Mandela of South Africa

Indian Ocean Rim Association
3rd Floor, Tower 1, NeXTeracom Building
Cybercity, Ebene,
Republic of Mauritius
hq@iora.int +230 454 1717 +230 468 1161

www.iora.int   f @iora20   @IORA20

@indianoceanrimassociation