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An Extensive Study of Mauritius' Innovation-Driven Entrepreneurial Economic Ecosystem

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An Extensive Study of Mauritius' Innovation-Driven Entrepreneurial Economic Ecosystem

A STRUCTURAL AND PLACE-SPECIFIC ANALYTICAL PERSPECTIVE TO DRIVE SUSTAINABLE DEVELOPMENT GOALS

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Abstract

This report supports the diagnostic phase for the formulation of the STI for SDGs roadmap of Mauritius. It focuses on the mapping of the entrepreneurial innovation-driven economic ecosystem's structure and social dynamics of Mauritius, assessing place-specific conditions and capacities. The analysis experiments participatory processes involving various stakeholders, aiming to discern effective interaction practices and evaluate foundational institutions, innovation capabilities, and entrepreneurship capacities.

The document unfolds in distinct sections, first presenting an overview of Mauritius' innovation-driven entrepreneurial economic ecosystem, followed by a detailed examination of the structural analysis methodology used by GED. The iEcosystem model is introduced to emphasize the significance of context in shaping economic ecosystems, drawing comparative results with other regions. Subsequently, the report offers recommendations informed by statistical correlation analyses between context and capacity indicators and selected SDGs, providing valuable insights for local actors designing programs and initiatives to foster entrepreneurship and innovation for sustainable development.

In conclusion, the report provides a comprehensive understanding of the innovation-driven entrepreneurial economic ecosystem in Mauritius, offering insights into its structure, context, and capacities. The findings aim to guide stakeholders in formulating the STI for SDGs roadmap, as well as to design initiatives to strengthen the ecosystem and promote sustainable development. The annex section further facilitates a deeper exploration of the methodologies employed in the document.

1. Introduction

The Science, Technology, and Innovation (STI) for Sustainable Development Goals (SDGs) Roadmaps in Africa project aims to develop operationalized roadmaps for investment in research and innovation priorities across African countries. The JRC's approach considers the potentials and challenges of each target country and leverages science, technology, and innovation to tackle societal, environmental, and economic issues while aligning with the Sustainable Development Goals (SDGs).

The project aims to formulate effective STI policies and strategies, enhancing innovation ecosystems to achieve the SDGs in Africa. As part of this mission, the JRC is seeking complementary approaches to study the context of innovation economic ecosystems. Developing operationalized roadmaps for investment in research and innovation priorities across African countries, considering the unique potentials and challenges of each target country, will allow for the formulation of effective STI policies and strategies, enhancing innovation ecosystems to achieve the SDGs in Africa.

Since 2010, Smart Specialisation has emerged as an innovative approach to innovation within the European Union (EU)'s cohesion policy. It promotes balanced development in European regions through the allocation of financial resources. Specifically, Smart Specialisation aims to boost jobs, growth, and investment through place- and fact-based strategic plans that support innovation-led territorial development, address local societal challenges, and contribute to the reduction of economic, social, and territorial disparities.

Based on participatory processes involving actors from businesses, universities and research centres, government, and civil society, Smart Specialisation Strategies enable each country or region to detect and exploit its competitive advantages in order to move up global value chains. During the first half of 2022, the Joint Research Center (JRC) has already worked on mapping the STI system in Africa, without any specific focus at the national level. As part of the project, fourteen countries have been identified as potential candidates for the development of Science, Technology, and Innovation (STI) for Sustainable Development Goals (SDGs) roadmaps at the national level. After a rigorous selection process, six countries have been chosen to participate in this initiative (The Gambia, Malawi, Mauritius, Namibia, Rwanda, and Seychelles).

To assess the underlying conditions that foster innovation-driven entrepreneurship within one of these six countries, the Joint Research Center (JRC) has sought the assistance of the Global Ecosystem Dynamics Initiative (GED) with two specific objectives:

a. Conduct an in-depth study of the structure and social dynamics of Mauritius' entrepreneurial innovation-driven economic ecosystem. This study aims to integrate the various actors within the ecosystem, taking into account their respective contributions and values. The objective is to determine the most effective interaction practices to be implemented within each ecosystem.

b. Undertake an assessment of the place-specific conditions and capacities within Mauritius' entrepreneurial innovation-driven economic ecosystem. This assessment will evaluate the foundational institutions, innovation capabilities, and entrepreneurship capacities necessary to generate social and economic impact towards sustainability. It will utilize a range of globally available indicators to gain insights into the correlation between these factors and the United Nations Sustainable Development Goals (SDGs).

This document presents the findings from two distinct perspectives: the analysis of the ecosystemic structure and composition, which is built upon the relationships among its various actors, and the analysis of the place-specific conditions and capacities within the ecosystem. Both of these macro components of an ecosystem interact and reinforce each other, making them equally significant when formulating strategies and initiatives aimed at fostering the development of the economic ecosystem as a whole. Each analytical perspective is accompanied by its own methodology, which will be further elucidated in their respective sections.

Firstly, the document provides a comprehensive description of the Mauritius innovation-driven entrepreneurial economic ecosystem, offering general data to enhance the understanding of its context. This section aims to provide a comprehensive overview of the ecosystem, including its key characteristics and contextual factors that influence its functioning.

Secondly, the document describes the structural analysis methodology implemented by GED, examining it from both conceptual and methodological perspectives. This methodology is used to analyze the dynamics of collaboration among actors and to derive the resultant ecosystemic structure. The section also presents the results obtained in Mauritius, discussing the purpose and composition of the ecosystem through the roles played by its actors. Additionally, a glossary of terms is provided in Annex to facilitate the interpretation of the results.

Thirdly, the document explores the significance of the context in shaping economic ecosystems, utilizing the iEcosystem model. This section delves into the theoretical foundations and methodology employed for data collection and analysis. It also presents the comparative results with other selected regions of interest.

Subsequently, a section of recommendations that can strengthen the innovation-driven entrepreneurial economic ecosystem in Mauritius. These recommendations are informed by the analysis of the ecosystem's structure, context, and capacities, using a statistical correlation analysis conducted by GED between context and capacity indicators and a set of selected Sustainable Development Goals (SDGs). This approach can provide valuable insights for local actors within Mauritius' ecosystem when designing programs and initiatives that foster entrepreneurship and innovation to promote sustainable development.

Finally, an annex section is included, providing additional information that allows readers to delve deeper into the methodologies employed in the document.

2. Mauritius: An Emerging Hub of Innovation and Entrepreneurship in Africa

Mauritius has made remarkable progress in establishing itself as a leading example of innovation and entrepreneurship. According to the Global Innovation Index (GII) 2022 (WIPO, 2022), Mauritius has significantly improved its global ranking among the 132 featured economies, climbing from 52nd place to 45th place in just two years. This notable advancement positions Mauritius as the top performer among 27 economies in the Sub-Saharan Africa region. Furthermore, Mauritius surpasses the regional average across all pillars of the GII, highlighting its comprehensive approach to cultivating an environment that fosters innovation and entrepreneurship. In the upper-middle-income group, Mauritius ranks sixth, solidifying its prominence within the region.

Mauritius has also demonstrated its commitment to facilitating entrepreneurship through its exceptional performance in the "Ease of Doing Business" index. In 2020, the country secured the impressive 13th position globally (World Bank, 2024). Within the Sub-Saharan Africa region, Mauritius stands at the forefront, holding the top rank. These achievements reflect Mauritius' favorable business environment and entrepreneur-friendly policies, which have contributed to the flourishing start-up culture in the country.

Mauritius has made significant investments in developing a robust entrepreneurial ecosystem that nurtures startups and fosters innovation. The presence of incubators, accelerators, and co-working spaces creates an environment conducive to knowledge sharing and collaboration among entrepreneurs. Moreover, the government's support through financial incentives, tax benefits, and grants for startups enhances the country's attractiveness as a destination for innovative ventures.

Mauritius has demonstrated a strong commitment to promoting research and development (R&D) as a driver of innovation-driven growth. According to the World Bank, the country has increased its R&D expenditure as a percentage of GDP from 0.35% in 2018 to 0.42% in 2020 (World Bank, 2024). This consistent investment in R&D across various sectors reflects Mauritius' focus on technological advancement and knowledge creation, laying the foundation for continued economic diversification and innovation.

Additionally, Mauritius has achieved the top position in Africa in the International Property Rights Index, indicating a robust system for protecting intellectual property rights (IPRA, 2022). Strong legal frameworks and efficient enforcement mechanisms for intellectual property rights play a crucial role in encouraging innovation and creativity.

Mauritius' strong performance in international rankings underscores its commitment to fostering innovation, sustainable economic growth, and an enabling environment for entrepreneurs. As a trailblazer in sub-Saharan Africa, Mauritius is well-positioned to continue its upward trajectory and serve as an example of how a nation can harness innovation and entrepreneurship to drive social and economic progress for the benefit of its citizens.

3. A Structural Analysis for Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem

For the purpose of this work, economic ecosystems are defined as communities of actors and individuals who interact with each other and their environment within a specific region. These ecosystems are shaped by social and natural dynamics and involve the exchange of resources with the goal of creating economic value (Tedesco, M. S., 2022).

To gain a deeper understanding of the social dynamics and structures within economic ecosystems, the Global Ecosystem Dynamics Initiative (GED) has developed a theoretical and applied framework that can be utilized for this purpose.

The approach employed in this study situates the analysis of economic ecosystems within the framework of Complex Systems Theory, drawing insights from various academic sources (Foster, J., 2004; Crawford, T. W., et al., 2005; Meadows, D., 2008; Farmer, J. D., 2012; Earls, J., 2013; Tedesco, M. S., 2020). By adopting a complex systems perspective, the study considers the dynamic and structural characteristics of economic ecosystems, including properties such as efficiency, robustness, resilience, and susceptibility to collapse (Thurner, S., et al., 2018). These properties are quantitatively measured using a carefully selected set of metrics derived from Complex Network Analysis techniques (Tedesco, M. S., 2022; Tedesco et al., 2022).

The methodological framework proposed in this study aims to provide a systematic and in-depth examination of collaboration among actors within an innovation-driven entrepreneurial economic ecosystem. Each participating actor is assigned a value based on their contribution, facilitating the identification and implementation of optimal interaction practices within the ecosystem. Leveraging advanced analytical tools such as Complex Network Analysis and the TE-SER model (Tedesco, M. S., & Serrano, T., 2019), this approach enables a comprehensive understanding of the collaboration dynamics and ecosystemic structure within the specific research context.

3.1 Structural and Composition Analysis Methodological Approach

3.1.1 The TE-SER model

To comprehensively analyze the composition and value diversity of an economic ecosystem, Tedesco, M.S., & Serrano T. (2019) propose a rigorous model that classifies actors based on their roles and the value they contribute to the ecosystem. This model consists of six distinct but complementary categorizations: Articulators, Enablers, Linkers, Knowledge Generators, Promoters, and Communities[1]. Each categorization represents a specific type of actor within the ecosystem, highlighting their specific role and contribution.

[1] A comprehensive description of each type of role, the value they provide, and the type of organization that traditionally fulfills these roles is included in Appendix 1 of this document.

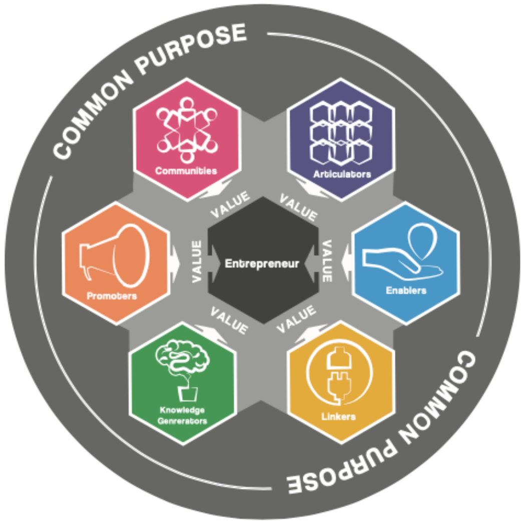


Figure 1. The TE-SER Model to Describe Economic Ecosystem Roles, Values and Social Dynamics (Tedesco, M. S., & Serrano, T., 2019)

Figure 1 The TE-SER Model to Describe Economic Ecosystem Roles

The categorizations within this model have been mathematically and empirically validated, ensuring their reliability and effectiveness in capturing the complex dynamics of economic ecosystems (Tedesco, M.S., & Serrano T., 2019). The model provides a comprehensive understanding of the actors' roles, the values they provide, and the interactions that shape the ecosystem. It enables researchers and practitioners to analyze and visualize the collaboration dynamics and ecosystemic structure of the economic ecosystem under study.

It is worth noting that the proposed model acknowledges the dynamic nature of economic ecosystems, allowing for the transformation and acquisition of different roles by organizations over time. Additionally, organizations can simultaneously assume primary and secondary roles, reflecting the multifaceted nature of their contributions within the ecosystem.

For a more detailed description of each categorization and its significance within the economic ecosystem, please refer to the Glossary section of this document.

The categorization of actors in this model deviates from the triple helix or quadruple helix model (Etzkowitz, H., & Leydesdorff, L., 1995; Ivanova, I., 2014; Carayannis, E., & Grigoroudis, E., 2016) which focuses on the sectors of the economy. Instead, it emphasizes the role and value that organizations bring to the economic ecosystem, with the objective of fostering collaboration among actors.

In this model, actors are defined as organizations or initiatives that exist within and for the economic ecosystem, with the purpose of providing support to innovators, entrepreneurs, and other users of the ecosystem. These actors play a vital role in facilitating interactions and generating value within the ecosystem. On the other hand, stakeholders are defined as organizations that may not meet the criteria of actors but are affected by, or have a positive or negative impact on, the economic ecosystem through their interactions.

The model has been successfully applied to various types of ecosystems, including social innovation, entrepreneurial innovation-driven ecosystems, and traditional entrepreneurship (Tedesco et al., 2018; Tedesco et al., 2019; Tedesco et al., 2020a, b, c, d, e; OECD/IDB, 2022). It provides a flexible framework for understanding and analyzing economic ecosystems. In the context of this work, the definitions and categorizations used will primarily focus on entrepreneurial innovation-driven economic ecosystems.

3.1.2 Complex Network Analysis (CNA)

The collaborations described in this study are further analyzed and visualized using network graphs, enabling the assessment of structural metrics and other important attributes of the ecosystem. In order to enhance this assessment, GED has introduced two concepts: the collaboration index (Tedesco, M. S., et al., 2020) and gravitational centers (Tedesco, M. S., 2020).

The collaboration index is a measure that reflects the capacity of the ecosystem's structure to maintain equilibrium and adapt to external changes or internal disruptions. It is not developed as a ranking system, but rather as a mathematical formula that captures various graph metrics related to robustness, resilience, efficiency, and vulnerability to collapse. This index can be compared with results from other studies to gain insights and draw meaningful comparisons.

The following table presents selected metrics from Complex Network Analysis, chosen for their utility, along with their corresponding descriptions and the interpretations used by GED to describe the structure of economic ecosystems in their studies, including the present one. The metrics specifically selected to calculate the Collaboration Index are described by Tedesco, M. S., et al., (2022).

Metric	CNA Meaning	Interpretation for economic ecosystems	Useful feature(s) to be measured	Range
Average shortest path length	The average number of steps or connections throughout the shortest routes for all of the possible pairs of nodes on the network.	The average number of contacts or connections that separate an actor from any other actor in the ecosystem.	Ecosystem's efficiency.	From 1 to n-1
Central point dominance	Average of the differences between the betweenness centralities metrics of all the nodes to the maximum betweenness centrality in the graph.	How centralized is the system. How much power does the most influential actor in the system have.	Ecosystem’s proneness to collapse	From 0 to 1.
Average clustering coefficient	Centrality assigning to a node the density of its egocentric graph when restricted to its neighbors.	To which extent is collaboration observed between the collaborators of an actor	Ecosystem robustness	From 0 to 1
Global efficiency	The inverse of the average characteristic path length between all nodes in the network.	How well information can travel through the network.	Ecosystem’s efficiency.	From 0 to 1
Average eccentricity	Average of the centrality that assigns, to each node, the greatest shortest path length possible to another node in the graph.	How far an actor can be from another within the system itself.	Ecosystem’s compactness and size.	From 1 to n-1
Average degree	The average number of edges incidental to the total number of edges to the node; the total number of edges in the network divided by the total number of nodes in the network.	The average number of collaborations in which an actor has participated.	Amount of collaborations in the ecosystem.	From 0 to infinity
Modularity	The fraction of the edges that fall within the given groups minus the expected fraction if edges were distributed at random.	How sparse are the connections between different modules or communities in the system.	Ecosystem’s proneness to collapse	From -1/2 to 1
Transitivity	Fraction of all the possible triangles present in the graph; density of triangles.	How likely is it that two actors collaborating with the same actor are also in collaboration with each other.	Ecosystem robustness	From 0 to 1

Rich Club Coefficient	Maximum density possible of the graph if restricted to the nodes with degree at least *k*, up to choice of *k*.	How much collaboration can be observed between the most active agents of the system.	Ecosystem robustness	From 0 to 1

Table 1. Common CNA metrics and their usefulness in measuring economic ecosystems (Tedesco, M. S., et al 2022).

Gravitational centers, on the other hand, refer to actors within the ecosystem that are deemed to be key due to their perceived relevance, connectedness, and strategic position within the network. These actors are identified through the evaluation of selected node metrics and subgraph parameters, highlighting their significance in shaping the ecosystem.

Together, these concepts provide valuable insights into the structure and dynamics of the economic ecosystem, shedding light on the collaborations and actors that play pivotal roles in its functioning.

The approach also encompasses a statistical and descriptive analysis of the following indicators, while employing the TE-SER model to classify the actors within the ecosystem and gain a deeper understanding of the collaboration dynamics among them:

- Key organizations: These are the organizations that have played a crucial role in the establishment and growth of the actors interviewed.
- Intensity: This refers to the strength of collaborations among actors, taking into account the relevance and impact generated as a result.
- Interactions required: This measures the number of meetings, calls, or significant digital exchanges needed for a collaboration to be initiated or dismissed, reflecting the ecosystem's ability to collaborate efficiently.
- Success: This indicates the percentage of collaborations that have been evaluated as successful, unsuccessful, or unachieved.
- Collaboration agreements: This represents the percentage of collaborations that involved a formal collaboration agreement or Memorandum of Understanding (MOU).
- Directionality: This examines who initiated the collaboration between the actors involved.
- Reason for collaboration: This explores the motivations behind why different actors seek collaboration with others.

The present study employs both Complex Network Analysis (CNA) and the TE-SER model to analyze the structural conditions of the economic ecosystem and its composition. To facilitate a comprehensive understanding of the terminologies used throughout the analysis, a detailed glossary of terms with their respective meanings has been provided in Appendix 1 of this document.

3.1.3 Data acquisition

The data collection process for the complex network analysis of Mauritius' innovation-driven entrepreneurial economic ecosystem employed a two-pronged approach, involving both an in-person workshop and a computer-based research instrument.

To identify potential participating organizations, a comprehensive desk research was conducted, supplemented by suggestions from the Mauritius Research and Innovation Council (MRIC). This initial phase resulted in the compilation of a directory consisting of 83 organizations deemed relevant to the ecosystem.

Subsequently, invitations were extended to these organizations to attend an in-person workshop, and 21 organizations participated in the workshop. The workshop was specifically designed for organizations leaders and representatives actively involved in Mauritius' innovation-driven entrepreneurial economic ecosystem. The workshop aimed to foster participation and engagement among the attendees and consisted of a series of activities and group discussions centered around the ecosystem's purpose, available resources, and the formulation of initiatives to enhance its strength through effective inter-organizational collaborations.

During the workshop, participants were also requested to complete a research instrument[2], which served as a valuable data collection tool for conducting a comprehensive complex network analysis of Mauritius' innovation-driven entrepreneurial economic ecosystem.

The research instrument asked participants to mention the actor that had been key to their organization's establishment in Mauritius' ecosystem, the actor that is currently key to the growth of their organization, and up to 25 of their most relevant collaborations with other actors over the last 3 years. Participants were also asked to provide additional information for at least 10 of their collaborations mentioned, such as the directionality of the interaction, its perceived intensity, and the reason for collaborating.

To ensure the quality and diversity of the sample, after an initial analysis of the data provided by workshop attendees, a second batch of online instruments was sent to other actors who were highly mentioned by participants but did not attend the workshop. A total of 28 individuals from 26 different organizations completed the research instrument[3]. After data cleaning and preprocessing, network data from 23 different organizations met the necessary parameters (Tedesco, M. S., et al., 2022) to be used in the analysis. Responses from individuals who did not meet the participant's profile or did not provide viable network data within the boundaries of the study were discarded.

The distribution of the sample by actor type according to the TE-SER model in this study remains consistent compared to the rest of the studies conducted by GED, as can be observed in Appendix 3, Section A. It is also worth noting that the high number of actors fulfilling the role of "Enablers" is in line with the trend of a high percentage of this type of actor within economic ecosystems, as shown in the same appendix and as previously described theoretically by Tedesco M. S. & Serrano, T. (2019).

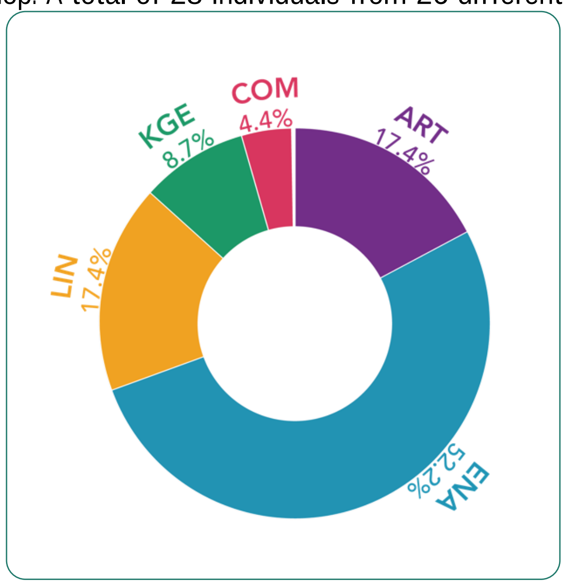


Figure 2. Distribution by role type (TE-SER) of the included respondent actors in the study

It is worth noting that, unlike analysis done with conventional data, there is no unambiguous notion of sample size for network data (Kolaczyk & Krivitsky, 2015) as mathematical approaches to network analysis usually treat the data as deterministic (Hanneman & Riddle, 2005). However, the experiments

[2] A complete version of the research instrument in English can be found in Appendix 4.
[3] A comprehensive list of the participating actors in the study can be found in Appendix 2.

conducted by GED on synthetic networks while developing the formula for the Collaboration Index (Tedesco, M. S., et al., 2022) and results from the studies carried out on comparable ecosystems have shown that samples similar in size and distribution to the one used in Mauritius are able to effectively capture the intricacies and structure of an economic ecosystem.

The workshop and its activities, as well as the research instrument, were designed following the principles of Lean Research. This approach aims to align research processes with four principles: rigor in the process and results, relevance of the research to diverse and multiple audiences, including participants in the research, respect for all participants in the process, and a research process of appropriate size: rigor, relevance, respect, and right size (Hoffecker, E., et al., 2015; Krystalli, R., et al., 2021). The goal is to achieve a balance between the collection and dissemination of information and to create an experience that is relevant and valuable for the participants, not just the researchers.

3.1.4 Data cleaning and pre-processing

The data cleaning and preprocessing involved several steps to ensure the accuracy and integrity of the collected information. This included correctly labeling and merging identical nodes, which involved unifying organizations that were referred to by different names or abbreviations by different participants. Additionally, secondary research was conducted to gather additional information and accurately classify the organizations based on the proposed roles in the TE-SER model.

A thorough review was conducted, and responses that did not contain viable network data, lacked specific organization information for collaboration, or involved organizations outside the predefined system boundary were excluded from the analysis. Only collaborations that included additional information such as directionality, reason for collaboration, or perceived outcomes were subjected to statistical analysis of qualitative variables. However, all collaborations that had at least a source (participant) and a target (mentioned organization) were included in the network analysis and visualization. The data obtained from our instrument allowed us to aggregate the ego-centered networks of each participant's direct connections, an approach which can be extended to map collaborations on a very large scale (Contandriopoulos, D., et al., 2016)

The data was codified as a directed graph with weights, utilizing *ForceAtlas2* (Jacomy et al., 2014) as a force-directed layout for the visualization of the network. Edge weights are set according to the survey question *"How would you rate the intensity of this collaboration? (1 Barely intense / relevant – 5 Very intense / relevant)"*, and node size is determined by its weighted in-degree, the amount and intensity of the mentions it received from other participants.

While edge directionality provides additional context on the collaboration dynamics within the ecosystem, the majority of graph metrics used for our analysis are calculated while interpreting the network as undirected, since our focus is on evaluating the structural soundness of the system through the existence of links between different actors.

Gravitational centers (Tedesco, M. S., 2022), nodes that had a significant number of mentions by other participants and that are highly connected to other highly connected nodes, are identified by meeting the following criteria:

- Belonging to the *k–1-core* subgraph, in which all nodes have a degree of at least k –1 after a recursive elimination process, with k being the maximum value possible that continues to generate a connected component.
- Having an in-degree value above the 95th percentile of the other nodes presents in the network.

Further details on the methodology and the calculation of the collaboration index can be found in Tedesco, M. S., (2022) and Tedesco, M. S., et al., (2022)

3.2 Mauritius Entrepreneurial Innovation-Driven Economic Structure and Composition

3.2.1 The relevance of defining the Purpose in Economic Ecosystems.

Meadows, D. (2008) asserts that a system lacking a defined purpose cannot be considered a true system but rather a collection of agents and connections. This principle holds true for any complex system, including economic ecosystems. An economic ecosystem that fails to align with the societal needs it serves runs the risk of becoming isolated and ineffective. Furthermore, the notion of purpose extends beyond individual actors or companies within the ecosystem; it also encompasses the purpose of the nation itself. Hoffecker, E. (2014) suggests a potential correlation between a nation's articulated purpose and the strength and maturity of its economic ecosystem.

In the study of economic ecosystems, integrating a clear understanding of purpose can serve as a catalyst for collaboration among its diverse actors. The process of collectively defining a shared purpose becomes a transformative and enriching experience for all participants (Tedesco, M. S. & Serrano, T., 2019). To facilitate this, a workshop employing interactive activities and collective reflection was conducted, drawing on the Lean Research Methodology (Hoffecker, E., et al., 2015; Krystalli, R., et al., 2021). The workshop engaged the participating actors, categorized according to the roles defined in the TE-SER model, to foster a shared sense of purpose and encourage collaborative efforts within the ecosystem.

One of the main dynamics of interaction within the ecosystem is the exploration of a collective purpose through an analysis of the ecosystem's current value proposition. This includes deliberate contributions made by the ecosystem itself for the benefit of its members, as well as unplanned elements that arise without direct involvement from its members. This social dynamic has led to the emergence of three resultant ecosystem purposes:

- Building together:
    - Stronger sustainable, inclusive, and relevant Mauritius
    - Wealth building & increase in quality of life.
    - Retain talent and make Mauritius attractive to the youth.
    - Converge efforts.
- Enable a seamless journey from ideation to go-to-market for an inclusive, sustainable, and resilient economy.
- Innovation for sustainable growth leading to the distributed social and economic well-being of society.

The pursuit of common goals through a collaborative approach involving various actors is of paramount importance to Mauritius, as well as any economic ecosystem (Hoffecker, E., 2014). The expressions of local actors underscore the central objective of this endeavor, which includes enhancing the overall strength and relevance of the nation by embracing sustainable practices and ensuring inclusivity. Simultaneously, the focus is on promoting economic prosperity and enhancing the quality of life for citizens.

In particular, the actors engaged in this collaborative effort express a compelling desire to retain talented individuals within the country and foster an appealing economic ecosystem for the younger generation. The overarching aspiration is to unite diverse efforts and initiatives, thereby avoiding duplication and maximizing their collective impact, ultimately propelling Mauritius towards a promising future.

The mentioned purposes also emphasize the importance of facilitating the transformation of innovative concepts into marketable products or services while ensuring a seamless transition. Furthermore, there is a proactive commitment to fostering an inclusive economy that considers the diverse segments of society, while adhering to sustainability principles and minimizing environmental impact.

Aligned with the overarching vision, actors within the Mauritius entrepreneurial innovation-driven economic ecosystem acknowledge the crucial role of resilience in effectively navigating and overcoming challenges and uncertainties. This resilience extends not only to the internal environment of the country but also to the external context in which they operate. The actors in Mauritius aspire to pave the way for a dynamic and progressive economic landscape that is both socially inclusive and environmentally sustainable, ultimately promoting sustainable growth and development.

During the discursive workshop session, participants underscored the fundamental role of innovation as a primary catalyst for achieving sustainable economic growth. The central objective is to ensure an equitable distribution of the benefits derived from economic progress and development, thereby leading to greater social well-being and enhanced economic opportunities for all members of society. This recognition of the transformative potential of innovation highlights the importance of directing research, creativity, and innovative ideas towards driving positive changes in economic domains, fostering an environment where social advancement and economic advancements are mutually reinforcing. As a result, this approach promotes a prosperous and inclusive society.

The collaborative approach pursued in Mauritius aims to strengthen the country's position and relevance by prioritizing sustainability and inclusion. By placing emphasis on economic prosperity and enhancing the standard of living for its citizens, collective efforts seek to propel Mauritius towards a more prosperous and resilient future. The adoption of innovation as a catalyst for sustainable economic growth and social progress lies at the heart of this vision.

3.2.2 Findings of the Structural Analysis

The comprehensive analysis of the Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem uncovers a cohesive and collaboration-focused ecosystem. This assessment presents valuable findings that can inform the formulation of public and private plans aimed at nurturing entrepreneurship and innovation in the region. By recognizing the positive elements and dynamics within the ecosystem, policymakers and stakeholders can develop targeted strategies to foster an enabling environment for entrepreneurial ventures. This evidence-based understanding of the ecosystem's characteristics and interactions serves as a foundation for the design and implementation of effective initiatives, policies, and programs that facilitate the growth and success of innovative enterprises. By capitalizing on the strengths of the ecosystem, decision-makers can foster an environment conducive to entrepreneurial activity, thereby driving economic development and creating opportunities for sustainable innovation.

It is important to allude to the fact that all references to data and findings pertaining to ecosystemic structures and compositions in other cities and countries studied by GED are solely for the purpose of contextualizing the findings in Mauritius' innovation-driven entrepreneurial economic ecosystem and should not be construed as a basis for direct comparison. The analysis and insights presented in this study are specific to Mauritius and its distinctive natural, social, and economic context. With that being said, before diving into all the specific results, it is important to highlight some of the key findings provided by this structural analysis:

a) Mauritius achieved a Collaboration Index of 6.7[4] indicating a medium-high level of collaboration within the economic ecosystem. The Collaboration Index observed by GED in 20 comparable ecosystems studied since 2019 ranges from the lowest of 4.85 (Sao Paulo) to the highest of 7.31 (Valencia). Mauritius ranks among the top 5 performers in this index. This index serves as a quantitative measure of the extent to which actors within the ecosystem engage in ongoing collaboration and exchange of various assets, including information, resources, knowledge, and contacts (Tedesco, M. S. et al., 2022). The Collaboration Index takes into account the overall structure and dynamics of the network, considering factors such as robustness, efficiency, flexibility, and propensity for collapse.

The calculation of the Collaboration Index incorporates metrics derived from Social Network Analysis, such as Global Efficiency, Transitivity, and Eccentricity. These metrics provide insights into the efficiency and effectiveness of collaboration within the ecosystem, the extent to which collaborations are interconnected, and the overall structure of the network.

A higher Collaboration Index signifies a stronger level of collaboration and a more conducive structure for collaboration within the ecosystem. This indicates that the actors are actively engaged in cooperative activities, sharing resources, knowledge, and expertise, which can contribute to the overall success and growth of the entrepreneurial ecosystem.

b) The innovation-driven entrepreneurial economic ecosystem in Mauritius exhibits a well-distributed leadership structure with seven different actors classified as Gravitational Centers. This is accompanied by extensive interaction among highly connected actors, as demonstrated by the network's Rich club coefficient value of 0.76, which is the second-highest observed so far by GED in an innovation-driven entrepreneurial ecosystem.

Even though Gravitational Centers include four out of the six categories defined in the TE-SER model, further analysis shows a considerable dependency on Articulators. According to the behavior of a complex system network, the diversity of actors could play a crucial role in mitigating the risks associated with proneness to collapse, which refers to disruptions that could potentially destabilize the economic ecosystem, as observed in a previous case study (Tedesco,

[4] A comprehensive list of the different "Collaboration Indices" as well as the rest of the metrics measured by GED in economic ecosystems can be found in Appendix 3, Section B, of this document.

M. S. et al., 2020a). By distributing the weight and influence of the ecosystem among various actors of different natures and roles, the risk of a single point of failure or over-dependence on a specific actor is minimized. This ensures the ecosystem's robustness and ability to adapt to external shocks, changes in the economic ecosystem environment, and emerging trends.

c) The ecosystem also exhibits a cohesive structure, with most of the actors being relatively close and the potential to connect seemingly distant nodes in just a few steps. This is evident as the network presents top scores for metrics such as Average shortest path length (2.99) and Average eccentricity (4.12) in comparison to other ecosystems.

d) Despite the tight structure described above, a significantly high number of interactions required to achieve successful collaboration (7.44) highlights the substantial effort and resources invested in initiating collaborative relationships. This is the highest number observed by GED, well above the average of 4.27 from other ecosystems. The quantity of attempts made to establish these connections can have a substantial impact on the overall effort and resources dedicated to this endeavor. While the number of interactions may vary based on the cultural and social context of each city, region, or country, a higher value suggests two potential factors. Firstly, it indicates a need for actors within Mauritius' economic ecosystem to enhance trust and foster stronger relationships among themselves. Secondly, it underscores the importance of improving the efficiency with which these relationships are established, aiming to reduce the time and resources invested in this process.

The above findings contribute to a comprehensive understanding of the Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem, highlighting its collaborative strength and distributed leadership. These positive aspects hold significant potential for shaping public and private strategies that can further foster entrepreneurship and innovation within the region.

The collaborative nature of this economic ecosystem, demonstrated by the high Collaboration Index and the presence of key actors in different roles, suggests a conducive environment for knowledge exchange, resource sharing, and collaborative initiatives. This provides a solid foundation for the development and implementation of programs and initiatives aimed at promoting entrepreneurship and innovation. By leveraging the strengths of the ecosystem and building upon its collaborative dynamics, Mauritius can enhance its position as an innovation-driven economy and drive sustainable economic growth.

3.3 Structure of Innovation-Driven Entrepreneurial Economic Ecosystem in Mauritius

6.7
Collaboration Index

132
Actors Identified in the Ecosystem using Complex Network Mapping

329
Collaboration Mapped in the Ecosystem

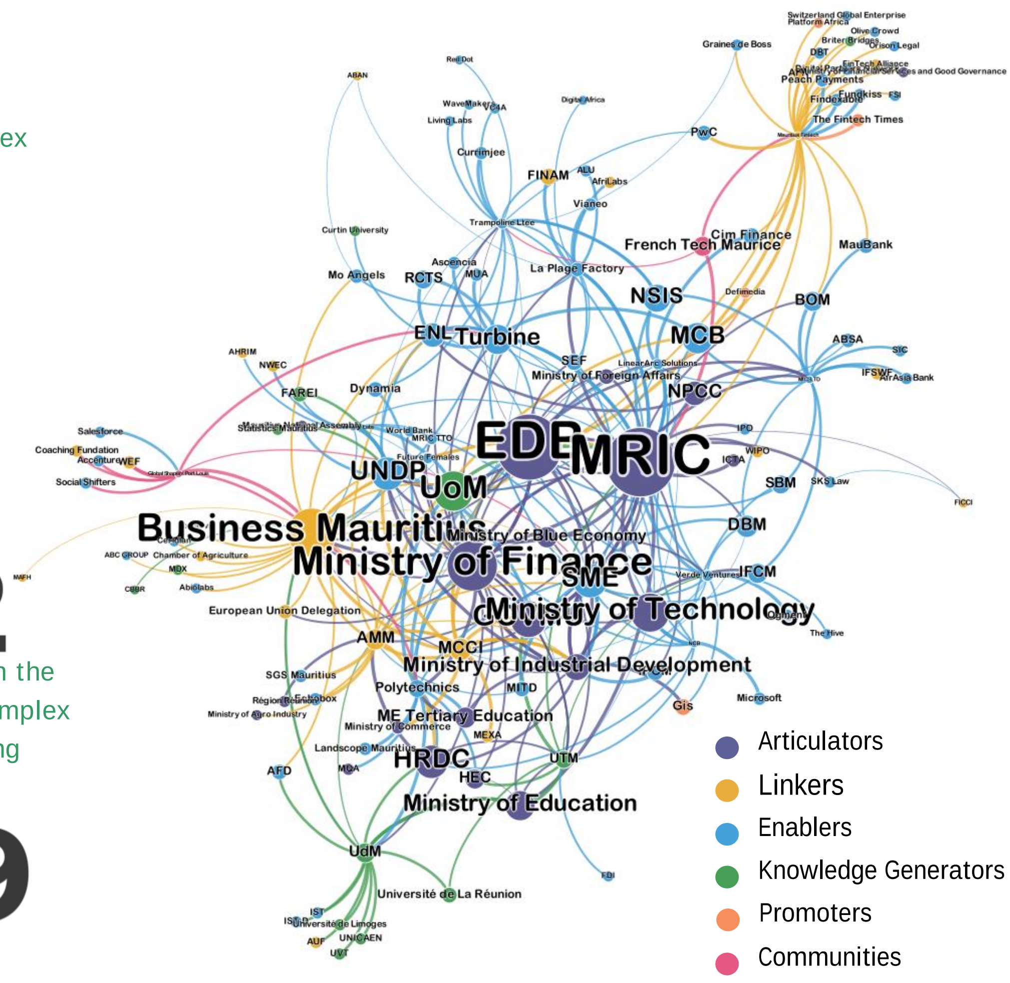


Figure 3. Mathematical graphical model of the structure of Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem

The sociogram (figure 3) presented here offers a mathematical depiction of the collaboration dynamics and structure of the Innovation-Driven Entrepreneurial Economic Ecosystem in Mauritius. By employing the methodology of Complex Network Analysis (CNA), we gain insights into the distinct attributes of this economic ecosystem.

Mauritius showcases a remarkable ability to facilitate seamless communication and resource exchange, resulting in the establishment of stable collaborations and bolstering the ecosystem's resilience. Nonetheless, there exist areas that could benefit from further development, particularly in fostering collaboration among key organizations within the economic ecosystem.

The following table presents a list of the different metrics obtained through the CNA analysis conducted for the Mauritius ecosystem, with values for other comparable ecosystems available in Appendix 3. For this work, the analysis is focused on the metrics that have been selected as of interest due to their unique characteristics within the studied economic ecosystem.

Nodes	Edges	Average eccentricity	Average clustering coefficient	Average shortest path length	Transitivity
132	329	4.12	0.4	2.99	0.2
Global efficiency	**Rich club coefficient**	**Central point dominance**	**Modularity**	**Average collaborations**	**Collaboration Index**
0.37	0.76	0.27	0.46	11.78	**6.67**

Table 2. List of CNA Metrics from the Mauritius' Entrepreneurial Innovation-Driven Economic Ecosystem Structure

Short path lengths between actors in Mauritius, expressed by a low Average shortest path length (2.99) and a high Global efficiency (0.37), are extremely beneficial for an ecosystem as they allow for a quick and efficient transferring of knowledge and resources within the network, while a low Average eccentricity (4.12) helps in ensuring that no one gets left behind by enabling connections between seemingly distant nodes in just a few steps. The scores of Mauritius for these metrics place it among the top 3 performers of 20 ecosystems studied by GED.

The tight structure of the ecosystem can be further proven by above-average values for Transitivity (0.2) and Average clustering coefficient (0.4), reflecting the proneness of collaborators from one actor to be collaborating among themselves as well, a crucial factor leading to the existence of strong clusters and communities. The benefits of this effect are improved when these communities still collaborate with other actors instead of closing themselves off; this is reflected through a below-average Modularity (0.46), for which values closer to 1 signify fewer relationships connecting different communities or modules within the network.

The Central Point Dominance metric for Mauritius (0.26) is just slightly above average (0.24), which, when paired with one of the highest Rich Club coefficients (0.76) observed, points to a healthy distributed leadership in the ecosystem. However, this distributed leadership might be affected by a strong dependency on government institutions with the role of Articulators, a phenomenon presenting a series of risks which will be discussed further in this analysis.

The Average Collaborations metric (11.78), representing the average number of valid collaborations mentioned by the study's participants, is slightly below average (12.11), indicating areas for potential growth. However, it's always important to consider that increasing the number of collaborations per actor, while structurally beneficial, also carries the risk of creating redundant relationships which can impact the ecosystem's efficiency, as every organization has a limited amount of time and resources available to collaborate with others.

This last metric, along with the Global Efficiency, Average Eccentricity and Transitivity metrics, contribute to the calculation of the Collaboration Index, which measures the ecosystem's capacity to maintain equilibrium and adapt to changes in the environment.

Furthermore, a moderate number of Gravitational Centers (7) can be observed in the Mauritius economic ecosystem. The role types of Gravitational Centers found in the ecosystem include Articulators, Enablers, Knowledge Generators, and Linkers. Notably, there is a significant presence of Articulators in the sociogram, with a total of 4 identified, as shown in table 3. This highlights the influential role of public actors within the economic ecosystem of Mauritius and their ability to make substantial impacts through their initiatives.

Full Name	Role	Weighted In-degree*
Economic Development Board	Articulator	47
Mauritius Research and Innovation Council	Articulator	45
Ministry of Finance and Economic Development	Articulator	37
Ministry of Information Technology, Communication and Innovation	Articulator	36
SME Mauritius Ltd	Enabler	29
University of Mauritius	Knowledge Generator	28
Business Mauritius	Linker	24
Average weighted in-degree for Mauritius' network		*7.39*

Table 3. Gravitational Centers by Role

* The weighted in-degree of a node reflects the amount and intensity of collaborations mentioned by other participants towards it

Moreover, the presence of Knowledge Generators acting as Gravitational Centers is crucial for an innovation-driven economic ecosystem like Mauritius. While the University of Mauritius (UoM) plays a central role in this capacity, the ecosystem could benefit from a greater number of such actors. A stronger presence of Knowledge Generators positioned closer to the center of the structure is associated with the ecosystem's capacity to generate new high-value entrepreneurial ventures in innovation (OECD/IDB, 2022).

Additionally, it is worth noting that only one actor, Business Mauritius, assumes the role of a gravitational center as a Linker. While the current diversity of actors within the Mauritius ecosystem encompasses various roles, it would be advantageous to have a greater number of actors fulfilling these roles. Specifically, an increased presence of Linkers collaborating with Knowledge Generators could facilitate stronger integration between industries and academia, fostering innovation and knowledge exchange within the ecosystem.

Among all others, Mauritius Research and Innovation Council (MRIC) and the Economic Development Board (EDB) emerge as the most prominent Gravitational Centers (Table 3). Nonetheless, the presence of other roles acting as Gravitational Centers contributes to diversity and equilibrium within the ecosystem. This diversity enhances the robustness of the Collaboration Index obtained for the ecosystem, reducing the likelihood of collapse in the improbable scenario of the disappearance of these organizations.

The sociogram (figure 3) analysis brings attention to the absence of two vital roles, namely Communities and Promoters, as Gravitational Centers within the Mauritius entrepreneurial economic ecosystem. These roles play a crucial role in fostering dynamism and nurturing a culture of entrepreneurship and innovation. While it is not uncommon to find this pattern in previous studies utilizing the GED methodology (Tedesco M. S. et al., 2020a, b, c, d, e), it is important for economic ecosystems to actively strengthen and promote the involvement of these roles. By actively engaging and promoting the participation of Communities and Promoters within the ecosystem, Mauritius can unlock their potential contributions, enriching the collaborative landscape and fueling the growth of entrepreneurship and innovation.

3.3.1 Economic Ecosystem's Composition

While the structure of an economic ecosystem is essential for maintaining the equilibrium necessary for economic development (Tedesco, M. S., 2022), diversity also plays a crucial role. Diversity within the ecosystem enables the beneficiaries, such as innovators, entrepreneurs, and companies, to access a wide range of resources and benefits.

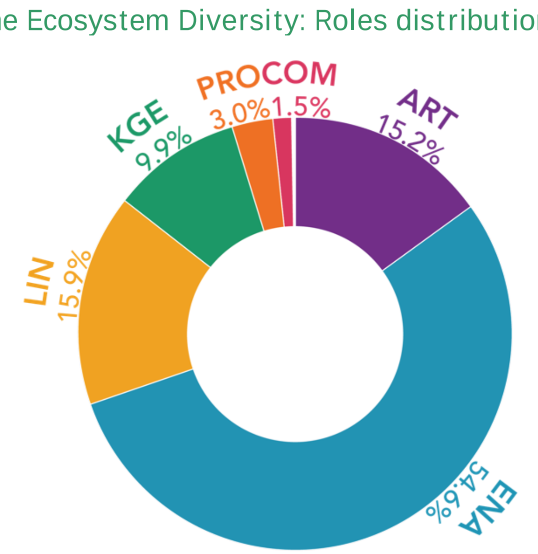


Figure 4. Distribution by role type (TE-SER) actors in the Mauritius' Innovation-Driven Entrepreneurial Economic Ecosystem.

A diverse ecosystem could provide a variety of opportunities, knowledge, expertise, and perspectives, which can stimulate innovation, collaboration, and growth. It allows for the exchange of ideas, the discovery of new possibilities, and the development of unique solutions to complex challenges.

Figure 4 illustrates the distribution of actors identified through Social Network Mapping based on their respective roles within the ecosystem. While there is currently no established ideal balance of roles in the ecosystem, the importance of having all roles represented has been recognized (Tedesco, M. S., 2022).

Upon analyzing the role distribution in the economic ecosystem (figure 4), a consistent pattern emerges that aligns with findings from other ecosystems studied using the TE-SER model by GED. Enablers, Linkers, and Articulators emerge as the most prevalent roles, indicating their significant contributions to the ecosystem. However, the roles of Promoters and Communities are relatively less represented in comparison.

The presence of all six actors' families is vital for the maturity and effective functioning of the ecosystem, as each role brings unique perspectives and contributions. The limited presence or absence of any role can have implications for the long-term sustainability and success of the ecosystem. In the case of Mauritius, this trend persists compared to other ecosystems analyzed using the same methodology. On the other hand, it is important to note that the presence of the roles "Communities" and "Promoters" increases in the economic ecosystems studied by GED in Europe and significantly reduces their percentage in ecosystems belonging to more vulnerable regions, such as La Plata in Argentina, Araucanía in southern Chile, or Costa Rica in Central America, as observed in Appendix 3, Section D (Total nodes in network by role type).

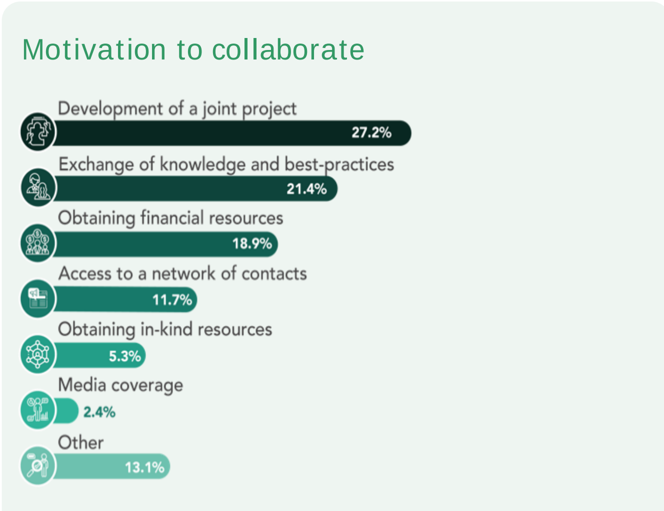


Figure 5. Motivation to collaborate into the ecosystem.

Figure 5 portrays the motivations underlying the collaborative efforts between organizations within the ecosystem. It depicts the distribution of proportions indicating the intrinsic motivations for collaboration. The figure highlights the emphasis placed by organizations on addressing inherent needs within the ecosystem, rather than solely prioritizing their own objectives and interests. There is a connection between the structures of economic ecosystems and the motivations that drive collaborative relationships among their actors (Tedesco, M. S. et al., 2020). Generally, ecosystems with robust and efficient structures tend to exhibit motivations that focus on the well-being of the ecosystem as a whole and the promotion of the common good.

Analyzing the primary motivations for collaboration among actors within the economic ecosystem, two distinct factors emerge, which have a significant medium and long-term impact. The responses from participating actors reveal that "Joint Project Development" and "Exchange of Knowledge and Best Practices" account for 48.5% of the total, indicating that these two motives are the main driving forces behind collaboration. This finding suggests that actors within the ecosystem prioritize long-term ecosystem development over immediate individual needs, such as obtaining in-kind resources or media coverage.

The high structural dependence on Articulators observed in the study, combined with the motivation associated with obtaining monetary resources substantially above the average (Appendix 3, Section E), underscores the importance of considering strategies focused on the financial sustainability of this economic ecosystem. It is crucial to carefully assess any potential shifts in public policy that could impact the access to financial resources from other actors, particularly from Enablers, who typically serve as the primary transferors of resources to entrepreneurs, innovators, and businesses. Any significant changes in funding or support from Articulators could have a profound effect on the ecosystem's ability to foster innovation and entrepreneurial activities in Mauritius.

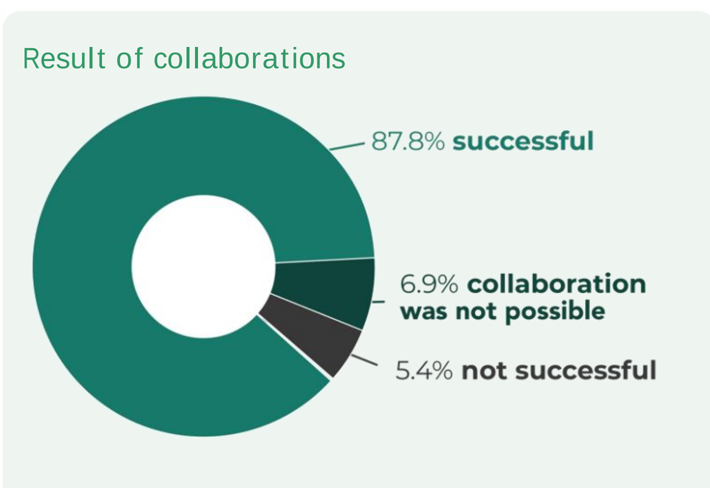


Figure 6. Percentage of successful collaboration projects.

Figure 6 presents the distribution of collaborations reported by participants, categorized according to their level of success. The data reflects the percentage of collaborations that were deemed successful, unsuccessful, or not realized by the participating actors.

While actors within the economic ecosystem in Mauritius invest a substantial amount of time and resources, as indicated by the high number of interactions required to initiate a project (7.44), the data also reveals a high percentage of successful projects (87.8%), as reported by the participating actors. Moreover, the number of unsuccessful projects is very low (5.4%), along with a relatively small proportion of projects that failed to initiate (6.9%).

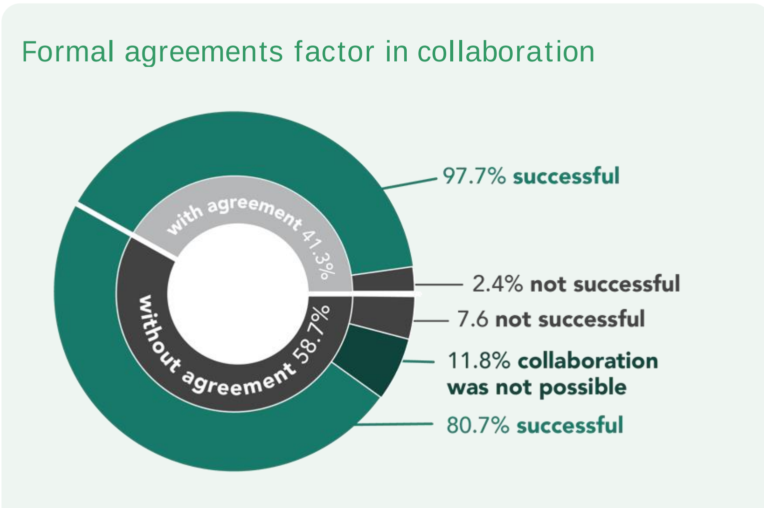


Figure 7. Collaborations with Formal Contracts vs. Collaborations without

Figure 7 illustrates the relationship between successful and unsuccessful collaborations within the context of formal relationships, represented by the presence or absence of a legal contract between the involved parties. It enables an analysis of the correlation between the effort invested in the collaboration process and the outcomes achieved.

As depicted in figure 6, over 87% of projects in Mauritius result from collaborations among actors. However, figure 7 demonstrates a significant disparity in success rates between collaborations supported by formal contracts (97.7%) and those without a formal relationship framework (80.7%). In all metrics related to collaborations without a formal agreement, Mauritius performs below the average compared to the rest of the studies conducted by GED, as observed in Appendix 3, Section D (Results without formal agreement) of this document. Moreover, projects that had a formal contract in place experienced no instances of failure to initiate (0%), while those lacking a formalized relationship encountered an 11.85% rate of non-initiation.

The findings emphasize the importance of formalizing collaborations through legal contracts or agreements in the case of Mauritius' ecosystem dynamics and indicate that formal relationships contribute to a higher probability of successful outcomes and mitigate unnecessary resource expenditure. This correlation between formalization and collaboration outcomes underscores the significance of establishing clear frameworks for effective collaboration within the economic ecosystem of Mauritius.

Figure 8 displays two significant characteristics: the types of roles that have been most important for establishing the current actors within the ecosystem, and the types of roles that are the main drivers of growth for the current actors within this economic ecosystem in Mauritius. The first set is considered fundamental for the birth of the ecosystem in question, from the perspective of the participating actors, while the second set is considered fundamental for the current development of the ecosystem, from the perspective of the participating actors.

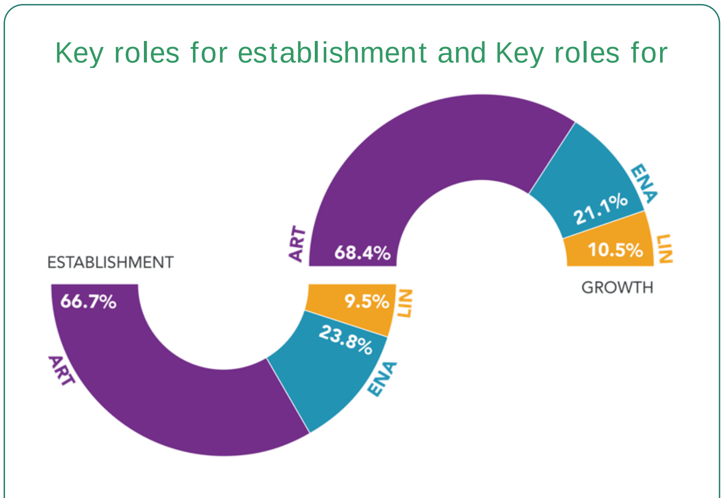


Figure 8. Most relevant roles to the development in the Mauritius' Innovation-Driven Entrepreneurial Economic Ecosystem

The results provide Insights into the key roles for both the establishment and growth of actors within the ecosystem in Mauritius. Participating actors highly value the role of Articulators, followed by Enablers and Linkers in both phases. However, Knowledge Generators, Promoters, and Communities are not considered as relevant actors during these stages.

Indeed, Articulators tend to play a crucial role in facilitating the establishment of other actors within the ecosystem, even in the European economic ecosystems studied by GED. However, Mauritius surpasses by far the average of 43.7% observed in other ecosystems, with its score of 66.7% being the second highest as demonstrated in Appendix 3, Section C. Furthermore, concerning roles that currently have the most influence on the growth of other actors, the mention of Articulators in Mauritius practically doubles the average of 38.8%, with the result of 68.4% being the highest observed so far. These results highlight the prominent role of Articulators in Mauritius' ecosystem and the strong dependency that other actors may have on them. This dependency can pose challenges in terms of diversification and autonomy for other actors in the ecosystem, suggesting the need to foster greater diversity of roles and capacities to ensure a more balanced and resilient ecosystem in Mauritius.

The prominence given to Articulators can be justified by their crucial role in defining public policies and initiatives that support entrepreneurship. Additionally, they play a significant role in resource-sharing through public programs, which contributes to fostering the development and growth of the ecosystem. Nevertheless, as also indicated by the structural analysis, it is of vital importance to increase the participation and leadership of Knowledge Generators in the Innovation-Driven Entrepreneurial Economic Ecosystem of Mauritius, among other type of actors.

Most sought-after roles for collaboration by organizations based on their role.

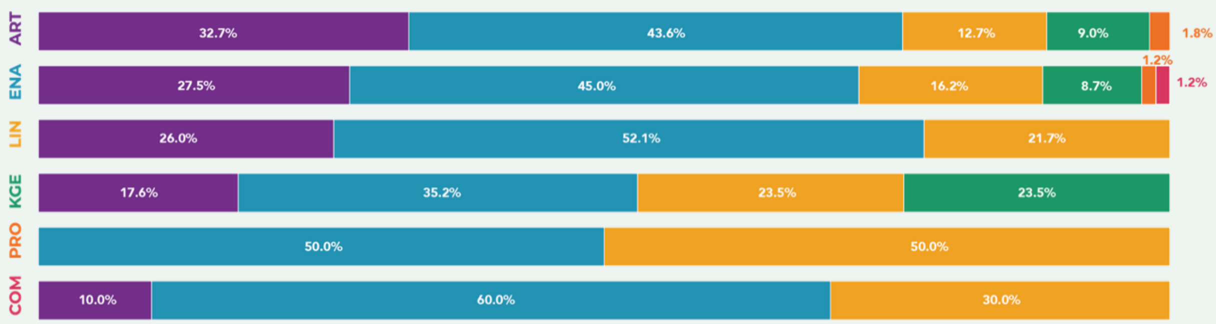


Figure 9. Most sought-after roles for collaboration in the Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem

In figure 9, the collaboration dynamics among different actors are observed, revealing trends in the most sought-after roles for collaboration within the same ecosystem for each type of role. These trends may be influenced by factors such as their influence, impact, or affinity with other roles.

The analysis of the most sought-after roles for collaboration can be categorized into two blocks. When categorized by the type of actor seeking collaborations, it is observed that Enablers actively seek collaborations with all six roles present in the ecosystem to achieve their objectives. Articulators also engage in collaborations with at least five out of the six roles. Knowledge Generators collaborate with half of the roles.

On the other hand, Promoters and Communities demonstrate the least intention to collaborate with the ecosystem, engaging with only two and one category of roles, respectively. In fact, they do not even collaborate with organizations of the same category. These findings emphasize the varying degrees of collaboration engagement among different types of actors within the economic ecosystem.

When reviewed by the type of sought-after role, Enablers are the most sought after by all the participating roles in the study, including actors from their own categories. They are followed by Articulators and Knowledge Generators. On the other hand, Promoters and Communities are the least sought-after roles in the ecosystem. Communities are required for collaboration by at least half of the role types present in the ecosystem, while Promoters are only sought after by two of the six roles. Neither of these two roles are required for collaborations from their own category.

On the other hand, when analyzed based on the type of sought-after role, Enablers emerge as the most sought-after role by all participating actors in the study, including actors from their own categories. Articulators and Knowledge Generators are also highly sought after. On the other hand, Promoters and Communities are the least sought-after roles in the ecosystem.

While Communities are required for collaboration by at least half of the role types present in the ecosystem, Promoters are sought after by just two of the six roles. Interestingly, neither of these two roles is required for collaborations from their own category. These findings indicate that Enablers play a pivotal role in collaborations and are highly valued by various actors across the ecosystem, whereas Promoters and Communities face lower demand for collaboration from other roles within the ecosystem.

It is worth noting that Linkers do not appear to actively seek collaboration with Knowledge Generators, which can potentially hinder industry-academia integration and its associated benefits for economic development.

3.4 Insights about Structural and Composition Analysis of Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem

The findings from this study provides valuable insights into several areas of opportunity that can be addressed to further enhance the strength and effectiveness of the ecosystem.

In the context of innovation-driven entrepreneurial economic ecosystems in Mauritius, one crucial area that requires strengthening is the role of Knowledge Generators. While one organization is recognized as a Gravitational Center and sought for collaboration by various roles in the ecosystem, there is room for improvement. Firstly, the role of Knowledge Generators is not considered relevant for all six roles during the Establishment and Growth phases. Moreover, apart from the University of Mauritius (UoM) as a Gravitational Center, the other Knowledge Generators receive minimal mentions and occupy peripheral positions in the sociogram. Additionally, Knowledge Generators should engage in more dynamic collaborations with all ecosystem actors, rather than focusing solely on collaborations with Articulators, Enablers, and other Knowledge Generators.

The role of Knowledge Generators plays a strategic function in innovation-driven entrepreneurial economic ecosystems as it serves as the source of novel knowledge generation. Therefore, it is imperative to elevate its significance in the ecosystem by initiating impactful actions within collaborations and promoting the dissemination of key collaboration outcomes. Specifically, fostering more collaborations with Linkers can enhance the understanding of industry needs in Mauritius and facilitate the sharing of innovative solutions through science and technology.

Mauritius exhibits a high number of interactions required to achieve collaboration between actors, with an average of 7.44, the highest value identified among 20 economic ecosystems analyzed by GED thus far (Appendix 3, Section B). This characteristic, however, has not had a negative impact on the observed Index of Collaboration in the ecosystem. Rather, it demonstrates that collaboration is carefully evaluated by the actors. Furthermore, the increased number of interactions needed for collaborations implies higher resource consumption for participants, including financial resources, time, and potential missed opportunities in case the collaboration does not yield successful results.

A clearer understanding of the roles of actors in an ecosystem, along with the presence of a clear and shared purpose, can enhance trust among actors and align individual objectives with collective goals. This alignment can lead to greater efficiency in interactions, expediting collaborations, and allocating fewer resources to collaborations that may not be successful. By gaining a better understanding of the roles of actors in the ecosystem and their individual interests, discussions can progress more rapidly towards collaboration. In this regard, the dissemination of the interactive sociogram generated in this study to the ecosystem will provide actors with a fresh perspective on the integration of collaboration dynamics in the ecosystem and identify actors that are most suitable for successful and effective collaborations.

It is important to note that despite the higher number of interactions required, this characteristic has not had a negative impact on the observed Index of Collaboration in the ecosystem. Instead, it signifies that actors approach collaboration with careful consideration. However, the increased number of interactions does result in greater resource consumption, for participating organizations, including financial resources, time, and potential missed opportunities in case collaborations do not yield successful outcomes. Nonetheless, a clearer understanding of the roles of actors in the ecosystem and the establishment of a clear and shared purpose can foster trust among actors and align individual objectives with collective goals.

Consequently, there can be an enhancement in the efficiency of interactions among actors, resulting in a quicker establishment of collaborations or the allocation of less time and effort to collaborations that may not be successful. In this regard, the dissemination of the interactive sociogram generated in this study to the ecosystem can provide significant value to its actors. By offering an alternative perspective on how collaboration dynamics are integrated within the ecosystem and identifying the actors most suitable for generating successful and effective collaborations, the sociogram offers valuable insights and guidance for future collaborative endeavors.

The ecosystem in Mauritius exhibits a strong reliance on the role of Articulators. Over 66% of the participating actors consider Articulators as a fundamental role during both the establishment and growth phases of the ecosystem. Additionally, the third most prevalent motivation for collaboration (Figure 5) within the ecosystem is access to financial resources, primarily provided by public actors, particularly in ecosystems with limited presence of venture capital, such as Mauritius.

Furthermore, the prominent presence and influence of the Articulators have been repeatedly addressed. These findings suggest a strong presence of government entities in driving innovation and entrepreneurship in the country through various organizations and programs, which can be viewed as a strength in certain contexts. However, it also raises the question of whether there is a centralization of functions or activities that could potentially be performed by other actors within the ecosystem. Therefore, a comprehensive analysis of the initiatives undertaken by Articulators in Mauritius is necessary to identify any potential opportunities for transferring these responsibilities to existing actors in the ecosystem or to encourage the emergence of new non-governmental entities that can collaborate with the government in executing these activities.

The innovation-driven entrepreneurial economic ecosystem in Mauritius prominently relies on Articulators as a central driving force. Over 66% of the participating actors perceive them as the pivotal role in both the establishment and growth phases of the ecosystem. Furthermore, the third most prevalent motivation for collaboration in the ecosystem is the access to financial resources, predominantly provided by public actors, particularly in ecosystems with limited venture capital presence like Mauritius.

The distribution of roles in the ecosystem highlights a significant proportion of Articulators (15.2%) compared to other ecosystems studied using this methodology. These compelling characteristics underscore the strong presence of the government in propelling innovation and entrepreneurship in the country through various organizations and programs, which can be regarded as a particular strength in certain contexts. However, this prevalence may also indicate a concentration of functions or activities that could potentially be undertaken by other actors in the ecosystem. Consequently, conducting a comprehensive analysis of the actions taken by Articulators in Mauritius becomes imperative to identify opportunities for their transfer to existing actors within the ecosystem or to foster the emergence of new non-governmental actors that can collaborate and support the government in executing these crucial activities.

Lastly, there is a noticeable lack of involvement and presence of fundamental roles within the economic ecosystem, particularly with regards to Promoters and Communities. Both roles are not perceived as relevant by any other role in the ecosystem during the Establishment and Growth phases. Additionally, the study reveals that these roles display limited dynamism within the mapped collaborations, as they engage with only a few of the six different roles and are not actively sought after by other participants in the study.

It is crucial to promote the significance and impact of these two specific roles within the ecosystem. Sharing information about innovation and the ecosystem can be a key responsibility of Promoters, while Communities can contribute to nurturing talent and fostering potential startups. It is possible that other actors in the ecosystem may fulfill these roles in specific activities. However, establishing a solid presence of Promoters and Communities within the ecosystem will strengthen the collaboration dynamics between actors in Mauritius.

To enhance the recognition and impact of these two specific roles within the ecosystem, it is crucial to promote their significance. Promoters can play a vital role in disseminating information about innovation and cultivating a supportive ecosystem, while Communities contribute to nurturing talent and fostering the growth of potential startups. It is possible that other actors in the ecosystem may already fulfill aspects of these roles in specific activities. However, establishing a strong presence of Promoters and Communities within the ecosystem will bolster collaboration dynamics among actors in Mauritius, ultimately fostering a more vibrant and robust innovation-driven entrepreneurial ecosystem.

4. A Comprehensive Analysis of the Innovation-Driven Entrepreneurial Economic Ecosystem Place-Specific Conditions and Capacities in Mauritius

As previously mentioned, the interplay between the two macro components of an ecosystem, namely its surrounding -or place-specific- and structure, is fundamental and mutually reinforcing. Additionally, the composition and capabilities of the ecosystem play crucial roles in shaping its dynamics. Considering these interconnected aspects becomes essential when devising strategies and initiatives to facilitate the comprehensive development of the economic ecosystem (Koltai, S. R. & Muspratt, M., 2016; Hoffecker, E., 2019 and Tedesco M. S., 2022).

In the preceding section, we delved into the innovation-driven entrepreneurial economic ecosystem of Mauritius, providing a detailed description of its composition and areas requiring enhancement to fortify its structure.

This section focuses on the elucidation and measurement of Mauritius' place-specific and capabilities, achieved through the combined assessment of a series of established indicators originally formulated in the iEcosystem model. These approaches consider that both the conditions in the surroundings and internal capabilities (resources, talent, infrastructure, etc.) exert influence on the development and success of the economic ecosystem.

Examining the place-specific enables a comprehensive understanding of external factors that may facilitate or impede innovation development, while evaluating internal capabilities enables the identification of the ecosystem's strengths and weaknesses concerning available competencies and its potential to foster innovation and entrepreneurship (Absher, E., et al., 2018; Koltai, S. R. & Muspratt, M., 2016; Budden, P., et al., 2019, and Hoffecker, E., 2019). The amalgamation of these analyses offers readers a comprehensive and holistic perspective for decision-making and designing public policies that can foster innovation development (Adner, R., 2006; Suseno, Y., & Standing, C., 2018).

First and foremost, this section assesses the place-specifics of the innovation-driven entrepreneurial economic ecosystem of Mauritius - encompassing public policies and their outcomes focused on enhancing the conditions for innovation-driven entrepreneurship to flourish - along with the inherent capabilities of this ecosystem, as compared to a series of country groups. The aim is to understand Mauritius' current situation in a contextualized manner.

Lastly, as will be further described, measuring the potential impact of different characteristics of an economic ecosystem on sustainable development can be a complex task. To address this limitation, this section proposes a mathematical correlation model between the indicators evaluating the context and capabilities with the Sustainable Development Goals (SDGs). This approach could help to Mauritius' actors, including policymakers, better comprehend which indicators to prioritize more efficiently and effectively, considering the significance of finite resources inherent in any ecosystem.

4.1 Place-Specific conditions and capacities Methodological Approach

4.1.1 About the iEcosystems Framework

The analysis is based on the framework presented by Budden, Murray, and Turskaya in their academic work titled "A systematic MIT approach for assessing 'innovation-driven entrepreneurship' in ecosystems" (2019). The framework aims to provide a simple yet comprehensive measurement approach by identifying four key pillars and a set of relevant metrics to analyze the place-specific conditions and capacities of entrepreneurial innovation-driven ecosystems (iEcosystems).

While various innovation indices and entrepreneurship rankings already exist, this approach aims to provide additional value to decision-makers by offering a clear framework that distinguishes between innovation and entrepreneurship capacities, as well as between inputs and outputs.

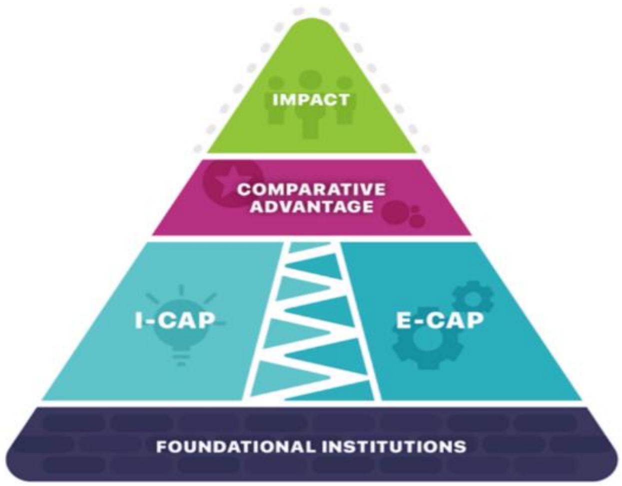


Figure 10. The system for innovation driven entrepreneurship as presented by Budden, Murray & Turskaya (2019)

The framework utilizes a selection of globally available metrics that are meaningful and not excessively complex. By focusing on these key differentiators, the approach aims to provide a comprehensive assessment of innovation-driven entrepreneurship ecosystems that is relevant and actionable for decision-makers.

The four key elements to measure in this framework are foundational institutions, separate innovation and entrepreneurship capacities, comparative advantage, and impact.

- Foundational institutions: These institutions encompass the necessary rules, practices, norms, and systems that are crucial for the effective functioning of nations and the regions within them. They ensure that investments in various capacities and assets can be safeguarded and leveraged to contribute to the overall economic well-being. In the context of innovation, the framework includes indicators that evaluate the robustness of these institutions in key areas such as the rule of law, protection of property rights, levels of corruption, and the overall ease of conducting business activities. Additionally, the framework incorporates indicators that assess the advancements in foundational conditions across various aspects of entrepreneurship and innovation. These indicators provide insights into the progress made in creating an enabling environment for entrepreneurial activities and fostering innovation.

- Entrepreneurship capacity (E-Cap): This capacity pertains to the ability to initiate, develop, and expand new enterprises, fostering the growth of both small and medium-sized enterprises (SMEs) and startups. Similar to the assessment of innovation capacity, this dimension is further evaluated across the same five key areas:
    - E-Human capital: Measuring human capital for entrepreneurship is a more intricate and complex task compared to measuring it for innovation. However, conceptually, it refers to the prevalence of individuals possessing the necessary skills and knowledge to establish and develop a business. This human capital is derived from relevant education, training, and practical experience in the entrepreneurial domain.
    - E-Funding: New businesses often require additional investment in the form of external risk capital, including equity funding, venture capital, debt finance, and credit arrangements. Therefore, this area includes a range of indicators aimed at capturing the availability and accessibility of these funding sources.
    - E-Infrastructure: The infrastructure needed for entrepreneurship may be more fundamental compared to the infrastructure required for innovation, but it remains equally significant. In this area, we evaluate the infrastructure for telecommunications and goods transfer. Additionally, as part of GED's inclusion of certain indicators initially

intended for the assessment of innovation capacity, we consider the basic access to technology that is increasingly adopted and necessary for a wider range of businesses.

- E-Demand: The demand for new products and services provided by entrepreneurs can be predicted to some extent based on the size and attractiveness of the domestic market. To gauge this factor, the assessment includes indicators that aim to capture the dimensions and appeal of the domestic market.
- E-Culture & Incentives: Culture could play a crucial role in either supporting or hindering the success of entrepreneurial activities. Therefore, the iEcosystem assessment aims to evaluate the cultural acceptance and celebration of entrepreneurship within a region, as well as attitudes towards failure. Additionally, this sub-pillar examines whether the surrounding regulatory environment imposes constraints on the efficient operation of businesses. These indicators help provide insights into the cultural and regulatory factors that could impact entrepreneurship within this context.

- Innovation capacity (I-Cap): This capacity encompasses not only the ability to conduct fundamental scientific research but also the capability to effectively translate and scale those solutions into practical products, technologies, and services that address real-world problems. The assessment of this innovation capacity is conducted across five crucial areas:
  - I-Human capital: Given that the quantity and quality of innovations generated by an economy significantly depend on the training and accessibility of highly skilled human talent, this section critically evaluates several dimensions. These dimensions include the quality of education, the level of educational attainment, and the extent of employment opportunities within specialized fields.
  - I-Funding: Both the later stages of innovation and the research and development activities from which they originate are characterized by their high costs and inherent risks, thereby demanding significant financial support. This area of evaluation focuses on the expenditure dedicated to research and development (R&D) and examines the distribution of funding between public organizations and businesses.
  - I-Infrastructure: The infrastructure required to foster innovation capacity encompasses a diverse range of highly specialized technological support and information access. Although the authors initially suggested including indicators related to the availability of reliable telephony and internet connections, the GED team made a conscientious decision to relocate these indicators to the entrepreneurship capacity section. This adjustment was made in order to introduce newer metrics that more precisely capture the concept of "highly specialized technological support." By doing so, a clearer differentiation between the sub-pillars of innovation infrastructure and entrepreneurship infrastructure is achieved.
  - I-Demand: Given that the demand for innovation can stem from both intrinsic and extrinsic factors, this area of assessment aims to evaluate the interplay between innovators across different sectors and the propensity of buyers to adopt new innovations. It seeks to analyze the dynamics of demand and the determinants that influence the adoption and diffusion of innovations within the market.
  - I-Culture & Incentives: While challenging to assess, culture and incentives play crucial roles in shaping a country's innovation capacity. This area encompasses measures designed to capture the level of support for pursuing technological innovations and the prevailing culture that drives scientific and technological advancements.

- Comparative advantage: This is based on specific areas of strength that differentiate an economy in a region from others surrounding it, which are shaped by the underlying strengths in innovation and entrepreneurship capacities. While measuring comparative advantage at a national or international scale can be challenging, it can be more easily assessed by examining a country's existing economic clusters. This approach helps identify its relative strengths, with indicators that capture the attractiveness of critical talent proving to be useful as well. While the authors suggest developing measures that capture the leading economic clusters, assets, areas of expertise, and specific challenges unique to a given region, rather than prescribing specific indicators as in the other pillars, GED's research team has incorporated a set of metrics to ensure broader adoption and comparability of the framework. The selected metrics aim to capture the state of cluster development, the attraction of critical talent, and the diversity and complexity of exports.

- Impact: Building upon strong foundational institutions, the resulting impact is derived from the convergence of innovation and entrepreneurial capacities with core comparative advantages, often facilitated through targeted program and policy interventions. It is important to acknowledge that even the most significant interventions within a given system are likely to yield measurable changes in impact over the long term, and the choice and prioritization of key impact metrics rest with the decision-makers involved. Nonetheless, at a high level, impact can be measured in terms of economic or social progress, encompassing indicators such as GDP per capita and the Sustainable Development Goals. Therefore, similar to the approach taken with comparative advantage, the adapted framework by GED incorporates a set of indicators that differentiate between social and economic impact, enabling comparability across a wide range of economies.

While maintaining the majority of indicators originally proposed by the authors, GED's research team conducted supplementary research to identify and select alternative indicators to replace those that have been modified or discontinued by the publishing organizations over time. Furthermore, a new set of indicators was curated to enrich the Comparative Advantage and Impact pillars, ensuring the preservation of the original metrics' purpose and comparability. Consequently, the adapted iEcosystems framework by GED encompasses a comprehensive selection of 67 indicators. These indicators are then uniformly weighted and averaged within the respective pillars to yield simplified scores, enhancing the readability and providing a holistic overview of the framework. The detailed composition of the updated framework, its alignment with the original indicators proposed by the authors, and the rationale underlying GED's modifications are thoroughly elucidated in *Appendix 6*, titled *"Updating the iEcosystems framework*", and *Appendix 7*, "*Indicator descriptions for the updated iEcosystems framework*."

4.1.2 Data acquisition

Since one of the main objectives of the iEcosystems framework is to leverage the abundance of readily available information, all metrics were sourced from publicly accessible data sources, which are thoroughly documented in the appendix.

While the goal was to include only the most recent data from the last 3 years, certain datapoints were allowed to go as far back as 2018 to ensure having a more robust sample of countries for future works. From a total of 118 observable countries that presented reported values from 2018 onward for at least 66% of the framework's metrics, we calculated the average of the following subsets using the World Bank's geographic region and income groups classification (World Bank, 2022) as to establish an adequate benchmark for Mauritius:

- Sub-Saharan Africa: This group includes 21 countries with at least two thirds of reported values from 2018 onward.

- Upper-middle income economies: This group includes 35 countries with at least two thirds of reported values from 2018 onward.
- European Union: This group includes 27 countries with at least two thirds of reported values from 2018 onward.

Below is the list of countries that have been included in each group for the purpose of comparing the place-specific conditions of the innovation-driven economic ecosystem in Mauritius. The countries have been categorized either based on their geographic region or their economic income level.

Sub-Saharan Africa
Benin
Botswana
Burkina Faso
Cameroon
Cote d'Ivoire
Ethiopia
Ghana
Kenya
Madagascar
Mali
Mauritius
Mozambique
Namibia
Nigeria
Rwanda
Senegal
South Africa
Tanzania
Togo
Uganda
Zambia

Upper middle income
Albania
Argentina
Armenia
Azerbaijan
Belarus
Bosnia and Herzegovina
Botswana
Brazil
Bulgaria
China
Colombia
Costa Rica
Dominican Republic
Ecuador
Georgia
Guatemala
Jamaica
Jordan
Kazakhstan
Malaysia
Mauritius
Mexico
Moldova
Montenegro
Namibia
North Macedonia
Panama
Paraguay
Peru
Romania
Russian Federation
Serbia
South Africa
Thailand
Turkey

European Union
Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
Netherlands
Poland
Portugal
Romania
Slovak Republic
Slovenia
Spain
Sweden

Table 4. Group of countries to compare by income level or region

4.1.3 Data cleaning and preprocessing

After the data collection process, the distribution of each indicator was analyzed. For hard data indicators that displayed extreme skewness and kurtosis (Groeneveld, R. A., & Meeden, G., 1984), preprocessing techniques were employed to address outliers and approximate normality. Indicators with an absolute skewness value greater than 2 and kurtosis value greater than 3.5 underwent winsorization (Dixon, W. J., & Yuen, K. K., 1974) or logarithmic transformations, as deemed necessary. Indicators derived from index or survey data were not subjected to any transformations.

Values for each indicator were subsequently normalized on a continuous scale from 1 (worst) to 5 (best) using a distance to frontier approach. This approach scales the score of each country based on its performance relative to the minimum and maximum values observed in the sample, referred to as the worst performance and frontier, respectively. For indicators such as 1.03 Political and operational stability (GII), 1.04 Government effectiveness (GII), and 4.01 Economic Complexity Index (ECI), which lack a standard range, the original series range of index and survey data (e.g., 0-100, 1-7) was maintained as the worst performance and frontier, irrespective of the actual values attained by the countries in the sample. In cases where missing values were present, imputation was performed using a K-nearest neighbors algorithm with 5 neighbors (Daniel T. Larose; Chantal D. Larose, 2014).

Finally, the metrics now with rescaled values were aggregated into the corresponding pillars of the iEcosystems framework by performing simple averages, leaving each indicator with equal weights within its pillar, or with equal weights within its sub-pillar in the case of the I-Cap and E-Cap sections.

The *Appendix 9, On data pre-processing* provides a detailed table with the normalized scores and original values attained by Mauritius and the groups used for benchmarking, specification of imputed values using K-nearest neighbors, the upper and lower bounds stablished for each indicator, and specification of whether if winsorization and/or logarithmic transformations were applied to a given indicator.

4.2 Innovation-Driven Entrepreneurial Economic Ecosystem Environment Assessment Results in Mauritius

4.2.1 Mauritius' Performance According to the iEcosystems Framework

Below is a comprehensive breakdown featuring specific indicators and metrics encompassed within each of the iEcosystem pillars and sub-pillars for Mauritius, along with the country groups it is compared against. These metrics are widely recognized and sourced from reputable reports published by specialized institutions responsible for measuring each component. The focus of the analysis will primarily center on identifying areas in which Mauritius still requires further attention and improvement.

For a comprehensive understanding of the indicators and metrics utilized within each pillar, please refer to Appendix 7. Furthermore, the rationale behind their inclusion can be found, including direct suggestions from the authors, which are further elaborated upon in their work (Budden, P., et al., 2019). Additionally, any replacements made were prompted by the discontinuity of original indicators, as previously outlined. In cases where the authors did not explicitly suggest specific indicators, the GED (Global Ecosystem Dynamics Initiative) made additions to bolster the pillars, guided by the authors' conceptual expectations for measurement within each pillar.

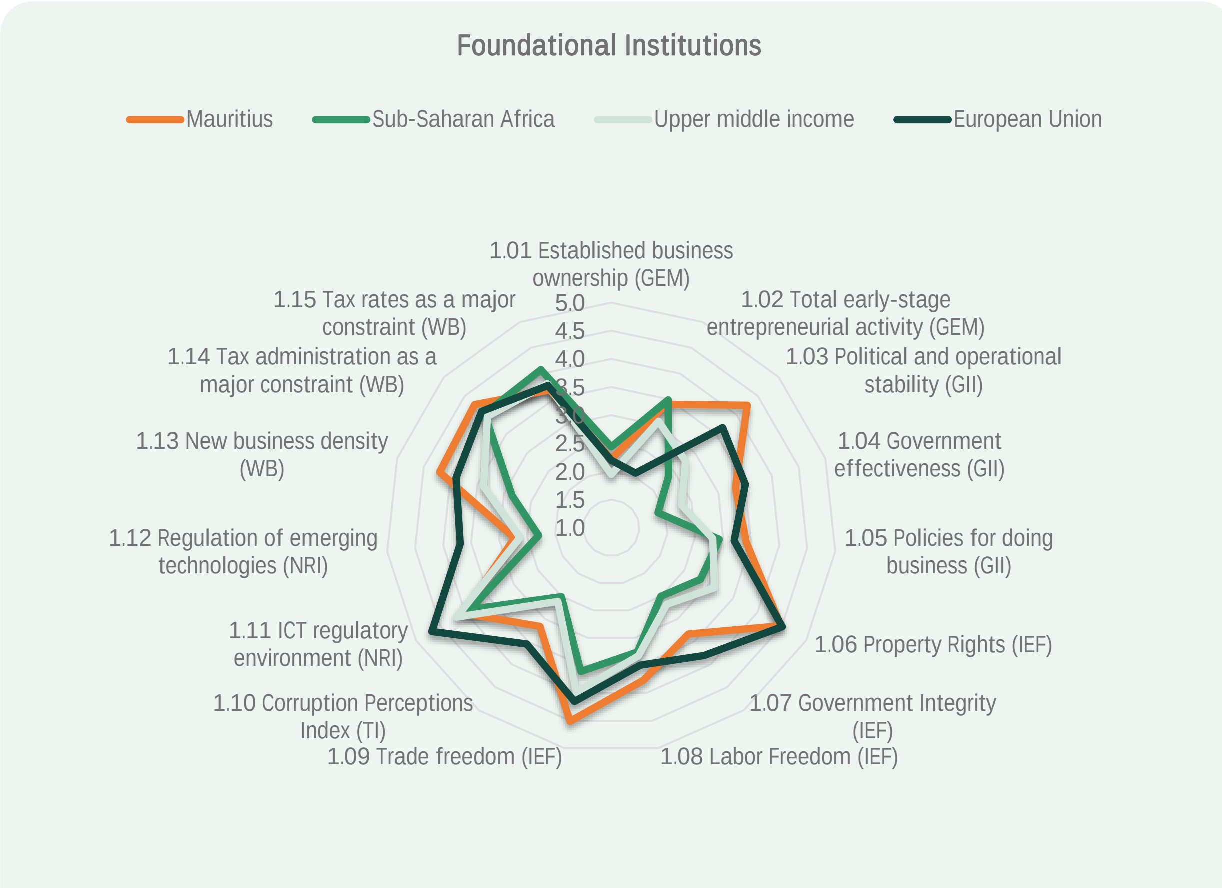


Figure 11. iEcosystems framework Foundational Institution Pillar for Mauritius and regions of interests.

According to a comparison of indicators for this pillar, Mauritius has made remarkable progress in strengthening institutions and establishing solid foundations that promote stability and confidence in entrepreneurship and innovation. Across various metrics, it is evident that Mauritius has not only surpassed countries with similar income levels (Upper middle income) but has even outperformed certain indicators of the European Union region. In light of this, a subsequent analysis will be conducted to examine the potential impact of early-stage entrepreneurial activity (1.02 Total early-stage entrepreneurial activity*) on economic development, particularly with regard to necessity-based entrepreneurship.

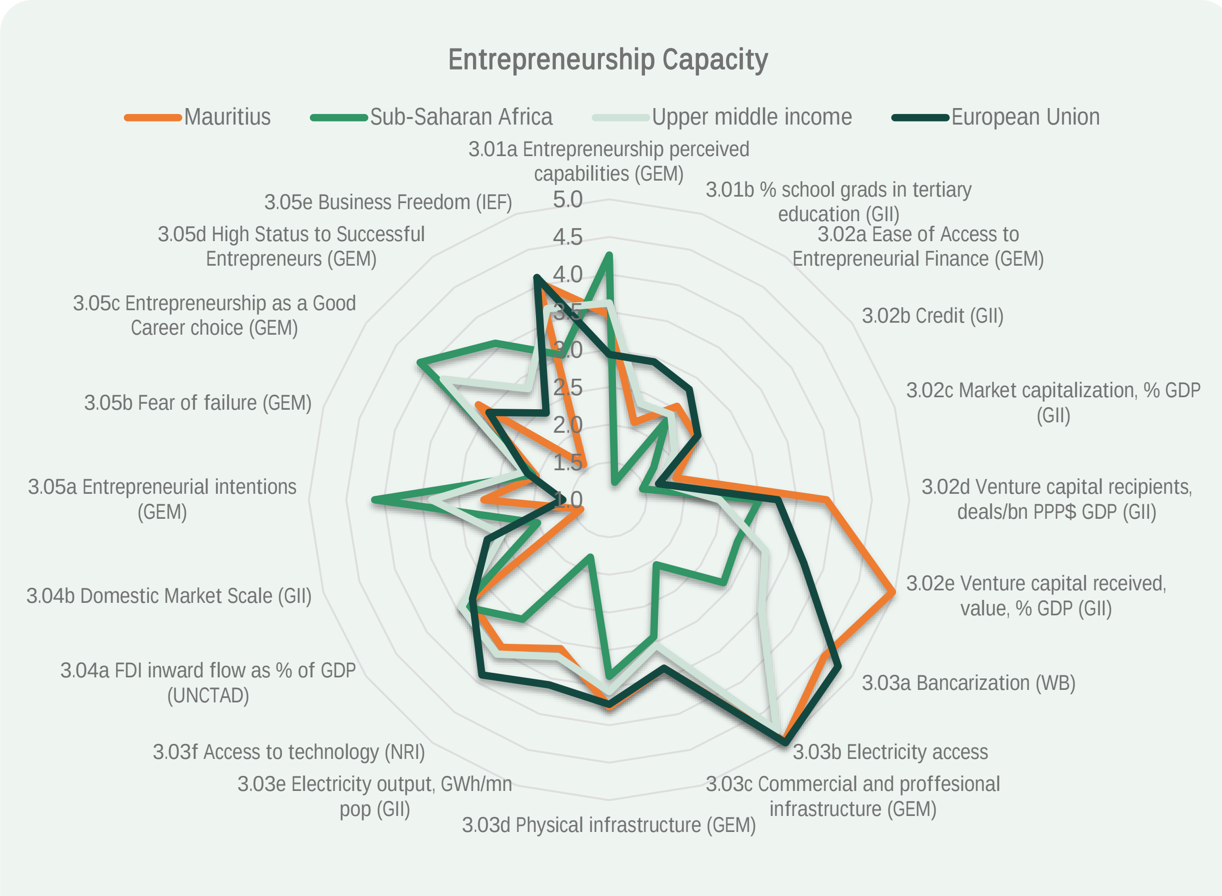


Figure 12. iEcosystems framework Entrepreneurship Capacity Pillar for Mauritius and regions of interests.

When considering the entrepreneurial capabilities of the Mauritius ecosystem, it excels in most indicators and metrics, particularly in terms of the availability of venture capital investment. However, it may seem that Mauritius scores lower in certain indicators such as 3.05a Entrepreneurial intentions*, 3.05c Entrepreneurship as a Good Career choice*, or 3.05d High Status to Successful Entrepreneurs* compared to countries within the same income group or even the Sub-Saharan African region. It is worth noting that this trend is observed among higher-income countries, including those in the European Union region, where these conditions are not given significant attention. Thus, Mauritius follows a similar pattern to that observed in the European region. A more comprehensive analysis on this topic will be presented later.

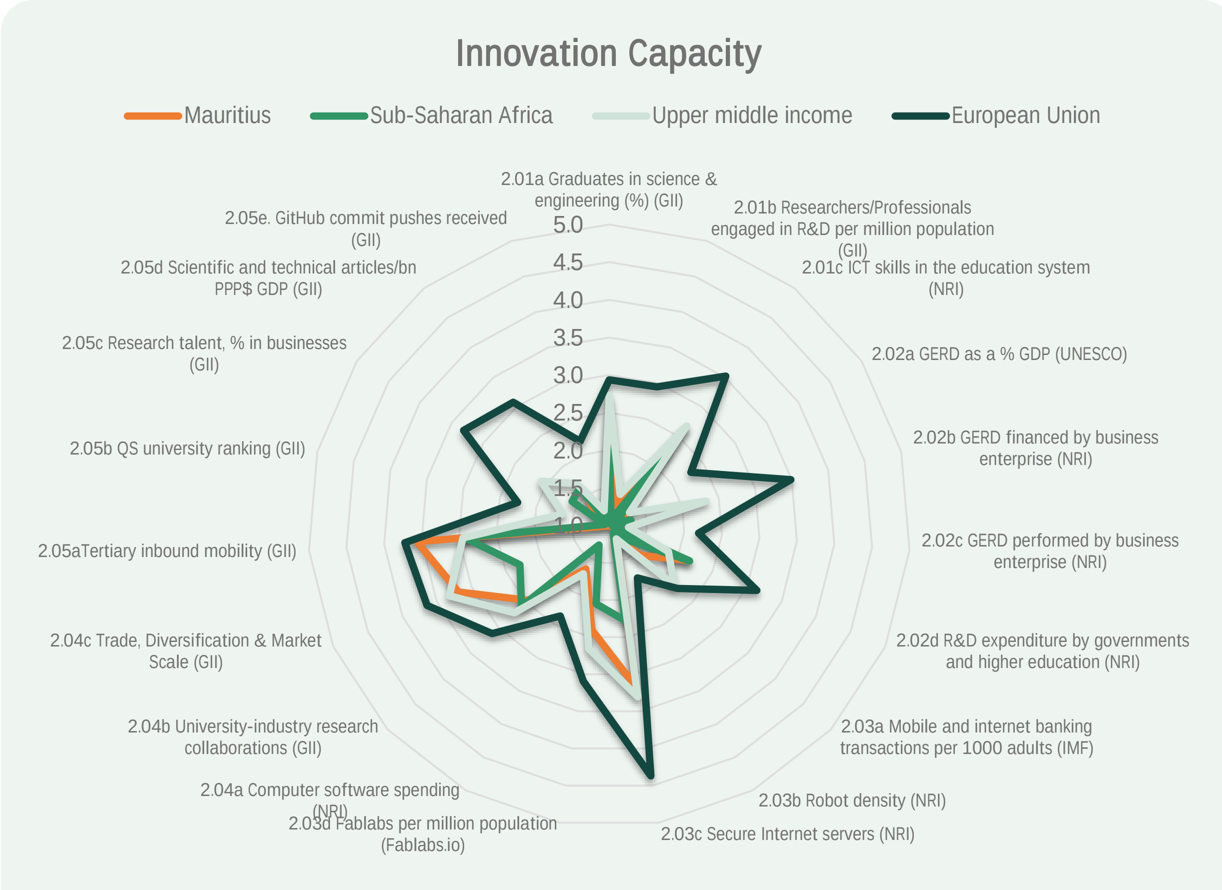


Figure 13. iEcosystems framework Innovation Capacity Pillar for Mauritius and regions of interests.

Innovation capabilities and effectively translating these capabilities into projects that yield sustainable economic and social impact pose significant challenges for Mauritius. It is in this pillar where Mauritius lags behind European Union countries, and in some cases, even falls below countries within the same income bracket (upper middle income). Factors associated with shared innovation infrastructure, such as access to advanced internet services (2.03a Mobile and internet banking transactions per 1000 adults), as well as other shared and accessible infrastructure, require attention and improvement.

Furthermore, there are other areas that warrant attention, such as enhancing the level of complexity in scientific research conducted in universities (2.05b QS university ranking) to foster a more sophisticated market demand for innovation (2.04c Trade, Diversification & Market Scale). Additionally, establishing robust university-industry relationships that facilitate the rapid dissemination of knowledge from science and technology to society (2.04b University-industry research collaborations) is crucial. Finally, efforts should also be directed towards promoting entrepreneurship and innovation ecosystems that support the successful commercialization of research outputs (2.05e Intellectual property payments and receipts*).

These areas require focused attention and targeted interventions to bolster innovation capabilities and ensure their effective translation into tangible economic and social benefits.

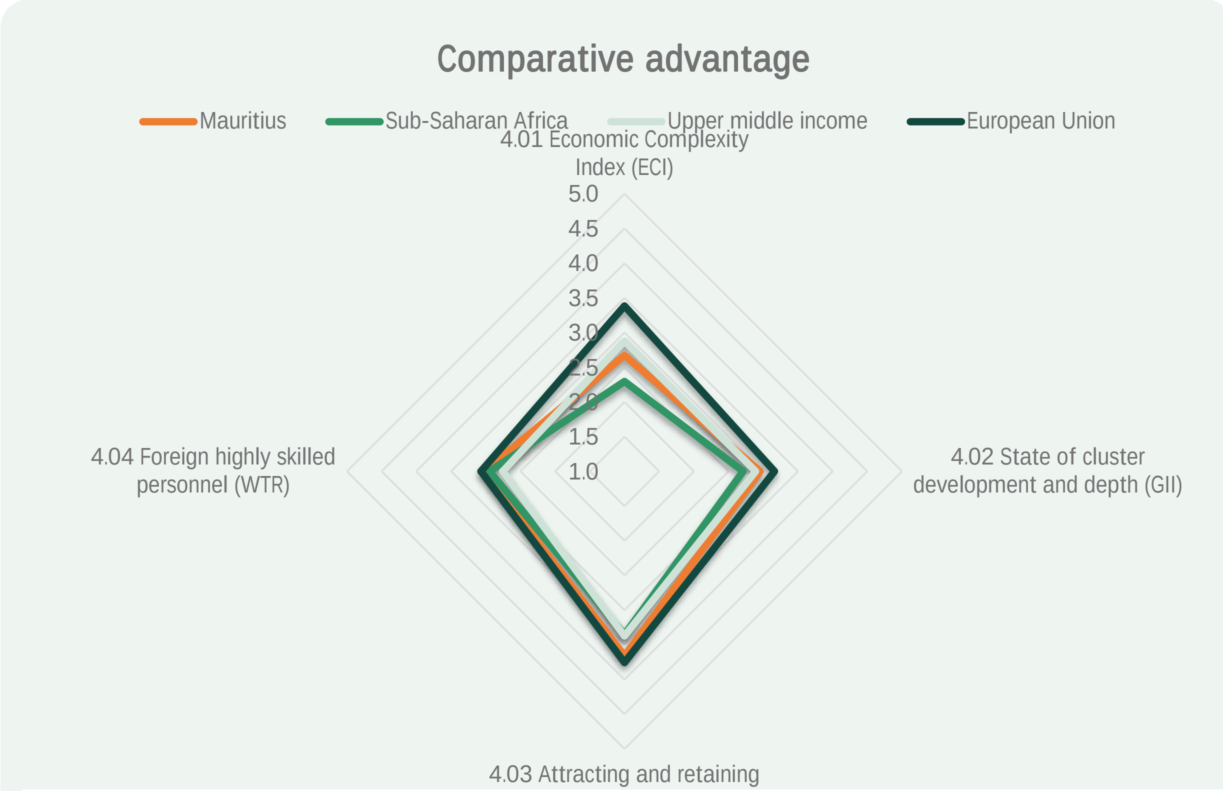


Figure 14. iEcosystems framework Comparative Advantage Pillar for Mauritius and regions of interests.

As demonstrated by the indicators and metrics in this specific pillar, Mauritius demonstrates effectiveness in the development of its primary clusters (4.02 State of cluster development and depth*). However, the heavy reliance on financial services and tourism, while neglecting more sophisticated industries and services, places Mauritius at a disadvantage in terms of the complexity of its economy (4.01 Economic Complexity Index). This situation persists even when compared to countries with similar income levels, and it could impact Mauritius' ability to attract highly skilled foreign talent (4.04 Foreign highly skilled personnel*). The presence of such talent would enable Mauritius to further develop capabilities associated with innovation.

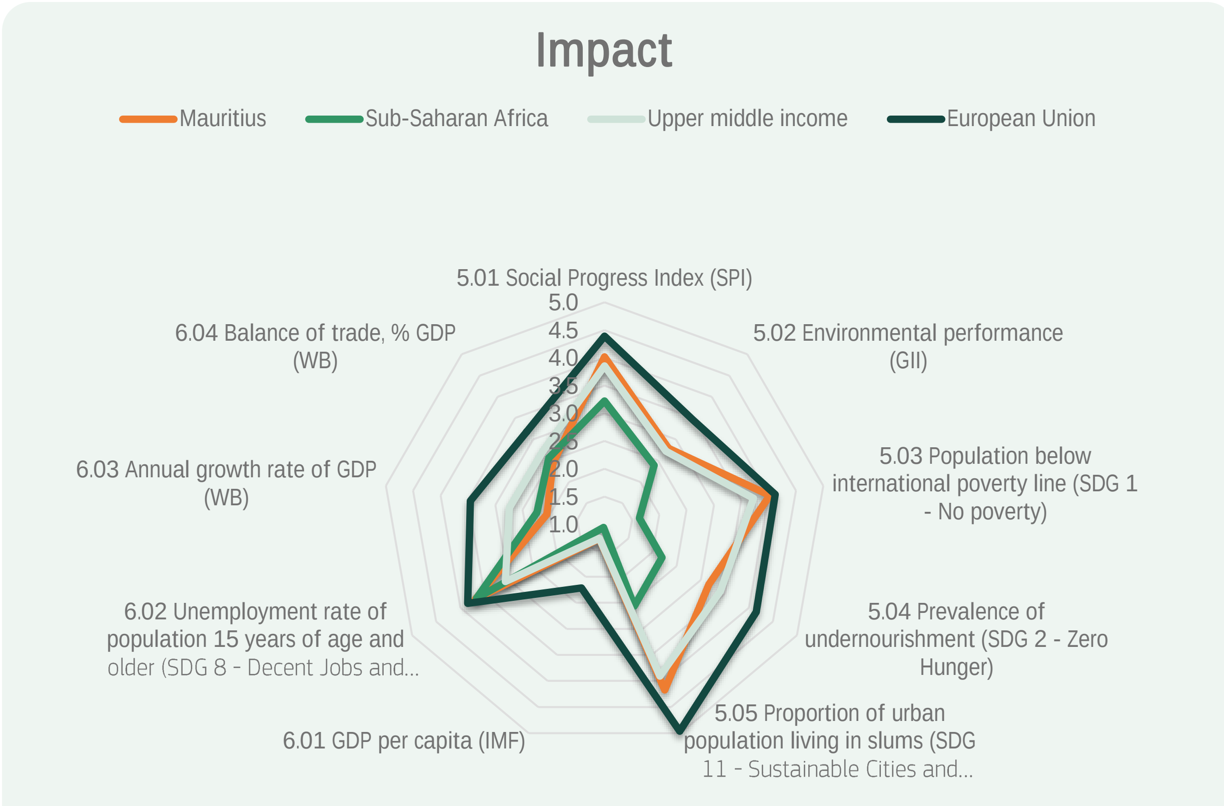


Figure 15. iEcosystems framework Impact Pillar for Mauritius and regions of interests.

Finally, in relation to the concept of impact in broader terms as proposed by iEcosystem (Budden et al., 2019), which encompasses not only economic development but also social development leading to more sustainable economies, Mauritius demonstrates a commendable level of performance. The indicators and metrics associated with social development in Mauritius exhibit good performance, comparable to that of Upper middle-income countries, and surpassing other countries in the Sub-Saharan Africa region.

However, the main challenge for Mauritius lies in achieving sustained economic development, particularly in light of the COVID-19 pandemic, which has had a significant impact on the annual growth of its gross domestic product (6.03 Annual growth rate of GDP). As tourism plays a crucial role in driving the economy and generating foreign exchange earnings, Mauritius is highly susceptible to external health, environmental, and economic crises. This vulnerability is also reflected in its trade balance (6.04 Balance of trade, % GDP). While a negative trade balance does not necessarily indicate an inherent problem in the economy, for Mauritius, which is sensitive to external economic and environmental factors, increasing export capacity through the production of more complex products and services derived from knowledge and innovation could help improve the trade balance. This, in turn, would result in higher foreign exchange earnings, a stronger local currency, an increase in GDP, and the creation of higher-value jobs.

4.3 Insights into the Assessment of the Innovation-Driven Entrepreneurial Economic Ecosystem Environment in Mauritius.

- Mauritius exhibits exceptional performance in relation to the indicators associated with the public policy pillars and fundamental conditions necessary for constructing a robust and sustainable innovation-driven entrepreneurial economic ecosystem. The country stands out prominently in the assessment of these conditions, surpassing countries with comparable income levels as well as those within the sub-Saharan African region, while also demonstrating a comparable performance to European Union countries for certain indicators.

- In terms of shared infrastructure and entrepreneurial human capacity, Mauritius surpasses neighboring countries with similar economic and regional income levels, and even achieves indicators on par with European Union nations. This indicates a higher level of development and readiness in these areas. Additionally, the country boasts a diverse range of financing options for entrepreneurs, outperforming European Union countries in this specific sub-pillar. This accessibility to funding sources contributes to the attractiveness of Mauritius as an entrepreneurial hub, not only for local entrepreneurs but also for international talents seeking opportunities.

- Nevertheless, despite notable efforts by the government to shift the focus towards the development of more sophisticated products and services, the indicators highlight the existence of considerable room for improvement in this domain. It is imperative to prioritize the promotion of an innovation-driven economy and avoid over-reliance on the existing traditional entrepreneurial culture. By fostering an ecosystem that encourages innovation and embraces technological advancements, Mauritius can further enhance its economic development potential.

- The remarkable progress achieved in establishing the institutional foundations for sustainable development within the innovation-based entrepreneurial economic ecosystem sets Mauritius apart. However, further advancements and enhancements are essential to fully exploit this potential and create an environment that maximizes the benefits of entrepreneurship and innovation for the country's economic growth and prosperity.

4.4 An approach focused on strategic efficiency towards sustainable development

The availability of resources and the capacity of government organizations, private entities, NGOs, and other economic ecosystem actors to address surrounding conditions may be limited. While government organizations have a significant influence on public policies, they may face constraints in terms of resources and time, which can make it challenging to address all aspects simultaneously. Furthermore, it may not be necessary it may not be necessary to do so.

The preceding section provided a comprehensive description of the current place-specific conditions and capacities of Mauritius' entrepreneurial innovation-driven economic ecosystem using the iEcosystem framework. In contrast, this section aims to ascertain the specific indicators that organizations, whether governmental or non-governmental, should prioritize in order to potentially achieve greater sustainable impact.

Given the inherent limitations in measuring sustainable impact within the iEcosystem framework[5], this section will conduct an analysis of the correlations between the metrics of the iEcosystem pillars (excluding the Impact pillar) and a carefully selected group of objectives from the United Nations' Sustainable Development Goals.

4.5 Analysis of Progress Towards the Sustainable Development Goals (SDGs) and Their Correlation with the iEcosystems Framework (Place-Specific Conditions and Capacities)

While reviewing the Impact section of the updated iEcosystems framework by GED, it was noted that various indicators related to social and economic progress are included. In addition, an in-depth analysis was conducted to assess Mauritius' progress towards achieving the Sustainable Development Goals (SDGs) as outlined in the "Sustainable Development Report 2022" (Sachs et al., 2022). The analysis specifically examined goals where Mauritius still encounters significant challenges, as reflected by scores below 70:

- SDG 2: Zero Hunger
- SDG 5: Gender Equality
- SDG 8: Decent Work and Economic Growth
- SDG 9: Industry, Innovation and Infrastructure
- SDG10: Reduced Inequalities
- SDG14: Life Below Water
- SDG15: Life on Land
- SDG17: Partnerships for the Goals

The following graphic illustrates the scores achieved by Mauritius in comparison to other African countries and countries within the European Union. The compliance threshold of 70/100 was determined based on the recognition that many countries within the European Union and other high-income nations

[5] For a comprehensive description of the constraints inherent in the models used, please refer to the "Limitations" section forward in this document.

already exceed this threshold, and that a more efficient analysis could be achieved by focusing solely on the targets where Mauritius still has significant progress to make.

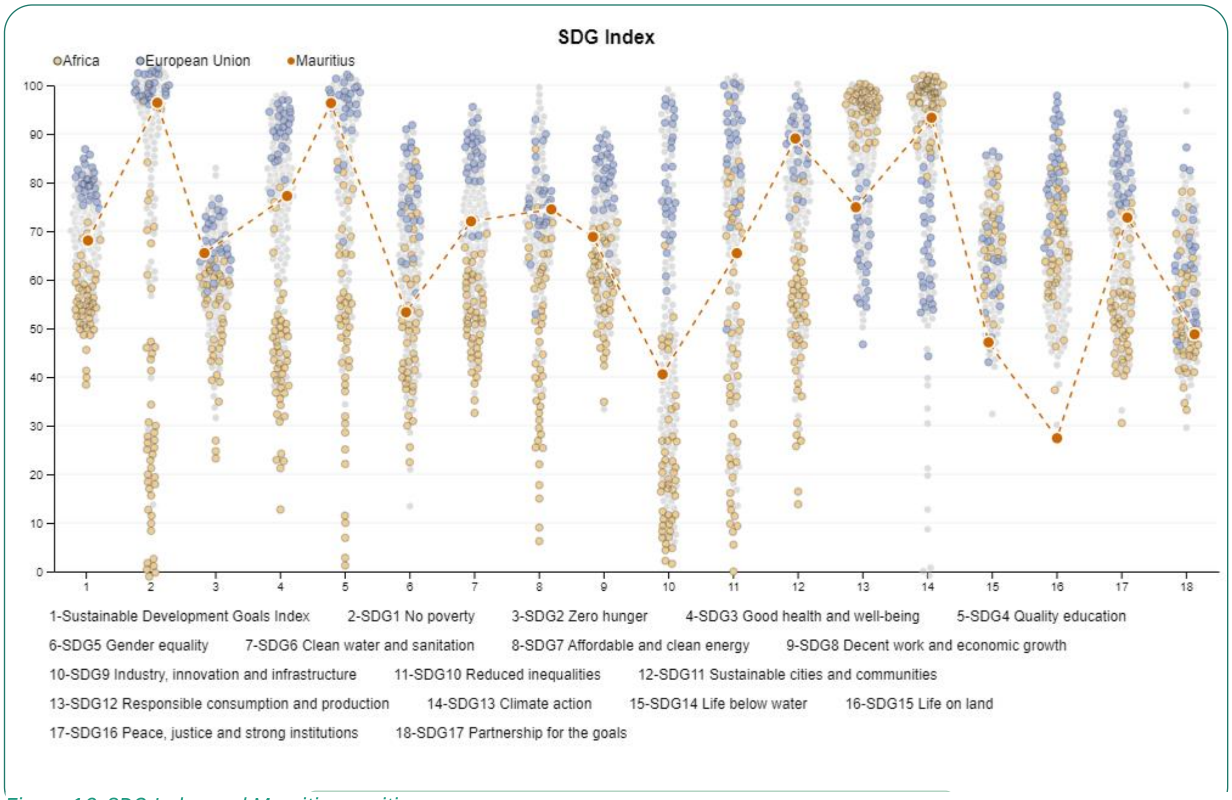


Figure 16. SDG Index and Mauritius position.

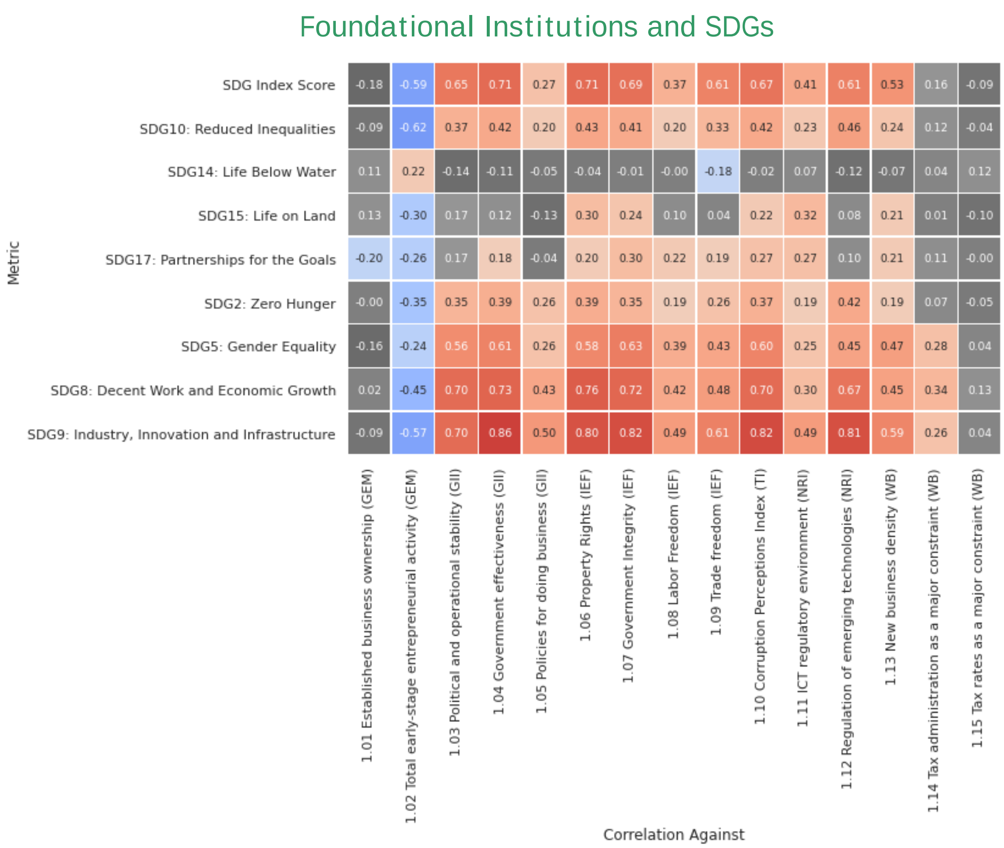
In order to assist decision-makers in identifying priority areas, a correlation analysis was conducted between the Sustainable Development Goals (SDGs) and the indicators of the iEcosystems framework. The analysis was performed using a sample of 118 countries that had reported values for at least 66% of the framework's metrics from 2018 onwards, as outlined in the Data Acquisition section of this study.

The following section includes heatmaps illustrating the Pearson correlation coefficient between the scores of the eight identified Sustainable Development Goals (SDGs), as well as the overall SDG Index Score, and the indicators within each pillar of the iEcosystems framework. Correlations that have a p-value smaller than 0.05 are considered statistically significant and are represented using shades of red for positive correlations and blue for negative correlations. For a detailed list and description of the indicators used in calculating each SDG score, please refer to Appendix 10, SDG Indicators, which includes the information provided by the original authors of the "Sustainable Development Report 2022" (Sachs et al., 2022).

Even though statistical correlations do not necessarily imply a direct influence or causality between the individual indicators involved (OECD/EC JRC, 2008), a deeper analysis of indicators that exhibit strong and statistically significant correlations with the Sustainable Development Goals (SDGs) in which Mauritius still requires substantial progress can provide initial criteria for prioritizing strategies aimed at enhancing their performance. By identifying the key areas that require improvement, policymakers and ecosystem actors can make informed decisions to effectively drive sustainable development and address pressing global challenges.

We then narrow our analysis to examine the relationships between indicators from the iEcosystems framework that exhibit a moderate or strong correlation[6] (above 0.50) with the relevant Sustainable Development Goals (SDGs). Indicators from the iEcosystems framework that are already included, either directly or in similar metric forms, in the computation of an SDG score are deliberately excluded from this analysis, as their collinearity is expected. By selecting metrics that offer unique and complementary information to the SDGs, the analysis aims to provide a comprehensive understanding of the relationship between the innovation-driven entrepreneurial economic ecosystem and sustainable development, while ensuring the accuracy and integrity of the results[7].

In the previous figure, it can be observed that metrics 1.07 Government Integrity, 1.04 Government Effectiveness, 1.10 Corruption Perception Index, 1.11 ICT Regulatory Environment, and 1.12 Regulation of Emerging Technologies exhibit a strong correlation with SDG9 and SDG8, as well as a moderate to high correlation with SDG5. While some level of collinearity could be expected due to the set of indicators, it is noteworthy the high correlation with the mentioned indicators.



(Correlations with a p-value < 0.05 are considered as statistically significant and highlighted in red (positive) or blue (negative).

Figure 17. Correlations between iEcosystem Foundational Institution metrics and SDGs.

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[6] Although interpretations of relationship strength, also known as effect size, may vary across disciplines, the average findings of several independent studies suggest that correlations of 0.5 can be considered moderate, while correlations above 0.7 are considered strong. In this study, weak correlations are defined as values below 0.5, moderate correlations as 0.5, and strong or very strong correlations as values above 0.7.

[7] A comprehensive list of the indicators included in the calculation of each SDG score can be found in Appendix 6 of this report.

In all of the aforementioned indicators, Mauritius has room for improvement (Figure 11). While this model cannot establish statistical causality, available literature suggests that well-designed public policies can indeed play a significant role in promoting sustainable development. Through careful planning and implementation, public policies can effectively address economic, social, and environmental challenges, thereby fostering sustainable development (Patanakul, P., & Pinto, J., 2014; Thongsri, N., & Chang, A., 2019; Kim, K., Choi, S., & Lee, S., 2020; Zhou, X., et al., 2021). Similarly, government integrity, corruption, and government effectiveness have a strong impact on economic and social development (Gyimah-Brempong, K., 2002; Welsch, H., 2004; Patanakul, P., & Pinto, J., 2014; Jiao, H., Koo, C., & Cui, Y., 2015; Chen, H., & Yoon, S., 2019).

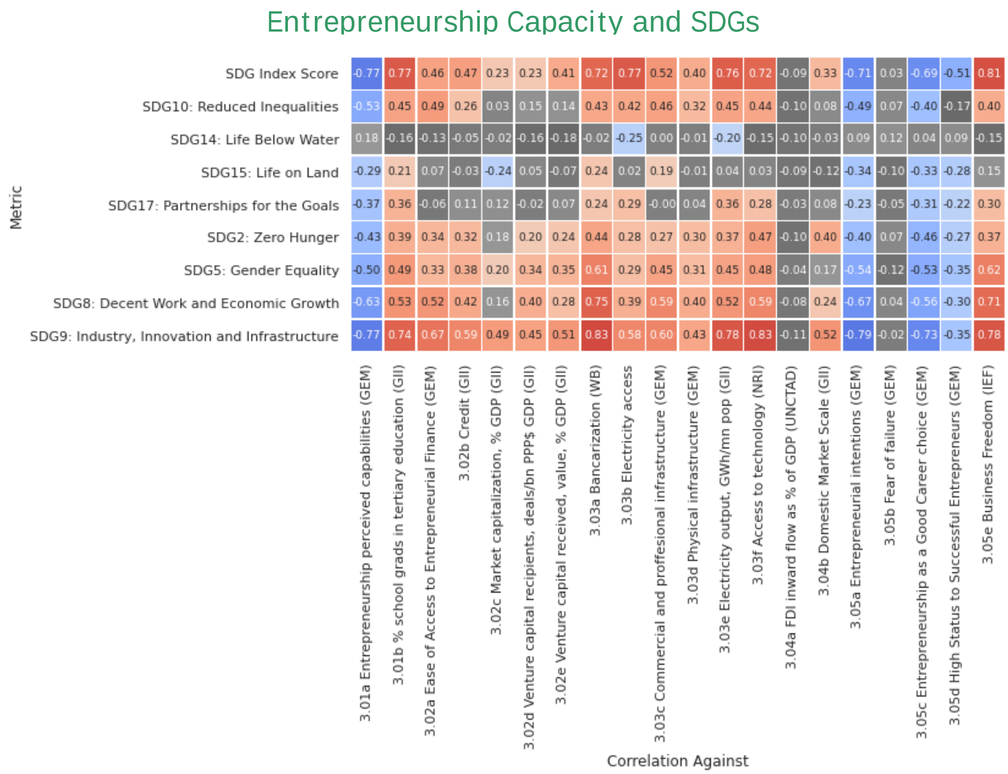
Lastly, although the correlation is not as high as with SDG8 and SDG9, it is relevant to understand how these indicators impact gender equality (SDG5). Available evidence in the literature also supports the notion that improved public policies and organizational strategies focused on gender equity have a real and measurable impact on innovation-based economies (Sastre, J., 2015; Kim, J., Lee, J., & Shin, K., 2016; Ritter-Hayashi, D., Vermeulen, P., & Knoben, J., 2019).

Given the previous evidence, both from available literature and the correlation model developed by Global Ecosystem Dynamics, it appears to be a sound strategy for governmental actors in Mauritius, who are identified as the most influential actors (Linkers) within the innovation-based economic ecosystem, to focus on developing initiatives aimed at improving the identified indicators while providing support to other organizations within the ecosystem.

Furthermore, a brief analysis of indicators associated with new ventures (1.02 Total early-stage entrepreneurial activity) can provide useful insights for ecosystem actors. Promoting early-stage entrepreneurial activity through public policy, along with providing incentives, is observed as a common practice in lower-income countries (Bosma, N., et al., 2020), including Sub-Saharan Africa with Mauritius showing some progress in this aspect, as depicted in Figure 11. In contrast, European Union countries allocate less attention to this aspect.

However, overstimulation in this regard will not necessarily guarantee achieving higher standards of sustainable development if this is not accompanied by strategies focused on sustainable impact, shifting from necessity-based entrepreneurship to opportunity-based entrepreneurship (Rosa, P., et al., 2006, and Aparicio, S., et al., 2016). The correlation model indeed reveals a negative correlation with all the selected SDGs, indicating that allocating excessive resources towards necessity entrepreneurship may not be as effective as directing those resources towards initiatives that promote innovation-driven entrepreneurship or opportunity entrepreneurship. By shifting the focus towards fostering an ecosystem that encourages and supports entrepreneurial activities based on opportunities and innovation, Mauritius can potentially achieve better outcomes in terms of sustainable development and SDGs.

Finally, despite the perceived low performance of Mauritius in the indicator 1.01 Established business ownership, which is generally consistent with the other analyzed groups, it does not seem worthwhile to allocate resources in this direction, as no correlation has been found with the SDGs. Instead, it would be more strategic to focus on other indicators and initiatives that have demonstrated stronger correlations with the targeted SDGs. By prioritizing resources and efforts towards areas that show a higher potential for impact and alignment with sustainable development goals, Mauritius can maximize its outcomes and for impact and alignment with sustainable development goals, Mauritius can maximize its outcomes and effectively contribute to the desired economic and social transformations.



(Correlations with a p-value < 0.05 are considered as statistically significant and highlighted in red (positive) or blue (negative).

Figure 18. Correlations between iEcosystem Entrepreneurship Capacity metrics and SDGs.

Similarly to the analysis regarding the Foundational Institution, the correlations between indicators in the Culture & Incentives sub-pillars of the iEcosystem framework and the selected SDGs reveal interesting insights. It is observed that certain aspects of early-stage entrepreneurship associated with necessity entrepreneurship, commonly found in developing countries, not only lack correlation with sustainable development but, in some cases, appear to hinder it. Specifically, indicators such as 3.05a Entrepreneurial Intentions, 3.05c Entrepreneurship as a Good Career Choice, and 3.05d High Status to Successful Entrepreneurs exhibit negative correlations with the selected SDGs.

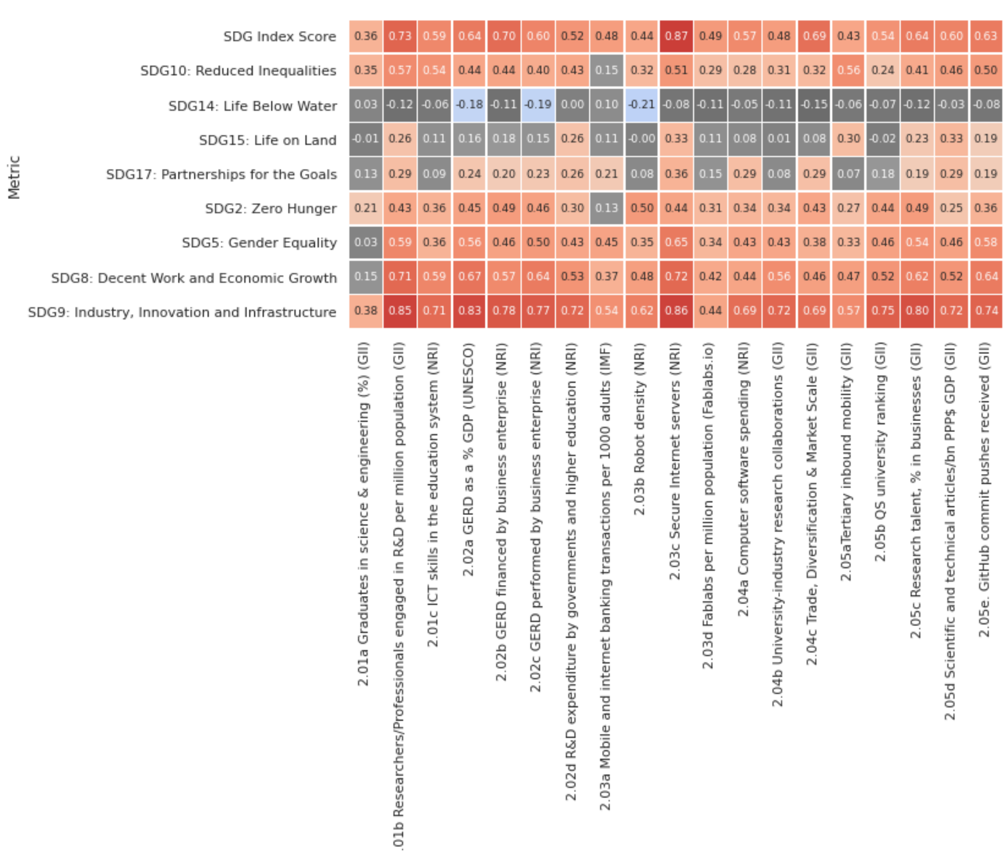
On the other hand, the indicator 3.05b Fear of Failure, while it may act as a barrier to entrepreneurship, does not show any correlation with sustainable impact. This finding is in line with the understanding that simply promoting entrepreneurship without clear strategies focused on innovation can impede overall development. A notable question arises regarding why choosing entrepreneurship as a career exhibits a negative correlation with SDG9: Industry, Innovation, and Infrastructure, and SDG8: Decent Work and Economic Growth, despite being considered a viable option in Sub-Saharan African countries or those with upper-middle incomes (Figure 12).

In contrast, it is evident that more developed countries, such as those in the European Union, tend to have better social conditions, resulting in necessity entrepreneurship being less common as the primary option. However, it is notable that these countries do not seem to actively promote initiatives that foster an entrepreneurial culture. In contrast, Mauritius is making progress in this aspect, as it follows a similar downward trend in these indicators as European Union countries (Figure 12). Additionally, Mauritius shows strong correlations with SDG5, SDG8, SDG9, and the overall SDG Index in the indicator 3.05e Business Freedom within the Culture & Incentives sub-pillar.

It is important to mention indicator 3.04b Domestic Market Scale, which has one of the lowest values in the iEcosystem assessment for Mauritius. This indicator also exhibits a moderate correlation with SDG9. However, due to the geographical and size constraints of the island, there are limited opportunities for improvement in this aspect since market size is closely related to population size. Nevertheless, efforts can be directed towards enhancing the sophistication of the economy and promoting the export of high-value products and services as strategies to counterbalance this natural disadvantage.

Furthermore, the indicators associated with the E-Infrastructure sub-pillar of the iEcosystem framework, particularly those related to shared infrastructure availability, demonstrate the highest correlations with the selected SDGs and sustainable development in general. In this regard, Mauritius still has room for improvement in indicators such as 3.03d Physical infrastructure, 3.03e Electricity output (GWh/m), and 3.03f Access to technology. Evidence suggests that for actors within the innovation-driven economic ecosystem of Mauritius, prioritizing initiatives that support the development of shared infrastructure can have a greater impact on high-value entrepreneurship and other pillars of sustainable development compared to initiatives focused solely on entrepreneurial culture, especially if that culture revolves around necessity entrepreneurship (Devece, C., et al., 2016 and Mrożewski, M., & Kratzer, J., 2017).

Innovation Capacity and SDGs



Correlations with a p-value < 0.05 are considered as statistically significant and highlighted in red (positive) or blue (negative).

Figure 19. : Correlations between iEcosystem Innovation Capacity metrics and SDGs.

Upon closer examination, it becomes evident that several of the arguments previously discussed regarding a strategic emphasis on innovation, rather than necessity entrepreneurship, can have a significantly greater impact on sustainable development. In this case, notable moderate to high positive correlations can be observed with five of the eight selected SDGs and the SDG Index.

Unsurprisingly, the highest correlations are found with SDG9. As previously mentioned, particular attention will be given to the iEcosystem indicators that are not included in the SDGs or do not measure similar conditions, as these factors continue to present challenges for Mauritius.

Within the pillar that encompasses innovation capacities, Mauritius still faces substantial hurdles (Figure 13). Despite the country's commendable progress in global innovation rankings (WIPO, 2022), the indicators for these sub-pillars underscore the ongoing need for further efforts and advancements. This indicators that present a greater challenge are mainly associated with economic development (Wennekers, S., et al., 2010 and Naudé, W., 2013).

Initially, it is noteworthy that two indicators of particular interest, namely 2.01b Researchers/Professionals engaged in R&D per million population and 2.01c ICT skills in the education system, demonstrate correlations with SDG9, SDG8, SDG5, SDG10, and the SDG Index. These indicators reflect the capabilities of human capital in innovation, science, and technology. The relatively low values observed, particularly in relation to the involvement of researchers and professionals in R&D, align with the limited influence of Knowledge Generators, with the exception of UoM, and Talent Developers, such as universities functioning as Enablers focused on capacity building, within the structure of the economic ecosystem (Figure 3). Therefore, a greater engagement of these actors in the ecosystem could potentially have a positive impact on the attainment of the SDGs and the overall development of Mauritius.

Furthermore, the aforementioned lack of involvement of Knowledge Generators in the ecosystem structure aligns with the indicator 2.04b University-industry research collaborations. Strategies jointly driven by Articulators, Linkers, and Knowledge Generators, with a specific focus on enhancing collaboration among the latter within the ecosystem, hold the potential to accelerate the sustainable development of Mauritius.

On the contrary, another area requiring improvement in Mauritius pertains to public (2.02d R&D expenditure by governments and higher education) and private (2.02b GERD financed by business enterprise and 2.02c GERD performed by business enterprise) funding for innovation. These indicators exhibit varying degrees of correlation with SDG9, SDG8, SDG5, and SDG10. It is evident that Mauritius has work to do in these aspects.

The relationship between government investment in R&D and sustainable development has been well-documented in the literature (Inekwe, J., 2015 and Szarowská, I., 2017), and similarly, the investment made by the private sector has demonstrated causal relationships in this regard (Hong, J., 2017). This underscores the importance for all actors within the Mauritius ecosystem to concentrate their efforts on developing initiatives that foster private investment in innovation.

Correlations with a p-value < 0.05 are considered as statistically significant and highlighted in red (positive) or blue (negative).

Figure 20. Correlations between iEcosystem Comparative Advantage metrics and SDGs.

Lastly, as discussed earlier and acknowledged in the limitations, measuring the comparative advantages of an innovation-driven entrepreneurial economic ecosystem can be a complex endeavor, as highlighted by Budden et al. (2019). However, through the proposed correlation model, we can emphasize two indicators that exhibit high correlations with SDG9: 4.02 State of cluster development and depth, and 4.03 Attracting and retaining talent. Additionally, these indicators demonstrate low to moderate correlations, albeit statistically significant, with 4.01 Economic Complexity Index and 4.04 Foreign highly skilled personnel.

Among all the indicators mentioned above, the assessment of the environment and capabilities of the Mauritius ecosystem (Figure 14) suggests that particular attention should be given to enhancing the complexity of its economy. In this regard, strategic initiatives focused on transitioning from an economy primarily reliant on tourism and financial services (World Bank, 2022b) to an innovation-driven economy can serve as a counterbalance to the market size disadvantage mentioned earlier.

4.6 Final thoughts on the correlations between the ecosystem environment and capabilities, and the SDGs.

- The iEcosystem approach, as emphatically established, places primary attention on the place-specific conditions and capabilities for entrepreneurship and innovation within an economic ecosystem. While high and moderate correlations have been identified between the indicators proposed by iEcosystems and Global Ecosystem Dynamics with SDG8, SDG9, SDG5, as well as the SDG Index, and moderately low but statistically significant correlations with SDG10, it has also been observed that there are very few correlations between these indicators and SDG14, SDG15, and SDG17.

- Furthermore, emphasizing the limited relevance that certain aspects of entrepreneurship, which may intuitively seem important, such as entrepreneurial culture and entrepreneurial human capital, may have on sustainable development does not imply eliminating public policies and incentives in this regard. Rather, it suggests a greater focus on initiatives and public policies driven by the actors within the Mauritius ecosystem towards opportunity-based entrepreneurship.

- It is also important to highlight how a comprehensive analysis of both the structure of the economic ecosystem and its environment and capabilities can help better understand where to allocate Mauritius' limited resources. This involves focusing on improving the ecosystem's structure while intervening in specific indicators that are most strongly correlated with sustainable development.

5. Conclusions about Mauritius Innovation-Driven Entrepreneurial Economic Ecosystem

Mauritius has been making efforts to promote innovation and entrepreneurship through its public policy. One example is The National Innovation Framework (NIF) (2018-2030), a public initiative aimed at transforming the Mauritian economy by creating innovation ecosystems. The NIF focuses on four pillars: first, a long-term sustainable policy that ensures balanced development at the national, industrial, business, and individual levels; second, a departure from the conventional state funding model, encouraging industry investment in innovative companies to mitigate risks and allocate public funds to relevant socio-economic needs; third, an integrated and coordinated approach that fosters collaboration between academia and industry in different disciplines, making innovation an inherent part of the country's economy; and fourth, an accountability system encompassing policies, incentives, and evaluations to hold market players and policymakers accountable for their contributions and results.

On the other hand, Mauritius' position on global rankings, such as the Ease of Doing Business (World Bank) and the Global Innovation Index (WIPO), shows that the government has been working to create a business-friendly environment by simplifying regulations, reducing bureaucratic barriers, and streamlining the process of starting and running a business. Additionally, the government encourages increased investment in R&D, both from the private sector and through government-funded programs, to stimulate technological advancements and innovation. These public policy strategies have a sustainable development focus, where the government promotes innovation and entrepreneurship in sectors that align with sustainable development goals, such as renewable energy, environmental conservation, and sustainable agriculture.

Having public institutions that prioritize fostering innovation and strengthening entrepreneurial capacities as part of their strategies for the country's socio-economic development is a competitive advantage for a nation like Mauritius, both regionally and internationally. However, it is crucial to continually assess the impact of these strategies on the environment and the structure of economic ecosystems to evaluate the effectiveness of public policies, adapt strategies to the local culture, and identify elements that require evaluation to enhance efficiency or, if necessary, be readjusted. This extensive study of Mauritius' Innovation-Driven Entrepreneurial Economic Ecosystem provides valuable insights into its structural composition, environmental factors, capacities, and correlation with Sustainable Development Goals (SDGs).

- The innovation-driven entrepreneurial economic ecosystem in Mauritius exhibits efficiency and robustness in its structural capacity.
- A shared purpose can serve as a driving force for collaboration and collective efforts towards the common goal of fostering innovation and entrepreneurship for sustainable development.
- The notion of a purpose centered on innovation for sustainable growth, leading to the distributed social and economic well-being of society, is already present among the actors in the ecosystem. Building initiatives and strategies focused on achieving this purpose can have a significant impact on increasing trust among the actors, while also energizing and streamlining relationships within Mauritius' economic ecosystem.
- The analysis underscores the significant role of Articulators in driving innovation and entrepreneurship in Mauritius. However, there is room for improvement in involving other key actors, such as Knowledge Generators, Linkers, Promoters, and Communities.
- The significant influence of the Articulators, which results in the dependency of other organizations, particularly the Enablers, poses a pressing challenge that government institutions must expeditiously address.
- Knowledge Generators' participation and influence within the ecosystem are relatively low, suggesting untapped potential for industry-academia collaboration and knowledge exchange. The leadership of Articulators, their influence on public policies, and their ability to foster collaboration are crucial for improving innovation capacities and creating a conducive environment for sustainable development.

- Challenges include the need for increased funding for research and development (R&D) from both the public and private sectors and the transition to an innovation-driven economy.

- Correlations between various indicators related to place-specific conditions and capacities with Sustainable Development Goals (SDGs) show the highest links to SDG8 (Decent Work and Economic Growth) and SDG9 (Industry, Innovation, and Infrastructure). Indeed, prioritizing these indicators should be a key aspect within the strategies to be developed in the economic ecosystem.

- Furthermore, certain other indicators related to public policy, its institutions, and specific capabilities for fostering innovation also show a positive correlation with SDG5 and SDG10. Therefore, it is crucial not to overlook these indicators, as they can play a significant role in advancing gender equality and reducing inequalities within the economic ecosystem.

- Articulators must continue advocating for policies that promote innovation and entrepreneurship, strengthen institutions, and improve the regulatory framework to support the growth of innovative ventures. The primary focus should be on indicators that exhibit a stronger correlation with the SDGs, while avoiding the allocation of resources to those indicators showing a negative correlation.

In conclusion, Mauritius possesses strong contextual conditions and capabilities that can drive innovation while focusing on sustainable development. Entrepreneurs, innovators, and businesses benefit from an ecosistemic structure that fosters economic life driven by innovation, positioning Mauritius advantageously compared to countries within its income group. Nevertheless, as mentioned earlier, it is crucial to implement targeted strategies addressing the aspects highlighted in this study, enabling Mauritius to achieve higher standards of sustainable development for the benefit of its society.

5.1 Limitations

The discontinuation of reports and indicators is always a possibility, presenting practitioners with the difficult decision to either keep using outdated information or undergoing the task of constantly updating and improving their frameworks. While, as shown in this work, we highly recommend pursuing the latter, it is true that besides the extensive work required for finding and selecting new indicators, this approach also poses a challenge in terms of the comparability of the overall framework across different years.

As originally stated by the authors of the iEcosystems framework, capturing the variables encompassed within the various key areas of the framework can pose challenges. Specialized measures often lack broad coverage or consistency, while more widely available metrics may not accurately assess the specific phenomena of interest, thereby introducing noise. Moreover, a limitation arises from the fact that most relevant indicators are only accessible at an international level. Consequently, employing such a framework at smaller scales, such as cities, while maintaining comparability with locations in other geographies, would necessitate substantial modifications to the specific set of indicators included in the framework.

The limited coverage of various indicators highlights the issue of missing data, which is particularly pronounced in countries from Sub-Saharan Africa. Increasing our data coverage threshold from 66% –

selected as a reference to the audit carried out by the JRC-COIN to the Global Innovation Index 2022 (Saisana, M. et al., 2022) – to 70% would have excluded an additional 7 countries from the region from the analysis. Even though our database of 118 countries allows for imputing values with considerable accuracy using the K-nearest neighbors method, indicators with imputed values should still be interpreted with great caution until a real value is reported by the country.

Measuring comparative advantage and impact proves to be particularly challenging, necessitating certain trade-offs in terms of depth within those pillars in order to ensure the future applicability of the framework across different countries. Bearing this in mind, the results derived from the present assessment of the comparative advantage and impact areas should be regarded as a starting point for further analysis of clusters and impact objectives that are of specific interest to the country. Furthermore, deliberation on the definition of these dimensions is necessary to ensure that they accurately reflect the concept of comparative advantage and impact. Careful consideration should be given to refine and refine the measurement criteria in order to capture the essence of these dimensions effectively.

Even though average scores are also provided for each pillar and sub-pillar, iEcosystems was conceived more as a framework for analysis than as a composite index. Since the authors provide no guidance on the topics such as the possible weighting and aggregation methods for each pillar, further work and experimentation is required to give more statistical robustness to the average pillar and sub-pillar scores, hence during the interpretation and analysis of the results, attention should be focused on the normalized scores of each indicator as opposed to the pillar and sub-pillar averages, for the time being.

Correlation analysis can indeed be a valuable tool for examining potential relationships between variables and prioritizing key areas of focus. However, it is important to acknowledge that the definition of a strong correlation can vary across different fields of study. Consequently, it is crucial to support the interpretation of correlations with additional evidence and conceptual evaluation to determine whether one variable truly influences the phenomena of interest.

It is important to clarify that correlation refers to a statistical association between variables, while causality implies a cause-and-effect relationship where one event or phenomenon directly produces a change in another event or phenomenon (Russo, F., 2011; Rohrer, J. M., 2018 and Rezaee, Z. et al., 2020). On the other hand, establishing causality is a complex process and, in some cases, can be difficult to achieve due to ethical or practical limitations (Cliff, N., 1983 and Morton, R. B., & Williams, K. C., 2010). Although, the correlation model has been meticulously detailed, we are not implying any causality between the variables but rather identifying strong and statistically significant associations, providing a solid foundation for the analysis presented in this study.

The primary objective of the complex network analysis conducted on the collaborations among actors in the innovation-driven entrepreneurial economic ecosystem of Mauritius was to assess its overall structural composition (Tedesco, M. S., 2022, and Tedesco et al., 2022) and identify key actors contributing to its development (Tedesco, M. S. & Serrano, T., 2019). It is important to note that this analysis does not aim to provide an exhaustive list of all the organizations and relationships present in the ecosystem. Social network data is frequently incomplete (Kossinets, G., 2003), and our data collection process deliberately sacrifices full network coverage to prioritize enhanced data quality.

While each node in the network is labeled as an organization, it is important to acknowledge that the research instruments are completed by individuals who represent these organizations and possess relevant knowledge of their interorganizational relationships. Therefore, the omission of certain collaborations may be attributed to the perspective or perception of the representative who completed the survey, rather than the actual absence of a relationship between the organizations.

The absence of complete network data poses challenges in the interpretation of commonly used centrality metrics such as average degree, as they heavily rely on the participation of nodes in the study, and no approximations have been developed concerning the distribution samples of most descriptive statistics used in network analysis, as there are generally no viable ways of identifying populations and extracting samples using probabilistic methods (Hanneman, R. A. & Riddle, M., 2005). Therefore, our analysis focuses on alternative metrics unaffected by participation, such as weighted in-degree, as well as overall graph metrics like average shortest path length and our collaboration index.

To address these limitations, we leverage the data collected from over 20 different economic ecosystems, allowing for comparative analysis. This approach has proven effective in capturing the complexities of various ecosystems that we have studied, and it provides valuable insights despite the constraints of incomplete network data.

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List of Abbreviations

CNA Complex Network Analysis

EU European Union

GDP Gross Domestic Product

GED Global Ecosystem Dynamics Initiative

GII Global Innovation Index

IDB Inter-American Development Bank

JRC Joint Research Centre

OECD Organization for Economic Co-operation and Development

R&D Research and Development

SDGs Sustainable Development Goals

STI Science, Technology, and Innovation

TE-SER Tedesco-Serrano Model

WIPO World Intellectual Property Organization

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Annexes

Annex 1 Glossary of Terms for Economic Ecosystem Structural Analysis.

Articulators

They provide coherence and stability to the ecosystem by creating an enabling environment for high-impact entrepreneurship and innovation to thrive. The role of articulators is to facilitate the establishment of spaces and platforms that promote active collaboration and joint initiatives among different actors. They achieve this through the development and implementation of public policies that encourage such collaboration.

Articulators are typically public or non-profit organizations equipped with the necessary capabilities and expertise in generating and executing public policies. Examples of articulators include government entities, entrepreneurship institutions, various non-governmental organizations (NGOs) involved in policy-making and implementation, and municipal institutions focused on entrepreneurship and innovation. These public policies serve public and societal interests and are not limited to a specific sector of the economy.

Linkers

They facilitate connections among entrepreneurs, companies, and other actors within the ecosystem, with the aim of fostering new relationships. These relationships promote collaboration and the exchange of knowledge, including best practices and market information, while enabling institutions to collectively address opportunities and challenges, thereby strengthening their collective position.

Linkers are typically organizations that specialize in connecting institutions with shared interests in order to enhance their collective impact. Examples of linkers include chambers of commerce, business or industrial councils, intermediary organizations, and networks of organizations. Through their efforts, linkers contribute to the establishment of common objectives and facilitate collaboration among institutions within the ecosystem.

Promoters

They disseminate the stories and culture of economic ecosystems, both locally and internationally, as a means to support the scalability of ecosystems and foster a culture of entrepreneurship and innovation.

Promoters are ecosystem organizations that focus on disseminating economic activity and sharing stories at the national or even international levels. These organizations are typically public or private institutions, such as print or digital media outlets, among others

Enablers

They provide resources to support the generation and development of new projects and ventures. Enablers encompass organizations that offer various types of tools and resources, including training, talent, consulting, financial support, infrastructure, and coworking spaces, among others. These resources enable the ecosystem to expand its available resources, thereby reducing barriers for actors and entrepreneurs to enter the ecosystem or market.

Enablers contribute strategic resources that go beyond monetary investments.

Enablers typically consist of public, private, academic, or civil society organizations focused on providing support to entrepreneurs, innovators, companies, among others. Examples include incubators, accelerators, investment funds, training centers, consultancy firms, non-research-based universities, coworking spaces, and foreign trade offices, among others.

Knowledge Generators

Knowledge generators are public and private institutions that generate new knowledge, which, in turn, can drive the creation of new projects, technologies, innovation, and high-impact ventures. Knowledge is not only generated or found in academic institutions but also in any organization with a strong focus on creating scientific, technological, or social-based knowledge. This knowledge can be utilized through entrepreneurship, innovators or companies to address significant challenges at a national or global level.

Knowledge generators typically include public, private, academic, or civil society institutions that prioritize research. Examples of such institutions include research centers, development centers, design centers, innovation centers, and research and development departments of universities or private enterprises, among others.

Communities

These actors encompass formal and informal civil organizations that foster knowledge sharing, collaboration, and contribute to the vitality of the high-impact entrepreneurial ecosystem. Communities, while rooted in civil society, typically emerge as informal entities with a primary objective of knowledge exchange, mutual support, and enrichment based on shared objectives. They transcend specific public policies and temporal governance or institutional structures, thereby ensuring the sustainability and continuity of the ecosystem.

Communities can manifest within diverse institutional settings, including public, private, and academic spheres, and operate autonomously as fundamental components of civil society, whether or not they are formally recognized as non-governmental organizations (NGOs).

Sociogram

We refer to the sociogram as the mathematical representation of the social dynamics within an Economic Ecosystem. It is derived from the Social Network Analysis methodology, which utilizes data collected from participating actors to identify and analyze the network of nodes (actors) and edges (collaborations) that shape and structure the ecosystem. The sociogram provides a visual representation of the relationships and interactions among actors, enabling a deeper understanding of the collaborative dynamics within the ecosystem.

Nodes (Actors)

In the sociogram, nodes represent the actors of the Economic Ecosystem who took part in the study or were mapped by participants using the Social Network Mapping methodology. The size and relative position of the nodes depict the significance of the actors within the ecosystem and their influence in terms of collaboration dynamics. Larger nodes indicate actors with a greater level of importance or influence, while the positioning of the nodes illustrates their relative prominence or centrality within the network. By visually representing the actors in this way, the sociogram provides insights into the structure and dynamics of the Economic Ecosystem.

Node Size

The size of each node (actor) in the sociogram is determined by considering two factors: the number of mentions by other actors and the intensity of collaborations with other organizations. This approach ensures that the node size reflects the perceived relevance of each actor in the ecosystem based on their collaboration interactions, rather than being biased by their participation or non-participation in data collection. By incorporating these measures, the node sizes provide a visual representation of the actors' significance and level of engagement within the collaboration network of the Economic Ecosystem.

Relative Position of Nodes

The position of each node (actor) in the sociogram is determined by their degree of connection and collaboration with other nodes in the network. This is achieved through the application of force-based algorithms commonly used in Social Network Analysis (SNA). These algorithms take into account factors such as the intensity of connections and the extent of collaboration between nodes.

Edges (Collaborations)

In the sociogram, edges represent the collaborations that exist within the Economic Ecosystem as reported by the participating actors. These edges visually depict the relationships and interactions between actors, illustrating the collaborative activities taking place within the ecosystem. The thickness or intensity of the edges reflects the strength or frequency of the collaborations, with thicker edges indicating stronger or more frequent collaborations between actors.

Edges Thickness

The thickness of each edge in the sociogram is determined by the intensity of the collaboration between two actors. A greater thickness indicates a higher level of collaboration between the actors. The intensity of collaboration is calculated by considering both qualitative indicators and quantitative metrics associated with the collaboration's comparative resources.

The intensity of collaboration reflects the level of importance that an actor assigns to collaborating with another actor, as well as the human and economic resources invested in the collaboration compared to other actors in the ecosystem. This level of importance is measured on a scale from 1 to 5, based on self-perceived qualitative data provided by the actors. Additionally, numerical data on budget and human resources are used to quantify the resources invested in the collaboration.

By incorporating both qualitative and quantitative data, the intensity of collaboration provides a comprehensive understanding of the level of importance and resources allocated to collaborations within the Economic Ecosystem. This information helps to visualize and analyze the strength and significance of collaborative relationships between actors.

Directionality

The curvature of the edges in the sociogram represents the directionality of the collaboration between two actors. The curvature is depicted in a clockwise manner, indicating the direction of the interaction. This allows us to identify which actor initiated the collaboration with another.

Furthermore, the color of the edge in the sociogram reflects the TE-SER role of the initiator. Each TE-SER role category is associated with a specific color, providing visual cues to distinguish the different roles of the actors within the collaboration network.

Interactions for Successful Collaborations.

The average number of interactions required within the ecosystem to achieve successful collaboration is a measure that reflects the agility for collaboration within the ecosystem. A higher number of interactions indicates a greater amount of energy and resources needed to initiate a collaboration.

Interactions can take various forms, such as meetings, calls, email chains, or any other form of communication or engagement between actors. These interactions represent the efforts and actions taken to kickstart a potential collaboration and move it towards a successful outcome.

Gravitational Centers

Gravitational Centers refer to nodes (actors) that, due to their centrality and influence in the ecosystem, attract a large number of other nodes through their relationships, thus reinforcing the collaboration dynamics within the ecosystem itself. These nodes act as central hubs that play a significant role in connecting and influencing other actors in the ecosystem.

Annex 2 List of Participating Actors

Organization	Workshop attendance	Network data included
Business Mauritius	x	x
Economic Development Board	x	x
ENL Corporate Services	x	x
Global Shapers Port Louis Hub	x	x
LinearArc Solutions	x	x
Made in Moris & Association of Mauritian Manufacturers	x	x
Mauritius Africa FinTech Hub	x	x
Mauritius Investment Corporation Ltd	x	x
Mauritius Research and Innovation Council	x	x
MCCI	x	x
MIB LTD	x	
Ministry of Industrial Development, SMEs and Cooperatives	x	x
Mochi Ltd	x	
National Commercial Bank	x	x
Polytechnics Mauritius	x	x
SME Mauritius Ltd	x	x
Trampoline Ltee	x	x
Turbine Incubator Limited	x	x
UNDP Mauritius and Seychelles	x	x
University of Technology, Mauritius	x	x
Verde Frontier	x	x
Accelerator Labs		x
La Plage Factory		x
Ministry of Finance		x
University of Mauritius		x

Table 5. Participating actors and network data included

Annex 3 Referenced results from economic ecosystems analyzed by GED

The following section presents a series of tables containing results obtained from 20 economic ecosystems that were studied by GED since 2019, using the same methodology described in this work. These tables provide comparable data, enabling a better understanding of the dynamics observed in Mauritius.

a) Sample size and role type distribution

			Participants by role type						Total nodes in network by role type					
Ecosystem	Country	Participants	Articulators	Enablers	Linkers	Knowledge generators	Promoters	Communities	Articulators	Enablers	Linkers	Knowledge generators	Promoters	Communities
Mauritius	Mauritius	23	17.4%	52.2%	17.4%	8.7%	0.0%	4.4%	15.2%	54.6%	15.9%	9.9%	3.0%	1.5%
Buenos Aires (2019)	Argentina	36	8.3%	61.1%	8.3%	19.4%	0.0%	2.8%	13.6%	55.3%	13.2%	10.1%	3.1%	4.8%
Buenos Aires (2022)	Argentina	24	8.3%	58.3%	16.7%	12.5%	0.0%	4.2%	14.5%	50.7%	13.0%	16.4%	1.9%	3.4%
La Plata	Argentina	27	11.1%	48.2%	22.2%	18.5%	0.0%	0.0%	21.1%	25.6%	28.9%	23.3%	0.0%	1.1%
Sao Paulo	Brazil	34	5.9%	79.4%	5.9%	5.9%	2.9%	0.0%	7.9%	61.1%	11.6%	12.0%	5.6%	1.9%
Araucanía	Chile	46	10.9%	67.4%	13.0%	6.5%	2.2%	0.0%	17.9%	47.0%	22.7%	8.8%	2.4%	1.2%
Santiago	Chile	30	13.3%	50.0%	10.0%	20.0%	0.0%	6.7%	13.3%	52.3%	14.9%	9.2%	7.7%	2.6%
Bogota	Colombia	25	12.0%	44.0%	20.0%	12.0%	0.0%	12.0%	17.8%	52.1%	15.8%	7.5%	2.1%	4.8%
Costa Rica	Costa Rica	19	5.3%	79.0%	5.3%	10.5%	0.0%	0.0%	15.1%	52.1%	21.9%	10.1%	0.8%	0.0%
Barcelona	Spain	37	8.1%	56.8%	16.2%	10.8%	2.7%	5.4%	9.6%	51.1%	4.3%	16.0%	10.6%	8.5%
Madrid	Spain	38	10.5%	63.2%	5.3%	18.4%	0.0%	2.6%	12.6%	53.1%	13.8%	9.2%	8.0%	3.4%
Málaga	Spain	38	7.9%	57.9%	15.8%	7.9%	5.3%	5.3%	11.8%	48.5%	19.9%	11.2%	5.0%	3.7%
Valencia	Spain	37	16.2%	46.0%	21.6%	16.2%	0.0%	0.0%	11.1%	39.4%	26.7%	13.3%	5.6%	3.9%
Mexico City (2019)	Mexico	51	0.0%	72.6%	7.8%	7.8%	3.9%	7.8%	11.0%	66.2%	8.0%	5.7%	6.0%	3.0%
Mexico City (2022)	Mexico	31	9.7%	51.6%	22.6%	9.7%	6.5%	0.0%	9.1%	47.3%	24.1%	8.6%	8.6%	2.3%
State of Mexico	Mexico	23	26.1%	34.8%	39.1%	0.0%	0.0%	0.0%	18.8%	45.1%	28.6%	6.8%	0.8%	0.0%

			Participants by role type						Total nodes in network by role type					
Ecosystem	Country	Participants	Articulators	Enablers	Linkers	Knowledge generators	Promoters	Communities	Articulators	Enablers	Linkers	Knowledge generators	Promoters	Communities
Guadalajara	Mexico	36	5.6%	44.4%	25.0%	11.1%	0.0%	13.9%	10.9%	46.7%	20.1%	10.5%	4.8%	7.0%
Lima	Peru	31	9.7%	61.3%	6.5%	9.7%	3.2%	9.7%	10.9%	57.4%	15.8%	10.4%	1.0%	4.5%
Lisboa	Portugal	33	6.1%	75.8%	6.1%	3.0%	3.0%	6.1%	11.1%	60.4%	11.1%	13.2%	2.1%	2.1%
Montevideo	Uruguay	59	13.6%	54.2%	13.6%	11.9%	1.7%	5.1%	16.2%	45.5%	15.7%	12.1%	6.1%	4.6%
	Average	33.9	10.3%	57.9%	14.9%	11.0%	1.6%	4.3%	13.5%	50.6%	17.3%	11.2%	4.3%	3.2%
	Min	19	0.0%	34.8%	5.3%	0.0%	0.0%	0.0%	7.9%	25.6%	4.3%	5.7%	0.0%	0.0%
	Max	59	26.1%	79.4%	39.1%	20.0%	6.5%	13.9%	21.1%	66.2%	28.9%	23.3%	10.6%	8.5%

Table 6. Sample size and role type distribution

b) Metrics from Complex Network Analysis

Ecosystem	Country	Nodes	Edges	Average eccentricity	Average clustering coefficient	Diameter	Average shortest path length	Transitivity	Global efficiency	Rich club coefficient	Central point dominance	Modularity	Average collaborations	Collaboration Index
Mauritius	Mauritius	132	329	4.12	0.4	5	2.99	0.2	0.37	0.76	0.27	0.46	11.78	6.67
Buenos Aires (2019)	Argentina	228	490	4.8	0.3	6	3.36	0.11	0.33	0.29	0.25	0.53	13.48	5.93
Buenos Aires (2022)	Argentina	207	378	4.87	0.34	6	3.4	0.08	0.32	0.46	0.17	0.59	13.29	5.6
La Plata	Argentina	180	359	4.97	0.39	6	3.59	0.11	0.31	0.24	0.43	0.6	10.15	5.46
Sao Paulo	Brazil	216	360	6.73	0.3	8	4.32	0.08	0.27	0.25	0.24	0.68	10.38	4.85
Araucanía	Chile	251	682	4.45	0.35	5	3.3	0.19	0.33	0.47	0.19	0.46	11.83	6.35
Santiago	Chile	195	382	5.04	0.31	6	3.23	0.1	0.34	0.21	0.53	0.54	13.04	5.81
Bogotá	Colombia	146	332	4.77	0.47	6	3.3	0.18	0.34	0.6	0.3	0.52	10.4	6.1
Costa Rica	Costa Rica	119	324	4.07	0.55	5	2.88	0.19	0.39	0.43	0.29	0.42	13.37	6.85
Barcelona	Spain	236	489	4.88	0.26	6	3.43	0.11	0.32	0.58	0.26	0.52	12.82	5.79
Madrid	Spain	239	448	6.08	0.27	8	3.78	0.08	0.29	0.22	0.18	0.61	12.13	5.26
Málaga	Spain	161	623	4.12	0.43	5	2.95	0.23	0.38	0.8	0.12	0.36	13.11	7.01
Valencia	Spain	180	623	4.23	0.38	5	3.01	0.25	0.37	0.56	0.12	0.37	15.05	7.31
CDMX (2019)	Mexico	299	542	5.62	0.18	7	3.82	0.05	0.29	0.2	0.2	0.62	12.33	4.98
CDMX (2022)	Mexico	220	407	5.4	0.36	7	3.7	0.1	0.3	0.42	0.23	0.61	10.9	5.33
EDOMEX	Mexico	133	302	4.41	0.41	5	3.17	0.16	0.35	0.6	0.25	0.48	9.87	6.01
Guadalajara	Mexico	229	575	4.85	0.32	6	3.38	0.15	0.33	0.26	0.15	0.49	12.67	6.14
Lima	Peru	202	413	5.94	0.31	7	3.59	0.13	0.31	0.45	0.22	0.54	10.58	5.48
Lisboa	Portugal	235	482	5.26	0.4	7	3.67	0.13	0.3	0.53	0.16	0.63	11.61	5.68
Montevideo	Uruguay	198	751	4.48	0.37	6	3.08	0.22	0.36	0.49	0.18	0.36	13.4	6.88
	Average	200.3	464.55	4.95	0.35	6.1	3.4	0.14	0.33	0.44	0.24	0.52	12.11	5.97
	Min	119	302	4.07	0.18	5	2.88	0.05	0.27	0.2	0.12	0.36	9.87	4.85
	Max	299	751	6.73	0.55	8	4.32	0.25	0.39	0.8	0.53	0.68	15.05	7.31

Table 7. Metrics from Complex Network Analysis on GED Economic Ecosystem studies.

c) Key actors by stage

		Key actors for "Establishment" by role type						Key actors for "Growth" by role type					
Ecosystem	Country	Articulators	Enablers	Linkers	Knowledge generators	Promoters	Communities	Articulators	Enablers	Linkers	Knowledge generators	Promoters	Communities
Mauritius	Mauritius	66.7%	23.8%	9.5%	0.0%	0.0%	0.0%	68.4%	21.1%	10.5%	0.0%	0.0%	0.0%
Buenos Aires (2019)	Argentina	40.0%	48.0%	8.0%	4.0%	0.0%	0.0%	10.5%	57.9%	21.1%	10.5%	0.0%	0.0%
Buenos Aires (2022)	Argentina	33.3%	44.4%	0.0%	22.2%	0.0%	0.0%	27.8%	27.8%	11.1%	33.3%	0.0%	0.0%
La Plata	Argentina	25.0%	16.7%	12.5%	41.7%	0.0%	4.2%	42.1%	26.3%	15.8%	15.8%	0.0%	0.0%
Sao Paulo	Brazil	21.7%	56.5%	8.7%	4.4%	8.7%	0.0%	11.1%	77.8%	11.1%	0.0%	0.0%	0.0%
Araucanía	Chile	30.0%	52.5%	7.5%	10.0%	0.0%	0.0%	32.4%	43.2%	8.1%	16.2%	0.0%	0.0%
Santiago	Chile	57.1%	14.3%	4.8%	23.8%	0.0%	0.0%	60.0%	25.0%	5.0%	10.0%	0.0%	0.0%
Bogotá	Colombia	50.0%	33.3%	5.6%	5.6%	0.0%	5.6%	53.3%	20.0%	13.3%	13.3%	0.0%	0.0%
Costa Rica	Costa Rica	46.7%	33.3%	13.3%	6.7%	0.0%	0.0%	28.6%	50.0%	21.4%	0.0%	0.0%	0.0%
Barcelona	Spain	39.1%	43.5%	4.4%	8.7%	0.0%	4.4%	50.0%	22.2%	5.6%	22.2%	0.0%	0.0%
Madrid	Spain	33.3%	52.4%	0.0%	9.5%	4.8%	0.0%	40.0%	40.0%	0.0%	20.0%	0.0%	0.0%
Málaga	Spain	40.0%	34.3%	17.1%	8.6%	0.0%	0.0%	36.1%	36.1%	13.9%	11.1%	2.8%	0.0%
Valencia	Spain	48.0%	12.0%	20.0%	16.0%	4.0%	0.0%	45.8%	25.0%	12.5%	16.7%	0.0%	0.0%
CDMX (2019)	Mexico	34.2%	43.9%	7.3%	2.4%	4.9%	7.3%	20.6%	64.7%	5.9%	0.0%	2.9%	5.9%
CDMX (2022)	Mexico	47.8%	26.1%	13.0%	8.7%	0.0%	4.4%	21.1%	36.8%	21.1%	21.1%	0.0%	0.0%
EDOMEX	Mexico	71.4%	4.8%	23.8%	0.0%	0.0%	0.0%	61.1%	27.8%	5.6%	5.6%	0.0%	0.0%
Guadalajara	Mexico	58.1%	25.8%	9.7%	0.0%	3.2%	3.2%	44.4%	25.9%	14.8%	11.1%	3.7%	0.0%
Lima	Peru	53.6%	28.6%	3.6%	3.6%	3.6%	7.1%	34.8%	39.1%	17.4%	4.4%	0.0%	4.4%
Lisboa	Portugal	30.8%	42.3%	3.9%	19.2%	0.0%	3.9%	33.3%	42.9%	4.8%	19.1%	0.0%	0.0%
Montevideo	Uruguay	47.8%	23.9%	13.0%	10.9%	2.2%	2.2%	55.3%	15.8%	7.9%	18.4%	0.0%	2.6%
	Average	43.7%	33.0%	9.3%	10.3%	1.6%	2.1%	38.8%	36.3%	11.3%	12.4%	0.5%	0.6%
	Min	21.7%	4.8%	0.0%	0.0%	0.0%	0.0%	10.5%	15.8%	0.0%	0.0%	0.0%	0.0%
	Max	71.4%	56.5%	23.8%	41.7%	8.7%	7.3%	68.4%	77.8%	21.4%	33.3%	3.7%	5.9%

Table 8. Key actors by stage on GED Economic Ecosystem studies.

d) Collaboration intensity and result

Ecosystem	Country	Collaboration Intensity	Result of the collaborations: Successful	Result of the collaborations: Unsuccessful	Result of the collaborations: Unachieved	Formal agreements	Result with formal agreement: Successful	Result with formal agreement: Unsuccessful	Result with formal agreement: Unachieved	Result without formal agreement: Successful	Result without formal agreement: Unsuccessful	Result without formal agreement: Unachieved
Mauritius	Mauritius	3.6	87.8%	5.4%	6.9%	41.3%	97.7%	2.4%	0.0%	80.7%	7.6%	11.8%
Buenos Aires (2019)	Argentina	3.4	88.3%	2.3%	9.4%	37.2%	97.5%	2.5%	0.0%	83.0%	2.2%	14.8%
Buenos Aires (2022)	Argentina	3.6	87.9%	1.4%	10.8%	44.8%	98.0%	0.0%	2.0%	79.7%	2.4%	17.9%
La Plata	Argentina	3.7	92.8%	2.4%	4.8%	43.1%	97.8%	2.2%	0.0%	89.1%	2.5%	8.4%
Sao Paulo	Brazil	3.8	91.3%	2.9%	5.8%	57.7%	96.0%	1.0%	3.0%	84.9%	5.5%	9.6%
Araucanía	Chile	3.8	88.1%	5.7%	6.2%	42.1%	98.2%	1.8%	0.0%	80.8%	8.6%	10.7%
Santiago	Chile	3.9	89.5%	4.6%	5.9%	50.3%	97.4%	2.6%	0.0%	81.6%	6.6%	11.8%
Bogotá	Colombia	3.7	93.1%	4.8%	2.1%	51.6%	96.9%	3.1%	0.0%	89.1%	6.5%	4.4%
Costa Rica	Costa Rica	4.1	95.5%	2.0%	2.5%	51.0%	99.0%	0.0%	1.0%	91.8%	4.1%	4.1%
Barcelona	Spain	3.3	86.1%	4.4%	9.5%	50.0%	96.3%	2.9%	0.7%	75.9%	5.8%	18.3%
Madrid	Spain	3.6	87.5%	6.6%	6.0%	48.6%	92.9%	5.2%	1.9%	82.3%	7.9%	9.8%
Málaga	Spain	3.7	88.4%	4.8%	6.7%	43.3%	93.2%	5.6%	1.2%	84.8%	4.3%	10.9%
Valencia	Spain	3.9	93.3%	2.7%	4.0%	51.6%	97.4%	1.0%	1.6%	88.9%	4.4%	6.7%
CDMX (2019)	Mexico	3.8	89.6%	8.1%	2.3%	51.5%	93.3%	6.0%	0.8%	85.7%	10.3%	4.0%
CDMX (2022)	Mexico	3.7	90.0%	5.0%	5.0%	48.3%	96.0%	3.2%	0.8%	84.3%	6.7%	9.0%
EDOMEX	Mexico	4.1	85.3%	4.2%	10.5%	34.7%	100.0%	0.0%	0.0%	77.4%	6.5%	16.1%
Guadalajara	Mexico	3.6	89.9%	5.9%	4.2%	46.3%	98.5%	0.8%	0.8%	82.5%	10.4%	7.1%
Lima	Peru	3.9	91.1%	4.2%	4.7%	47.7%	100.0%	0.0%	0.0%	83.0%	8.0%	8.9%
Lisboa	Portugal	3.8	93.7%	1.0%	5.3%	51.7%	98.1%	1.3%	0.7%	89.0%	0.7%	10.3%
Montevideo	Uruguay	3.4	91.0%	3.2%	5.8%	53.6%	97.9%	0.9%	1.3%	83.2%	5.9%	10.9%
	Average	3.7	90.0%	4.1%	5.9%	47.3%	97.1%	2.1%	0.8%	83.9%	5.8%	10.3%
	Min	3.3	85.3%	1.0%	2.1%	34.7%	92.9%	0.0%	0.0%	75.9%	0.7%	4.0%
	Max	4.1	95.5%	8.1%	10.8%	57.7%	100.0%	6.0%	3.0%	91.8%	10.4%	18.3%

Table 9. Collaboration intensity and results on GED Economic Ecosystem studies.

a) Interactions required and Motivation to collaborate.

			Motivation to collaborate						
Ecosystem	Country	# of interactions required to start successful collaborations	Access to a network of contacts	Obtaining financial resources	Obtaining in-kind resources	Exchange of knowledge and best practices	Development of a joint project	Media coverage	Other
Mauritius	Mauritius	7.44	11.70%	18.90%	5.30%	21.40%	27.20%	2.40%	13.10%
Buenos Aires (2019)	Argentina	3.6	20.00%	12.10%	5.60%	24.20%	28.40%	2.30%	7.40%
Buenos Aires (2022)	Argentina	3.61	18.40%	15.30%	5.40%	18.80%	32.30%	1.40%	8.50%
La Plata	Argentina	3.89	12.40%	6.20%	2.40%	36.40%	33.50%	1.00%	8.10%
Sao Paulo	Brazil	6.3	15.80%	17.00%	1.10%	23.70%	38.40%	0.60%	3.40%
Araucanía	Chile	4.25	15.40%	10.20%	3.50%	24.80%	38.20%	1.00%	7.00%
Santiago	Chile	3.5	15.50%	21.90%	3.20%	16.10%	33.60%	4.50%	5.20%
Bogotá	Colombia	3.32	11.10%	6.80%	4.20%	20.00%	45.80%	2.60%	9.50%
Costa Rica	Costa Rica	2.73	11.50%	13.50%	2.00%	33.50%	24.50%	2.50%	12.50%
Barcelona	Spain	4.28	8.00%	15.60%	9.80%	25.50%	29.50%	4.40%	7.30%
Madrid	Spain	5.3	6.30%	11.00%	9.10%	25.70%	34.20%	8.20%	5.60%
Málaga	Spain	3.56	14.20%	16.00%	7.00%	23.50%	30.80%	4.30%	4.30%
Valencia	Spain	2.86	10.20%	12.80%	5.90%	21.70%	34.50%	4.80%	10.20%
CDMX (2019)	Mexico	5.7	10.40%	25.00%	10.40%	16.90%	23.50%	8.90%	5.00%
CDMX (2022)	Mexico	4.62	12.70%	8.10%	1.50%	21.50%	33.90%	11.90%	10.40%
EDOMEX	Mexico	3.03	16.80%	10.00%	1.60%	35.10%	29.30%	1.60%	5.80%
Guadalajara	Mexico	4.36	9.00%	9.00%	4.50%	27.40%	37.20%	5.20%	7.60%
Lima	Peru	4.51	13.50%	8.40%	3.70%	27.00%	30.20%	2.80%	14.40%
Lisboa	Portugal	4.18	14.70%	15.00%	7.70%	22.70%	32.70%	2.70%	4.70%
Montevideo	Uruguay	4.32	9.60%	16.50%	7.10%	28.00%	30.70%	3.90%	4.10%
	Average	4.27	12.80%	13.50%	5.00%	24.70%	32.40%	3.80%	7.70%
	Min	2.73	6.30%	6.20%	1.10%	16.10%	23.50%	0.60%	3.40%
	Max	7.44	20.00%	25.00%	10.40%	36.40%	45.80%	11.90%	14.40%

Table 10. Interactions required and Motivation to collaborate on GED Economic Ecosystem studies.

Social Dynamics Analysis of Mauritius' Innovation-Driven Entrepreneurial Economic Ecosystem

1) Contact Information

Organization*: ______________________________

Name and Surname*: ______________________________

Job title*: ______________________________

Email*: ______________________________

Telephone : ______________________________

2) Would you like to grant your consent for our allied organizations to send you promotional information on workshops, products and related services, or any information of value to your activities in the entrepreneurship ecosystem?*

( ) Yes

( ) No

3) How many individuals work in your organization?*

In the special case of being part of a larger organization such as the government or a university, select the option that corresponds to your sub-organization or department. E.g. if you represent the Incubator of your University, specify how many people work in the Incubator, not the total staff of the University

( ) 1 - 10

( ) 11 - 30

( ) 31 - 50

( ) 51 - 100

( ) 101 - 500

( ) 501 - 1,000

( ) More than 1,000

4) What is your organization's approximate annual budget? *(ranges in dollars)*

In the special case of being part of a larger organization such as the government or a university, select the option that corresponds to your sub-organization or department. E.g. if you represent the Incubator of your University, specify the Incubator's annual budget, not the whole University's budget

( ) 0 - 999 USD

( ) 1,000 - 4,999 USD

( ) 5,000 - 9,999 USD

( ) 10,000 - 29,999 USD

( ) 30,000 - 49,999 USD

( ) 50,000 - 99,999 USD

( ) 100,000 - 499,999 USD

( ) 500,000 - 999,999 USD

( ) 1,000,000 - 9,999,999 USD

( ) More than 10,000,000 USD

5) What organization was key for the successful establishment of [your organization] in the ecosystem?*

You can write any organization (or answer) even if it is not in the suggested list

____

6) Why do you consider it was key for your establishment?*

____

____

____

____

7) What organization is currently being key for the growth of [your organization]?*

You can write any organization (or answer) even if it is not in the suggested list

____

8) Why do you consider it as key for your growth? *

____

____

____

____

9) Which are the main organizations with which you have collaborated in the last 3 years?*

Write down all of which you consider relevant, regardless of whether the collaboration was successful or not ; it's not necessary for the organization to be included on the suggested list, you're free to include any other local or international organization. Please add at least 10 organizations.

1: ____

2: ____

3: ____

4: ____

5: ____

6: ____

7: ____

8: ____

9: ____

10: ____
11: ____
12: ____
13: ____
14: ____
15: ____
16: ____
17: ____
18: ____
19: ____
20: ____
21: ____
22: ____
23: ____
24: ____
25: ____

The following group of questions is required for each of the organizations you previously listed (at least 10)

10) Regarding your collaboration with [Organization #1]

Who made the first contact for collaboration?*

( ) We looked for them

( ) They looked for us

( ) Someone else connected us

Which organization connected you?*: ____

What was the initial purpose of the connection?*

( ) Access to a network of contacts

( ) Acquisition of monetary resources

( ) Acquisition of in-kind resources

( ) Exchange of knowledge and best-practices

( ) Development of a joint project

( ) Media coverage ("exposure")

( ) Other: ____*

How many interactions were needed for this collaboration to take off (or get rejected)?*

____

Was any formal collaboration contract or MOU signed?*

( ) Yes

( ) No

What was the budget (in dollars) that [your Organization] allocated for this collaboration?

If your contribution consisted of in-kind resources, provide an approximate estimation of their monetary value

( ) 0 - 99 USD

( ) 100 - 499 USD

( ) 500 - 999 USD

( ) 1,000 - 2,999 USD

( ) 3,000 - 4,999 USD

( ) 5,000 - 9,999 USD

( ) 10,000 - 49,999 USD

( ) 50,000 - 99,999 USD

( ) 100,000 - 999,999 USD

( ) More than 1,000,000 USD

How many individuals did [your Organization] assign for this collaboration?*

( ) 1 - 3

( ) 4 - 6

( ) 7 - 10

( ) 11 - 20

( ) 21 - 30

( ) 31 - 50

( ) 51 - 100

( ) More than 100

Would you consider the results of this collaboration as successful?*

( ) Yes, the collaboration was successful

( ) No, the collaboration was not successful

( ) The collaboration didn't take place

Why?*

____

____

____

How would you rate the intensity of this collaboration?*

Consider the frequency, relevance and impact of the collaboration over the last 3 years

Barely intense / relevant

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5

Very intense / relevant

Annex 5 Data sources

Certain abbreviations are included within an indicator's name as to provide a reference to the source it was obtained from. The abbreviations used and data sources referenced are as follows:

Abbreviation	Reference
ECI	Economic Complexity Index
EIS	European Innovation Scoreboard
Fablabs.io	Fablabs.io
GCI	Global Competitiveness Index
GEM	Global Entrepreneurship Monitor
GII	Global Innovation Index
IEF	Index of Economic Freedom
IMF	International Monetary Fund
NRI	Network Readiness Index
OECD	Organization for Economic Cooperation and Development
OWD	Our World in Data
SDG	Sustainable Development Goals
SPI	Social Progress Imperative
TI	Transparency International
UNCTAD	United Nations Conference on Trade and Development
UNESCO	UNESCO's Institute for Statistics
WB	World Bank
WTR	World Talent Ranking

Table 11. Interactions required and Motivation to collaborate on GED Economic

Annex 6 Updating the iEcosystems framework

The following table provides a detailed view of the original indicators proposed by Budden, Murray & Turskaya (2019) and the adaptations conducted by GED's research team. The "Status" column indicates if the original indicator was preserved as is, deprecated or substituted for a similar one. The "Referencing original indicator" column specifies to which of the preserved original indicators corresponds the indicator in the updated framework, and the "Substituting original indicator" column specifies the original indicator that the updated framework is aiming to replace. Finally, the "Addition to original framework" identifies the indicators that were selected and included by the GED team to either give more robustness to the corresponding pillar in light of deprecated original indicators for which no similar replacement could be found, or to construct a set of widely comparable metrics in the case of the Comparative advantage and Impact pillars.

Pillar	ID	Original iEcosystems framework	Status	iEcosystems framework adapted by GED	Referencing original indicator	Substituting original indicator	Addition to original framework
1 Foundational Institutions	#1	Ease of doing business (WB)	Deprecated	1.01 Established business ownership (GEM)		#2	
	#2	Starting a business (WB)	Substituted	1.02 Total early-stage entrepreneurial activity (GEM)		#2	
	#3	Paying taxes (WB)	Substituted	1.03 Political and operational stability (GII)			Yes
	#4	Resolving Insolvency (WB)	Deprecated	1.04 Government effectiveness (GII)			Yes
	#5	Enforcing contracts (WB)	Deprecated	1.05 Policies for doing business (GII)			Yes
	#6	Property Rights (IEF)	Preserved	1.06 Property Rights (IEF)	#6		
	#7	Government Integrity (IEF)	Preserved	1.07 Government Integrity (IEF)	#7		
	#8	Labor Freedom (IEF)	Preserved	1.08 Labor Freedom (IEF)	#8		
	#9	Trade freedom (IEF)	Preserved	1.09 Trade freedom (IEF)	#9		
	#10	Corruption Perceptions Index (TI)	Preserved	1.10 Corruption Perceptions Index (TI)	#10		
				1.11 ICT regulatory environment (NRI)			Yes
				1.12 Regulation of emerging technologies (NRI)			Yes
				1.13 New business density (WB)		#2	

Pillar	ID	Original iEcosystems framework	Status	iEcosystems framework adapted by GED	Referencing original indicator	Substituting original indicator	Addition to original framework
				1.14 Tax administration as a major constraint (WB)		#3	
				1.15 Tax rates as a major constraint (WB)		#3	
2.01 I-Human Capital	#11	Quality of STEM education (GCI)	Substituted	2.01a Graduates in science & engineering (%) (GII)		#28	
	#12	STEM Graduates per capita (OECD)	Deprecated	2.01b Researchers/Professionals engaged in R&D per million population (GII)	#15		
	#13	New PhD graduates per capita (EIS)	Deprecated	2.01c ICT skills in the education system (NRI)		#11	
	#14	Availability of Scientists & Engineers (GCI)	Deprecated				
	#15	Researchers/Professionals engaged in R&D per million population (GII)	Preserved				
2.02 I-Funding	#16	R&D expenditure as a % GDP (UNESCO)	Preserved	2.02a GERD as a % GDP (UNESCO)	#16		
	#17	R&D expenditure in '000 current PPP$ (UNESCO)	Deprecated	2.02b GERD financed by business enterprise (NRI)			Yes
	#18	Public R&D Expenditure as % of total R&D expenditure (UNESCO)	Preserved	2.02c GERD performed by business enterprise (NRI)	#19		
	#19	Business Expenditure as % of total R&D expenditure (UNESCO)	Preserved	2.02d R&D expenditure by governments and higher education (NRI)	#18		
2.03 I-Infrastructure	#20	ICT access (GII)	Substitued	2.03a Mobile and internet banking transactions per 1000 adults (IMF)			Yes
	#21	Internet Bandwidth (GCI)	Substitued	2.03b Robot density (NRI)			Yes
	#22	Production Process Sophistication (GCI)	Deprecated	2.03c Secure Internet servers (NRI)			Yes
	#23	Availability of latest technologies (GCI)	Deprecated	2.03d Fab labs per million population (Fablabs.io)			Yes

Pillar	ID	Original iEcosystems framework	Status	iEcosystems framework adapted by GED	Referencing original indicator	Substituting original indicator	Addition to original framework
2.04 I-Demand	#24	Government procurement of advanced technology (GCI)	Deprecated	2.04a Computer software spending (NRI)			Yes
	#25	University-industry research collaborations (GII)	Preserved	2.04b University-industry research collaborations (GII)	#25		
	#26	Trade, Competition & Market scale (GII)	Preserved	2.04c Trade, Diversification & Market Scale (GII)	#26		
2.05 I-Culture & Incentives	#27	Quality of scientific research institutions (GCI)	Substitued	2.05a Tertiary inbound mobility (GII)			Yes
	#28	Graduates in science & engineering (%) (GII)	Substitued	2.05b QS university ranking (GII)		#27	
				2.05c Research talent, % in businesses (GII)			Yes
				2.05d Scientific and technical articles/bn PPP$ GDP (GII)			Yes
				2.05e. GitHub commit pushes received (GII)			Yes
3.01 E-Human Capital	#29	% school grads in tertiary education (GII)	Preserved	3.01a Entrepreneurship perceived capabilities (GEM)	#30		
	#30	Entrepreneurship perceived capabilities (GEM)	Preserved	3.01b % school grads in tertiary education (GII)	#29		
3.02 E-Funding	#31	Easy Access to Loans (GCI)	Substitued	3.02a Ease of Access to Entrepreneurial Finance (GEM)		#31, #33	
	#32	Ease of Credit (GII)	Preserved	3.02b Credit (GII)	#32		
	#33	Venture capital availability (GCI)	Substitued	3.02c Market capitalization, % GDP (GII)			Yes
	#34	VC investment (EIS)	Substitued	3.02d Venture capital recipients, deals/bn PPP$ GDP (GII)	#35		
	#35	VC deals (GII)	Preserved	3.02e Venture capital received, value, % GDP (GII)		#34	
3.03 E-Infrastructure	#36	Electricity & telephony infrastructure (GCI)	Substitued	3.03a Bancarization (WB)			Yes

Pillar	ID	Original iEcosystems framework	Status	iEcosystems framework adapted by GED	Referencing original indicator	Substituting original indicator	Addition to original framework
	#37	Number of internet users (UNESCO)	Substitued	3.03b Electricity access (OWD)		#36	
	#38	Logistics performance (WB)	Deprecated	3.03c Commercial and proffesional infrastructure (GEM)			Yes
				3.03d Physical infrastructure (GEM)			Yes
				3.03e Electricity output, GWh/mn pop (GII)		#36	
				3.03f Access to technology (NRI)		#20, #21, #37	
3.04 E-Demand	#39	Buyer sophistication (GCI)	Deprecated	3.04a FDI inward flow as % of GDP (UNCTAD)			Yes
	#40	Domestic Market Scale (GII)	Preserved	3.04b Domestic Market Scale (GII)	#40		
3.05 E-Culture & Incentives	#41	Entrepreneurial intention (GEM)	Preserved	3.05a Entrepreneurial intentions (GEM)	#41		
	#42	Fear of failure (GEM)	Preserved	3.05b Fear of failure (GEM)	#42		
	#43	Entrepreneurship as a Good Career choice (GEM)	Preserved	3.05c Entrepreneurship as a Good Career choice (GEM)	#43		
	#44	High Status to Successful Entrepreneurs (GEM)	Preserved	3.05d High Status to Successful Entrepreneurs (GEM)	#44		
	#45	Business Freedom (IEF)	Preserved	3.05e Business Freedom (IEF)	#45		
4 Comparative Advantage				4.01 Economic Complexity Index (ECI)			Yes
				4.02 State of cluster development and depth (GII)			Yes
				4.03 Attracting and retaining talent (WTR)			Yes
				4.04 Foreign highly skilled personnel (WTR)			Yes
5 Social Impact				5.01 Social Progress Index (SPI)			Yes
				5.02 Environmental performance (GII)			Yes
				5.03 Population below international poverty line (SDG 1 - No poverty)			Yes
				5.04 Prevalence of undernourishment (SDG 2 - Zero Hunger)			Yes

Pillar	ID	Original iEcosystems framework	Status	iEcosystems framework adapted by GED	Referencing original indicator	Substituting original indicator	Addition to original framework
				5.05 Proportion of urban population living in slums (SDG 11 - Sustainable Cities and Communities)			Yes
6 Economic Impact				6.01 GDP per capita (IMF)			Yes
				6.02 Unemployment rate of population 15 years of age and older (SDG 8 - Decent Jobs and Economic Growth)			Yes
				6.03 Annual growth rate of GDP (WB)			Yes
				6.04 Balance of trade, % GDP (WB)			Yes

Table 12. GED's Updated iEcosystems framework.

Regarding the modifications carried out by GED

Foundational Institutions

The recent controversy surrounding and discontinuation of the World Bank's Doing Business report has necessitated the deprecation and substitution of several indicators recommended for this pillar. While awaiting the publication of the new B-READY data and report, the Development Economics Global Indicators Group (DECIG) of the World Bank has released a document titled "Alternative Indicators as a Stopgap for Doing Business" (2021), which includes a list of alternative indicators from various data sources. Utilizing this catalog, the GED team has identified indicators that can serve as substitutes for some of the original indicators within the framework.

The *Established business ownership, Total early-stage entrepreneurial activity* and *New business density* suggested by the WB as a replacement for *Starting a business (WB)* allow us to capture the overall ease of starting a new business, while the suggested *Tax administration as a major constraint* and *Tax rates as a major constraint* serve as a clear replacement for the original *Paying taxes (WB)* indicator. We also seized the opportunity to bolster the strength of this critical pillar by incorporating additional specialized indicators provided by the Global Innovation Index and the Network Readiness Index, such as *Regulation of emerging technologies (NRI)* and *Policies for doing business (GII)*

I-Human Capital

Suggested indicators from the OECD and the EIS were deprecated to the lack of coverage over a broader set of countries. While the Graduates in science & engineering (GII) indicator was originally conceived as part of E-Culture & Incentives by the authors, after careful consideration the indicator was decided to serve better as a replacement for the original *STEM Graduates per capita (OECD)* indicator.

I-Funding

This section remained largely unchanged, with de deprecation of *R&D expenditure in '000 current PPP$ (UNESCO)* due to an unavailability of recent data, and the addition of the *GERD financed by business enterprise (NRI)* indicator.

I-Infrastructure

This pillar was subjected to extensive modifications, *Production Process Sophistication (GCI)* and *Availability of latest technologies (GCI)* had to be deprecated as there's no recent data available, while the ICT access (GII) and Internet bandwidth (GCI) were deemed to have become basic for any entrepreneurial activity, no longer falling under the "highly specialized technological support" category initially described by the framework. After careful consideration, these last two were integrated as part of E-Infrastructure, while taking the opportunity to incorporate more recent measures that could be better considered as highly specialized, such as *Mobile and internet banking transactions*, *Robot density*, *Secure internet servers*, and the presence *Fablabs.*

I-Demand

This section remained unchanged.

I-Culture & Incentives

As previously mentioned, the *Graduates in science & engineering (GII)* indicator was incorporated into I-Human capital, while the *Quality of scientific research institutions (GII)* was substituted by *QS university ranking (GII)* as it provided enough similarities. Following the objective pursued by this area of the assessment, we included 4 new indicators that help in capturing said culture and incentives regarding innovation in a country. *Tertiary inbound mobility (GII)* is in a sense capturing the incentives, whether they be academic, cultural, financial, or administrative, required for a foreign student to decide on pursuing his or her tertiary education at a given country instead of its own. *Research talent, % in businesses (GII)* helps us capture the existence of the appropriate culture and incentives within business as to have researchers employed in a full-time measure. The *Scientific and technical articles/bn PPP$ GDP (GII)* indicator exhibits the disposition of researchers to publish their scientific discoveries, which is in turn associated to a greater innovation culture, much like the *GitHub commit pushes received (GII)* is exhibiting the proneness to contribute to the world's largest host of source code.

E-Human capital

This section remained unchanged.

E-Funding

This section required only some minor substitutions to address the lack of recent data published by the GCI and the lack of a wider coverage by the EIS.

E-Infrastructure

The *Logistics performance (WB)* indicator had to be deprecated due the lack of more recent data, with no other similar available with enough coverage. The Electricity & telephony infrastructure (GCI) needed to be substituted for similar indicators because of the lack of a more recent GCI report as well. As previously stated, the access to basic technological infrastructure originally suggested as a part of I-Infrastructure was incorporated into E-Infrastructure in the form of the NRI's *Access to technology* sub-pillar. We took the opportunity to include GEM's *Commercial and professional infrastructure* and *Physical infrastructure* indicators, as well as a measurement on *Bancarization* by the World Bank, since access to banking institutions or other forms of mobile finance solutions have become essential to entrepreneurs, both for their own administration and to be able to serve a wider array of consumers.

E-Demand

Buyer sophistication (GCI) was deprecated due to a lack of recent data. *FDI inward flow as % of GDP* was included since foreign investment is often associated with a perceived increase in demand and opportunity within the local economy.

E-Culture & Incentives

This section remained unchanged.

Comparative advantage

While the authors advise on the development of measures that capture the leading current economic clusters, assets, areas of expertise and critical problems specific to a given region instead of suggesting specific indicators as in the other pillars, GED's research team incorporated a set of metrics as to ensure a wider adoption and comparability of the framework. The ability of the *Economic Complexity Index* to capture the diversity of complex and specialized productive know-how within a country proved to be a great fit for this section, and since the authors state that "comparative advantage can most easily be measured through an assessment of a region's existing economic clusters", the *State of cluster development and depth* indicator was another obvious choice. Similarly, the ability to attract and retain critical talent is recognized as another valuable measure. Therefore, the combination of companies prioritizing talent attraction and retention, along with the presence of foreign highly-skilled personnel being drawn to a country's business environment, allows us to capture a range of underlying strengths that distinguish the country and make it appealing to the mentioned talent pool.

Impact

Thus, in the same way as with comparative advantage, while the authors don't provide specific indicators to be employed, the adapted framework by GED incorporates a series of indicators, distinguishing between social and economic impact, that allow for comparability with a broad range of economies. Even though it represents a great challenge and there's a wide variety of ways to measure impact, it is also stated that at the highest-level, impact can be captured in the form of economic or social progress. Thus, for the social impact aspect we include a series of relevant SDG's, along with the *Social Progress Index* and the GII's indicator on *Environmental performance.* For economic impact we include commonly used indicators such as *GDP per capita, Annual growth rate of GDP* and the *Unemployment rate of population,* as well as the *Balance of trade, % GDP* indicator, since a positive trade balance is generally associated with a greater capacity for exporting goods and services, which stimulates national production, job creation and a stronger local currency.

Annex 7 Indicator descriptions for the updated iEcosystems framework

The following table provides the definition, source of reference, and latest year reported of the 67 indicators included in the iEcosystems framework updated by GED.

Pillar	Metric	Reference	Latest year	Definition
1 Foundational Institutions	1.01 Established business ownership (GEM)	Global Entrepreneurship Monitor	2022	Percentage of adults aged 18–64 who are currently owner-managers of an established business, i.e., who are owning and managing a running business that has paid salaries, wages or made any other payments to the owners for over 42 months (3.5 years).
1 Foundational Institutions	1.02 Total early-stage entrepreneurial activity (GEM)	Global Entrepreneurship Monitor	2022	Percentage of adults aged 18–64 who are either a nascent entrepreneurs or owner-managers of a new business, i.e., the proportion of the adult population who are either starting or running a new business.
1 Foundational Institutions	1.03 Political and operational stability (GII)	Global Innovation Index	2021	Index that measures the likelihood and severity of political, legal, operational or security risks affecting business operations.
1 Foundational Institutions	1.04 Government effectiveness (GII)	Global Innovation Index	2020	Index that reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
1 Foundational Institutions	1.05 Policies for doing business (GII)	Global Innovation Index	2018 - 2021	Average answer to the survey question: In your country, to what extent does the government ensure a stable policy environment for doing business? [1 = not at all; 7 = to a great extent].
1 Foundational Institutions	1.06 Property Rights (IEF)	Index of Economic Freedom	2023	The property rights component assesses the extent to which a country's legal framework allows individuals to acquire, hold, and utilize private property, secured by clear laws that the government enforces effectively.
1 Foundational Institutions	1.07 Government Integrity (IEF)	Index of Economic Freedom	2023	The score for this component is derived by averaging scores for the following five sub-factors, all of which are weighted equally: Irregular payments and bribes, Transparency of government policymaking, Absence of corruption, Perceptions of corruption, and Governmental and civil service transparency.

Pillar	Metric	Reference	Latest year	Definition
1 Foundational Institutions	1.08 Labor Freedom (IEF)	Index of Economic Freedom	2023	The labor freedom component is a quantitative measure that considers various aspects of the legal and regulatory framework of a country's labor market, including regulations concerning minimum wages, laws inhibiting layoffs, severance requirements, and measurable regulatory restraints on hiring and hours worked, plus the labor force participation rate as an indicative measure of employment opportunities in the labor market.
1 Foundational Institutions	1.09 Trade freedom (IEF)	Index of Economic Freedom	2023	Trade freedom is a composite measure of the extent of tariff and nontariff barriers that affect imports and exports of goods and services. The trade freedom score is based on two inputs: The trade-weighted average tariff rate and A qualitative evaluation of nontariff barriers (NTBs).
1 Foundational Institutions	1.10 Corruption Perceptions Index (TI)	Transparency International	2021	The index offers an annual snapshot of the relative degree of corruption by ranking countries and territories from all over the globe. In 2012, Transparency International revised the methodology used to construct the index to allow for comparison of scores from one year to the next. The 2018 CPI draws on 13 surveys and expert assessments to measure public sector corruption in 180 countries and territories, giving each a score from zero (highly corrupt) to 100 (very clean).
1 Foundational Institutions	1.11 ICT regulatory environment (NRI)	Network Readiness Index	2022	The ICT regulatory environment indicator is based on the ICT Regulatory Tracker composite index that provides a measure of the existence and features of ICT legal and regulatory frameworks. The index covers 50 indicators distributed across four pillars: (1) Regulatory Authority, (2) Regulatory Mandate, (3) Regulatory Regime, and (4) Competition Framework.
1 Foundational Institutions	1.12 Regulation of emerging technologies (NRI)	Network Readiness Index	2022	The Legal framework's adaptability to emerging technologies indicator refers to the simple mean of the average answer of a similarly-worded question posited by the World Economic Forum's Executive Opinion Survey regarding five different emerging technologies (Artificial intelligence, Robotics, App- and web-enabled markets, Big data analytics, and Cloud computing): "In your country, how adequately is the legal framework adapting to artificial intelligence, robotics, app- and web enabled markets, big data analytics, and cloud computing? (1: not at all; 7: to a great extent - the legal framework is up-to-date)
1 Foundational Institutions	1.13 New business density (WB)	World Bank	2018 - 2020	Number of newly registered companies per 1,000 working-age people (those ages 15-64)
1 Foundational Institutions	1.14 Tax administration as a major constraint (WB)	World Bank	2018 - 2022	Percent of firms identifying tax administration as a major constraint
1 Foundational Institutions	1.15 Tax rates as a major constraint (WB)	World Bank	2018 - 2022	Percent of firms identifying tax rates as a major constraint

Pillar	Metric	Reference	Latest year	Definition
2.01 I-Human Capital	2.01a Graduates in science & engineering (%) (GII)	Global Innovation Index	2018 - 2020	The share of all tertiary graduates in science, manufacturing, engineering, and construction over all tertiary graduates.
2.01 I-Human Capital	2.01b Researchers/Professionals engaged in R&D per million population (GII)	Global Innovation Index	2018 - 2021	Researchers per million population, full-time equivalence. Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned.
2.01 I-Human Capital	2.01c ICT skills in the education system (NRI)	Network Readiness Index	2022	Average answer to the question: In your country, how well does the current education system meet the skills needs of a competitive economy? Digital and technology skills [1= Not at all; 7 = To a great extent]
2.02 I-Funding	2.02a GERD as a % GDP (UNESCO)	UNESCO's Institute for Statistics	2020 - 2021	Gross domestic expenditure on R&D (GERD) as a percentage of GDP is the total intramural expenditure on R&D performed in the national territory during a specific reference period expressed as a percentage of GDP of the national territory.
2.02 I-Funding	2.02b GERD financed by business enterprise (NRI)	Network Readiness Index	2022	GERD: Financed by business enterprise (% of total GERD). The following indicator refers to the Gross expenditure on R&D (GERD) financed by a business enterprise as a percentage of total gross R&D expenditure. GERD or Intramural R&D expenditure consists of all spent funds on R&D performed within a statistical unit or sector of the economy during a specific period, regardless of the funding source.
2.02 I-Funding	2.02c GERD performed by business enterprise (NRI)	Network Readiness Index	2022	GERD performed by business enterprise (% of GDP). The indicator measures the gross expenditure on R&D performed by a business enterprise as a percentage of GDP.
2.02 I-Funding	2.02d R&D expenditure by governments and higher education (NRI)	Network Readiness Index	2022	Gross domestic expenditure on R&D performed by government and higher education institutions (% of GDP). The following indicator refers to the combined expenditure by governments and higher education institutions on research and development (R&D) as a percentage of GDP. The government sector comprises all central, regional, and municipal government units. It excludes all public enterprises (public enterprises fall under the business enterprise category). Higher education institutions include an organization whose primary focus is on providing formal tertiary education (i.e., levels 5–8 of the International Standard Classification of Education, ISCED). The definition of R&D expenditure involves all current expenditure plus gross fixed capital expenditure for R&D performed by government and higher education institutions, no matter the source of funds.
2.03 I-Infrastructure	2.03a Mobile and internet banking transactions per 1000 adults (IMF)	International Monetary Fund	2021	Number of mobile and internet banking transactions per 1000 adults
2.03 I-Infrastructure	2.03b Robot density (NRI)	Network Readiness Index	2022	Number of robots in operation per 10,000 employees in the manufacturing industry.
2.03 I-Infrastructure	2.03c Secure Internet servers (NRI)	Network Readiness Index	2022	Secure Internet servers (per million population). Secure Internet servers are servers that use encryption technology in Internet transactions.

Pillar	Metric	Reference	Latest year	Definition
2.03 I-Infrastructure	2.03d Fablabs per million population (Fablabs.io)	Fablabs.io	2023	Number of active fablabs part of the Fablabs.io network per million population
2.04 I-Demand	2.04a Computer software spending (NRI)	Network Readiness Index	2022	Total computer software spending (% of GDP)
2.04 I-Demand	2.04b University-industry research collaborations (GII)	Global Innovation Index	2018 - 2021	Average answer to the survey question: In your country, to what extent do people collaborate and share ideas in between companies and universities/research institutions? [1 = not at all; 7 = to a great extent]
2.04 I-Demand	2.04c Trade, Diversification & Market Scale (GII)	Global Innovation Index	2022	Sub-pillar 4.3. Trade, competition, & market scale
2.05 I-Culture & Incentives	2.05aTertiary inbound mobility (GII)	Global Innovation Index	2018 - 2020	The number of students from abroad studying in a given country as a percentage of the total tertiary-level enrolment in that country.
2.05 I-Culture & Incentives	2.05b QS university ranking (GII)	Global Innovation Index	2021	Average score of the top three universities per country. If fewer than three universities are listed in the QS ranking of the global top 1,000 universities, the sum of the scores of the listed universities is divided by three, thus implying a score of zero for the non-listed universities.
2.05 I-Culture & Incentives	2.05c Research talent, % in businesses (GII)	Global Innovation Index	2018 - 2020	Researchers in the business enterprise sector, measured in full-time equivalence (FTE), refers to researchers as professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of these projects, broken down by the sectors in which they are employed (business enterprise, government, higher education and private non-profit organizations). In the context of R&D statistics, the business enterprise sector includes all firms, organizations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price and the mainly private non-profit institutions serving them; the core of this sector is made up of private enterprises.
2.05 I-Culture & Incentives	2.05d Scientific and technical articles/bn PPP$ GDP (GII)	Global Innovation Index	2021	The number of articles published in the fields of science and technology. This encompasses 182 different research categories belonging to research areas including engineering, chemistry, physics, environmental sciences, computer science, mathematics, biochemistry, molecular biology, oncology, agriculture, cell biology and many more. Article counts are taken from a set of journals covered by the Science Citation Index Expanded (SCIE) and the Social Sciences Citation Index (SSCI). Articles are classified by year of publication and assigned to each economy on the basis of the institutional address(es) listed in the article.
2.05 I-Culture & Incentives	2.05e. GitHub commit pushes received (GII)	Global Innovation Index	2021	GitHub is the world's largest host of source code, and a commit is the term used for a change on this platform. One or more commits can be saved (or pushed) to projects (or repositories). Thus, "GitHub commit pushes received" refers to the number of batched changes received by publicly-available projects on GitHub within a specific economy.

Pillar	Metric	Reference	Latest year	Definition
3.01 E-Human Capital	3.01a Entrepreneurship perceived capabilities (GEM)	Global Entrepreneurship Monitor	2020 - 2021	Percentage of 18-64 population who believe they have the required skills and knowledge to start a business
3.01 E-Human Capital	3.01b % school grads in tertiary education (GII)	Global Innovation Index	2018 - 2021	The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education.
3.02 E-Funding	3.02a Ease of Access to Entrepreneurial Finance (GEM)	Global Entrepreneurship Monitor	2022	Average answer to GEM's National Expert Survey, are funds for new startups easy to access?
3.02 E-Funding	3.02b Credit (GII)	Global Innovation Index	2022	The Credit sub-pillar (4.1) of the Global Innovation Index takes into account Finance for startups and scaleups, Domestic credit to private sector (% of GDP), and Loans from microfinance institutions (% of GDP).
3.02 E-Funding	3.02c Market capitalization, % GDP (GII)	Global Innovation Index	2018 - 2020	Market capitalization of listed domestic companies (% of GDP, three-year average). Market capitalization (also known as "market value") is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts and companies whose only business goal is to hold shares of other listed companies are excluded. Data are the average of the end-of-year values for the last three years.
3.02 E-Funding	3.02d Venture capital recipients, deals/bn PPP$ GDP (GII)	Global Innovation Index	2019 - 2021	Refinitiv data on private equity deals, per deal, with information on the location of the firm receiving the VC investment, among other details. The data extraction corresponds to a query on VC deals between January 1, 2019, and December 31, 2021, with the data aggregated by the location invested in. The data represent the three-year average of 2019–21 deals received and are reported per billion PPP$ GDP.
3.02 E-Funding	3.02e Venture capital received, value, % GDP (GII)	Global Innovation Index	2019 - 2021	Refinitiv data on the monetary value of private equity deals, per deal, with information on the location of the firm receiving the VC investment, among other details. The data extraction corresponds to a query on VC deals between January 1, 2019, and December 31, 2021, with the data aggregated by the location invested in. The data represent the three-year average of reported deal value, in current USD (billions), received and are reported per billion PPP$ GDP.
3.03 E-Infrastructure	3.03a Bancarization (WB)	World Bank	2021	The percentage of respondents 15 years and older who report having an account (by themselves or together with someone else) at a bank or another type of financial institution (see the definition for "financial institution account") or report personally using a mobile money service in the past year.
3.03 E-Infrastructure	3.03b Electricity access	Our World in Data	2020	Share of the population with access to electricity, defined as having an electricity source that can provide very basic lighting, and charge a phone or power a radio for 4 hours per day.

Pillar	Metric	Reference	Latest year	Definition
3.03 E-Infrastructure	3.03c Commercial and professional infrastructure (GEM)	Global Entrepreneurship Monitor	2022	Average answer to GEM's National Expert Survey, Are commercial and professional infrastructure sufficient and affordable?
3.03 E-Infrastructure	3.03d Physical infrastructure (GEM)	Global Entrepreneurship Monitor	2022	Average answer to GEM's National Expert Survey, Is physical infrastructure sufficient and affordable?
3.03 E-Infrastructure	3.03e Electricity output, GWh/mn pop (GII)	Global Innovation Index	2019 - 2020	Electricity production, measured at the terminals of all alternators sets in a station. In addition to hydropower, coal, oil, gas and nuclear power generation, this indicator covers generation by geothermal, solar, wind, tide, and wave energy, as well as that from combustible renewables and waste. Production includes the output of plants that are designed to produce solely electricity as well as the output of combined heat and powerplants. Electricity output in GWh is scaled by population.
3.03 E-Infrastructure	3.03f Access to technology (NRI)	Network Readiness Index	2022	The Access sub-pillar (1.1) of the Network Readiness Index takes into account Mobile tariffs, Handset prices, FTTH/building internet subscriptions, Population covered by at least a 3G mobile network, international internet bandwidth, and Internet access in schools
3.04 E-Demand	3.04a FDI inward flow as % of GDP (UNCTAD)	UNCTAD	2021	Foreign direct investment (FDI) is an investment made by a resident enterprise in one economy (direct investor or parent enterprise) with the objective of establishing a lasting interest in an enterprise that is resident in another economy (direct investment enterprise or foreign affiliate). The lasting interest implies the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence on the management of the enterprise. The ownership of 10% or more of the voting power of a direct investment enterprise by a direct investor is evidence of such a relationship.
3.04 E-Demand	3.04b Domestic Market Scale (GII)	Global Innovation Index	2021	The domestic market size is measured by gross domestic product (GDP) based on the purchasing-power-parity (PPP) valuation of country GDP, in current international dollar (billions).
3.05 E-Culture & Incentives	3.05a Entrepreneurial intentions (GEM)	Global Entrepreneurship Monitor	2020 - 2021	Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who are latent entrepreneurs and who intend to start a business within three years
3.05 E-Culture & Incentives	3.05b Fear of failure (GEM)	Global Entrepreneurship Monitor	2020 - 2021	Percentage of 18-64 population perceiving good opportunities to start a business who indicate that fear of failure would prevent them from setting up a business
3.05 E-Culture & Incentives	3.05c Entrepreneurship as a Good Career choice (GEM)	Global Entrepreneurship Monitor	2020 - 2021	Percentage of 18-64 population who agree with the statement that in their country, most people consider starting a business as a desirable career choice

Pillar	Metric	Reference	Latest year	Definition
3.05 E-Culture & Incentives	3.05d High Status to Successful Entrepreneurs (GEM)	Global Entrepreneurship Monitor	2020 - 2021	Percentage of 18-64 population who agree with the statement that in their country, successful entrepreneurs receive high status
3.05 E-Culture & Incentives	3.05e Business Freedom (IEF)	Index of Economic Freedom	2023	The business freedom component measures the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses.
4 Comparative Advantage	4.01 Economic Complexity Index (ECI)	Economic Complexity Index	2020	A rank of countries based on how diversified and complex their export basket is. Countries that are home to a great diversity of productive know-how, particularly complex specialized know-how, are able to produce a great diversity of sophisticated products.
4 Comparative Advantage	4.02 State of cluster development and depth (GII)	Global Innovation Index	2018 - 2021	Average answer to the survey question: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = nonexistent; 7 = widespread in many fields].
4 Comparative Advantage	4.03 Attracting and retaining talent (WTR)	World Talent Ranking	2022	Answer to the survey question "Attracting and retaining talents is a priority in companies" on a scale of 0 to 10.
4 Comparative Advantage	4.04 Foreign highly skilled personnel (WTR)	World Talent Ranking	2022	Answer to the survey question "Foreign highly-skilled personnel are attracted to your country's business environment" on a scale of 0 to 10.
5 Social Impact	5.01 Social Progress Index (SPI)	Social Progress Imperative	2022	The Social Progress Index is an aggregate index of social and environmental indicators that capture three dimensions of social progress.
5 Social Impact	5.02 Environmental performance (GII)	Global Innovation Index	2022	The 2022 Environmental Performance Index (EPI) provides a data-driven summary of the state of sustainability around the world. Using 40 performance indicators across 11 issue categories, the EPI ranks 180 countries on climate change performance, environmental health, and ecosystem vitality.
5 Social Impact	5.03 Population below international poverty line (SDG 1 - No poverty)	Sustainable Development Report	2022	The proportion of the population living below the extreme poverty line
5 Social Impact	5.04 Prevalence of undernourishment (SDG 2 - Zero Hunger)	Sustainable Development Report	2019	The proportion of the population suffering from hunger
5 Social Impact	5.05 Proportion of urban population living in slums (SDG 11 - Sustainable Cities and Communities)	Sustainable Development Report	2018	Proportion of urban population living in slums (percent)

Pillar	Metric	Reference	Latest year	Definition
6 Economic Impact	6.01 GDP per capita (IMF)	International Monetary Fund	2020 - 2022	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.
6 Economic Impact	6.02 Unemployment rate of population 15 years of age and older (SDG 8 - Decent Jobs and Economic Growth)	Sustainable Development Report	2022	The total unemployment rate
6 Economic Impact	6.03 Annual growth rate of GDP (WB)	World Bank	2019 - 2021	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
6 Economic Impact	6.04 Balance of trade, % GDP (WB)	World Bank	2020 - 2021	External balance on goods and services (formerly resource balance) equals exports of goods and services minus imports of goods and services (previously nonfactor services).

Table 13. Indicator descriptions for the updated iEcosystems framework

Annex 8 Normalized scores

The following table presents the normalized scores attained by Mauritius, as well as the averages of the Sub-Saharan Africa, Upper-middle income, and European Union groups, during the assessment using the iEcosystems framework. Scores with an asterisk (*) signal imputed values that were obtained used a K-nearest neighbors' algorithm with 5 neighbors.

Indicator	Mauritius	Sub-Saharan Africa	Upper middle income	European Union
1 Foundational Institutions	3.65	3.00	3.11	3.62
1.01 Established business ownership (GEM)	2.22*	2.44	1.95	2.20
1.02 Total early-stage entrepreneurial activity (GEM)	3.40*	3.49	3.07	2.06
1.03 Political and operational stability (GII)	4.25	2.37	2.78	3.66
1.04 Government effectiveness (GII)	3.32	1.87	2.31	3.51
1.05 Policies for doing business (GII)	3.41	2.93	2.81	3.19
1.06 Property Rights (IEF)	4.48	2.83	3.12	4.51
1.07 Government Integrity (IEF)	3.33	2.50	2.68	3.80
1.08 Labor Freedom (IEF)	3.76	3.25	3.32	3.49
1.09 Trade freedom (IEF)	4.51	3.61	3.99	4.15
1.10 Corruption Perceptions Index (TI)	3.16	2.51	2.62	3.55
1.11 ICT regulatory environment (NRI)	4.04	3.89	4.17	4.68
1.12 Regulation of emerging technologies (NRI)	2.73	2.30	2.63	3.70
1.13 New business density (WB)	4.20	2.85	3.39	3.89
1.14 Tax administration as a major constraint (WB)	4.27*	4.03	3.96	4.09
1.15 Tax rates as a major constraint (WB)	3.68*	4.07	3.80	3.77

Indicator	Mauritius	Sub-Saharan Africa	Upper middle income	European Union
2.01 I-Human Capital	2.18	1.80	2.28	3.13
2.01a Graduates in science & engineering (%) (GII)	2.64	2.02	2.73	2.94
2.01b Researchers/Professionals engaged in R&D per million population (GII)	1.25	1.08	1.44	2.95
2.01c ICT skills in the education system (NRI)	2.64	2.29	2.68	3.52
2.02 I-Funding	1.40	1.41	1.69	2.78
2.02a GERD as a % GDP (UNESCO)	1.23	1.12	1.32	2.29
2.02b GERD financed by business enterprise (NRI)	1.20	1.30	2.33	3.49
2.02c GERD performed by business enterprise (NRI)	1.02	1.04	1.26	2.19
2.02d R&D expenditure by governments and higher education (NRI)	2.14	2.17	1.86	3.14
2.03 I-Infrastructure	2.09	1.67	2.33	2.87
2.03a Mobile and internet banking transactions per 1000 adults (IMF)	1.58	1.25	2.17	2.23
2.03b Robot density (NRI)	1.21*	1.11	1.20	1.79
2.03c Secure Internet servers (NRI)	3.18	2.28	3.30	4.37
2.03d Fablabs per million population (Fablabs.io)	2.41*	2.05	2.65	3.10
2.04 I-Demand	2.44	2.06	2.58	3.04
2.04a Computer software spending (NRI)	1.66	1.29	1.73	2.36
2.04b University-industry research collaborations (GII)	2.46	2.58	2.71	3.11
2.04c Trade, Diversification & Market Scale (GII)	3.19	2.29	3.32	3.64

Indicator	Mauritius	Sub-Saharan Africa	Upper middle income	European Union
2.05 I-Culture & Incentives	1.68	1.65	1.92	2.91
2.05aTertiary inbound mobility (GII)	3.56	2.93	2.95	3.72
2.05b QS university ranking (GII)	1.00	1.06	1.63	2.25
2.05c Research talent, % in businesses (GII)	1.20	1.59	2.08	3.31
2.05d Scientific and technical articles/bn PPP$ GDP (GII)	1.44	1.64	1.71	3.08
2.05e. GitHub commit pushes received (GII)	1.20	1.04	1.21	2.19
3.01 E-Human Capital	2.77	2.75	2.98	2.93
3.01a Entrepreneurship perceived capabilities (GEM)	3.46*	4.26	3.62	2.94
3.01b % school grads in tertiary education (GII)	2.08	1.25	2.35	2.93
3.02 E-Funding	3.15	2.26	2.38	2.79
3.02a Ease of Access to Entrepreneurial Finance (GEM)	2.54*	2.30	2.40	2.82
3.02b Credit (GII)	2.43	1.73	2.08	2.46
3.02c Market capitalization, % GDP (GII)	1.93	1.47	1.73	1.69
3.02d Venture capital recipients, deals/bn PPP$ GDP (GII)	3.90	3.00	2.47	3.25
3.02e Venture capital received, value, % GDP (GII)	4.97	2.80	3.19	3.73
3.03 E-Infrastructure	3.86	2.67	3.61	4.05
3.03a Bancarization (WB)	4.54	2.88	3.51	4.77
3.03b Electricity access	4.98	2.07	4.80	5.00
3.03c Commercial and proffesional infrastructure (GEM)	3.36*	2.92	3.03	3.36
3.03d Physical infrastructure (GEM)	3.76*	3.35	3.56	3.72
3.03e Electricity output, GWh/mn pop (GII)	3.09	1.80	3.20	3.59
3.03f Access to technology (NRI)	3.43	2.96	3.54	3.88
3.04 E-Demand	2.34	2.71	2.96	2.98
3.04a FDI inward flow as % of GDP (UNCTAD)	3.29	3.42	3.43	3.25
3.04b Domestic Market Scale (GII)	1.40	2.00	2.50	2.71

Indicator	Mauritius	Sub-Saharan Africa	Upper middle income	European Union
3.05 E-Culture & Incentives	2.69	3.38	3.16	2.66
3.05a Entrepreneurial intentions (GEM)	2.67*	4.12	3.36	1.62
3.05b Fear of failure (GEM)	2.02*	2.07	2.20	2.15
3.05c Entrepreneurship as a Good Career choice (GEM)	3.15*	4.11	3.73	2.98
3.05d High Status to Successful Entrepreneurs (GEM)	1.58*	3.58	2.83	2.43
3.05e Business Freedom (IEF)	4.04	3.02	3.67	4.11
4 Comparative Advantage	3.08	2.83	2.97	3.34
4.01 Economic Complexity Index (ECI)	2.67	2.30	2.88	3.38
4.02 State of cluster development and depth (GII)	2.95	2.71	2.89	3.16
4.03 Attracting and retaining talent (WTR)	3.66*	3.35	3.37	3.76
4.04 Foreign highly skilled personnel (WTR)	3.02*	2.94	2.75	3.07
5 Social Impact	3.63	2.40	3.52	4.22
5.01 Social Progress Index (SPI)	4.02	3.22	3.85	4.39
5.02 Environmental performance (GII)	2.79	2.39	2.72	3.46
5.03 Population below international poverty line (SDG 1 - No poverty)	4.02	1.64	3.72	4.12
5.04 Prevalence of undernourishment (SDG 2 - Zero Hunger)	3.17	2.19	3.41	4.15
5.05 Proportion of urban population living in slums (SDG 11 - Sustainable Cities and Communities)	4.17*	2.56	3.91	4.96
6 Economic Impact	2.36	2.38	2.45	3.17
6.01 GDP per capita (IMF)	1.27	1.06	1.27	2.22
6.02 Unemployment rate of population 15 years of age and older (SDG 8 - Decent Jobs and Economic Growth)	3.69	3.66	3.06	3.85
6.03 Annual growth rate of GDP (WB)	2.05	2.23	2.74	3.45
6.04 Balance of trade, % GDP (WB)	2.44	2.56	2.72	3.18
SDG Index Score	3.74	3.31	3.83	4.19

Table 14. Normalized scores for Mauritius' analysis and regions.

Annex 9 On data pre-processing

As mentioned in the methodology section, the data acquisition process involved rescaling the values for each indicator on a scale of 1 (worst) to 5 (best). In some cases, certain indicators required additional processing techniques such as winsorization or logarithmic transformations to address outliers and achieve distributions that were as close to normal as possible. The following table presents the normalized scores and original values obtained for Mauritius, as well as the averages for the Sub-Saharan Africa, Upper-middle income, and European Union groups, as assessed using the iEcosystems framework. Scores marked with an asterisk (*) indicate imputed values obtained through a K-nearest neighbors algorithm with 5 neighbors. The data preprocessing section provides information on the lower and upper bounds used for rescaling each indicator and specifies which indicators underwent winsorization or logarithmic transformation.

	Mauritius		Sub-Saharan Africa		Upper middle income		European Union		Data pre-processing			
Indicator	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Worst performance	Frontier	Type	Transformation
1.01 Established business ownership (GEM)	2.22*	NA	2.44	9.90	1.95	5.67	2.20	7.16	1.60	19.90	%	
1.02 Total early-stage entrepreneurial activity (GEM)	3.40*	NA	3.49	16.30	3.07	16.83	2.06	8.91	1.60	29.40	%	
1.03 Political and operational stability (GII)	4.25	1.00	2.37	2.50	2.78	2.18	3.66	1.47	3.60	0.40	Score	
1.04 Government effectiveness (GII)	3.32	0.87	1.87	-0.39	2.31	-0.01	3.51	1.03	-1.15	2.34	Score	
1.05 Policies for doing business (GII)	3.41	4.62	2.93	3.89	2.81	3.72	3.19	4.29	1.00	7.00	Likert scale	
1.06 Property Rights (IEF)	4.48	87.00	2.83	45.84	3.12	52.98	4.51	87.69	0.00	100.00	Score	
1.07 Government Integrity (IEF)	3.33	58.20	2.50	37.57	2.68	41.92	3.80	70.11	0.00	100.00	Score	
1.08 Labor Freedom (IEF)	3.76	69.10	3.25	56.34	3.32	58.09	3.49	62.36	0.00	100.00	Score	
1.09 Trade freedom (IEF)	4.51	87.80	3.61	65.18	3.99	74.64	4.15	78.79	0.00	100.00	Score	
1.10 Corruption Perceptions Index (TI)	3.16	54.00	2.51	37.67	2.62	40.43	3.55	63.74	0.00	100.00	Score	
1.11 ICT regulatory environment (NRI)	4.04	75.88	3.89	72.32	4.17	79.67	4.68	91.97	0.00	100.00	Score	
1.12 Regulation of emerging technologies (NRI)	2.73	43.16	2.30	33.42	2.63	40.91	3.70	67.46	0.00	100.00	Score	

	Mauritius		Sub-Saharan Africa		Upper middle income		European Union		Data pre-processing			
Indicator	**Normalized score**	**Original value**	**Normalized score**	**Original value**	**Normalized score**	**Original value**	**Normalized score**	**Original value**	**Worst performance**	**Frontier**	**Type**	**Transformation**
1.13 New business density (WB)	4.20	7.05	2.85	2.58	3.39	3.46	3.89	6.03	0.05	24.19	#	Logarithmic transformation
1.14 Tax administration as a major constraint (WB)	4.27*	NA	4.03	15.38	3.96	16.36	4.09	15.18	63.20	1.10	%	
1.15 Tax rates as a major constraint (WB)	3.68*	NA	4.07	19.78	3.80	26.94	3.77	28.86	88.40	2.30	%	
2.01a Graduates in science & engineering (%) (GII)	2.64	21.61	2.02	17.06	2.73	22.48	2.94	23.81	9.50	39.04	%	
2.01b Researchers/Professionals engaged in R&D per million population (GII)	1.25	563.91	1.08	207.49	1.44	1175.61	2.95	4250.53	14.45	8713.63	#	
2.01c ICT skills in the education system (NRI)	2.64	41.12	2.29	32.38	2.68	41.42	3.52	62.94	0.00	100.00	Score	
2.02a GERD as a % GDP (UNESCO)	1.23	0.37	1.12	0.26	1.32	0.58	2.29	1.77	0.06	5.35	%	
2.02b GERD financed by business enterprise (NRI)	1.20	5.02	1.30	8.77	2.33	34.85	3.49	62.19	0.00	100.00	Score	
2.02c GERD performed by business enterprise (NRI)	1.02	0.57	1.04	1.49	1.26	7.37	2.19	29.73	0.00	100.00	Score	
2.02d R&D expenditure by governments and higher education (NRI)	2.14	28.54	2.17	30.90	1.86	22.19	3.14	53.44	0.00	100.00	Score	
2.03a Mobile and internet banking transactions per 1000 adults (IMF)	1.58	35196.00	1.25	15328.20	2.17	73470.13	2.23	75954.95	0.11	241722.70	#	Winsorization at 0.975
2.03b Robot density (NRI)	1.21*	NA	1.11	5.97	1.20	7.33	1.79	20.53	0.00	100.00	Score	
2.03c Secure Internet servers (NRI)	3.18	54.41	2.28	32.40	3.30	57.39	4.37	84.25	0.00	100.00	Score	

	Mauritius		Sub-Saharan Africa		Upper middle income		European Union		Data pre-processing			
Indicator	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Worst performance	Frontier	Type	Transformation
2.03d Fablabs per million population (Fablabs.io)	2.41*	NA	2.05	0.07	2.65	0.37	3.10	0.89	0.00	26.21	#	Logarithmic transformation
2.04a Computer software spending (NRI)	1.66	16.40	1.29	7.47	1.73	17.84	2.36	34.12	0.00	100.00	Score	
2.04b University-industry research collaborations (GII)	2.46	3.20	2.58	3.38	2.71	3.56	3.11	4.17	1.00	7.00	Likert scale	
2.04c Trade, Diversification & Market Scale (GII)	3.19	54.71	2.29	32.35	3.32	57.96	3.64	66.01	0.00	100.00	Score	
2.05aTertiary inbound mobility (GII)	3.56	6.71	2.93	3.05	2.95	4.18	3.72	10.83	0.10	72.98	%	Logarithmic transformation
2.05b QS university ranking (GII)	1.00	0.00	1.06	1.49	1.63	15.86	2.25	31.30	0.00	100.00	Score	
2.05c Research talent, % in businesses (GII)	1.20	4.40	1.59	4.40	2.08	26.48	3.31	47.42	0.32	81.83	%	
2.05d Scientific and technical articles/bn PPP$ GDP (GII)	1.44	8.88	1.64	12.22	1.71	13.42	3.08	37.08	1.20	70.31	#	
2.05e. GitHub commit pushes received (GII)	1.20	204084.71	1.04	38642.07	1.21	221845.09	2.19	1216698.28	1849.60	4094050.02	#	
3.01a Entrepreneurship perceived capabilities (GEM)	3.46*	NA	4.26	81.90	3.62	62.60	2.94	51.07	12.26	91.90	%	
3.01b % school grads in tertiary education (GII)	2.08	44.26	1.25	14.95	2.35	54.87	2.93	74.64	5.53	148.53	%	
3.02a Ease of Access to Entrepreneurial Finance (GEM)	2.54*	NA	2.30	3.30	2.40	3.70	2.82	4.58	1.00	9.00	Likert scale	
3.02b Credit (GII)	2.43	35.71	1.73	18.01	2.08	26.99	2.46	36.49	0.00	100.00	Score	
3.02c Market capitalization, % GDP (GII)	1.93	62.39	1.47	49.94	1.73	55.28	1.69	36.39	0.23	266.51	%	
3.02d Venture capital recipients, deals/bn PPP$ GDP (GII)	3.90	0.1216	3.00	0.0427	2.47	0.0263	3.25	0.0737	0.0019	0.5943	#	Logarithmic transformation

	Mauritius		Sub-Saharan Africa		Upper middle income		European Union		Data pre-processing			
Indicator	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Worst performance	Frontier	Type	Transformation
3.02e Venture capital received, value, % GDP (GII)	4.97	0.0126	2.80	0.0013	3.19	0.0014	3.73	0.0020	0.00	0.0135	%	Logarithmic transformation
3.03a Bancarization (WB)	4.54	0.91	2.88	0.58	3.51	0.72	4.77	0.95	0.21	1.00	%	
3.03b Electricity access	4.98	99.66	2.07	59.12	4.80	97.23	5.00	99.99	44.16	100.00	%	Winsorization at 0.05
3.03c Commercial and proffesional infrastructure (GEM)	3.36*	NA	2.92	4.35	3.03	4.90	3.36	5.66	1.00	9.00	Likert scale	
3.03d Physical infrastructure (GEM)	3.76*	NA	3.35	4.60	3.56	6.02	3.72	6.31	1.00	9.00	Likert scale	
3.03e Electricity output, GWh/mn pop (GII)	3.09	2267.72	1.80	574.79	3.20	3231.26	3.59	5813.93	75.22	51702.70	GWh	Logarithmic transformation
3.03f Access to technology (NRI)	3.43	60.76	2.96	49.23	3.54	63.34	3.88	72.10	0.00	100.00	Score	
3.04a FDI inward flow as % of GDP (UNCTAD)	3.29	2.29	3.42	3.01	3.43	3.10	3.25	2.07	-10.65	11.97	%	Winsorization at 0.95
3.04b Domestic Market Scale (GII)	1.40	28.27	2.00	182.72	2.50	1409.33	2.71	796.98	13.30	27071.96	$	Logarithmic transformation
3.05a Entrepreneurial intentions (GEM)	2.67*	NA	4.12	40.05	3.36	33.43	1.62	11.36	2.85	57.50	%	
3.05b Fear of failure (GEM)	2.02*	NA	2.07	48.78	2.20	43.17	2.15	43.79	56.01	12.08	%	
3.05c Entrepreneurship as a Good Career choice (GEM)	3.15*	NA	4.11	81.14	3.73	74.93	2.98	60.72	23.99	96.55	%	
3.05d High Status to Successful Entrepreneurs (GEM)	1.58*	NA	3.58	85.57	2.83	75.95	2.43	67.67	53.47	96.33	%	
3.05e Business Freedom (IEF)	4.04	76.00	3.02	50.58	3.67	66.85	4.11	77.74	0.00	100.00	Score	
4.01 Economic Complexity Index (ECI)	2.67	-0.04	2.30	-0.57	2.88	0.24	3.38	0.88	-2.20	2.96	Score	
4.02 State of cluster development and depth (GII)	2.95	3.93	2.71	3.58	2.89	3.83	3.16	4.24	1.00	7.00	Likert scale	

	Mauritius		Sub-Saharan Africa		Upper middle income		European Union		Data pre-processing			
Indicator	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Normalized score	Original value	Worst performance	Frontier	Type	Transformation
4.03 Attracting and retaining talent (WTR)	3.66*	NA	3.35	5.39	3.37	5.82	3.76	6.92	0.00	10.00	Likert scale	
4.04 Foreign highly skilled personnel (WTR)	3.02*	NA	2.94	5.39	2.75	4.50	3.07	5.21	0.00	10.00	Likert scale	
5.01 Social Progress Index (SPI)	4.02	75.44	3.22	55.58	3.85	71.48	4.39	84.68	0.00	100.00	Score	
5.02 Environmental performance (GII)	2.79	44.80	2.39	34.80	2.72	43.02	3.46	61.57	0.00	100.00	Score	
5.03 Population below international poverty line (SDG 1 - No poverty)	4.02	0.30	1.64	32.99	3.72	2.94	4.12	0.36	76.40	0.00	%	Logarithmic transformation
5.04 Prevalence of undernourishment (SDG 2 - Zero Hunger)	3.17	6.20	2.19	17.83	3.41	6.67	4.15	2.57	43.20	1.20	%	Logarithmic transformation
5.05 Proportion of urban population living in slums (SDG 11 - Sustainable Cities and Communities)	4.17*	NA	2.56	49.32	3.91	22.83	4.96	0.63	76.90	0.00	%	
6.01 GDP per capita (IMF)	1.27	9111.61	1.06	2442.95	1.27	8946.00	2.22	39261.99	521.58	127672.50	$	
6.02 Unemployment rate of population 15 years of age and older (SDG 8 - Decent Jobs and Economic Growth)	3.69	6.90	3.66	7.03	3.06	10.14	3.85	6.07	20.82	0.10	%	Winsorization at 0.975
6.03 Annual growth rate of GDP (WB)	2.05	-4.80	2.23	-4.22	2.74	-2.60	3.45	-0.29	-8.20	4.70	%	
6.04 Balance of trade, % GDP (WB)	2.44	-9.71	2.56	-7.45	2.72	-4.32	3.18	4.41	-37.45	39.38	%	

Table 15. Data pre-processing for iEcosystems analysis.

Annex 10 SDG Indicators

The following table includes the list of indicators employed by the original authors of the "Sustainable Development Report 2022" (Sachs et al., 2022) in the calculation of the score for goals SDG 2: Zero Hunger, SDG 5: Gender Equality, SDG 8: Decent Work and Economic Growth, SDG 9: Industry, Innovation and Infrastructure, SDG10: Reduced Inequalities, SDG14: Life Below Water, SDG15: Life on Land, and SDG17: Partnerships for the Goals.

SDG	Indicator	Reference Year	Source	Description
2	Prevalence of undernourishment (%)	2019	FAO	The percentage of the population whose food intake is insufficient to meet dietary energy requirements for a minimum of one year. Dietary energy requirements are defined as the amount of dietary energy required by an individual to maintain body functions, health and normal activity. FAO et al. (2015) report 14.7 million undernourished people in developed regions, which corresponds to an average prevalence of 1.17% in the developed regions. We assumed a 1.2% prevalence rate for each high-income country with missing data.
2	Prevalence of stunting in children under 5 years of age (%)	2019	UNICEF et al.	The percentage of children up to the age of 5 years that are stunted, measured as the percentage that fall below minus two standard deviations from the median height for their age, according to the WHO Child Growth Standards. UNICEF et al. (2016) report an average prevalence of wasting in high-income countries of 2.58%. We assumed this value for high-income countries with missing data.
2	Prevalence of wasting in children under 5 years of age (%)	2019	UNICEF et al.	The percentage of children up to the age of 5 years whose weight falls below minus two standard deviations from the median weight for their age, according to the WHO Child Growth Standards. UNICEF et al. (2016) report an average prevalence of wasting in high-income countries of 0.75%. We assumed this value for high-income countries with missing data.
2	Prevalence of obesity, BMI ≥ 30 (% of adult population)	2016	WHO	The percentage of the adult population that has a body mass index (BMI) of 30kg/m² or higher, based on measured height and weight.
2	Human Trophic Level (best 2-3 worst)	2017	Bonhommeau et al. (2013)	Trophic levels are a measure of the energy intensity of diet composition and reflect the relative amounts of plants as opposed to animals eaten in a given country. A higher trophic level represents a greater level of consumption of energy-intensive animals.
2	Cereal yield (tonnes per hectare of harvested land)	2018	FAO	Cereal yield, measured as tonnes per hectare of harvested land. Production data on cereals relate to crops harvested for dry grain only and excludes crops harvested for hay or green for food, feed, or silage and those used for grazing.
2	Sustainable Nitrogen Management Index (best 0-1.41 worst)	2015	Zhang and Davidson (2019)	The Sustainable Nitrogen Management Index (SNMI) is a one-dimensional ranking score that combines two efficiency measures in crop production: Nitrogen use efficiency (NUE) and land use efficiency (crop yield).
2	Yield gap closure (% of potential yield)	2018	Global Yield Gap Atlas	A country's yield expressed as a percentage of its potential yield in the three annual crops using the most land area, weighted for the relative importance of each crop in terms of surface area.

SDG	Indicator	Reference Year	Source	Description
2	Exports of hazardous pesticides (tonnes per million population)	2019	FAO	Exports of pesticides deemed hazardous to human health, standardized by population. Due to volatility, the calculation uses the average value over the last 5 years.
5	Demand for family planning satisfied by modern methods (% of females aged 15 to 49)	2022	UNDESA	The percentage of women of reproductive age whose demand for family planning has been met using modern methods of contraception.
5	Ratio of female-to-male mean years of education received (%)	2019	UNESCO	The mean years of education received by women aged 25 and older divided by the mean years of education received by men aged 25 and older.
5	Ratio of female-to-male labor force participation rate (%)	2020	ILO	Modeled estimate of the proportion of the female population aged 15 years and older that is economically active, divided by the same proportion for men.
5	Seats held by women in national parliament (%)	2020	IPU	The number of seats held by women in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats. Seats refer to the number of parliamentary mandates, or the number of members of parliament.
5	Gender wage gap (% of male median wage)	2020	OECD	The difference between male and female median wages of full-time employees and those self-employed, divided by the male median wage.
8	Adjusted GDP growth (%)	2020	World Bank	The growth rate of GDP adjusted to income levels (where rich countries are expected to grow less) and expressed relative to the US growth performance. World Bank data on GDP per capita, PPP (current international $) annual data were used as the starting point. The growth rate over the last 3-year period (t-3 to t) was calculated where GRa=(At/At-3)^(1/3)-1 and where GRa is the growth rate for country A and At is the GDP per capita data for the year t in country A. Then our adjustment is as follows : ADJa= [GRa-(GRusa - 0,015*log(At-3/USAt-3))] * 100, where GRusa is the United States growth rate and USAt-3 is the United States GDP per capita 3 years ago.
8	Victims of modern slavery (per 1,000 population)	2018	Walk Free Foundation (2018)	Estimation of the number of people in modern slavery. Modern slavery is defined as people in forced labor or forced marriage. It is calculated based on standardized surveys and Multiple Systems Estimation (MSE).
8	Adults with an account at a bank or other financial institution or with a mobile-money-service provider (% of population aged 15 or over)	2017	Demirguc-Kunt et al. (2018)	The percentage of adults, 15 years and older, who report having an account (by themselves or with someone else) at a bank or another type of financial institution, or who have personally used a mobile money service within the past 12 months.
8	Unemployment rate (% of total labor force, ages 15+)	2022	ILO	Modeled estimate of the share of the labor force that is without work but is available and actively seeking employment. The indicator reflects the inability of an economy to generate employment for people who want to work but are not doing so.
8	Fundamental labor rights are effectively guaranteed (worst 0–1 best)	2020	World Justice Project	Measures the effective enforcement of fundamental labor rights, including freedom of association and the right to collective bargaining, the absence of discrimination with respect to employment, and freedom from forced labor and child labor.

SDG	Indicator	Reference Year	Source	Description
8	Fatal work-related accidents embodied in imports (per 100,000 population)	2015	Alsamawi et al. (2017)	The number of fatal work-related accidents associated with imported goods. Calculated using extensions to a multiregional input-output table.
8	Employment-to-population ratio (%)	2021	OECD	The ratio of the employed to the working age population. Employed people are those aged 15 or older who were in paid employment or self-employed during a specified period. The working age population refers to people aged 15 to 64.
8	Youth not in employment, education or training (NEET) (% of population aged 15 to 29)	2020	OECD	The percentage of young people who are not in employment, education or training (NEET). Education includes part-time or full-time education, but exclude those in non-formal education and in educational activities of very short duration. Employment is defined according to the ILO Guidelines and covers all those who have been in paid work for at least one hour in the reference week or were temporarily absent from such work.
9	Population using the internet (%)	2020	ITU	The percentage of the population who used the Internet from any location in the last three months. Access could be via a fixed or mobile network.
9	Mobile broadband subscriptions (per 100 population)	2019	ITU	The number of mobile broadband subscriptions per 100 population. Mobile broadband subscriptions refer to subscriptions to mobile cellular networks with access to data communications (e.g. the Internet) at broadband speeds, irrespective of the device used to access the internet.
9	Logistics Performance Index: Quality of trade and transport-related infrastructure (worst 1-5 best)	2018	World Bank	Survey-based average assessment of the quality of trade and transport related infrastructure, e.g. ports, roads, railroads and information technology, on a scale from 1 (worst) to 5 (best).
9	The Times Higher Education Universities Ranking: Average score of top 3 universities (worst 0-100 best)	2022	Times Higher Education	The average score of the top three universities in each country that are listed in the global top 1,000 universities in the world. For countries with at least one university on the list, only the score of the ranked university was taken into account. When a university score was missing in the Times Higher Education World University Ranking, an indicator from the Global Innovation Index on the top 3 universities in Quacquarelli Symonds (QS) University Ranking was used as a source when available.
9	Articles published in academic journals (per 1,000 population)	2020	Scimago Jounal Rank	Number of citable documents published by a journal in the three previous years (selected year documents are excluded). Exclusively articles, reviews and conference papers are considered.
9	Expenditure on research and development (% of GDP)	2018	UNESCO	Gross domestic expenditure on scientific research and experimental development (R&D) expressed as a percentage of Gross Domestic Product (GDP). We assumed zero R&D expenditure for low-income countries that do not report any data.
9	Researchers (per 1,000 employed population)	2019	OECD	The number of researchers per thousand employed people. Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of the projects concerned

SDG	Indicator	Reference Year	Source	Description
9	Triadic patent families filed (per million population)	2019	OECD	A triadic patent family is defined as a set of patents registered in various countries (i.e. patent offices) to protect the same invention. Triadic patent families are a set of patents filed at three of these major patent offices: the European Patent Office (EPO), the Japan Patent Office (JPO) and the United States Patent and Trademark Office (USPTO). The number of triadic patent families is "nowcast" for timeliness.
9	Gap in internet access by income (percentage points)	2020	OECD	The difference in the percentage of household Internet access between the top and bottom income quartiles.
9	Female share of graduates from STEM fields at the tertiary level (%)	2018	World Bank	Female share of graduates from Science, Technology, Engineering and Mathematics (STEM) programmes, tertiary (%)
10	Gini coefficient	2019	World Bank	The Gini coefficient measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution.
10	Palma ratio	2019	OECD & UNDP	The share of all income received by the 10% people with highest disposable income divided by the share of all income received by the 40% people with the lowest disposable income.
10	Elderly poverty rate (% of population aged 66 or over)	2019	OECD	The percentage of people of 66 years of age or more whose income falls below half the median household income of the total population.
14	Mean area that is protected in marine sites important to biodiversity (%)	2020	Birdlife International et al.	The mean percentage area of marine Key Biodiversity Areas (sites that are important for the global persistence of marine biodiversity) that are protected.
14	Ocean Health Index: Clean Waters score (worst 0-100 best)	2020	Ocean Health Index	The clean waters subgoal of the Ocean Health Index measures to what degree marine waters under national jurisdictions have been contaminated by chemicals, excessive nutrients (eutrophication), human pathogens, and trash.
14	Fish caught from overexploited or collapsed stocks (% of total catch)	2018	Sea around Us	The percentage of a country's total catch, within its exclusive economic zone (EEZ), that is comprised of species that are overexploited or collapsed, weighted by the quality of fish catch data.
14	Fish caught by trawling or dredging (%)	2018	Sea Around Us	The percentage of fish caught by trawling, a method of fishing in which industrial fishing vessels drag large nets (trawls) along the seabed.
14	Fish caught that are then discarded (%)	2018	Sea around Us	The percentage of fish that are caught only to be later discarded.
14	Marine biodiversity threats embodied in imports (per million population)	2018	Lenzen et al. (2012)	Threats to marine species embodied in imports of goods and services.
15	Mean area that is protected in terrestrial sites important to biodiversity (%)	2020	Birdlife International et al.	The mean percentage area of terrestrial Key Biodiversity Areas (sites that are important for the global persistence of biodiversity) that are protected.

SDG	Indicator	Reference Year	Source	Description
15	Mean area that is protected in freshwater sites important to biodiversity (%)	2020	Birdlife International et al.	The mean percentage area of freshwater Key Biodiversity Areas (sites that are important for the global persistence of biodiversity) that are protected.
15	Red List Index of species survival (worst 0-1 best)	2021	IUCN and Birdlife International	The change in aggregate extinction risk across groups of species. The index is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species.
15	Permanent deforestation (% of forest area, 3-year average)	2020	Curtis et al. (2018)	The mean annual percentage of permanent deforestation over the last 3-year period. Permanent deforestation refers to tree cover removal for urbanization, commodity production and certain types of small-scale agriculture whereby the previous tree cover does not return. It does not include temporary forest loss due to cuttings within the forestry sector or wildfires. Since data on tree cover gains are not available, the annual net loss cannot be calculated, thus the indicator is an estimate for gross permanent deforestation.
15	Terrestrial and freshwater biodiversity threats embodied in imports (per million population)	2018	Lenzen et al. (2012)	Threats to terrestrial and freshwater species embodied in imports of goods and services.
17	Government spending on health and education (% of GDP)	2020	UNESCO	The sum of public expenditure on health from domestic sources and general government expenditure on education (current, capital, and transfers) expressed as a percentage of GDP. This indicator is based on the World Bank health and education spending datasets, sourced from WHO & UNESCO respectively. Values are carried forward for both health and education, but a value in a given year is only reported if at least one data point is a real observation (not carried forward).
17	For high-income and all OECD DAC countries: International concessional public finance, including official development assistance (% of GNI)	2021	OECD	The amount of official development assistance (ODA) as a share of gross national income (GNI). It includes grants, "soft" loans (where the grant element is at least 25% of the total) and the provision of technical assistance, and excludes grants and loans for military purposes. There is a break in the series because from 2018, the ODA grant-equivalent methodology is used whereby only the “grant portion” of the loan, i.e. the amount “given” by lending below market rates, counts as ODA.
17	Other countries: Government revenue excluding grants (% of GDP)	2019	IMF	Government revenue measured as cash receipts from taxes, social contributions, and other revenues such as fines, fees, rent, and income from property or sales. Grants are also considered as revenue but are excluded here.
17	Corporate Tax Haven Score (best 0-100 worst)	2019	Tax Justice Network	The Corporate Tax Haven Score measures a jurisdiction’s potential to poach the tax base of others, as enshrined in its laws, regulations and documented administrative practices. For countries with multiple jurisdictions, the value of the worst-performing jurisdiction was retained.
17	Financial Secrecy Score (best 0-100 worst)	2020	Tax Justice Network	The Index measures the contribution of each jurisdiction to financial secrecy, on a scale from 0 (best) to 100 (worst). It is calculated using qualitative data to prepare a secrecy score for each jurisdiction and quantitative data to create a global scale weighting for each jurisdiction according to its share of offshore financial services activity in the global total. For countries with multiple jurisdictions, the average score of the jurisdictions was used.

SDG	Indicator	Reference Year	Source	Description
17	Shifted profits of multinationals (US$ billion)	2018	Zucman et al. (2019)	Estimation of how much profit is shifted into tax havens and how much non-haven countries lose in profits from such shifting. Based on macroeconomic data known as foreign affiliates statistics. Negative values indicate profit shifting.
17	Statistical Performance Index (worst 0-100 best)	2019	World Bank	The Statistical Performance Index is a weighted average of the statistical performance indicators that evaluate the performance of national statistical systems. It aggregates five pillars of statistical performance: data use, data services, data products, data sources, and data infrastructure.

Table 16. SDG Indicators.

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