

# LOKAL REBOUND

Using Mauritius' production expertise  
to stimulate its economy

#LokalisBeautiful



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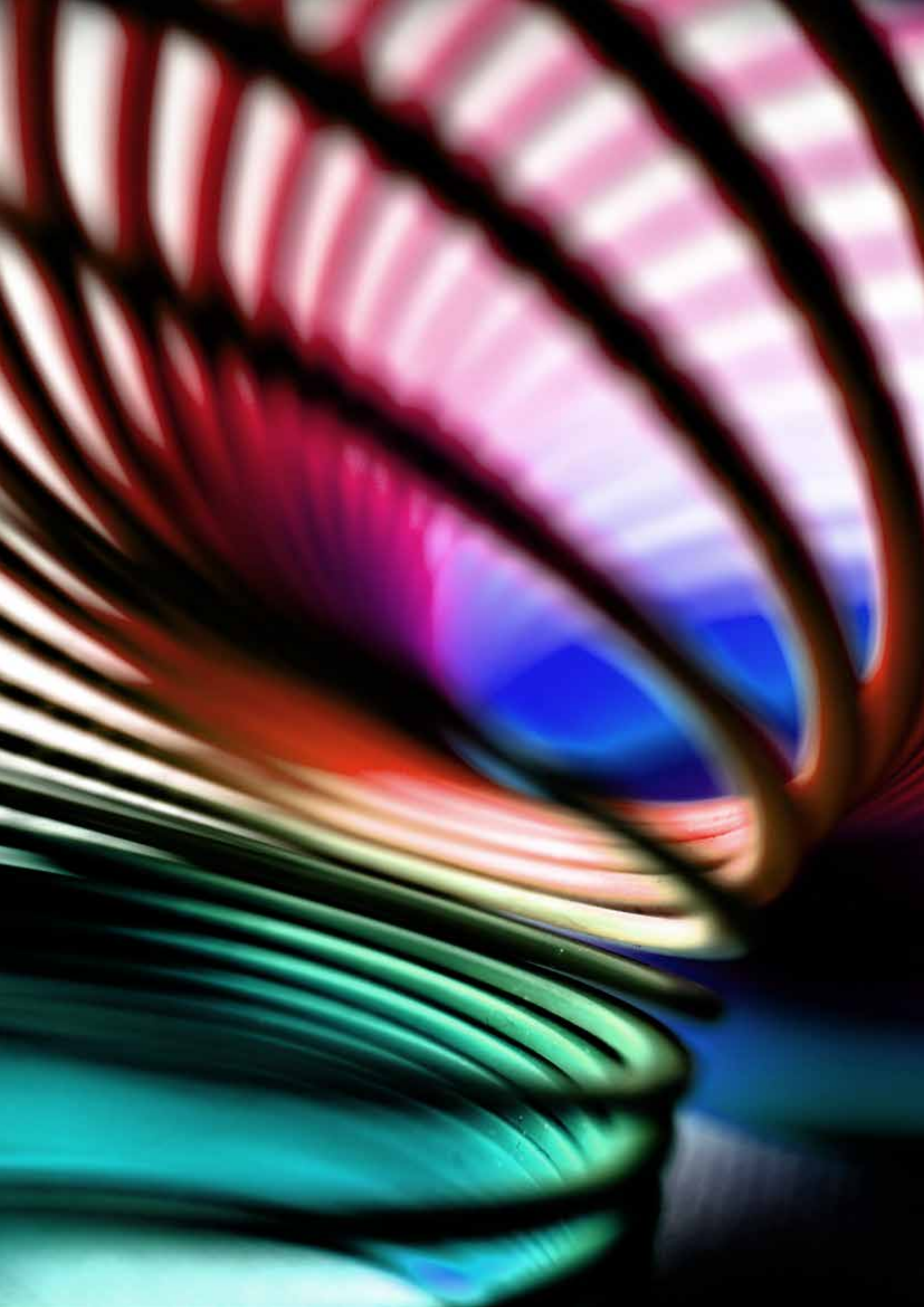
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# How to transform the current economic crisis into an opportunity for an overhaul of the Mauritian economy, by diversifying it and making it more resilient and prosperous over time?

*A study commissioned by MCB and conducted by UTOPIES*

“ A pessimist sees  
the difficulty in every  
opportunity; an optimist  
sees the opportunity in  
every difficulty.”

Sir Winston Churchill



**PART 1**

**RESILIENCE IN PRODUCTION:  
FOR A SUSTAINABLE RECOVERY**

The COVID-19 induced economic crisis has highlighted Mauritius' vulnerability to the hazards of international trade, shining the light in particular on the country's lack of autonomy in terms of its production and the need to diversify said production. It is not the first time an MCB report flags this lacuna but the issue now seems pressing in light of the current circumstances.

It is now time for Mauritius to draw on its strengths, namely its reputed entrepreneurial culture and its dynamism, to attempt another Mauritian miracle. This second miracle would bring about a more resilient local economy, through the diversification of local production. This transition is all the more pressing in view of the climatic urgency looming ahead, to which,

as a small island state, Mauritius is particularly vulnerable.<sup>1</sup>

These two challenges facing the country are not mutually exclusive. On the contrary, they should go hand in hand seeing as an increasing share of Mauritius' carbon emissions come from its imports.<sup>2</sup>

**So how to diversify the country's production fabric not only to cater for its own needs but also to produce more high value-added goods than those currently produced, to ensure prosperity over time?** The answer lies in the strengthening of resilience in production. The objective of this report is to formulate practical solutions to achieve that state of resilience.



<sup>1</sup> UNH Institute for Environment and Human Security (2016)

<sup>2</sup> In 2017, carbon emissions generated from the imports of Mauritius (5,2MtCO<sub>2</sub>) represented 119% of the country's total emissions (4,38MtCO<sub>2</sub>), compared to 84% in 2005. Klima Neutral 2050 Report, MCB 2020

# I. Resilience in production

## Agility is key

What is resilience in production? In nature, ecosystems are diversified, offer complementarities and overlap in functions. It is like a spider's web. It is not perfect but a broken thread will not endanger the web and the spider will very rarely have to start spinning its web all over again. Similarly, when faced with a threat, the more diversified an economy is, the more it will be able to find synergies or alternatives and the more agile it will be in terms of the way it responds to a crisis – be it having to find new trade opportunities and/or having to adapt to local needs.



## Defining resilience in production

A study was conducted in May 2020 to gauge the level of resilience in production of countries the world over<sup>3</sup>, using a resilience test that measured the share (in %) of 1242 products that a territory is able to produce in a reasonable time and in sufficient quantities, based on the fact that:

- The country is already specialised in the production of said goods (thus able to respond positively to high local demand for that product)
- And/or the country has a specialisation at least in two products that are related with the goods that needs to be produced. (This makes it possible to jump short distances into related products, a 'production jump').

**The resilience scoring measures a country's capacity to cover as large a production space as possible in times of temporary disruptions. A maximum score of 100% resilience means that a country is able to maintain production of any goods in a crisis.**

### Notes:

Products are said to be 'related' when there is proximity in the production process, in raw materials or in know-how.

The 1242 products used as a basis for the resilience test are part of the Harmonised System, an international nomenclature for the classification of products. It allows participating countries to classify traded goods on a common basis for customs purposes.

<sup>3</sup> Position paper no. 20 of Utopies, « Covid-19 : une question de résilience productive », May 2020, available on the website : [www.utopies.com/publications/covid-19-une-question-de-resilience-productive](http://www.utopies.com/publications/covid-19-une-question-de-resilience-productive)



## Mauritius' resilience in production

Mauritius scores 20.5% at the resilience test conducted by Utopies in May 2020, ranking 79th worldwide in terms of countries with the most resilience in their production. **Mauritius scores better than other small island developing states** such as Malta (19.5%), Singapore (19.2%) and Iceland (9.7%). Only much bigger islands with more diversified economies perform better at the test. Likewise, Mauritius scores better than most of the Indian Ocean countries. That being said, the country's score is relatively weak compared to the more resilient world economies such as China or Italy, both leading the ranking at 49.3%.

What this means is that in case of a worldwide disruption to the supply chain, as is currently the case, **Mauritius would only be able to produce one fifth of all the goods that are consumed directly or indirectly locally.** In other words, 80% of those goods cannot be produced locally. This score highlights the magnitude of the challenge of making of Mauritius a resilient territory. It is hard to define what a good threshold should be but it would be reasonable to think that a resilient system would be one that is able to maintain production of a substantial number of goods, possibly above 66%.

Island economies				Indian Ocean	
Cyprus	27,4%	Seychelles	6,0%	India	37,2%
Sri Lanka	25,5%	French Polynesia	4,7%	Sri Lanka	25,5%
Dominican Republic	23,7%	Bermuda	4,5%	Kenya	23,0%
New Zealand	22,8%	Maldives	2,0%	<b>Mauritius</b>	<b>20,5%</b>
<b>Mauritius</b>	<b>20,5%</b>	New Caledonia	1,4%	Tanzania	19,6%
Malta	19,5%	Comoros	1,2%	Madagascar	13,3%
Singapore	19,2%	Reunion	N.A	Mozambique	8,2%
Tuvalu	17,1%			Seychelles	6,0%
Madagascar	13,3%			Somalia	3,1%
Iceland	9,7%			Maldives	2,0%
Cabo Verde	8,6%			Comoros	1,2%
Trinidad & Tobago	7,2%			Reunion	N.A

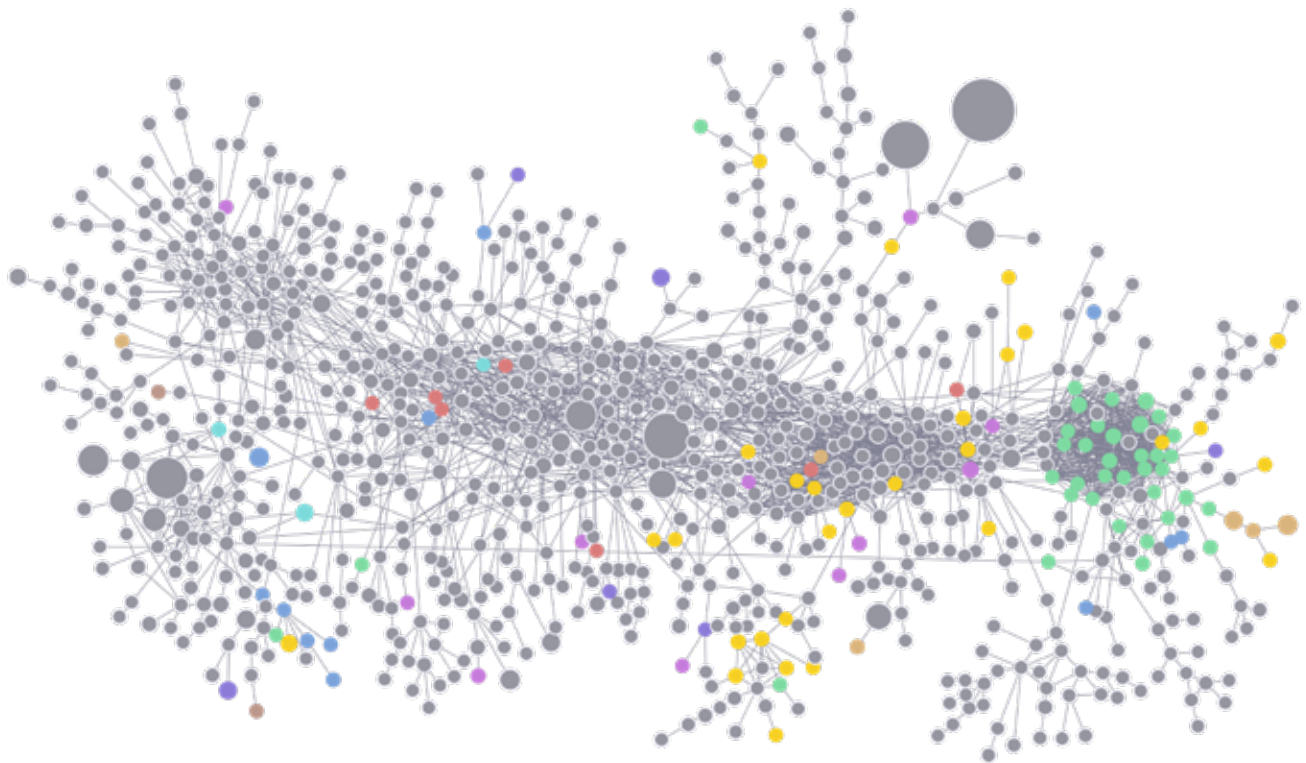
Resilience test ranking for island economies and the Indian Ocean, 2020

The analogy used by economist Ricardo Hausmann, director of Harvard's Growth Lab, helps explain what is meant by the product space of a territory. He compares it to a forest where each product is represented by a tree, as illustrated below, and where monkeys (representing entrepreneurs) would progressively jump from one tree to the other in the product forest, without exploring areas of the forest that are too far afield or unattainable.

Hereunder, Mauritius' product space or product forest illustrates how little diversity there is in

the country's production fabric. Out of the 1242 families of products, there are only 113 families of products that Mauritius can supply (coloured points). The grey points represent products not currently produced – or produced in very little quantity – in Mauritius. What emerges is the concentration of the local offer around two clusters – the textile industry (green points) and the agroindustry (yellow points).

### Mauritius' product forest, 2020



Product sectors



**Mauritius currently stands out from other island economies by having a rather dense production fabric, concentrated around two sectors.**

**Although a good thing, it is still too specialised.**

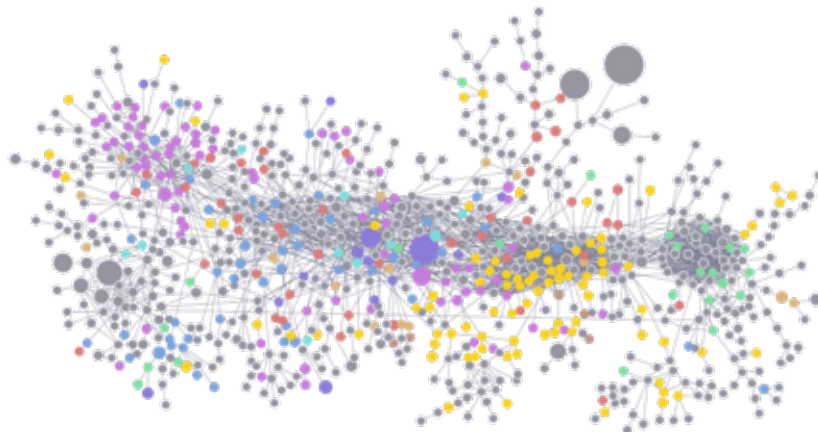
This lack of diversification is obvious when compared to more resilient countries, like China, ranked as the most resilient economy, as evidenced in the country's product forest that shows a substantial number of coloured points well distributed across the forest. Although it is the first country in terms of resilience in production, China still does not score more than 50% (showing more modest resilience in sectors such as the food industry).

France on the other hand, has lost some of her industrial density in the past 40 years but remains rather diversified with a big palette of different production activities, hence explaining its score of nearly 45%.

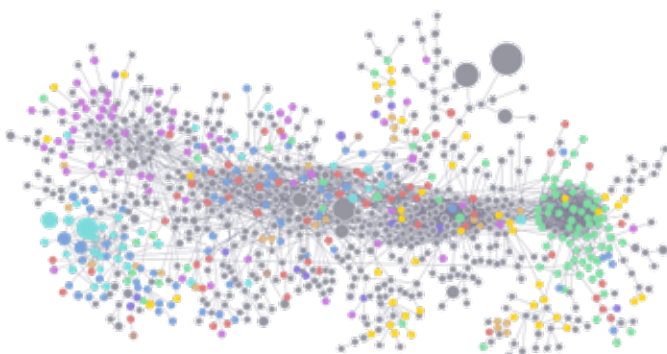
Estonia has the best resilience score (36.5%) when compared to countries with a similar size as Mauritius, and shows a rather varied product forest; proof if needed that a country of that size can have good production diversity.

**The main issue for Mauritius in the coming years will be to progressively "colour" new points in its product forest, starting from strategic points, allowing it to use synergies to explore new zones in the forest, hopefully more complex ones or even by trying to graft on new sectors, currently unexplored but that are related to the local production fabric.**

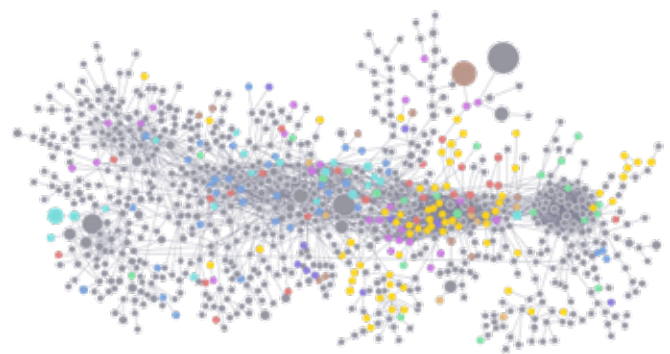
France's product forest



China's product forest



Estonia's product forest



## Resilience in production on a regional scale

**What about the Indian Ocean?** It is not too far-fetched to imagine a regional resilience plan, by exploring potential synergies in the neighbouring islands; there are some complementarities between Mauritius, Madagascar and Reunion Island, mainly in the agro-industry or even chemicals, metallurgy and paper/cardboard sectors. In those sectors only, a regional project to create synergies in the Indian Ocean would allow Mauritius to gain nearly three points in its resilience score.

The problem however is that while Mauritius can make good use of the Indian Ocean, the opposite is not necessarily true. The resilience score of the Indian Ocean as a whole is about 0.5% higher than that of Mauritius. Mauritius currently leads the region in terms of resilience with a more diversified and dense production fabric while the economies of the neighbouring countries are at the moment less able to form synergies (having few coloured points in their respective product forests). There are also many similarities in terms of production (agriculture, textile, etc.) in the region. While this shows density, it does not show diversity in the regional economy. **So as long as the other island economies in the region do not diversify, a regional dynamic will have minimal impact on the region's resilience.**

## II. Towards production redeployment

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### METHODOLOGY USED

This work was carried out using LOCANOMICS®, a tool developed by French consultancy firm, UTOPIES. LOCANOMICS® works on the premise that resilience in production be placed at the heart of national strategies and provides a better understanding of the product space of different countries as well as the synergies they present to potential local or foreign investors. It combines the seminal work done by Harvard Growth Lab on countries' product space with the expertise of Utopies in economic modelling of territories.

Based on the Statistical Classification of Economic Activities in the European Community, 615 product and service lines that could potentially be developed on the island have been analysed using a set of indicators:

- The number of connections, which is the number of locally manufactured products and services with which the target product/service has a degree of proximity greater than 50% in terms of inputs (explicit or implicit proximity in terms of manufacturing process, materials, raw materials, etc.) and/or skills (proximity in terms of knowledge and know-how listed by the French Register of Occupations and Trades)
  - The quality of the connections (size of local businesses and proximity percentage level)
  - The LOCANOMICS® Index (product proximity index: number of connections x quality of connections)
  - The weight of local production (in terms of number of jobs)
  - The weight of production in a high-income country (national ranking, modelled on the French and US economies)
  - The coverage level relative to the weight of production in a high-income country (in terms of share of employment in the economy).
-

How do we widen Mauritius' product forest? We can use the trees - in this case, products or services - that are already thriving in the forest, those for which Mauritius already has human or material resources. **The production redeployment of Mauritius will not start from nothing but will come from the ability of its businesses to "jump" from one tree to another in the most agile way possible:**

- either by connecting coloured dots to create synergies, to grow and generate new shoots on existing trees in the Mauritian product forest;
- or by connecting coloured dots with grey dots in order to plant new trees, which will gradually enable the exploration and cultivation of new areas of the forest, thus contributing to the diversification of the production fabric of Mauritius.

Mauritius has a rich production culture and diversification can be done by optimising what's already in existence and adding complexity to it, similar to trying to enhance the biodiversity in an endemic forest. But it is also a matter of making production grafts to create new wealth, provided that they can easily adapt and contribute to the local ecosystem.

The production redeployment of Mauritius can thus be considered along three lines:

1. **Optimisation** to improve synergies within or between existing sectors;
2. **Adding complexity** to create new product and service lines in existing sectors; and
3. **Establishment** of new sectors within the territory.

What strategy to adopt for this redeployment? Depending on the type of tree to be grown (i.e. the products to be developed) and its situation with regard to the current economic fabric of Mauritius (local demand, numbers of jobs involved, import volumes, proximity with

the island's existing sectors), the three complementary production redeployment strategies detailed in the following sections should be considered:

1. **Implementing an industrial and territorial ecology strategy** to have a more sophisticated production and enhance its environmental performance to optimise results;
2. **Leveraging local entrepreneurship** to develop new products and make the production capital of Mauritius more complex by making the most of product proximities and setting up local innovation hubs; and
3. **Attracting new businesses to the territory** by developing future connections with already established companies in order to add new high value-added sectors into the production fabric of Mauritius with the aim to set up new operations.



**PART 2**

**STRATEGIES TO MAKE MAURITIUS  
MORE RESILIENT**

# I. Fostering industrial and territorial ecology approaches within the local production heritage

Key industrial sectors in Mauritius must **optimise their production processes to promote industrial innovations while striving to protect the environment** in order to continue to support economic and human development on the island. In this train of thought, industrial and territorial ecology (ITE) approaches that pool production tools, resources or knowledge are very promising.

The aim is to optimise and add complexity to product and service lines:

- in sectors of specialisation (with a high number of jobs and bigger coverage than in high-income countries);
- presenting a number of high-quality synergies with existing sectors (high LOCANOMICS® Index); and
- which can tap into significant important market opportunities relating to local demand or exports.

**Our study reveals that opportunities for optimising and adding complexity to the economic fabric through Industrial and Territorial Ecology (ITE) approaches are mainly found in the textile industry, especially in finishing activities, technical textiles and new fibres, but also in the paper-cardboard and chemical sectors (paint manufacturing, detergents, paper packaging, sanitary ware, pharmaceutical products, etc).**

## What is an ITE approach?

An ITE approach is about bringing together local companies that have significant production synergies. The idea is, broadly speaking to pool production tools and use by-products or waste produced on the site as new sources of raw materials. . In addition to pooling tools and flows, know-how can be shared to foster innovation, for example by investing in R&D. Such approaches also help improve the environmental performance of industries by limiting the use of raw materials and associated greenhouse gas emissions.

## How to develop ITE approaches?

For such a dynamic to emerge in Mauritius, it is essential to create and improve networking opportunities to strengthen cooperation between local companies, for example by creating a business leaders' club for each sector, where members would meet regularly as a means to promote local innovation. The ITE strategy will also require securing dedicated funding for investment and experimentation.

## A. Optimising and sophisticating the Mauritian textile production ecosystem

Textile production in Mauritius today is relatively dense but not very complex (simple garments, low value-added fabrics), and relies largely on cotton fibres or fabrics imported over long distances and made from generally intensive crops that use a great deal of water. This production has consequences on ecosystems (water, soil, biodiversity, etc.), but also on the men and women working in this industry, as textile finishing (bleaching, dyeing, finishing, etc.) requires certain chemicals that can be toxic for health and the environment.

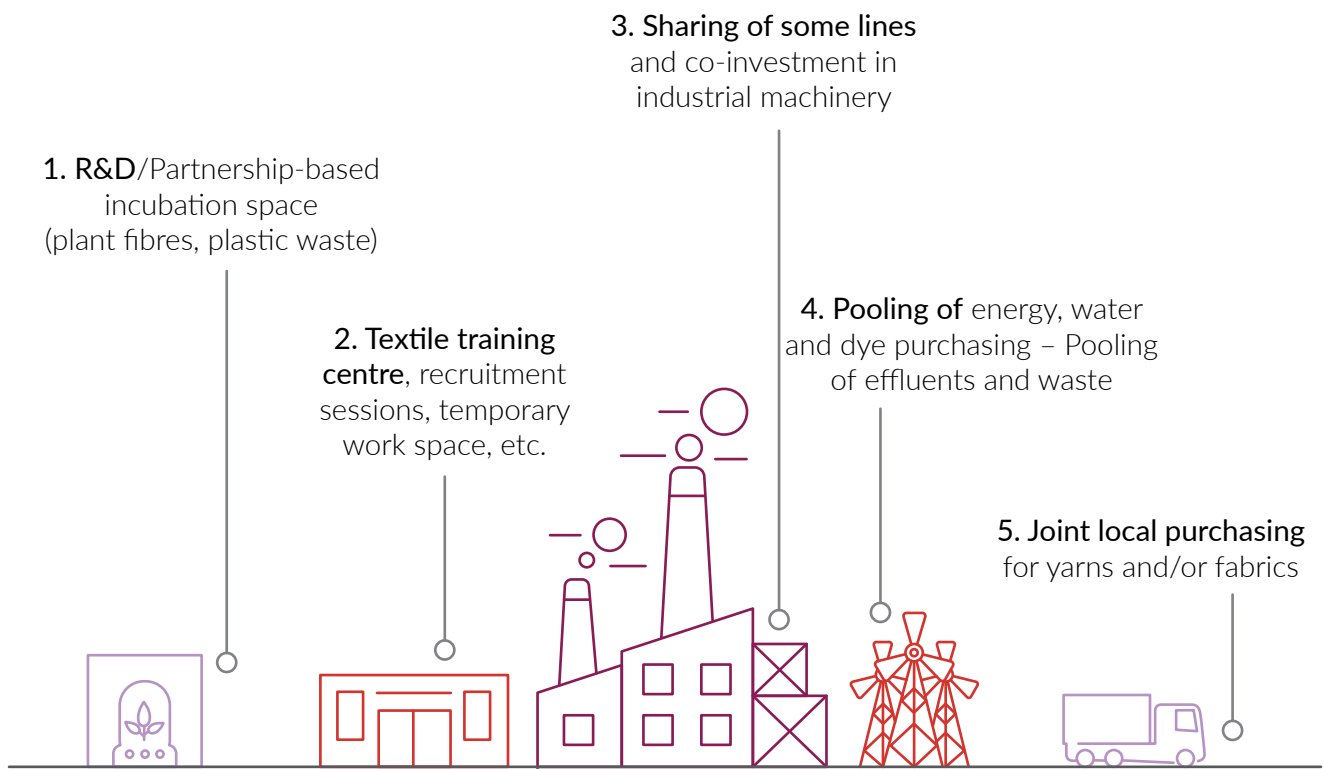
The ITE approach should enable the sophistication of textile production by developing new materials, designs and textile models, but also improve the creation of local or regional circular loops (in the Indian Ocean area), maximising local value creation, enhancing ecological footprint control and reducing supply risk.

### What is the strategy to develop ITE in the textile industry?

The implementation of the ITE approach requires having several textile manufacturing companies on the same premises to pool research and training, identify and build common local alternative sectors (such as recycled plastic or vegetable fibres), carry out joint purchasing, share production lines and co-manage material, water and energy flows. This business combination could involve creating a new dedicated site, or relocating the activities of several local companies to a site that is better suited to ITE requirements (logistics, storage, pooling, etc.) and to their growth.







**PRODUCTION - VALUE ADDING - SALE STEPS**

Production/Adding value to plant fibres and dyes

Adding value in situ to fabric scraps and used textiles

Recovering and adding value in situ to plastic waste

Area for collection of used clothing items

Labels



Weaving lines

Garment factories

Repair shops

Showroom

Temporary venues for local designers

Second-hand sales areas

**A model ITE textile industrial park**

### Synergies to be explored with finishing activities

Proximity between the textile industry and other production sectors can also be developed to stimulate innovation, optimise resource management and reduce the environmental footprint of the manufacturing process.

Various synergies can be enhanced or created by exploring the production proximity between textile finishing and other industries in Mauritius (see the product tree chart below):

- Upstream of the sector in the weaving mills supplying the textiles, which have similar job-related skills (knowledge of fibres, expertise in textile machinery, etc.): e.g. dyeing fibres before weaving saves up to 90% of water;

- Downstream of the sector by examining customer requirements in the clothing, furniture and home textiles sectors;
- With the printing sector due to the apparel printing processes and the use of inks;
- With the paint, ink, detergent, cleaning product and electronic component manufacturing sectors, which have significant similarities in terms of job-related skills (toxic fluid management, chemical component mixing, etc.) and products used (dyes, solvents, coatings, etc.).



Product tree showing the proximity between textile finishing and other products established in Mauritius

## Diversification of technical and industrial textile production

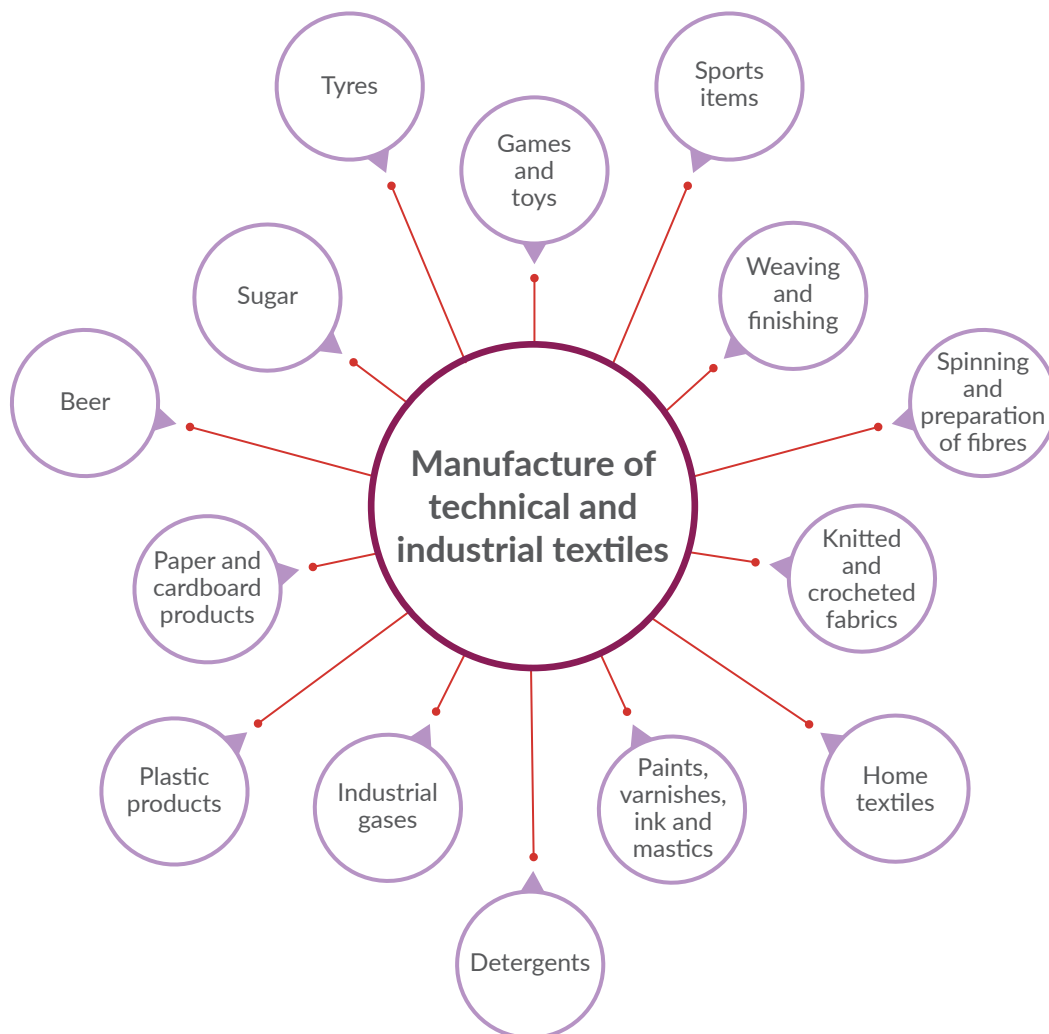
An obvious production jump can be made from the already abundant production of non-woven textiles on the island to more complex production of technical and industrial textiles. Non-wovens can be used in the medical sector (e.g. to make disposable face masks) and in construction for its filtering properties (geotextile filter-fabric for drainage, phyto-purification, etc.), thermal and sound insulation and shock absorption.

Companies wishing to enhance the complexity of their technical and industrial textile manufacturing operations can thus rely on the know-how and inputs of other industries in Mauritius throughout the value chain:

- **Research and development**, through the

presence of chemical engineering capabilities - detergents, paints, industrial gases;

- **The supply of raw materials**, through sugar and beer by-products, and plastics manufacturing;
- **Manufacturing**: spinning, weaving, textile finishing as well as manufacture of plastic and paper products have a similar skills proximity (use of industrial machinery, finishing treatment, etc.); and
- **Marketing**: technical and industrial textiles can be used in the building and construction sector, the manufacture of clothing and home textiles (cushions, boat sails, etc.), as well as the manufacture of sports and play equipment (balls, mats, surfboards, etc.) – all of these sectors also having a proximity of expertise.



Product tree showing the proximity between technical and industrial textile manufacturing and other manufacturing activities in Mauritius

## Relying on new textile fibres

Finally, the textile ITE hub can be open to other industries to foster innovation. For example, Mauritius could diversify and add complexity to

its textile sector by exploring new fibres, made from plant residues, fishery co-products or recycled plastic waste.

## Best practices



©AgraLoop

### A plug-and-play module: The Agralooop, plant residue upcycled into fashion items

Agralooop is a technology developed by the US start-up Circular Systems to create clothing from agricultural residues using sugar cane, banana trees, pineapple leaves, rice straw, flax or hemp seeds. It consists of a modular biorefinery that can be set up quickly in the vicinity of crops or textile factories. Circular Systems has also developed the Orbital technology, which combines organic and recycled textile fibres to produce high-performance technical clothing without chemical finishes.



©Nordic Fish Leather

### Nordic Fish Leather, alternative fibres from fishery by-products

Atlantic Leather is an Icelandic company that produces environmentally friendly fish leather by using fish skin recuperated from the fishing industry. The company also produces leather from other animals (horses, sheep, etc.) but always using food industry waste.

### ECOALF, alternative fibres from recycled marine plastic waste

The creations of the Spanish brand of clothing and accessories, ECOALF are made from 100% recycled and recyclable materials since 2009.

The company uses plastic waste recovered from the Mediterranean Sea. To this end, 200 Valencia Community fishing boats have agreed to systematically collect saturated polyester (PET) waste during their offshore fishing trips.

# ECOALF

## B. Leveraging synergies in the chemicals and paper-cardboard sectors

Two of the high-growth industries in Mauritius have common know-how: **paper-cardboard**, with the manufacture of packaging and household and sanitary products (tissues, toilet paper, cotton pads, etc.), and **chemicals**, such as the manufacture of paints, varnishes, ink and mastics.

Following the recent ban on single-use and non-biodegradable plastic packaging, local demand for paper packaging is likely to increase. Similarly, growth in demand for fast-moving consumer goods and significant imports of household and sanitary paper products<sup>4</sup> suggests that there is a potential local market in this sector.

The “paints, varnishes and similar coatings, printing ink and mastics” sector currently employs more than 2,000 people on the island and continues to import massive amounts of specific items such as synthetic polymers. Construction is a key sector of the Mauritian economy and the middle class aspires to greater well-being in their homes. Mauritius can therefore position itself at the leading edge of innovation in this industry.

### Exploring synergies within an ITE industrial park

**The implementation of an EIT approach within and between these two sectors would allow Mauritius to enhance the complexity of production, design greener industrial processes and develop alternatives to imports.**

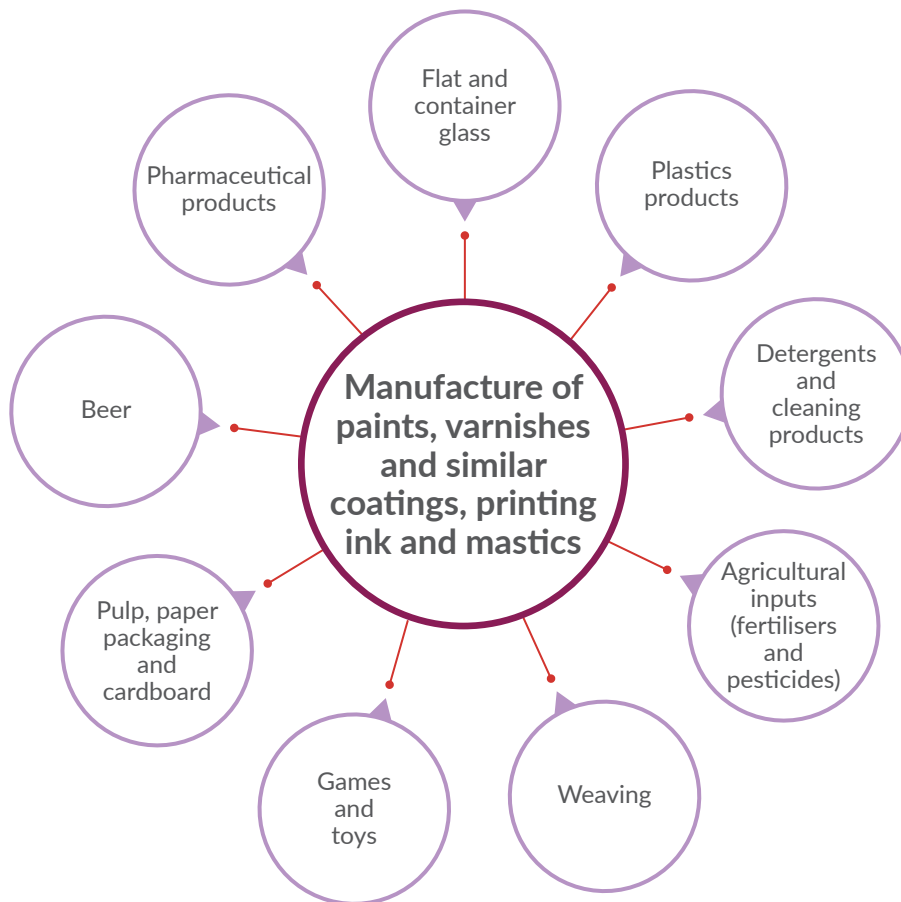
What is the proximity of these two sectors?

The paper and paint industries have similarities in their job-related skills with the manufacture of detergents and cleaning products, which is also highly developed in Mauritius. Paints and detergents also use petroleum-derived chemicals, like plastic products, medicines and phytosanitary products. Finally, paper manufacturing has strong connections with various sectors of the construction industry: construction plastics manufacturing, wood veneer, non-woven textiles, etc.

The example of the Barceloneta ITE hub shows that **these chemical industries can be brought together to better control, recycle and pool the flow of water, materials, energy and toxic products.**

The ITE approach can also foster the development of eco-innovations based on the island’s biotechnology research and development. For example, **a line of paints and varnishes can be developed using bio-based local components**, such as calcium carbonate from fishing by-products (shellfish) that can produce lime, ethyl acetate contained in beer and used as a solvent in varnish, or oil made from lignin derived from plant waste.

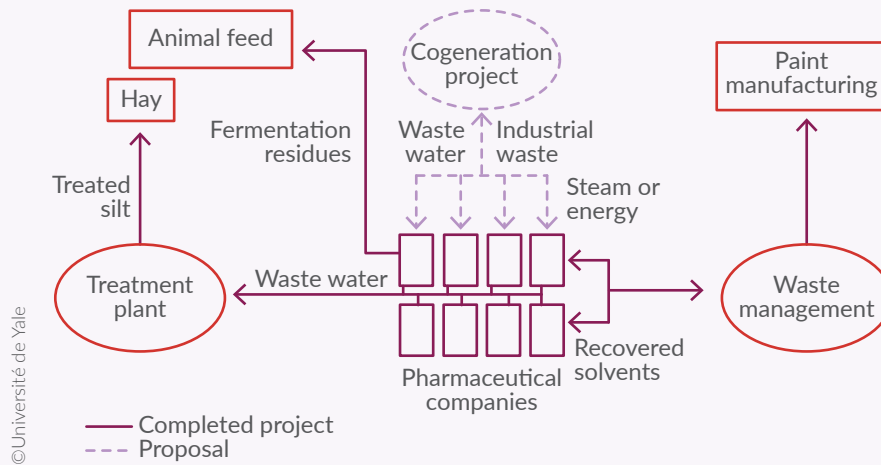
<sup>4</sup> *Industrial Policy and Strategic Plan for Mauritius 2020-2025*, UNCTAD/Ministry of Industrial Development, SMEs and Cooperatives (2020)



Product trees showing the proximity for paper packaging and paper products and for the manufacture of paints, varnishes, inks and mastics with other products manufactured in Mauritius

## Best practices

### The Barceloneta ITE hub for the pharmaceutical industry



The Barceloneta industrial site in Puerto Rico is home to some 15 pharmaceutical companies. They have set up an ITE hub near a more extensive system to address their main concerns, including water supply and waste management. They jointly manage a wastewater treatment plant, steam and energy cogeneration from their wastewater and waste as well as the recycling and supply of solvents to paint manufacturing plants. Agricultural companies have joined the group to turn fermentation residues into animal feed and sewage sludge into hay.



### Algo, a 100% bio-based paint

Following research carried out with the Ecole Supérieure de Chimie de Rennes and the Centre d'Etudes et de Valorisation des Algues, the French company Algo has developed paints entirely bio-based from plant resin, scallop waste and seaweed grown the traditional way on the Brittany coast. With a volatile organic compound (VOC) content ten times lower than the Ecolabel standard, they are just as resistant as conventional paints. The company's product packaging is provided by an institution specialising in the employment of people with disabilities.

## II. Boosting local entrepreneurship through innovation hubs

Mauritius has an exceptional entrepreneurial culture which can and must be used to explore new areas of the product forest of Mauritius, starting with sectors that have a high degree of proximity with the island's key industrial sectors, notably through the creation of innovation hubs..

To achieve this, priority must be given to the emergence of companies aiming to produce goods or services:

- that are not produced locally or on a small scale (few or no jobs);
- with a large number of high-quality synergies (high LOCANOMICS® Index) with well-established sectors of the Mauritian economy (high coverage in terms of product proximity); and
- with local market potential (medium to zero coverage, high priority in high-income economies)

Such opportunities are primarily in the food sector (prepared meals and dishes and high value-added processed products) and in the repair, reuse and recycling sectors.

### What is an innovation hub?

An innovation hub is when various job-related skills that can be reused and upcycled are regrouped on the same site to devise new products and services. A fertile ecosystem must be created to encourage the genesis and development of start-ups: peer-to-peer mentoring and coaching, smart and shared production tools, administrative and legal support functions, easier access to funding, etc. An innovation hub must have a specialist area to encourage competition and cooperation among entrepreneurs. For example, it may be specialised in the type of product or service to be created (e.g. packaging reuse services), or a sector from which innovations are to emerge (e.g. sugar cane).

### How to support local entrepreneurship?

Entrepreneurship can be promoted in three key ways: e.g. funding subsidised loans following calls for proposals to support entrepreneurship, the provision of infrastructure (coworking spaces, design workshops, etc.) and the development of an entrepreneurship culture in secondary and higher education (hackathons, collective projects, university incubators, etc.).

### A. An innovation hub focused on agricultural and food innovation opportunities

The food sector is already relatively well developed in the Mauritian product forest with a few dominant trees such as sugar cane cultivation and the manufacture of sugar, beer, pasta and processed fishery products. Mauritius could build on these strengths to diversify and add sophistication to food products manufactured on the island, thereby improving its food self-sufficiency, but also exploring opportunities to add value to agricultural products (such as bagasse) in other productive sectors.

Mauritius could harness the skills of its food industry to develop high value-added products, which are currently insufficiently or not produced at all:

- prepared meals and dishes;
- blended (for infants) and dietary foods;
- fruit and vegetable preparations, including fresh juice that may be made from unsold products; and
- condiments and seasonings.

This diversification could leverage existing know-how in the processing industry, which tops the exports of Mauritius (pasta, fishery products, etc.), sugar and beverage (rum, beer, soft drinks, etc.) production, tourism-related food services, packaging activities, as well as nutraceutical research and development (food supplements, superfoods, etc.).



## Exploring new avenues for bagasse

Sugar cane cultivation is a historical feature of Mauritius and is still grown on most of the island's arable land. To generate new income for sugar cane producers while contributing to reduce greenhouse gas emissions, bagasse (a fibrous residue from sugar cane crushing) has been used for the past ten years to produce energy and has supplied part of electricity consumed by the country.

**With the deployment of a specialised hub to add value to sugar cane (following the example of the Iceland Ocean Cluster), new opportunities could be developed from bagasse, including:**

- the manufacture of food packaging (cellophane, biodegradable bottles, etc.) – an interesting opportunity given the economic performance of packaging activities and the recent ban on non-biodegradable plastic food packaging;
- the manufacture of textile fibres (biodegradable fibres, rayon viscose, cellulose esters, etc.);
- the manufacture of chipboard for the construction sector; and
- mushroom cultivation, like what is currently being done in Martinique.



## Best practices



### An innovation hub for the fisheries sector, Iceland Ocean Cluster

The Iceland Ocean Cluster is based in Reykjavik and promotes the emergence of start-ups specialising in fish processing and adding value to fisheries by-products for uses other than food: textiles, medicine, cosmetics, etc. To this end, it brings together project developers and local companies in the maritime industry (events, learning expeditions, etc.) and supports start-ups within an incubator providing them with various resources and services (consulting, R&D, sharing of expertise, networking, etc.).



Source : Internet

### Brooklyn FoodWorks, an incubator for food start-ups made in Brooklyn

Brooklyn FoodWorks is a publicly funded but privately operated 10,000 m<sup>2</sup> incubator with the aim to provide mentoring, consulting, special events and comprehensive programming for food entrepreneurs. The main service offered by Brooklyn FoodWorks is a low-cost kitchen space (from \$300/month for 24/7 kitchen access with personalised monitoring). Nearly 120 entrepreneurs currently use these services. Almost 400 new products have been introduced since the launch of Brooklyn FoodWorks, including ZEST Y, POP PASTA and MALAI ICE CREAM.



© NoFilter

### NoFilter, 100% raw local juice

No Filter is a French start-up created in 2017 to produce juice from fruit and vegetables that farmers are unable to sell because they do not comply with distributors' specifications. No Filter uses them to make fresh handmade juice without additives through a local food system and long-term remuneration contracts with farmers. The brand thus ensures complete transparency in the manufacture of its products. Production residues are composted and the use of glass bottles avoids plastic pollution. To date, 15 tonnes of unsold fruit and vegetables have been recycled.

## B. Repair, reuse and recycling innovation hubs

Current sustainable development challenges and society's aspirations for a cleaner island are the perfect opportunity for the development of local entrepreneurship in the Mauritian repair (machines, electronic equipment, etc.), reuse (deposit systems, building dismantling, etc.) and recycling (plastic, metals, textiles, cardboard, etc.) industries, leaning on the country's current product forest.

**The recycling sector can benefit from product proximity with hazardous and non-hazardous waste collection services, wastewater treatment, dismantling of wrecks and the manufacture of**

**machinery for the food industry. Enhancing this sector would reduce the island's reliance on iron and steel imports<sup>5</sup>, the pollution of local ecosystems and the extraction of new raw materials.**

Furthermore, the ban on single-use plastic packaging is a great opportunity to encourage the population to develop innovative ideas to promote reuse in the packaging industry. A reuse innovation hub could bring together existing skills in the import-export sector (intermediaries in wholesale trade, auxiliary transport services, warehousing and storage, etc.).



<sup>5</sup> *Industrial Policy and Strategic Plan for Mauritius 2020-2025, UNCTAD/Ministry of Industrial Development, SMEs and Cooperatives (2020)*

## Best practices



Source : Internet

### Le Booster du Réemploi (“The Reuse Booster”)

Le Booster du Réemploi (“The Reuse Booster”) was created in 2020 and brings together more than 30 French master builders with the aim of accelerating the reuse of materials from dismantling operations in the construction sector: partitions, joinery, plumbing, locksmithing, subfloors, suspended ceilings, doors, lighting, furniture, etc. An online platform will centralise and standardise the needs for materials on the master builders’ major sites in order to better structure the demand, and thus create a threshold effect that will make it possible to generalise their use – and devise new uses.



© MTB

### The BOX system, a modular recycling plant

MTB has developed the BOX system, a modular mini-recycling plant that can be easily installed on industrial sites to recycle their hazardous and non-hazardous waste: power cables, tyres, plastics, etc. It produces a new, high-quality raw material that can be immediately reused.



© Loop

### Loop, a shared deposit system for zero-waste shopping

Loop is an e-commerce platform founded by a small waste recycling business, TerraCycle and 25 multinational food companies to enable consumers to find a zero-waste version of their favourite products with the implementation of reusable containers and a shared deposit system. After consumption, the containers are recovered, washed and redistributed by TerraCycle to the food companies’ factories.

## How to seize these opportunities? Initial avenues for action for Mauritian entrepreneurs.

In order to take advantage of the above local production potential, Mauritian companies will have to deepen the exploration of their value chains and develop their ecosystems. This approach can be broken down into several components and summarised in ten major actions:

- 1) **Better understanding the value chains on which the company relies, especially upstream, in order to initiate a double-sourcing approach** and identify local suppliers or alternatives for its most strategic inputs.
  - **ACTION 1 – Setting up a local purchasing club** like Lab Pareto, which enables large groups (Allianz, CA, Bouygues, BPCE, SNCF, etc.) and local SMIs/SMEs in France to share experiences to enable the local purchasing share of large companies to reach 20% of total purchase, through better information to SMIs/SMEs on their direction and needs.
  - **ACTION 2 – Creating a Mauritian marketplace** like Maker's Row, an online marketplace that aims to make manufacturing in the US more accessible and easier for companies by connecting them with US manufacturers. The platform currently brings together 10,000 manufacturers and 100,000 brands, and has enabled the manufacture of 2 million products. MCB is already working on setting up Punch, a marketplace designed specifically for SMEs in Mauritius to be launched in 2021 in order to facilitate the pooling of resources among Mauritian entrepreneurs.
- 2) **Interacting with players in the same sector as the company or in sectors with which it has strong proximity** in terms of skills or technologies, and gradually creating a climate

of trust conducive to collaboration: exchange of know-how, pooling, etc.

- **ACTION 3 – Launching a B2B exchange platform** like France Barter, which enables businesses to exchange goods and services without cash outflow. Companies connect with each other via the platform and transactions between customers and suppliers are carried out using a virtual currency, Bart€r.
  - **ACTION 4 – Pooling industrial tools and resources** in the same spirit as Factoryz, a platform for sharing human and material resources between companies, which allows each of them to search for and access human and material resources, space and materials in companies within their territory and thus optimise the latter's production by using their available resources in case of low activity.
- 3) **Developing the company's innovation strategy through opportunities offered by local synergies: industrial ecology, diversification through product proximity, saving on services, micro-production, etc.**
    - **ACTION 5 - Joining a local innovation club** like Club Noé, an association for all economic players in the Hauts-de-France Region who are interested in the economy of functionality and cooperation. The Club promotes networking and the upskilling of its members through workshops and support. Members can participate in working groups to co-create new solutions (housing, sustainable food systems, support, etc.).
    - **ACTION 6 – Deploying demonstrators of plug-and-play solutions** (small mobile and modular production units) through setting up an event, "campus" or "village" to showcase several plug-and-play concepts, and partnering with start-ups or large corporations offering this type of solution.

- **ACTION 7 – Developing integration structures focused on production activities**, especially in logistics, the circular economy or subcontracting. The Archer Group has developed five industrial subcontracting workshops in France with around 100 people, three quarters of them through supported employment schemes, in jobs that could have been relocated.
- **ACTION 8 – Assessing the strength of its business model in the face of future crises, particularly climate change** (changes in the price of fossil fuels, carbon taxing), and **developing its value proposition** by exploring opportunities offered by the new climate economy (renewable energy, vegetarian diets, energy savings, clean mobility, etc.).

#### 4) **Joining forces to provide training and dedicated financing instruments while supporting the diversification of the island’s production**

- **ACTION 9 – Creating an investment fund for the diversification of the Mauritian economy**, similar to the Herrikoa investment fund, which has nearly 5,000 shareholders, including individuals, local authorities, financial institutions and a number of local businesses. This financial tool for local solidarity-based private equity has provided support to more than 360 companies in the Basque Country for a total capital investment of €18 million.
- **ACTION 10 – Developing and taking new training programmes on the challenges of distributed manufacturing and micro-production** like the ARTEM (“Art, Technology and Management”) Alliance, a pioneering initiative set up by

the three “écoles” in Nancy linking creation, new technologies and strategy, or courses on **the circular economy open to people alienated from the workplace** or undergoing retraining, following the example of the Low-tech Skol, a unique school in France to train multi-skilled and employable individuals in any type of sector: large corporations, small or mid-sized businesses, local recycling businesses, etc.

### III. Attracting new businesses to the country

Where parts of the forest are still unplanted, new seeds may have to be sourced and offered the best conditions for growth through a thriving and collaborative ecosystem. An effective way to diversify the Mauritian production fabric is thus to bring in foreign companies producing goods that are not currently made locally by putting forward the quality of the Mauritian economic ecosystem.

**Such an approach would be particularly relevant for the emergence of industries:**

- to produce goods not manufactured in Mauritius (no jobs):
- to cater for unmet local demand (zero coverage) or export potential; and
- enjoying a number of good quality synergies with the local production fabric, thus relevant for the company wishing to set up business in Mauritius (high LOCANOMICS® Index).

**Our study found that this approach could enable the establishment in Mauritius of a sector for the manufacturing of perfume and toiletries, as well as products and services related to the new climate economy: monitoring instruments, renewable energies and environmental certification support.**

**What strategy should be adopted to encourage such industrial grafts?**

To make the grafts relevant, foreign investment should preferably be directed towards targeted, reasoned and selective industries. To convince foreign companies of the interest and feasibility of setting up business in Mauritius, an attraction policy could be based on restructuring the “Invest in Mauritius” brand, including the creation of a business development book promoting the Mauritian market and potential local synergies for investors. This book would serve as a promotional tool to proactively approach targeted international companies and convince them of the interest of capturing opportunities existing in Mauritius.

**Why rely on the plug-and-play approach?**

The plug-and-play approach seems ideal for quick grafting with little investment. It involves introducing small, mobile and modular units, like Lego bricks, into the Mauritian ecosystem. This approach has the advantage of enabling experimentation with small-scale productive hybridisations before considering larger-scale deployments, and dealing differently with land and production capabilities, with emphasis on decentralisation and adaptation to the needs of the territory.

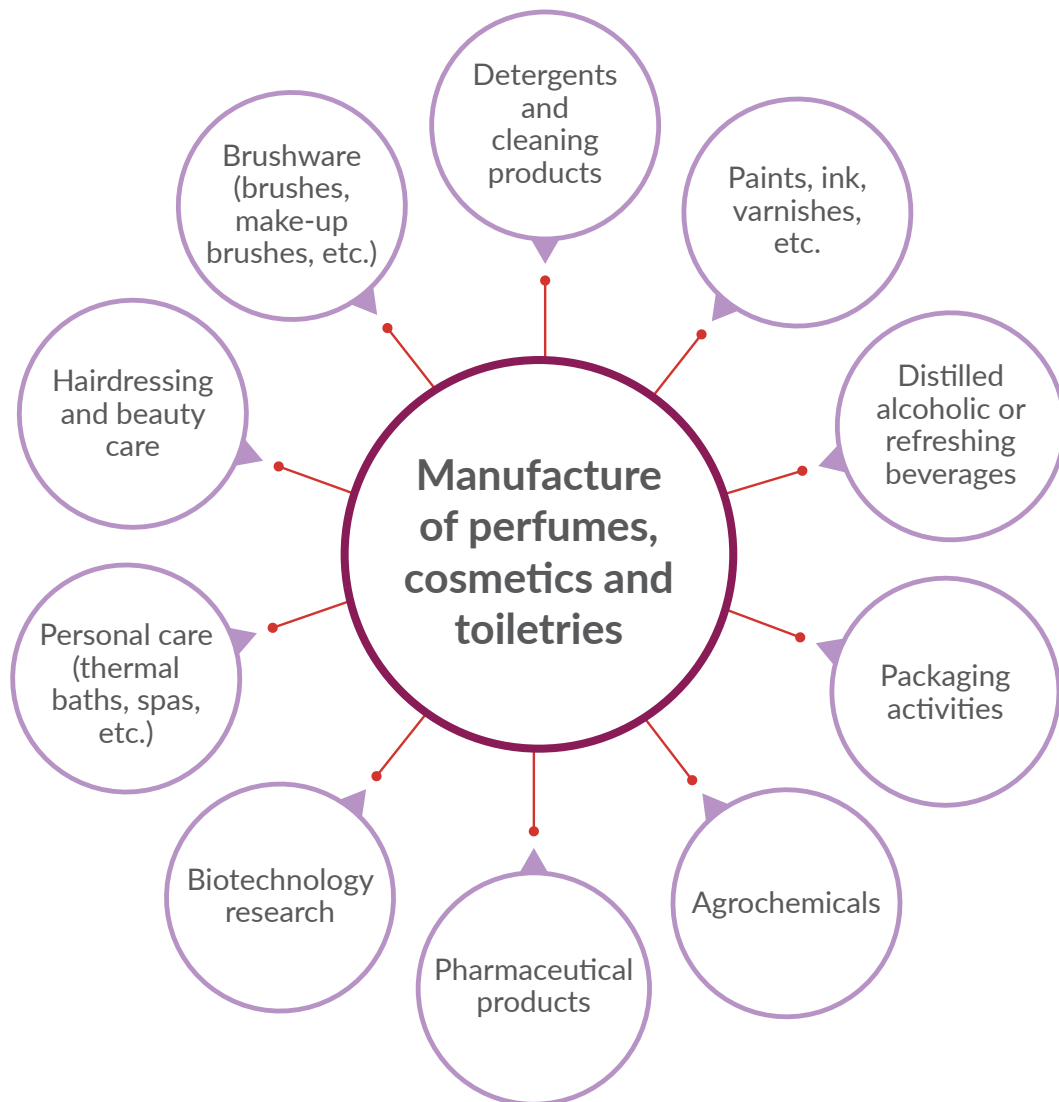


## A. Developing the perfume, cosmetics and toiletries sector

Mauritius produces few perfumes, cosmetics (beauty products and make-up) and personal care products (toothpaste, shower gel, shampoo, etc.). It is however a sector with strong potential with regard to the tourism sector, local demand trends and the added value of these products. There could thus be opportunities for perfumes, cosmetics and other toiletries with individuals, hotels and beauty centres (sauna, thermal baths, health centres, etc.) as well as hairdressing salons.

The Mauritian production ecosystem can easily accommodate grafts in this sector given

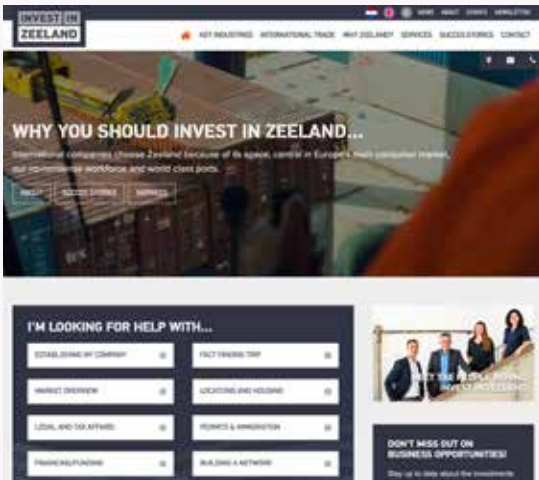
its product proximity with advanced chemistry (biotechnology R&D, pharmaceutical products, agrochemicals, etc.) and small-scale chemistry (paints, detergents, etc.). The beverage industry and packaging activities also bring value to production packaging. The emergence of the sector is an opportunity for development for the body care sector, e.g. through the manufacture of brushes (toothbrushes, hairbrushes, etc.) and make-up brushes.



Product tree showing the proximity between the perfume, cosmetics and toiletries sector and activities in Mauritius



## Best practices



### Symbiosis 4 Growth, a directory to foster industrial synergies

The Smart Delta Resources programme is an initiative involving a group of companies in the South-Western Dutch province of Zeeland to attract companies that could benefit from the existing ecosystem. With the motto, “Symbiosis 4 Growth”, the initiative’s website lists the companies in the region and their main inputs, products and wastes to enable the identification of potential synergies with a view to forming industrial ecology loops in order to reduce the extraction of raw materials and the energy consumption of local businesses.



©StepOne

### Step One, natural and solidarity-based cosmetics in a ready-to-dissolve powder form!

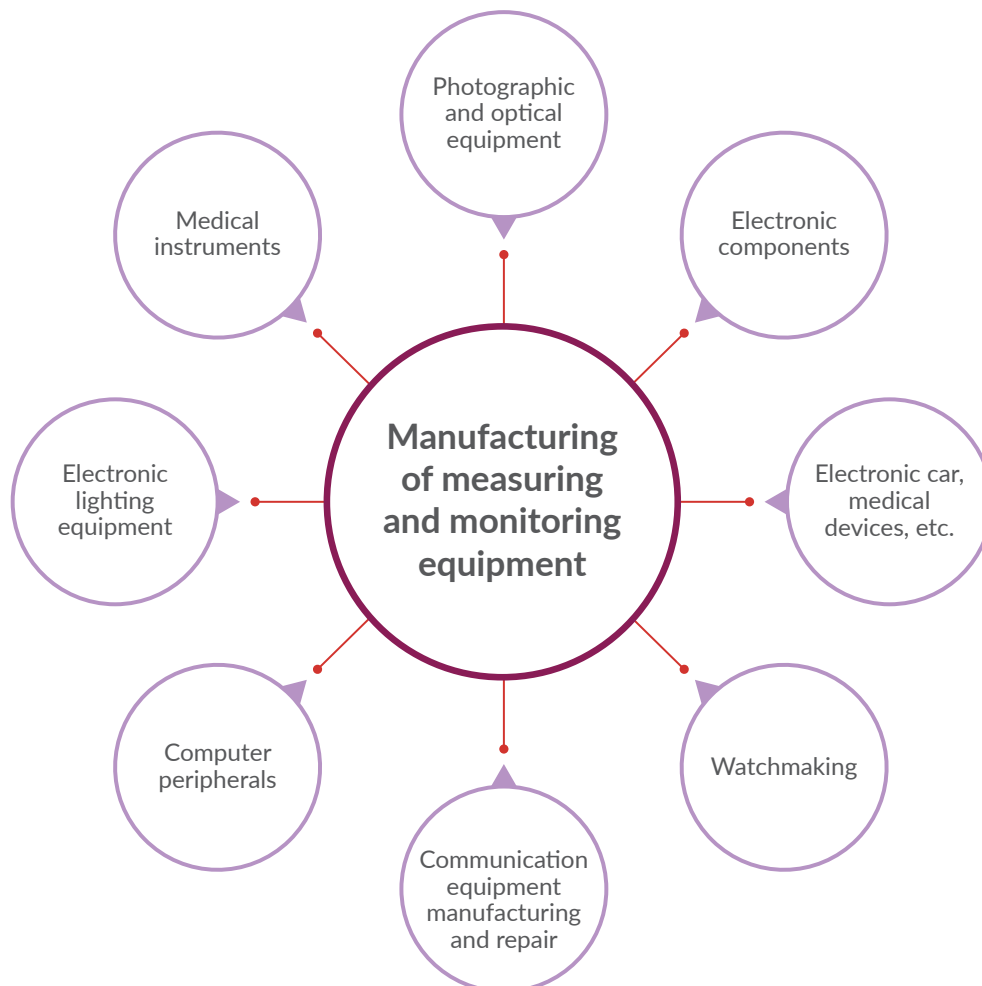
The French start-up, Step One has developed shower gels, shampoos and hand wash in a ready-to-dissolve powder form to reduce water transportation and the use of plastic bottles in cosmetics. The bottles initially supplied are made from recycled PET and the powder refills are packaged in compostable and recyclable bags. These non-animal tested cosmetics with 99% natural products from Europe, manufactured in France and packaged by people with disabilities are a sustainable alternative that also reduces transport costs and storage volumes.

## B. Attracting investment in the new climate economy

To achieve climate neutrality by 2050, in line with the recommendations of the Klima Neutral 2050 report<sup>6</sup>, it would benefit Mauritius to attract foreign investment and develop local expertise in the **renewable energy and energy efficiency sector**. In order to address the island's land use optimisation issues, companies developing small energy production units that take up little space and fit easily into the landscape could be targeted.

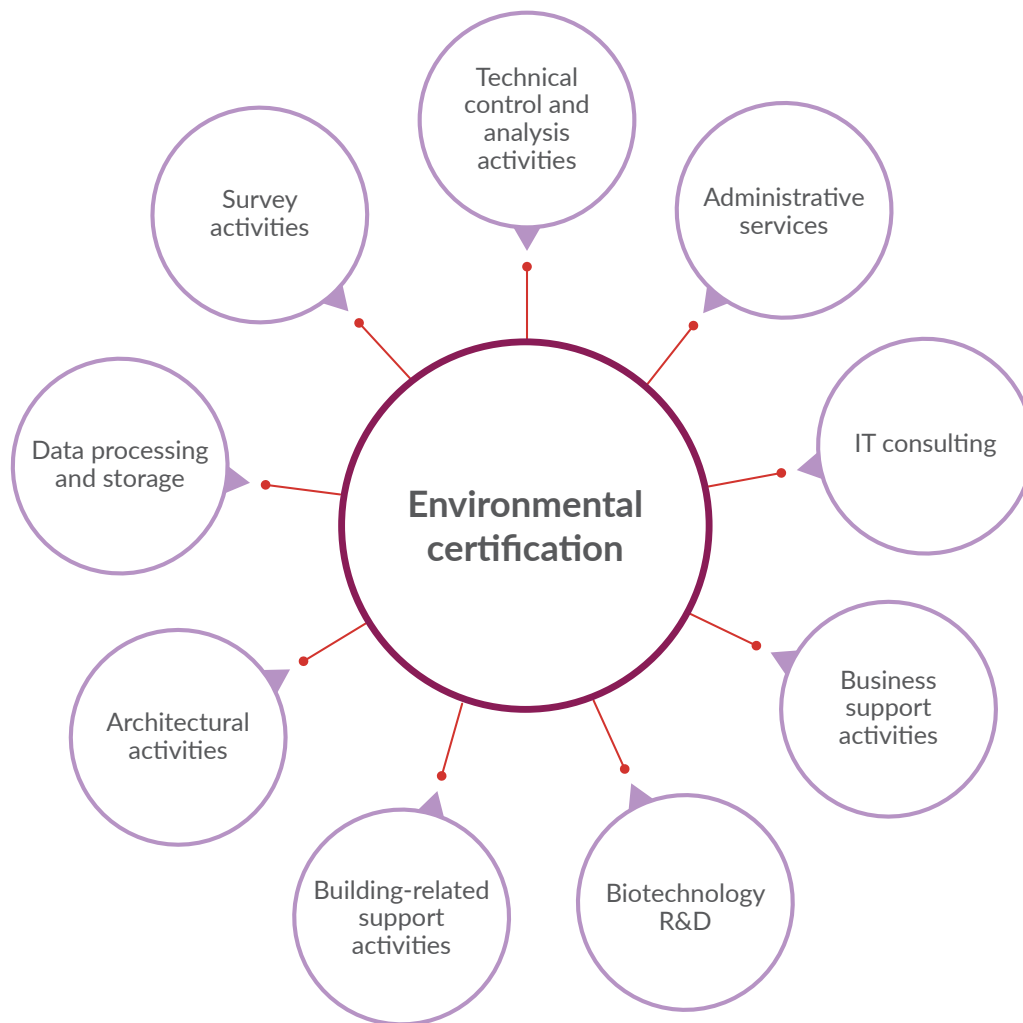
The island is also very well positioned to set up a **sector for the manufacture of environmental**

**monitoring equipment** (thermostat, power consumption measurement, data recording and transfer, measurement of the concentration of pollutants in the water or air, etc.). Foreign companies could **leverage existing skills and products on the island for the manufacture of medical devices (an export-focused industry), photographic and optical equipment, the electronics sector (electronic parts, materials for communication and automobile equipment, etc.) and watchmaking (watches, etc.)**.



Product tree showing proximity between monitoring devices and the production fabric of Mauritius

<sup>6</sup> Klima Neutral 2050, a study conducted by Utopies for MCB (2020), available on the website: [www.klima.mu](http://www.klima.mu)



**Product tree showing proximity between environmental certification sector and the production fabric of Mauritius**

Finally, it is important for the island to acquire environmental performance consulting and assessment skills. An environmental certification sector could easily be added to the Mauritian ecosystem because, despite a certain lack of scientific and engineering skills, similar know-how can be found in other activities:

technical control and analysis (for environmental performance measurement), architecture and building-related support activities (for sustainable building consultancy), data processing and storage as well as biotechnology R&D (for knowledge in biochemistry, agronomy and ecosystem sciences).

## Best practices



©Eco-tech Ceram

### **A plug-and-play module: The Eco-Stock, an accumulator to recycle industrial heat**

Based on the observation that 20-40% of industrial energy is dissipated as heat during manufacturing, Eco-Tech Ceram has developed the Eco-Stock, a container to store this heat (2MWh) at 600° and restore or convert it into industrial cold or electricity on site. It can also be transported to another site.



© Uneole

### **Uneole, a made-in-local wind turbine**

Uneole has developed a wind turbine from almost 100% locally sourced recycled and recyclable materials in order to avoid pollution from the extraction of raw materials to produce renewable energies. This silent and average-sized (3.85m high x 2m wide) device can be integrated into an urban setting by being placed on building roofs to avoid utilising additional land and cause disturbance to the fauna and flora.

# CONCLUSION



There are many opportunities for the Mauritian economy and businesses of all sizes and sectors to optimise their production processes, add complexity to their production and create new opportunities. Some of them are already in place, the fruit is ripe and waiting to be picked on plots that are already in use in the product forest.

Business cooperation in the fields of innovation, training and the circular economy will be the key to leveraging these opportunities. Others will require application of the power of entrepreneurship and the agility of Mauritian enterprises to explore new strategic sectors for the island to reduce its dependence on imports and gradually lessen its environmental footprint. Moreover, the forest is large enough to support new plants, with know-how that should take advantage of the Mauritian dynamism, but also benefit local companies and gradually add sophistication to the economic fabric, enhancing Mauritius' reach in the Indian Ocean area.

It is time for Mauritian enterprises to take radical action to diversify the island's production fabric. It is time to use the creative and entrepreneurial spirit, so inherent to Mauritius, and see the current crisis as the tipping point to build a more resilient and thriving local economy down the road.

**Together, let's create a resilient and carbon neutral Mauritius!**

## APPENDIX (See commentaries, reading keys and definitions of indicators on page 40)

NACE Code	Product or Service
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### Textiles

1310	Preparation and spinning of textile fibres
1320	Weaving of textiles
1330	Finishing of textiles
1395	Manufacture of non-wovens and articles made from non-wovens, except apparel
1396	Manufacture of other technical and industrial textiles

### Chemicals and Paper-Cardboard

2030	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
2041	Manufacture of soap and detergents, cleaning and polishing preparations
2110	Manufacture of basic pharmaceutical products
1722	Manufacture of household and sanitary goods and of toilet requisites
1721	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard

### Food

1081	Manufacture of sugar
114	Growing of sugar cane
1020	Processing and preserving of fish, crustaceans and molluscs
1105	Manufacture of beer
1073	Manufacture of macaroni, noodles, couscous and similar farinaceous products
1085	Manufacture of prepared meals and dishes
1039	Processing and preserving of fruit and vegetables
1032	Manufacture of fruit and vegetable juice
1084	Manufacture of condiments and seasonings
1086	Manufacture of homogenised food preparations and dietetic food

### Waste Collection and Treatment

3811	Collection of non-hazardous waste
3821	Treatment and disposal of non-hazardous waste

### Perfumery, Cosmetics and Toiletries

2042	Manufacture of perfumes and toilet preparations
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### Manufacture of Environmental Monitoring Equipment

2651	Manufacture of instruments and appliances for measuring, testing and navigation
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	LOCANOMICS® Index	Number of Connections	Quality of Connections	Local Employment	Rank	Coverage
	19	5	3.90	3,388	458	5064%
	53	14	3.82	543	383	445%
	27	8	3.35	2,035	477	3740%
	75	21	3.56	428	465	694%
	95	26	3.66	0-30	242	< 5%
	62	20	3.09	706	256	236%
	72	25	2.89	999	338	596%
	4	2	1.90	111	121	15%
	40	12	3.33	416	345	256%
	74	25	2.96	469	123	62%
	27	7	3.84	1,613	376	1272%
	27	8	3.39	6,998	394	6286%
	3	1	2.82	7,074	305	3315%
	28	8	3.47	1,426	417	1516%
	32	8	4.02	716	435	899%
	32	7	4.56	153	97	15%
	32	7	4.61	0-30	156	< 5%
	36	11	3.24	0-30	412	< 5%
	27	6	4.56	0-30	439	< 5%
	30	7	4.31	0-30	468	< 5%
	27	8	3.35	156	89	14%
	34	10	3.39	30	232	8%
	33	11	2.97	0-30	130	< 5%
	28	10	2.84	0-30	115	< 5%



NACE Code	Product or Service	LOCANOMICS® Index	Number of Connections	Quality of Connections	Local Employment	Rank	Coverage
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### Other Key Production Areas

7211	Research and experimental development on biotechnology	7	2	3.26	633	96	38400%
2221	Manufacture of plastic plates, sheets, tubes and profiles	58	18	3.22	1,789	169	326%
4611	Agents involved in the sale of agricultural raw materials, textile raw materials and semi-finished goods	161	39	4.12	9,218	528	42286%
4110	Development of building projects	29	9	3.19	14,554	142	2219%
5510	Hotels and similar accommodation	33	9	3.72	28,807	23	823%

### Reading Keys:

NACE Code	Product or service code in the Statistical Classification of Economic Activities in the European Community
LOCANOMICS® Index	Product proximity index of the product or service (number of connections x quality of connections)
Number of Connections	Number of locally manufactured products and services with which the product or service in question is related
Quality of Connections	Quality of the product proximity with other products or services in terms of professional skills or inputs in the production process
Local Employment	Number of existing jobs in Mauritius for manufacturing of the product or service
Rank	Weight of production in terms of employment in high-income countries
Coverage	Ratio of the number of jobs in the Mauritian economy to the number of jobs in a high-income country

\* Renewable energies and environmental certification are not included in the table because these products and services have no link to sectors identified in the INSEE's classification. They have been modelled via other sectors (e.g.: other business services).

