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## Article

# Sustainable Islamic financial engineering with special reference to Gulf Cooperation Council's economies

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# SUSTAINABLE ISLAMIC FINANCIAL ENGINEERING WITH SPECIAL REFERENCE TO GULF COOPERATION COUNCIL'S ECONOMIES

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## ABSTRACT

**Purpose** — This paper explores how Islamic economics and finance, when developed as an embedded framework for regenerative development in line with *maqāṣid al-Sharī'ah* (the objectives of Islamic law), can facilitate the design of sustainable contracts and Islamic financial engineering. This framework provides a mechanism to achieve the paradigm shift advocated by Islamic finance scholars to accommodate the sustainability agenda into the practical applications of Islamic economics and finance. The paper specifically focuses on the Gulf Cooperation Council's (GCC) economies.

**Design/Methodology/Approach** — This study employs an analytical research approach to evaluate the compatibility of Islamic social and commercial finance with sustainability objectives. The analysis is primarily qualitative and relies on the One Earth Framework proposed by Simpson *et al.* (2021) to structure the assessment of opportunities and challenges related to sustainability that Islamic economics and finance in the GCC region can help address.

**Findings** — The paper highlights the potential of Islamic economics and finance as an embedded framework to address sustainability challenges in the GCC countries. By examining the capacity of Islamic finance to accommodate sustainability pathways, it elucidates avenues for integrating sustainable practices within Islamic financial contracts and institutions.

**Originality/Value** — One of the key contributions of this paper is the introduction and development of Islamic economics and finance as an embedded framework. This pioneering concept not only lays the groundwork for a practical mechanism but also signifies a fundamental step in realising the paradigm shift within Islamic finance. This transformative approach enhances the relevance and effectiveness of Islamic finance in fostering sustainability, marking a significant advancement in the field.

**Research Limitations** — While the study provides valuable insights, it primarily follows an analytical approach and does not involve quantitative analysis. It serves as a starting point for further research on the integration of sustainability objectives in Islamic finance.

**Practical Implications** — The paper suggests practical implications for Islamic finance stakeholders, highlighting the potential for sustainable contract design and financial engineering.

**Keywords** — Islamic finance, Islamic financial engineering, Natural capital, Regenerative development, Sustainable contract design

**Article Classification** — Conceptual paper

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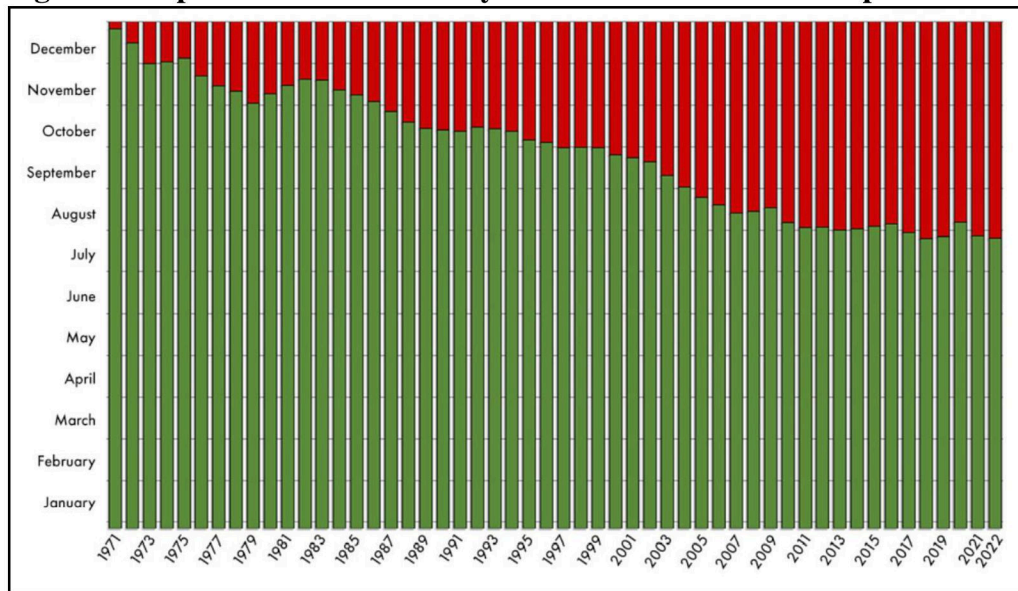
## INTRODUCTION

Sustainability studies need to pivot natural capital. Contemporary dominant economic theories, corporate models, and policy prescriptions tend to overlook natural capital ecosystems and non-renewable and renewable natural resources. This is despite the fact that natural capital is inextricably linked to the global drive for sustainable development (pursued via changes in education and legal frameworks) to limit harm to ecosystems and enable clean alternatives via policy change and disruptive technologies. The United Nations (UN) has designated the period 2021–2030 as the UN decade for ecosystems restoration.

A telling metric of the impact of human activities on the earth's natural capital is Earth Overshoot Day. Calculated by the Global Footprint Network, this day represents the point at which the earth's biocapacity aligns with humanity's ecological footprint. Earth Overshoot Day is determined by dividing the planet's biocapacity (the annual ecological resources the earth can provide) by humanity's ecological footprint (our demand) and multiplying by 365, the number of days in a year.

**Figure 1** illustrates the alarming and systematic degradation of the earth's natural capital. Natural capital encompasses the earth's natural resources and ecosystems that provide essential elements such as clean air, water, food and raw materials. When the demand surpasses supply, natural capital faces stress, leading to biocapacity depletion, loss of biodiversity and disruptions in ecosystems on an ever-increasing scale.

**Figure 1: Impact of Human Activity on the Earth's Natural Capital**



Source: Global Footprint Network (2024a)

The National Footprint and Biocapacity Accounts compile global ecological footprint and biocapacity indices annually. The latest data utilises 2018 data and United Nations statistics and employs the Global Carbon Project's data to estimate this year's Earth Overshoot Day. Earth Overshoot Day's precise date is less crucial than understanding the ecological overshoot's

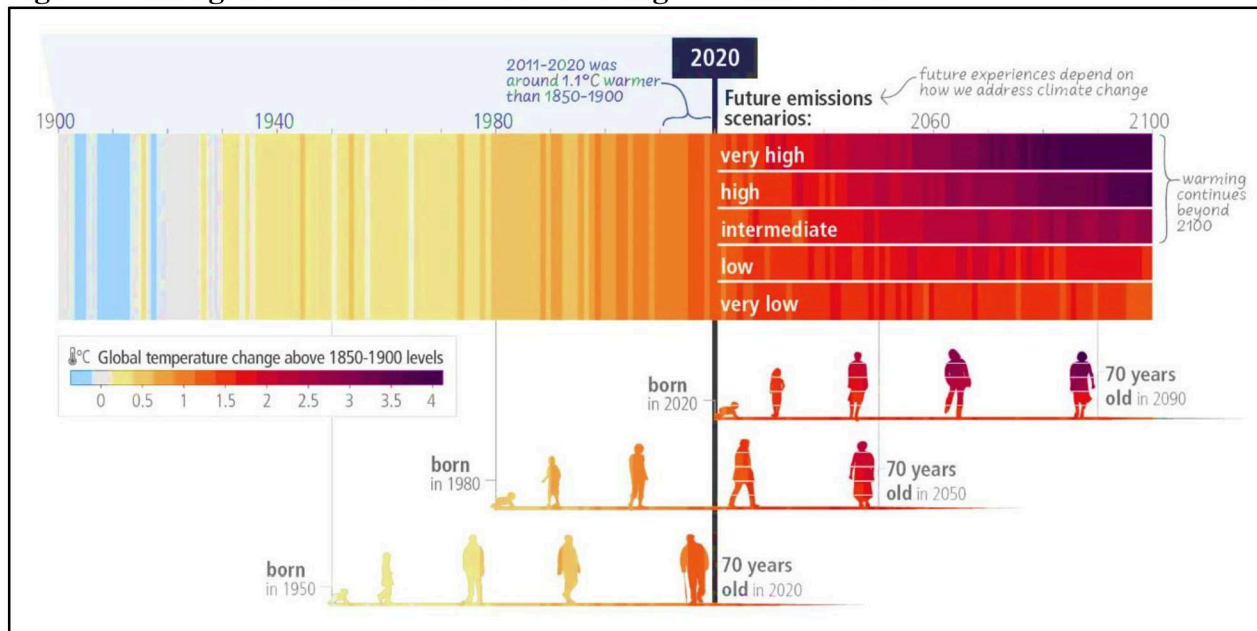


magnitude and its persistent year-over-year increase. The timeline from 1971 to 2022 in **Figure 1** demonstrates the Earth Overshoot Day's gradual advancement (excluding 2020, an anomaly due to the COVID-19 pandemic), signifying humanity's overuse of the earth's natural capital.

The most significant universal negative externality of human economic activities, transferred to future generations, is the loss of natural capital. **Figure 2** provides an overview of the intergenerational transmission of negative externalities under various climate scenarios (1.5°C, 2°C, 2.5°C, 3°C, and 4°C) from the 1900's to the years beyond 2100. Notably, Nordhaus (2018a) concludes that limiting global warming to 2 degrees Celsius (2°C) is unattainable, as suggested in his Nobel Laureate Lecture (Nordhaus, 2018b), recommending a focus on 3°C and beyond and the development of adaptive strategies.

The degree of warming by the year 2100 will have profound effects on 70-year-olds born in 2022. With a 1.2°C increase by 2023, global climate scenarios indicate that at 1.5°C, the world would witness significant climate refugees and altered lifestyles due to changing weather patterns and extreme events. However, at 2°C, extreme weather events would intensify, leading to the loss of ecosystems and biodiversity, declining agricultural productivity (causing food shortages), water scarcity and public health issues such as heat stress and disease outbreaks. At 2.5°C, 3°C, and 4°C, the incidence of extreme weather events, ecological collapse and biodiversity loss would escalate, triggering accelerated food and water shortages, displacement, conflicts, and humanitarian crises. Adaptation to rapid changes would lead to heat-related illnesses, infections, and mental health challenges, further threatening public health.

**Figure 2: Intergenerational Transmission of Negative Externalities**



Source: Intergovernmental Panel on Climate Change (IPCC) (2023, p. 7)



Crucially, **Figure 2** highlights that the baby boomer generation was the first to generate negative externalities on such an unprecedented scale, with the adverse impacts intensifying. The magnitude of these repercussions hinges on our present efforts to reduce greenhouse gas emissions, enhance resilience, and adapt to ongoing changes.

Indeed, addressing these existential threats necessitates an unparalleled transformation of our economies. This paper aims to explore the potential of Islamic economics and finance in mitigating the negative externalities of human actions. Specifically, with a focus on the Gulf Cooperation Council (GCC) countries, this paper seeks to identify challenges and opportunities and how Islamic finance can best respond. The objective is to address these questions with special reference to the design of contracts, institutions, and policies. The subsequent sections of the paper are organised as follows: the next section reviews the key literature on the climate, natural capital and finance nexus. It is followed by a description of the methodology employed in this study; presentation of the key findings; discussion of the sustainability pathway for Islamic financial contracts; and the concluding remarks.

## LITERATURE REVIEW

This section conducts a literature review to explore the existing research on the intersection of the climate, natural capital, and finance, with a specific focus on Islamic finance within the GCC countries. The review aims to highlight key themes, gaps and insights that will inform the analysis carried out in subsequent sections.

### Green Economic Transformation in GCC Countries

Sustainability studies have increasingly emphasised the pivotal role of natural capital, encompassing ecosystems and both renewable and non-renewable resources. However, within prevailing economic theories, corporate models, and policy directives, the importance of natural capital has often been overlooked. This section delves into the existing literature that highlights the evolution of green economic transformation among GCC countries where Islamic finance is of systemic significance, to analyse the role that Islamic economics and finance ought to play in managing these economies' ecological footprint and in driving the movement to a regenerative economy.

### Human Development Index and Ecological Footprint

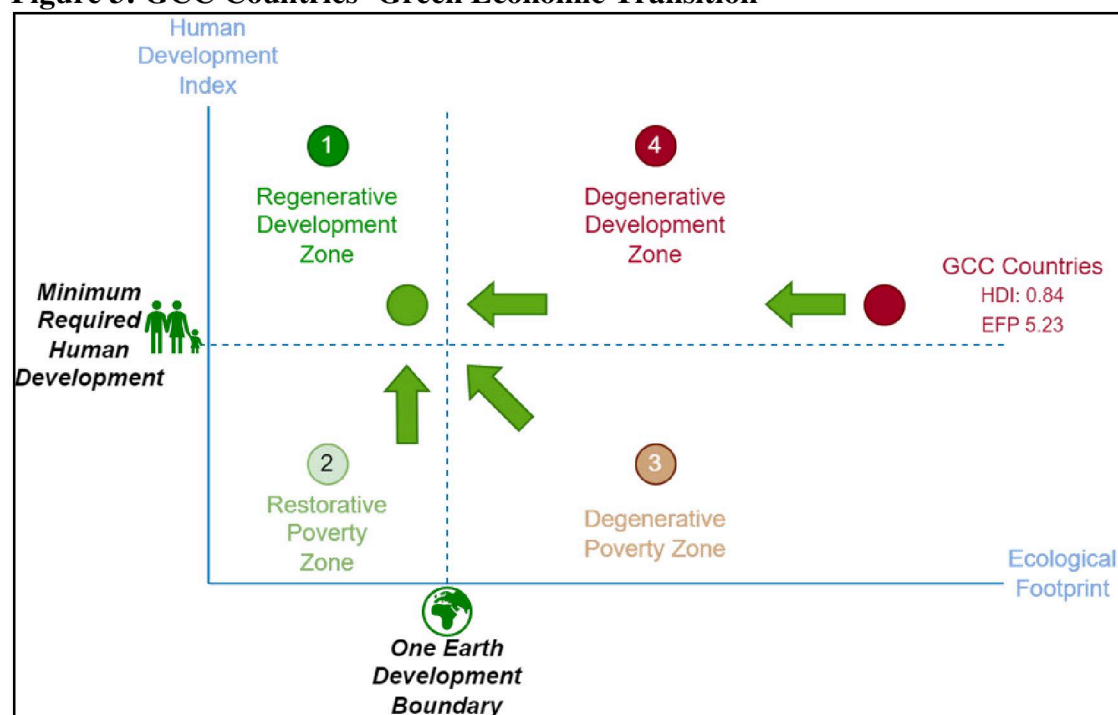
All GCC countries have achieved a high Human Development Index (HDI) as can be seen in **Table 1**. However, the average ecological footprint (in number of earths) for the GCC countries is 5.23—signifying that if each person of the earth can live like an average person in the GCC, 5.23 earths will be needed to maintain ecological balance. Like all developed countries, the GCC countries fall in zone 4 of **Figure 3**. The goal of sustainable development is to maintain the high levels of HDI but to undertake an unprecedented green transformation of the economies to move to zone 1 to be within the capacity of One Earth. This means that the GCC countries will need to undertake a massive green transformation of their economies to ensure that high HDI is maintained while simultaneously drastically reducing their ecological footprint. The challenges and opportunities of this imminent transformation are tremendous. Islamic economics and finance is one of the most important stakeholders of this transformation.

#### **Table 1: GCC Countries' HDI and Ecological Footprint (Number of Earths Required)**

Source: Global Footprint Network (2024b)

GCC Country	HDI	Ecological Footprint (No. of Earths)	Comparable Country	HDI	Ecological Footprint (No. of Earths)
Bahrain	0.875	5.2	Portugal	0.866	2.9
Kuwait	0.831	5.0	Türkiye	0.838	2.1
Oman	0.816	4.0	Romania	0.821	2.3
Qatar	0.855	9.0	Chile	0.855	2.7
Saudi Arabia	0.875	3.1	Portugal	0.866	2.9
United Arab Emirates	0.911	5.1	Austria	0.916	3.8
Averages	0.860	5.23	Averages	0.860	2.78

### Figure 3: GCC Countries' Green Economic Transition



Source: Derived from Table 1. This framework was also used in Musari & Khan (2023)

## Systemic Importance of Islamic Finance in GCC Countries

According to Islamic Financial Services Board (IFSB, 2022), if the share of Islamic banks is 10 per cent or more in a country's overall banking system, Islamic banking is considered of systemic importance. Based on **Table 2**, Islamic banking is of systemic importance in all GCC countries. The annual growth rate has also been significant even during the COVID-19 lockdowns. Moreover, the share of GCC countries in total global *shukūk* and Islamic mutual funds is noticeable, especially in the case of Saudi Arabia. The *takāful* industry further represents an important segment of national insurance industries.

**Table 2: Systemic Importance of Islamic Finance in GCC Countries as of 2021**

GCC countries	Percentage share of Islamic banking assets	Percentage annual growth of	Percentage share of national sovereign <i>sukūk</i> in global	Percentage share of national Islamic	Percentage share of <i>takāful</i> in total national
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	in national banking	Islamic banking assets	<i>ṣukūk</i> industry	mutual funds in the global industry	insurance
Bahrain	21	3.3	1.2	0	12
Kuwait	52	6.3	5.3	1.5	39.3
Oman	15	0.7	2.8	0	0
Qatar	24	6.6	3.4	0	13.9
Saudi Arabia	77	30.6	41.6	35.2	100
United Arab Emirates	21	10	0.0	0.5	10.2

Source: Compiled from IFSB (2022)

### Natural Capital Risks and Islamic Banks

Degrading natural resources and ecosystems which constitute the natural capital can harm the quality of Islamic banks' asset portfolios. Islamic banks, finance users, and financed companies face enhanced financial risks through the channels of natural capital risks. These risks encompass various dimensions:

- **Physical risks:** Climate change, natural disasters and harsh weather conditions can threaten Islamic banks' assets and operations. These risks damage property, disrupt business, and increase credit and operational risk.
- **Transition risks:** Moving towards low-carbon, sustainable economies creates transition risks. Policies, laws and market dynamics to reduce greenhouse gas emissions and promote sustainability may threaten Islamic banks' asset quality, especially where financing portfolios include hard-to-abate carbon-intensive sectors.
- **Legal risks:** Islamic banks' clients and counterparties may be penalised for environmental damages. These clients or sectors can damage a bank's reputation, legal obligations, and financed asset portfolios.
- **Reputational risks:** Ecologically hazardous operations of Islamic banks may add to their reputational risks. As environmental awareness rises, customers, investors and other stakeholders may leave or criticise non-sustainable financial institutions.
- **Regulatory risks:** Environmental regulations, policies, reporting and disclosure requirements may change. Environmental standards, disclosure regulations, and non-compliance fines may increase compliance costs and lower bank profitability as well as complicate and delay financing decisions.
- **Market risks:** As depositors, clients and investors' preferences change, the dynamics of strategic business positioning change. Banks with a poor record for sustainability may lose money, market share, and may even confront higher costs for raising resources as sustainable finance and responsible investing alternatives grow.
- **Liquidity risks:** As the uncertainty of asset quality grows due to transition risks, asset liquidity may worsen and overall funding liquidity may also become unfavourable.

In addressing these increasingly material risks, environmental risk assessments, sustainable financing products, responsible investing, client sustainability involvement, and robust disclosure practices are essential tools for Islamic banks. These measures not only mitigate risks but also



position Islamic finance as a key player in sustainable and responsible banking practices within the GCC region.

## RESEARCH METHODOLOGY

This study employs an analytical research approach to evaluate the compatibility of Islamic social and commercial finance with sustainability objectives. The analysis is primarily qualitative in nature and relies on the One Earth Framework proposed by Simpson *et al.* (2021) to structure and guide the assessment undertaken in this study.

To ensure a comprehensive exploration of the subject, data sources encompass academic articles, reports, and publications related to Islamic finance, sustainability, and the One Earth Framework. To ensure rigour and relevance, an extensive literature review is conducted, focusing on databases such as Brill, Emerald-insight, ScienceDirect, Scopus, and Wiley Online Library with keywords including Islamic finance, sustainability, and One Earth Framework. The inclusion criteria are defined to select literature relevant to the study's objectives. The literature review lays the background for the subsequent analysis, contributing to the development of a nuanced understanding of Islamic finance in relation to sustainability and to investigate how Islamic finance can accommodate sustainability pathways.

The sustainability objective of this study aims to investigate how Islamic social and commercial finance align with sustainability goals. The objectives encompass assessing the ecological impact of Islamic finance, identifying pathways for paradigmatic shifts, and exploring how Islamic financial contracts and institutions can contribute to sustainable practices.

To this end, the choice of the One Earth Framework is justified by its comprehensive and integrative approach to sustainability (Simpson *et al.*, 2021). It provides a structured lens to assess the ecological dimensions of Islamic finance. The framework's suitability to address the research questions lies in its ability to integrate ecological indicators with financial practices, offering a holistic perspective on sustainability.

The analysis process involves the application of the One Earth Framework to the selected literature. It seeks to discern patterns, gaps and opportunities within Islamic finance concerning sustainability objectives. Given the qualitative nature of the analysis, triangulation is incorporated by cross-referencing findings from diverse literature sources, thereby enhancing the credibility and validity of the study while avoiding potential biases.

## FINDINGS: NEED FOR REGENERATIVE DEVELOPMENT OF ISLAMIC FINANCE

Islamic finance is founded on principles and purposes that dictate its role and objectives. The core principles of Islamic finance include balancing for-profit and not-for-profit activities, adhering to financial and non-financial prohibitions, protecting private property and free markets, fostering innovation, promoting ethical and Sharī'ah-based self-regulation, and recognising the rights of passive stakeholders, including future generations and natural capital.

These principles align with the overarching purposes of Islamic finance, which are safeguarding religion and cultural heritage, preserving life and dignity, nurturing human intellect and personal development, securing the well-being of future generations, and maintaining wealth and livelihood. A holistic view embedded in the *maqāṣid al-Sharī'ah* (objectives of Islamic law)

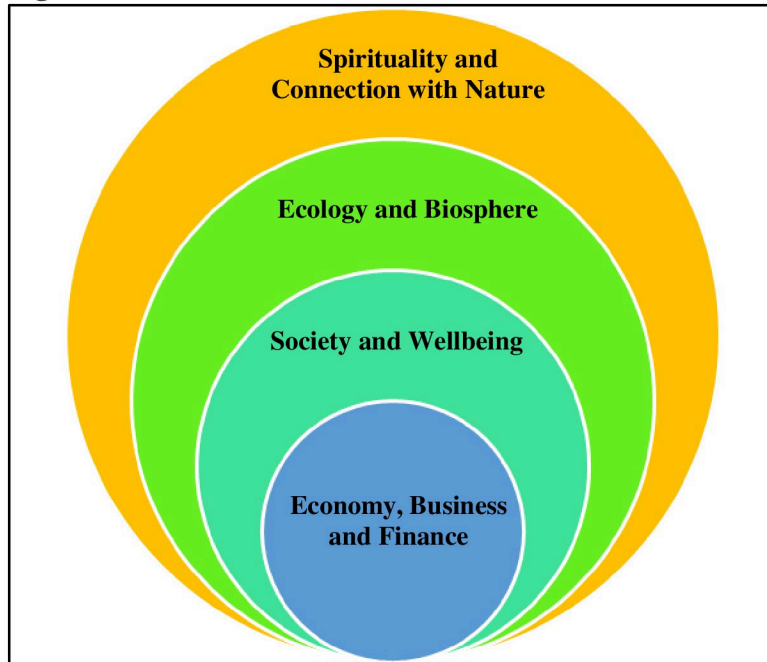
framework highlights the interconnectedness of these objectives with the environment, emphasising the need to protect and conserve natural resources.

Al-Qaraḍāwī (2022) considers the preservation of the environment and natural capital to be embedded in each of these five objectives of the Sharī'ah. For example, the existence of life is a precondition to practising religion, and that requires a conducive ecological environment. Furthermore, cleanliness/hygiene is one of the foundational pillars of the religion and its practice.

The *maqāṣid al-Sharī'ah* premises therefore present an embedded framework, as summarised in **Figure 4**. A well-functioning and sustainable economy requires a content and healthy society with adequate security and wellbeing, which in turn requires clean air, water and flourishing natural world and capital. The existence of a healthy ecological environment and biosphere facilitates people's strong spiritual connection with the natural world as its trustees and stewards.

As science-based evidence of global warming has become recently available, other researchers have added the ecological environment as an explicit sixth objective of the Sharī'ah (Asutay & Harningtyas, 2015). Furthermore, adherence to responsibility and stewardship is fundamental to responsible economics, social and ecological ideals, and as such, this may be considered a seventh objective of the Sharī'ah.

**Figure 4: The Embedded Islamic Economic Framework**

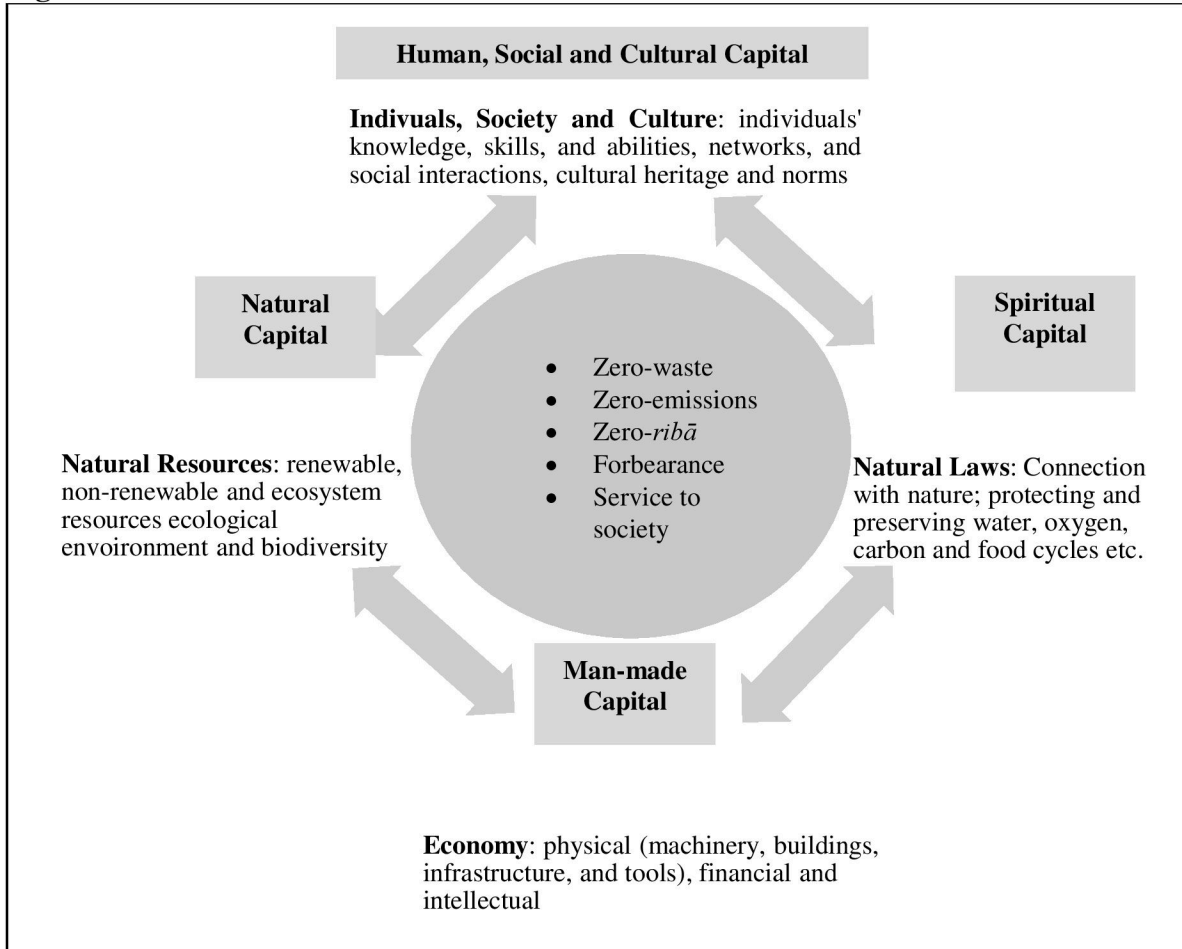


Source: Authors' own

Within this framework, Islamic economics and finance promotes various attributes and norms, such as being a trustee of Allah (SWT) on earth, avoiding usurious practices (*ribā*), practising the middle path (*wasatīyah*), establishing a universal balance (*al-mīzān*), prohibiting waste and extravagance, and acknowledging the rights of passive stakeholders.

This holistic view of Islamic economics and finance provides a stark contrast to the neoclassical economic model, which is best represented by Paul Samuelson's famous diagram of circular cashflows. In this framework, the economy exists in isolation of the society and the ecological environment, and what is not priced in the circular cashflows is the externality of the system for the society, such as inequalities, discrimination, etc., and for the ecological environment such as waste, pollution and biodiversity loss. The neoclassical paradigm exaggerates the positive externalities and trivialises the negative externalities. Therefore, the degradation and deterioration of natural capital may occur rapidly and unabated due to the disregard for fundamental costs/outcomes.

**Figure 5: Islamic Economics and Finance as an Embedded Framework**



Source: Authors' own

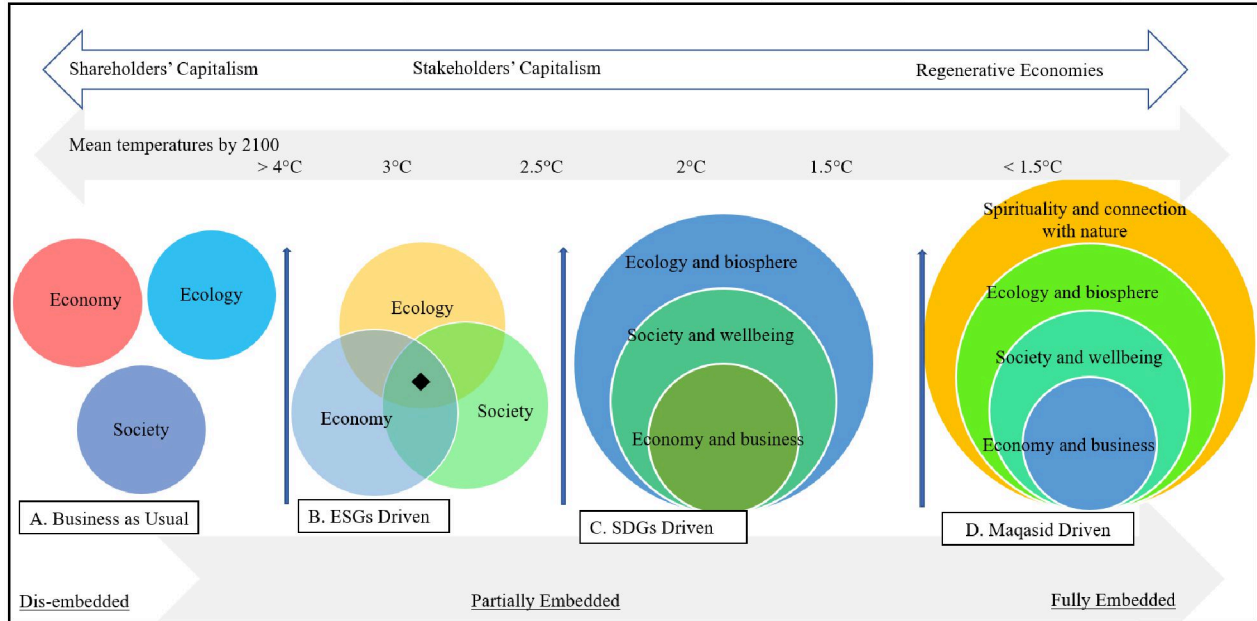
**Figure 5** summarises an Islamic economics framework derived from the embedded approach of the *maqāṣid al-Sharī'ah*. In the suggested framework, the economy exists as one component in the embedded system, its other components being natural capital, human, social and cultural capital, and spiritual capital. Since the components of the framework are intertwined and not



isolated, the framework is inherently suitable for the internalisation of externalities and thus facilitate their management.

Adopting this framework into the pathway of achieving a regenerative economy will create an alternative path. **Figure 6** presents a summary of the future global warming scenarios under different paradigmatic approaches. The question that is posed is: can Islamic economics and finance contribute to keeping the global mean temperatures under bearable ranges of 1.5°C by year 2100?

**Figure 6: Alternative Pathways of Degenerating and Regenerating the Natural Capital**



Source: Authors' own

In **Figure 6**, four paradigmatic approaches are highlighted:

### A. Business as Usual – Degenerative Development

The Intergovernmental Panel on Climate Change (IPCC) warns that if current high greenhouse gas emissions continue unabated, global temperatures may rise by 2.6°C to 4.8°C by the end of the 21st century, resulting in catastrophic consequences. This 'business as usual' scenario envisions widespread, irreversible damage to ecosystems and human societies. Urgent mitigation efforts are needed to avoid this dire outcome. Nordhaus (2018a; 2018b) provides prime examples of business-as-usual scenarios in which the models predict temperatures exceeding 3.5°C and the only mitigation strategy is to rely on adaptations.

### B. Environmental, Social and Governance (ESG) Driven

ESG models aim to limit global warming to below 2°C, with an ideal target of 1.5°C. Achieving this goal requires substantial reductions in greenhouse gas emissions, along with the adoption of negative emissions technologies. However, many corporations do not fully adhere to ESG

principles, risking widespread 'greenwashing' concerns. Recent studies indicate that operations of most ESG-disclosing companies still contribute to over 3°C of global warming.

### C. Sustainable Development Goals (SDGs) Driven

The SDGs and the Paris Agreement set the path for the 2100 global temperature scenario. These international agreements aim to reduce emissions and keep global warming below 2°C. Achieving these goals necessitates substantial changes in global economics, the society and cooperation. Implementing the SDGs is challenged by resource gaps, calamities and conflicts between goals.

### D. *Maqāṣid* Driven – Regenerative Development

The strength of the SDGs framework lies in its integration of social, economic, governance and environmental objectives. However, this integration requires addressing the negative environmental externalities generated by tackling poverty and hunger. For instance, as income rises, addressing poverty while causing air and water quality deterioration may lead to increased healthcare costs. Regenerative development focuses on enhancing the earth's natural processes, biocapacity and natural capital. It involves shifting human activities towards regeneration to reduce negative externalities (public harms, i.e., *maḡāṣid 'āmmah*) and enhance positive ones (public benefits, i.e., *maṣāliḥ 'āmmah*). Internalising externalities through inseting strategies that would consider social, environmental, and economic costs within the product pricing can mitigate the social harm caused by economic activities. Inseting strategies involve integrating environmental and social sustainability initiatives directly into a company's supply chain or operational activities. This approach differs from traditional offsetting methods by focusing on internal actions within the company's own value chain to address sustainability challenges.

Regenerative development advocates restoration and enhancing biodiversity and the ecological environment by integrating it within the business process. Reducing the extraction of non-renewable resources and their wastage through circular businesses, promoting energy efficiency and clean energy generation and usage, investing in carbon capture and negative emission technologies will enhance regenerative development. Offsetting the remaining negative externalities by supporting other external regenerative activities and initiatives will further strengthen the regenerative processes. The three distinct states of the natural capital-focused development process can be summarised in three equations:

1. **State 1 Degenerative:** Positive externalities + offsets for negative externalities – negative externalities < 0
2. **State 2 Sustainable:** Positive externalities + offsets for negative externalities – negative externalities = 0
3. **State 3 Regenerative:** Positive externalities + offsets for negative externalities – negative externalities > 0

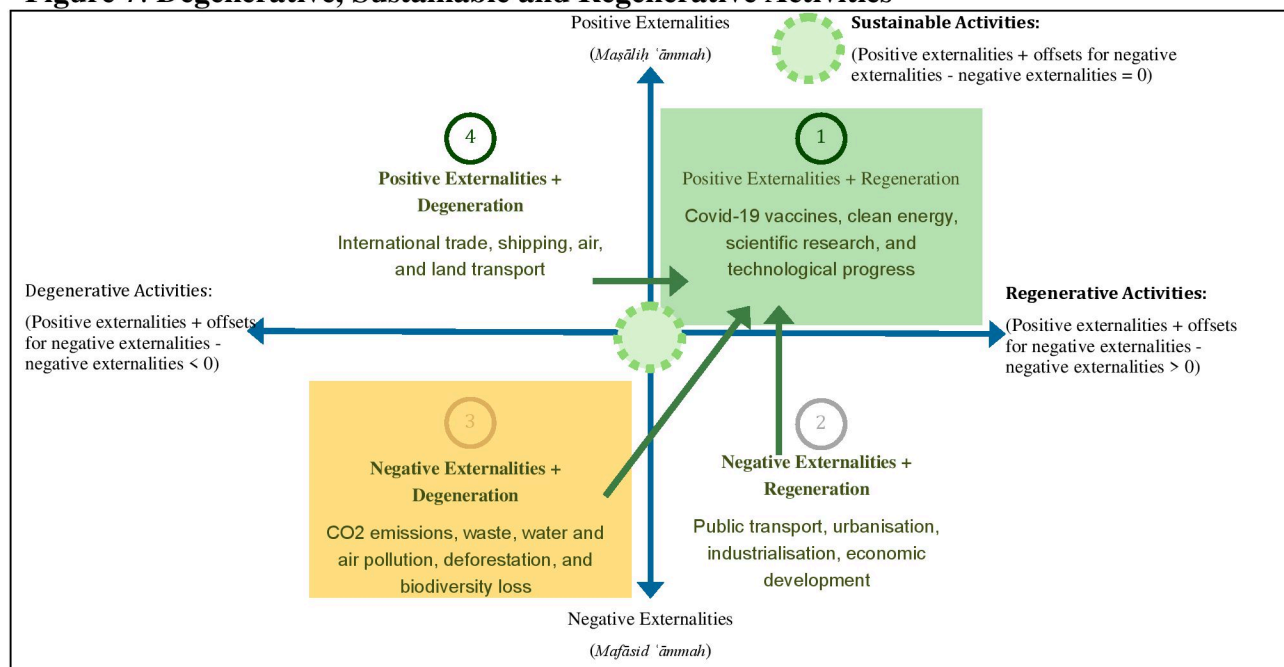
Based on these equations, the various activities can be organised into four quadrants, pictured in **Figure 7**. The examples of activities that will fall in quadrant 4 are international trade, shipping, air and road transport where there are considerable positive externalities but with respect to the natural capital, such activities are likely to be degenerative because of carbon emissions, resource extraction, waste, and biodiversity losses. On the other hand, producers' responsibility,

legislation, industrial symbiosis and waste reduction, reliance on cleaner energy, carbon capture technology, etc., are examples that can reduce the negative externalities and move the activities to quadrant 1.

Quadrant 4 represents activities which have clear negative externalities and are degenerative. Examples are all types of waste generation, air and water pollution, fossil fuel and coal energy, etc. It is obvious that a combination of carbon capture technologies and coal-based less costly clean energy as well as zero-waste strategies will shift the activities to quadrant 1.

Quadrant 2 represents activities that are regenerative but have negative externalities. Examples are solar energy storage batteries, mass public transit, etc. Although mass transit is gradually shifting to clean energy and moving to quadrant 1, the externalities of energy storage facilities depend on clean technologies.

**Figure 7: Degenerative, Sustainable and Regenerative Activities**



Source: Authors' own

Depending on its current state, the transformation of a business can be divided into four stages:

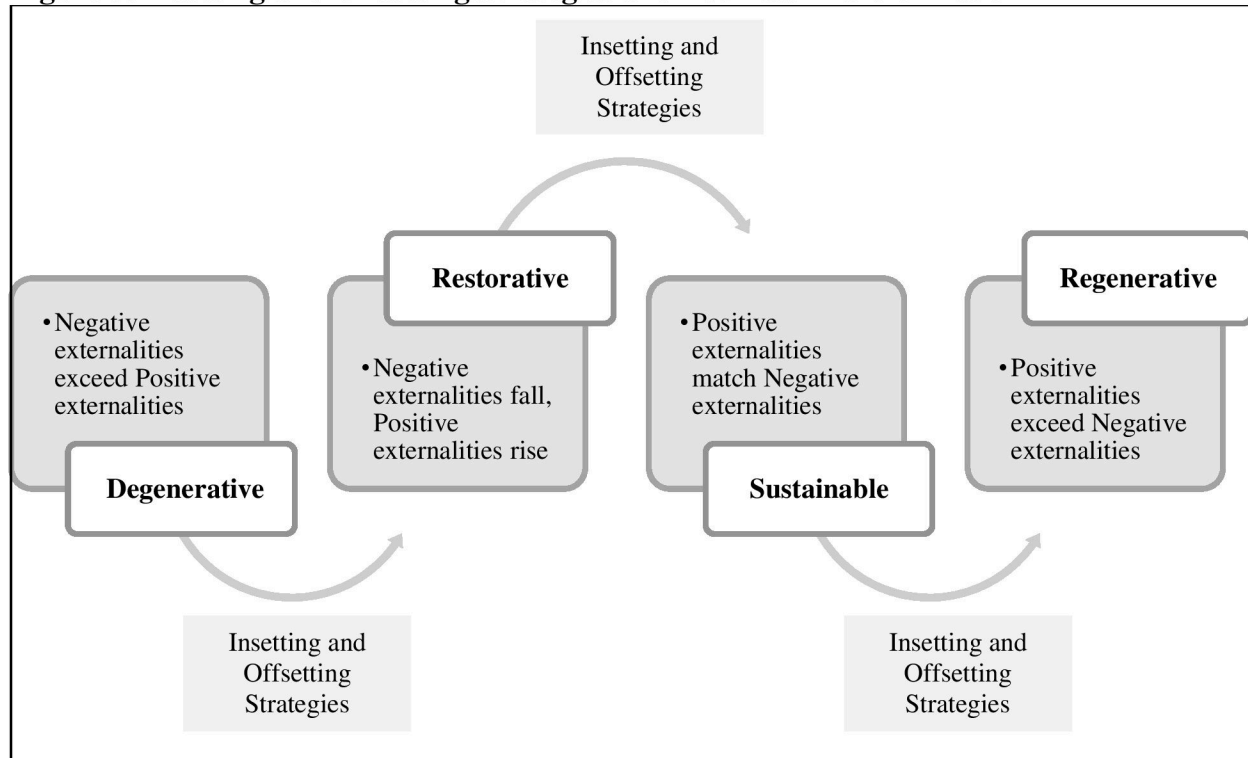
1. The **degenerative stage**, where the negative impacts of the business (*maḥāsīd*) outweigh the positive impacts (*maṣāliḥ*) and the business contributes to the degradation of the earth's biocapacity and natural capital.
2. The **restorative stage**, where by the application of insetting and offsetting strategies, the negative impacts decrease and the positive impacts increase over time, but the overall result is still negative, though the business is contributing to the restoration of the earth's biocapacity.
3. The **sustainable stage**, where the negative and positive impacts of the business on the earth's biocapacity are balanced and the business neither degrades nor regenerates the earth's biocapacity.



4. The **regenerative stage**, where the positive impacts of the business outweigh the negative impacts and the business is making a net contribution to enhancing and preserving the earth's biocapacity.

Insetting and offsetting strategies remain valid in all the three stages of transformation of a degenerative business. Some examples of the strategies are given in **Figure 8**.

**Figure 8: Insetting and Offsetting Strategies and Business Transformation**



Source: Authors' own

## DISCUSSION: SUSTAINABILITY PATHWAY FOR ISLAMIC FINANCIAL CONTRACTS

The previous section explored the significant potential for a green transition in the GCC countries, with implications for economies worldwide. Within this context, Islamic economics and finance may play a crucial role. Economic, business and financial activities in Islamic economics are traditionally categorised as either for-profit (commercial) or not-for-profit (social) pursuits. Historically, commercially-incentivised activities employed unstructured contracts such as *mudārabah* (profit sharing), *mushārah* (profit-and-loss sharing) or deferred sales. However, since the inception of Islamic banking in 1975, structured products have been developed, such as *murābahah* to the purchase orderer (MPO), *ijārah* (lease) ending-in-ownership, and declining partnerships. Further information about the financial contracts is available in Kahf (2015) and the AAOIFI Shari'ah Standards (2023).

## Design of Sustainable Contracts

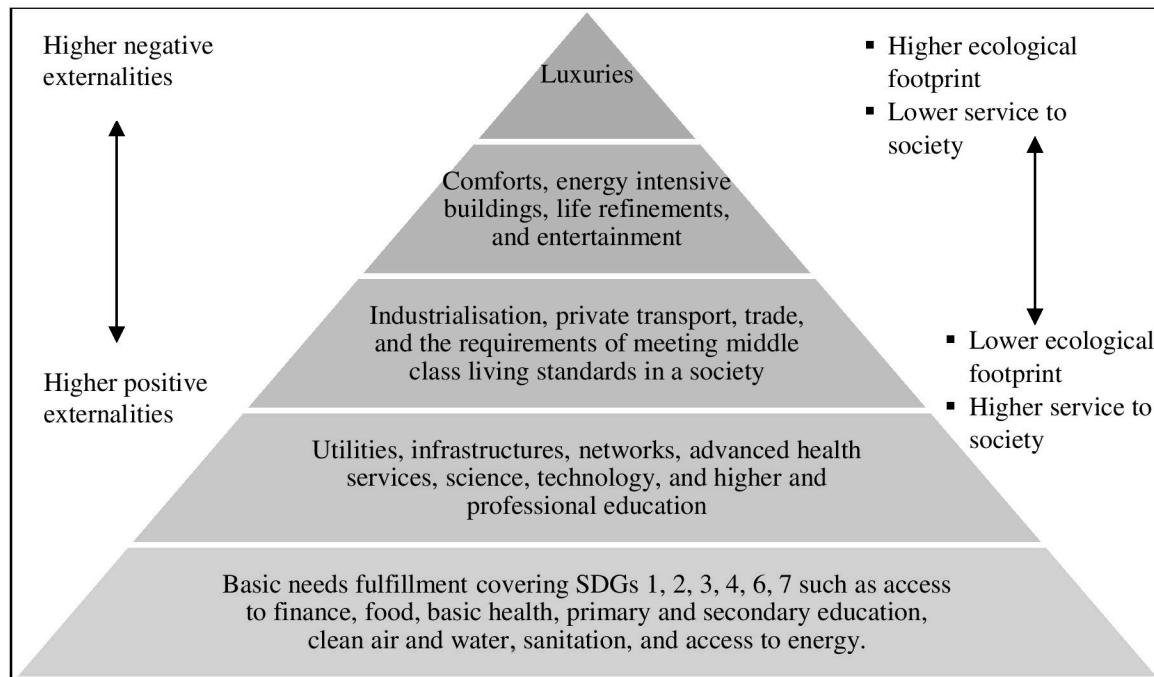
Certain scholars in Islamic economics favor unstructured products, particularly *muḍārabah-mushārah* which have risk-sharing qualities. Nevertheless, the practice of Islamic finance is dominated by MPO, which is becoming the mainstream Islamic finance contract. The MPO has evolved into commodity *murābahah* (*tawarruq*) with the aim of serving as a comprehensive mechanism to replicate conventional loans. While MPO and *tawarruq* both have their proponents and are substantively similar, the difference hinges on whether the asset buyer actually takes possession of the asset or if an agent (the bank) sells the asset and delivers the generated cash to the buyer. Sustainability of the contract design—especially in the context of industry choices (e.g., fossil fuels vs. clean energy) and business types (e.g., traditional small and medium enterprises (SMEs) vs. green SMEs)—often remains unaddressed.

All areas of Islamic finance, including banking, *ṣukūk* (Islamic investment certificates), mutual funds, *takāful* (Islamic insurance) and Islamic social finance, rely on financial contracts as outlined in the AAOIFI Shari'ah Standards. These contracts define rights, obligations, terms, risks, and dispute resolution. To integrate environmental sustainability, contracts should support long-term environmental and social responsibilities, aligning with the principles of Islamic finance. The following key considerations are needed to develop a sustainability pathway for designing Islamic financial contracts:

- **Shari'ah basis:** Shari'ah compliance forms the foundation of Islamic financial contracts and the associated financial services industry. Traditionally, compliance has been determined through negative screens, ensuring the absence of prohibitions that would deem the contract Shari'ah non-compliant such as interest, gambling and ambiguity. Halal, in this context, is defined by its compliance and adherence to a set of predefined rules. Recognising the growing importance of sustainability, and the potential adverse environmental and social impacts of economic activities, it becomes imperative to consider these externalities and consequences in assessing a financial contract's alignment with Shari'ah principles as the Shari'ah inherently advocates for dealings that are beneficial and free from harm to the society and the environment.
- **Service to society:** Design of financial contracts must promote service to society. One possible way to interpret service to society as a rubric is to evaluate how the contracts contribute to the social welfare and well-being of the stakeholders and the broader community. For example, a financial contract that supports the provision of basic needs of the society—e.g., eradicative poverty (SDG 1), zero hunger (SDG 2), good health and wellbeing (SDG 3), quality education (SDG 4), clean water and sanitation (SDG 6), affordable clean energy (SDG 7), etc.—serves the society in the best way.

**Figure 9** lists a society's needs in order of their environmental impact. HDI and ecological footprint data reveal that as HDI rises, inequalities grow and the negative environmental footprint also grows. Higher standards of living are associated with higher ecological footprints, and lower standards of living with lower footprints. Financial contracts designed to meet basic needs will hence be environmentally sustainable as well.

### Figure 9: Hierarchy of Needs and Ecological Footprints



Source: Authors' own

To achieve the following objectives, the considerations below should be taken into account in the engineering of financial contracts:

- **Social impact:** Contracts should consider how they affect stakeholders, addressing social risks, promoting social justice, diversity, equity, and social impact investing.
- **Waste-reduction plans:** Contracts should facilitate zero-waste strategies, contributing to resource efficiency and environmental resilience.
- **Water plan:** Contracts should include documented water usage plans to incentivise water conservation and management.
- **Energy use:** Contracts and disclosures should encourage clean energy use and fossil fuel reduction, aligning with renewable energy mandates.
- **Offsets:** Contracts can incorporate 'net-zero offsets' to compensate for greenhouse gas emissions, promoting carbon sequestration and sustainability initiatives.
- **Sustainable supply chains:** Contracts should reward sustainable raw material and product purchases, supporting sustainability audits and disclosures.
- **Diversity:** Contracts can support social inclusion and diversity, and focus on reducing social inequality.
- **Financial sustainability:** Contracts should promote responsible investing and sustainable financial products and services.
- **Governance and disclosures:** Contracts may require good governance through timely and accurate disclosures, enhancing transparency and accountability.

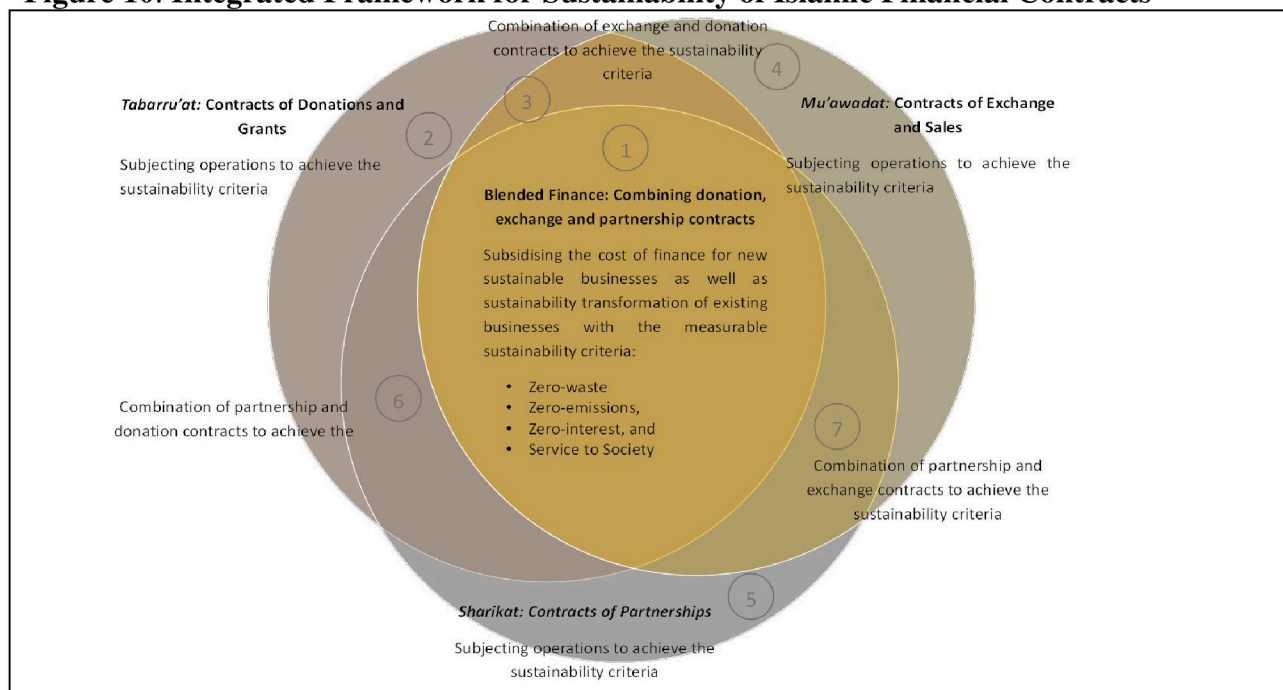
## Integrated Framework for Islamic Financial Engineering



This article has introduced a sustainability pathway for the design of Islamic finance, with a primary focus on natural capital, among other considerations. Below is a proposed re-evaluation of Islamic financial contracts. **Figure 10** serves as a summary of the comprehensive discussion, emphasising the following key points:

1. Sustainability is highly consistent with the *maqāṣid al-Sharī'ah* and the values system on which Islamic economics and finance are based, and therefore must be integrated in all types of financial contracts. Examples as shown in Figure 10 are: (2) all contracts of donation and grants, (4) all exchange and sale contracts, and (5) all revenue sharing contracts; all of which must integrate the sustainability objective.
2. Likewise, the different contracts should be blended where possible to achieve sustainability objectives. Examples as reflected in Figure 10 are: (3) combination of exchange and donation contracts, (7) combination of exchange and partnership contracts, and (6) combination of partnership and donation contracts to achieve the sustainability objectives.
3. Finally, in terms of Figure 10, (1) all types of contracts can be blended to achieve the sustainability objectives.

**Figure 10: Integrated Framework for Sustainability of Islamic Financial Contracts**



Source: Authors' own

### Sustainability Mismatch between Funds and Assets

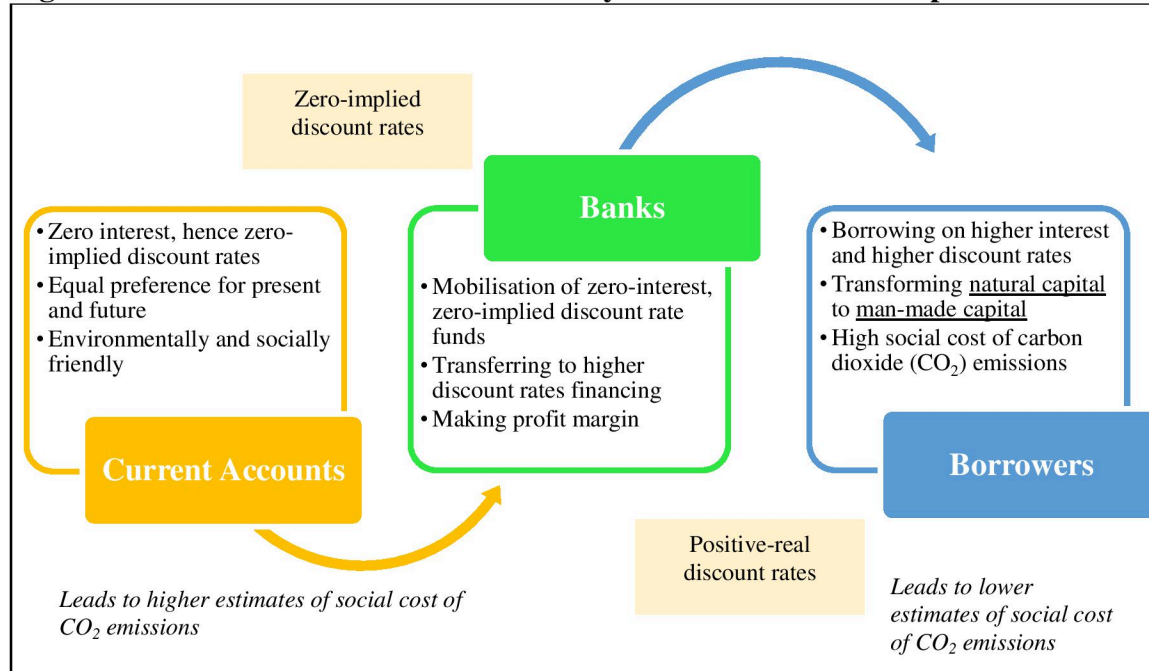
The effectiveness of financial and economic transactions in promoting environmental sustainability hinges on a fundamental element: discount rates. Ensuring that current needs, demands, and action targets are met without compromising the requirements of future generations is central to sustainability. Consequently, the future holds equal importance to the present in sustainable considerations. Discount rates play a pivotal role in this context, as they

can either undervalue future benefits and costs, thereby risking underinvestment in sustainable practices and policies, or appropriately value future advantages when set at low or zero rates.

High discount rates reflect an emphasis on present consumption over the long-term effects of climate change. Such rates prioritise market-driven economic growth, including financial gains, employment, and innovation, while neglecting non-market benefits such as environmental protection and natural capital.

One of the challenges arises from the discrepancy between depositors, who implicitly have low discount rates, and borrowers, who demand high discount rates. While the classical banking model is based on loans being funded by deposits, the contemporary banking landscape is extensively more complex. Notably, liquidity requirements, once integral to this relationship, have been largely supplanted by capital adequacy requirements, focusing on solvency in relation to weighted assets. There is a link between the discount rate and its conduciveness to sustainability as it directly impacts the allocation of resources and the consequent impact on the economy and the environment over time. **Figure 11** summarises this mismatch.

**Figure 11: Discount Rates and Sustainability Mismatch between Deposits and Financing**



Source: Authors' own

The Social Cost of Carbon (SCC), which quantifies the economic damages caused by each additional ton of carbon dioxide (CO<sub>2</sub>) emissions, offers a useful measure to evaluate the benefits and costs of policies aimed at reducing greenhouse gas emissions and enhancing carbon sequestration. Addressing the mismatch between the perceived low discount rates of depositors and the actual high discount rates of borrowers can significantly contribute to enhancing sustainability. Achieving this alignment can be accomplished by adhering to the sustainability pathways for contract design, as discussed in the preceding sections.

## CONCLUSION

The first section of this paper introduced natural capital in Islamic finance literature and identified the alarming crisis of sustainability management in terms of the fast degradation of natural capital and its very serious consequences for future generations. Section two then related the discussion of section one with the GCC economies. The section suggested that GCC countries, having already achieved high levels of HDI, need to focus on maintaining it but bringing their ecological footprint within the planetary capacity of one earth. This requires an unprecedented green economic transformation and diversification to shift away from their current reliance on exhaustible resources to renewable energy and enhanced natural capital.

Cultural values play an important role in reducing negative externalities and increasing positive externalities of human business and consumption activities. Section three suggested that Islamic economics and finance hold great promise of facilitating and supporting the green economic transformation of GCC countries. In the framework of *maqāṣid al-Sharī'ah*, it also discussed regenerative development as the ideal goal and the prospects of Islamic economics and finance in achieving the goal.

Section four highlighted the need for the Islamic economics and finance values and aspirations to be translated into sustainability pathways. The section discussed the sustainability levels of contracts, institutions, and systems. Islamic economics inherently offers a *maqāṣid al-Sharī'ah*-based sustainability pathway—new criteria of doing business at its core ideally being zero-waste, zero-emissions, zero-*ribā*, forbearance, and service to society. Each contract must adopt such a pathway and all institutions must support the shared sustainability pathway. Systems level reforms are needed in several areas including the creation of: (i) a social subsidy through blended finance, (ii) integrated bailout and finance users' support programme, and (iii) removing the sustainability mismatches between sources of funds and financing.

The research offers several prospective implications. Firstly, focusing on natural capital, the regenerative development framework suggested in the paper can be the basis for further research. Secondly, the sustainability pathway suggested can be considered as the basis of evaluating the design of Islamic financial contracts. Thirdly, the institutional and systems levels reforms suggested are relevant for various stakeholders including Islamic finance infrastructural and architectural institutions as well as the industry itself. Finally, the research may induce reforms of different economic policies, including monetary and fiscal, and there is a growing need for government policies to support sustainability efforts of different stakeholders.

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## **DECLARATION**

### **Credit Authorship Contribution Statement**

- Tariqullah Khan: Conceptualization, Methodology, Write up
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The authors declare that they have no known competing financial interest or personal relationships that could have influenced the research work.

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The authors declare that they understand the Ethical Guidelines and have adhered to all the statements regarding ethics in publishing. They also confirm that this paper is original and has not been published in any other journal nor is under consideration by another publication.

### **Data Availability**

None

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### **Appendix**

None