

2023

INTELLECAP **LIGHTHOUSE**

AN ANTHOLOGY OF IDEAS AND INSIGHTS



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Aavishkaar
Group

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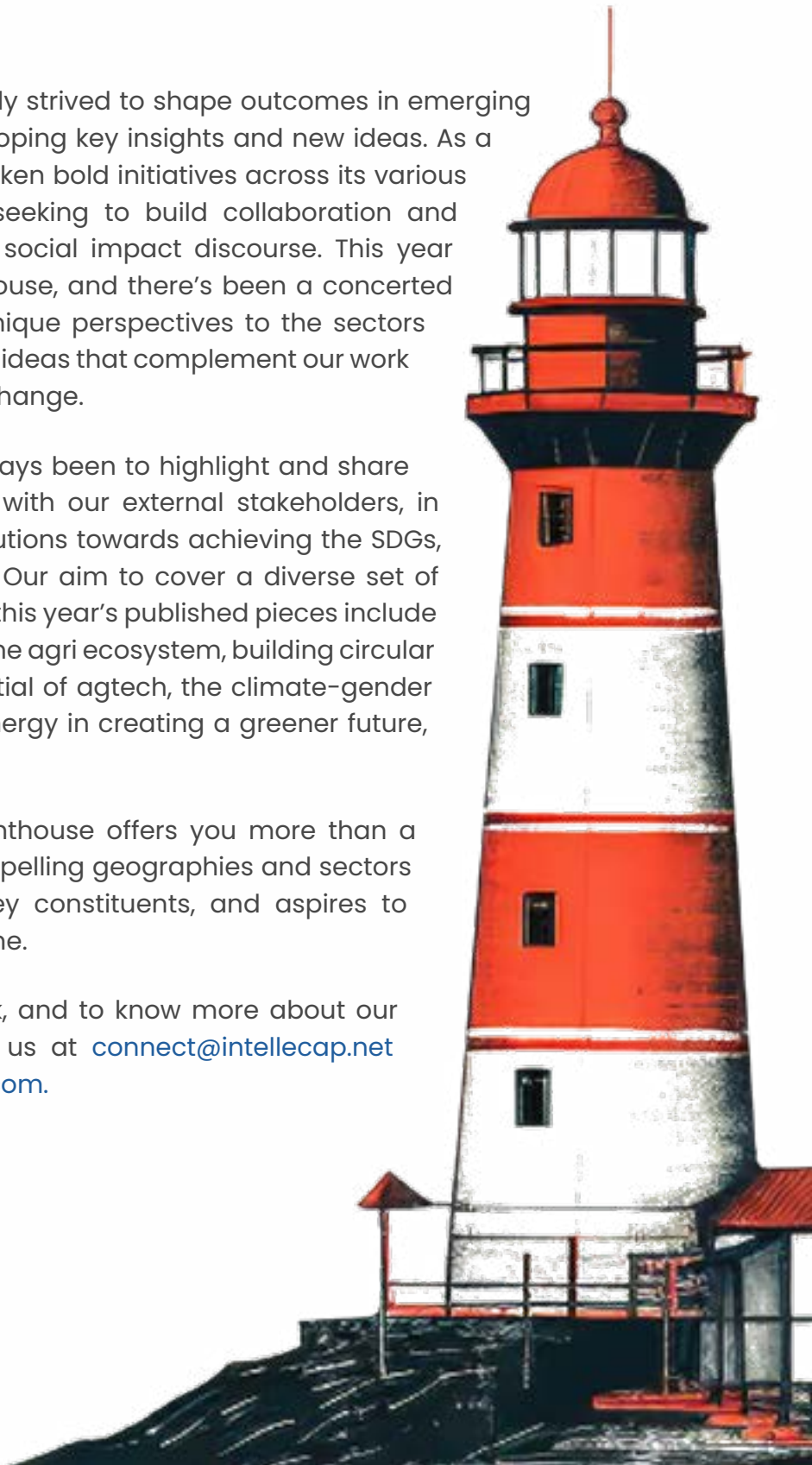
Overview

Since 2002, Intellectap has constantly strived to shape outcomes in emerging and underserved markets by developing key insights and new ideas. As a result, the organization has undertaken bold initiatives across its various practices to push the envelope, seeking to build collaboration and thought leadership as part of the social impact discourse. This year marks the 5th edition of the Lighthouse, and there's been a concerted effort to bring more diverse, yet unique perspectives to the sectors Intellectap covers, and unearth fresh ideas that complement our work in nurturing ecosystems to deliver change.

The goal of this endeavour has always been to highlight and share the most relevant thought pieces with our external stakeholders, in order to bring forth sustainable solutions towards achieving the SDGs, as set forth by the United Nations. Our aim to cover a diverse set of perspectives continues, as some of this year's published pieces include accelerating net zero transitions in the agri ecosystem, building circular supply chains, the disruptive potential of agtech, the climate-gender nexus and the role of renewable energy in creating a greener future, among others.

It is our sincere hope that the Lighthouse offers you more than a glimpse into some of the most compelling geographies and sectors Intellectap serves as part of its key constituents, and aspires to continue serving in the years to come.

To connect with us about our work, and to know more about our various initiatives, please write to us at connect@intellectap.net or visit our website www.intellectap.com.



CIRCULAR ECONOMY



Circular Economy

Building the supply chain infrastructure for a Circular Apparel industry

Siddharth Lulla, Principal, CAIF, Intellectap

Published in The Times of India

such as aligning internal stakeholders on goals and milestones; working collaboratively with supply chain partners, customers; keeping all partners engaged in multiyear change efforts; non-transparent carbon accounting and tracking mechanisms.

An in-depth assessment through in-person consultations with Textile & Apparel (T&A) stakeholders, which included industry leaders such as H&M, IKEA, Marks and Spencer and their manufacturing partners, and learning's from our initiatives have identified key gaps that need to be addressed to develop the supply chain infrastructure for circular and net-zero apparel:

- ◇ Lack of the implementation of a cohesive milestone-based strategy to decarbonize the supply chain, as well as operations
- ◇ Poor availability of commercially scalable circular, low-carbon technologies that are in sync with the decarbonization needs of the T&A industry
- ◇ Limited awareness and technical capability to measure, report, and set decarbonization goals as per the Science Based Targets

Hence Intellectap, through its initiative Circular Apparel Innovation Factory (CAIF), is working with upstream supply chain partners primarily SMEs to reduce carbon emissions, through testing, validating and commercial adoption of circular and low-carbon solutions in resource efficiency (energy, water), alternate materials (low-carbon dyeing

Under the aegis of UN Climate Change, brands and retailers worked during 2018 to identify ways in which the broader textile, clothing and fashion industry can move towards a holistic commitment to climate action. As a result, industry players made bold commitments to enable circularity, reduce 45% emissions by 2030 and achieve net-zero by 2050. Initially these commitments were focused on Scope 1 and Scope 2 emissions, which are produced by the companies directly or through the purchase of energy. However today, most companies have pledged to reduce their Scope 3 emissions generated in the upstream and downstream value chain. This is a crucial step since, for many companies, Scope 3 accounts for 80% of their overall climate impact.

Given the scale of the problem, it is imperative to set ambitious targets and implement a well thought approach to deliver on them. Achieving net-zero for Scope 1 and Scope 2 themselves requires overcoming formidable economic and technical challenges. Scope 3 presents an additional layer of complexity

alternatives, etc.), and from recovering value from waste (fiber2fiber recycling). Based on our learnings, we believe that four steps need to be followed by organizations that are committed to multiplying their own efforts and decarbonizing the supply chain through supplier engagement. They are:

1. **Emission Mapping & Profiling:** Understanding and quantifying carbon emissions across the supply chain, product impact & climate change risks and developing BAU projections.
2. **Set Roadmap and Create Targets:** Developing sustainability strategies, targets and roadmaps at process and organization level, aligned with science and business requirements.
3. **Reduce Footprint:** Identifying & deploying best available technology solutions (input materials, energy efficiency, water mgmt. waste to value, etc) that perform better than the benchmarks; adopting global best practices.
4. **Adopt offset mechanisms:** Address hard-to-abate emissions through off-setting projects such as investing in impact funds, identifying climate finance solutions, etc

Research findings have indicated that existing solutions which include renewable electricity, sustainable materials and processes, alternate fuels, etc., have the potential to reduce supply chain carbon emissions by 47%. However, for the balance there is a need to test, validate and adopt innovative technologies and business models such as next generation materials, waterless dyeing, dry processing just to name a few. In order to address this, through our ongoing initiatives we have successfully worked towards building a strong business case for low carbon / circular supply chain solutions available in India. Project ACE, a two-year program (2021-2023), designed as a common action platform with the singular purpose of establishing a business case (economic value creation for the private sector organizations while reducing their environmental footprint). To create a robust business case, CAIF designed demonstration pilots with multiple stakeholders (brands and their manufacturing

partners) to test, validate and commercially deploy high potential low-carbon solutions in areas including energy efficiency, water efficiency, alternative dyes and chemicals, digital solutions in textiles waste traceability, etc. In the last 12 months alone, we have undertaken six pilots and delivered the below outcomes:

- ◇ Improvement in energy efficiency: 15 to 20%
- ◇ Reduction in process heat: 25%
- ◇ Water Recovery: Up to 95%
- ◇ Reduction in chemical & biological effluents: 50 to 75%
- ◇ Provided end-to-end traceability for ~850 Tons of Textiles waste (2x manufacturers; 4 months)
- ◇ Solutions indicated a payback period of 2 to 3 years (work to measure the impact on carbon footprint is currently in process)

According to our private sector partners, three key aspects were critical in design /execution of the pilots along with expediting the buy-in from leadership / board teams for eventual long-term commercial contracts:

1. The ability of CAIF to source and evaluate high-potential innovative solutions
2. Technical assistance provided by CAIF to innovators (from problem-solution through product-market fit) and the capacity building support provided to manufacturers and supply chain partners
3. Provision for a pool of capital available for both innovators and brands /manufacturers to cover the cost of demonstration pilots that expedited approvals & enabled collaborations

Hence based on these learnings we believe there is a need for and are working towards designing long term transformation programs with brands and their supplier networks to lay the foundation of a circular supply chain infrastructure and catalyze their journey to NetZero.

AGRICULTURE AND FOOD SYSTEMS



Agriculture and Food Systems

Accelerating Net-Zero Transitions in Agriculture and Food Systems

Shreejit Borthakur, Senior Innovation Manager and Technology Lead, IDH and Ravi Gupta, Manager, Intellectap

Published in Impact Entrepreneur

years, he has witnessed the effects of climate change firsthand. Erratic rainfall patterns, prolonged droughts, and the increasing prevalence of pests and diseases have made it more challenging for him to maintain a stable crop yield. The rising cost of fertilizers and other farm inputs has only added to his financial burden. Rajiv is aware that his agricultural practices contribute to greenhouse gas emissions, but he feels powerless to change the situation.

Rajiv's story illustrates the challenges faced by smallholder farmers worldwide, particularly in low- and middle-income countries (LMICs). These farmers are not only struggling to adapt to the changing climate but also grappling with their role in the global emissions problem. The urgent need for net-zero transitions in agriculture and food systems calls for innovative solutions that address the unique challenges faced by farmers like Rajiv.



As climate change accelerates, transforming agriculture and food systems to reduce emissions has become a global imperative. Technologies for a net-zero transition in agriculture and food systems are playing a critical role in complementing existing climate action initiatives. **IDH and Intellectap Advisory Services** are jointly studying these technologies to better understand their potential use-cases in mitigating emissions and how they can be integrated into businesses, governments, and developmental agencies' strategies. This article provides an overview of the ongoing study and highlights some early findings related to emission hotspots, technology use-cases, benefits, and principles related to adoption in the smallholder context.

A Farmer's Struggle: The Impact of Climate Change on Smallholder Agriculture

Imagine a smallholder farmer in a low-income country, let's call him Rajiv, who has been cultivating maize for generations on his family's land. Over the

The Urgency of Net-Zero Transitions in Agriculture and Food Systems

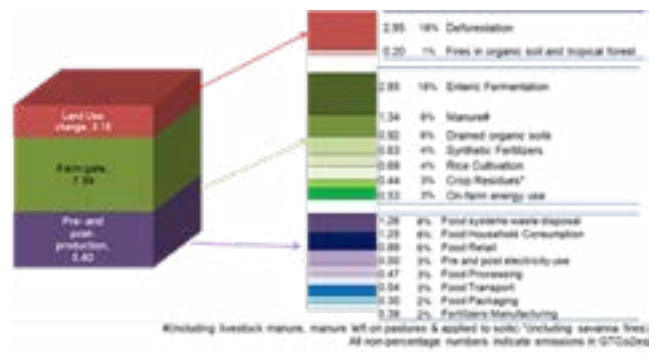
Current scientific projections indicate that the global temperature is likely to increase by a devastating 2.8°C by the end of the century if urgent action is not taken. The consequences of this increase are expected to be disastrous, with millions of people exposed to extreme heatwaves, severe droughts, and potential food insecurity.

Agriculture and food systems contribute to nearly one-third of all global emissions, or approximately 18 GtCO₂e annually. These emissions are projected to increase to 30 GtCO₂e by 2050. On a positive note, more than 70 countries, representing 76% of global emissions, have committed to net-zero targets. Many private sector stakeholders, including Nestle, Mondelez, Costa Coffee, and Inditex, have also announced net-zero commitments. However, there is still a need for more company commitments and action to accelerate net-zero transitions in agriculture and food systems.

The Role of Technology in Achieving Net-Zero Transitions

Agricultural technologies have the potential to support net-zero transitions, but their systematic review has not yet been conducted. As a result, stakeholders lack sufficient insights on which technologies work well and under what circumstances. IDH and Intellectap Advisory Services are undertaking a study to identify how technologies can enable or even accelerate net-zero transitions. The study will review emission hotspots across different value chains, evaluate relevant technologies, and provide

recommendations to scale high-priority technology use-cases, particularly for smallholder farmers in low- and middle-income countries (LMICs).



Source: FAOSTAT 2020 data (latest available)

Early Findings: Emission Hotspots, Technology Use-Cases, Benefits, and Principles

1. Emission hotspots are diverse and depend on value chains, geography, and position within a value chain; they should not be generalized.

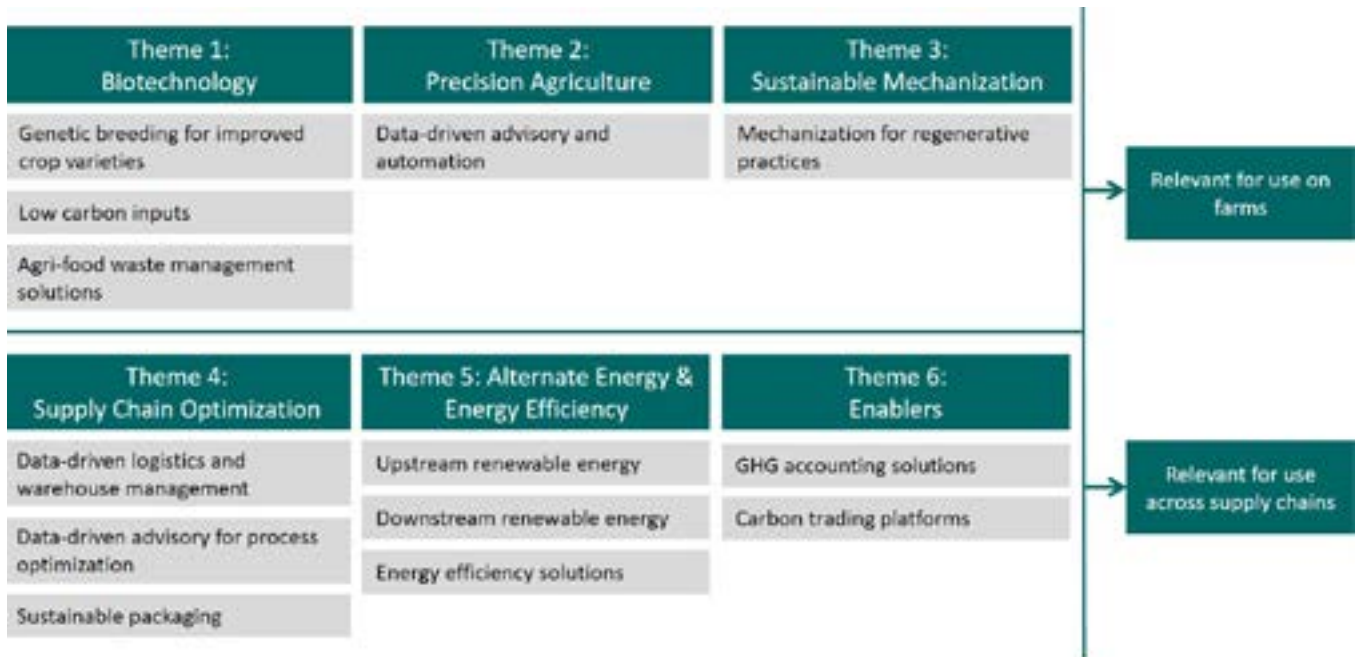
Emission hotspots vary significantly depending on value chains and geographical contexts, making them difficult to generalize. For example, enteric fermentation contributes to more than 40% of all emissions in livestock, while inefficient use of fertilizers is a key contributor in horticulture and spices. For plantation crops, land use change, specifically deforestation, is a significant source of emissions. Identifying and understanding these emission hotspots is the first step for businesses to subsequently reduce emissions.



2. Technologies are available for almost all emission hotspots, and they impact emissions through several pathways.

The study analyzed over 110 technology service providers and grouped them into six themes, containing 11 clusters of technologies that can directly contribute to decarbonization and two support clusters that indirectly enable decarbonization.

These technology clusters impact emissions through various pathways, such as reducing fossil fuel use, improving farm-level circularity and waste management, and enabling easier monitoring of land use and land cover change. Understanding these pathways can help businesses make informed decisions on adopting technologies, as the pathways often impact long-run emission reduction potential.



3. In addition to mitigation, some technologies have the potential to drive climate resilience.

Beyond climate mitigation, some technologies can also help farming systems become more resilient to climate change. Adaptive capacity, or changes in practices and farm systems, and absorptive capacity, or the ability of smallholder farming systems to withstand climate shocks, can be improved by adopting certain technologies. For instance, low-carbon inputs that can be synthesized on the farm using bio-waste boost resilience against global supply shocks. Precision agriculture can limit the overuse of farm inputs by improving resource use efficiency.

Furthermore, data collected via digital technology solutions can be used to provide crop insurance to farmers, boosting their absorptive capacity. With

rapidly changing climate patterns, businesses should consider the indirect benefits related to adaptation to encourage adoption at the last mile.

4. Adoption of technologies in low-and-middle-income countries is driven by both the potential to impact emissions and the feasibility of adoption, given the constraints of smallholder agriculture.

In LMICs, businesses should consider the feasibility of adoption alongside the efficiency of the technology. Factors such as the potential to reduce emissions, cost-reasonability, and the indirect and direct benefits of adoption should be assessed for efficiency. Meanwhile, the availability of the minimum digital and physical infrastructure, skills and capabilities, and enabling environment should be considered for feasibility. For example, precision agriculture may be highly effective in mitigating emissions but would not be useful in areas with poor internet connectivity.



5. Adoption needs to be facilitated through a robust enabling environment.

Technology providers have highlighted that scaling net-zero technologies requires support from the ecosystem, especially in the smallholder context. Areas of support consistently highlighted include research support for impact assessments, access to innovative financing instruments such as long-term debt and concessional debt, last-mile awareness and capacity-building support, and robust digital infrastructure and connectivity.

Challenges and Future Directions

The research has established significant private sector interest in leveraging technologies for decarbonizing supply chains. However, plans to test and scale such technologies need to be in place today if they are expected to be an integral part of net-zero strategies. At the same time, the research is constrained by limited data availability. Sparse data and research on cost estimates of technologies due to variations in service providers, geography, and technology complexity make decision-making difficult for companies and farmers.

IDH will explore partnerships with key players to create insights that can help stakeholders make better-informed decisions on where to invest. By embracing technology and overcoming challenges, the agriculture and food systems can be transformed to achieve net-zero emissions, ensuring a sustainable and secure future for generations to come.

Conclusion

The urgency of the net-zero transition in agriculture and food systems calls for a comprehensive understanding of the role of technology in achieving this goal. The ongoing study by IDH and Intellectap Advisory Services aims to provide insights and recommendations for businesses, governments, and development agencies to accelerate the adoption of technologies that contribute to decarbonization. With

a focus on smallholder farmers in low- and middle-income countries, the study seeks to identify the most effective and feasible technologies to reduce emissions and enhance climate resilience.

By understanding emission hotspots, technology use-cases, benefits, and principles related to adoption, stakeholders can create tailored strategies that address the unique challenges faced by farmers like Rajiv. The early findings of the study emphasize the importance of considering both the potential impact on emissions and the feasibility of adoption when selecting technologies for smallholder contexts.



The road to net-zero transitions in agriculture and food systems is riddled with challenges, such as limited data availability, lack of access to finance, and inadequate infrastructure. However, through partnerships, research support, innovative financing instruments, and capacity-building, these challenges can be addressed. The agriculture and food systems sector has a pivotal role to play in mitigating climate change, and embracing technology is key to ensuring a sustainable and secure future for all.

The research conducted by IDH and Intellectap Advisory Services will continue to delve deeper into the possibilities of technology-driven net-zero transitions in agriculture and food systems. With the findings and recommendations from this research, businesses, governments, and development agencies will be better equipped to make informed decisions and investments in technologies that enable a greener, more resilient future for the planet and its inhabitants. By working together and embracing innovation, we can achieve the net-zero future that is so critical for the survival and prosperity of the global community.

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The authors are grateful for the inputs received from **Joost Hoedjes**, Senior Innovation Manager, Better Environment, IDH and **Victor Dagnelie**, Innovation Manager, Better Environment, IDH.

Agriculture and Food Systems

Feasting on Secrets: Unearthing the Truth Behind the Food We Consume

Bikram Mahajan, Partner, Intellectap and Swapnil Pawar, Founder & CEO, ASQI

Published in Indian Retailer

This alarming statistic raises the question of how consumers would respond if they had access to information about the origins of their chocolate, differentiating between products sourced from sustainable farms versus those associated with deforestation.

The Whole Truth

Reliable traceability, from farm to fork, offers numerous benefits for making claims about ingredient source and production practices. These claims can be categorized into two broad categories: healthier growing practices, such as organic farming, and ethical sourcing, including fair trade and eliminating child labor. Additionally, the need to monitor the carbon footprint of our food choices has become increasingly significant. A report from Poore & Nemecek (2018) indicated that food production accounts for between 21 to 37 percent of global greenhouse gas emissions, highlighting the extensive carbon impact of our food systems.

Savvier Consumers, Conscientious Brands

Consumers are increasingly concerned about the environmental impact of their food choices and the quality of ingredients. Consequently, food brands are recognizing the challenges and opportunities inherent in this trend. Brands must now take greater responsibility for their manufacturing and sourcing practices, engaging with the finer points of their supply chains. By embracing transparency and traceability, these brands can differentiate

In an era of increasing consumer awareness and demand for sustainable and ethical food practices, traceability plays a crucial role in establishing trust and transparency throughout the food supply chain. Traditionally, traceability focused on ensuring ingredient quality, but with the rising concern for greenhouse gas (GHG) emissions and environmental impact, traceability now extends to tracking the carbon footprint associated with food products.

Deforestation by Chocolate

Take, for example, the tale of a humble bar of chocolate, which commences its journey in the sun-kissed cocoa plantations of West Africa. A case study conducted by Touton Group revealed that producing one ton of cocoa contributes approximately 2.8-19.5 tons of carbon dioxide to our atmosphere. According to a recent article in *The Economist*, nearly 20% of the world's chocolate products may contribute to deforestation in Africa, unbeknownst to consumers.

themselves from competitors, capture higher market share, and potentially command a premium price.

A survey conducted by NielsonIQ indicates that approximately 50% of consumers are willing to pay a premium of 2% or more for more sustainable products, while 66% express a clear preference for sustainably sourced products. Brands that view traceability as a mere cost source risk being left behind in a market increasingly driven by conscientious consumers.

A shining instance of this is in the vineyards of Torres Winery, Spain, where each bottle of wine comes with a measurable carbon footprint. By investing in carbon credits, this winery offsets its emissions, creating a balance between indulgence and environmental responsibility.

Intrinsic Constraints of Web2 Solutions

Existing traceability solutions often face challenges and friction due to the involvement of multiple stakeholders, including farmers. These solutions may lack adequate auditability, leaving room for manipulation by vested interests. Additionally, conventional “Web2” solutions suffer from closed architectures, requiring participants in the value chain to submit data and proofs exclusively through proprietary platforms. This often leads to resistance and non-participation from value chain actors. As a result, Web 2 solutions grapple with escalating hurdles related to complexity, scalability, data redundancy, and burgeoning costs, making them untenable for deployment across extended and intricate value chains.

Web3 for Traceability: An idea whose time has come

Traceability solutions built on decentralized ledgers, such as public blockchains, can overcome the limitations of conventional technology. Web3 solutions offer superior features compared to Web2 solutions in terms of trust, openness, and authenticity.

Brand Image vs. Digital Certainty: The New Trust Paradigm

DLT-based traceability solutions eliminate the need for users, including consumers and food brands, to rely solely on the word of the solution provider. The decentralized nature of blockchain technology ensures tamper-proof data integrity, as blockchain-based ledgers are “append-only.” Such security and transparency are not possible in traditional Web2 solutions.

Take the case of Bumble Bee Foods, a seafood company that implemented blockchain technology to bring unprecedented transparency to its supply chain. As a result, consumers can trace the journey of their yellowfin tuna from “bait to plate,” gaining insight into the product’s origin, freshness, safety, and environmental impact. Moreover, it enabled the company to tangibly demonstrate its commitment to sustainable fishing practices, underscoring the multifaceted benefits of food traceability.

A Quantum Leap: Web3’s Open Architecture Triumph over Web2 Silos

Web3 solutions also offer the advantage of an open architecture. The authentication of data submitters relies on their public key, reducing the need for specialized middleware to transfer data between systems. In contrast, Web2 solutions require access control, rights management, and credential verification at each step, leading to increased complexity.

The Giants are Embracing Web3

Walmart, a notable example of early adopters, implemented traceability solutions in its marine products division in 2021. This initiative aimed to improve safety and convey product quality to consumers. Traceability is becoming increasingly important throughout the food value chain. However, conventional technologies face limitations in ensuring effective traceability, particularly regarding auditability and closed architectures. Decentralized ledger-based approaches, such as web3, offer significant advantages in these areas, alongside numerous other benefits.

Then, we have the audacious experiment by Microsoft and Starbucks. By harnessing the potential of blockchain technology, they have embarked on a journey to enhance the transparency of their coffee supply chain. Their initiative promises to bring to light the carbon emissions associated with every cup of coffee savored by consumers, thus creating an unprecedented level of awareness and accountability.

The UN Food and Agriculture Organization states that if about a third of the food that gets lost or wasted were saved, it could feed more than 870 million people. Technology like IBM’s Food Trust, which uses blockchain to reduce waste in the supply chain, can play a pivotal role in addressing this issue while curbing carbon emissions.

Who Foots the Bill for Transparency

Web 3 solutions for traceability and carbon credits hold tremendous potential to revolutionize the food value chain. They promise to enhance productivity by enabling real-time, unbroken tracking; bring about economic benefits by reducing food wastage and meeting consumer demand for transparency; and accrue financial benefits to brands by offering sustainable food products at a premium price. As our food systems continue to evolve, blockchain may well be the key ingredient in cooking up a more sustainable, efficient, and equitable future.

Nurturing the Roots of a Greener, More Sustainable Food Chain

Traceability in the food value chain is catalyzing significant socio-environmental impact. As a powerful instrument to build trust and transparency, traceability propels sustainable agriculture, mitigates food spoilage and waste, curtails emissions, amplifies the assurance of quality and safety throughout the food supply chain, boosts farmers' earnings, and cultivates more equitable trade practices.



Agriculture and Food Systems

Revolutionising agriculture in India: The impact of disruptive technology start-ups

Ambika Chandra, Associate, Intellectap

Published in Hindu Business Line

key role in fueling its growth. Technologies such as surveillance and smart irrigation systems, both of which have the potential to transform the industry, as well as precision agriculture and drone-based monitoring of crops, will drive it. According to the Niti Aayog, AI in agriculture is expected to grow at a rate of 22.5 per cent CAGR, and is likely to be valued at \$2.6 billion by 2025.

Biggest advantage

One of the biggest advantages of DAT is its ability to provide real-time information to farmers about their crops. For example, sensors can be used to measure soil moisture levels, allowing farmers to better irrigate their crops. This not only reduces water consumption but also increases productivity and quality. Similarly, precision farming techniques can be used to increase fertilizer use efficiency, reduce waste, and improve soil health.

The adoption of DATs is already underway in India, with start-ups such as CropIn and Ninjacart leading the way. CropIn provides farmers with real-time information on crop health and weather conditions, while NinjaCart uses a technology platform to directly connect farmers and retailers, reducing waste and increasing profits for both parties. However, to reach the full potential of DATs in India, support and resources are needed for agtech start-ups in this space. crowdfunding Overcoming this requires new sources of funding, such as impact investors and crowdfunding platforms.

One of the biggest challenges they face is funding as traditional venture capitalists are reluctant to invest.

Agriculture has long been the backbone of the Indian economy and provides livelihood to a large section of the population. But with the world becoming increasingly connected and technology advancing rapidly, agriculture in India is poised for major changes. Disruptive agricultural technologies (DATs) have the potential to change the way farmers work, increase yields, reduce waste, and improve production. In this article, we will explore the impact of DATs on agriculture in India, as well as the support and infrastructure needs for agtech start-ups in this space.

According to a recent report by the National Association of Software and Services Companies (NASSCOM), India's agriculture sector could reach \$24 billion by 2025, with DAT approval playing a

Another challenge agtech start-ups face is the lack of infrastructure and support systems. For example, many farmers in India do not have access to the internet and other digital technologies, making it difficult for them to use DATs. To address this, partnerships between agtech start-ups and local governments and NGOs can help provide farmers with the services and training they need to adopt this technology.

Innovative initiatives in India have provided just such support to both agtech start-ups as well as smallholder farmers to improve access to and adoption of disruptive agriculture technologies. Intellectap designed and implemented a unique proposition, the 'SMART Agtech Integration Facility 2022', for the Government of Maharashtra and the World Bank in a joint endeavour to build a resilient and robust agriculture technology ecosystem in the state.

This is a unique collaborative concept which connected over 35 DAT solution providers with more than 200 community-based organisations (CBOs)

and provided them with the most relevant solutions to address their critical technological needs. Similarly, Intellectap implemented the 'Odisha AgTech Challenge 2022' for the Government of Odisha, the World Bank and the Foreign, Commonwealth & Development Office of the UK to solve critical issues in key agriculture value-chains and increase farmer profitability in Odisha. It invited agtech enterprises working in key agriculture value chains to test or scale their product through a pilot project in the state, and provided financial support through grants to scale up their operations, as well as outreach, incubation and mentorship support, in addition to on-ground network support for the same.

In conclusion, the adoption of DAT has the potential to transform the agricultural industry in India, increasing productivity, reducing waste and improving productivity but to achieve this potential, this area is needed support and resources for agtech start-ups, with additional funding and partnerships with local governments. By supporting more disruptive agtech start-ups, we can build a sustainable and profitable agriculture industry in India.



CLEAN ENERGY AND CLIMATE



Clean Energy and Climate

Renewable energy's soaring ascent: Fueling growth, overcoming hurdles, and forging an inclusive future

Shruti Deora, Partner, Intellectap

Published in ET Energyworld

The International Renewable Energy Agency (IRENA) estimates that 90 per cent of the world's electricity can be generated from renewable sources like solar, wind and green hydrogen by 2050. Clean energy can help countries reduce their reliance on imported fossil fuels, ensure inclusive economic growth, create new jobs (estimated 42 million by 2050), and reduce poverty. The trajectory of renewables is marked by remarkable achievements, persistent challenges, and promising avenues. Let's delve into this transformative journey.

Renewable energy has taken giant leaps forward. In 2022, the world added more power from sources like wind and solar than any other year, reaching about 340 GW. Multiple forces are driving the adoption of renewable energy. Reduced costs, heightened environmental consciousness, and growing energy security concerns, have compelled governments, businesses, and individuals to embrace greener energy sources. In 2023, the world will add even more renewable power, ~107 GW, the biggest increase yet. However, renewables share has remained steady over the decades – at around 17 per cent of total final energy consumption.

Policies such as REPowerEU in the European Union, the Inflation Reduction Act (IRA) in the United States and China's 14th Five-Year Plan for Renewable Energy, are expected to help accelerate the growth of renewable electricity in the next few years.

Clean energy can help countries reduce their reliance on imported fossil fuels, ensure inclusive economic growth, create new jobs (estimated 42 million by 2050), and reduce poverty.

Imagine, if your car could clean the air instead of polluting it. Or that you got paid to cycle to work?

These are some of the ideas that people are working on to make the world 'net zero'. Net zero means that we stop adding more greenhouse gases (GHGs) to the atmosphere than we can remove. 97 countries, covering ~79.3 per cent of global GHG emissions, have communicated a net zero target.

Transitioning to a net-zero world requires us to completely transform how we produce, consume, and move. Over 75 per cent of global GHG emissions and 90 per cent of all carbon dioxide emissions comes from the burning of fossil fuels – coal, oil and gas.

Renewable energy also has its share of challenges. The integration of intermittent sources into grids and efficient energy storage remains a puzzle. The Government needs to use hybrid energy systems to keep the grid stable. We need new ways to store energy. We can also make more green hydrogen, if we agree on the global regulations and standards for it.

The world cannot rely on a few countries and companies for renewable energy deployment. If the supply is disrupted for any geopolitical, economic or environmental reasons, the progress of renewable energy will be at risk. The recent G20 meeting of energy ministers acknowledged the need to promote non-discriminatory international energy markets; maintain sustainable supply chains of critical minerals, materials, as well as semiconductors and related technologies.

The world spent more (USD 1.3 trillion in 2022) on energy transition technologies in 2022, but also more on fossil fuels. Fossil fuel subsidies amounted to \$7 trillion, or 7.1 per cent of global GDP². Annual investment of over USD 5 trillion until 2030 is required with a high share of renewable energy in the primary energy mix. The G20 states that it will work towards facilitating access to low-cost finance for clean and sustainable energy technologies. However, no substantial commitments were made here.

Gender equality needs to be seen as a key part of energy projects to unlock the full potential of renewable energy. Women suffer more from the lack of energy due to their traditional roles in society. Women's lives can improve significantly with access to renewable energy in terms of better health, reduced workload, thereby giving them more time for education and income generation. Studies from the International Finance Corporation (IFC) reveal that increasing women's participation in the renewable

energy sector could improve the economy, environment, and efficiency.

Yet, women's participation across technical, leadership, and entrepreneurial roles remains limited. Initiatives like the GroW Network are actively working to change this by empowering women in green and climate finance.

India is leading the way in renewable energy. It has already achieved its first target of 40 per cent renewable energy capacity and now aims for 50 per cent by 2030. India's transition to a net-zero economy by 2050 presents an investment opportunity of greater than \$12.7 trillion. Ancient Indian literature has various references of the importance of sun, wind and water as natural resources. For example, Arthashastra 2.24.27, Chanakya mentions of using windmills to lift water for irrigation purposes: पवनेनोत्पादितोदकं कृतस्मनंकृतस्मनस्य कालस्य समाहरेत् which means water raised by wind-power should be collected throughout the year. India's One Sun One World One Grid (OSOWOG) initiative plans to connect nearly 140 countries. Once the grid is fully functional, the power generated in the daytime in one part of the world can be sent to other parts of the world, where it is night.

The future of renewable energy appears remarkably promising. As the world embarks on ambitious carbon neutrality targets, innovations in energy storage are expected to bridge the gap between intermittent energy supply and demand. Furthermore, the advent of distributed energy generation is revolutionizing energy dynamics, with communities and households transitioning from being passive consumers to active producers of clean energy. The road ahead is marked by challenges and opportunities – let's tread it together, driven by the force of renewable energy, sustainability, and gender inclusion.



Clean Energy and Climate

How Technology can be leveraged to achieve Environmental Sustainability Goals

Kavya Hari, Manager, Intellicap and Jaya Jain, Senior Associate, Intellicap

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60 per cent of emission reductions required for stabilizing the climate by 2050, if deployed at scale.



In this article, Kavya Hari and Jaya Jain say that an ecosystem approach entailing the key stakeholders, including enterprises, policymakers, and public and private investors, would accelerate the deployment of climate technologies, and enable climate resilient growth and achievement of environmental sustainability. This would facilitate the transition to a global netzero economy by 2050 and bring us closer to achieving the goals of the Paris Agreement.

Impact of Technology on Sustainability

Achieving the goals of the Paris Agreement requires global greenhouse gas (GHG) emissions to be reduced to 50 per cent (of current levels) by 2030¹. Capital and technology are two critical factors that can enable climate resilient growth and achievement of environmental sustainability. It is estimated that mature climate technologies could deliver around

There are multiple examples to demonstrate how technology is a critical lever in enabling sustainability—both at an organizational and sectoral level. Technologies play a critical role in paving the pathway towards sustainability by providing solutions to improve efficiency, reduce resource consumption, and enhance resilience. Energy efficient technologies (especially digitally integrated technologies such as energy management systems, smart meters, and sensor, etc.) optimize energy usage in applications, buildings/industries, and transport systems; thereby reducing fossil fuel consumption and emissions. According to the International Energy Agency,

¹ IIF - Taskforce on Scaling Voluntary Carbon Markets (2021)

deployment of energy efficient technologies (like LED lighting, efficient appliances, and smart thermostats) enabled higher reduction in energy consumption by up to 15 per cent in 2021².

Technology-enabled innovations are also playing a critical role in agriculture. Techniques such as precision farming reduce input (i.e., water and fertilizers) usage and improve crop productivity. This has led to increased climate resilience of agricultural systems. Various studies estimate that internet-of-things (IoT) enabled micro-irrigation and variable rate fertilizations have decreased water and fertilizer usage by up to 30–40 per cent.

Innovations in mobility (such as electric vehicles, shared mobility solutions, and smart transport systems) have reduced traffic congestion and fossil fuel consumption. Further, circular economy technologies are evidenced to create sustainable and efficient systems for production, consumption and waste disposal that improve resource efficiency and reduce waste. A report by Ellen MacArthur Foundation states that circular economy approaches (in five sectors of cement, steel, aluminum, plastic, and food) can reduce global emissions up to 40–50 per cent by 2050³.

Moreover, emerging technologies such as blockchain and carbon capture and storage (CCS) are increasingly transforming environmental sustainability outcomes. Blockchainbased platforms improve supply chain transparency and promote responsible sourcing of resources/materials by providing an efficient mechanism for recording and tracking of unique transactions.



Landscape of Climate Investment

The intersection of technology and sustainability is also evident from the rising trend of investments in the climate tech sector, despite macroeconomic and geopolitical crises that severely impacted global capital markets. This is mainly driven by the increasing commitments of private and public sector actors on climate action and by investors on funding for environment, social and governance (ESG) and net-zero⁴. The number of corporates committing to science-based targets more than doubled in one year to reach over 2200 in 2022. With respect to state commitments, 30 countries and the European Union have set net-zero targets as part of a policy or regulation, and more than 100 countries have either proposed or in the process of defining net-zero targets as of March 2023⁵. As for financiers, more than 450 financial institutions have pledged around \$130 trillion to support investments for achievement of net-zero goals as a part of the Glasgow Financial Alliance for Net-Zero.



Globally, more than \$260 billion has been invested in climate-tech since 2018, of which \$50 billion was accounted for in 2022. Moreover, there was an increased rate of investment in sectors with higher potential for emission reduction. While in 2021, 35 per cent of climate-tech investment was attributed to sectors accounting for 85 per cent emissions; in 2022, 52 per cent of the funding was diverted towards those sectors (i.e., energy, food, agriculture and land-use, industry and built environment). Mobility and the transport sector continued to have the highest share of total climate tech investments at 48 per cent in

² IEA - Energy Efficiency (2021)

³ EMF - Circular Economy and Climate Change (2021)

⁴ PwC - Climate Tech Investing (2022)

⁵ Climate Action Tracker - Net Zero Targets (2022)

2022, followed by 27 per cent share in energy and 12 per cent in the food, agriculture, and land-use sector⁶.

The ecosystem of climate-tech investment has evolved significantly over the last few years, with an increased focus on 'deep-tech' and 'carbon-tech' solutions. Deep-tech solutions consist of innovations in segments of artificial intelligence, robotics, blockchain, drones, advanced materials, etc. Some use-cases include green hydrogen, peer-to-peer energy trading through blockchain, drones for precision agriculture, farm analytic platforms, energy storage, climate risk and analytics platform, etc. Carbon-tech typically comprises of solutions that enable carbon sequestration such as carbon capture utilization and storage (CCUS), carbon removal technologies, direct-to-air capture, carbon credit marketplace, and procurement platforms, etc. The prevailing investment trends also lay evidence of this global shift. Carbon-tech had a breakthrough in 2022 (at ~\$48 billion), with more than 1.5x growth in investment for CCS technology over one year. Similarly, climate management (comprising of emissions and sustainability reporting, climate risk and analytics platform, remote sensing, ESG investing and fintech) and industry (consisting of low carbon cement, steel, manufacturing, circular economy commerce, sustainable textiles and packaging, waste, and recycling) showcased a steady increase in investments between 2021 and 2022. Within the food, agriculture and land-use sector, there is increased investment in disruptive technology (like precision agriculture, farm analytics software, drone-based MRV, portable soil testers, etc.) that play a key role in emission reduction at the farmgate level, pre- and post-production, and resource conservation. A recent estimate by McKinsey suggests that 'next-generation' climate-tech across the sectors of agriculture, electrification, carbon capture, hydrogen, and power grid (comprising segments of 'deep-tech' and 'carbon-tech') could attract \$1.5-\$2 trillion of capital investment annually by 2025⁷.



6 PwC – State of Climate Tech (2022)

7 McKinsey – Executives Guide to Climate Technology

8 PwC – Climate Tech Investing (2022)

9 Climake and Unitus Capital – State of Climate Finance in India (2023)

Key Barriers to Leveraging Technology for Achieving Environmental Sustainability

Despite the demonstrated benefits, and an increased flow of funding for climate-tech, there persists a significant investment gap in the integration of technology towards achieving environmental sustainability. Low level of investments for early-stage climate tech, skewed funding towards certain sectors, and lack of diversity in capital sources and instruments could be attributed as key reasons for the investment gap.



Decreasing investments for early-stage climate tech

Even though the investment trend for the climate-tech sector has followed a steep upward trajectory, financing is largely skewed towards later stages of funding, i.e., series A and B. According to a recent report by PricewaterhouseCoopers (PwC), venture capital investment in climate tech for deals amounting to less than \$5 million has declined by a staggering 66 per cent from 1620 deals to 556 deals from 2019 to 2022, demonstrating a decline in total investment of 64 per cent from \$1.3 billion to \$0.45 billion. On the other hand, venture capital funding for deals between \$5 million and \$1 billion increased by 73 per cent in the same period, reaching a whopping \$71 billion in 2021⁸. In India, equity funding for climate tech in 2022 was dominated by eight large IPO and post-IPO deals worth \$5 billion. Investments at the seed stage stood at a very low \$112 million⁹. If early-stage enterprises are unable to raise initial and pre-seed funding, the sector could start witnessing stagnancy in innovation and declining pipeline of climate tech start-ups.

Skewed funding at the sectoral level

Mobility and ag-tech continue to dominate the climate tech investment landscape at a sectoral level. Globally, mobility solutions attracted 61 per cent of the total venture capital funding in 2021¹⁰. In India, ag-tech funding grew by 20 per cent from 2021 to 2022¹¹. This has resulted in a significantly lower share of funding for emerging sectors (such as circularity, built environment, etc.) Moreover, funding trends are skewed towards mitigation technologies. There is a critical need for increased investments towards adaptation technologies (like climate-proofing infrastructure, technologies for productive use of energy, clean cooking, water technologies, etc.) According to the UNEP Adaptation Gap Report 2022, the estimated annual adaptation needs are USD 160–340 billion by 2030 and USD 315–565 billion by 2050¹².

Limited diversity in sources and instruments of capital

Capital sources for technology-enabled solutions achieving environmental sustainability are dominated by venture capital and private equity. There is a lack of development finance, debt capital providers, and sovereign finance. Further, deployment of innovative funding mechanisms, including green bonds, risk mitigation instruments, results-based financing, and blended finance instruments, is largely limited. For instance, the Clean Technology Fund (CTF) that provides resources to scale up low-carbon technologies in developing countries, expects the largest share of co-financing (32%) to come from the private sector for its 161 projects in the pipeline, while a low 12 per cent to flow from Governments¹³. The lack of investments from public sources and international development institutions undercuts the economic attractiveness of capital-intensive clean technologies.



An Ecosystem Approach for Effective Integration

To effectively and efficiently leverage and scale technology interventions to enhance environmental sustainability, an ecosystem approach would be required that brings together networks, knowledge, capital, and innovation would be required. This could include: (i) driving collaboration in the development and deployment of innovative technologies through industry coalitions or partnerships with climate innovators; (ii) strengthening demand signal for emerging climate-tech solutions through initiatives that aggregate demand and/ or enable market creation (examples include First Movers Coalition and Frontier Climate); and (iii) developing innovative financing modalities (such as blended finance structures, partial risk guarantee funds, etc.) for early-stage climate-tech funding to reduce the perceived risk of private investors.

Such an ecosystem approach entailing the key stakeholders, including enterprises, policymakers, and public and private investors, would accelerate the deployment of climate technologies, and enable climate resilient growth and achievement of environmental sustainability. This would facilitate the transition to a global net-zero economy by 2050 and bring us closer to achieving the goals of the Paris Agreement.

¹⁰ PwC - Climate Tech Investing (2022)

¹¹ Climake and Unitus Capital – State of Climate Finance in India (2023)

¹² UNEP – Adaptation Gap Report (2022)

¹³ Clean Technology Fund

Clean Energy and Climate

The climate-gender nexus

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men. Women also bear the brunt of climate change impacts on agriculture, water and energy, as they are often responsible for managing these resources for their families and communities. Moreover, women have less access to education, information, finance and technology that could help them cope with and adapt to climate change.

Recognising and addressing these gendered impacts is crucial for effective climate action. One key aspect of achieving this is by actively engaging women leaders such as elected women representatives (EWRs), local women entrepreneurs, and women farmers in shaping and implementing climate solutions at the grassroots level. 41% of households are still using solid fuels for cooking resulting in air pollution, respiratory diseases and premature deaths. Women-led development will happen when women leaders become active agents of change in public and political avenues. Women can play a vital role in mitigating greenhouse gas emissions, using clean and renewable energy sources, and promoting low-carbon lifestyles. Women also have a strong potential to lead and participate in adaptation efforts, enhancing their resilience to climate shocks, diversifying their livelihoods, and strengthening their social networks.

We recently completed three decades to the historic 73rd and 74th Amendment Acts, which provided women with 33% reservation in local panchayats and urban local bodies. EWRs have the potential to bridge the gender gap in climate action by advocating for

According to the United Nations, women make up 80% of the people displaced by climate change, they are also at a greater risk of sexual violence and more likely to die from natural disasters than men, writes Shruti Deora.

Climate change is a global challenge that requires urgent action and innovative solutions. It is not just an environmental issue but also a social and economic one. Climate change is affecting every aspect of our lives, from health and food security to migration and conflict. India is witnessing an increase in the severity and frequency of climate-related events.

However, not everyone is equally affected by climate change. Women and girls, especially in developing countries, face disproportionate risks and burdens due to their social roles, economic status, and cultural norms. According to the United Nations, women make up 80% of the people displaced by climate change, are at a greater risk of sexual violence and are more likely to die from natural disasters than

gender-responsive approaches, ensuring equal participation, mobilising their communities, and prioritising the needs of vulnerable groups. Firstly, their presence in decision-making bodies ensures that the concerns and experiences of women are represented and integrated into climate change policies and strategies. Secondly, EWRs have a deep understanding of their communities and a direct connection to the challenges faced by women and marginalised groups. This enables them to create context-specific climate adaptation strategies. EWRs can work towards building community resilience by incorporating traditional practices, indigenous knowledge, and innovative solutions that address the vulnerabilities of their localities. Third, through their elected positions and community networks, they can raise awareness about the impacts of climate change, promote sustainable practices, and encourage behaviour change. EWRs can initiate and support community-led initiatives such as afforestation drives, waste management programmes, renewable energy projects, and climate education campaigns. Lastly,

EWRs can advocate for gender-responsive climate policies. They can influence budget allocations and programme implementation to ensure that the needs and perspectives of women and marginalised groups are considered.

In addition to EWRs, the engagement of self-help groups (SHGs) and local women entrepreneurs is crucial in climate adaptation. These groups and individuals can play a significant role in implementing sustainable community and business practices and building resilience at the grassroots level. SHGs and local women entrepreneurs bring valuable local context and can drive customised solutions, strengthening the overall climate adaptation efforts.

As the world prepares for the COP28 summit in UAE later this year, it is crucial that we put women and their voices at the heart of our climate agenda, to accelerate our race to net zero and build a more inclusive, resilient and green future for all.



Clean Energy and Climate

Biodiversity Financing— Going Beyond Public Finance

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Published on Medium

well-being and cultural and spiritual activities are intrinsically linked to nature. Nature also serves as our savior when it comes to hazards and extreme weather events. The contribution of biodiversity to our lives cannot be overestimated, but it has often been underestimated in many studies due to difficulties associated with its valuation and the limitations of our approaches.

However, with the world obsessed with valuation and pricing, scientists have estimated the annual value of biodiversity services, and different estimates range from USD 120 trillion to USD 160 trillion every year. But biodiversity is invaluable. In the absence of it, there is no life, and you cannot put a monetary value on humanity.

The Need for Biodiversity Financing

Conserving and restoring biodiversity requires a significant investment in biodiversity conservation and restoration. The total funding required for this is estimated to be in the range of USD 722 billion to USD 967 billion, but only a fraction (USD 78 billion to USD 143 billion per year) of this is currently available.¹ Presently, biodiversity financing primarily relies on public finance, with private financing accounting for less than 15 percent.²

While our businesses and policymakers are now increasingly committed to reducing GHG emissions, they do not yet realize the gravity of the situation that we are going to face due to the rapid loss of biodiversity. Species extinction or the loss of biodiversity is caused by many factors, but the human-induced loss is alarming. Human activities have caused species to become extinct 100 times faster than natural causes.

The loss of biodiversity reduces nature's capability to provide us with some of the most critical services and products on which human life depends. The air we breathe, the water we drink, the food we eat... all originate from nature. Beyond this, our mental

¹ https://www.paulsoninstitute.org/wp-content/uploads/2020/10/FINANCING-NATURE_Full-Report_Final-with-endorsements_101420.pdf

² https://www.paulsoninstitute.org/wp-content/uploads/2020/10/FINANCING-NATURE_Full-Report_Final-with-endorsements_101420.pdf

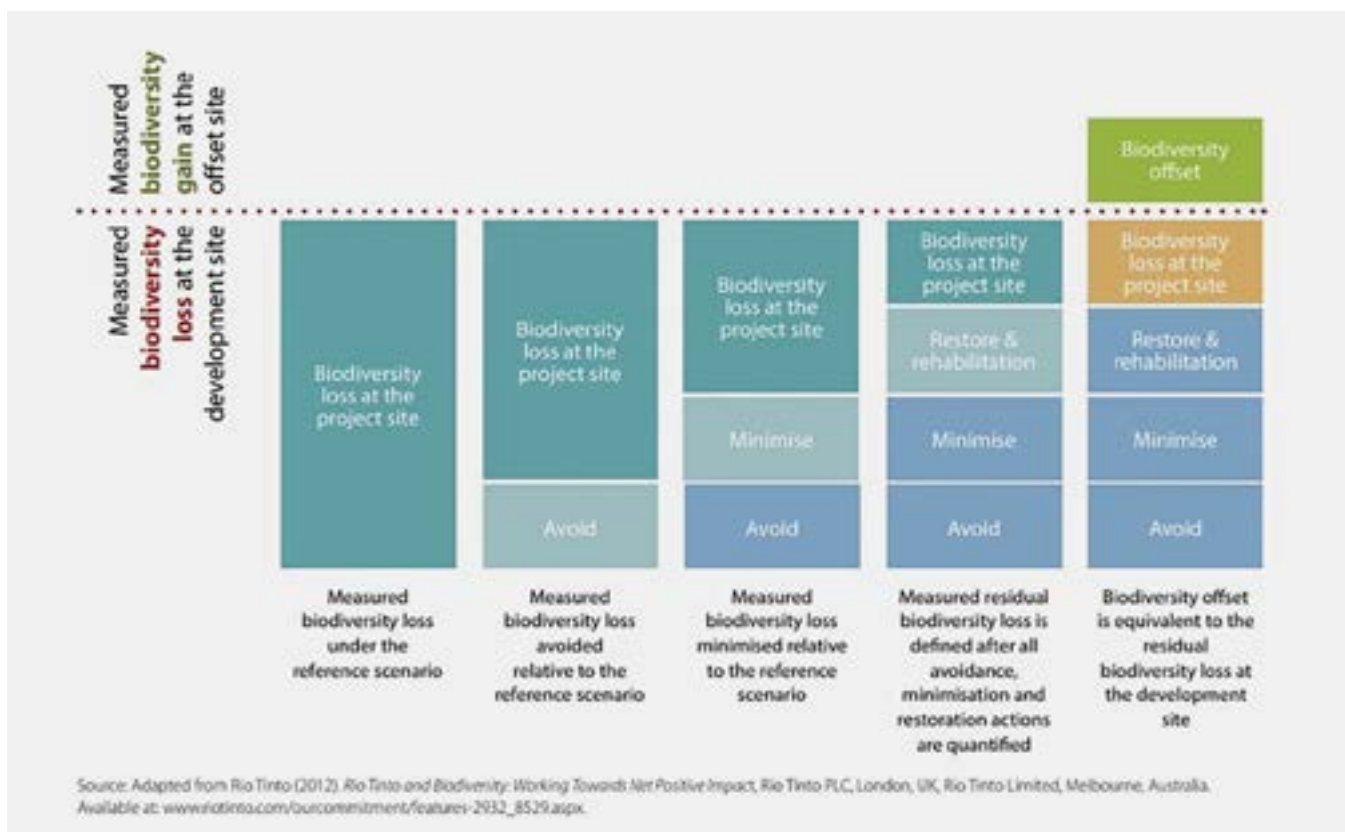
A lack of financing for biodiversity conservation and restoration remains a challenge, a more serious challenge is the money flowing into activities that are destroying biodiversity. Globally, governments are spending six times more on activities that harm biodiversity than on restoring or protecting it. Subsidies going to sectors such as agriculture, forestry, fishery, and fossil fuel production need to be vetted to ensure that biodiversity loss is minimized.

The Biodiversity Financing Gap – Going Beyond Public Finance

The USD 500 billion-a-year biodiversity financing gap requires innovation in financing mechanisms and leveraging all available options. Sustainable investment instruments, such as green bonds and sustainability bonds, can be great options as they have provided much-needed capital inflow for sustainability agendas. According to the Climate Bond Initiative report, in 2022, the total volume of these bonds was USD 858.5 billion, but the share allocated to the biodiversity sector remains very low. Only around USD 50 billion has been directed towards

sectors that may have biodiversity relevance, while the rest went to sectors such as renewable energy, energy transition, sustainable transport, agriculture, etc. A dedicated focus by government agencies and development finance institutions can help channelize more capital into the biodiversity sector.

The other options are biodiversity offsets and biodiversity credits. Biodiversity loss is sometimes unavoidable despite taking all feasible measures. In these situations, biodiversity offsets come into play to ensure that there is at least no net loss of biodiversity. A typical example of a biodiversity offset is the enforcement of restoring forests, wetlands, etc., in another location/site to compensate for the unavoidable loss of forests or wetlands due to road construction or mining (see the graphics below). Biodiversity offsets are already being enforced in several countries (you can explore the database of offset policies here), albeit in a limited way, contributing around USD 6.3 to 9.2 billion per year. Biodiversity offsets have the potential to contribute USD 162–168 billion every year by 2030³.



Source: Biodiversity Offsets – Effective Design and Implementation

3 https://www.paulsoninstitute.org/wp-content/uploads/2020/10/FINANCING-NATURE_Full-Report_Final-with-endorsements_101420.pdf

Biodiversity credits are similar to biodiversity offsets, but unlike biodiversity offsets, they are not only meant for negating biodiversity loss. Biodiversity credits are used to channelize capital for any biodiversity projects that have a positive impact on species, nature, or ecosystems. This is not a new concept, as we have seen numerous transactions involving these biodiversity credits.

In Colombia, the conservation and restoration of the Bosque de Niebla forest leveraged Voluntary Biodiversity Credits (VBCs) created by Climate Trade and Terrasos. Each VBC corresponds to 30 years of conservation and protection of 10 square meters of the Bosque de Niebla forest and was priced at USD 30⁴. Similar biodiversity credit transactions have also been carried out in Australia and New Zealand.



4 <https://climatetrade.com/climatetrade-and-terrasos-jointly-promote-voluntary-biodiversity-credits-to-support-biodiversity-conservation/>

Clean Energy and Climate

Green Pioneers: 4 Startups Leading The Climate Change Charge

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Published in Youth ki Awaaz

themselves, and with each other, with established companies, research institutions, and government bodies to pool resources, share knowledge, and collectively work towards common sustainability goals.

The success of startups in the fight against climate change goes beyond individual enterprises. It involves the creation of a green ecosystem where sustainable practices become the norm rather than the exception.

As startups champion eco-friendly technologies and business models, they inspire larger corporations to adopt similar practices, creating a ripple effect throughout the business landscape. Startups continue to drive change and set new benchmarks for sustainability, and their impact on the global climate fight is bound to intensify, offering hope for a greener, more resilient planet.

At the heart of all of this lies the critical lever of catalytic capital. Estimates indicate that climate finance must increase by 590% to \$4.35 trillion annually by 2030 to achieve global climate objectives. This injection of capital is crucial for startups to scale their operations, conduct research and development, and bring innovative solutions to market faster.

The success stories of Angaza Foods, Strawcture Eco, Hasiru Dala Innovation, and REVY Environmental Solutions underscore the power of startups to develop and implement sustainable practices across diverse

As the world grapples with the ever-increasing challenges of climate change, startups from emerging economies are coming up as crucial players in the race toward sustainability. The innovative spirit inherent in these enterprises is driving the development of groundbreaking solutions that have the potential to reshape industries and contribute significantly to global climate goals.

Unlike established corporations, startups are often unencumbered by legacy systems, allowing them to adopt and implement green technologies swiftly. They are uniquely positioned to disrupt traditional industries and introduce sustainable practices. This agility enables them to experiment with novel ideas and adapt quickly to market demands, making them invaluable contributors to the fight against climate change.

Collaboration is a key aspect of the startup ecosystem, and it plays a vital role in the fight against climate change. Startups often collaborate amongst

industries, as evidenced at the recently concluded 15th Sankalp Global Summit 2023 where each of them received USD \$20,000 as winners of the Sankalp X Artha Impact Global Awards.

Angaza Foods: Cultivating Green Prosperity

Angaza Foods is a trailblazer in the agricultural sector, particularly in the export of fresh fruits, with avocados taking center stage in their portfolio. What sets them apart is their dual commitment to environmental sustainability and economic growth. Beyond exporting fresh produce.

Angaza Foods has pioneered the production of avocado oil, a versatile product used for culinary purposes and as a key ingredient in hair care products. By creating a market for avocado oil, the company not only adds value to its primary product but also promotes sustainable farming practices. This innovative approach fosters a circular economy, benefitting both the environment and local economies.

Strawcture Eco Pvt. Ltd.: Building a Sustainable Tomorrow

Strawcture Eco Pvt. Ltd. is revolutionizing the construction industry with its commitment to carbon-negative materials. By utilizing alternate natural feedstock, the company produces materials that actively offset the embodied carbon footprint of buildings. Architects, designers, and project management consultants (PMCs) play a pivotal role in integrating Strawcture Eco's products at the design stage.

This forward-thinking approach not only reduces the environmental impact of construction but also educates and influences key decision-makers in the industry. Strawcture Eco exemplifies how startups can drive change by providing sustainable alternatives in sectors traditionally associated with high carbon emissions.

Hasiru Dala Innovation Pvt. Ltd.: Pioneering Inclusive Circularity

Hasiru Dala Innovation Pvt. Ltd. stands out for its mission to create a waste-free world, guided by the principle of Inclusive Circularity™. The startup is dedicated to integrating waste pickers into the evolving circular economy value chain. By developing innovative circular economy business models, Hasiru Dala empowers waste pickers to actively participate in waste management, recycling, and upcycling.

This not only addresses environmental concerns but also fosters social inclusivity and economic empowerment. Hasiru Dala's approach exemplifies how startups can be catalysts for positive change by prioritizing inclusivity in their sustainability initiatives.

REVY Environmental Solutions Pvt. Ltd.: From Waste to Resource

REVY Environmental Solutions Pvt. Ltd. specializes in waste management, focusing on converting waste into reusable resources. Their expertise lies in the Anaerobic Digestion (AD) process, which transforms organic waste into bio-methane. By providing sustainable waste treatment solutions.

REVY Environmental Solutions contributes to reducing greenhouse gas emissions and mitigating the environmental impact of landfills. The company's commitment to turning waste into a valuable resource showcases how startups can innovate within the waste management sector to create a more sustainable and circular approach to resource utilization.

These four startups from emerging economies are not just businesses; they are agents of change, demonstrating that innovative solutions can emerge from unexpected places. By addressing environmental challenges while simultaneously contributing to economic development and social inclusivity, these enterprises showcase the transformative power of startups in the global fight against climate change.

As they continue to lead the way, their stories inspire others to think creatively, act responsibly, and strive for a sustainable and prosperous future.



IMPACT INVESTING



Impact Investing

Seed to IPO: A Venture Investor's Perfect Dream

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*Published in Indian Venture and Alternate
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In early 2000, our investment decisions were both similar and different to current VC decision-making in the broader investing market. The difference extended not just to how we operated but also to the manner we imagined the future of the company.

Like every generation of VCs, the management team and its founder leader were key diligence items for us and consumed most of our time, but when it came to the business model, our diligence used to focus on profitability (a term that lost its relevance for some time but has found its mojo back post-2021) and sustainability of scale.

In 2009, when I met the founder of Utkarsh Small Finance Bank, we were seeking out a trustworthy leader from banking or finance around whom we could build an incubated start-up in microfinance in Eastern UP to scale and build market credibility for low-income states as a destination for microfinance.

In Govind Singh, we thought we found a person who was credible and trustworthy and a worthy partner. Our diligence needed us to find verifiable evidence of his ability to be long term, be decisive, and act speedily. We put a few conditions in front of him, and I share those conditions and our thinking behind those questions:

- ◇ If you are convinced about the opportunity, would you be willing to quit your job without any commitment to our capital? The purpose of the question was to test his



Aavishkaar, a pioneering impact fund manager that does multi-stage investing, recently saw its fourth seed to IPO story play out with the listing of Utkarsh Small Finance Bank. Every success has a good story behind it, and here is an attempt to share our thinking behind the investment and what kept us going till the IPO and further.

All seed investments are made with the belief of great unrealized potential. The challenge with potential is that it does not get realized often, and hence, seed investors are unsure of how long to stick out with their early investments.

Aavishkaar's journey started in early 2000, and given the very scarce follow-on markets, our focus used to be on sustainability and profitability at the start-up. All capital raises were directed toward securing the company and its growth, and secondaries for seed/angel investors or for promoters were not even on the discussion table.

conviction in the idea and if he was decisive enough. We wanted to be his support but not his crutch.

- ◊ Could you convince a couple of senior folks from your current employer to invest money in this adventure? We wanted to see if his bosses trusted him with their personal money and gauge his credibility within the system he operated.
- ◊ Could you invest your personal savings in buying a non-banking finance company without our capital commitment behind you? We were keen to see if the person was willing to take a very large risk to make their dream come true.
- ◊ Please keep the head office of the company in Varanasi and build a business there, as it has a high density of poverty. We knew microfinance needs a hands-on business leader and not someone who wants to play golf every evening. For us, Varanasi was a location we felt would give him an edge. We wanted to see if he is rational when his professional and personal interests collide.

Govind nodded and left my office, only to come back after completing all the tasks in a period of four months. He never once sought further assurance, and thus, we built a relationship of mutual trust and have kept backing Govind and Utkarsh through thick and thin.

Once we made our decision, we defined our role as cheerleaders, supporters, and personal advisors to Govind. We decided to intervene only if the institution needed it. Govind made sure no investor was ever surprised by any development in the business, and when it happened, it was not under his control.

Immediately after our investment, Govind walked into the microfinance crisis of 2010, and we were forced to

invest in Utkarsh again to keep our promise of trust going.

Utkarsh has seen many crises since its infancy and has slowly grown to become a strong microfinance institution. Finally, Utkarsh got an opportunity to become a banker in 2016. This was a major pivot, and we supported the transition with more capital and commitment.

As the institution prepared to become a bank, it kept getting hit with new risks such as demonetization, and just when it was ready to go for IPO, COVID struck and thwarted all plans for the IPO. As the COVID impact forced Govind to raise more capital, Aavishkaar this time decided to come in and participate in the bank as well.

While the narrative sounds like a bold decision to back the institution, in reality, we made our choices early about the sector, the entrepreneur, and the potential for scale. Post that, our decisions were driven by opportunity and ability, and our desire to support scale was backed by our trust in the leadership.

As I conclude, I would like entrepreneurs to keep in mind that the seed to IPO journey is a long one and has many ups and downs. You need a village to raise the venture baby, so surround yourself with people who can support you when the chips are down and cheer for you when you achieve success.

To investors, I would say that make your choices early and back the leadership to help build scalable companies that deliver success and IPO.

And in general, my closing statement is that an IPO is a minor pit stop in the journey of building an institution that lasts beyond the leader, the investors, and everyone involved. The ultimate goal for all of us is to build a lasting legacy of great institutions that can deliver impact, scale, and return.



Impact Investing

The Role Of Sustainable Investing In Contributing Towards A Greener Future

Shruti Deora, Partner, Intellectap

Published in Entrepreneur India

shows that sustainability initiatives correlate with financial performance, sustainable supply chains, renewable energy usage, employee satisfaction, and diversity, equity, and inclusion (DEI).

Despite challenging market conditions in 2022, sustainable investment funds experienced net positive fund flows of \$115 billion, according to the Morgan Stanley Institute for Investing's Sustainable Reality report. CareEdge Research shows that ESG reporting by Indian corporates has jumped by 160% basis reports from top 1,000 listed entities over the past three fiscal years with 18% companies voluntarily disclosed the BRSR data in FY22.

Gender lens investing is an important subset of sustainable investing that promotes gender equity and inclusion. Studies indicate that empowering women could significantly lower global carbon dioxide emissions by 2050. Companies with over 30% female board representation have reported lower carbon emission growth rates, reduced energy consumption intensity, decreased greenhouse gas emissions, and less water usage.

Climate finance plays a crucial role in promoting a greener and more climate-resilient future. The International Energy Agency asserts that annual clean energy investments must increase from \$1.3 trillion in 2021 to above \$4 trillion by 2030 to reach net-zero emissions by 2050. Climate finance can help mobilize the capital needed to support the transition

This Earth Day, we'll examine how incorporating gender lens investing and climate finance into sustainable investing practices can boost growth, profitability, and foster a greener, more gender-inclusive, and climate-resilient future.

Sustainable investing is gaining momentum as investors recognize its potential for financial returns and positive social and environmental impacts. This Earth Day, we'll examine how incorporating gender lens investing and climate finance into sustainable investing practices can boost growth, profitability, and foster a greener, more gender-inclusive, and climate-resilient future.

Sustainable investing, also known as responsible or values-based investing, involves considering environmental, social, and governance (ESG) factors in investment decisions rather than relying purely on financial considerations. The business case for sustainable investing is well established. Recent research from Bain & Company and Eco Vadis also

to a low-carbon economy and enhance climate resilience. Climate Investment Funds have raised over \$11.1 billion in climate finance and supported more than 390 projects in developing countries. Companies like Tesla and Beyond Meat have seen significant growth and profitability by prioritizing sustainability and ESG factors. Climate finance in India totalled a whopping ~USD 44 billion per annum for 2020, but reports estimate that for India to achieve its Nationally Determined Contribution (NDCs) under the Paris Agreement, we require USD 2.5 trillion per year up to 2030.

Agence Française de Développement (AFD), the Small Industries Development Bank of India (SIDBI), and the Shakti Sustainable Energy Foundation have recently launched GroW - Greening of Finance by Women as part of the Green Indian Financial System (GIFS) Initiative, aimed at advancing and leveraging women's participation, leadership, and knowledge in green and climate finance, with the vision to create a gender-equitable green and climate finance sector and address these gaps.

Sustainable investing presents multiple new opportunities for entrepreneurs to contribute to a greener future. By prioritizing sustainability and ESG factors in their business practices, entrepreneurs can reduce their environmental impact and drive positive social and environmental outcomes. For instance, entrepreneurs can adopt renewable energy sources, minimize waste generation, and focus on sustainability in their supply chain by selecting environmentally friendly materials and reducing carbon emissions. These practices can improve overall sustainability performance, reduce reputational risks, and attract sustainable-minded customers and investors.

The increasing demand for sustainable products and services offers new business opportunities for entrepreneurs. By creating innovative solutions that address social and environmental challenges, entrepreneurs can tap into new markets and drive innovation. Examples include developing energy-efficient technologies, sustainable agriculture practices, clean transportation, sustainable fashion and beauty products, sustainable food products, and eco-friendly building materials. These innovations can cater to the growing demand for sustainable consumer goods and contribute to a greener future.

While there are concerns about "green-washing", regulatory standards are being established globally to address and streamline the measurement and reporting aspects of sustainability initiatives. Sustainable investing is growing exponentially and is expected to become the new normal within a decade. By integrating gender lens investing and climate finance into sustainable investing practices, investors and entrepreneurs can drive positive change while generating financial returns. Millennials are more conscious of the environmental and social impact of their investments and purchasing decisions. This awareness has led to a growing preference for companies that prioritize sustainability and ESG factors. The quote from Sir Christopher Hohn, founder of TCI Fund Management, captures this sentiment: "Investing in a company that doesn't disclose its pollution is like investing in a company that doesn't disclose its balance sheet." As more investors and consumers demand transparency and accountability, companies that embrace sustainable practices are better positioned to attract capital, talent, and customers. This shift in consumer behavior will drive businesses to adopt sustainable practices, resulting in a greener, more gender-inclusive and climate-resilient future.



Impact Investing

The significance of the UN Sustainable Development Goals for Sustainable Investing

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Published in The Times of India

and the struggles to keep up with the pace required. For instance, in 2020 and 2021, developed countries' post-pandemic recovery spending was \$12,200 per capita, 30 times greater than developing countries (\$410) and 610 times more than least developed countries (\$20). Sustainable investing experienced a 15% growth since 2015, reaching \$35.3 trillion in 2020. However, sustainable finance isn't ubiquitous, with on-going funding for fossil fuel companies and concerns about green/SDG washing. Some crucial changes are underway, such as accelerated global energy transition investments, reaching a record \$1.1 trillion in 2022. For the first time, these investments outpaced fossil fuel investments, though primarily in China and developed nations.

The poorest half of the world, consisting of low-income and lower-middle-income countries, struggles to access capital on favourable terms in the market. According to the United Nations Conference on Trade and Development, there is an annual investment gap of \$4 trillion in developing countries alone to achieve the SDGs. A worldwide strategy for financing the SDGs is essential. There is a need for sustainable industrial policies, supported by integrated national planning, to amplify investments and enable in physical infrastructure and human capital. Inclusive growth opportunities lie in agroindustry, green energy, and manufacturing.

The SDGs are not only relevant for governments and NGOs but also for businesses, as they provide a framework for businesses to create long-term

In 2015, three major agreements marked significant milestones in international cooperation: the 2030 Agenda and the Sustainable Development Goals (SDGs), the Paris Climate Agreement, and the Addis Ababa Action Agenda on financing for development. SDGs are a call for action by all countries to promote prosperity while safeguarding the planet, focusing on 17 goals that cover a wide range of issues such as poverty, hunger, health, education, gender equality, clean water and sanitation, sustainable cities and communities, climate action. The 2022 SDG Index is led by three Nordic countries—Finland, Denmark, and Sweden—with the top 10 consisting entirely of European nations. Despite their high rankings, even these countries face significant obstacles in achieving multiple SDGs. The 2022 International Spillover Index highlights that affluent countries produce negative socioeconomic and environmental impacts through unsustainable trade and supply chains.

The 2023 Financing for Sustainable Development Report shows growing need for sustainable investing,

value. Aligning investments with the SDGs (for example renewable energy) can help businesses to manage risks (such as climate change) and identify opportunities aligned with their goals (growth in green economy). Businesses can enhance their reputation by creating sustainable business models, contributing to solving global challenges and in the process build stronger relationships and trust with their customers, employees, and communities. The green economy has rapidly expanded, becoming the fifth-largest sector with a market capitalization of \$7.2 trillion in 2021. It has outpaced retail, financial services, and oil & gas, and exhibits diversity in growth, with energy efficiency and e-vehicles leading the way. According to the Business & Sustainable Development Commission, achieving the SDGs could unlock \$12 trillion in market opportunities and create 380 million new jobs by 2030. It further adds that female leaders act as catalysts, enabling companies to unlock the 'economic prize' associated with pursuing the Global Goals. The recently launched Greening of Finance by Women (GroW) initiative, under the Green Indian Financial System (GIFS), aims to promote women's leadership in green and climate finance.

Achieving the Sustainable Development Goals (SDGs) necessitates localizing development efforts by empowering communities to design and implement policies suited to their unique needs. Engaging local stakeholders, particularly women, can drive sustainable growth and promote inclusivity. For instance, Arulrahini, from Sri Lanka began farming at age 12 and continued despite gender-based

social pressure. She joined the Malarumboomi Women's Agriculture Development Cooperative, which helped her significantly increase her farm and income. The all-women cooperative, provides a platform for discussing women farmers' issues, finding solutions, offering support, and voicing their concerns. Agbato Olubunmi, a highly-educated woman in fisheries and aquaculture management, from Nigeria, expanded her aquaculture business and aims to create a fish processing community for women, empowering them and promoting economic growth. Kanku Ben, an award-winning artisan and elected sarpanch of Kukma Juth Panchayat in Kutch, introduced computers to government schools for modernized education and addressed social issues within various communities. Across India, elected women representatives are driving change in their communities by ensuring road repairs, electricity access, school construction, toilet facilities, medical services, safe water sources, and the formation of local savings groups, among other initiatives.

Sustainable finance and investing in local communities and enabling them to lead policymaking and implementation can foster tailored solutions addressing specific challenges. The SDGs provide a powerful framework for businesses, governments, and communities to create long-term value for their stakeholders while contributing to solving global challenges. As we move towards 2030, it is essential that we all play a leadership role in achieving the SDGs to create a more sustainable and equitable world.



Impact Investing

Challenges in effective ESG reporting in Kenya

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Published in Entrepreneur India

that ignore addressing these challenges are liable to miss out the most valuable benefits of ESG reporting such as accessing new sources of capital from sustainably conscious investors like pension funds, development finance institutions and private equity firms, as well as achieving operational efficiencies.

Four challenges exist in operationalizing an effective ESG reporting structure.

These are setting governance structures, understanding reporting boundary, conducting materiality analysis and developing and publishing relevant ESG content. Let us examine each challenge in detail.

The setting of an active governance structure to drive meaningful ESG reporting is critical. The Kenya Companies Act of 2017 mandates company directors to review ESG issues that may affect the future performance of the company. The board provides oversight of the ESG reporting agenda endorsed by the CEO and driven by the Sustainability Manager. A great example of a well-designed ESG report is by Diageo UK, which mentions the CEO's support for sustainability reporting in a letter at the beginning.

The reporting 'boundary' refers to all the entities a company has control over ('organizational boundary') and all those entities over which it exercises influence ('operational boundary') such as subsidiaries, suppliers, vendors and contractors. The upstream and downstream need to be considered, and the reporting boundary set accordingly. This

ESG reporting is gaining fresh momentum in Kenya, as investor interest and activism rises globally. ESG stands for environmental, social and corporate governance issues that are of increasing concern, over and above financial returns provided by companies. It is the need of the hour for companies to understand their impact on environment and society, to maximize the positive and reduce negative. While many companies in Kenya have been reporting ESG, this has been largely inconsistent. This is not the fault of the companies, as there exists a veritable 'alphabet soup' or 'ESG zoo' of reporting standards and acronyms. The most widely used of these, globally and by listed companies in Kenya, is the Global Reporting Initiative (GRI) reporting standard. GRI is also recommended by the NSE manual, to help reduce uncertainties on which framework to apply, as well as for consistency in reporting in Kenya.

While the benefits of the ESG reporting are well documented, here are a few challenges in implementing ESG reporting in Kenya. Companies

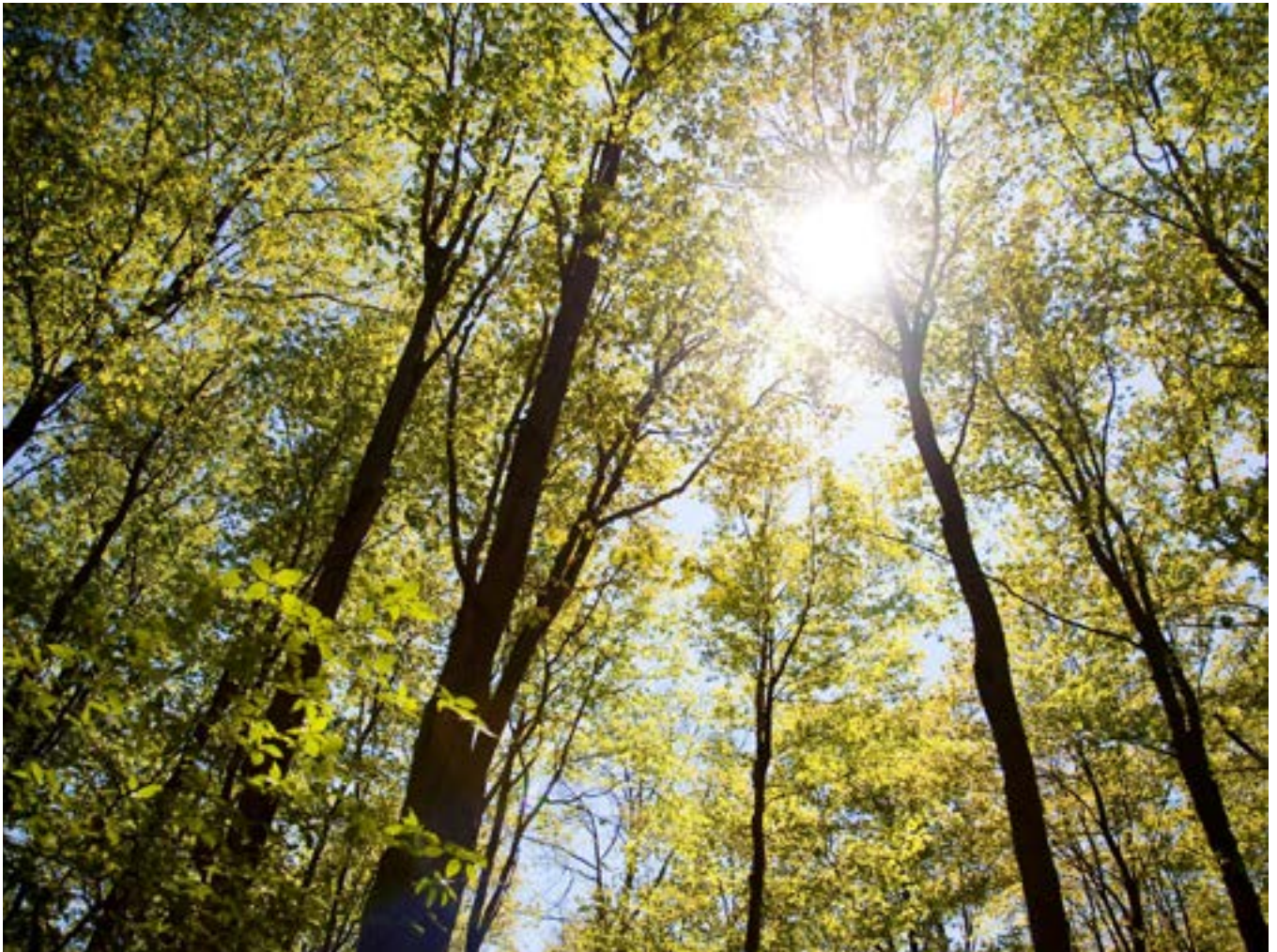
may vary from company to company depending on the sector of the company and type of information needed.

Materiality refers to the principle that determines which topics are sufficiently important enough to require being reported. All ESG topics are not of equal importance to every company; disclosures relating to water waste and treatment may be more important to a chemical manufacturer as compared to a furniture company. Materiality is defined within the reporting boundary, and materiality analysis should ideally be carried out annually by listed companies.

Once the three challenges are addressed, it should be straightforward to select the relevant data. The Sustainability manager, supported by the CEO, will need to engage in stakeholder outreach, both internally and externally, to set up the relevant systems to gather the required information. At this stage, the GRI also provides guidance on how the sustainable development goals (SDGs) relevant to the ESG reporting process can be selected. Not all the

SDGs are required, companies must select those most relevant to their business. This is important to avoid allegations of green washing, and report measurable and tangible annual progress in achieving the targets under the chosen SDGs.

The Nairobi Securities Exchange (NSE) took an important step for ESG reporting by publishing the ESG Disclosures Guidance Manual in November last year. The manual provides a clear roadmap to collect, analyze and publicly disclose important ESG information as per international reporting standards. Listed companies in Kenya have a one-year grace period to integrate and comply with these standards; all listed companies are expected to share ESG reports as part or in addition to their annual corporate reporting requirements by 2023. This will allow investors as well as the public to understand and compare ESG performance of different companies. Listed companies as well as SMEs that aspire to be listed should proactively leverage the ESG manual and expert advice to benefit from effective ESG reporting.



GENDER AND LIVELIHOODS



Gender and Livelihoods

Inclusive Value Chains: Experiences of Gender Mainstreaming

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Published by Gender Equality in a Low Carbon World (GLOW)

globally are estimated to have been created by women, large corporations and governments spend less than 1%² of their procurement budgets on WSMEs, leaving key business and development benefits untapped. A structural transformation in commercial ecosystems is required in order to incorporate WSMEs and other disadvantaged groups in supply chains equitably.

It is in this context that Intellectap and the International Development Research Centre (IDRC) hosted an event, moderated by Amar Gokhale of Intellectap, at the 10th Sankalp Africa Summit. The aim of the session was to share experiences and ways in which different organisations, small and large businesses, public and private, across multiple sectors, can enhance gender considerations in their value chains, with the intent of increasing women's participation throughout.

Paul Okwi, Senior Programme Specialist, IDRC introduced the session and explained that IDRC focuses on fostering partnerships and generating quality knowledge to create social impact. IDRC funds the GLOW programme, which investigates pathways to achieving SDG 5 by creating gender equality in low carbon economic transitions. Via GLOW, IDRC supports the Intellectap-led project 'Reorienting the

Women's Economic Empowerment through the reduction of gender inequalities in global value chains is a crucial path to achieving the 2030 Agenda for Sustainable Development Goals, especially SDG 5–Gender Equality. It is estimated that if women are allowed to participate equally and fully in the global value chains, they could contribute up to USD 28 trillion¹ to global GDP annually by 2025.

Despite the commitment and funds channeled into numerous initiatives to get more Women-owned and led Small and Medium Enterprises (WSMEs) into global value chains, the results have been underwhelming. Procurement from WSMEs by businesses across sectors vastly lags that of male-owned and led SMEs. For instance, although one-third of registered SMEs

¹ <https://unglobalcompact.org/what-is-gc/our-work/social/gender-equality>

² https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/gender+at+ifc/priorities/entrepreneurship/sourcing2equal

Private Sector to Enable Climate-Smart Agricultural Solutions to Address Gender Inequalities³.

In this project, Intellectap is working with 10 SMEs operating at the intersection of sustainable agriculture/food systems and climate change, to help them mainstream gender considerations in their operations, including in their value chains.



Source: Intellectap

Inclusive value chains through inclusive procurement policies

One of the most effective ways firms can champion diversity, equity and inclusion is to increase their spending with diverse suppliers and vendors in their value chains. For example, Safaricom, a listed Kenyan mobile network that is well known for its invention of the global mobile payment service Mpesa, has incorporated a policy that requires 10% of the organisation's procurement to be sourced from WSMs, through its Women in Business initiative.

Agnes Wanjiru, Sustainability Manager, Safaricom explained that the number of women-owned businesses pre-qualified in Safaricom's procurement has increased from 20 to 245, via this initiative.

Despite the increase, Safaricom's experience is that WSMs are concentrated in less profitable sectors that are associated with low spending. This is a consequence of the additional barriers that women face while trying to build and grow a business, such as

time constraints: women have competing demands on their time, such as family responsibilities. They also face gender biases arising from cultural constraints, and they lack access to business networks – due to limited access to capital and information.

It is evident that having policies that promote inclusive procurement is a step in the right direction. However, more needs to be done by organisations and actors in commercial ecosystems to address systemic inequalities in value chains. While noting the challenge, Ms Wanjiru mentioned that Safaricom's initiative has provided useful insights and learnings for the organisation, as well as fostering forums within Safaricom that promote awareness about inclusion. Furthermore, through its sustainability reporting, Safaricom has striven to report on progress in women's inclusion, irrespective of the small strides achieved thus far.



Source: EUCP

Inclusive value chains through capacity building

To ensure that WSMs are able to participate in global supply chains, it is critical to strengthen their capacities on procurement readiness. Sourcing2Equal Kenya is an initiative by IFC that brings together 11 corporate buyers, including Safaricom, to increase access to corporate procurement opportunities for WSMs. Angela Kariuki, Project Coordinator – Gender and Economic Inclusion Group, IFC noted that the programme is addressing barriers faced by both buyers and WSMs through two activity streams: a) corporate peer learning on ways to increase sourcing

³ <https://glowprogramme.org/project/reorienting-private-sector-enable-climate-smart-agricultural-solutions-address-gender>

from WSMs; and b) capacity building of WSMs on corporate procurement requirements.

WSMs are provided with technical assistance on formalising their businesses, procurement policies and regulations, contract management, procurement technology, market research and analysis and negotiation skills. With the technical assistance and skills garnered through procurement capacity building programmes, more women entrepreneurs are able to engage more competitively in 'high spend' (more lucrative) business categories.

Inclusive value chains through tech-enabled platforms

Technological platforms can play a significant role in encouraging more women entrepreneurs to participate. Platforms provide remote access to procurement opportunities, encouraging women to be economically engaged while working from home. The majority of women work from home as they are the primary caregivers at home.

Online platforms also provide greater transparency in the procurement process, making it easier for women-owned businesses to understand what they need to do in order to succeed. It helps to level the playing field and make it easier for women to compete with larger, more established businesses. By providing a centralised platform where buyers and sellers can connect, procurement platforms create more opportunities for women entrepreneurs and help close the gender gap in procurement. In addition, the platforms help women-owned businesses, which may have previously struggled to gain visibility or access to funding, to connect and showcase their businesses to potential investors.

Data collected through procurement platforms can be useful in tracking progress and identifying areas where further action is needed to address gender inequalities. For instance, Aquarech, a fish farming platform, enables fish farmers, fish feed manufacturers, and fish traders to trade and build trusting long-lasting partnerships. It has made significant strides in developing activities along the value chain in Kenya's aquaculture sector.

Dave Okech, Founder and CEO, Aquarech, noted that through the platform more women fish farmers are able to participate along the value chain. They are able to procure and sell fish products conveniently and access aquaculture knowledge and skills, such as precision fish farming techniques.

Moreover, the platform enables women to participate equally and fairly in the value chain by eliminating fish for sex (FFS) and other forms of discrimination in the aquaculture sector.

Finally, Aquarech uses the information from the platform to better understand and serve the women fish farmers and traders by providing solutions to their challenges.



Source: Green Harvest and Intellectap

Inclusive value chains through financial inclusion

A majority of women entrepreneurs disproportionately face barriers to accessing finance, primarily due to lack of collaterals, as a consequence of lack of ownership of land and other fixed assets. Globally, less than 15% of all landholders are women. Additionally, limited financial literacy and limited access to financial education due to societal and cultural norms makes it harder for women to navigate financial systems and secure financing. Furthermore, family responsibilities such as caring for children and elderly family members, prevent them from fully participating in the economy and thus improving their livelihoods.

One of the ways to address financial access barriers faced by women entrepreneurs is by developing financial products tailored specifically for women. In this regard, Jackie Githiga, Business Development Manager, KWFT noted that KWFT, a women-only microfinance bank in Kenya, has been on the forefront of addressing this challenge through providing specialised financial products such as affordable loan financing to women entrepreneurs with limited access to financing.

Through access to affordable financing, women entrepreneurs can participate more fully in the value chain by expanding their product and service offerings and creating more job opportunities. Moreover, through their products and services, women entrepreneurs can bid for procurement opportunities in higher-spending categories.

Finally, the specialised products and services for women enable more women to be included in the financial sector thus enabling researchers to deepen their study, develop a framework for inclusion, innovate new products and services and highlight their successes and challenges, thereby increasing insight on how to address financial access barriers.

In summary

Inclusive value chains are critical in addressing systemic inequalities and leveling the playing field for disadvantaged groups. Both the private and public sectors can adopt policies to ensure diversified and inclusive sourcing. Secondly, governmental support through grants and interventions that support equality, education and awareness for disadvantaged groups such as WSMEs can be ramped up. Finally, increased access to financing by the financial service sector can be promoted. Research institutes can also play an important role by highlighting successes and challenges in the world of business and suggesting possible solutions.



Gender and Livelihoods

The Role Of Climate-Smart Agriculture Enterprises In Women's Empowerment

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the most vulnerable regions to climate change as a result of its considerable development constraints.¹ Resilience and coping mechanisms across East Africa remain limited, reflecting structural factors restricting the region's abilities to respond to and recover from shocks. In particular, heavy reliance on rain-fed agriculture increases humanitarian, social, and macroeconomic vulnerabilities to rising temperatures and extreme weather shocks, which most heavily affect the poorest segments of the region's rapidly growing population.²

The scaling of climate-smart enterprises with a gender lens would contribute to the transition of East Africa countries to a low-carbon economy through women's economic empowerment. Innovations and enterprises using climate-smart agriculture practices can play a critical role in improving the region's food security. For this reason, it is imperative to support them in their efforts to scale up. In addition, given women's critical role in the region's food systems ecosystem – as producers, farm laborers, processors, and traders – it also becomes essential for these enterprises to embed a gender lens within their business design and advance gender mainstreaming. This is especially important since women in agriculture are often disproportionately affected by climate change.

Experts from Intellectap's GLOW project share progress in reorientating the private sector to women's empowerment in climate-smart agricultural solutions in East Africa.

Climate change continues to be a significant concern globally. The effects of climate change are being experienced in East Africa in the form of increasing temperatures, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and more frequent extreme weather events. On farms, climate change is reducing crop yields, the nutritional quality of major cereals, and livestock. To combat the menace, an integrated approach to managing landscapes – cropland, livestock, forests and fisheries – has been championed in a bid to enhance food security. East Africa is one of

¹ <https://www.ipcc.ch/report/ar6/wg2/>

² <https://www.imf.org/-/media/Files/Publications/REO/AFR/2020/April/English/ch2.ashx>

It is estimated that 50% of the agricultural labour force in East Africa³ comprises women. Gender imbalances exist in the agriculture value chain and are further exacerbated by climate change. Women smallholder farmers are more vulnerable than men to climatic shocks and stressors as they tend to be more dependent on agriculture and natural resources and have less diversified livelihoods.

Structural gender inequalities impede women's ability to respond to, adapt to or mitigate climate change impacts. Women tend to have fewer and lower-value assets as well as less access to land, capital, labor, agricultural inputs, and social and institutional networks. Coupled with social norms and gender roles that limit their agency, both at the household and community levels, women's access to and use of climate-smart technologies is constrained. Subsequently, they have less time to pursue other sources of income as they are stuck in undertaking drudgery-prone activities as unpaid workers on the farm and in their homes. As a result, they face challenges such as limited decision-making power, negligible ownership of and control over land and other productive resources, time poverty and mobility.

It is in the business interest of enterprises⁴ to adopt a gender lens in their operations. Gender-inclusive approaches to business hold the potential for not only positively impacting women engaged in the sector, but also for providing a significant potential for the business growth of climate-smart agricultural enterprises. Evidence suggests that businesses incorporating women in their operations have better profitability and higher returns, more innovation, better decision-making, improved customer responsiveness and retention, and are also able to attract gender lens investing.⁵

Intellecqap has launched an accelerator program, 'Business Acceleration through gender

mainstreaming'⁶ which aims to support climate smart agricultural enterprises in Kenya, Rwanda, Tanzania and Uganda to scale-up and simultaneously mainstream gender in their operations. This programme is part of the wider 'Reorienting the private sector to enable climate-smart agricultural solutions to address gender inequalities' programme, being supported by the International Development Research Centre (IDRC). The accelerator programme has so far selected two enterprises in Kenya and Tanzania operating at the nexus of sustainable agriculture and climate change. The accelerator programme runs for a period of 12 months, for each of the enterprises, divided into 2 phases: the first six months are spent on providing customised technical assistance support and capacity strengthening through training and coaching on business and gender mainstreaming; and the second phase includes impact assessment and monitoring and evaluation to support the businesses in further institutionalizing gender mainstreaming and keep track of it as the businesses scale.



Source: Intellecqap

The first cohort

Agriculture is one of the most important sectors⁷ of economic activity in East Africa, accounting for more

3 <https://www.fao.org/3/am307e/am307e00.pdf>

4 <https://gender.cgiar.org/news/identifying-climate-agriculture-gender-inequality-hotspots-can-help-target-investments-and>

5 https://www.unido.org/sites/default/files/2016-03/new_Guide_on_Gender_Mainstreaming_Business_Investment_and_Technology_Services_for_Private_Sector_Development__3__0.pdf

6 https://www.unido.org/sites/default/files/2016-03/new_Guide_on_Gender_Mainstreaming_Business_Investment_and_Technology_Services_for_Private_Sector_Development__3__0.pdf

7 https://www.unido.org/sites/default/files/2016-03/new_Guide_on_Gender_Mainstreaming_Business_Investment_and_Technology_Services_for_Private_Sector_Development__3__0.pdf

than 68% in Tanzania⁸ and more than 40% in Kenya⁹. Good agricultural practices such as using quality, improved, and resilient seeds and planting material, soil testing, and health conservation, land preparation techniques, safe and efficient use of crop protection products, efficient water use and post-harvest loss management, are fundamental in mitigating and adapting to the impacts of climate change. Inadequate implementation of these measures leads to increasing inefficiencies in the use of inputs. This, in turn, leads to increased cost of production, reduced yields, and an overall reduction in incomes due to the reduced yields and increased cost of production.

Alaska Tanzania and Aquarech Ltd in Kenya, two enterprises supported by the programme, are helping farming communities adapt to climate change.

Alaska Tanzania is working to support women farmers improve their productivity. Tanzania is the leading producer of rice in East Africa and the fourth largest in hectares¹⁰. Evidence shows that negative impacts associated with climate change, inadequate use of regenerative agricultural practices, low yielding rice varieties, pests and diseases, and gender dynamics all contribute¹¹ to the yields. While more than 68% of women in Tanzania are employed in agriculture, they have limited access to and control over productive resources like land and capital. Approximately, 8% of women in Tanzania own land independently, and furthermore, only men traditionally inherit land¹². This implies that most women can only farm their spouse's land or rent land. Subsequently, women have limited access to financing, leading to inadequate access to modern farming tools and other GAP resources such as seeds and fertiliser.

Alaska Tanzania sources rice from a pool of 65 small-scale farmers, of whom 65% are women farmers. The rice is cleaned, sorted and packaged, and sold to customers through various distribution channels. Customers include; retail stores, hotels and restaurants, women-street vendors and institutions

such as hospitals and schools. Alaska Tanzania trains farmers on good agricultural practices, climate change effects and coping mechanisms, including water conservation and effective use of inputs, thereby reducing the cost of inputs. So far, Alaska Tanzania has supported 8,000 paddy farmers through trainings on good agricultural practices, post-harvest losses and climate-smart measures. Additionally, it assists farmers in accessing high-quality inputs, and finance. On the customer side, Alaska Tanzania trains micro businesses, who form part of their customer base, on business management, to improve and scale their businesses. The business owners are empowered and equipped with knowledge on better business management, which enhances their income management and equips them to cope with climate change. In addition to the above interventions, Alaska Tanzania, through its Mama Lishe programme is championing gender inclusivity in agriculture by providing access to grants to women in the programme. Through this programme, Alaska Tanzania empowers street food vendors by training them on effective ways of managing their businesses.



Source: Malingering, flickr.com

Aquarech in Kenya is striving to reduce the vulnerabilities of women fish traders and enhance economic empowerment for women fish farmers. The fishing industry in Kenya is already under pressure from overfishing, habitat destruction, and weak governance due to inadequate policies and increased food demand from a rapidly growing

8 <https://www.fao.org/3/I8356EN/i8356en.pdf>

9 <https://www.fao.org/kenya/fao-in-kenya/kenya-at-a-glance/en/>

10 <https://foodforafrika.com/2022/06/08/tanzania-sets-sights-on-being-africas-top-rice-producer/>

11 <https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/2048-7010-3-7>

12 <https://www.unwomen.org/en/news-stories/feature-story/2022/10/climate-smart-agricultural-practices-deliver-life-changing-benefits-for-women-farmers-in-tanzania>

population¹³. These local stressors, along with the direct and indirect impacts of climate change, are resulting in an estimated 40% of the potential growth of the aquaculture sector being lost¹⁴.

The sector is grappling with increasing sea temperatures and rising sea levels that affect fish breeding patterns and lower fish food supply, disrupting the regional fishing industry. Changes in the marine ecosystems have resulted in fish moving from the shore into deeper waters, which makes it riskier for small fishermen to accumulate enough catch to sustain their livelihoods¹⁵. Although fishing is customarily considered a male activity, in Kenya, women play a substantial role in the fisheries sector, making up nearly half of the overall workforce in the fisheries value-chain¹⁶. Despite their participation in the value chain, persistent gender inequalities exist due to inadequate education and training, cultural and societal norms and lack of financing, which prevent women from fully participating in economic opportunities and decision-making in the sector. This is where Aquarech is playing its part in helping small-scale fish farmers to adapt to climate change while actively championing gender mainstreaming in the sector.

Aquarech sells high-quality floating fish feed to fish farmers, and sources, aggregates fish from small-scale farmers and sells to fish traders and eateries. It also trains farmers on good aquaculture practices, climate change effects and coping mechanisms, including using improved and more efficient feeds. On the customer side, by linking farmers with quality fish feed, it is improving efficiency in the fish feed and reducing the overall production costs. By aggregating and selling fish to traders and eateries, it creates a reliable market for the farmers hence managing their revenues and providing income stability. It also has fish distribution outlets that directly serve the low-income communities, hence increasing access to nutritious food i.e., fish. Aquarech has an online platform, Aquarech farmer app, which allows fish farmers to directly trade with buyers on the platform,

enhancing transparency in pricing. It also allows farmers to buy fish feed by placing orders through the platform. Furthermore, the platform offers a precise feeding regime that helps farmers adapt to climate change by monitoring and controlling water temperature. This feature eliminates underfeeding or overfeeding, thereby boosting fish production.

In addition to the above interventions for farmers, Aquarech is building sustainability for fish farmers by offering credit financing. Access to finance enables the fish farmers to increase their production whilst adapting to climate change and thus enables them to build sustainable businesses.



Source: Intellectap

Challenges and opportunities in gender mainstreaming for the enterprises

While several enterprises offer climate-smart agriculture products and services in East Africa, multiple challenges limit their effective adoption and use: access to relevant and timely information, and inadequate capital are the most critical ones. The gender-impact potential of such products and services often remains unrealised due to the insufficient focus of the business on gender mainstreaming. Stakeholders such as investors lack the evidence to validate such enterprises' investment case and impact on women's economic empowerment and low carbon development.

¹³ <https://www.fao.org/3/i9705en/i9705en.pdf>

¹⁴ <https://online.ucpress.edu/cse/article-abstract/6/1/1544759/164784/Status-and-Outlook-for-Climate-Resilient?redirectedFrom=fulltext>

¹⁵ <https://www.reuters.com/article/us-climate-change-kenya-fishing-idUSKBN2B20KB>

¹⁶ <https://documents1.worldbank.org/curated/en/351201584151630748/pdf/Kenya-Marine-Fisheries-and-Socio-Economic-Development-Project.pdf>

Alaska Tanzania faces challenges in sourcing from more women farmers since women have limited access to finance and training on good agricultural practice. Aquarech faces challenges in linking women farmers to inputs and knowledge on good agricultural practice, as most of their suppliers and customers are men. Women traders also face challenges accessing fish due to underlying social issues, like fish for sex required to access fish, and in effect, affecting their equal opportunity to earn a living from fish trading¹⁷.

Intellectap conducted a needs assessment of these two enterprises which surfaced the opportunities for gender mainstreaming across their operations. Over and above the impact on improving livelihoods of the people in the community, Alaska Tanzania can increase sourcing from women farmers through contract farming, supported by linking the women to capital, markets and agronomy training. For Alaska Tanzania's women customers, who are micro traders/street food vendors (known as Mama Lishe), there is an opportunity to scale their businesses by linking them to financing partners and providing capacity-building support on business management.

On the other hand, opportunities for Aquarech can increase access to fish feed for its women fish farmers and improve access to markets for the women fish traders and thus potentially reducing their exposure

to fish for sex. In addition, increased use of the digital platform has the potential to better link fish farmers to inputs and advisory services while transparently linking traders to markets.

The enterprises will spend the first six months of the program going through targeted gender-lens business development support. Support includes developing core value propositions through a business model canvas, market analysis and marketing opportunities, scaling strategies (including business planning, growth and operational efficiency), team and partnership management, financial management, capital raising and investor readiness. Intellectap will work with each of the enterprises to develop a Gender Action Plan which will guide them in their gender mainstreaming efforts across their operations.

By gender mainstreaming and including more women as customers and suppliers, the enterprises will increasingly impact women by helping them to cope with climate change. Adoption of a Gender Action Plan by these enterprises will not only lead to women's economic empowerment but also contribute to transition to a low carbon economy through the climate smart agriculture techniques they adopt.



¹⁷ <https://www.globalsistersreport.org/news/ministry/news/lake-victoria-fishmongers-try-escape-sex-fish-trap-and-hiv-outcomea/2019/12/26/789129312/no-sex-for-fish-how-women-in-a-fishing-village-are-fighting-for-power>

TECHNOLOGY



Technology

Transforming Industries: The Unstoppable Rise of AI, Machine Learning, and Digital Twin Technologies

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Anchoring Safety: When Ships Stop Rocking the Accident Boat

Like a captain steering his ship through stormy seas, the maritime industry has skillfully navigated through the waves of technological innovation. The Mayflower Autonomous Ship (MAS), with its AI-guided and digital twin-assisted operation, serves as a compass leading the industry to safer shores. As Benjamin Franklin wisely stated, "An ounce of prevention is worth a pound of cure," and the MAS, trained on an ocean of data, has proven this to be true, lowering marine accidents by a whopping 90%.

Moreover, AI and ML have donned the mantle of a ship's mechanic, predicting and averting mechanical failures, resulting in a 75% drop in unanticipated mishaps. Simultaneously, digital twins are sculpting the future of ship construction, poised to cut costs by a significant 20%.

As autonomous ships become more common, we can expect an increase in the use of AI for navigation, predictive maintenance, and overall ship management. Companies are also looking at digital twin technology to run simulations and test new ship designs before construction, reducing costs and ensuring the vessels are built to the highest standards. With increasing investments in AI and

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Artificial Intelligence (AI), Machine Learning (ML), and Digital Twin technologies have significantly transformed various industrial sectors. They have brought about the automation of routine tasks, predictive analytics, real-time monitoring, and more efficient decision-making processes. This article delves into the evolution, growth, and applications of these technologies in the Maritime and Shipping, Oil and Gas, Manufacturing, and Defense industries.

digital twin technologies, the maritime industry is projected to save up to \$400 billion annually by 2030.

Turning the Tide: A World Beyond Oil Tears

The oil and gas industry, once a lumbering giant, has started to dance to the tunes of AI. These technologies serve as the industry's crystal ball, foreseeing pipeline leaks and failures before they wreak havoc. A digital twin works tirelessly, like a sentinel on guard, ensuring real-time monitoring and simulating potential changes or disruptions. The result? A neat 25% saving on pipeline inspection costs.

AI technology in the oil and gas industry is projected to become more sophisticated, capable of providing detailed analyses of oil well and pipeline conditions. This will lead to better decision-making and risk management. Digital twin technology, on the other hand, will continue to be used for real-time monitoring of infrastructure, and we can expect advancements in its ability to accurately simulate and predict pipeline issues. As per a report by McKinsey, the use of AI and digital twins in the oil and gas industry could boost the sector's value by up to \$450 billion annually by 2030.

A Stitch in Time: Manufacturing's Dance Without a Downbeat

In the manufacturing sector, AI and ML are like the maestro of an orchestra, harmonizing the entire production process. Axion Ray's AI technology, for instance, spots a needle in the haystack—uncovering issues before they snowball, leading to a 30% reduction in downtime.

Like a mirror reflecting reality, digital twins in manufacturing provide a faithful representation of production lines, enabling operators to test different scenarios without risking real-world consequences. With this technology, the manufacturing sector might soon bid adieu to high development costs, hoping to reduce them by up to 15%.

AI and ML are poised to become integral parts of the manufacturing process, with applications ranging from the design stage to quality control. In addition, digital twin technology will likely be used to replicate entire manufacturing plants, allowing companies to run simulations and make necessary adjustments before implementing changes in the real world. The global market for AI in manufacturing is expected to grow at a CAGR of 57.2% from 2021 to 2027, reaching \$16.7 billion by 2027.

Shields Up: The Defense Sector's Brave New World

The defense industry, which once relied on sheer might, now leans on the brains of AI, ML, and digital twin technologies. AI-powered drones, radar, and sonar systems have adopted the philosophy of "work smarter, not harder." They're making autonomous decisions, and in doing so, have upped operational efficiency by 40%.

Digital twins, akin to stunt doubles, have bravely stepped into the risky business of testing radar and sonar systems, reducing both the risks and the costs of physical testing. A resounding 20% drop in design costs and a 50% decrease in testing expenses speak volumes about the efficacy of these digital replicas.

The defense industry is expected to continue leveraging AI, ML, and digital twin technologies. AI and ML will be used to enhance the capabilities of drones, radar, and sonar systems, and digital twins will be used to test these systems. The defense sector's investments in AI are expected to reach \$18 billion by 2025, and the digital twin market in defense is predicted to grow at a CAGR of 31.7% during 2022–2027.

Mind Over Machine: The Quantum Leap of Intelligent Industrial Systems

The world is indeed a stage, and AI, Machine Learning, and Digital Twin technologies have made quite a dramatic entrance. They've transformed a multitude of industries, taking on roles from meticulous inspectors to daring testers. As these players continue to hone their skills and deliver extraordinary performances, the audience—spanning the Maritime and Shipping, Oil and Gas, Manufacturing, and Defense sectors—can only watch in awe, anticipating the next act in this thrilling play of technological evolution.

The maritime and shipping industry, a venerable old stalwart, has shown remarkable agility in adopting these technologies, echoing Darwin's sentiment that it's not the strongest or the most intelligent, but the most adaptable to change that survive. The outcome? A course set towards heightened safety and efficiency, embodying the ideal of seamless operations.

Harnessing the prophetic insights of AI and the continual vigilance of digital twins, the Oil & Gas sector is rewriting its operational playbook, underlining

the wisdom in prevention being better than cure, especially in terms of potential spills and leaks.

The traditionally tactile world of manufacturing has welcomed AI and ML, revolutionizing the harmony of its assembly lines and eliminating the cacophony of downtime. The sector is reinventing the old adage of “measure twice, cut once”, with digital twins facilitating a new paradigm of virtual simulations and preemptive problem-solving. Meanwhile, the defense industry has demonstrated a progressive shift from reliance on physical prowess to the strategic

utilization of intellectual resources. AI, ML, and digital twins are the new vanguards.

As we extrapolate this trajectory into the future, we recognize that AI, ML, and digital twin technologies are evolving beyond being mere tools. They are becoming strategic architects, pushing industries towards unseen heights of efficiency, cost-effectiveness, and safety. The Industrial Revolution 4.0 is not just a fleeting trend. It’s a revolution in the truest sense—a complete and profound change in the way industries operate.



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