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From Innovation to Regeneration: A Triadic Entrepreneurship Framework for Human-Centered Green Economic Transition

*Nurul Ainun Ahmad Atory[1], Janiffa Saidon[1], Mohammed Hardy Loh Rahim[1],
Zaza Afnindar Fakhrurozi[2], Sumardianshah Bin Silah[3]
[1]Faculty of Business and Management, Universiti Teknologi MARA (UiTM), Bandar Puncak Alam, Selangor, Malaysia
[2]Faculty of Sports Science and Health, Universitas Negeri Yogyakarta (UNY), Yogyakarta, Indonesia
[3]Faculty of Education, Universiti Teknologi MARA (UiTM), Bandar Puncak Alam, Selangor, Malaysia
Email: *nurulainun@uitm.edu.my
Corresponding Author: Nurul Ainun Ahmad Atory

Abstract: The green transition is often presented as a problem of technology, finance, and policy. That framing is useful, but it says less about the entrepreneurial activity that translates broad ambitions into products, services, and workable local solutions. This conceptual paper develops a Triadic Entrepreneurship-Regeneration Framework that brings digital, creative-cultural and social entrepreneurship into the same discussion while keeping their different starting points visible. We use a dynamic-capabilities lens and an integrative review of recent literature to examine how these pathways may build sustainability-oriented innovation capability. Digital ventures contribute technological reach and experimentation; creative-cultural ventures work from heritage, design and place-based knowledge; and social ventures begin with unmet social or community needs. The common mechanism is not the type of venture itself, but the ability to recognize opportunities, recombine resources and turn ideas into viable forms of economic, environmental or social value. Whether that capability contributes to green transition also depends on finance, skills, infrastructure, standards and institutional support. The framework therefore treats transition quality as more than environmental efficiency. It also asks whether new opportunities are inclusive, livelihoods remain viable, communities are resilient and human well-being improves. The paper offers a conceptual basis for later empirical work in ASEAN economies.

Keywords: *Green economy, Entrepreneurship, Sustainability-oriented innovation, Regenerative development, ASEAN*

1. Introduction and Background

Green transition is commonly discussed at the level of energy systems, technology and environmental regulation. From an economic perspective, however, the transition is also about how value is created and who is able to participate in that process. Resource efficiency, renewable energy and cleaner production remain central, but they now interact with digitalization, creative industries and demands for more inclusive growth. This makes entrepreneurship relevant to the green-economy debate in a way that goes beyond firm formation. The question is how different kinds of entrepreneurial activity can contribute to greener development without separating environmental goals from livelihoods, participation and well-being.

ASEAN provides a useful setting for this question because the region combines rapid economic change with marked differences in institutional capacity, industrial structure and digital readiness. Environmental pressures linked to urbanization, resource use and industrialization are also uneven across member states. Recent regional work therefore treats green transition as a development challenge involving investment, skills, employment and inclusion, not simply as an environmental program (Asian Development Bank [ADB], 2026). The region's digital transformation is occurring at the same time, which makes the interaction between technology, entrepreneurship and sustainability particularly relevant (Sonobe et al., 2024).

A single transition pathway is unlikely to fit this diversity. Digital platforms can widen market access where connectivity, skills and trust are already in place, yet produce little benefit where those conditions are weak. Green standards may encourage cleaner production among firms that can finance compliance, while smaller enterprises may struggle with the same requirements. These contrasts suggest that the policy issue is not only how quickly ASEAN can move towards greener activity, but also which combinations of capabilities and institutions allow different firms and communities to take part in that movement (ADB, 2026).

This is where entrepreneurship becomes analytically useful. Entrepreneurs often sit close to changing consumer needs, local constraints and emerging technologies, so they are among the actors who convert broad agendas such as digitalization or sustainability into something that can actually be used. They do not all work from the same resource base. A digital venture may begin with data and connectivity; a cultural enterprise with design, heritage or craft knowledge; and a social venture with an unmet community need. Treating these forms as interchangeable would obscure the mechanisms through which each one creates value.

Existing studies provide strong pieces of this argument, although they are usually located in separate literatures. Digital technologies can support green growth when institutions and human capabilities are able to absorb them (Yang et al., 2024). Work on digital sustainable entrepreneurship shows that technology can be embedded in business models that create economic, social and environmental value, while also carrying environmental costs of its own (Gregori & Holzmann, 2020; Seidl & Bican, 2025). Research on Indonesian batik SMEs demonstrates that cultural enterprise can combine entrepreneurship and digital technology with both conventional and green innovation (Febrianda et al., 2025). Social-entrepreneurship studies, meanwhile, place community needs, stakeholder relationships and social innovation at the centre of value creation (Prateeppornnarong, 2026; Yoon & Ho, 2025).

The problem is not a shortage of research on any one of these areas. It is the lack of a convincing explanation of how they might sit within the same green-transition process. Digital entrepreneurship is often examined through platforms and firm performance, creative entrepreneurship through culture and design and social entrepreneurship through mission and impact. Green-economy studies more often model technology, finance, governance or human capital as parallel determinants. What is still less clear is the mechanism that links heterogeneous entrepreneurial resources to sustainability-oriented change.

We address that gap through the Triadic Entrepreneurship-Regeneration Framework. The framework keeps digital, creative-cultural and social entrepreneurship conceptually distinct, but asks whether each can strengthen a shared capability for sustainability-oriented innovation. In this paper, that capability refers to the ability to notice relevant needs or opportunities, recombine resources and develop solutions that are economically workable while carrying social or environmental value. It is the bridge between entrepreneurial activity and green economic transition. The extent to which the bridge holds depends on the surrounding ecosystem, including finance, education, infrastructure, standards and policy support. Human outcomes are kept visible because a transition can be technically greener and still distribute its benefits narrowly.

Four questions structure the discussion. First, what does each entrepreneurial pathway contribute to sustainability-oriented innovation capability? Second, through what mechanism might that capability support green economic transition? Third, which institutional and policy conditions enable or limit the move from entrepreneurial innovation to wider green outcomes? Finally, how should transition quality be judged when regenerative and human-centred outcomes are included? Framing the paper around these questions shifts attention from a list of determinants to the process through which change may occur.

2. Literature Review and Conceptual Foundations

Green economy and the transition perspective

A green economy can broadly be understood as an economy that improves human welfare and economic opportunity while reducing environmental risks and ecological pressures. The transition perspective adds a dynamic element to this idea. Rather than treating an economy as simply green or non-green, it focuses on the process through which technologies, institutions, investment patterns, production systems and consumption behaviors change over time. This distinction is important because the drivers of transition are unlikely to operate independently or uniformly across countries.

For ASEAN, green transition has several dimensions that move together only imperfectly. The ADB (2026) places measurement, jobs and skills, regulation, private investment and country-specific pathways within the same agenda. This is important because lower emissions alone do not tell us whether firms can adapt, workers can acquire relevant skills or communities can maintain viable livelihoods. Environmental improvement may therefore be necessary without being sufficient for a developmentally strong transition.

The determinants literature is useful in showing that greener growth is shaped by economic and institutional conditions as well as environmental variables. Yang et al. (2024), for instance, report relationships among digital technologies, human development, finance, institutional quality and green growth in South Asia. Such evidence supports a multi-factor view of transition. What it does not fully show is how these conditions are translated into changes in firms, products and business practices. That explanatory gap is where an entrepreneurship-and-capability perspective can add value.

This distinction matters for the present paper. A statistical association between digital development and green growth can identify a potentially important determinant, but it does not tell us what firms or entrepreneurs actually do with digital capability. The same is true for finance or governance. Yang et al. (2024) demonstrate that these conditions matter; our concern is the mechanism between the condition and the outcome. The framework therefore complements, rather than replaces, a determinants approach.

Distribution is another reason to view transition as a process rather than an end-state. New green sectors may create jobs and investment, yet the costs of adjustment can fall unevenly on workers, small firms and communities. The ADB (2026) places skills and country-specific pathways alongside environmental indicators for this reason. In our framework, transition quality improves when firms can adapt, workers can participate and new opportunities are not confined to actors who already have strong access to capital, skills or technology.

Theoretical anchor: a dynamic-capabilities perspective

Dynamic capabilities provide the main theoretical anchor because the framework is concerned with what actors do when conditions change, not only with the resources they possess. Teece (2007) describes this in terms of sensing, seizing and transforming. The distinction is useful here because the three entrepreneurial pathways start from different assets. Digital ventures tend to rely on technology, data and connectivity; creative-cultural ventures on design, heritage and place-based knowledge; and social ventures on mission, stakeholder relationships and unmet needs. A capabilities lens allows those different resource bases to be compared without treating them as equivalent.

We extend that logic in two directions. The first is directional: the capability of interest is not innovation in general, but innovation that is consciously connected to sustainability. Adaptation has greater relevance to this study when it creates viable economic value while reducing environmental pressure or strengthening social value. The second extension is contextual. Capabilities are exercised within an ecosystem, so finance, skills, infrastructure, standards, networks and legitimacy influence whether a promising idea remains local or develops into a wider economic contribution.

The value of the dynamic-capabilities perspective is especially clear when resources are abundant but action is weak. Owning a technology does not guarantee a useful digital service, just as possessing a cultural asset does not guarantee a viable creative enterprise and having a social mission does not guarantee impact. Sensing may involve recognizing a new digital opportunity, an unmet social need or a market for culturally distinctive products. Seizing turns that opportunity into an offering; transforming requires changes in routines, partnerships or resource use so that the offering can survive. This sequence gives the framework a common process without erasing the differences among pathways (Teece, 2007).

There is an important qualification. A firm can be highly adaptive and still create environmental damage or exclude particular groups. For this reason, adaptability alone is not the outcome we seek to explain. The relevant capability is one that also considers resource use, accessibility and longer-term development effects. Put differently, sustainability orientation gives direction to capability: it asks not only whether an innovation is new or commercially effective, but whether it moves value creation towards a more responsible form.

Sustainability-oriented innovation capability as a connecting mechanism

Sustainability-oriented innovation capability is the connecting construct in the model. Adams et al. (2016) describe sustainability-oriented innovation as intentional changes in products, processes, practices or organizational arrangements that create environmental and social value alongside economic returns. We use that idea at the capability level. The concern is whether entrepreneurs and firms can identify sustainability-related needs, combine knowledge and resources, experiment, and adapt their business models without merely

relocating social or environmental costs elsewhere. The three entrepreneurial pathways enter this process differently, but each ultimately has to convert its starting resources into workable value.

This distinction prevents the framework from assuming that entrepreneurship is automatically sustainable. Omri and Almoshaigeh (2025) show that the development effects of entrepreneurship vary with the form of entrepreneurship and with complementary innovation and financial conditions. Their findings support the argument that entrepreneurial activity needs an enabling environment before it can generate balanced economic, social and environmental outcomes. Policy, therefore, should not treat more entrepreneurship as an end in itself; it should strengthen the capabilities and conditions that make entrepreneurial activity useful for transition.

Digital entrepreneurship as a technology-enabled pathway

Digital entrepreneurship is defined here by the role of digital technology in creating, delivering or reorganizing value. Platforms, mobile applications, data analytics, cloud services and artificial intelligence can lower information and transaction costs, extend market reach and allow new service configurations. This matters particularly for smaller or newer firms that cannot rely on extensive physical infrastructure. At the same time, the value of a digital venture depends on more than the presence of technology; it depends on how that technology changes access, coordination and user experience.

The sustainability literature on digital entrepreneurship is therefore mixed in a productive way. Gregori and Holzmann (2020) show that digital technologies can support business models that create economic, social and environmental value. Seidl and Bican (2025) likewise identify sustainability as a source of differentiation and stakeholder value for digital start-ups. Neither line of work justifies treating digitalization as inherently green, however, because data infrastructure and energy-intensive technologies have environmental footprints of their own. Digital entrepreneurship is better understood as an enabling pathway whose sustainability effects depend on design and context.

Sport-tech offers a simple illustration. An application for sport participation or service access is not an environmental innovation by definition. Yet it can reduce search and coordination costs, connect users with providers, widen access to activities and create new forms of service delivery. Those outcomes matter because economic value is being created through changes in participation and information, not only through higher productivity. Whether such an application contributes to sustainability depends on the resources it uses, the groups it reaches and the kind of behavior it enables.

We deliberately keep the sport-tech example generic. Its role is to show that a digital venture can contribute to human-centred development even when environmental objectives are not its primary purpose. An application that improves access to information, lowers coordination costs or helps users participate in services may create social and economic value. The sustainability question comes later: how inclusive is access, how resource-intensive is the technology, and can the model scale without creating new forms of exclusion? This interpretation is consistent with Gregori and Holzmann's (2020) emphasis on multidimensional value creation.

The same reasoning cautions against technological optimism. More digital activity does not automatically mean greener activity. Energy use, infrastructure requirements and unequal access can offset some of the expected benefits. Seidl and Bican (2025) make a similar point by showing that sustainability can be valuable to digital start-ups while remaining difficult to embed in the business model. For ASEAN, this tension is practical: digital expansion can open markets and services, but gaps in affordability, skills and connectivity can reproduce existing inequalities.

Accordingly, we expect digital entrepreneurship to strengthen sustainability-oriented innovation capability through faster experimentation, better connectivity, data-enabled learning and new value propositions. That expectation is conditional, not universal. Skills, infrastructure, finance, digital trust and the environmental footprint of the technology all influence whether a digital venture contributes meaningfully to green transition.

Creative-cultural entrepreneurship as a place-based pathway

Creative-cultural entrepreneurship starts from a different resource base. Its value is rooted in artistic practice, design, heritage, identity and place-based knowledge rather than primarily in technology. Entrepreneurs create value by adapting those resources through design, storytelling, branding, experience and market access. The development significance lies in the possibility that economic activity can support livelihoods while keeping cultural knowledge active rather than treating it as a static asset.

Batik is a useful Southeast Asian example because culture, enterprise and design are closely intertwined in the sector. The argument here is not that batik is automatically sustainable. Rather, batik shows how inherited knowledge can remain economically relevant when it is combined with design innovation, digital market access and changing consumer preferences. If adaptation strengthens markets without stripping away cultural meaning, creative-cultural entrepreneurship can contribute to livelihood continuity as well as innovation.

This pathway reaches green transition only under additional conditions. Cultural preservation and environmental sustainability are not the same thing. Cleaner materials, energy use, waste management and sourcing determine whether cultural production also improves environmental performance. Creative-cultural entrepreneurship therefore contributes first through adaptation, differentiation and livelihood creation; it becomes more directly relevant to green innovation when responsible production practices are also part of the business model.

Evidence from Indonesian batik SMEs illustrates this layered relationship. Febrianda et al. (2025) find that entrepreneurship and digital technology can support both conventional and green innovation. Their study is useful for the present framework because it shows that heritage-based enterprise is not outside contemporary innovation. Cultural knowledge can be combined with new market and technological capabilities while remaining a distinctive source of value.

The boundary is important precisely because it prevents overclaiming. A culturally valuable enterprise can still rely on environmentally harmful production. Conversely, a small creative enterprise may improve its environmental practices without losing cultural authenticity. The framework therefore separates cultural resilience from green performance and allows both to be assessed. This makes the creative-cultural pathway analytically stronger than simply labelling heritage enterprise as sustainable.

Social entrepreneurship as a mission-oriented pathway

Social entrepreneurship is distinguished mainly by its orientation towards a social or community problem. Technology, partnerships and commercial methods may all be used, but the venture is organized around social value as well as financial viability. This makes the pathway particularly relevant to a human-centred transition, because opportunity recognition begins with the question of whose problem is being addressed rather than with technology or heritage as the starting asset.

Research on social innovation also shows that mission is not enough. Yoon and Ho (2025), drawing on cases from South Korea and Singapore, describe social innovation as a system involving entrepreneurs, institutions, intermediaries and support structures. Prateeppornnarong (2026) similarly identifies pro-social motivation alongside managerial competence, stakeholder management and multi-stakeholder governance in Thai social enterprises. Both studies point towards an ecosystem rather than an individual-hero interpretation of social entrepreneurship.

This has implications for entrepreneurship education. If young people encounter entrepreneurship only as business-plan preparation, they may learn to recognize market gaps without asking who benefits from the proposed solution. Exposure to social entrepreneurship broadens that frame. It encourages students to identify a problem, consider affected stakeholders and test whether a proposed response is both useful and financially viable. That habit of reasoning is relevant to a human-centred green transition even when the resulting venture is not formally classified as a social enterprise.

Education therefore matters less because every student should become a social entrepreneur and more. After all, it shapes what counts as an opportunity. Students can be asked to consider profitability together with

resource use, inclusion and durability. In practice, this means examining whether a solution solves a real problem, whether the people expected to benefit can access it, and whether the model can survive beyond a short project cycle. Such questions bring social value into entrepreneurial judgement rather than adding it after a venture has been designed.

The ecosystem evidence reinforces the same point. Social purpose may motivate a venture, but sustained outcomes require organizational capability, partnerships, legitimacy and often finance. Yoon and Ho (2025) emphasize the interaction among actors and support structures, while Prateeppornnarong (2026) highlights managerial and stakeholder capabilities. In the present model, social entrepreneurship contributes to sustainability-oriented innovation when the mission is translated into a solution that can persist, adapt and mobilize support.

Social entrepreneurship should nevertheless remain distinct from sustainable entrepreneurship. Bonfanti et al. (2024) show that the literatures overlap but are not interchangeable. We therefore treat social entrepreneurship as a complementary pathway: its particular contribution is to keep unmet needs, participation and stakeholder value visible within the wider transition, rather than to assume that social purpose is equivalent to environmental performance.

Institutional and policy ecosystem

Entrepreneurial innovation does not take place in an institutional vacuum. Access to digital and physical infrastructure, finance, education, intellectual-property arrangements, public procurement, environmental standards and research networks can all influence whether a promising idea is developed, financed and scaled. These conditions also affect who is able to enter the innovation process in the first place.

This institutional dimension is consistent with green-growth evidence. Yang et al. (2024) identify institutional governance as an important part of the relationship between economic capability and green growth, while the ADB (2026) stresses regulatory coherence, skills, investment and private-sector mobilization in ASEAN. A fragmented policy approach can therefore produce isolated programs that each address technology, enterprise or sustainability without creating a pathway between them.

In the framework, institutional and policy support is treated as an enabling condition rather than as another entrepreneurial pathway. It includes access to finance, entrepreneurship education, infrastructure, standards, market access and collaboration among universities, firms, communities and government. These elements influence both the scale of entrepreneurial activity and its direction. The same venture may remain a local experiment in one setting and become a scalable transition solution in another because the surrounding ecosystem differs.

This helps explain why entrepreneurship programs often produce uneven results. Training can strengthen individual skills, but it cannot compensate for missing finance or market access. Environmental standards can signal a preferred direction, yet small firms may still need technical assistance to comply. Universities can generate knowledge and talent, but that knowledge has limited value if there are no channels through which firms or communities can use it. The relevant policy question is therefore relational: which combinations of support allow capabilities to reinforce one another?

The answer is unlikely to be identical across the three pathways. Digital ventures may depend particularly on connectivity, trust and scaling finance. Creative-cultural enterprises may need design capability, certification, intellectual-property awareness and access to wider markets. Social enterprises may rely more heavily on partnerships, blended finance and institutional legitimacy. A coordinated ecosystem does not mean providing the same support to every venture. It means recognizing different constraints while keeping a common direction towards inclusive and sustainable value creation.

Human-centred regenerative development

Green transition is usually monitored through indicators such as carbon intensity, renewable-energy use, resource productivity or environmental innovation. These measures are necessary, but they say little about

whether people and communities can participate in the transition and benefit from it. A human-centred perspective adds that distributional question to the environmental one.

Relevant outcomes therefore include more than income growth. Decent livelihoods, access to entrepreneurial opportunities, skills, participation, social inclusion, community resilience and cultural continuity all matter to the quality of transition. Amorós et al. (2021) show that entrepreneurship also has consequences for subjective well-being, reminding us that entrepreneurial outcomes are experienced by individuals as well as firms. At a regional level, the practical question is whether greener economic change produces opportunities that are accessible and durable.

Regenerative development gives the framework a more demanding endpoint. Mang and Reed (2012) approach regeneration through the potential of place and the co-evolution of human and ecological systems. Hahn and Tampe (2021) translate a similar logic into business strategy by arguing that firms can contribute to the health of the social-ecological systems on which they depend. We use the term in that spirit: economic activity should not only reduce damage, but where possible strengthen environmental, social, cultural and human capacities while remaining economically viable.

This is different from using 'regenerative' as a decorative synonym for sustainability. The distinction is about direction. A sustainability strategy may aim to reduce harm or maintain acceptable conditions; a regenerative orientation asks whether the wider system becomes more capable over time (Hahn & Tampe, 2021; Mang & Reed, 2012). The trade-offs are real. A program can create local income without reducing environmental pressure, and an environmental intervention can improve resource efficiency while leaving communities economically fragile. The framework keeps those tensions visible instead of assuming that all desirable outcomes move together.

Human well-being belongs in the model for the same reason. Entrepreneurship is not experienced only through revenue, productivity or firm survival. Amorós et al. (2021) show that motivation is associated with differences in subjective well-being. At the community level, similar concerns appear in participation, resilience and livelihood quality. We do not claim that entrepreneurship alone delivers these outcomes. Rather, they provide a test of transition quality: are the opportunities created through innovation meaningful and accessible to the people expected to live with the transition?

3. Research Methodology

We used an integrative conceptual review because the research question crosses literatures that do not share one set of constructs, methods or levels of analysis. A meta-analysis would not be appropriate for this purpose, and the paper is not presented as an exhaustive systematic review. Following Snyder (2019), we made the review process explicit enough for readers to see how literature was identified, selected and brought together. The aim was conceptual explanation rather than article counting.

The search and reading process was organized around six domains that came directly from the research questions: green economy and green transition; digital entrepreneurship; creative-cultural entrepreneurship; social entrepreneurship and social innovation; institutional and policy ecosystems; and human-centred or regenerative development. We used iterative combinations of these domain terms, including related expressions such as digital sustainable entrepreneurship, institutional quality, entrepreneurial ecosystem and sustainability-oriented innovation. Regional policy reports were included when they offered direct ASEAN context.

A source was retained when it served at least one clear purpose in the framework: defining a focal construct, supporting a proposed relationship, or identifying a condition, limitation or regional feature that affected that relationship. Priority was given to peer-reviewed work and authoritative regional reports, with recent studies preferred where suitable. Older sources were kept when they were foundational to the argument, as with dynamic capabilities and regenerative development. Descriptive sources with little conceptual relevance were not used as core evidence.
During reading, we extracted five kinds of information rather than coding for effect sizes. For each entrepreneurial pathway, we asked: what resource does the pathway start from; how is value created; where is the

sustainability relevance; what conditions strengthen or weaken the mechanism; and what economic, environmental or human outcomes are discussed? This made it possible to compare firm-level studies, cross-country evidence and regional reports without pretending that they were methodologically equivalent.

The synthesis then focused on convergence and difference. Innovation capability appeared repeatedly as a point of connection, but the literature also provided reasons not to equate the three pathways. Digital entrepreneurship is not the same as digitalization; cultural enterprise is not automatically green; and social entrepreneurship is not synonymous with sustainable entrepreneurship. Keeping those distinctions was important because the framework depends on explaining how different starting points can converge without erasing their boundaries.

The framework emerged through three rounds of comparison. We first mapped the value-creation logic of each pathway separately. We then compared the pathways to identify a common capability that could plausibly connect their different resources with sustainable transformation. Finally, we added institutional conditions and downstream human outcomes to explain why similar entrepreneurial ideas may have very different transition effects in different settings. The five propositions were developed from this final configuration.

This method involves judgement. Conceptual fit across heterogeneous literatures cannot be reduced to a mechanical inclusion rule, so the claims have been kept proportionate to the review design. We do not report an exhaustive article count, pooled effect or ranked list of determinants. The framework should instead be read as a middle-range explanation that can be challenged and tested in later empirical work.

Its intended domain is emerging economies, especially ASEAN, where digital growth, cultural enterprise, social innovation and sustainability pressures coexist. The relative importance of each pathway is likely to vary with sectoral structure, market maturity and institutional capacity. That variation is not a weakness of the model; it is one of the questions the model is designed to make testable.

4. Proposed Conceptual Framework and Propositions

The framework begins with a deliberately simple claim: entrepreneurs can start from very different resources and still contribute to the same broad transition. Digital entrepreneurship begins largely with technology, connectivity and data. Creative-cultural entrepreneurship works from heritage, design and local knowledge. Social entrepreneurship begins with mission, stakeholder relationships and community needs. Rather than forcing these pathways into one category, the framework asks whether each can build a capability for sustainability-oriented innovation.

That capability is the point at which an entrepreneurial idea becomes relevant to green transition. It involves moving from experimentation to changes in products, services, processes, resource use or business models. Institutions and policy shape whether this movement can continue. Finance, education, infrastructure, standards and collaboration may help an innovation travel beyond its original setting, while their absence can leave it fragmented. The endpoint is intentionally broader than environmental performance because transition quality also depends on livelihoods, resilience and well-being.

Figure 1: Triadic Entrepreneurship-Regeneration Framework

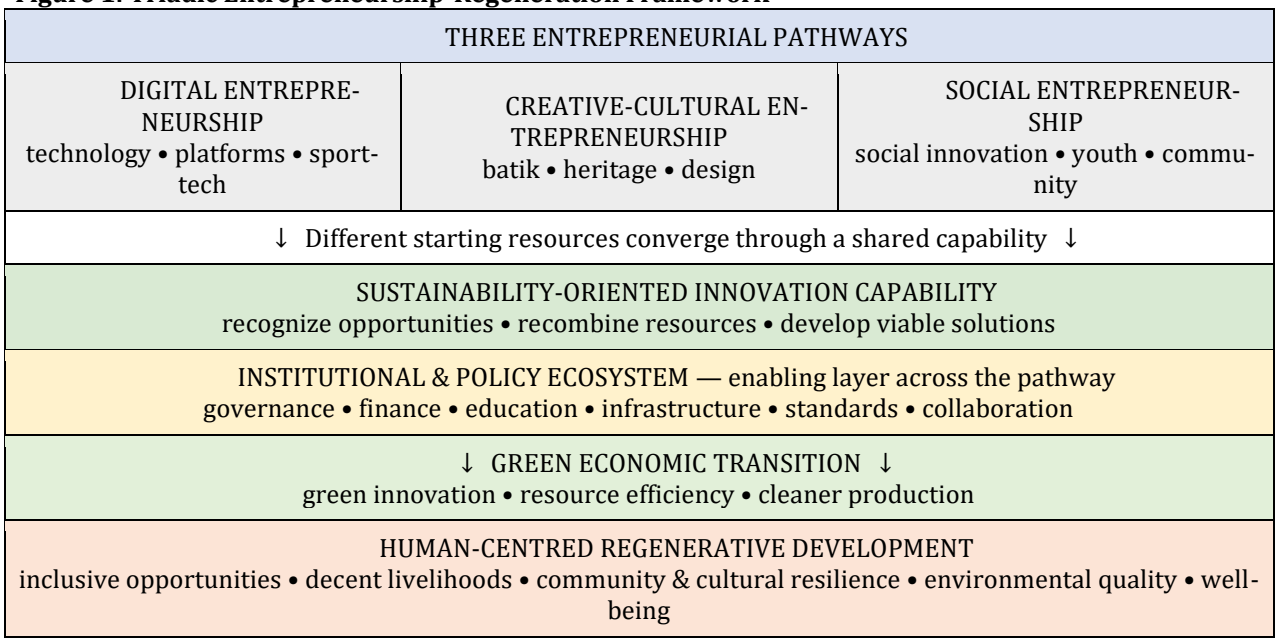


Table 1: Entrepreneurial pathways, mechanisms and expected contributions

Construct	Primary resource/base	Proposed mechanism	Expected contribution
Digital entrepreneurship	Technology, platforms, connectivity and data	Technology-enabled ex-perimentation, access and information efficiency	Sustainability-oriented in-novation capability
Creative-cultural entre-preneurship	Heritage, design, cultural knowledge and place	Cultural adaptation, de-sign innovation and mar-ket differentiation	Sustainability-oriented in-novation capability and cultural resilience
Social entrepreneurship	Social mission, stakeholder networks and community needs	Problem-solving, social innovation and collabora-tive value creation	Sustainability-oriented in-novation capability and inclusion
Institutional & policy ecosystem	Governance, finance, edu-cation, infrastructure, standards and collabora-tion	Reduces barriers, enables scaling and aligns capabil-ity with transition goals	Strengthens the capabil-ity-to-transition relation-ship
Green economic transi-tion	Green innovation, resource efficiency and cleaner pro-duction	Economic and environ-mental transformation	Human-centred regenera-tive development

Distinctive mechanisms and boundary conditions

Digital entrepreneurship works mainly through speed, connectivity and information efficiency. Those advantages are not available equally everywhere. Weak digital skills, poor affordability, limited infrastructure, low trust or a resource-intensive digital system can reduce the expected sustainability benefit. Digital intensity may widen access in one setting and deepen exclusion in another.

Creative-cultural entrepreneurship works through the adaptation of heritage, design and place-based knowledge. Its main constraints are different: cultural authenticity, intellectual-property protection, market access and the environmental performance of production. A culturally valuable product may be economically

successful and still have a poor environmental footprint, so cultural value should not be used as a proxy for green performance.

Social entrepreneurship relies on mission-driven problem solving and stakeholder mobilization. Here, the main limits arise when a socially useful idea lacks financial viability, managerial capability or stakeholder legitimacy, or when growth produces mission drift. The pathway therefore depends on an organizational model that can preserve purpose while remaining capable of surviving and scaling. Institutional quality cuts across all three pathways. Finance, skills, infrastructure, standards and collaboration affect how far an innovation can move beyond local experimentation. These conditions do not remove the differences among the pathways. They determine whether those differences can be converted into a sustainability-oriented capability that has wider economic relevance.

Propositions

Proposition 1 (P1): Digital entrepreneurship is expected to strengthen sustainability-oriented innovation capability through connectivity, technological adoption, data-enabled learning and technology-enabled value creation. The reasoning is primarily capability-based. Digital tools can shorten experimentation cycles, improve access to information and support new service configurations. We do not expect a direct or automatic improvement in green performance. The sustainability effect depends on what the application is designed to do, its resource footprint and the institutional conditions under which it operates (Gregori & Holzmann, 2020; Seidl & Bican, 2025).

Proposition 2 (P2): Creative-cultural entrepreneurship is expected to strengthen sustainability-oriented innovation capability when cultural and creative assets are adapted into economically viable value while social and environmental considerations are retained. Cultural and creative assets are treated here as productive resources, not as passive heritage. Design, storytelling and market adaptation can renew their economic relevance, and digital tools can extend market reach. Febrianda et al. (2025) provide a useful batik example. The proposition remains conditional because cultural innovation contributes more directly to green transition when adaptation is accompanied by responsible production, resource efficiency or other environmentally relevant practices.

Proposition 3 (P3): Social entrepreneurship is expected to strengthen sustainability-oriented innovation capability when mission-driven problem solving is combined with stakeholder collaboration and organizational capability. This proposition is concerned with the direction of entrepreneurial purpose. Social ventures begin from unmet needs and stakeholder value, which gives them a natural connection to inclusion and community problem solving. Yet purpose alone is insufficient. Evidence from Yoon and Ho (2025) and Prateeppornnarong (2026) suggests that social innovation depends on ecosystems, managerial competence and stakeholder relationships. The pathway becomes transition-relevant when social purpose is converted into a viable solution that can persist and, where appropriate, scale.

Proposition 4 (P4): Sustainability-oriented innovation capability is expected to contribute positively to green economic transition, with the strength of this relationship depending on institutional and policy support. A firm may possess a promising innovation and still be unable to diffuse it because finance, standards, infrastructure, market access or legitimacy are missing. Institutional support can lower those barriers and align private experimentation with wider transition goals. This logic is consistent with evidence on institutional quality and green growth and with the ADB's (2026) emphasis on policy coherence, investment and skills. The proposition therefore distinguishes having an innovation from having the conditions needed for that innovation to matter at scale.

Proposition 5 (P5): Green economic transition is more likely to support human-centred regenerative development when environmental gains are accompanied by inclusive economic opportunities, viable livelihoods, community and cultural resilience, and improved well-being. The final proposition treats green transition as a route to development rather than as the endpoint itself. Cleaner production and greater resource efficiency remain essential, but the transition is more complete when people can participate in the opportunities it creates and communities are better able to absorb future shocks. This broader outcome also makes trade-offs visible:

empirical work can ask whether environmental improvement is accompanied by human gains or whether one is being achieved at the expense of the other.

5. Discussion and Conceptual Contributions

The framework's first contribution is to make the mechanism between entrepreneurship and green transition explicit. Entrepreneurship is not assumed to cause green outcomes directly. Its relevance depends on whether entrepreneurial activity produces a capability for sustainability-oriented innovation. This shifts the question from 'does entrepreneurship matter?' to 'what kind of capability is created, and in what direction is it used?' Dynamic capabilities therefore become useful not only for understanding adaptation, but also for asking whether adaptation moves economic activity towards better environmental and social outcomes.

A second contribution is to take entrepreneurial diversity seriously. A mobile application, a heritage-based enterprise and a community-oriented social venture may appear to belong to different conversations. They do. The framework does not try to collapse them into one category. Instead, it shows that different resource bases can still feed into a shared capability mechanism, provided the differences in how value is created are kept visible.

That plural view matters in ASEAN because advanced digital ecosystems exist alongside craft-based microenterprises, cultural industries and community ventures. A model built only around frontier technology can miss local knowledge and forms of innovation that are embedded in place. A model built only around community enterprise can understate what digital tools make possible. The regional context therefore strengthens the case for analyzing several entrepreneurial pathways within the same transition framework.

This changes the level at which entrepreneurship enters green-economy research. Rather than treating entrepreneurship as one more variable in a determinants model, the framework asks which resources entrepreneurs mobilize, what capability those resources produce and which conditions allow that capability to influence transition. The approach can still be tested quantitatively later, but it retains the qualitative differences among entrepreneurial forms that a single aggregate indicator would hide.

The pathways may also reinforce one another. Digital tools can help cultural enterprises reach wider markets, cultural knowledge can differentiate digital offerings, and social purpose can influence how either type of venture defines value. Some of the most interesting cases may therefore be hybrid rather than pure examples of one pathway. This opens a useful empirical question: do combinations of pathways produce stronger sustainability outcomes than any pathway operating alone?

A third contribution is the refusal to equate novelty with sustainability. Digital technologies can increase efficiency, creative ventures can create new markets and social enterprises can address local needs, but none of these outcomes is automatically green. Sustainability orientation acts as a directional test. It asks whether an innovation changes resource use, production practices, inclusion or other transition-relevant outcomes in a meaningful way.

The creative-cultural pathway adds a place-based dimension that many transition models overlook. Cultural assets can support livelihoods and local identity, but they need adaptation if they are to remain economically viable. When design, market access and responsible production are combined, creative enterprise can contribute to resilience without reducing heritage to a commodity. The key is to separate cultural continuity from environmental performance while allowing the two to reinforce one another.

The social pathway adds a distributive dimension. A technically efficient transition can still be developmentally weak if opportunities are concentrated among a small group of firms or communities are excluded. Social entrepreneurship keeps attention on unmet needs, participation and stakeholder value. In this sense, it brings the question of 'who benefits?' into the innovation process itself.

The final contribution concerns the endpoint. Environmental efficiency remains central, but the framework treats it as part of a wider development judgement. A transition is stronger when it also expands capabilities,

supports viable livelihoods and leaves communities better able to cope with future shocks. Regenerative development is used in that sense: not as one narrow measurable variable, but as an orientation towards building economic, ecological, social and cultural capacity over time.

Managerial and Policy Implications and Recommendations

The policy implication is not that governments need another stand-alone entrepreneurship program. The stronger message is that green-economy policy, digital policy, creative-economy support and social-enterprise development should speak to one another. Digital-skills programs can include sustainability applications; creative-economy support can address cleaner production and circular design; and social-enterprise initiatives can connect community problem-solving with green innovation. Integration matters because entrepreneurs make business-model decisions before many sustainability requirements are imposed on them.

For economic-development agencies, this means avoiding policy silos. Digital adoption can accelerate activity without improving transition quality if resource use and access are ignored. Cultural-enterprise support can increase sales while leaving production practices unchanged. Social-enterprise programs can celebrate mission while underinvesting in managerial capability. Support is more likely to produce durable value when technology, markets, finance, sustainability and social purpose are considered together at the point where ventures are being developed.

Universities have a particular role because they sit between knowledge creation, youth development and external stakeholders. Applied projects, living laboratories and university-community-industry collaborations can give students experience with real problems while giving firms and communities a space to test ideas. This is relevant in ASEAN, where universities are simultaneously expected to contribute to employability, digital transformation, innovation and sustainable development.

Industry involvement is equally important for the next stage of the framework. Sport-tech firms, batik and other creative SMEs, and social enterprises can act as practice partners in testing whether the proposed mechanisms make sense outside the literature. Expert panels, co-design workshops and pilot cases could help refine the measurement of sustainability-oriented innovation capability before larger empirical work. The value of industry involvement lies in validation and learning, not in adding names to the author list.

Financing and market access also need to reflect the diversity of the three pathways. Digital ventures may require technology investment and scaling finance. Creative-cultural enterprises may benefit more from design support, certification, branding and market development. Social enterprises often depend on partnerships, blended finance or outcome-oriented procurement. A green-finance system focused only on large infrastructure projects can therefore miss smaller forms of innovation that matter to local transition.

Institutional quality remains a basic condition across these interventions. Predictable regulation, clear environmental standards, functioning digital infrastructure, intellectual-property protection, skills and coordination all reduce uncertainty for entrepreneurs. The ADB (2026) similarly emphasizes policy coherence, private-sector participation and skills in ASEAN's transition. The policy objective is not simply to increase entrepreneurial activity, but to create conditions in which useful innovation can be developed and directed towards sustainable outcomes.

Monitoring should follow the same logic. Emissions and resource intensity remain important, but they should be read alongside indicators of decent work, entrepreneurial access, community resilience, cultural capability and well-being. A policy that improves environmental performance while narrowing economic participation should not be treated as an unqualified success. The framework therefore suggests evaluating both ecological performance and the quality of development produced by the transition.

Implications for Future Research

The framework has clear limits, and those limits define the next research tasks. The relationships proposed here are theoretical rather than empirically established. The pathways can overlap in practice, and green transition does not mean exactly the same thing across sectors or countries. Institutional support is also represented at a relatively broad level. Future research therefore needs to test construct boundaries and examine

whether the proposed mechanisms behave differently across ASEAN settings rather than assuming that one configuration fits the region.

Measurement will be particularly important. Digitalization can be represented through infrastructure, adoption or platform use; entrepreneurship through firm entry, activity rates or sector-specific measures; and institutional quality through governance indicators. Sustainability-oriented innovation capability is harder to capture because it combines the ability to innovate with the direction of that innovation. Future measures will need to distinguish general innovation capacity from innovation that is explicitly related to resource efficiency, cleaner production, inclusion or other transition goals.

A Malaysia-Indonesia comparison could be useful for this purpose. The two economies are geographically close and institutionally connected within ASEAN, yet they differ in market scale, entrepreneurial ecosystems and policy arrangements. A comparative design could test whether the same determinants operate differently across the two settings and whether institutional quality changes the strength of the entrepreneurship-transition relationship. A broader ASEAN panel would sacrifice some institutional depth but provide greater generalizability. Both approaches are compatible with the framework.

At the macro level, the model can be translated into testable relationships among digitalization, entrepreneurship, green innovation, institutional quality and green economic transition. Panel data would make it possible to examine direct effects as well as mediation, moderation or threshold behavior. Human-development indicators could then be added to test whether stronger green performance is associated with more inclusive outcomes rather than assuming that the two necessarily move together.

At the meso level, the focus can shift to entrepreneurial ecosystems in particular cities or regions. Comparative work could examine how universities, government agencies, creative industries, digital ventures and social enterprises interact, and whether different ecosystem configurations produce different forms of green innovation. This level is useful because national indicators often hide the place-based institutions and relationships through which entrepreneurs actually operate.

At the micro level, multiple case studies offer a direct route to the three pathways. Sport-tech or other application-based ventures could represent digital entrepreneurship; batik or heritage-based firms could represent creative-cultural entrepreneurship; and education- or community-oriented ventures could represent social entrepreneurship. Comparing these cases would allow researchers to identify common capabilities while retaining sector-specific constraints and differences in sustainability mechanisms.

For a later doctoral study, the framework can be simplified into a more parsimonious empirical model. One possible design is to examine digitalization, entrepreneurship, sustainability-oriented innovation capability and institutional quality as drivers of green transition, with innovation capability tested as a mediator and human-centred development as a downstream outcome. This would preserve continuity with earlier research on the determinants of green economy while adding the mechanisms and distributional questions that the present conceptual paper brings into view.

Conclusion

Green economic transition is better understood as a process than as a single technological shift. Entrepreneurs, firms, institutions, communities and public policy all shape how value is created and how quickly new practices spread. By placing digital, creative-cultural and social entrepreneurship in the same framework, this paper shows that their contribution does not arise from being similar. It arises from the different resources they bring into a shared capability for sustainability-oriented innovation.

The Triadic Entrepreneurship-Regeneration Framework makes two points. First, heterogeneous entrepreneurial starting points can converge through a capability mechanism without losing their distinctive logics. Second, environmental improvement is not a sufficient test of transition quality. Institutions and policy determine whether useful innovations move beyond isolated experiments, while human-centred regenerative development asks whether greener economic activity also broadens opportunity, strengthens livelihoods and supports resilience.

The practical implication is modest but important. Innovation has developmental value when it creates sustainable value for people, place and the future. For ASEAN, green transition should therefore be treated neither as an environmental obligation nor simply as a race to adopt new technology. It is also an opportunity to connect digital capability, cultural creativity, social purpose and institutional support in ways that make economic development more resilient, inclusive and worth sustaining.

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