KENYA BIO-ENTREPRENEURSHIP MODULE (KBEM v1.0)

An Open, Evidence-Based Resource for Research-to-Market Translation in Biosciences

IMPLEMENTATION AND ADOPTION ROADMAP

A Guide for Universities, Research Institutions, Technology Transfer Offices, and Innovation Intermediaries in Kenya

Acronyms

KBEM - Kenya Bio-entrepreneurship Module
TRL - Technology Readiness Level
MRL - refers to Manufacturing Readiness Level
TRD - Translation Readiness Dossier
TTO - Technology Transfer Office,
CPD - Continuing Professional Development
KeNIA - Kenya National Innovation Agency
TDG - Technology Development Grant.
CUE - Commission for University Education
NRF - refers to the National Research Fund.
PBL - Problem-Based Learning
R2I - Research-to-Innovation

Executive Summary

This roadmap is intended to move KBEM from pilot delivery to durable institutional adoption by securing the governance, resourcing, and academic legitimacy required for long-term sustainability. It is for institutional leaders responsible for mandates, budgets, and approvals, while also supporting programme teams, industry liaison staff, KeNIA regional officers, and co-investing partners. At institutional levels, KBEM should be delivered at least annually and should lead learners towards concrete commercialisation actions within twelve months, including grant applications, regulatory engagement, county pilots, or investor discussions. Nationally, the aim is to establish within four years a self-sustaining network of 10 to 15 implementing institutions, more than 40 certified facilitators, and a strong community of practice, with clear evidence that more Kenyan bioscience innovations are progressing through the translational "Valley of Death" into market-facing ventures.

KBEM can be adopted through four delivery tracks: a credit-bearing elective, a co-curricular venture studio, a CPD short course, or TTO-embedded translation clinics. Institutions may adopt one or combine several, provided their choices reflect actual capacity. Roll-out is structured over forty-eight months in three phases: pilot and standard-setting; scale through regional hubs and quality-assured blended delivery; and institutionalisation through accredited embedding, TTO integration, and sustainable financing. Success depends on three conditions: a stable and capable facilitation team, formal incentive alignment so delivery is not sustained by volunteerism, and strong ecosystem engagement with regulators, investors, county actors, founders, and other practitioners. Together, these conditions position KBEM as a credible national platform for bioscience commercialisation in Kenya.

Implementation Context

Evidence from Kenyan bioscientists' commercialisation experiences has repeatedly highlighted gaps in entrepreneurial skills, proof-of-concept infrastructure, business development funding, and structured access to IP support, investors, and advisory networks. KBEM addresses these translational gaps; its impact depends on consistent, high-quality institutional delivery rather than curriculum design alone.

KBEM is positioned at the university–institute–industry interface, supporting research outputs that are technically credible but not yet commercially mobilised. It is a structured education programme that equips researchers and TTOs with the competencies needed to engage those specialist actors effectively: market discovery, IP strategy, regulatory planning, unit economics and financial modelling, capital readiness, and county engagement.

This roadmap references policy only where it creates implementable requirements, incentives, or funding pathways for KBEM adoption. Vision 2030 and Medium-Term Plan IV (2023–2027) strengthen the internal case for resourcing translation capacity aligned to health, food security, and local manufacturing. KeNIA's commercialisation mandate positions it as a natural convenor and potential co-investor in adoption. CUE accreditation processes determine whether KBEM can operate as a credit-bearing elective and therefore shape institutional timelines. NRF and related schemes increasingly reward commercialisation readiness, making KBEM-aligned training strategically useful for applicants. BETA further reinforces the relevance of translation-oriented skills for value chains and enterprise growth.

The module itself contains the curriculum, tools and annexes required for bioscience commercialisation in Kenya. This roadmap addresses how institutions create the conditions for sustained, high-quality delivery and ecosystem-connected learning. It therefore focuses on the institutional determinants of whether KBEM performs as designed. In 2013, Nyende, McEnrue, and Senelwa identified thirty-five persistent resource constraints spanning funding, infrastructure, collaboration, policy, and public awareness that systematically impede the commercialisation of bioscience research in Kenya. The most cited gaps included the absence of entrepreneurial skills among scientists, no access to proof-of-concept infrastructure, insufficient funding aimed at biotech business development, and no systematic connection between scientists and patent application support, private investors, or business consulting. These the gaps that KBEM is designed to close. The remaining constraint is the capacity of Kenyan institutions to deliver this curriculum consistently, at high quality, and at the scale required by the country's bioscience sector.

Adoption Models for Institutions

KBEM's modular architecture enables deployment across diverse institutional environments without requiring a single standardised delivery model. The framework defines four implementation tracks, each aligned with different configurations of institutional maturity, faculty availability, technology-transfer capacity, and learner characteristics. Each track represents a complete, context-appropriate implementation pathway capable of delivering KBEM's intended learning and commercialisation outcomes within its respective institutional setting.

Track A: Credit-Bearing Elective

Track A delivers KBEM as a credit-bearing elective with full CUE-recognised assessment, formal transcript entry, and evaluation centred on the Translation Readiness Dossier, which functions simultaneously as an academic assessment and an actionable commercialisation asset. This requires institutional approval, a defined credit load, an academically appointed lead facilitator, and a protected institutional budget.

While institutionally demanding, Track A yields a direct and measurable commercialisation return. A cohort of postgraduate researchers graduating each year with investor-ready dossiers strengthens the institution's pipeline through increased KeNIA TDG submissions, patent filings, and first-investor engagements. Track A is therefore the optimal model for institutions with sufficient postgraduate scale, an operational TTO, and a Senate willing to support curriculum innovation in research training.

Track B: Co-Curricular Venture Studio

Track B operates outside the formal credit curriculum, through a structured co-curricular programme that combines facilitated coaching sessions, peer learning cohorts, demonstration events, and connections to the national bioscience innovation ecosystem. It is accessed by students and early-career researchers through a voluntary application process, typically running alongside their core degree or research programme. The venture studio model which has proven effective in East African university contexts through programmes like the GSBI, Villgro Africa cohorts, and KeNIA's own accelerator streams creates a focused learning environment for a small cohort of highly motivated learners without requiring the organizational approvals that credit programmes demand.

Track B is strategically important for two reasons. First, it allows institutions that are not yet ready for Track A to begin delivering KBEM at meaningful quality while building toward formal curriculum integration. Second, it reaches learners who have specific innovations at a critical stage of development and who need intensive support now, rather than waiting for a scheduled credit module. The PBL-BioAfrica experience demonstrated that problem-based learning in a non-credit context can produce enterprise formation outcomes comparable to, and sometimes better than, formal academic modules provided that the facilitation quality is maintained and the ecosystem connections are genuine.

Track C: CPD and Professional Short Course

Track C extends to professionals outside formal degree programmes ie, researchers in national institutes like KEMRI, KALRO, and KIRDI, TTO staff strengthening support for inventor-entrepreneurs, clinicians advancing diagnostic or therapeutic innovations, and agronomists driving biofortification or biopesticide adoption. It is delivered as a CPD short course, either through intensive residential format (5-7 days) or distributed series of half-day sessions over 6-8 weeks. It also establishes KBEM's sustainable revenue model. Unlike Tracks A and B, which rely on institutional or donor funding, Track C enables partial or full cost recovery through course fees. Institutional CPD budgets in national research institutes form a reliable paying market, while TTO networks achieve economies of scale by co-funding shared cohorts. As such, Track C provides the most credible long-term financial foundation for KBEM's national delivery infrastructure. Institutions that invest in a strong Track C meet an underserved professional training need and secure the programme's long-term independence from donor support.

Track D: TTO-Embedded Translation Clinic

Track D is the most distinctive pathway, embedding KBEM directly into the operational workflow of a TTTO rather than a standalone programme. Using KBEM's R2I Bottleneck Diagnostic, TTO staff triage incoming disclosures, direct inventors to the relevant KBEM tools, support market discovery and IP strategy through structured canvases, and connect teams to ecosystem actors. Track D transforms KBEM into a deal-flow and its outputs are active commercialisation cases: disclosures with completed freedom-to-operate analyses, early market validation, and investor-ready financials. For institutions with functioning TTOs but thin pipelines, it offers the most immediate return on KBEM adoption. Successful implementation requires at least

one KBEM-trained TTO staff member, a steady disclosure pipeline, and working relationships with key ecosystem partners who can provide market insight and early investment engagement.

Selecting the appropriate implementation track

The choice of implementation track should be driven by an honest assessment of institutional rather than ambition. For example, adopting Track A without the institutional support, facilitator pipeline, TTO capability, or budget stability required for sustainable delivery will be a mistake. Any institution that delivers Track B well for consecutive years creates far more value for Kenya's bioscience ecosystem than one that launches a weak Track A cohort and discontinues the programme once external funding ends.

Institutions with a functioning postgraduate research programme, an active TTO, at least one champion for innovation education, and a multi-year protected budget should pursue Track A, potentially complemented by Track B for learners outside the formal curriculum. Institutions with strong innovation energy (student clubs, committed faculty, and active inventors) but without formal approvals or budget stability should begin with Track B, using it as a deliberate pathway toward Track A within two to three years. National or international research institutes whose learners are professional researchers should adopt Track C, with the option to add Track D where a TTO or equivalent technology-management function exists. Institutions with a functioning TTO but limited teaching capacity should prioritise Track D, using it to build the evidence base and institutional credibility needed to justify later investment in Tracks A or B.

Standard Learning Artefacts and Stage-Gate Outputs

KBEM achieves consistency across all four delivery tracks through a common set of core learning artefacts. The principal output is the Translation Readiness Dossier (TRD), which brings together evidence on problem–market fit, IP position, regulatory pathway, business model, unit economics, capital needs, team capacity, and the translation strategy. Built progressively across the curriculum and assessed through a shared national rubric, the TRD provides the foundation for quality assurance and inter-institutional comparability. This is supported by stage-gate checklists completed at the end of each section. These capture the evidence generated, decisions taken, and outstanding gaps, thereby strengthening learner progression and facilitator oversight. What varies by track is the mode of delivery, assessment, and governance.

Track A carries graded academic assessment and formal institutional oversight. Tracks B and C lead to certificate-based completion with professional value. Track D is embedded within TTO workflow and judged through pipeline outputs rather than conventional assessment. This combination of common artefacts and track-specific delivery gives KBEM both national consistency and institutional flexibility.

Stakeholder System and Partnership Architecture

National Actors and Their Roles in KBEM Adoption

Several national actors have formal roles that directly affect whether and how institutions can deliver the programme, and cultivating the right relationships with these actors is as important as designing the delivery programme itself.

KeNIA is the most directly relevant national actor mandated to support commercialisation of research and develop Kenya's entrepreneurial ecosystem. This makes KBEM adoption a natural fit with KeNIA's strategic objectives. KeNIA's regional offices can serve as entry points for county government networks and county engagement activities, as referral pathways for innovators who complete KBEM and need KeNIA TDG support, and as co-funders for institutional KBEM pilot programmes. CUE's role is primarily regulatory: its approval is required for Track A credit programmes, and its curriculum quality standards shape the assessment framework and contact hour requirements. The Ministries of Education, Health and Agriculture, Livestock and Fisheries are relevant where KBEM is integrated into national researcher development frameworks. MoH's health research training requirements and MoALF's agricultural extension professional standards are potential institutional hooks for mandatory KBEM adoption. NRF's competitive grant mechanisms increasingly favour research proposals that demonstrate commercialisation awareness, creating an incentive for researchers to complete KBEM before submitting major research proposals.

Institutional Actors and Internal Governance

KBEM depends on a small set of internal institutional relationships. Senate or Academic Board approval is essential for Track A; without it, KBEM cannot be credit-bearing, and securing approval typically requires a senior champion at Dean or DVC level. The Graduate School is the operational anchor for Track A in research universities, while the TTO is critical for Tracks A and D and valuable across all tracks, supplying real invention disclosures, industry networks, and ecosystem

co-facilitators. The Finance Office is a decisive stakeholder as KBEM requires a dedicated budget line, facilitator honoraria, ecosystem-guest support, and learner materials. These costs must be approved and released reliably. Finance officers who understand KBEM's institutional value accelerate implementation; those who do not introduce delays that undermine programme quality. Investing early in building Finance Office buy-in is therefore a practical and often underestimated requirement for successful adoption.

Industry and Ecosystem Partners

KBEM's distinctive strength lies in its insistence on substantive ecosystem engagement. The programme is effective only when practitioners participate not as ceremonial guests, but as active intellectual partners who help shape the learning process alongside innovators. The most valuable ecosystem partners are experienced professionals who speak candidly about both success and failure, respond to learners with depth and specificity, and remain engaged beyond formal presentations to interrogate the practical realities of individual innovations. By contrast, keynote-style appearances that offer generic narratives of achievement without sustained interaction contribute little to the programme's aims and should be excluded. KBEM requires practitioners who can engage directly with real translational challenges, whether by scrutinising financial models, testing regulatory assumptions, or clarifying how processes such as county-level procurement negotiations unfold in practice. It is this form of grounded, problem-specific engagement that converts a guest speaker into a genuine ecosystem partner and gives KBEM its distinctive pedagogical value.

Partnership Instruments

The relationships underpinning KBEM's ecosystem integration must be embedded in formal instruments that remain valid beyond individual tenures. Verbal commitments from ecosystem partners, however sincere, offer little protection when personnel change or institutional priorities shift. For this reason, four core instruments are treated as standard across the KBEM implementing network. First, the Implementation Memorandum of Understanding between the host institution and the KBEM Programme Office defines the reciprocal obligations of both parties, sets minimum delivery standards, and establishes an accountability framework that endures beyond any single institutional champion. Second, annually renewed industry co-facilitator service agreements specify the scope and schedule of

contributions, the honorarium arrangements, and the confidentiality provisions required to safeguard learner innovations during programme delivery. Third, mentor non-disclosure agreements provide protection for the intellectual property of learners who disclose unpublished research or undeclared innovations during coaching sessions and ecosystem engagement activities. Fourth, data-sharing protocols between implementing institutions and the KBEM Programme Office govern the collection, transfer, and use of monitoring, evaluation, and learning data, ensuring that learner privacy is protected while preserving the aggregated evidence base required for continuous programme refinement.

Institutional Readiness and Site Selection

Before committing resources to a new implementation site, the KBEM Programme Office must assess institutional readiness with realism and discipline. Introducing the programme in settings that lack minimum enabling conditions does not strengthen capacity; it weakens learner experience and risks undermining programme credibility at the point of expansion.

A viable KBEM site is defined by six core conditions.

1. There must be a senior institutional sponsor, such as a Dean, Deputy Vice-Chancellor, or Institute Director, whose endorsement creates formal accountability rather than relying on personal goodwill alone.
2. The institution must have an implementation team, including a certified lead facilitator and at least one industry co-facilitator, with the combined expertise required to deliver both the curriculum and its practical grounding in Kenya's innovation ecosystem.
3. A technology transfer office or equivalent institutional unit must be in place to manage intellectual property disclosures, uphold confidentiality arrangements, and support a credible pipeline of innovations.
4. The institution must have an industry liaison function capable of mobilising the practitioner relationships on which programme quality depends.
5. These it must possess basic delivery infrastructure, including reliable internet, participant laptop access, presentation facilities, and appropriate collaborative teaching space.
6. There must be access either to laboratory or field-validation partners or to a defined referral pathway, since some learner activities depend on testing facilities, pilot production capacity, or trial infrastructure beyond the host institution itself.

Readiness Assessment and the KeNIA Nine-Construct Framework

KeNIA's assessment of entrepreneurial capacity across eighteen Kenyan universities in 2023 offers a rigorous, locally validated framework for judging institutional readiness for KBEM adoption. Its nine domains align closely with KBEM's own minimum readiness criteria. Institutions that have already undergone the KeNIA assessment should therefore treat that report as their primary readiness evidence.

Institutions without a prior KeNIA assessment should complete the KBEM Institutional Readiness Assessment before committing to any delivery timeline. This tool is intended to generate an honest profile of institutional preparedness across the six core readiness conditions and to determine whether the institution is ready to proceed to pilot delivery, requires a readiness-strengthening phase, or should defer adoption. A low score should not be read as institutional failure, but as an early diagnostic safeguard: when acted upon candidly, it prevents the far greater cost of launching an underprepared pilot that compromises learner experience, erodes programme credibility, and wastes the time of facilitators, learners, and ecosystem partners alike.

Site Selection for the National Pilot Cohort

Site selection should be governed by quality and diversity, not convenience or pre-existing relationships. Pilot institutions must meet the readiness threshold, demonstrate credible internal leadership, and show the capacity to generate and share MEL data rigorously. The cohort should also reflect institutional, geographic, and sectoral diversity: at minimum, it should include a research-intensive university, a national research institute or TTO-led programme, and an institution outside Nairobi, while collectively spanning at least three of KBEM's five priority sub-sectors. Without such breadth, the pilot cannot generate a credible national evidence base.

At the same time, readiness standards must not confine KBEM to better-resourced institutions. Many of the innovators who stand to benefit most are located in settings that are not yet prepared for full delivery. The readiness uplift pathway addresses this by offering institutions below the threshold for Track A or Track C a structured route to adoption. In many cases, Track B provides the most appropriate entry point, enabling early delivery, facilitator development, and ecosystem-building while laying the groundwork for later progression. Readiness uplift is therefore not a concession, but a deliberate sequencing strategy rooted in institutional reality.

Implementation Phases and Deliverables

Phase One: Pilot and Standard-Setting (Months 0–12)

Phase 1 establishes the quality foundation for national rollout. Its purpose is not merely early delivery, but the generation of evidence, standards, and institutional learning that will guide all subsequent implementation. Three to five pilot institutions are selected through the readiness and diversity criteria outlined earlier. All lead facilitators must complete certification before delivery begins. Pilot institutions are also expected to adapt selected cases to their sectoral and geographic context and contribute resources to the shared KBEM Resource Hub. Robust baseline monitoring, evaluation, and learning (MEL) is mandatory: each institution must collect and submit participation data, learner feedback, end-of-programme assessments, and follow-up outcomes. These data inform the Phase 1 learning report, which serves as the basis for Phase 2 design.

Phase Two: Scale with Regional Hubs (Months 13–30)

Phase 2 expands delivery to a wider network through a regional hub model designed to preserve quality while extending reach. High-performing Phase 1 institutions with fully certified facilitators serve as hubs, providing mentoring, case-sharing, and MEL support to neighbouring institutions. This structure reflects Kenya's institutional geography and reduces over-reliance on Nairobi-centred delivery. Phase 2 also introduces the blended learning platform, which supports preparatory and supplementary learning without replacing facilitated engagement. In parallel, an inter-institution assessment moderation system is established to ensure consistency of standards across all sites.

Phase 3: Institutionalisation (Months 31–48)

Phase 3 secures KBEM beyond donor support and individual champions. Institutionalisation requires embedding the programme in formal systems, including curriculum structures, staff responsibilities, budget lines, operating procedures, and assessment processes. For credit-bearing delivery, accreditation processes should be concluded during this phase. For TTO-led models, KBEM workflows should be integrated into routine operating practice. Long-term financing mechanisms must also be operational, with delivery increasingly supported through institutional budgets and earned income rather than external grants. A formal annual national

review cycle should be established to update content, support facilitators, and consolidate cross-institutional learning.

Critical Path Dependencies

Several implementation milestones depend on processes outside immediate programme control and must therefore be anticipated early. Accreditation and university approval cycles can take many months and may delay delivery if not initiated on time. Staff recruitment processes in public institutions are often lengthy, particularly where dedicated coordination roles are required. Similarly, formalising agreements with external practitioners through institutional procurement systems may take longer than expected. These dependencies should be built into the implementation timeline from the outset to avoid avoidable delays across the rollout.

Governance, Quality Assurance, and Operating Model

National implementation of KBEM requires a governance and quality assurance architecture that is both clear and durable. At the apex sits the National Steering Committee, which provides strategic oversight across the implementing network. Its role is to approve implementing institutions, set minimum standards, review annual performance, endorse curriculum revisions, and guide the allocation of Programme Office resources. To reflect KBEM's multi-institutional character, the Committee should include representation from KeNIA, CUE, NACOSTI, rotating implementing institutions, industry ecosystem partners, and at least one alumnus or alumna whose venture has progressed towards commercialisation. It should meet twice annually, while day-to-day coordination remains with the KBEM Programme Office, housed within ISAAA AfriCenter in partnership with KeNIA and led operationally by a Programme Director.

Alongside this strategic structure, the Technical Working Group safeguards the intellectual and pedagogical integrity of the curriculum. Its function is to ensure that KBEM remains accurate, contextually relevant, and educationally robust. Membership should therefore combine delivery experience, technology transfer expertise, investment perspective, and subject knowledge across the programme's priority sub-sectors. Through the annual DBTL review cycle, the TWG considers structured feedback from implementing institutions and recommends curriculum revisions in response to emerging ecosystem developments and delivery challenges. It also oversees facilitator certification by maintaining the competency framework,

setting assessment standards, and reviewing borderline cases, thereby serving as the programme's principal academic quality assurance body.

Within each implementing institution, delivery should rest on a minimum three-person team comprising a senior institutional sponsor, a programme coordinator, and a lead facilitator. The senior sponsor provides formal mandate and institutional backing; the coordinator manages operational delivery, partner engagement, data collection, and liaison with the Programme Office; and the lead facilitator is responsible for teaching, learner support, assessment, and contribution to curriculum review. To preserve continuity, each role should be defined through formal terms of reference lodged with the Programme Office before delivery begins.

Quality Assurance System

Quality assurance across the network depends on four linked mechanisms: facilitator certification, assessment moderation, delivery monitoring, and curriculum version control. No facilitator should deliver KBEM without formal certification, and re-certification should be required periodically on the basis of continued engagement and contribution to programme improvement. Translation Readiness Dossiers should be moderated across institutions through annual benchmarked review to maintain consistency of assessment standards. Delivery quality should be monitored through minimum requirements on contact hours, stage-gate completion, practitioner participation, and MEL submission, with underperforming institutions placed on improvement plans or suspended where necessary. Curriculum version control completes the system by ensuring that all institutions deliver the same approved version and adopt revisions within the required timeframe. Together, these arrangements provide the institutional discipline needed for KBEM to scale without losing coherence, quality, or credibility.

Delivery Design and Faculty Development

Pedagogical Model

KBEM is founded on a problem-based pedagogical model in which learners engage the curriculum through their own live innovations rather than hypothetical cases. This approach ensures that learning is anchored in real translational decisions, using the learner's own data, regulatory pathway, customer assumptions, and financing needs. Its educational value lies in requiring participants to test the strength of their evidence and confront the practical implications of incomplete or weak assumptions. This

structure is reinforced through stage-gated progression. At the end of each section, learners must meet explicit evidence-based criteria before advancing. These stage-gates function not as procedural checkpoints, but as diagnostic devices that identify where a venture remains underdeveloped, weakly evidenced, or strategically unprepared. Progression, therefore, reflects demonstrable readiness rather than nominal completion.

Delivery Modes

KBEM is designed primarily for facilitated, in-person delivery. This reflects the interactive nature of its core activities, which depend on discussion, peer challenge, immediate feedback, and practitioner engagement. Tasks such as customer discovery, regulatory pathway analysis, financial modelling, and stakeholder planning are most effective in settings that allow assumptions to be interrogated collectively and refined in real time. Blended delivery may be used where institutions have adequate digital infrastructure and learners can participate in periodic face-to-face sessions. In such cases, online components should support preparation, reflection, and access to programme resources rather than replace facilitated engagement. Fully online delivery is unsuitable for the core interactive elements of KBEM and should be limited to preparatory or supplementary content. Any institution proposing an open and distance learning format should first demonstrate that it can maintain equivalent standards of engagement, facilitation, and ecosystem connection.

Faculty Development Plan

KBEM responds directly to a structural constraint within Kenyan higher education: most academic staff are trained and rewarded as researchers, not as facilitators of commercialisation or translational practice. Many, therefore, have limited direct exposure to industrial, regulatory, or investment processes, despite being expected to guide learners through them. Effective faculty development is thus essential to programme quality.

The KBEM model addresses this through structured facilitator preparation combining curriculum mastery, facilitation training, and supervised co-delivery. This equips academic staff to guide translational learning without requiring them to become commercial practitioners themselves. Short, targeted secondments in bioscience enterprises, regulatory agencies, or technology transfer settings can further strengthen facilitation by grounding it in current ecosystem realities. Sustainability, however, depends on institutional recognition. KBEM facilitation must be formally

incorporated into workload allocation and performance evaluation at a level proportionate to the time and responsibility involved. Without this, delivery relies on discretionary effort and is unlikely to endure.

Support and Progression

Learner support extends beyond scheduled sessions. Coaching clinics between sessions should provide structured assistance for participants facing specific technical, regulatory, strategic, or financial challenges. These clinics are a standard feature of the programme's support architecture and should be presented as such from the outset. Progression beyond the programme must also be actively supported. Referral pathways to incubators, accelerators, and innovation support platforms should be formalised for learners who complete the programme with a credible Translation Readiness Dossier and a defined next step. Wherever possible, these referrals should be facilitated through direct introductions rather than passive signposting. Protection of learner intellectual property is equally essential. From induction, participants should be informed that innovations discussed within KBEM remain protected under the programme's confidentiality arrangements and that outputs generated through the process, including the Translation Readiness Dossier, remain their own commercial assets. This is fundamental to trust, participation, and the programme's translational integrity.

Resource Plan and Budget Architecture

A credible KBEM should clearly distinguish between a one-time investment cost and recurrent delivery costs. This distinction is fundamental to sustainability. One-time costs include facilitator certification, curriculum localisation, digital platform configuration, and the initial development of ecosystem partnerships. These are appropriate targets for catalytic support from government programmes, bilateral partners, or philanthropic and development funders. Recurrent costs, by contrast, include facilitator time or honoraria, programme coordination, learner materials, practitioner contributions, venue and logistics, MEL management, and participation in national learning activities. These costs must be covered through institutional budgets or dependable earned income. Programmes fail when recurrent delivery is sustained artificially through short-term grant funding.

The hub model strengthens both quality and financial efficiency. By clustering institutions around regional hubs, KBEM can share high-value resources that would otherwise be too costly to duplicate. Practitioner sessions, investor engagement,

regulatory advisory clinics, and intensive bootcamps can be delivered across multiple institutions at lower per-site cost while also enriching peer learning through cross-institutional interaction. The same principle applies to access to specialised facilities for laboratory, field, or pilot-stage validation, which can be coordinated through structured resource-sharing arrangements rather than negotiated repeatedly by individual institutions.

Digital infrastructure should be functional, accessible, and easy to administer rather than technologically elaborate. The KBEM platform must support curriculum delivery, resource sharing, and MEL oversight across the network. Existing institutional systems such as Moodle or Google Classroom are generally sufficient, provided they are configured reliably, accessible on mobile devices, and supported by timely technical administration. The objective is not technological sophistication for its own sake, but dependable access to materials, tools, and performance data.

Long-term sustainability requires a blended funding architecture in which no single source is indispensable. Government and institutional co-financing should provide the programme's core annual commitment and signal local ownership. Industry support can fund selected high-value components, particularly where firms and investors benefit directly from a stronger innovation pipeline. Donor funding is best reserved for catalytic investments, especially during early standard-setting and platform development, rather than for routine delivery. Over time, fee-based continuing professional development should become the principal revenue-generating arm of the model. Properly designed and priced, Track C can generate meaningful income, support national coordination, and cross-subsidise delivery in lower-capacity settings. For this reason, it should be treated not as a peripheral offering, but as a central component of KBEM's long-term financial architecture.

TTO Integration and Translation Pipeline

For institutions implementing Track D, KBEM should function as the core framework through which the TTO organises translational support. Inventor engagement begins not with a passive disclosure process, but with structured triage. Using the KBEM R2I Bottleneck Diagnostic, the TTO identifies the innovation's stage of development, clarifies the principal barrier to progression, and directs the inventor to the most relevant parts of the KBEM framework. This approach shifts support from administrative intake to problem-oriented guidance, ensuring that innovators receive stage-appropriate assistance rather than generic advice.

Mapped in this way, the TTO workflow becomes a coherent translation pipeline. Early disclosure and problem framing align with the initial KBEM stages; intellectual property and protection strategy link to the relevant IP and access-and-benefit-sharing components; market validation draws on the customer and adoption tools; and later-stage pathway development connects inventors to licensing, investment, or public-sector adoption routes. The practical value of this alignment is that all support activity is directed towards a common output: a Translation Readiness Dossier capable of underpinning licensing discussions, grant applications, investor engagement, or institutional decision-making.

To operate credibly, this model requires defined service standards. TTOs adopting KBEM should commit to timely inventor acknowledgment, structured triage, written bottleneck assessments, and clear progression recommendations. Where inventors are introduced to industry, investors, or public-sector partners, briefing materials should be prepared to a consistent standard and reviewed internally before circulation. These service expectations are essential if KBEM is to improve not only the quality of innovations, but also the professionalism of institutional translation support.

A major advantage of this integration is the strengthening of the deal pipeline itself. Inventors who complete a Translation Readiness Dossier enter licensing or investment discussions with a far higher level of preparation than those presenting only a disclosure or technical concept. They are better positioned to articulate market need, regulatory requirements, capital demands, and commercial logic. In this sense, KBEM helps convert the TTO pipeline from a repository of undeveloped disclosures into a more credible portfolio of transaction-ready opportunities. Market-facing activities such as industry days, licensing clinics, and investor office hours then become mechanisms for advancing these opportunities into concrete partnerships and deals.

At the same time, KBEM must remain clear about the limits of its role in intellectual property and access-and-benefit-sharing support. The programme can equip learners to recognise core strategic issues, including ownership, disclosure timing, Nagoya Protocol obligations, and the basic logic of freedom-to-operate. It should not, however, substitute for specialist legal or patent advice. Institutions must therefore maintain clear referral pathways for cases involving complex ownership disputes, blocking patents, or cross-border ABS obligations. Where internal expertise is limited, access to external patent agents or IP counsel should form part of the wider implementation support structure. This boundary between structured translational

education and formal legal advice is essential to both quality and institutional credibility.

Risk Management and Change Management

KBEM adoption is most likely to falter where institutional ownership is diffuse, facilitator incentives are weak, staffing is fragile, financing is discontinuous, or approvals move more slowly than implementation plans anticipate. In practice, these risks are rarely technical; they are organisational. The most serious is institutional siloing, in which responsibility is dispersed across faculties, TTOs, and administrative units without any one body assuming formal ownership. This must be resolved through senior institutional designation of a responsible unit with clear accountability for delivery. A second recurrent risk is the failure to recognise facilitation within academic workload and performance systems, which predictably weakens faculty commitment when competing demands intensify. Additional vulnerabilities arise from staff turnover within small implementation teams, funding gaps between catalytic support and sustainable revenue, and delays in regulatory, governance, or procurement processes that can stall rollout well beyond planned timelines.

Early disruption is especially common within the first ninety days of adoption, when institutional commitments are most severely tested. In most cases, delay reflects one of three underlying problems: insufficient institutional mandate, facilitator unavailability, or the loss of a key ecosystem partner. Each requires a distinct response. Weak mandate demands escalation to senior leadership and a candid reassessment of whether the institution is genuinely prepared to proceed. Facilitator disruption requires temporary support through the regional hub network until local capacity is restored. Ecosystem partner withdrawal should be addressed through pre-established relationship pools at both Programme Office and institutional level. The effectiveness of these responses depends not on improvisation, but on prior preparation.

Sustained implementation therefore requires robust continuity mechanisms. Institutional memory must be embedded in documentation and process rather than left to individuals. Programme decisions, delivery materials, MEL records, and ecosystem relationships should be stored in shared institutional systems rather than personal accounts or devices. Implementation roles should be defined through formal terms of reference, and staff transitions should trigger structured handover processes. In parallel, institutions should maintain an active record of ecosystem partners, including relationship history and re-engagement protocols, so that critical

external linkages can survive personnel change. These measures do not remove risk, but they significantly reduce the likelihood that routine disruption becomes programme failure.

Monitoring, Evaluation, and Learning Framework

Theory of Change

KBEM is founded on a clear translational premise: high-quality bioscience research alone is insufficient to generate products, ventures, or public value unless it is matched by commercial, regulatory, and financing capability. The programme therefore seeks to strengthen this missing layer through structured, practice-oriented education grounded in real innovations, live ecosystem engagement, and market-facing outputs. Its core proposition is that such training can improve the capacity of innovators to move promising research across the translational gap.

This theory must remain testable. If KBEM participants do not progress more consistently than comparable non-participants in areas such as regulatory engagement, translation-stage financing, partnership formation, and early commercial traction, then the programme's design requires revision. The framework therefore distinguishes clearly between outputs, outcomes, and longer-term impact, while recognising that system-level effects will require sustained longitudinal observation.

KPI Set with Kenya-Appropriate Indicators

The KPI framework is organised across three levels. Output indicators assess delivery quality and immediate programme performance. These include learner completion rates, Translation Readiness Dossier quality, stage-gate completion, cohort gender balance, and learner ratings of facilitation quality. Outcome indicators assess post-programme behaviour and progression. In the Kenyan context, these include submission of KeNIA translation-stage applications, engagement with relevant regulators, entry into investor or licensing discussions, county-level pilot agreements, and measurable advancement in translational readiness. Impact indicators assess wider system effects, particularly the extent to which more Kenyan bioscience innovations progress beyond the translational bottleneck over time. Taken together, these indicators allow KBEM to assess not only whether delivery occurred, but whether it improved translational behaviour and contributed to stronger innovation progression within the wider ecosystem.

Data Collection, Reporting Cadence, and Learning Loops

Data collection should occur at four points across the programme cycle. Session-level data capture immediate participation, stage-gate progression, and learner feedback. End-of-programme data assess dossier quality, cumulative completion, learner satisfaction, and intended next steps. Follow-up data at six and twelve months track post-programme actions and translational progression. Together, these provide a staged evidence base linking programme participation to medium-term behavioural change. The value of MEL lies not only in accountability, but in structured learning. Annual review processes should synthesise institutional data to inform programme refinement, while the DBTL update cycle should translate evidence from delivery into curricular revision. Equally important is the annual learning community, through which facilitators, coordinators, and alumni share practical insight that formal metrics alone cannot capture. This combination of quantitative monitoring, longitudinal follow-up, and collective reflection is essential if KBEM is to remain adaptive, evidence-driven, and contextually relevant over time.

Sustainability and the Long-term Vision

Sustainability in KBEM should not be understood as a narrow question of post-grant financing, but as a broader test of institutional value. A programme becomes sustainable when it is sufficiently useful to universities, research institutes, facilitators, learners, and industry partners that they are willing to invest in its continuation without constant external advocacy. On this view, sustainability rests on embedded demand as much as on revenue. Financially, this requires a diversified model in which continuing professional development income, institutional co-investment, and structured industry support progressively replace dependence on catalytic donor funding. CPD provision is especially important because it offers a scalable revenue base capable of supporting national coordination and subsidising delivery in lower-capacity settings. Over the longer term, more resilient mechanisms, including consortium support and endowment-style models, can deepen this foundation and align programme continuity with the interests of the wider bioscience ecosystem.

Institutional durability also depends on the community. The long-term strength of KBEM will rest in part on a national community of practice linking facilitators, coordinators, alumni, TTO professionals, and ecosystem partners. This network provides the social infrastructure through which implementation quality is sustained,

practical knowledge is exchanged, new facilitators are developed, and curriculum improvement remains grounded in lived experience. It is particularly valuable for technology transfer practice, where institutions often face similar translational challenges but operate with uneven capacity and limited opportunities for structured peer learning. A strong national learning community, therefore supports not only programme continuity, but also wider system coherence.

Over a ten-year horizon, KBEM should be judged not principally by the number of cohorts delivered, but by the extent to which it contributes to structural change in Kenya's bioscience innovation system. Its ambition is to make translational capability a normal and expected part of scientific training, to strengthen the pipeline of locally developed innovations reaching regulators, investors, and county-level adopters, and to increase the number of biosciences ventures capable of progressing beyond the translational bottleneck. In practical terms, this implies a mature national network of implementing institutions, a large and capable facilitator base, a substantial alumni community linked to measurable commercialisation outcomes, and a financing model in which most operating costs are met through earned and locally anchored support rather than donor dependence. Under this vision, KBEM is not a short-term training initiative, but a long-range institutional investment in Kenya's scientific, commercial, and developmental capacity.