

American Journal of Economics and Business Management

Vol. 9 Issue 8 | **pp.** 485-491 | **ISSN:** 2576-5973
Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Managing Government and Venture-Backed Startups in The Innovation Ecosystems of Developing Countries: A Project Management Framework

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Abstract: This article develops a project management framework for startups financed jointly by public money and venture capital in the innovation ecosystems of developing countries. The argument proceeds from a single premise: public capital and venture capital are not substitutable resources but distinct instruments with different risk tolerances, time horizons and success criteria, and treating them as interchangeable is the source of the most common failures in state-supported startup programmes. The article identifies four governance defects observed across developing-country ecosystems — the inter-stage gap, misaligned measurement, the absence of an exit channel, and the persistence of grant dependence — and proposes a stage-gate architecture in which the financing instrument, the decision-maker and the performance indicator all change at defined transition points. The framework is applied to the case of Uzbekistan, whose startup and venture ecosystem has expanded rapidly and whose stated targets to 2030 imply a change in the structure rather than the volume of support. The article concludes with a set of design propositions concerning the allocation of decision rights, the leverage ratio as the central control indicator, and the sequencing of reform.

Keywords: Startup Management, Government Venture Capital, Hybrid Financing, Innovation Ecosystem, Stage-Gate, Valley of Death, Fund of Funds, Exit Strategy, Developing Countries, Project Governance

Citation: Sodiq, T. M. Managing Government and Venture-Backed Startups in The Innovation Ecosystems of Developing Countries: A Project Management Framework. American Journal of Economics and Business Management 2026, 9(8), 485-491

Received: 28th Jun 2026
Revised: 20th Jul 2026
Accepted: 15th Aug 2026
Published: 30th Aug 2026

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1. Introduction

Governments in developing countries have adopted startup support programmes at a considerable rate over the past decade, and the instruments they employ are broadly convergent: grants for early-stage projects, accelerator subsidies, tax preferences for technology residents, and public participation in venture funds. What varies far more than the instruments is the outcome. Some ecosystems have converted public expenditure into a self-sustaining flow of private capital; others have produced a growing population of grant-dependent projects that never attract commercial investment and never reach a market.

The explanation advanced here is managerial rather than financial. The instruments are largely correct; what is frequently absent is a framework specifying which instrument applies at which stage, who takes the selection decision at each stage, and by what indicator each stage is judged. Without such a framework the two capitals are treated as interchangeable pools of money differing only in origin, and the programme defaults to whichever instrument is administratively easiest to deploy — almost always the grant.

The distinction between the two forms of capital is not merely one of source. Public capital operates under an accountability regime in which the loss of funds is a failure

requiring explanation; venture capital operates under a portfolio regime in which the loss of most investments is an expected cost of the few that succeed [1]. Public budgeting runs on an annual cycle; a venture fund is constituted for roughly a decade and realises returns towards its end [2]. A public programme is evaluated by coverage and disbursement; a fund by the terminal value of its portfolio. Each difference generates a distinct managerial requirement.

The theoretical basis for public intervention in early-stage technology finance rests on two arguments. Returns to early-stage invention are partly captured by parties other than the investor, so private investment falls below the socially optimal level. And early-stage projects combine acute asymmetry between founder and financier with intangible assets that serve poorly as collateral, which restricts debt and compresses the supply of equity. Hall and Lerner set out the structure of this financing gap and its implications for the composition of external finance available to research-intensive firms [3].

The empirical literature on whether public intervention actually corrects the gap is more equivocal than policy documents usually acknowledge. Lerner's evaluation of the United States SBIR programme found that awardees subsequently grew faster in employment and sales than matched non-awardees, but that the effect was concentrated in regions with pre-existing venture capital activity [4]. This regional conditionality is the single most policy-relevant finding in the literature, because it implies that a public grant programme operating in an environment without downstream private capital is not producing the same effect as the programme it was copied from.

Lerner's later synthesis extends this into a general critique of public efforts to construct venture markets, identifying the characteristic failure modes: programmes designed without regard to the incentives of fund managers, allocations driven by regional or sectoral distribution rather than by quality, and evaluation against disbursement targets [1]. Mazzucato advances the opposing emphasis, documenting the extent to which foundational technologies originated in publicly funded programmes and arguing that the state functions as a risk-taker of first resort whose contribution is systematically understated [5]. The two positions are less contradictory than they appear: the first concerns the design of intermediation, the second the origin of technological capability, and both are consistent with a framework in which public money is decisive early and counterproductive late.

Studies of government-sponsored venture capital converge on a finding that is central to the framework developed here. Brander, Du and Hellmann, examining international data, report that enterprises receiving moderate government venture support alongside private investment perform better than those financed exclusively by either government or private sources, while enterprises dominated by government funding perform worse [6]. Bertoni and Tykvová reach a compatible conclusion, finding that governmental venture investors contribute more to innovation output when they syndicate with independent private investors than when they act alone [7]. Cumming and MacIntosh document the opposite risk in the Canadian case, where subsidised labour-sponsored funds displaced rather than complemented private venture capital [8]. Colombo, Cumming and Vismara, surveying this body of work, note that the effects of governmental venture capital are strongly conditional on programme design rather than uniform across programmes [9].

The venture capital literature supplies the microfoundations for the stage-gate architecture. Sahlman identified staged capital infusion as the most powerful control mechanism available to a venture investor, since the option to abandon at each round disciplines the entrepreneur more effectively than any contractual covenant [2]. Kaplan and Strömberg show that cash flow, board, voting and liquidation rights are allocated separately and made contingent on defined milestones, so that control shifts towards the investor when performance disappoints [10]. Hellmann and Puri demonstrate that venture-backed firms professionalise more rapidly than comparable firms, adopting formal human resource practices and replacing founder-managers earlier [11] — evidence

that the contribution of venture capital is organisational as well as financial, with direct consequences for what a public grant cannot substitute for.

The ecosystem literature supplies the level of analysis above the individual project. Isenberg cautions against attempting to replicate the conditions of an established technology cluster and argues for building around locally available assets and demand [12]. Stam observes that the ecosystem concept risks tautology, since ecosystems are identified by the presence of successful entrepreneurship and then invoked to explain it, and calls for causal specification of the elements [13] — a critique taken seriously here, since the framework below specifies elements as decision rights and transition conditions rather than as a list of desirable attributes.

Finally, the project management literature supplies the structural device. Cooper's stage-gate model organises innovation projects as a sequence of stages separated by decision points at which continuation is explicitly authorised on the basis of defined criteria [14]. The seventh edition of the PMBOK Guide moves from prescribed processes to principles and tailoring, and its emphasis on delivering value through adaptive governance is compatible with the application of stage-gate logic to portfolios rather than to single projects [15].

The remainder of the article is structured in three main sections. The Methodology explains the comparative institutional, documentary and systems approaches. The Results and Discussion section develops the functional differentiation between public and venture capital, derives the stage-gate project management framework, identifies recurrent governance defects and performance indicators, and applies the framework to Uzbekistan. The final section presents the conclusions.

2. Materials and Method

The study employs comparative institutional analysis, documentary analysis and a systems approach. Comparative institutional analysis contrasts national programmes across four variables: the channel through which public capital reaches the enterprise, the identity of the party taking the selection decision, the criterion by which performance is measured, and the mechanism by which public participation is terminated. Documentary analysis draws on the normative acts and official statistical reporting of the Republic of Uzbekistan concerning the development of the startup ecosystem. The systems approach treats public and private capital as interdependent elements of a single financing architecture rather than as separate programmes with separate objectives.

3. Results and Discussion

The comparative analysis yields a consistent result: public and venture capital should not be treated as interchangeable financing sources. Their effective roles differ by stage, and the transition from prototype development to market entry is the critical governance boundary. The findings below connect the proposed stage-gate architecture with the empirical and institutional evidence synthesised in the Introduction.

The project life cycle is divided here into four stages: idea formation, prototype development, market entry, and scaling. This division corresponds to the four-stage structure adopted in Uzbekistan's own startup support system, which distinguishes idea formation, project development, launch, and scaling with export orientation [16].

In the first two stages venture capital is largely inactive, and the reason is not the height of the risk but the character of the uncertainty. An investor will accept a low probability of success provided the probability can be estimated; an investor will not accept an unquantifiable prospect. At the idea and prototype stages the relevant parameters — whether the technology will work, whether anyone will pay for it, at what price — are not merely unfavourable but unmeasured. This is the condition under which non-dilutive instruments are appropriate: grants, testing subsidies and public procurement of development work, all structured as funds that are not expected to be returned.

At the market entry and scaling stages the position reverses. Once a product has reached customers, uncertainty becomes measurable: acquisition cost, retention, unit economics and gross margin are observable quantities. At this point the grant becomes actively harmful for two reasons. The first is informational: grant revenue is not a market signal, and a founder optimising for grant eligibility is optimising against the wrong objective function. The second is organisational: the professionalisation effect documented by Hellmann and Puri [11] is a consequence of investor governance — board composition, milestone contracting, management replacement — and a grant confers none of it. A public agency disbursing a grant does not take a board seat, does not renegotiate terms at the next round, and does not replace a founder who cannot scale. It therefore cannot supply what venture capital supplies beyond money. The framework proposed here applies the stage-gate structure [14] not to a single project but to the financing architecture of a portfolio, and it varies three things simultaneously at each gate: the instrument, the decision-maker and the indicator.

Stage 1 — Idea formation. Instrument: small non-dilutive grant, awarded in standardised amounts with minimal documentation. Decision-maker: an administrative body applying published eligibility criteria, since at this stage discrimination between applicants is not reliably possible and the cost of an elaborate selection procedure exceeds the value of the funds awarded. Indicator: the proportion of recipients that reach Gate 1.

Gate 1. Transition condition: a demonstrable technical concept and an identified customer segment. Failure here should be the modal outcome and should be recorded as such rather than concealed.

Stage 2 — Prototype development. Instrument: a larger milestone-based grant or a development contract, with payment tranches released against defined technical deliverables. Decision-maker: a panel combining technical and commercial expertise. Indicator: technical milestones achieved and the proportion of projects reaching Gate 2.

Gate 2. Transition condition: a working prototype and evidence of willingness to pay. This is the point at which the framework requires a change of instrument, and it is the point at which most developing-country programmes fail, for reasons discussed below.

Stage 3 — Market entry. Instrument: equity investment through a fund in which public money participates as a limited partner. Decision-maker: the private fund manager, not the public agency. This allocation of decision rights is the operative element of the framework and follows directly from the empirical finding that public capital performs best when subordinate to private judgement [6, 7]. Indicator: capital raised from private sources per unit of public capital deployed; survival and revenue growth of portfolio companies.

Gate 3. Transition condition: evidence of a repeatable sales process and unit economics consistent with growth.

Stage 4 — Scaling and exit. Instrument: later-stage equity, syndicated with foreign investors where the domestic market is too small to absorb the round. Decision-maker: the fund manager, with the public participant exercising only limited-partner rights. Indicator: realised exits, export revenue, and the aggregate return on the public participation.

Two design rules govern the operation of the gates. First, the instrument must change at the gate; retaining grant financing beyond Gate 2 reproduces the failure the gate exists to prevent. Second, the decision-maker must change at Gate 2; if the public agency continues to select portfolio companies after that point, the framework collapses into direct public venture investment, which the literature associates with the weakest outcomes [6].

The rationale for locating the transfer of decision rights at Gate 2 is that selection there becomes a judgement about a business rather than about a technology. A public technical panel can assess whether a prototype works. It cannot reliably assess whether a team will execute, whether a market will develop at the assumed rate, or whether investment terms match the risk — and it has no mechanism for revising its judgement, since it holds no ongoing position.

Governance defects in developing-country ecosystems

The inter-stage gap. The most common structural defect is the discontinuity between Stage 2 and Stage 3. A grant programme carries a growing number of projects to prototype,

and no capital exists to receive them. The diagnostic signature is a programme in which the number of grant recipients rises year on year while the proportion subsequently raising private capital remains flat. The defect is frequently misdiagnosed as insufficient project quality, which prompts an increase in grant selectivity and leaves the gap untouched. The finding that SBIR effects were concentrated where venture capital already existed [4] speaks directly to this: an upstream grant instrument transplanted into an environment without downstream capital does not reproduce the effect observed where it originated. It produces prototypes.

Misaligned measurement. Public programmes are commonly assessed by indicators that measure resource deployment: projects supported, participants trained, funds disbursed. These are inputs. Because measurement drives behaviour, a programme assessed on disbursement will disburse, and in whatever manner minimises administrative risk — typically many small grants distributed widely rather than concentrated support to fewer projects. Lerner identifies this dynamic as a recurrent feature rather than an occasional lapse [1].

Absence of an exit channel. Venture returns are realised at exit, and in a small or thin market exits are scarce: the stock exchange is illiquid, and domestic strategic acquirers are few. Where no exit channel exists, the venture model does not merely underperform; its internal logic does not close, since fund managers cannot demonstrate returns and therefore cannot raise successor funds. The Yozma structure addressed this by granting private partners an option to acquire the public stake at a predetermined price [17], which converted the public participant's presence into an asset that the private manager had an incentive to make valuable.

Grant dependence. Where public funding remains available at Stages 3 and 4, a rational founder will pursue it, since it is non-dilutive and its allocation criteria are more predictable than an investor's. The result is a firm whose revenue is predominantly public, whose product development is oriented towards programme criteria, and whose commercial viability is untested. The diagnostic indicator is the share of firm revenue derived from public programmes and whether that share declines over successive years. A cohort in which it does not decline is not maturing.

Measurement and control indicators

The framework requires a small set of indicators, each attached to a specific stage and each measuring an outcome rather than an input.

The central indicator is the leverage ratio: private capital raised per unit of public capital deployed, measured at Stage 3 and above. Its interpretation is direct. A ratio at or near unity indicates that public capital is occupying a position that private capital would otherwise have taken — the displacement effect documented in the Canadian case [8]. A ratio substantially above unity indicates that public participation is expanding the volume of capital available rather than substituting within it. The target value should be set at the outset of a programme and published annually, since an indicator that is calculated but not published is subject to redefinition when it disappoints.

The second indicator is the gate transition rate: the proportion of projects entering a stage that reach the following gate. Transition rates make the inter-stage gap visible before it becomes structural and identify the specific gate at which the pipeline fails.

The third indicator is cohort survival: the proportion of firms in a given entry cohort still operating after three and five years, together with their revenue and employment. Cohort measurement is essential because aggregate portfolio statistics conceal the pattern that matters — whether successive cohorts perform better than earlier ones, which is the only evidence that the programme is learning. The fourth is the public revenue share described above, tracked by cohort and by year.

Application to Uzbekistan

Uzbekistan provides an instructive case because the volume of its ecosystem has expanded rapidly while the structural questions addressed above remain open. According to official reporting, the aggregate value of the country's startup and venture ecosystem reached approximately 3.9 billion US dollars in 2024–2025; the number of domestic startups exceeded 750; fifteen venture funds were operating; and the volume of venture

capital exceeded 180 million US dollars [16]. The targets stated for 2030 are five thousand startups, two hundred startups present in export markets, and two billion US dollars of venture investment [16].

The internal proportions of these targets are more informative than their absolute values. The number of startups is to rise approximately sixfold while venture investment rises approximately elevenfold. The implied change is in capital per project, not in the number of projects. A programme oriented towards increasing the count of supported projects would satisfy one target while making the other harder to reach, since a wider distribution of the same public funds reduces the concentration required to attract co-investment. In the terms of the framework, the binding constraint lies at Gate 2 and above, not at Stage 1.

The institutional preconditions for the proposed architecture are substantially in place. A national venture fund was established by government decision in 2020, and a public venture fund associated with the country's IT Park was subsequently created to support early-stage companies [16]. What the framework requires is not the creation of further institutions but the assignment of stages to existing institutions with non-overlapping mandates, so that a single project does not receive grant and equity support from bodies applying different criteria to the same evidence.

Recent measures indicate movement in the direction the framework recommends. Support has been organised into four stages corresponding to idea formation, project development, launch and scaling for export; residency status with associated preferences has been extended to participants in the digital startup programme without the minimum export thresholds otherwise applicable; part of the cost of participation in acceleration and incubation programmes is reimbursed up to a defined ceiling; and substantial resources have been committed for 2026–2027 through a combination of international financial institutions, venture funds and public funds [16].

Three propositions follow for the design of these measures. First, the allocation of the committed resources between the grant channel and the fund channel will determine whether the inter-stage gap narrows. Resources directed predominantly to the grant channel will increase the population of Stage 1 and Stage 2 projects without increasing the capacity to receive them at Stage 3, which is the mechanism by which the gap widens rather than closes.

Second, preferences and reimbursements should carry an expiry condition tied either to elapsed time or to a revenue threshold. Preferences that persist after a firm reaches commercial viability distort competition between supported and unsupported firms in the same market, and they contribute directly to the grant dependence defect.

Third, the leverage ratio should be adopted as a reported indicator of the programme rather than as an internal management statistic. Its publication is what makes the displacement risk identified in the comparative literature [8] observable in the national context, and it is the only indicator that distinguishes a programme that is expanding the venture market from one that is occupying it.

4. Conclusion

Public capital and venture capital are not substitutable. They differ in risk tolerance, time horizon and success criterion, and each is effective at a different point in the project life cycle. In the first two stages venture capital is inactive because uncertainty is unmeasured; in the last two stages grant capital is harmful because it detaches the project from market signals and supplies none of the governance that investor participation entails.

The empirical literature on government venture capital converges on a specific design conclusion: public capital performs best when it is subordinate to private judgement and worst when it is dominant [6, 7, 9]. The institutional expression of subordination is the fund-of-funds structure, in which the state selects fund managers rather than portfolio companies, and the operative moment is the transfer of selection rights at the transition from prototype to market entry.

The framework proposed here organises the financing architecture as a sequence of stages separated by gates, at each of which the instrument, the decision-maker and the indicator change together. Its distinguishing feature is that the transfer of decision rights is a structural requirement rather than an administrative preference, since retaining selection within the public agency after Gate 2 reproduces the configuration associated with the weakest observed outcomes.

For Uzbekistan, the stated targets to 2030 imply an increase in capital per project rather than in the number of projects, which locates the binding constraint at the market-entry gate and above. The institutional components required by the framework largely exist; what remains is the assignment of stages to institutions, the attachment of expiry conditions to preferences, and the adoption of the leverage ratio as a published indicator.

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