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Public-private partnership contracts for projects in countries facing economic crises

Nikolaos Kalyviotis
Department of Planning and Regional Development, School of Engineering, University of Thessaly, Volos, Greece (Orcid:0009-0006-5658-4262) (corresponding author: nkalyviotis@uth.gr)

Raquel Langarita
Department of Economic Analysis, Faculty of Economics and Business, University of Zaragoza, Zaragoza, Spain (Orcid:0000-0003-0754-4046)



Public–private partnership (PPP) projects in countries facing prolonged economic crises are exposed to intensified financial and contractual risks. This study investigates how contract management functions under such conditions, with emphasis on the allocation of financial risks and responsibilities between public and private actors. Using a qualitative case-study approach, it combines systematic document analysis with network and cohort analyses, applied to Greece's largest PPP building project at the University of Crete. The findings indicate a persistent structural bias against the public sector embedded in PPP contractual and financial frameworks. Governance is shown to be dominated by financial actors, while public authorities retain long-term accountability despite nominal risk transfer. The study demonstrates that PPP delivery entails substantial cost premiums – such as elevated financing costs and contractor profit margins – that are not compensated by meaningful risk mitigation. Moreover, asset-impairment mechanisms primarily safeguard lenders' cash flows rather than service quality or public value. The study underscores the need for stronger public-sector oversight, clearer accountability structures, and comprehensive lifecycle financial assessments when evaluating PPPs in crisis-prone economies. Its contribution lies in integrating governance-oriented analytical tools with financial modelling to show how contractual design can systematically generate adverse fiscal outcomes for the public sector.

Keywords: asset impairment/CAPEX (Capital Expenditure) model/contract management/contracts & law/decent work & economic growth/economic crises/financial risks/industry/innovation, & infrastructure/justice, & strong institutions/partnerships for the goals/peace/public-private partnerships/quality education/UN SDG 4: Quality education/UN SDG 8: Decent work and economic growth/UN SDG 9: Industry, innovation and infrastructure/UN SDG 16: Peace, justice and strong institutions/UN SDG 17: Partnerships for the goals

1. Introduction

Contract management is a complex and multifaceted concept with various approaches and interpretations found in literature. These differences arise from the diverse experiences, attitudes, and viewpoints of managers (Baloi and Price, 2003). A possible way to define successful contract management is ensuring that 'contractual obligations are met' (Latilo *et al*., 2024a, 2024b; Singh *et al*., 2024; Shalehin *et al*., 2024; Mabelele and Mrindoko, 2024; Haidar, 2021; Mokwena *et al*., 2020; Eliufoo, 2018; Kalyviotis *et al*., 2010; Natovich, 2003; Griffith-Jones *et al*., 2003), thereby achieving project objectives in terms of cost, time, and quality (Nsefu *et al*., 2020; Berton *et al*., 2018; Lengwe, 2014).

Several researchers have examined public-private partnership (PPP) projects in countries experiencing economic crises (Lawal *et al*., 2024; Akomea-Frimpong *et al*., 2024; Castelblanco and Guevara, 2022; Castelblanco *et al*., 2022; Eguren *et al*., 2020; Torres and Freitas, 2019a, Torres and Freitas, 2019b; Ushakov, 2018; Gao and Eshaghoff, 2004). They all identified that the most critical contractual issues revolve around financial aspects, government policies affecting the projects, economic conditions, and project relationships (Eguren *et al*., 2020; Torres and Freitas, 2019a, Torres and Freitas, 2019b; Ushakov, 2018; Triantafyllopoulos and Alexandropoulou, 2010; Gao and Eshaghoff, 2004). Similar risks have been noticed in developing countries (Haarmeyer and Mody, 1997; Thobani, 1999).

This research aims to explore the contract management processes from a financial perspective, in countries affected by economic crises. We will try to answer one main research question: What is the management strategy for public-private projects in countries facing economic crises? The specific objectives of the paper are to identify what information is required for evaluating a PPP project, and to assess contract management strategies. Subsequently, the propose is to evaluate contract allocation and potential bias within the contract.

To this end, the CAPEX (capital expenditure) model was used, which provides a framework for evaluating the upfront investment

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costs associated with infrastructure projects. This model helps assess the financial viability of PPP initiatives by analysing capital costs, funding sources, and long-term financial commitments. By applying the CAPEX model, it is aimed to understand how financial constraints and economic instability influence contract structuring, risk allocation, and decision making in PPP projects. The analysis was particularised to the case of the University of Crete (see Figure 1), the largest PPP building project in Greece, for the year 2025 (Kalyviotis and Langarita, 2025). This research's main results suggest that, in Greek PPPs, external auditors play a pivotal role, necessitating the involvement of reputable and experienced firms – an approach more commonly seen in developing countries. Further exploring the economic and financial nature of risks and considering the impact of the public sector on these factors, a less common approach to managing PPP contracts is through asset impairments (Dappe *et al*., 2023; Bisbey, 2022; Casady and Geddes, 2020; Harland *et al*., 2007). Asset impairments due to substandard performance or service unavailability are calculated based on infrastructure availability and quality standards to ensure lender payments; however, these do not guarantee successful project delivery to the public. Furthermore, while university employees may delegate responsibilities to contractors through formal agreements, they retain ultimate accountability for ensuring compliance and performance. This continued responsibility exposes them to legal, financial, and reputational risks if contractors fail to meet required standards, underscoring the need for active oversight and monitoring even in the presence of contractual safeguards.

After this introduction, the rest of the paper is structured as follows. In Section 2, the literature review is shown. Section 3 describes our case study: The University of Crete PPP building project and its main stakeholders. In Section 4, we explain the methodology implemented in the analysis. Section 5 shows the main results, and the paper ends with conclusions and future lines of research.

2. Literature review

Potter and Wetherell (2007) support the idea that although the theories that scientists construct shape to a certain extent the various phenomena, and despite the fact that they are the action operators, through a continuous symbolic interaction, they constitute, reproduce, and transform the environment; however, the symbolic structure that we call reality can be explained by theories that are more or less 'correct', meaning that they approach and explain in a conceptually satisfactory way the various phenomena (Potter and Wetherell, 2007). Based on the above, the authors studied the broader reality, studied the existing needs, and initially established by studying the theory and the international literature.

2.1 PPPs in crisis-affected economies

Global economic crises have reshaped the conditions under which infrastructure projects are planned, financed, and delivered, exposing the limitations of traditional project management approaches. In volatile environments, the ability to anticipate risks and adapt to rapidly changing economic conditions becomes essential for project success (Baloi and Price, 2003). Countries such as Greece – although classified as high-income OECD members – experienced prolonged economic downturns after 2007, with the construction sector suffering severe contraction (Metwally, 2023; Sklias *et al*., 2021; Levendis, 2021; Lapavitsas, 2019; Fouskas and Dimoulas, 2018; Moschovitis, 2017; Meghir *et al*., 2017; Triantafyllopoulos



Figure 1. 3D representation of the University of Crete's PPP Building Project (University of Crete, 2025)

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and Kandyla, 2010), making risk identification and allocation essential (Shishehgarkhaneh *et al*., 2024; Bayraktar, 2020; Banaitiene and Banaitis, 2012).

In such contexts, PPPs have emerged as critical mechanisms for sustaining infrastructure development (Eguren *et al*., 2020; Torres and Freitas, 2019a, Torres and Freitas, 2019b; Ushakov, 2018; Gao and Eshaghoff, 2004). These studies consistently identify financial risks, government policy volatility, and macroeconomic instability as the most influential factors shaping PPP performance.

Despite extensive documentation of crisis impacts, there is limited empirical analysis of how prolonged economic crises reshape PPP contract management and risk allocation, particularly in high-income but crisis-affected countries like Greece. This motivates a deeper examination of PPP financial resilience in such environments.

2.2 Financial and policy risks in PPP contracts

A substantial body of research highlights the centrality of financial risks in PPPs, including interest-rate fluctuations, exchange-rate volatility, and liquidity constraints (Akomea-Frimpong *et al*., 2024; Almeile *et al*., 2024; Owusu-Manu *et al*., 2021; Ameyaw *et al*., 2015; Cartlidge, 2006; Li *et al*., 2001). These collaborations, involving both governmental and private sector entities, are often necessary to bridge infrastructure gaps and maintain economic stability (Owojori and Erasmus, 2025; Muhammad *et al*., 2023; Badi and Alhosani, 2024). These risks are amplified in economies experiencing fiscal stress, where government policies may shift abruptly, affecting project viability (Eguren *et al*., 2020; Torres and Freitas, 2019a, Torres and Freitas, 2019b).

Risk classification and prioritisation frameworks have been widely applied to PPPs, yet they often remain static, failing to capture the dynamic nature of crisis-driven financial shocks. Moreover, studies in developing countries show similar patterns of financial and policy-driven risks (Haarmeyer and Mody, 1997; Thobani, 1999), suggesting that crisis-affected high-income countries may face comparable challenges.

Existing literature rarely integrates financial modelling tools with contract management strategies to understand how financial volatility should influence PPP decision making. This limits the ability of contracting authorities to anticipate impairment risks and adjust contract structures accordingly.

2.3 Asset impairments in PPP projects

Asset impairments – occurring when an asset's carrying value exceeds its recoverable amount – represent a critical but underexplored dimension of PPP financial risk. Impairments may arise from economic downturns, declining market conditions, or inadequate financial planning (Fonseca, 2012). Asset impairments in PPP projects present significant financial and operational challenges (Fraser *et al*., 2020; Gunn *et al*., 2018; Archer *et al*., 2017; Haslam *et al*., 2017; Akinrele, 2016; Weijermars and Watson, 2011; Navarro, 2005). Transparency in financial reporting is crucial (Triantafyllopoulos, 2006), especially in mitigating the impact of asset impairments on PPP projects.

The adoption of IFRS and IPSAS has intensified these challenges. Haslam *et al*. (2017) show that fair-value accounting requirements have unintentionally transferred financial burdens back to the public sector, undermining the original risk-transfer rationale of PPPs. These standards expose public entities to speculative asset valuations and impairment tests, often resulting in negative net worth and pressure to renegotiate service costs.

Sector-specific studies reinforce the importance of robust financial assessment. Fraser *et al*. (2020) demonstrate how funding strategies affect concession valuation in port PPPs, while Weijermars and Watson (2011) and Akinrele (2016) highlight similar dynamics in energy and natural gas PPPs. Archer *et al*. (2017) emphasise that without strong financial governance, PPPs become vulnerable to impairment-driven instability.

Although impairments are recognised as a financial risk, there is no systematic analysis of asset impairments as a contractual risk-transfer mechanism – particularly in crisis-prone economies where lenders may use impairments to protect their interests.

2.4 Biases and data limitations in PPP impairment research

A recurring theme in the literature is a tendency to attribute PPP failures or impairments primarily to public-sector inefficiencies (Haslam *et al*., 2017; Archer *et al*., 2017). This perspective often overlooks the role of private-sector decision-making, market volatility, and regulatory constraints.

Triantafyllopoulos (2008) highlights that long-term public investment data are often fragmented or unreliable, complicating efforts to assess performance objectively. As a result, analyses may inadvertently reinforce a public-sector bias, failing to account for the shared nature of PPP risks.

Furthermore, impairments are sometimes used by financing organisations as protective tools when trust in the public sector is low, regardless of whether project failures stem from broader economic conditions or governmental actions.

There is a need for balanced analytical frameworks that evaluate both public and private contributions to impairment risk, rather than attributing responsibility asymmetrically.

3. Case study: the University of Crete

In this section, we describe our case study, the University of Crete, as well as its main stakeholders.

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3.1 The University of Crete's public-private partnership building project

As it has been said in the introduction, we particularise the analysis for the case of the largest PPP building project in Greece. Specifically, our case study is the University of Crete's Public-Private Partnership Building Project in Greece, which is the largest of its kind of projects in Greece, although our findings can be extrapolated to another PPP projects. In Figure 2, we can see the design of the University of Crete's PPP building project.

The Greek university accommodation PPP contracts utilise the Availability Payment PPP model, wherein the government or university provides monthly payments to a Special Purpose Vehicle (SPV) formed by project sponsors (Triantafyllopoulos, 2024). These payments are contingent upon the performance and availability of the facilities and services, with deductions for any deficiencies. The SPV is responsible for financing, designing, constructing, and maintaining the facilities over an ≈30-year term, managing contractors and sub-contractors. The Contracting Authority (CA) oversees the SPV's performance and issues monthly performance-based Service Payments, ensuring continuous service delivery. Ownership of the facilities remains with the CA, transferring fully to the university at the end of the PPP term.

Under this arrangement, the SPV raises the necessary finance for the construction of the facilities from private sources. Upon satisfactory completion of the construction, the buildings open for use, and Service Payments commence from the CA.

3.2 Key stakeholders

In Figure 3, we can see a schedule of the main stakeholders (see Table 1) of the University of Crete's PPP Building Project (Finnigan *et al*., 2025).

The key stakeholders in the PPP project include the CA, represented by the University of Crete, which – through its Council, Rector, Technical Services, and Monitoring and Assessing Committee – oversees governance, delegated responsibilities, construction supervision, and operational performance management. The SPV, formed specifically for the project and comprising contractors and investors, is responsible for design, construction, financing, operation, and maintenance, often supported by specialist management firms to ensure compliance and financial viability. The Independent Auditor (IA), a highly specialised and independent third party, verifies that technical and financial obligations are met, monitors SPV performance, and reports to both parties, while the CA must actively safeguard the IA's independence and effectiveness. Finally, the Construction Contractor (CC) delivers the design and construction works under contract with the SPV, with all CA–contractor communication routed strictly through the SPV to preserve the PPP structure. To be able to evaluate a PPP project either as a contractor or as a public entity important information is required during planning phase, since this information is defined by the contract and cannot change (see Appendix).

4. Methodology and data

In this section, we show the procedure developed in the analysis, which can be summarised as follows. First, the methodology is presented in Sections 4.1–4.4, and Section 4.5 explains the financial model CAPEX.

4.1 Research design

This study adopts a qualitative, exploratory research design to analyse how financial risks, asset impairments, and contractual structures influence PPP projects in countries facing economic crises. An exploratory design is appropriate when the full scope of the phenomenon is not yet known and when the objective is to uncover patterns, mechanisms, and strategic implications (David and Sutton, 2011; Robson, 2002).

The research follows an iterative and abductive logic, moving back and forth between empirical evidence and theoretical concepts, consistent with the 'weaving between data and theory' described by Bryman and Bell (2007). This approach allows the study to refine theoretical propositions on PPP contract management as new insights emerge from the case material.

The epistemological stance is grounded in critical realism (May, 2011; David and Sutton, 2011), which seeks to identify the underlying mechanisms shaping contractual and financial outcomes in PPPs. Critical realism is suitable for analysing PPPs because it goes beyond surface-level observations and focuses on the structural conditions – economic, institutional, and contractual – that influence project performance (see Bryman and Bell, 2007).

The overall research design integrates three complementary components. It begins with a document-based analysis of PPP contractual frameworks and financial mechanisms, proceeds with a case study investigation of the University of Crete PPP building project, and culminates in the application of the CAPEX model to evaluate financial viability and potential impairment exposure. Together, these components support a structured examination of how contract management strategies function under conditions of economic instability. Together, these components support a structured investigation of how contract management strategies operate under economic instability.

4.2 Data sources and document analysis with networks and cohorts method

The study relies primarily on secondary data, including PPP legislation, contractual documents, technical reports, and financial guidelines relevant to the University of Crete PPP project. Secondary data analysis is appropriate when examining institutional processes and contractual arrangements (Heaton, 2000).

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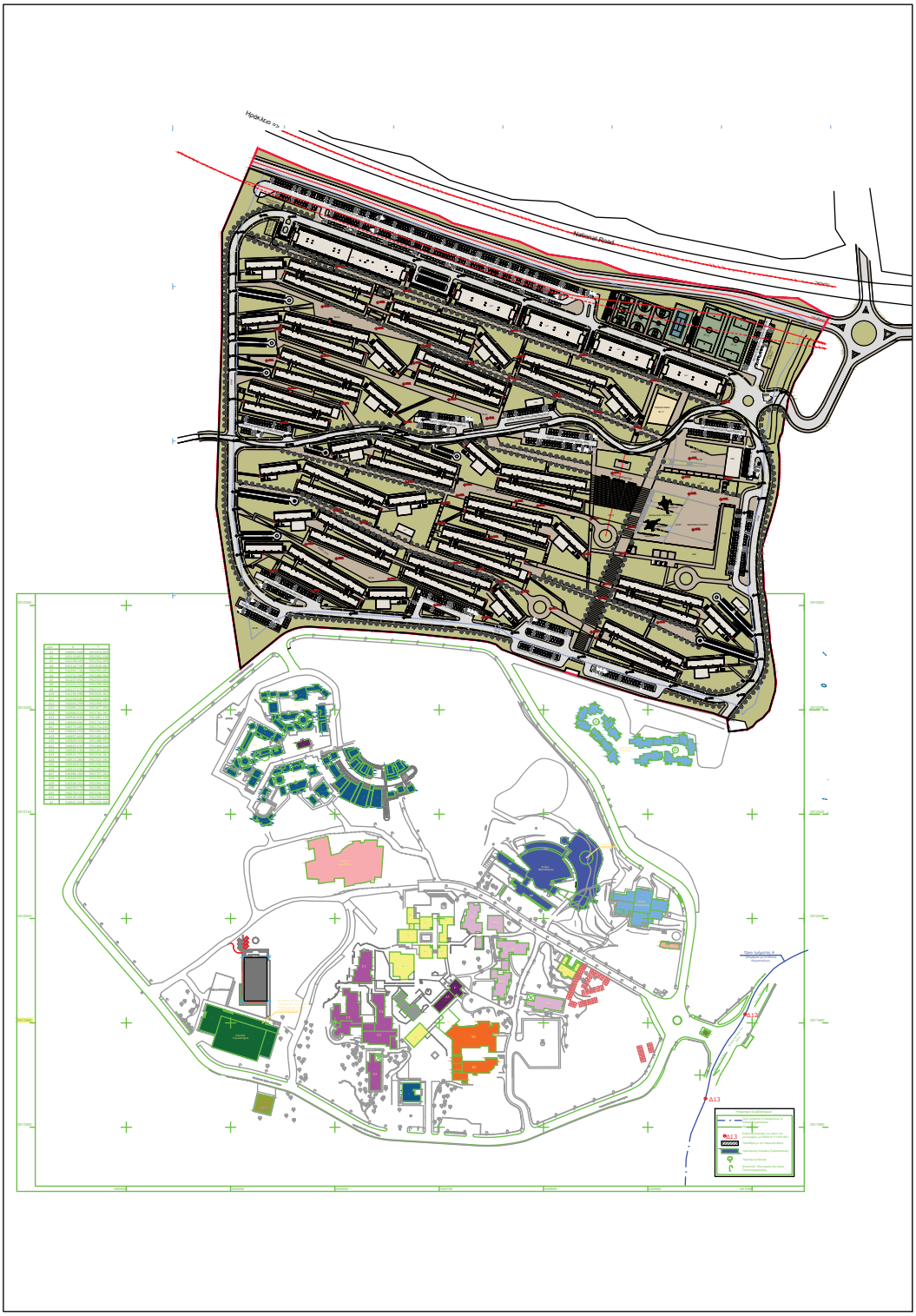


Figure 2. The layout of the University of Crete's PPP Building Project (grey area) in relation to the existing topography and current buildings (green viewport) (University of Crete, 2025)

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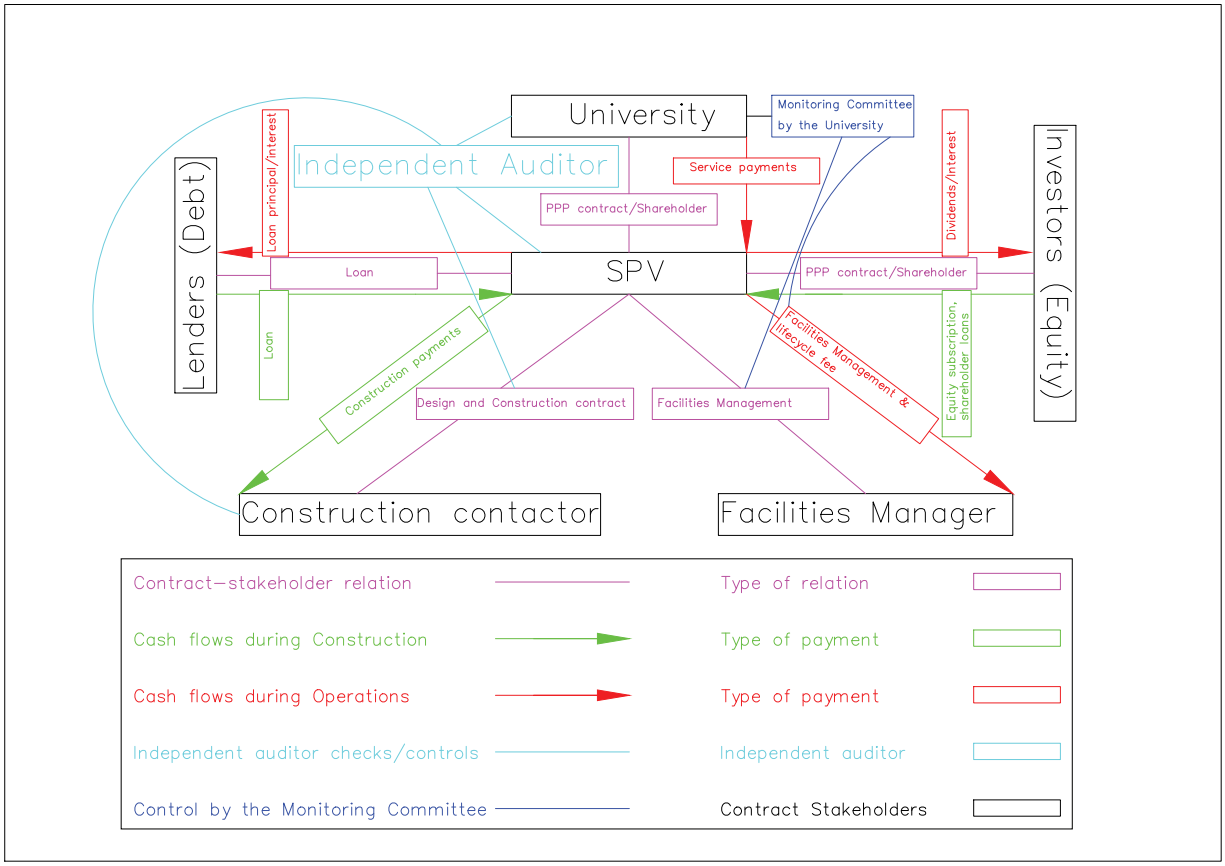


Figure 3. Project stakeholder of the University of Crete's PPP Building Project (Finnigan *et al.*, 2025)

Table 1. Main project stakeholder

Stakeholder	Role in the PPP	Key responsibilities
Contracting Authority (CA) – University of Crete	Public owner of the project	Governance, oversight, performance monitoring, issuing availability payments
Special Purpose Vehicle (SPV)	Private consortium delivering the project	Financing, design, construction, maintenance, lifecycle management
Independent Auditor (IA)	Third-party performance verifier	Certifies compliance, monitors construction and operations, ensures contractual standards
Construction Contractor (CC)	Builder contracted by SPV	Executes design and construction; interacts only with SPV, not CA

The research strategy follows an archival approach, as defined by Saunders *et al*. (2009), using administrative and contractual documents that reflect day-to-day project governance. These materials provide insight into the allocation of responsibilities, performance monitoring mechanisms, and financial risk-sharing structures within the PPP. Archival research refers to the analysis of 'administrative records and documents as principal source of data because they are products of day-to-day activities (Saunders *et al*., 2009). These data are considered secondary data since they were 'originally collected from different person' (Saunders *et al*., 2009). The researcher is aware that these manuals were created for different purpose than the objective of the current research (Olson, 2010).

Document analysis is conducted through a structured process inspired by Hill's (1993) 'networks and cohorts' method, which is well-suited for identifying interactions, dependencies, and control flows in complex organisational settings. Document analysis was conducted through systematic reading and coding of the material. Contractual clauses and supporting documents were examined to identify key actors, formal responsibilities, reporting obligations, financial flows, and enforcement mechanisms. Particular attention was given to provisions related to availability payments, asset impairments, auditing, indexation, and financial guarantees, as these elements are central to understanding financial risk allocation in PPPs operating under economic stress. The analysis encompasses several interconnected tasks. It begins by identifying contractual linkages relevant to financial risk and asset impairments, followed by mapping stakeholder interactions and

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governance responsibilities to clarify how decision-making authority is distributed. It also involves extracting the financial mechanisms embedded within the PPP structure, alongside recognising recurring patterns that shape contract management decisions. Collectively, this approach enables a systematic interpretation of how contractual provisions function in practice and how they influence project performance under varying economic conditions.

Network diagrams and interaction matrices were constructed by tracing contractual linkages, information and reporting flows, and control or verification responsibilities related to financial performance and compliance. This approach allows the identification of central actors within the contractual network and highlights where financial oversight and decision making authority are concentrated. By focusing on documented interactions rather than informal perceptions, the network analysis reveals how governance is structurally embedded in the contract and how financial risk management dominates contractual relationships.

In addition to network analysis, cohort analysis was employed to capture the temporal dimension of contract management and performance. Cohorts were defined based on contract stages, stakeholder groupings, and functional responsibilities, such as design, construction, operation, financial oversight, and auditing.

By tracking these cohorts over time, the analysis examines how responsibilities evolve across the PPP lifecycle and how different actors perform under changing economic and contractual conditions. This longitudinal perspective makes it possible to identify persistent patterns, critical transition points, and bottlenecks in contract execution. Cohort analysis complements network analysis by demonstrating not only who is involved in the contractual system, but also when and how specific responsibilities are activated, transferred, or reinforced throughout the project duration.

4.3 Case study approach

The University of Crete PPP building project serves as the empirical foundation of this study. Case studies are widely employed in applied research to analyse contemporary organisational and contractual phenomena within their real-world context (Yin, 2009; Herling *et al*., 2000). This particular project is especially relevant because it constitutes the largest university-level PPP building initiative in Greece and illustrates the practical challenges of implementing PPP schemes in a crisis-affected economic environment.

The case enables a focused examination of risk-allocation mechanisms, availability-payment structures, and the role of independent auditors in shaping project governance. It also provides insight into contractual responses to financial volatility and potential asset-impairment triggers, both of which are central to understanding how PPP contracts behave under conditions of macroeconomic instability.

The purpose of the case study is not statistical generalisation but analytical generalisation (Lincoln and Guba, 1985), allowing the findings to inform broader interpretations of PPP contract management in comparable institutional settings.

4.4 Qualitative orientation and analytical focus

A qualitative orientation is essential for analysing PPP governance and financial risk, given the institutional complexity and interpretive nature of contractual arrangements. Qualitative methods enable the researcher to examine how contractual provisions are constructed, how stakeholder roles are enacted, and how financial mechanisms operate within their organisational and economic context (Morgan and Smircich, 1980; Denzin and Lincoln, 2003). In contrast, a purely quantitative approach would be insufficient for capturing the institutional, legal, and relational dimensions of PPP contract management, nor the subtle ways in which impairments and financial risks are embedded within contractual structures (Grant, 2003).

The qualitative analysis therefore concentrates on contractual clauses related to performance, payments, and risk, examining how these provisions allocate responsibilities and shape incentives. It also investigates governance structures and oversight mechanisms, with particular attention to monitoring arrangements and the distribution of decision-making authority. In addition, the study analyses financial models used to assess capital expenditure and impairment exposure, exploring how financial assumptions influence contractual outcomes. Finally, it considers interactions between public authorities, SPVs, auditors, and contractors to understand how coordination, compliance, and accountability unfold in practice.

This analytical focus aligns with the study's objective of identifying strategic contract-management considerations in crisis-prone environments, where financial volatility and institutional constraints heighten the importance of robust contractual design and governance.

The study adheres to established ethical principles for qualitative research, including confidentiality, respect for institutional information, and the responsible handling of sensitive contractual material (Guillemin and Gillam, 2004; Flick, 2009), while applying recognised quality criteria – credibility, transferability, dependability, confirmability, and authenticity – to ensure transparency and analytical rigour (Bryman and Bell, 2007). The research design is exploratory, addressing underexamined aspects of PPP contract management; qualitative, enabling the interpretation of contractual, financial, and governance mechanisms; document-based, drawing on archival PPP materials and financial models; case-study-driven, grounded in the University of Crete PPP project; and informed by a critical-realist perspective that seeks to uncover the underlying mechanisms shaping contractual and financial outcomes. Together, these elements support a rigorous examination of how financial instability and asset-impairment risks influence PPP contract management in crisis-affected economies.

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4.5 Financial model: CAPEX

The financial model extensively outlines the CAPEX (Capital Expenditure) framework (see Table 2) for the private entity of the SPV, including data relevant to construction and operational phases, indexation factors, and associated costs (Intrakat, 2023).

A detailed breakdown of construction expenses is provided, categorised into site preparation, structural work, building shell, finishes, and installations. These costs are further segmented by location, including Rethymno, Heraklion, and Rethymno Amphitheatre, with corresponding data for each area (Intrakat, 2023). In addition, the report incorporates monthly indexation factors and profiles SPV development costs. It encompasses detailed financial insights, such as amounts of letters of guarantee for execution of works and committed investments, fee rates, quarterly flags, and share capital stamp-duty information (Intrakat, 2023). The analysis progresses to capitalised financial costs, detailing interest expenses arising from shareholder loans, bank debt, and VAT facilities, alongside arrangement and commitment fees (Intrakat, 2023). Comprehensive data for construction works, other capitalised costs, and financial capitalised costs, inclusive of VAT, are delineated (Intrakat, 2023). Assets and depreciation calculations are also featured, encompassing buildings, capitalised costs, and financial costs, segmented by location (Intrakat, 2023). Depreciation methodologies for each asset category are employed, supplemented by annual conversions of CAPEX data (Intrakat, 2023). Moreover, insights on the phasing of CAPEX, broken into monthly intervals and segmented by construction costs and indexation factors, are meticulously documented (Intrakat, 2023). This structured approach provides a granular and multifaceted view of financial and developmental dimensions over various time frames and regional scopes (Intrakat, 2023).

The CAPEX model outlined in the document encompasses several key components essential for comprehensive financial analysis and planning. Construction costs constitute a major aspect, detailing phases such as pre-works and infrastructure, load-bearing construction, building shell and installations, finishes, mechanical/electrical (M/E) systems, utility connections, external spaces, professional fees, contingencies, and contractor profit. Capitalised costs include taxes (VAT) and additional costs associated with development. The model also addresses development and financial costs, incorporating financing mechanisms such as shareholder loans and bank debt, with their respective interest expenses and fees, as well as share capital injections, stamp duties, and guarantee commitments. Letters of guarantee are accounted for, specifying amounts and fee rates related to execution and committed investments. Depreciation assumptions are integrated, providing calculations for asset types that influence the model's overall financial structure. Finally, indexation factors are applied to adjust for inflation or cost variations over time. Collectively, these elements enable a thorough evaluation of construction expenses, financing arrangements, guarantees, and the effects of depreciation and inflation on financial projections.

Depreciation is meticulously integrated into the financial projections, adhering to a systematic approach across various asset categories, including buildings, other capitalised costs, and financial capitalised costs (Junnila, 2024; Makris, 2024). Each category is evaluated using beginning and ending balances, which incorporate additions made during the period (Junnila, 2024; Makris, 2024). Depreciation deductions are applied to the balances to calculate the final ending balance for each asset category over the defined periods (DCAA, 2025; Lilford and Guj, 2020). This structured process ensures consistency in asset valuation and alignment with the overarching financial framework.

The projections feature detailed depreciation calculations for each asset type, guided by assumptions regarding the useful life of assets. For instance, depreciation for buildings and other capitalised costs is explicitly documented, with corresponding amounts deducted from beginning balances to determine the ending balances for each period. Furthermore, rigorous checks are conducted throughout the projection process to validate the accuracy of depreciation deductions, ensuring they align with anticipated balances and reflect any capital additions or reductions. Collectively, these measures uphold the reliability and integrity of the financial model, emphasising the critical role of depreciation in asset valuation and its impact on financial statements (see Table 3).

The financial component of the methodology is centred on the CAPEX model associated with the University of Crete PPP project. The purpose of the CAPEX analysis is to examine how capital costs, financing structures, and financial risks are distributed between the public and private parties, and to assess whether the PPP structure embeds systematic cost premiums relative to a public-sector delivery scenario (see Li *et al*., 2001; Haslam *et al*., 2017; Cartlidge, 2006).

The analysis draws primarily on the audited bid financial model submitted by the SPV, which provides detailed information on construction costs, financing arrangements, interest rates, fees, depreciation schedules, guarantees, and indexation mechanisms (Intrakat, 2023). These elements are treated as empirical inputs derived directly from official project documentation.

In contrast, comparative scenarios examining public-sector delivery – such as the elimination of contractor profit margins, lower financing costs due to sovereign borrowing, or reduced administrative overheads – are based on explicit assumptions introduced by the authors. These assumptions are clearly distinguished from audited financial data and are used analytically to highlight structural differences in cost composition, rather than to propose an alternative project design.

To enhance clarity and relevance for contract management, the CAPEX analysis deliberately reduces descriptive detail and focuses on key economic findings, including contractor profit margins, financing costs, and the implications of profit elimination under public-sector delivery. This targeted approach supports decision-oriented

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Table 2. CAPEX example of total values and the first month of construction

Capex					
Year					2025
Construction period					1
Operational period					0
Column counter					1
Indexation factor					1.0404
	Unit	Constant	Total		
Capex - Monthly conversion					
Construction costs					
Months					1
Construction period flags					1
Year					2025
Construction costs					
Complex	Rethimnon	Herakleion	Rethimnon Amphitheatre		
Preparatory Works - Infrastructure	3703630	1262569	1068272		
Load-bearing Construction	58325390	33406635	9866967		
Building Shell / Filling Organization	0	0	0		
Finishings	0	0	0		
Electrical and Mechanical Installations	39584625	28234239	9456353		
Connections/utilities	0	0	0		
Exteriors	6608118	3498141	259485.2		
Fees	2164435	1328032	413021.5		
Contingencies	541108.8	332007.9	103255.4		
Overhead and contractor benefit	4037356	2569227	734064.8		
Capex phasing					
Rethimnon			1		0.013637
Herakleion			1		0.013637
Rethimnon Amphitheatre			1		0.013637
Rethimnon Capex		1.15E+08	1.15E+08		1567796
Herakleion Capex		70630850	70630850		963206.7
Rethimnon Amphitheatre Capex		21901419	21901419		298673.9
A. Total Capex	€	0	2.07E+08		2829676
Total VAT Capex	€	0.24	49799264		679122.3
Other Capitalized costs					
Months					1
B. Development costs					

(continued on next page)

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Table 2. Continued

Monthly Indexation factor					1.0404
Development costs profiling	%		1		0.028571
SPV development	€		5138551		5138551
B. Total development costs	€		5503606		152747.1
VAT development	€	0.24	1320866		36659.3
C. Letter of Guarantee Execution of Works					
LG proper execution amount	€	9000000			9000000
LG fee rates	% annual	0.0125			0.003125
Quarterly flags	Flag [0,1]				0
Construction period flags	Flag [0,1]				1
C. Total Letter of Guarantees Execution of Works	€		337500		0
D. Letter of Guarantee Committed Investment					
Committed investment Drawdowns					
(+) Share capital injection	€		12807187		261628.4
(+) Shareholder loan injection	€		51228750		1046514
Total LG amount	€				62727795
LG fee rates	% annual	0.0125			0.003125
Quarterly flags	Flag [0,1]				0
Construction period flags	Flag [0,1]				1
D. Total Letter of Guarantees Committed investment	0		1272231		0
E. Share capital stamp-duty					
Initial capital injection	Flag [0,1]				1
Share capital injection	€		12807187		261628.4
Share capital stamp duty	%	0.002	25091.12		0
Hellenic Competition Committee duty	%	0.001	12807.19		261.6284
Stamp capital duty			37898.31		261.6284
I. Share capital stamp-duty	€		37898.31		261.6284
F. Capitalized Financial Costs					
F.1 Shareholder loan					
Interest expenses	€		0		0

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Table 2. Continued

F.2 Bank debt					
Interest expenses	€		12373990		15946.13
Arrangement fees	€		1953700		1953700
Commitment fees & agency fees	€		2433640		106565.5
F.3 VAT facility					
Interest expenses	€		1337792		3446.584
Arrangement	€		562321.4		562321.4
Commitment fees	€		903346.4		29394.07
Total amounts					
Total construction works	€		2.07E+08		2829676
Total other capitalized costs	€		7151236		153008.7
Total capitalized financial costs	€		19564791		2671374
VAT construction costs	€		49799264		679122.3
VAT other capitalized costs	€		1320866		36659.3

interpretation, linking financial structure directly to governance incentives, risk exposure, and long-term public accountability.

5. Results

Networks analysis helps understanding relationships between parties in a contract, identifying key players and potential risks, based on the documents provided by the University of Crete (2025) (see Table 4). Thus, one of the contributions of the paper is the identification of key players and risks in the University of Crete PPP project. As it can be seen in Table 4, these are (1) the Independent Auditor (IA), (2) the Construction Manager & Section Heads SPV, (3) the Procurement (Material Management) of the SPV, (4) the Design Disciplines (Civil, Mech, Electr, Instr) and QA/QC of the SPV, and the (5) the External Auditor or IA: Finance/Accounts.

These findings confirm the hypothesis that financial risks significantly impact PPP projects, as the documentation and analysis consistently highlight financially related actors and responsibilities over other types of contractual risks.

Cohorts analysis tracks contract performance and outcomes over time, providing insights into successful contract types and reasons for their success based on the documents provided by the University of Crete (2025) (see Table 5). Main reason for its success is that it reveals how different groups behave over time, rather than lumping everyone into one average. By tracking when stakeholders enter a system and how they behave afterward, you can pinpoint exactly when and why engagement drops – or thrives. Table 5 tracks responsibilities across a PPP contract lifecycle and its cohort-style analysis help identify which departments consistently meet deadlines, where bottlenecks occur, or how changes in leadership affect task execution. The table helps organisations make data-driven choices by showing which strategies work best for specific groups. Comparing cohorts over time helps identify trends, anomalies, or the impact of changes like new policies, tools, or workflows. Knowing which cohorts perform better lets you focus efforts and investments where they'll have the most impact. Combining these approaches leads to better decision making and improved document and contract management processes.

5.1 Payment mechanism

Availability Payment mechanisms are fundamental to the effective delivery and management of PPP projects, exemplified by the Greek university accommodation project. These mechanisms incentivise the SPV to meet all contractual obligations by focusing on providing agreed-upon services while maintaining financial stability and high-performance standards. The Annual Service Payment (ASP) covers (1) debt service, (2) financing charges, and (3) operational expenditure, adjusted with inflation annually. Asset impairments for substandard performance or non-availability of services are calculated based on infrastructure availability and quality standards. Timeliness of payments and accrual of interest on late payments ensure financial stability for the SPV. The practical application of the payment mechanism incorporates flexibility, accommodating unforeseen circumstances, and supporting effective contract management while maintaining accountability.

It is worth mentioning that annual inflation is used in the payment mechanism after contract negotiation, since in the initial version of the document cumulative inflation was suggested. Cumulative inflation can be used in the payment mechanism of a PPP project instead of annual inflation. This approach involves adjusting payments based on the total accumulated inflation over the project's duration rather than

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Table 3. CAPEX variables considered

TIMING						
Partnership Start Date	Date	07/01/2025				
Service availability date - Rethymno Student Residences	Date	07/01/2028				
Service availability date - Heraklion Student Residences	Date	07/01/2028				
Service availability date - Rethymno Amphitheater	Date	07/01/2028				
Project Services Availability Date	Date	07/01/2028				
Partnership Agreement Expiration Date	Date	07/01/2055				
SOURCES AND USAGES	Unit of Measurement	Value		SOURCES AND USAGES DURING CONSTRUCTION	Unit of Measurement	Value
Sources		1288432.03		Sources		338124.3
Availability payments	€ thousands	709821.03		Availability payments	€ thousands	991.3032
VAT refund	€ thousands	51120.1295		VAT refund	€ thousands	40105.58
Disbursement of VAT loan	€ thousands	51120.1295		Disbursement of VAT loan	€ thousands	51120.13
Share capital contribution	€ thousands	12807.1875		Share capital contribution	€ thousands	12807.19
Secondary loan	€ thousands	55253.0534		Secondary loan + capitalized interest	€ thousands	55253.05
Bank loan disbursement	€ thousands	177609.109		Bank loan disbursement	€ thousands	177609.1
Debt Service Reserve Account (DSRA) Release	€ thousands	13663.0861		Debt Service Reserve Account (DSRA) Release	€ thousands	0
Maintenance Reserve Account (MRA) Release	€ thousands	45637.8642		Maintenance Reserve Account (MRA) Release	€ thousands	0
Opening cash	€ thousands	1043.39087		Opening cash	€ thousands	0
Input VAT	€ thousands	170357.047		Opening cash balances	€ thousands	237.9128
Liquidation of share capital upon expiry of the Partnership Agreement		0				
Usages		1288432.03		Usages		338124.3
Operating costs	€ thousands	247453.203		Operating costs	€ thousands	144.2742
Taxes	€ thousands	38804.412		Taxes	€ thousands	0
Capital expenditures	€ thousands	214648.169		Capital expenditures	€ thousands	214648.2
VAT outflows	€ thousands	221477.177		VAT outflows	€ thousands	51161.68
VAT loan repayments	€ thousands	51120.1295		VAT loan repayments	€ thousands	40105.58
Bank loan repayments	€ thousands	177609.109		Bank loan repayments	€ thousands	0
Subordinated loan repayments	€ thousands	55253.0534		Subordinated loan repayments	€ thousands	0
Loan finance costs	€ thousands	130830.082		Loan finance costs	€ thousands	19564.79
Accrued & expensed interest on subordinated loan	€ thousands	37797.1318		Accrued & expensed interest on subordinated loan	€ thousands	4024.304
Debt Service Reserve Account (DSRA) Additions	€ thousands	13663.0861		Debt Service Reserve Account (DSRA) Additions	€ thousands	7432.087
Maintenance Reserve Account (MRA) Additions	€ thousands	45637.8642		Maintenance Reserve Account (MRA) Additions	€ thousands	0
Dividends	€ thousands	40288.0322		Dividends	€ thousands	0
Share buyback	€ thousands	12807.1875		Share buyback	€ thousands	0
Cash available at maturity	€ thousands	1043.39087		Cash available at maturity	€ thousands	1043.391
FINANCIAL INDICATORS	Unit of Measurement	Value		PERFORMANCES	Unit of Measurement	Value
Average debt service coverage ratio (DSCR)	Indicator	1.38734483		Project Internal Rate of Return (IRR)	%	0.059476
Minimum debt service coverage ratio (DSCR)	Indicator	1.29574011		Equity Internal Rate of Return (Equity IRR)	%	0.060286
Average Loan Life Coverage Ratio (LLCR)	Indicator	1.39943477		Actual Project Internal Rate of Return (IRR)	%	0.038702
Minimum Loan Life Coverage (LLCR)	Indicator	1.34810585		Actual internal rate of return (Equity IRR)	%	0.039496
Project Life Coverage Ratio (PLCR)	Indicator	1.80737837		Internal Project Grade before taxes	%	0.064515
Minimum Project Life Coverage (PLCR)	Indicator	1.40477141		Internal rate of return on equity before taxes	%	0.074294
Weighted loan life	Years	13.2933324		Internal rate of return on equity	%	0.057297
				Internal rate of return of subordinated debt	%	0.062491

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Table 3. Continued

FINANCING	Unit of Measurement	Value		ACCOUNTING ASSUMPTIONS	Unit of Measurement	Value
Bank loan amount	€ thousands	177609.109		Nominal accounting margin - capital expenditures	%	0.1
Bank loan arrangement fee	%	0.011		Nominal accounting margin - development cost	%	0.1
Bank loan default commission	%	0.0072		Nominal accounting margin - life cycle replacement costs	%	0.1
Bank loan margin	% per year	0.023		Internal rate of return of financial assets	%	0.026973
Repayment of a bank loan	Years	22				
TAXATION	Unit of Measurement	Value		COMMITTED INVESTMENT	Unit of Measurement	Value
Income tax	%	0.24		Invested share capital	€ thousands	12807.19
Tax on expenses	%	0.24		Invested subordinated loan	€ thousands	51228.75
VAT loan amount	€ thousands	51120.1295		Subordinated loan interest rate	% per year	0.06
VAT event supply	%	0.011				
VAT loan interest rate	% per year	EURIBOR 6m + 2,30%				
CONTRACTUAL REVENUES	Unit of Measurement	Value		OPERATING COSTS AND LIFE CYCLE REPLACEMENT COSTS OF THE PROJECT	Unit of Measurement	Value
Basic single payment	€ thousands	23094		Basic operating costs	€ thousands	2278.279
Αναπροσαρμοστέο στοιχείο	%	0.7		Project Life Cycle Replacement Cost (Baseline Prices)	% of capital expenditure	0.260777
Present value of contractual revenues (Financial model)	€ thousands	195659.334				
Present value of contractual revenue (Maximum)	€ thousands	205940				
Offer discount	%	-0.0499207				
DISTRIBUTION OF SINGLE PAYMENT	Unit of Measurement	Value				
Contractual revenue received	€ thousands	709821.03				
Project life cycle replacement costs payable	€ thousands	95696.1845				
Payable operating costs	€ thousands	151757.019				
Taxes payable to the Tax Authorities	€ thousands	38804.412				
Capital expenditures	€ thousands	214648.169				
Interest and related loan costs	€ thousands	130830.082				
Additional shareholder return	€ thousands	78085.164				
Uses of basic single payment during the Project		709821.03				
Project life cycle replacement costs paid	%	0.13481734				
Operating costs	%	0.21379617				
Taxes paid to the Tax Office	%	0.05466788				
Capital expenditures	%	0.30239759				
Interest and related loan costs	%	0.18431418				
Additional shareholder return	%	0.11000683				
Uses of basic single payment during the Project		1				

year-by-year changes. Using cumulative inflation to adjust payments typically allocates the risk of inflation to the public sector. By adjusting payments based on cumulative inflation, the public sector ensures that the private partner is compensated for the overall increase in costs due to inflation over the contract period. This approach protects the private partner from inflation risk, making the project more attractive to private investors. Cumulative inflation adjustments provide long-term stability in payment calculations, which can be crucial for large infrastructure projects that span many years. This stability can help in securing financing and maintaining the financial viability of the project.

This approach assumes that the public sector, having more resources and financial stability, is better positioned to manage inflation risks in PPP projects. By assuming the inflation risk, the public sector can provide more predictable and stable cash flows for the private partner, thus attracting investment and improving project viability. The public sector can employ various mechanisms to mitigate inflation risk, such as indexing payments to inflation rates, using price adjustment clauses, or employing financial hedging instruments. These measures ensure that the value of payments remains consistent over time, protecting both parties from adverse inflationary impacts. By effectively managing inflation risk, the public sector can foster a more conducive

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Table 4. Interactions in the University of Crete's PPP project (network analysis)

Department / Function	Independent Auditor (IA)	SPV: Construction Manager & Section Heads	SPV: Procurement (Material Management)	SPV: Design Disciplines (Civil, Mech, Electe, Instr) or, QA/QC	External Auditor or IA: Finance/ Accounts
Preparations and Updating of Method Statement	Review Schedule & Recourses compared to Tender	Create Document		Input as required	
Procurement of Materials and Services	Issue list of requirements with particulars. Check conformity to schedule and cost. Contract administration of Sub-contractors & Suppliers.		Float requests for Quotations, Negotiate& Issue Comparative Statements. Issue Award letters and finalize agreements.	Technical Evaluation of Quotations	Check comparative statement.
Variations					
-Ste instructions -Design Changes- Contract with Design Scope	IA to coordinate Record keeping and quantify time & cost; IA to identify changes in drawings and notify client;	Identify changes in project specifications and notify the University of Crete. Record keeping and qualification by IA.		Identify changes and notify client.	
Reporting	Develop report format and circulate "required by" dates for filling reports. Consolidate and develop reports for the University of Crete.	Fill relevant section of daily/ weekly/ monthly report on required basis.	Fill relevant section of daily/ weekly/ monthly report on required basis.	Fill relevant section of daily/ weekly/ monthly report on required basis.	Check relevant section of monthly report on required basis.
Cost Control	Develop Monthly Cost Control report based on monthly cost reports.	Make sure that correct cost center has been used in the stores issues, equipment and personnel time sheets.			Make sure that costs are posted correctly as per cost codes.
Planning & Scheduling	Coordinate schedule development and discuss planning with project team. Update schedule according to progress given by other departments.	Prepare lists of activities, durations, resourcing, sequence and logical links and provide progress	Prepare lists of activities, durations, resourcing, sequence and logical links and provide progress	Prepare lists of activities, durations, resourcing, sequence and logical links and provide progress	Provide progress to the University of Crete
Invoicing	Develop according to information at hand and follow up issue of payment certificate	Review			
Monitor Expected Final Contract Amount	Quantify all changes to identify expected final contract amount.	Review			
Contract Review	Identify contractors and employer's obligations under the contract. Communicate such to all stakeholders				
Insurances	Provide contract and other information as necessary for the issue of insurance certificates.	Inform claimable event			Check insurance certificates for equipment and

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Table 4. Continued

	Inform Insurance Department of any deviations to design and any significant change of contract. In case of claim to insurance coordinate and quantify repair/reinstatement cost				personnel and CAR insurance as required by contract. Notify the University of Crete for claimable event
Bonds	Provide contract and other information as necessary for the issue of bonds required by the contract. Provide info to the University of Crete if any changes occur.				Issue bonds in the manner and time required
As-build Drawings required by the University of Crete	Coordinate during the course of the works and compile at the end of the project "As-built" drawings for submittal to the University of Crete.	Mark Drawings as required showing "As-built" situation		Mark Drawings as required showing "As-built" situation.	
End of Project Report – Internal	Prepare at end of project report as outline in the contract. Collect all final approved documents and drawings, quality records, reports, method statements, material submissions, correspondence with client and organize in sections in hyper linking each document.	Review /Consent			

environment for successful PPP projects, although, due to the economic crisis, the aforementioned actions are debatable.

In contracts, asset impairments refer to the reductions in the value of assets due to wear and tear, damage, or other factors that affect their efficiency. Impairments can be calculated and applied to various assets, such as real estate, equipment, or even inventory. In financial valuation, impairments are an important part of risk management and business decision making, as they help analyse the true value of assets.

5.2 Potential cost savings for the project under public sector leadership

The cost implications of public sector-led construction projects reveal several areas for potential savings and specific financial benefits. Public entities typically benefit from lower financing costs through reduced interest rates and lower financial fees, such as arrangement and commitment fees, owing to government backing. The absence of contractor profit margins, which often range from 10% to 30%, represents another significant cost saving. For instance, if a project's total CAPEX is €207,496,933, which is the case for the University of Crete, and the contractor profit margin is 15%, the potential savings would be €31,124,540. Additional savings are achievable by reducing administrative overheads through in-house management, eliminating consultant fees, and minimising risk premiums and tendering costs. For example, using in-house resources for administration could result in an estimated 5% savings, equalling €10,374,847.

However, these savings come with risks that may counterbalance the benefits. Bureaucratic inefficiencies and regulatory complexities in public sector projects can delay execution, inflate costs, and erode anticipated savings. The lack of competitive pressure in public sector-led initiatives may also reduce cost discipline and impact efficiency. Furthermore, public entities may lack the technical expertise and specialised skills of private contractors, potentially leading to execution challenges, extended timelines, or quality issues. Despite these risks, the public sector's alignment with social objectives, such as creating local jobs or ensuring environmental compliance, can offset purely financial considerations.

Ultimately, while significant financial savings, such as the aforementioned €31,124,540 in contractor profit margins and €10,374,847 in administrative overheads, can be realised, these benefits must be evaluated against the potential challenges of delays, inefficiencies, and quality risks. A detailed cost-benefit analysis that considers both monetary and qualitative factors, including stakeholder priorities and project-specific conditions, is essential to determine whether a public sector-only approach would achieve cost-effectiveness and long-term sustainability.

6. Conclusions

This study examined contract management in PPP projects from a financial and economic-risk perspective, focusing on countries experiencing prolonged economic crises. Using the case of the University of Crete – the largest PPP building project in Greece –

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Table 5. Gantt chart to track contract performance and outcomes over time (cohort analysis)

Task	Contract Articles	Task execution part	Consultant	Final Decision maker
Planning phase				
Validate Letter of Guarantee for Works	Article 6.1	UoC's Technical Services dept		Financial dept
Payment schedule	Not a contractual requirement.			
Validate Letter of Guarantee for Investment	Article 6.2	UoC's Technical Services dept	UoC's Technical Board	UoC's Technical Services dept/ Financial dept
Declarations of Responsibility	Article 3.3	Rector		Rector
Contact persons for Works and Service period.	Article 7.1	Rector		Rector
Protocol of hand over of building site	Article 15	UoC's Technical Services dept		UoC's Technical Services dept
Noise and air pollutions study-Approval	Article 39.4	UoC's Technical Services dept	TB/ IA/ TP	UoC's Technical Services dept/IA/CC
Risks Insured / Submission of copy /Check for co-insurance	Article 42	UoC's Technical Services dept	UoC's Technical Board	UoC's Technical Services dept
Studies/designs for approval	Article 9	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept/IA/CC
Signing of the PPP contract		Rector/ UoC's Technical Services dept	Rector/ UoC's Technical Services dept	Rector/ UoC's Technical Services dept
Design and Construction				
Daily project calendar	Not a contractual requirement.	UoC's Technical Services dept	IA/ CC	UoC's Technical Services dept
Review/request comment on Independent monthly report	Article 8	UoC's Technical Services dept		UoC's Technical Services dept
Monthly project reports	Article16.2	UoC's Technical Services dept	IA	UoC's Technical Services dept
Monthly meetings during construction	Article 16.6	UoC's Technical Services dept	UoC's Technical Board/IA/CC	UoC's Technical Services dept
Monthly certificate of completion of work	Article 17	UoC's Technical Services dept	UoC's Technical Board/ IA	UoC's Technical Services dept
Response to Request support for public utility services	Article10.3	UoC's Technical Services dept		UoC's Technical Services dept
Review of the management plan of hazardous substances	Article 10.4	UoC's Technical Services dept	IA/ CC	UoC's Technical Services dept
Financial statements - quarterly and annually audited	Not a contractual requirement.			
Review/comments/approval of Quality Management System	Article11.2	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept
Comments/ Acceptance Certificate of achievement	Article 18.2.1	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	Rector/ UoC's Technical Services dept
Construction closeout				
Commissioning and Acceptance	Article 17	UoC's Technical Services dept	IA/ CC	UoC's Technical Services dept
Maintenance programme	Article21.3	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept
End of Life cycle replacement schedule	Article 21.4	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept
Quality Management System	Article 25	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept
Approve on onsite personal	Article 24	UoC's Technical Services dept	UoC's legal dept	Contract Contact Person
Risks Insured / Submission of copy/ Check for co-insurance	Article 42	UoC's Technical Services dept	UoC's Technical Board	UoC's Technical Services dept
Operation, Management and Maintenance				
Monthly Availability fee payment + VAT tax (monthly)	Article 27.1/ Annex 3/ Article 27.8	Contract Contact Person	Monitoring Committee	Rector
Calculation of reductions to monthly availability fee (monthly)	Article 27.1/ Annex 3	Monitoring Committee	TB/ IA/ TP	Monitoring Committee
Monitor Maintenance programme (monthly)		Monitoring Committee	UoC's Technical Services dept	Monitoring Committee
Validate Letter of Guarantee for Services (annually)	Article 6.3	Contract Contact Person		Accounting department
Calculation of Annual Availability fee (annually)	Annex 3			Accounting department
University Annual budget approval/request (annually)			Accounting department	UoC's Technical Board/ Rector
5-year running Maintenance programme (annually)	Article 21.3	Contract Contact Person	TB/ IA/ TP	TS

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Table 5. Continued

Report on replacement needs (36+5M)	Article 21.4	Contract Contact Person	TB/ IA/ TP	TS
Tasks in case something goes wrong/ changes (to be added the date the change occurs)				
Refinancing	Article 28 & 32	SPV	European Central Bank	UoC's Technical Board/ Rector
Corporate Changes	Article 51	SPV		UoC's Technical Board/ Rector
Change in Law	Article 31	SPV	UoC's Technical Board	UoC's Technical Board/ Rector
Changes in Scope - CAPEX - OPEX	Article 52	SPV/ Rector	UoC's Technical Board/ European Central Bank	UoC's Technical Board/ Rector
Force Majeure Events	Article 35	SPV	UoC's Technical Board	Rector /UoC's Technical Services dept
Economic Model Updates	Article 52	SPV/ Rector	UoC's Technical Board /European Central Bank	UoC's Technical Board/ Rector
Dispute Settlement	Article 75	SPV/ Rector	UoC's Technical Board/ IA/ CC	UoC's Technical Board/ Rector
Issues with local government services	Articles 59, 60, 61, 62, 65	UoC's Technical Services dept	IA/ CC/European Central Bank	UoC's Technical Board/ Rector
Contract Termination Events- Compensations.	Annenx 6	SPV/ Rector	UoC's Technical Board	UoC's Technical Board/ Rector
Project hardback phase				
Initiation of hand - over procedures (33 years)		UoC's Technical Services dept	UoC's Technical Board	Rector
Protocol of hand back of PPP site	Article 15	UoC's Technical Services dept	UoC's Technical Board	Rector

the analysis combined network and cohort methods with a CAPEX-based financial assessment to evaluate how contractual structures allocate risk, protect financial flows, and influence managerial decision making.

The findings clearly confirm that financial risks dominate PPP contract design and governance in crisis-affected environments. Contractual documentation, monitoring mechanisms, and stakeholder roles are structured primarily to safeguard debt service and private cash flows, often at the expense of service quality, flexibility, and public value delivery. This financial dominance is reflected in the central role of the Independent Auditor, whose function in Greek PPPs exceeds that typically observed in high-income OECD countries and resembles governance patterns found in developing economies.

A key conclusion is that asset impairments operate mainly as financial protection instruments for lenders rather than as performance-improvement tools. While impairments ensure the continuity of payments to financiers, they do not guarantee successful project delivery or adequate service provision to end users. Moreover, impairments are applied regardless of whether underperformance stems from contractor behaviour, macroeconomic shocks, or regulatory constraints, resulting in a systematic transfer of downside risk back to the public sector.

The CAPEX analysis further demonstrates that PPP delivery embeds a structural cost premium for the public sector. Contractor profit margins, higher financing costs, advisory fees, and risk premiums significantly increase total project costs compared to public-sector delivery. In the University of Crete case, foregone contractor profits and administrative savings alone amount to several tens of millions of euros, calling into question the economic rationale of the PPP model in fiscally constrained settings.

Despite formal risk transfer through contractual delegation, ultimate accountability remains with public-sector employees and institutions. Universities retain legal, financial, and reputational responsibility for outcomes, even when operational control is outsourced. This misalignment between contractual risk allocation and actual liability creates moral hazard and weakens effective governance.

Overall, the analysis reveals a systemic contractual bias against the public sector in PPP arrangements. Contract clauses frequently presume public-sector non-compliance, while offering limited protection against opportunistic contractor behaviour. Asset impairments, inflation indexation mechanisms, and availability payments collectively reinforce this asymmetry, placing disproportionate financial and technical risk on public authorities.

From a contract management and policy perspective, the results suggest that PPPs in crisis-prone economies should be approached with caution. Asset impairment mechanisms should be reconsidered and, where possible, replaced with clearly defined penalty clauses and enforceable performance obligations. Public-sector oversight capacity must be strengthened rather than diluted through excessive reliance on external auditors. Most importantly, PPP decisions

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should be based on full lifecycle economic comparisons, not on nominal risk transfer or short-term budgetary considerations.

Although the analysis is grounded in the Greek case, the methodology and conclusions are transferable to other PPP projects in economies facing financial instability. Just to conclude, as it has been said in the results section, despite the risks, the public sector's alignment with social objectives, such as offering good public services (education in the case of the University of Crete), creating local jobs or ensuring environmental compliance, can offset purely financial considerations.

Appendix data needed

To be able to evaluate a PPP project either as a contractor (CC) or as a public entity (CA) or as a Special Purpose Vehicle (SPV), important information is required during planning phase, since this information is defined by the contract and cannot change:

1. Name of Project: Identifies the specific project and provides clarity.
2. Name of Client: Defines the primary stakeholder responsible for funding and oversight.
3. Name of Engineer/Consultant: Identifies the key technical expert responsible for the project's design and guidance.
4. Time of Completion: Establishes the expected duration, helping with planning and scheduling.
5. Sectional Completion: Specifies any partial completion milestones, aiding phased delivery and payment.
6. Liquidated Damages/Penalties (Whole): Sets financial penalties for delays, ensuring timely completion.
7. Liquidated Damages/Penalties (Sections): Specifies penalties for delays in specific sections, promoting phased progress.
8. Commencement Date: Marks the start of project activities, providing a reference for tracking progress.
9. Performance Bond: Provides financial security that the contractor will fulfill their obligations.
10. Date of Return of Performance Bond: Indicates when the bond will be returned, ensuring contractor accountability.
11. Defects/Maintenance Period: Defines the period for identifying and rectifying defects, ensuring quality.
12. Method of Measurement: Establishes the standards for assessing work, ensuring consistency.
13. Payment Terms: Outlines the financial arrangements, ensuring clear expectations for payments, retention, and advance payments.
14. Insurance Requirements: Specifies the necessary insurance coverage, mitigating risks.
15. Other Comments: Allows for additional relevant information to be documented.

REFERENCES

Akinrele A (2016) The current impact of global crude oil prices on Nigeria—an overview of the Nigerian petroleum and energy sector. *The Journal of World Energy Law & Business* **9(5)**: 313–345.

Akomea-Frimpong I, Jin X and Osei-Kyei R (2024) Mitigating financial risks in sustainable public–private partnership infrastructure projects: a quantitative analysis. *Systems* **12(7)**: 239, 10.3390/systems12070239.

Almeile AM, Chipulu M, Ojiako U, Vahidi R and Marshall A (2024) Project-focussed literature on public-private partnership (PPP) in developing countries: a critical review. *Production Planning & Control* **35(7)**: 683–710, 10.1080/09537287.2022.2123408.

Ameyaw EE, Chan AP, Owusu-Manu DG and Coleman E (2015) A fuzzy model for evaluating risk impacts on variability between contract sum and final account in government-funded construction projects. *Journal of Facilities Management* **13(1)**: 45–69, 10.1108/JFM-11-2013-0055.

Archer S, Davies B and Karim RAA (2017) Overview of the Islamic capital market. *Islamic Capital Markets and Products: Managing Capital and Liquidity Requirements Under Basel III* **1**.

Badi S and Alhosani M (2024) Public-private partnerships (PPPs) for the realisation of the sustainable development agenda in the built environment. *In The Elgar Companion to the Built Environment and the Sustainable Development Goals*. Edward Elgar Publishing, pp. 457–480, 10.4337/9781035300037.00038.

Baloi D and Price AD (2003) Modelling global risk factors affecting construction cost performance. *International Journal of Project Management* **21(4)**: 261–269.

Banaitiene N and Banaitis A (2012) Risk management in construction projects. *Risk Management-Current Issues and Challenges* : 429–448, 10.5772/51460.

Bayraktar OY (2020) Risk management in construction sector. *World Journal of Advanced Research and Reviews* **8(2)**: 237–243, 10.30574/wjarr.2020.8.2.0433.

Berton JC, Ellsiepen P, Mazzaglia F and Gerlach C (2018) Automated distribution of ESA software, *In 2018 SpaceOps Conference*, p. 2330.

Bisbey LR (2022) Integrating climate risk management in infrastructure PPPs in developing countries. *WAPPP Journal 2022*, 10.55898/wappp2022_climate_risks_PPPs.

Bryman A and Bell E (2007) *Business Research Methods* 2nd edition. Oxford University Press, New York.

Cartlidge D (2006) *Public Private Partnerships in Construction*. Routledge.

Casady CB and Geddes RR (2020) Asset recycling for social infrastructure in the United States. *Public Works Management & Policy* **25(3)**: 281–297, 10.1177/1087724X20911652.

Castelblanco G and Guevara J (2022) Crisis driven literature in PPPs: a network analysis. *IOP Conference Series: Earth and Environmental Science* **1101(5)**: 052002, 10.1088/1755-1315/1101/5/052002.

Castelblanco G, Guevara J and Salazar J (2022) Remedies to the PPP crisis in the COVID-19 pandemic: Lessons from the 2008 global financial crisis. *Journal of Management in Engineering* **38(3)**: 04022017, 10.1061/(ASCE)ME.1943-5479.0001036.

Dappe MH, Foster V, Musacchio A, Ter-Minassian T and Turkgulu B (2023) *Off the Books: Understanding and Mitigating the Fiscal Risks of Infrastructure*. World Bank Publications.

David M and Sutton CD (2011) *Social Research: An Introduction*. SAGE Publications Ltd, London, UK.

DCAA (Defense Contract Audit Agency) (2025) *Contract Audit Manual: Chapter 7 – Selected Areas of Cost*. DCAA, Fort Belvoir, VA.

Denzin N and Lincoln Y (2003) *The Discipline and Practice of Qualitative Research in Collecting and Interpreting Qualitative Materials* 2nd edition. Sage, Thousand Oaks, California.

Eguren F, Joy M, Maurini C *et al.* (2020) Capital flows during the pandemic: lessons for a more resilient international financial architecture. *Bank of England Financial Stability Paper* (45).

Eliufoo H (2018) Risk factors in cost estimation: building contractors' experience. *American Journal of Civil Engineering and Architecture* **6(3)**: 123–128.

Downloaded from http://www.emerald.com/jmapl/article-pdf/doi/10.1680/jmapl.25.00094/11724533/jmapl.25.00094en.pdf by University of Birmingham user on 02 August 2026

Finnigan M, Pantaridis P and Roumboutsos A (2025) Contract management manual for the University of Crete. *In IBF International Consulting*, Brussels, Belgium.

Flick U (2009) *An Introduction to Qualitative Research* 4th. ed. Sage Publications, London.

Fonseca MIS (2012) *Equity Valuation*. Master's thesis, Universidade Catolica Portuguesa, Portugal.

Fouskas V and Dimoulas C (2018) *Greece in the 21st Century: The Politics and Economics of a Crisis*. Routledge.

Fraser D, Mpikeleli T and Notteboom T (2020) A valuation approach of port funding strategies with application to a container terminal concession in Sub-Saharan Africa. *Maritime Business Review* **6(2)**: 147–172.

Gao T and Eshaghoff TS (2004) Decision factors considered important by MNCs in their reevaluation and/or modification of foreign entry modes during the Argentine Financial Crisis. *Latin American Business Review* **5(2)**: 45–69.

Grant RM (2003) Strategic planning in a turbulent environment: Evidence from the oil majors. *Strategic Management Journal* **24(6)**: 491–517, 10.1002/smj.314.

Griffith-Jones S, Ocampo JA and Chiappe ML (2003) *What Progress on International Financial Reform?: Why So Limited?*. EGDI Secretariat.

Guillemin M and Gillam L (2004) Ethics, reflexivity, and "ethically important moments" in research. *Qualitative Inquiry* **10(2)**: 261–280, 10.1177/1077800403262360.

Gunn JL, Khurana IK and Stein SE (2018) Determinants and consequences of timely asset impairments during the financial crisis. *Journal of Business Finance & Accounting* **45(1–2)**: 3–39, 10.1111/jbfa.12287.

Haarmeyer D and Mody A (1997) Private capital in water and sanitation. *Finance and Development* **34(1)**: 34.

Haidar AD (2021) *Handbook of Contract Management in Construction*. Springer, Cham, Switzerland.

Harland C, Rudd A and Knight L (2007) Procurement in the English National Health Service. In *Public Procurement*. Routledge, pp. 70–87.

Haslam C, Tsitsianis N and Hoinaru R (2017) How public sector accounting mimics private sector reporting and puts foundational services at risk (No. 1). Foundational Economy Working Paper, See https://foundationaleconomy.com/wp-content/uploads/2017/01/haslam-et-al-private-sector-financial-reporting-in-public-sector-final.pdf (accessed 30/03/2026).

Heaton J (2000) Secondary data analysis of qualitative data: a review of the literature. In Social Policy Research Unit (SPRU), University of York, York.

Herling RW, Weinberger L and Harris L (2000) *Case Study Research: Defined for Application in the Field of HRD. St*. University if Minnesota, Human Resource Development Research Center, Paul.

Hill MR (1993) *Archival Strategies and Techniques*. Sage Publications.

Intrakat (2023) *Financial Model (Audited Bid Model) for the Design, Construction, Financing, Operation and Maintenance of Student Residence Facilities*. University of Crete.

Junnila J (2024) *Fixed asset accounting guide: for hydrogen CapEx investments*. Master's Thesis, Centria University of Applied Sciences, Finland.

Kalyviotis N, Kitsios D and Naniopoulos A (2010) Construction contracts, project delivery methods and roles of the project stakeholders. In *The Case of Khalifa Port Project in Abu Dhabi. PM-05 – Advancing Project Management for the 21st Century "Concepts, Tools & Techniques for Managing Successful Projects" 29-31*, May, Heraklion, Crete, Greece.

Kalyviotis N and Langarita R (2025) Contract management of public-private partnership building projects in countries experiencing economic crises: the case of the University of Crete. 64th European Regional Science Association Congress, *In Regional Science in Turbulent Times. In Search of a Resilient, Sustainable and Inclusive Future*, Athens, Greece, pp. 26–29.

Lapavitsas C (2019) Political economy of the Greek crisis. *Review of Radical Political Economics* **51(1)**: 31–51, 10.1177/0486613417730363.

Latilo A, Imosemi HO and Imosemi QA (2024a) Contractual challenges in renewable energy projects: the role of ADR in managing risks and disputes. *Global Journal of Advanced Research and Reviews* **2(01)**: 078–098.

Latilo A, Uzougbo NS, Ugwu MC and Aziza OR (2024b) Developing legal frameworks for successful engineering, procurement, and construction projects. *Int J Appl Res Soc Sci* **6(8)**: 1868–1883.

Lawal C, Friday S, Ayodeji D and Sobowale A (2024) Advances in public-private partnerships for strengthening national financial governance and crisis response systems. *International Journal of Advanced Multidisciplinary Research and Studies* **6(4)**: 1700–1719.

Lengwe EC (2014) *An investigation into the use of existing public-private partnerships models in the Zambian water and sanitation sector*. Doctoral dissertation, Heriot-Watt University, United Kingdom.

Levendis V (2021) *Paphos Real Estate since the beginning of the Global Financial Crisis, An analysis of trends and causes. A case study of Paphos*. Doctoral dissertation, Business Administration Program, School of Economic Sciences and Business, Neapolis University Pafos, Cyprus.

Li B, Akintoye A and Hardcastle C (2001) Risk analysis and allocation in public private partnership projects. *In 17th Annual ARCOM Conference* **1**: 895–904.

Lilford E and Guj P (2020) Corporate income tax provisions and fiscal incentives specific to mining. *In Mining Taxation: Reconciling the Interests of Government and Industry*. Springer International Publishing, Cham, pp. 71–100, 10.1007/978-3-030-49821-4_5.

Lincoln YS and Guba EG (1985) *Naturalistic Inquiry*. Sage Publications, Beverly Hills, CA.

Mabelele B and Mrindoko A (2024) The influence of dispute resolution mechanism on managing procurement contract in Tanzania: a case of CRDB bank plc. *Asian Journal of Management, Entrepreneurship and Social Science* **4(04)**: 1650–1665.

Makris AS (2024) *Financial statements analysis of shipping firms*. Master's thesis, University of Piraeus, Greece.

May T (2011) *Social Research; Issues, Methods and Process* 4th edition. Open University Press, McGraw Hill, Maidenhead.

Meghir C, Pissarides CA, Vayanos D and Vettas N (2017) *The Greek Economy before and during the Crisis–and Policy Options Going Forward*. Reforming the Greek economy, Beyond austerity, pp. 3–72.

Metwally M (2023) *The impact of economic instability and inflation on the construction contractors and real estate companies in Egypt*. Master thesis, Metropolia UAS and HTW Berlin.

Mokwena J, Mashwama NX, Thwala D, Aigbavboa C and Hamma-Adama M (2020) The current state of corporate social responsibility practices of firms operating in construction industry. *Proceedings of International Structural Engineering and Construction* **7(2)**.

Morgan G and Smircich L (1980) The case for qualitative research. *The Academy of Management Review* **5(4)**: 491–500, 10.2307/257453.

Moschovitis P (2017) *Causes of the recent W-shaped recession in Greece*. Master's thesis, University of Piraeus, Greece.

Muhammad A, Mike MEE, Idris MB, Ishaq AA and Abdullah AK (2023) The belt and road initiative: implications for infrastructure development and economic integration in Eurasia. *Journal of Environmental Science and Economics* **2(2)**: 50–63, 10.56556/jescae.v2i2.548.

Natovich J (2003) Vendor related risks in IT development: a chronology of an outsourced project failure. *Technology Analysis & Strategic Management* **15(4)**: 409–419.

Navarro A (2005) *M The Treatment of Public-Private Partnership Assets in the GFSM 2001 Framework*. IMF Research Paper.

Nsefu MK, Mwanaumo EM, Mambwe M, Daka J and Mwanza BG (2020) Effectiveness in the Contract Management Performance within the Lusaka Provincial Administration–A Balanced Scorecard Application, *Conference: 2020 IEOM Harare Conference*. Zimbabwe.

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Olson M (2010) *Document Analysis*. Raddison.
Owojori OM and Erasmus LJ (2025) Public–private partnerships as catalysts for green infrastructure: a three-pronged analysis of economic, environmental, and institutional factors. *Frontiers in Sustainable Cities* **7**: 1591278, 10.3389/frsc.2025.1591278.
Owusu-Manu DG, Kukah AS, Boateng F, Asumadu G and Edwards DJ (2021) Exploring strategies to reduce moral hazard and adverse selection of Ghanaian public–private partnership (PPP) construction projects. *Journal of Engineering, Design and Technology* **19(2)**: 358–372, 10.1108/JEDT-05-2020-0195.
Potter J and Wetherell M (2007) *Discourse and Social Psychology: Beyond Attitudes and Behaviour*. Sage, London.
Robson C (2002) *Real World Research* 2nd Edition. Blackwell, Oxford.
Saunders M, Lewis P and Thornhill A (2009) *Research Methods for Business Students*. Pearson education.
Shalehin MDA, Salleh RM, Mustapa NA and Ghani NHA (2024) Influential factors in the selection of procurement methods by quantity surveyors. *International Journal of Business and Technology Management* **6(S1)**: 303–315.
Shishehgarkhaneh MB, Moehler RC, Fang Y, Aboutorab H and Hijazi AA (2024) Construction supply chain risk management. *Automation in Construction* **162**: 105396, 10.1016/j.autcon.2024.105396.
Singh A, Rose Anish P, Verma A *et al.* (2024) A data decomposition-based hierarchical classification method for multi-label classification of contractual obligations for the purpose of their governance. *Scientific Reports* **14(1)**: 12755.
Sklias P, Rukanas SA and Galatsidas G (2021) Was the Great Depression of 1929 harsher than the Greek depression? *International Journal of Business and Economic Sciences Applied Research (IJBESAR)* **14(3)**: 35–59, 10.25103/ijbesar.143.03.
Thobani M (1999) Private infrastructure, public risk. *Finance and Development* **36(1)**: 50–53.
Torres F and Freitas ML (2019a) *Portugal's Adjustment Program. The Political Economy of Adjustment Throughout and Beyond the Eurozone Crisis: What Have We Learned*. Springer, p. 89.
Torres F and Freitas ML (2019b) *Portugal's Adjustment: program The Run-up to the Sovereign Debt Crisis, Program Design, Implementation and Legacy. The Political Economy of Adjustment throughout and beyond the Eurozone Crisis*. NOVA, pp. 122–156.
Triantafyllopoulos N (2006) Public sector transparency and tourism real estate investments in Greece. *Regional and Sectoral Economic Studies* **6(2)**: 57–72.
Triantafyllopoulos N (2008) Does land property structure affect local development patterns? Evidence from a Greek tourist area. *Urban Studies* **45(4)**: 797–824, 10.1177/0042098007088469.
Triantafyllopoulos N and Alexandropoulou I (2010) Land-based financing of the EU JESSICA initiatives. In 1 th annual European real estate society conference (pp. 23-26). *Discussion Paper Series* **16(8)**: 183–202.
Triantafyllopoulos N and Kandyla T (2010) Buyers' behaviour and the housing bubble in Greece, *In 17th Annual European Real Estate Society Conference*, Milan, (Vol. **23**).
Triantafyllopoulos N (2024) Investigating energy renovation of Multi-Owner buildings and real estate market issues in a degraded Greek urban area. *Sustainability* **16(7)**: 2903, 10.3390/su16072903.
University of Crete (2025) *Partnership Agreement for the Design, Construction, Financing, Operation and Maintenance of Student Residence Facilities*. University of Crete.
Ushakov D (2018) *Global Trends of Modernization in Budgeting and Finance*. IGI Global.
Weijermars R and Watson S (2011) Unconventional-natural-gas business: TSR benchmark and recommendations for prudent management of shareholder value. *SPE Economics & Management* **3(04)**: 247–261.
Yin RK (2009) *Case Study Research: Design and Methods*. Sage Publications Inc, Thousand Oaks, California.

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