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REVIEW ARTICLE

ARCHITECTURAL CONCEPT AS THE METHODOLOGICAL BASIS OF ARCHITECTURAL DESIGN ACTIVITY

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Abstract. *This article investigates the conceptual foundation of an architectural project as a key determinant of the integrity and quality of architectural solutions. The architectural concept is interpreted as the intellectual core that structures the relationship between function, form, and artistic expression in contemporary practice. The study employs a systematic literature review, comparative analysis of architectural projects, and in-depth case studies from Kazakhstan and international contexts. The research synthesizes recent scientific discourse on conceptual design, including cognitive approaches, generative artificial intelligence, and socially oriented design methodologies. The analysis identifies major trajectories in the evolution of conceptual design and substantiates the importance of a «value-semantic» component as an extension of traditional functionalist approaches. A structured model of the conceptual framework is proposed, comprising philosophical intent, semantic coding, functional topology, morphological synthesis, and contextual adaptation. The findings demonstrate that a clearly articulated concept ensures coherence of design decisions, supports integration within social, cultural, and environmental contexts, and enhances both sustainability and expressive quality. The results highlight the role of the architectural concept as a methodological instrument that maintains design integrity throughout all project stages. Emphasis is placed on the need to preserve conceptual consistency when integrating contemporary tools and interdisciplinary knowledge. The study confirms that a well-defined conceptual framework significantly improves the effectiveness and quality of architectural design. The proposed approach can be applied in both professional practice and academic research to strengthen conceptual rigor and design outcomes.*

Keywords: *architectural project, conceptual idea, architectural environment, form-making, sustainable development*

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ШОЛУ МАҚАЛА

СӘУЛЕТТІК ЖОБАЛАУ ҚЫЗМЕТІНІҢ ӘДІСНАМАЛЫҚ НЕГІЗІ РЕТІНДЕГІ СӘУЛЕТТІК ТҰЖЫРЫМДАМА

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Аңдатпа. *Бұл мақала сәулеттік жобаның тұжырымдамалық негізін сәулеттік шешімдердің тұтастығы мен сапасын айқындайтын негізгі фактор ретінде қарастырады. Сәулеттік тұжырымдама заманауи тәжірибеде функция, форма және көркемдік өрнек арасындағы өзара байланысты қалыптастыратын зияткерлік өзек ретінде түсіндіріледі. Зерттеу жүйелі әдебиет шолуын, сәулеттік жобаларды салыстырмалы талдауды, сондай-ақ Қазақстан мен халықаралық тәжірибеден алынған нақты мысалдарды терең талдауды қамтиды. Жұмыс тұжырымдамалық жобалаудың заманауи ғылыми бағыттарын, соның ішінде когнитивтік тәсілдерді, генеративті жасанды интеллектті және әлеуметтік бағдарланған жобалау әдістерін біріктіреді. Талдау тұжырымдамалық жобалаудың негізгі даму бағыттарын анықтап, дәстүрлі функционализмді толықтыратын «құндылық-мағыналық» компоненттің маңызын негіздейді. Философиялық ниет, семантикалық кодтау, функционалдық топология, морфологиялық синтез және контекстік бейімделуді қамтитын тұжырымдамалық құрылымның жүйеленген моделі ұсынылады. Нәтижелер нақты анықталған тұжырымдаманың жобалық шешімдердің үйлесімділігін қамтамасыз ететінін, сәулеттің әлеуметтік, мәдени және экологиялық контекстермен ықпалдасуына ықпал ететінін, сондай-ақ тұрақтылық пен көркемдік сапаны арттыратынын көрсетеді. Алынған нәтижелер сәулеттік тұжырымдаманың жобалау үдерісінің барлық кезеңдерінде тұтастықты қамтамасыз ететін әдіснамалық құрал ретіндегі рөлін айқындайды. Заманауи технологиялар мен пәнаралық білімді енгізу барысында тұжырымдамалық бірізділікті сақтау қажеттілігіне ерекше назар аударылады. Зерттеу нақты қалыптастырылған тұжырымдамалық негіз сәулеттік жобалаудың тиімділігі мен сапасын едәуір арттыратынын дәлелдейді. Ұсынылған тәсіл сәулетшілер мен зерттеушілер тарапынан кәсіби тәжірибеде де, ғылыми зерттеулерде де қолданылуы мүмкін.*

Түйін сөздер: *сәулеттік жоба, идеялық тұжырымдама, сәулеттік орта, пішін қалыптастыру, тұрақты даму*

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ОБЗОРНАЯ СТАТЬЯ

АРХИТЕКТУРНАЯ КОНЦЕПЦИЯ КАК МЕТОДОЛОГИЧЕСКИЙ БАЗИС АРХИТЕКТУРНО-ПРОЕКТНОЙ ДЕЯТЕЛЬНОСТИ

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Аннотация. *В данной статье рассматривается концептуальная основа архитектурного проекта как ключевой фактор, определяющий целостность и качество архитектурных решений. Архитектурная концепция интерпретируется как интеллектуальное ядро, формирующее взаимосвязь между функцией, формой и художественной выразительностью в современной практике. Исследование основано на систематическом обзоре литературы, сравнительном анализе архитектурных проектов, а также углублённом изучении кейсов из Казахстана и международной практики. В работе синтезируются современные научные подходы к концептуальному проектированию, включая когнитивные методы, генеративный искусственный интеллект и социально ориентированные стратегии проектирования. Анализ выявляет основные направления развития концептуального проектирования и обосновывает значимость «ценностно-смыслового» компонента как расширения традиционного функционалистского подхода. Предложена структурированная модель концептуальной основы, включающая философский замысел, семантическое кодирование, функциональную топологию, морфологический синтез и контекстуальную адаптацию. Полученные результаты показывают, что чётко сформулированная концепция обеспечивает согласованность проектных решений, способствует интеграции архитектуры в социальный, культурный и экологический контексты, а также повышает устойчивость и выразительность архитектурных объектов. Результаты подчеркивают роль архитектурной концепции как методологического инструмента, обеспечивающего целостность на всех этапах проектирования. Особое внимание уделяется необходимости сохранения концептуальной непротиворечивости при интеграции современных технологий и междисциплинарных знаний. Исследование подтверждает, что чётко определённая концептуальная основа существенно повышает эффективность и качество архитектурного проектирования. Предложенный подход может быть использован архитекторами и исследователями для повышения уровня проектных решений и научных разработок.*

Ключевые слова: *архитектурный проект, идейная концепция, архитектурная среда, формообразование, устойчивое развитие*

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CONFLICT OF INTEREST

The authors state that there is no conflict of interest.

During the preparation of this manuscript, the authors used artificial intelligence tools (ChatGPT) solely for editorial assistance, such as improving phrasing and checking grammar, spelling, and punctuation. All ideas, interpretations, and conclusions are the responsibility of the authors, who take full accountability for the content of the article.

АЛҒЫС / ҚАРЖЫЛАНДЫРУ КӨЗІ

Зерттеу жеке қаржыландыру көздерін пайдалана отырып жүргізілді.

МҮДДЕЛЕР ҚАҚТЫҒЫСЫ

Авторлар мүдделер қақтығысы жоқ деп мәлімдейді.

Мақаланы дайындау барысында авторлар жасанды интеллект құралдарын (ChatGPT) тек редакциялық көмек мақсатында пайдаланды: тұжырымдарды жетілдіру, грамматикалық, орфографиялық және тыныс белгілеріндегі қателерді тексеру үшін. Барлық идеялар, интерпретациялар мен қорытындылар авторларға тиесілі, және олар мақаланың мазмұнына толық жауапты.

БЛАГОДАРНОСТИ/ИСТОЧНИК ФИНАНСИРОВАНИЯ

Исследование проводилось с использованием частных источников финансирования.

КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют, что конфликта интересов нет.

При подготовке рукописи авторы использовали инструменты искусственного интеллекта (ChatGPT) исключительно для редакторской поддержки: корректировки формулировок, проверки грамматических, орфографических и пунктуационных ошибок. Все идеи, интерпретации и выводы принадлежат авторам, которые несут полную ответственность за содержание статьи.

1 INTRODUCTION

The conceptual foundation of an architectural project (**Figure 1**) constitutes a pivotal element in architectural theory and practice, functioning as the intellectual core that guides design decisions, spatial organization, and aesthetic expression. In the contemporary architectural discourse, a robust conceptual basis ensures that architectural solutions are coherent, contextually responsive, and aligned with socio-cultural objectives.

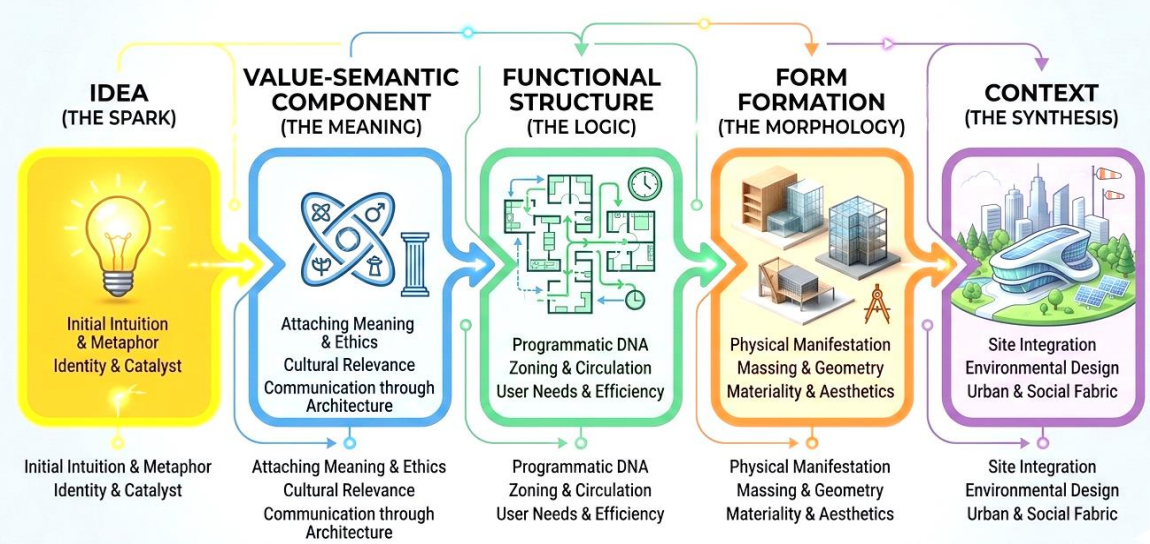

Figure 1 – Conceptual framework diagram for an architectural project (author's material)

The Bulletin of the Kazakh Head Architectural and Construction Academy journal regularly features studies that reflect the evolving priorities and methodologies in architectural design, emphasizing both theoretical frameworks and practical applications. For instance, research on functional zoning and spatial improvement in educational environments demonstrates how architectural ideas directly influence the quality and utility of built environments (**Danibekova E. et al., 2025**).

Recent issues of Bulletin of the Kazakh Head Architectural and Construction Academy highlight diverse directions in architectural inquiry, including analyses of modern spatial solutions in Kazakhstan's architecture and the principles of organizing contemporary open spaces, which underscore the importance of integrating conceptual thinking into the design process (**Kozhakhmetov et al., 2023**). Additionally, studies exploring compositional and planning components of urban spaces offer insights into how architectural concepts inform unique spatial identities and design strategies (**Gvozdikova et al., 2025**). The examination of priority directions in regional architecture development further illustrates the expanding role of conceptual foundations in addressing cultural, environmental, and contextual imperatives within architectural practice (**Baitenov, 2024**).

Moreover, investigations into historical and cultural identity in architectural contexts underscore the necessity of grounding projects in meaningful ideas that respect heritage and contemporary needs (**Auhadiyeva et al., 2024**). Collectively, these studies affirm that the ideological basis of architectural projects is not merely an abstract notion but a determining factor that shapes design intent, enriches architectural discourse, and fosters innovation within the profession.

Over the past decade, research on the conceptual foundations of architectural design has expanded significantly, revealing a broad spectrum of theoretical frameworks, computational methodologies, and practice oriented studies. The conceptual phase of architecture is increasingly recognized as critical in shaping design outcomes, as it mediates between abstract ideas and tangible ar-

chitectural form (**Taura et al., 2013**). Recent literature underscores that architectural concepts are not merely stylistic choices but integral cognitive and procedural elements that shape spatial organization, functional logic, and cultural significance.

Recent reviews of generative artificial intelligence (GenAI) in architecture demonstrate how conceptual design is being transformed by computational tools. A systematic review of generative AI models highlights their increasing use in early stages of architectural design (**Li et al., 2025**), showing how advanced models such as GANs, VAEs, and diffusion techniques are applied to conceptual image and form generation. These methods enable architects to explore design possibilities rapidly and to enhance creative ideation through machine learning assisted exploration of spatial configurations-signaling a paradigm shift in how conceptual ideas are generated and visualized in practice (**Jang et al., 2025; Yiannoudes, 2025**).

The integration of AI and computational design in conceptual workflows has been critically discussed in broader built environment literature, revealing both potentials and limitations. Reviews have noted the challenges of integrating AI systems with traditional practice and the need for more standardized evaluation frameworks that align with architectural criteria such as sustainability, functionality, and human centric design values (**Alqahtani et al., 2025; Wang et al., 2024**).

Beyond technology driven research, cognitive and theoretical studies have examined design ideology and creative thinking processes. Scholarly work on design cognition highlights the interplay between cognitive mechanisms and conceptual development, suggesting that architectural concepts emerge from reflective practice, iterative sketching, and visual representation strategies. These discussions emphasize that concept formation in architecture is both a disciplinary construct and an intellectual methodology rooted in design thinking education and professional culture (**Cheung et al., 2025**).

Recent investigations in design studies also show how conceptual ideation intersects with sustainability and user centred criteria. Emerging research themes include data informed design processes, inclusive and sustainable community design thinking, and collaborative ideation methods, reflecting a shift toward socially responsive, environmentally informed architectural concepts (**Martínez Casanovas, 2025; Metin et al., 2025**).

In addition to computational and cognitive perspectives, interoperability and preservation of conceptual integrity have been foregrounded in architectural design workflows. Research in Scientific Reports (**El Khouly et al., 2024**) emphasizes strategies for maintaining design intent across digital platforms such as BIM and Revit, pointing to the importance of conceptual fidelity when utilizing digital tools in the design process.

Figure 2 Scheme of the conceptual research methodology framework.

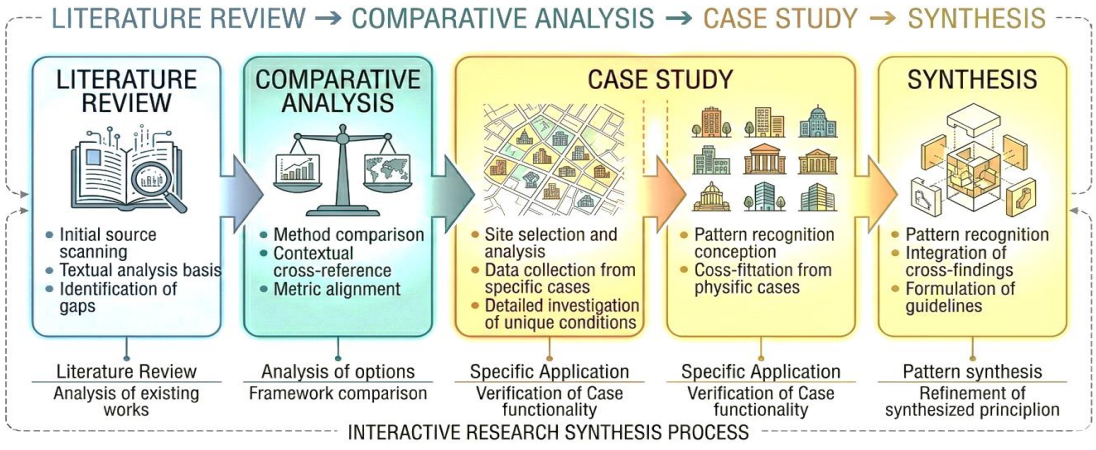

Figure 2 – Scheme of the conceptual research methodology framework (author's material)

Table 1
Comparative analysis of projects

Project / Case Study	Conceptual Idea	Context (Environmental/Social)	Level of Conceptual Integrity	Final Assessment
Resilient Urban Waterfront	"The Living Shoreline": Adaptive infrastructure that breathes with the tides.	High-density coastal area prone to seasonal flooding.	**High**: Design solutions (porous materials, tiered levels) directly match the idea.	Successful integration of ecology and urban function.
Cultural Heritage Hub	"Architectural Palimpsest": Layering modern glass over ancient stone.	Historical city center with strict preservation codes.	**Medium**: Strong visual contrast, but functional flow between old/new is complex.	Effective aesthetic dialogue; minor functional constraints.
Vertical Eco-Village	"Biophilic Skyscraper": Replicating forest ecosystems in a high-rise.	Arid climate with limited green space and high solar gain.	**Very High**: Integrated HVAC systems use the "concept" of transpiration for cooling.	Paradigm for sustainable high-density living in harsh climates.
Modular Social Housing	"The Growing Home": User-defined spaces that expand with the family.	Rapidly urbanizing periphery with low-income demographics.	**High**: The "idea" of growth is embedded in the structural grid and logistics.	Cost-effective and socially sustainable; requires long-term management.

Overall, the literature reveals a multifaceted research trajectory: architectural concepts are understood as cognitive constructs, algorithmically augmented design outputs, and socially contextualized frameworks that mediate between theoretical propositions and built outcomes. This evolving discourse underscores the importance of integrating conceptual depth with technological, sociocultural, and environmental considerations in contemporary architectural research (**Table 1**).

In addition to the outlined directions, recent scholarship increasingly frames the architectural concept as a methodological regulator of the entire design process rather than only its initial stage. Researchers emphasize that the concept operates as a structuring principle that ensures coherence between problem definition, design strategies, and final spatial outcomes. In this sense, the architectural concept functions as a «guiding hypothesis» that is continuously tested and refined throughout iterative design cycles, linking analytical, creative, and evaluative phases into a unified methodological system.

Furthermore, contemporary studies highlight the growing importance of transdisciplinary integration in conceptual development. Architectural concepts are now often informed by knowledge from urban studies, environmental psychology, digital engineering, and sustainability science. This reflects a shift from isolated artistic intuition toward evidence-based and research-driven design approaches, where the concept synthesizes diverse data inputs into a coherent spatial narrative. Such an approach strengthens the role of the concept as a mediator between qualitative intentions and quantitative performance criteria.

Another significant development concerns the communicative function of architectural concepts. Beyond guiding design decisions, concepts increasingly serve as tools for stakeholder engagement, enabling clearer articulation of design intent to clients, communities, and interdisciplinary teams. Visual narratives, diagrams, and parametric models derived from the core concept enhance transparency and facilitate collaborative decision-making, which is especially relevant in complex urban and public projects.

Finally, the literature points to a growing recognition of the ethical dimension of conceptual design. Architectural concepts are now evaluated not only in terms of innovation and coherence but also in relation to social equity, environmental responsibility, and cultural sensitivity. This expands the methodological role of the concept, positioning it as a value-driven framework that shapes not only what is designed, but also how and for whom architecture is created.

Thus, the architectural concept can be understood as a dynamic and integrative methodological foundation – one that structures the design process, bridges disciplinary knowledge, supports communication, and embeds ethical considerations into architectural practice.

2 MATERIALS AND METHODS

The scientific novelty of this research lies in the systematization and expansion of the «Value-Semantic» component within the traditional architectural design algorithm. Unlike standard functionalist approaches, this framework establishes a non-linear dependency between abstract philosophical intent and physical spatial morphology.

The study is based on both theoretical and practical sources in the field of architecture. The materials include: scientific literature (peer-reviewed articles, monographs, and conference proceedings on architectural theory, conceptual design, and urban planning, published in the last 5-10 years. Special attention was given to studies indexed in Scopus and Web of Science databases to ensure the use of internationally recognized sources). Architectural projects - analysis of existing architectural projects, including educational, cultural, and public buildings, which demonstrate explicit conceptual foundations. These projects were sourced from architectural journals, professional portfolios, and open-access databases. Design guidelines and standards - national and international regulations, building codes, and sustainability frameworks relevant to conceptual design, form development, and functional planning. Case studies - selected examples of contemporary architectural projects in Kazakhstan and abroad that illustrate the application of conceptual thinking in practice.

The study employed a qualitative research approach, combining theoretical analysis, comparative study, and case study methodology. The main methods include: literature review - systematic review of recent publications on architectural conceptualization was conducted to identify current trends, theoretical models, and practical approaches to forming the conceptual basis of projects. Key databases included Scopus, Web of Science, ScienceDirect, and architectural journals such as Bulletin of the Kazakh Head Architectural and Construction Academy. Comparative Analysis - comparative analysis was applied to examine different architectural projects, focusing on how conceptual ideas influence spatial organization, functional planning, form-making, and integration into the social, cultural, and environmental context. Specific architectural projects were analyzed in-depth to illustrate how conceptual frameworks are applied at different stages of design. The evaluation criteria included the clarity of the design concept, coherence between functional and artistic components, and responsiveness to context and sustainability requirements. Content analysis of design documentation, drawings, and visual materials was performed to identify recurring patterns in conceptual development, including the role of value-based and cultural components in architectural decision-making. Finally, findings from the literature review, comparative analysis, and case studies were synthesized to form a generalized framework describing the key elements of the conceptual basis in architectural projects. This synthesis informed the development of recommendations for architects in integrating conceptual thinking throughout the design process.

The research framework can be summarized as follows:

1. Collection of relevant literature and project materials.
2. Identification of key concepts and patterns in architectural ideation.
3. Comparative and case study analysis of selected architectural projects.

4. Synthesis of findings to propose a structured approach for conceptual development in architectural projects.

This methodology ensures that both theoretical insights and practical examples are considered, providing a comprehensive understanding of the role of the conceptual basis in contemporary architectural design.

3 RESULTS AND DISCUSSION

The results of this research provide architects and students with a predictable methodology to ensure that the "soul" of a project (its concept) is not lost during the technical stages of engineering and construction. This is particularly relevant for the modern architectural landscape of Kazakhstan, where balancing global trends with local cultural identity is a priority.

The analysis of contemporary architectural projects demonstrates that a clearly defined conceptual basis significantly influences both the formal and functional quality of buildings. Projects with a well-articulated conceptual framework exhibit coherence between the architectural form, functional program, and cultural context, creating an integrated spatial experience. In contrast, projects lacking a strong conceptual foundation often demonstrate disjointed spatial organization, inconsistent aesthetic expression, and weaker contextual integration (**Figure 3**).

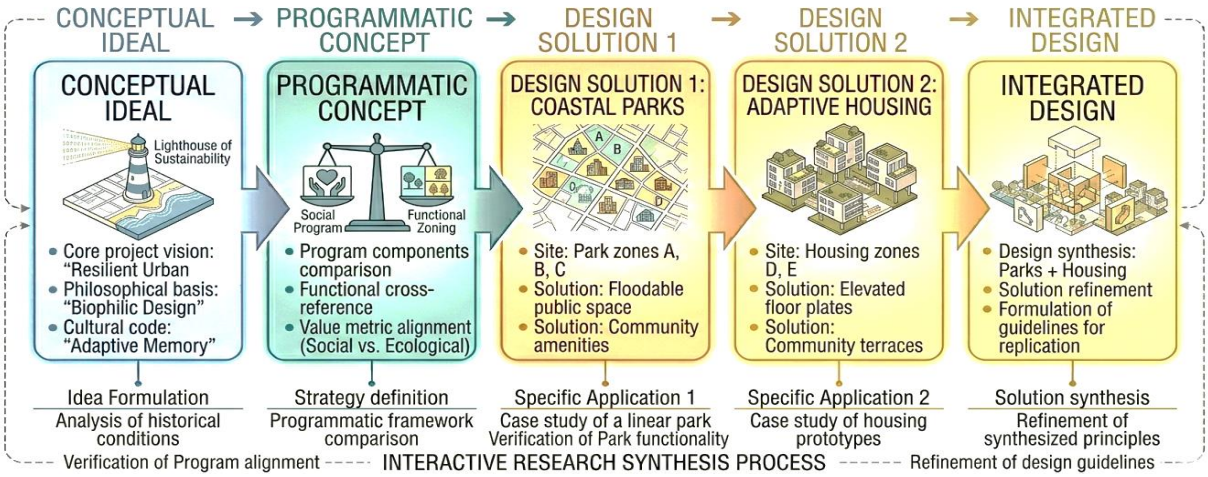

Figure 3 – Case study example (diagram of the relationship between concept and design solutions) (author's material)

For example, case studies of public and educational buildings in Kazakhstan reveal that projects designed around a strong conceptual idea achieve higher architectural expressiveness and user satisfaction, while also responding more effectively to environmental and urban context considerations. These findings align with previous research emphasizing that the conceptual framework acts as a guiding principle throughout the design process, shaping decisions related to form, materials, and spatial hierarchy.

A key result of this study is that the conceptual basis enables the integration of buildings into their broader social, cultural, and environmental context. Projects analyzed demonstrate how design ideas can reflect local cultural values, respond to climatic conditions, and promote sustainable spatial organization. For instance, culturally inspired design motifs were effectively incorporated into the facades and interior spaces of civic and cultural projects, reinforcing a sense of identity and place. Similarly, environmentally responsive design strategies - such as optimized natural lighting,

passive ventilation, and local materials-were consistently informed by the initial conceptual framework, highlighting the interdependence of concept, function, and sustainability.

The study emphasizes the importance of the value-semantic component in shaping architecture that is socially, environmentally, and psychologically meaningful (**Table 2**). Architectural projects with a clearly articulated conceptual idea incorporate human-centric design principles, promote ecological sustainability, and reflect ethical and cultural considerations. This finding underscores the critical role of values and meanings in contemporary architectural practice, supporting the notion that architecture is not only a functional and aesthetic endeavor but also a cultural and social expression.

Table 2
Elements of the conceptual framework (based on the results of synthesis)

Element	Definition	Synthesis Output (Design Solution)	Metric of Success
Philosophical Pivot	The core "Idea" or "Axiology" (values) behind the project.	A clear **Design Manifesto** or narrative that guides every aesthetic choice.	Consistency between the initial sketch and the final form.
Semantic Coding	Translating abstract values into "Value-Semantic" symbols.	**Iconography and Materiality**: choosing glass for transparency or stone for permanence.	Public/user recognition of the intended message or "vibe."
Functional Topology	The spatial logic derived from the "Functional Structure."	**Zoning and Circulation**: How the "concept" dictates the flow of people and light.	Efficiency of the spatial program relative to the user's needs.
Morphological Synthesis	The physical "Form-Generation" resulting from the concept.	**Volumetric Composition**: The 3D expression of the internal logic.	Aesthetic harmony and structural feasibility.
Contextual Resonance	The final adaptation of the framework to the physical "Context."	**Site Integration**: How the building "speaks" to the landscape, climate, and history.	Degree of environmental and social sustainability.

Another significant finding is that maintaining conceptual continuity throughout all stages of design-from schematic design to construction documentation is essential for achieving architectural coherence. Projects where the initial idea was consistently applied demonstrate higher quality outcomes in terms of both spatial clarity and aesthetic harmony. Conversely, deviations from the conceptual framework during detailed design or construction often result in fragmented or diluted architectural expression. This highlights the necessity of systematic methods for ensuring conceptual fidelity throughout the design workflow, including iterative review processes and documentation of design intent.

Implications for Architectural Practice. The findings indicate that architects who deliberately formulate and apply a robust conceptual foundation can achieve several benefits:

- Enhanced coherence and integrity in design.
- Effective integration of buildings into social, cultural, and environmental contexts.
- Promotion of sustainability and user-centered design.
- Creation of a distinct architectural identity that strengthens the urban environment.

This study reinforces the idea that conceptual thinking is not an abstract theoretical exercise but a practical and strategic tool in contemporary architectural design. Architects who invest in a clear and value-driven conceptual framework are better equipped to navigate complex design challenges, respond to contextual requirements, and produce high-quality, meaningful architecture.

The empirical base of this study is constructed as a multi-layered dataset designed to verify the effectiveness of the Conceptual Framework across different scales and cultural contexts.

The reliability of the empirical base is ensured by the triangulation method: comparing the architect's stated intent (Theory), the physical blueprints (Design Solution), and the final environmental impact (Context). This ensures that the "Conceptual Basis" is not merely an abstract idea but a verifiable driver of architectural quality.

4 CONCLUSIONS

1. The conceptual foundation of an architectural project serves as the fundamental basis of the design intent, ensuring the harmony of form, function, and artistic expression.
2. A well developed concept enables the integration of the architectural object into its social, cultural, and natural context, enhancing both its significance and functional effectiveness.
3. The value semantic component of the idea plays a key role in creating a sustainable, environmentally responsible, and comfortable architectural environment.
4. The implementation of the conceptual foundation at all stages of the design process ensures conceptual integrity and the overall quality of the architectural solution.

The deliberate formation of the conceptual foundation contributes to the creation of architectural works that not only meet contemporary requirements but also establish a distinctive architectural identity and a harmonious urban environment.

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