Алгоритм биоклиматического проектирования многофункциональных зданий постсоветских городов

Абдурахманов Али Авазбекович
магистрант, Российский университет дружбы народов имени Патриса Лумумбы, 1132247961@rudn.ru

Калинина Наталья Сергеевна
кандидат архитектуры, доцент кафедры архитектуры и реставрации, Российский университет дружбы народов имени Патриса Лумумбы

В статье разработан предпроектный алгоритм интеграции биоклиматических принципов в архитектурное проектирование крупных многофункциональных зданий. Актуальность исследования связана с необходимостью согласования климатических условий, функциональной программы, оболочки и инженерных режимов уже на стадии концепции. Методика включает сравнительный анализ климатических профилей Москвы, Минска, Алматы и Ташкента, сопоставление четырех реализованных объектов и систематизацию проектных параметров. Алгоритм объединяет шесть этапов: климатический паспорт, функциональную матрицу, оценку глубины корпуса, фасадную карту, климатическую схему атриума и инженерную матрицу с последующей расчетной верификацией. Показано, что для Москвы и Минска приоритетны теплозащита и ограничение инфильтрации, для Ташкента — защита от солнечных теплопоступлений и перегрева, для Алматы — сочетание зимней теплозащиты и летней солнцезащиты. Научная новизна заключается в объединении известных биоклиматических приемов в последовательную процедуру раннего архитектурного выбора; конкретные численные параметры должны уточняться расчетом.

Ключевые слова: многофункциональное здание, биоклиматическое проектирование, климатическая адаптация, фасадная оболочка, атриум, солнцезащита, функциональное зонирование, микроклимат, энергоэффективность.

1. Введение

Многофункциональные здания объединяют торговые, офисные, жилые, гостиничные, общественные, сервисные и парковочные пространства с различными режимами эксплуатации и требованиями к микроклимату [6]. Поэтому единая архитектурная и инженерная стратегия для всех функциональных блоков не всегда соответствует условиям их использования.

Основы биоклиматического подхода сформированы в работах Ю. А. Табунщикова, М. С. Мягкова, V. Olgyay и K. Yeang [1; 2; 4; 5]. Современные исследования развивают эти принципы применительно к энергоэффективности, фасадам, естественному освещению, атриумам и пассивной вентиляции [3; 6; 13–17]. Для ранней стадии крупного МФЗ актуальна задача объединить эти решения в последовательный алгоритм.

Научная проблема состоит в недостаточной формализации последовательности учета климата при формировании концепции МФЗ. Объект исследования — крупные многофункциональные здания постсоветских городов; предмет — взаимосвязь климата, функционального зонирования и архитектурно-планировочных решений. Цель — разработать предпроектный алгоритм учета биоклиматических факторов.

Задачи исследования: определить климатические входные данные; связать их с функциональной программой; выделить параметры корпуса, фасада и атриума для вариантного анализа; сформировать принципы инженерного зонирования; сопоставить четыре объекта-аналога и установить границы применимости алгоритма. Новизна состоит в объединении этих операций в единую последовательность с последующей расчетной проверкой.

2. Материалы и методы

Исследование основано на нормативных документах [7–12], научной литературе по биоклиматической архитектуре и параметрическому анализу [1–6; 13–17], климатических данных Москвы, Ташкента, Алматы и Минска [18–21] и опубликованных данных об объектах-аналогах [22–25].

Применены сравнительный, системно-структурный и параметрический методы. Переменными предпроектного анализа являются доля светопрозрачных конструкций Ko = Aост/Афас, U- и g-характеристики, ориентация и солнцезащита фасада, глубина корпуса, геометрия атриума H/W, функциональные буферы и режимы воздухообмена. Их значения не являются универсальными нормативами и уточняются расчетом [13–17].

3. Климатическая дифференциация и структура алгоритма

Москва, Минск, Алматы и Ташкент выбраны как четыре контрастных климатических сценария внутри постсоветского пространства. Используемые среднемноголетние данные служат сравнительной характеристикой и не заменяют расчетные параметры, принимаемые по действующим нормам и официальным метеорологическим источникам [8; 18-21].

Таблица 1
Климатические профили и проектные приоритеты

Город	Характерный диапазон	Основной риск	Предпроектный приоритет
Москва	янв. –10…–4 °C; июль +14…+24 °C	теплопотери, инфильтрация	теплозащита, входные зоны, контроль верхнего остекления
Минск	янв. –7…–2 °C; июль +13…+23 °C	холодный влажный период	теплозащита, ограничение инфильтрации
Алматы	янв. –11…–2 °C; июль +16…+29 °C	выраженная сезонная амплитуда	зимняя теплозащита + летняя солнцезащита
Ташкент	янв. –2…+6 °C; июль +21…+36 °C	солнечные теплопоступления, перегрев	наружное затенение, контроль кровли и западных фасадов

Сопоставление показывает, что единая фасадная и инженерная стратегия для четырех городов методически некорректна. Климатический профиль служит первым фильтром проектных решений, далее параметры уточняются с учетом участка, функции и нормативной среды.

Таблица 2
Алгоритм предпроектной биоклиматической проверки

Этап	Исходные данные	Результат	Проверяемый риск
1. Климатический паспорт	температура, солнце, ветер, осадки	карта климатических воздействий	ошибка выбора формы
2. Функциональная матрица	функция, режим, плотность людей	карта климатической чувствительности	конфликт функции и микроклимата
3. Глубина корпуса	геометрия, свет, функция	решение об атриуме/дворе	зоны без естественного света
4. Фасадная карта	ориентация, Ko, U, g, затенение	дифференцированная оболочка	перегрев, теплопотери, блики
5. Схема атриума	H/W, верхний свет, отверстия	сезонные сценарии	перегрев, стратификация, конденсат
6. Инженерная матрица	приток, вытяжка, режимы	зональная схема ОВиК	неуправляемость и перерасход



Рисунок 1 — Алгоритм биоклиматического проектирования многофункционального здания

Климатический паспорт фиксирует наружные температуры, ветер, солнечную нагрузку, осадки и локальное затенение. Функциональная матрица разделяет помещения по режиму эксплуатации и климатической чувствительности; технические и сервисные зоны при необходимости могут выполнять роль функционального буфера.

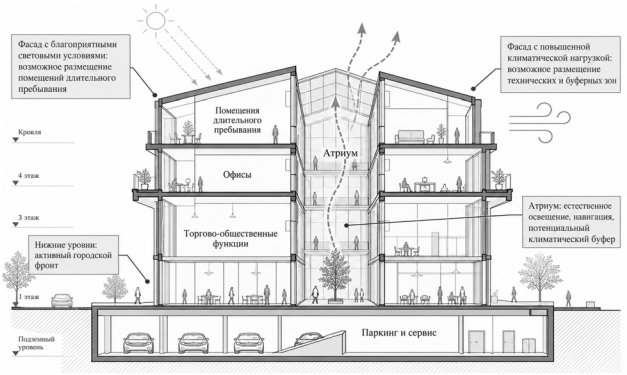


Рисунок 2 — Принцип климатически обусловленного функционального зонирования многофункционального здания

На этапе оценки глубины корпуса определяется, достаточно ли фасадного естественного света или необходимы двор, световой разрыв либо атриум. Для отдельных офисных схем в литературе используется ориентир порядка 6–8 м от светового проема [13], но его нельзя переносить на все функции МФЗ: фактическая глубина зависит от геометрии помещения, остекления, затенения и нормируемой освещенности [10].

Фасадная карта формируется по ориентациям. Ko рассматривается как переменная: рациональное соотношение прозрачных и непрозрачных участков зависит от климата, ориентации, g-фактора, солнцезащиты и режима эксплуатации [14]. Для юга оценивается сезонное затенение, для востока и запада — защита от низкого солнца, для севера — баланс естественного света и теплозащиты.

Атриум рассматривается как световой, навигационный и климатически активный узел. H/W служит параметром описания, но его эффективность определяется также верхним остеклением, вентиляционными отверстиями, солнцезащитой и наружными условиями [15]. Инженерная матрица разделяет функциональные зоны по графикам и требованиям к воздухообмену [11; 16].

4. Взаимосвязь архитектурных и инженерных решений

Алгоритм основан на взаимосвязи решений: остекление влияет на свет, теплопотери и охлаждающую нагрузку; геометрия атриума связана с верхним светом, вентиляцией и противодымной защитой; функциональное зонирование определяет инженерные шахты и режимы систем. Озелененная кровля может снижать температуру поверхности и задерживать часть осадков, но эффект зависит от климата и конструкции [17].

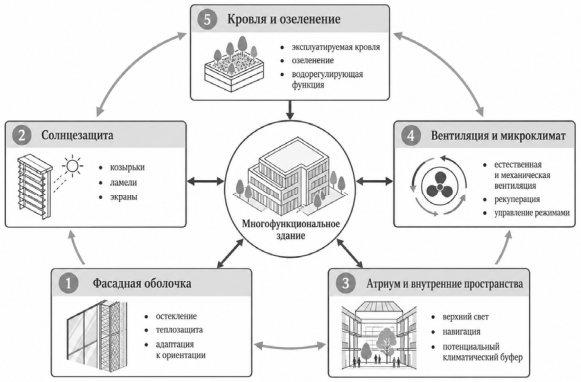


Рисунок 3 — Система взаимосвязи биоклиматических решений в многофункциональном здании

5. Сравнение объектов-аналогов

Объекты-аналоги используются как типологические примеры МФЗ в разных климатических условиях, а не как эталоны биоклиматического проектирования. Публикуемые показатели площади относятся к различным категориям (GBA, GLA или площади комплекса), поэтому не рассматриваются как однородный статистический ряд.

Таблица 3
Сопоставление объектов-аналогов

Объект	Показатель площади	Функциональная структура	Климатическая задача в авторском анализе
AFIMALL City, Москва	GBA 165 714 м² без подземного паркинга; GLA 107 208 м² [22]	торговля, питание, развлечения, транзитные связи	тепловой режим крупных светопрозрачных пространств
Tashkent City Mall, Ташкент	GBA 410 000 м² [23]	торговля, офисы, гостиница, жилье	летняя солнечная нагрузка и перегрев
Esentai Complex, Алматы	около 368 000 м² комплекса [24]	торговля, гостиница, апартаменты, общественные функции	сочетание зимней теплозащиты и летнего затенения
Galleria Minsk, Минск	около 54 500 м² общей и 36 000 м² арендопригодной площади [25]	торговля, питание, гостиница, паркинг	теплопотери и защита входных зон

Сравнение подтверждает различие климатических задач, но не доказывает эффективность конкретных инженерных приемов на объектах. Поэтому последний столбец таблицы отражает авторскую интерпретацию, а не описание неподтвержденных реализованных систем.

6. Обсуждение результатов и границы применимости

Результаты позволяют сформулировать три положения: климат учитывается до фиксации формы и фасада; функциональная программа выступает инструментом климатической адаптации; Ko, U, g, H/W и размеры открываемых элементов являются переменными расчетной модели, а не универсальными рекомендациями.

Алгоритм предназначен для предпроектной и эскизной стадий крупных МФЗ с несколькими функциональными блоками и не заменяет специальные методы проектирования зданий с технологически заданным микроклиматом. Для России окончательные решения проверяются по действующим нормативам [7–12].

Таблица 4
Границы применимости и последующая проверка

Параметр	Роль алгоритма	Необходимая верификация
Объемно-планировочное решение	выбор вариантов формы, глубины, функций	нормативная и функциональная проверка
Фасад	ориентация, Ko, U, g, солнцезащита	теплотехнический и светотехнический расчет
Атриум	геометрия, верхний свет, вентиляционный сценарий	энергетическое/CFD-моделирование, пожарная проверка
Инженерная зональность	разделение функций и резервирование шахт	расчет ОВиК и автоматики
Перенос в другой город	замена климатического профиля	локальные нормы и метеоданные

Ограничения исследования обусловлены выборкой из четырех городов и четырех объектов, использованием открытых данных без инструментального обследования и отсутствием динамического моделирования единой тестовой модели. Поэтому подтвержденный результат работы — структура алгоритма и логика взаимосвязей, а количественная эффективность конкретных вариантов требует дальнейшей верификации.

Дальнейшая проверка должна сопоставлять на единой тестовой модели варианты ориентации, остекления, g-фактора, солнцезащиты, геометрии атриума и инженерной зональности в климате Москвы, Минска, Алматы и Ташкента. Оцениваются потребность в отоплении и охлаждении, риск перегрева, естественное освещение и воздушный режим средствами EnergyPlus/DesignBuilder, DIALux/Ladybug Tools и при необходимости CFD.

Заключение

1. Разработан шестистадийный предпроектный алгоритм: климатический паспорт → функциональная матрица → оценка глубины корпуса → фасадная карта → климатическая схема атриума → инженерная матрица с последующей расчетной и нормативной проверкой.

2. Для Москвы и Минска приоритетны теплозащита и ограничение инфильтрации; для Ташкента — контроль солнечных теплопоступлений и перегрева; для Алматы — сочетание зимней теплозащиты и летней солнцезащиты.

3. Коэффициент остекления, геометрия атриума и функциональные буферы должны рассматриваться как переменные проектной модели и уточняться для конкретного климата, функции и фасадной системы.

4. Научная новизна заключается в объединении климатических, функциональных, фасадных, атриумных и инженерных параметров в последовательную процедуру раннего архитектурного выбора; дальнейшая апробация на единой модели позволит количественно уточнить области рационального применения решений.

Литература

1. Табунщиков Ю. А., Бродач М. М., Шилкин Н. В. Энергоэффективные здания. — М.: АВОК-ПРЕСС, 2003. — 200 с.

2. Мягков М. С., Табунщиков Ю. А., Шилкин Н. В. Город, архитектура, человек и климат. — М.: Архитектура-С, 2007. — 312 с.

3. Кривенко О. В. Архитектоника дизайна биоклиматических высотных зданий // Архитектура и современные информационные технологии. — 2022. — № 1. — С. 145–161.

4. Olgyay V. Design with Climate: Bioclimatic Approach to Architectural Regionalism. — Princeton: Princeton University Press, 1963. — 190 p.

5. Yeang K. Bioclimatic Skyscrapers. — London: Artemis, 1994. — 256 p.

6. Bera M., Nag P. K. Trends in bioclimatic design strategies for climate change-induced heat stress mitigation based on a literature review // International Journal of Biometeorology. — 2025. — Vol. 69, No. 12. — P. 3243–3254. — DOI: 10.1007/s00484-025-03036-w.

7. СП 160.1325800.2014. Здания и комплексы многофункциональные. Правила проектирования. — М.: Минстрой России, 2014. — В действующей редакции.

8. СП 131.13330.2025. Строительная климатология. — М.: Минстрой России, 2025.

9. СП 50.13330.2024. Тепловая защита зданий. — М.: Минстрой России, 2024.

10. СП 52.13330.2016. Естественное и искусственное освещение. — М.: Минстрой России, 2016. — В действующей редакции.

11. СП 60.13330.2020. Отопление, вентиляция и кондиционирование воздуха. — М.: Минстрой России, 2020. — В действующей редакции.

12. СП 118.13330.2022. Общественные здания и сооружения. — М.: Минстрой России, 2022. — В действующей редакции.

13. Raji B., Tenpierik M. J., Van den Dobbelsteen A. Early-Stage Design Considerations for the Energy-Efficiency of High-Rise Office Buildings // Sustainability. — 2017. — Vol. 9, No. 4. — Art. 623. — DOI: 10.3390/su9040623.

14. Goia F. Search for the optimal window-to-wall ratio in office buildings in different European climates and the implications on total energy saving potential // Solar Energy. — 2016. — Vol. 132. — P. 467–492. — DOI: 10.1016/j.solener.2016.03.031.

15. Moosavi L., Mahyuddin N., Ab Ghafar N., Ismail M. A. Thermal performance of atria: An overview of natural ventilation effective designs // Renewable and Sustainable Energy Reviews. — 2014. — Vol. 34. — P. 654–670. — DOI: 10.1016/j.rser.2014.02.035.

16. Solgi E., Hamedani Z., Fernando R., Skates H., Orji N. E. A literature review of night ventilation strategies in buildings // Energy and Buildings. — 2018. — Vol. 173. — P. 337–352. — DOI: 10.1016/j.enbuild.2018.05.052.

17. Jamei E., Chau H. W., Seyedmahmoudian M., Stojcevski A. Review on the cooling potential of green roofs in different climates // Science of the Total Environment. — 2021. — Vol. 791. — Art. 148407. — DOI: 10.1016/j.scitotenv.2021.148407.

18. Moscow Climate, Weather By Month, Average Temperature [Электронный ресурс]. — URL: https://weatherspark.com/y/100524/Average-Weather-in-Moscow-Russia-Year-Round (дата обращения: 11.06.2026).

19. Tashkent Climate, Weather By Month, Average Temperature [Электронный ресурс]. — URL: https://weatherspark.com/y/106899/Average-Weather-in-Tashkent-Uzbekistan (дата обращения: 11.06.2026).

20. Almaty Climate, Weather By Month, Average Temperature [Электронный ресурс]. — URL: https://weatherspark.com/y/108859/Average-Weather-in-Almaty-Kazakhstan-Year-Round (дата обращения: 11.06.2026).

21. Minsk Climate, Weather By Month, Average Temperature [Электронный ресурс]. — URL: https://weatherspark.com/y/95128/Average-Weather-in-Minsk-Belarus (дата обращения: 11.06.2026).

22. AFI Development PLC. Information Regarding a Very Substantial Investment Property — AFIMALL City [Электронный ресурс]. — URL: https://mayafiles.tase.co.il/rpdf/803001-804000/p803039-00.pdf (дата обращения: 17.09.2026).

23. Tashkent City Mall Mixed-Use Complex / Öncüoğlu [Электронный ресурс]. — URL: https://oncuoglu.com.tr/projects/tashkent-city-mall-mixed-use-complex (дата обращения: 11.06.2026).

24. Esentai Tower. Комплекс Esentai [Электронный ресурс]. — URL: https://esentaitower.com/ (дата обращения: 11.06.2026).

25. Galleria Minsk only 40 pct leased [Электронный ресурс]. — URL: https://eurobuildcee.com/en/news/20267-galleria-minsk-only-40-pct-leased (дата обращения: 11.06.2026).

Bioclimatic design algorithm for multifunctional buildings in post-soviet cities

Abdurakhmanov A.A., Kalinina N.S.

Peoples' Friendship University of Russia named after Patrice Lumumba

JEL classification: L61, L74, R53

The study develops an early-stage algorithm for integrating bioclimatic principles into the architectural design of large multifunctional buildings. The research addresses the need to coordinate climate, functional programme, building envelope and engineering regimes at the concept stage. The method combines a comparison of Moscow, Minsk, Almaty and Tashkent climate profiles, an analysis of four built complexes, and a systematization of design variables. The algorithm contains six stages: climate profile, functional matrix, building-depth assessment, orientation-based facade map, atrium climate scheme and engineering matrix, followed by numerical verification. Moscow and Minsk require greater attention to thermal protection and infiltration; Tashkent to solar-gain and overheating control; Almaty to a combined winter and summer strategy. The contribution of the study is a structured sequence that links climatic input data with early architectural decisions without treating preliminary parameter values as universal norms.

Keywords: multifunctional building, bioclimatic design, climate adaptation, building envelope, atrium, solar protection, functional zoning, indoor environment, energy efficiency.

References

1. Tabunshchikov Yu. A., Brodach M. M., Shilkin N. V. Energy-efficient buildings. Moscow: AVOK-PRESS, 2003. 200 p.
2. Myagkov M. S., Tabunshchikov Yu. A., Shilkin N. V. City, architecture, human and climate. Moscow: Arkhitektura-S, 2007. 312 p.
3. Krivenko O. V. Architectonics of bioclimatic high-rise building design. Architecture and Modern Information Technologies, 2022, no. 1, pp. 145–161.
4. Olgyay V. Design with Climate: Bioclimatic Approach to Architectural Regionalism. Princeton: Princeton University Press, 1963. 190 p.
5. Yeang K. Bioclimatic Skyscrapers. London: Artemis, 1994. 256 p.
6. Bera M., Nag P. K. Trends in bioclimatic design strategies for climate change-induced heat stress mitigation based on a literature review. International Journal of Biometeorology, 2025, vol. 69, no. 12, pp. 3243–3254. DOI: 10.1007/s00484-025-03036-w.
7. SP 160.1325800.2014. Multifunctional buildings and complexes. Design rules. Moscow: Ministry of Construction of Russia, 2014. Current edition.
8. SP 131.13330.2025. Construction climatology. Moscow: Ministry of Construction of Russia, 2025.
9. SP 50.13330.2024. Thermal protection of buildings. Moscow: Ministry of Construction of Russia, 2024.
10. SP 52.13330.2016. Natural and artificial lighting. Moscow: Ministry of Construction of Russia, 2016. Current edition.
11. SP 60.13330.2020. Heating, ventilation and air conditioning. Moscow: Ministry of Construction of Russia, 2020. Current edition.
12. SP 118.13330.2022. Public buildings and structures. Moscow: Ministry of Construction of Russia, 2022. Current edition.
13. Raji B., Tenpierik M. J., Van den Dobbelsteen A. Early-Stage Design Considerations for the Energy-Efficiency of High-Rise Office Buildings. Sustainability, 2017, vol. 9, no. 4, art. 623. DOI: 10.3390/su9040623.
14. Goia F. Search for the optimal window-to-wall ratio in office buildings in different European climates and the implications on total energy saving potential. Solar Energy, 2016, vol. 132, pp. 467–492. DOI: 10.1016/j.solener.2016.03.031.
15. Moosavi L., Mahyuddin N., Ab Ghafar N., Ismail M. A. Thermal performance of atria: An overview of natural ventilation effective designs. Renewable and Sustainable Energy Reviews, 2014, vol. 34, pp. 654–670. DOI: 10.1016/j.rser.2014.02.035.

16. Solgi E., Hamedani Z., Fernando R., Skates H., Orji N. E. A literature review of night ventilation strategies in buildings. Energy and Buildings, 2018, vol. 173, pp. 337–352. DOI: 10.1016/j.enbuild.2018.05.052.
17. Jamei E., Chau H. W., Seyedmahmoudian M., Stojcevski A. Review on the cooling potential of green roofs in different climates. Science of the Total Environment, 2021, vol. 791, art. 148407. DOI: 10.1016/j.scitotenv.2021.148407.
18. Moscow Climate, Weather By Month, Average Temperature. Available at: https://weatherspark.com/y/100524/Average-Weather-in-Moscow-Russia-Year-Round (accessed 11.06.2026).
19. Tashkent Climate, Weather By Month, Average Temperature. Available at: https://weatherspark.com/y/106899/Average-Weather-in-Tashkent-Uzbekistan (accessed 11.06.2026).
20. Almaty Climate, Weather By Month, Average Temperature. Available at: https://weatherspark.com/y/108859/Average-Weather-in-Almaty-Kazakhstan-Year-Round (accessed 11.06.2026).
21. Minsk Climate, Weather By Month, Average Temperature. Available at: https://weatherspark.com/y/95128/Average-Weather-in-Minsk-Belarus (accessed 11.06.2026).
22. AFI Development PLC. Information Regarding a Very Substantial Investment Property — AFIMALL City. Available at: https://mayafiles.tase.co.il/rpdf/803001-804000/p803039-00.pdf (accessed 17.09.2026).
23. Tashkent City Mall Mixed-Use Complex / Öncüoğlu. Available at: https://oncuoglu.com.tr/projects/tashkent-city-mall-mixed-use-complex (accessed 11.06.2026).
24. Esentai Tower. Esentai Complex. Available at: https://esentaitower.com/ (accessed 11.06.2026).
25. Galleria Minsk only 40 pct leased. Available at: https://eurobuildcee.com/en/news/20267-galleria-minsk-only-40-pct-leased (accessed 11.06.2026).

INNOVACII i INVESTICII
№9 2026
научно-аналитический журнал
ISSN 2307-180X
ИННОВАЦИИ "ИНВЕСТИЦИИ

INNOVATION MANAGEMENT

Quantum Marketing as an Innovative Approach to Business Management in the Information Economy. Akyulov R.I., Akyulov T.R. 6
An Innovative Model for Territorial Marketing Development. Vikulova E.Yu. 10
The specifics of managerial innovations in the metallurgical industry. Herts N.A. 13
Current trends in the innovative infrastructure of industry: the transformation of human capital in the context of digitalization. Sekerin V.D., Soppa I.V., Semyonova V.V., Gorokhova A.E. 16
The strategic importance of engineering in national innovation systems. Dubodelov A.V. 21
Innovation activity and dividend decisions as drivers of market value in public companies. Zastavskiy R.R. 25
Strategic trends in the development of innovative industrial clusters. Kalinin V.S. 29
The role of innovative industrial cluster strategizing in the development of Moscow's high-tech industry. Kalinin V.S. 33
Information and analytical tools in industrial innovation management. Kamchatova E.Yu., Konikovskaya N.O., Kamchatov D.K. 37
Combined modelling approach for national innovation systems monitoring. Kurganskiy E.D. 41
Methodological limitations of the Tobin coefficient as an indicator of companies' innovativeness in the Russian context. Malashenko E.A. 45
Assessing the innovation capabilities of organizations on an agro-industrial complex digital platform (a case study of precision farming). Serdechnaya Yu.N. 49
Impact of Social Architecture on the Development of Innovative Industrial Infrastructure. Sekerin V.D., Skubriy E.V., Semenova V.V., Gorokhova A.E. 53
Opportunities for developing the innovative ecosystem of regional technology parks. Eldieva T.M., Anishchenko M.Yu. 56

INVESTMENT ACTIVITY MANAGEMENT

Regression Analysis of Factors Influencing Investment Activity in Municipalities of a Region with a Favorable Investment Climate (A Case Study of the Republic of Tatarstan). Abdullaev A.P. oglu 60
Return on Consolidated Net Assets as an Integral Criterion for Assessing Investment Attractiveness of a Consolidated Group of Enterprises. Angarov A.A. 64
R&D as a driver of a company's investment attractiveness. Vasetskaya N.O. 68
Profitability of Olympic Investments: A Comparative Analysis of Costs and Medal Returns of the Russian Swimming Team (1992–2028). Krivenkov A.A., Bochkareva S.I., Artamonov D.V., Lubyshev E.A. 71
Model assessment of the efficiency of investments in capital construction projects. Mitrofanov E.P., Kulagina A.G., Petrov K.A., Mitrofanov M.E. 74
Signal method for assessing investment attractiveness in innovative projects. Gafarov A.V., Khalimon E.A., Tsymbal A.A. 77
Comparative analysis of the investment attractiveness of IIS-3 and LSP: opportunities and limitations for different categories of investors. Shestakov A.A. 81

ECONOMIC THEORY AND HISTORY

Gnoseology of types of rehabilitation services. Demidov S.S., Babenko D.A. 84
Digitalization as a factor in the sustainable development of socio-economic systems. Varavin E.V., Eremeev A.N., Makovetsky M.Yu. 88
The development of theoretical approaches to the investment attractiveness of organizations in russia's it sector. Mameko N.S. 93
Theoretical approaches to selecting priorities for the strategic development of a region with a diversified economy. Pantyukhova O.N. 97
Cybernetics of living organizations: synthesis of p.k. anokhin's theory of functional systems and g.b. kleiner's systemic economic theory in search of a system-forming result. Pereverzeva N.Y. 101
Territorial-sectoral management method (on the example of the activities of the Stone Works Order in the XVI-XVII centuries). Pilyak S.A. 104
Evolution of the concept of technological sovereignty of russia and its essence. Jiao Yunyang, Ge Xinrong 107

GLOBAL EXPERIENCE

Personnel shortage in the Russian arctic zone: problems and solutions (foreign experience). Bezdudnaya A.G., Kynev S.I. 110
The strategic importance of the African continent for Russian investors in the context of the sanctions policy of unfriendly states. Borisov Il.V. 113
The role of the initiative «One belt - one road» in China's economic openness in XXI century. Golikov B. 116
An assessment of the effectiveness of mutual trade between EAEU member states as a factor in the development of international economic integration. Kokorin V.A., Roschina L.N., Solenaya S.V. 119
Cooperation between the Russian Federation and the MERCOSUR states in the field of innovative technologies: technological barriers and prospects for the development of cooperation. Kononov S.A. 122
Problematic aspects of energy cooperation between Russia and Asean in the context of the emerging lng market. Kostrov I.D., Nenuzhenko M.S., Gulina E.V. 126
The environmental transformation of Russian-Chinese trade and economic relations in the context of the global climate agenda. Lachinov N.R. 129
Integration of Digital Technologies into the Financial Mechanism of BRICS Countries: Opportunities for Economic Cooperation. Luo Yi 133
Iran's oil industry under sanctions: adaptation strategies, international cooperation and development prospects. Momeni Mani, Mitina N.N. 140
An analysis of the effectiveness and contradictions of the current model of the European Union. Ostudina S.V., Ostudina T.V. 144
Concentration of Russia's Foreign Trade as a Source of Structural Vulnerability: Evidence from Mirror Data, 2015—2024. Prokofyev D.S. ...147
Typology of National Digital Regulation Models and Adaptation of International Experience in the EAEU. Rogashkov N.A. 151
Technological sovereignty and Russia–china industrial cooperation within the belt and road initiative. Savinov A.L., Fadeev Yu.E., Kuptsov M.A., Chernov A.M., Dranidis A. 154
Dynamics of international trade in pharmaceutical products. Senotrusova S.V., Panova T.V., Svinukhov V.G. 158
Comparative efficiency of Russian lng export destinations under sanctions and logistical constraints. Sladikov V.N. 162
Digitalization of the eaeu labor market. Teslenko I.B. 166
Improving the effectiveness of government strategic planning in China's housing sector: problems and solutions. ZHAO Yuqi 170
India in the context of the Transformation of the World Economy. Polayeva G.B., Vardanyan A.K. 174
Transformation of the Global Transport and Logistics Infrastructure in Response to Restrictions on Navigation through the Strait of Hormuz. Katyukha P.B., Bodrov N.V., Durnev N.Yu. 176

MANAGEMENT THEORY. MANAGEMENT. MARKETING

Corporate KPIs and Individual Performance Indicators in Retail. Baboyan M.A. 180
The role of marketing in supporting regional food security. Bovsunovsky V.V. 183
Hybrid Marketing Project Management Tailored to Small Business Specifics. Vershinin D.N., Guseva M.N. 186
Information and methodological tools for managing the competitiveness of an agro-industrial processing enterprise. Veryaskin P.G. 190
Consolidation of sap integration flow diagnostic tools for reducing incident response time. Vokhrov R.A. 193
Assessing the effectiveness of implementing a university development program within the paradigm of an ecosystem approach: methodological approaches and their testing. Gatiyatov A.R. 197
The Impact of Captivization and Business Fragmentation Factors on the Transformation of a Company's Organizational Structure. Gribov P.G., Bubnov D.E., Ruban E.V. 201
Digital Maturity as a Mediating Mechanism for Realizing Dynamic Capabilities: A Methodological Approach to Assessing Competitiveness. Grigoriev D.D. 204
Analysis and forecasting of consumer behavior in the food market using artificial intelligence technologies. Dyukanov D.V. 207
Distinguishing approaches to management related on data. Yeliseev G.G., Komarova V.V., Farzaliev E.V. 210
The essence and types of information and communication services consumed by manufacturing organizations. Zaynutdinov B.I. 213
Methodology for researching the positioning and promotion processes of an industrial city brand. Izrailev A.V. 216
Balancing centralization and decentralization in corporate management in the digital transformation era: theoretical approaches, mechanisms, limitations, and research prospects. Yin Keqi 220
Digital maturity indicators in the assessment system of industrial enterprise competitiveness. Karapetyan D.A. 224
Development of a methodology for assessing the effectiveness of an innovative project of an industrial enterprise based on the life cycle concept. Karimov R.Il., Kuznetsova Yu.A. 227
Digital platforms as a driver of business model transformation in the modern economy. Karimov D.B. 230
The conceptual meaning of effective forecasting of business processes in the industrial production of the country's regions by. Kletskova E.V. 234
Directions for the development of digital marketing analytics in russian high-tech startups. Korotkova P.A. 237

Internal Audit of Pharmacy Organizations: The Path to Digital Monitoring. Kostrov S.A., Potapov M.P., Zamiralova T.B. 241
Improving the efficiency of educational organizations: modern management and pedagogical mechanisms. Kurtov E.A. 245
Optimization of production processes in woodworking enterprises: methods and equipment. Lisov S.I., Lumpov M.A. 248
Analysis of mechanisms for managing the sports marketing system in the Russian Federation. Kolbasin D.A., Makovetsky M.Yu., Silakova V.V. 252
Conceptual Foundations for Designing Adaptive Strategies for Energy Companies in Modern Conditions. Lashkov E.I., Malyshkin N.G., Nabatova V. 256
Marketing channels for stimulating the sales of bioeconomics products. Melentieva O.V. 258
Methods for keeping an online store in the market during a crisis period by reducing costs. Paraev R.E. 261
Organizational and management models of the Russian higher education system (using the example of implementing additional professional education). Pilyak S.A., Oreliana Ursua M.I. 265
Transformational leadership as an effective management tool during the restructuring of the tourism market. Platov A.V., Novichkova I.A., Udalov D.E., Troitskaya N.G. 269
The Role of Marketplaces in the Russian Economy: Socio-Economic Aspects and Development Prospects. Pogorelov D.A., Shakhova M.S. 273
Factors of the external macro- and microenvironment affecting oil companies in Russia. Savinova E.V. 277
Cascade model for assessing the effectiveness of hybrid projects in the event industry. Semenov M.R., Komarova A.V. 280
Ambidexterity in decision-making for heat network management: integrating operational and innovation activities through digital twins. Skvortsova I.V., Chayuk S.V., Somov A.G. 285
Supply Chain Infrastructure as a Basis for Industrial Development in Regional Production Complexes. Syrovetskiy V.A. 289
Managing digital marketplace innovations: dynamic pricing as a way to implement. Tsvetkov S.V., Sobolevskaya A.I., Treyman M.G. 293
Application of Agile approaches in construction project management. Trubnikov M.A., Ivanov M.S., Mustafaev B.E. 295
Typology of multimodal logistics strategies for supplying Arctic industrial enterprises: classification features, criteria and methodological approach to selection. Uskornikov I.A., Pechurkin V.E., Sokolitsyna N.A., Fadeev A.M. 299
Classification of digital tools for managing import substitution development. Fokina D.A., Mangusheva L.S. 302
Managing Environmental and Operational Risks in Vehicle Servicing. Cherbunin R.N. 306
The Impact of Management Quality on Adaptation to Technological Changes. Sharapov A.S. 309
Specifics of Interpreting Material Flow Parameters of Vertically Integrated Oil Companies in Industrial Planning Practice. Shikov V.O. 313
Modern Strategies for Managing the Value of Public Joint-Stock Companies in the Russian Federation. Vasilyeva I.V., Markov D.S. 316
Development of digital services in agribusiness: status, challenges, and prospects. Chudnovsky A.D., Kim D. A. 320

ECONOMICS OF SECTORS AND REGIONS. STATE AND MUNICIPAL ADMINISTRATION

Developing a Regional Investment Policy Strategy: The Case of the Republic of Tatarstan. Abdullaev A.P. ogly 324
Regional Tourism Brand as a Strategic Resource for Destination Development (the Case of the Republic of Kalmykia). Avachev A.V. 329
Foreign trade of the Ural federal district: oil and gas exports, metallurgy and customs administration. Aksenov Ilia A. 333
Legal mechanisms of Russia's foreign economic activity under hybrid threats: a two-contour model of technological sovereignty. Andreeva D.A., Kushnarenko A.V. 336
State Material Reserve in the System of Industrial Sustainability Tools. Arsenyeva N.A. 340
Organizational and economic mechanism for improving the management of technology parks in the regions of Russia. Batin S.L., Kramin T.V. 343
Growing share of hard-to-recover reserves as a key driver of digital transformation in the Russian oil and gas industry. Vasiliev S.V., Ignatov D.A. 347
The history and development prospects of Volgograd region economic zones. Vedenina A.N., Vikhlyantsev A.K. 350
ASMM: prospects for creating a reference power unit. Gribachev A.V. 353
User loyalty management of music streaming services based on economic and statistical analysis of content and behavioral metrics. Demarin I.I. 355
Assessment of the economic return on digital transformation in the regions of the Russian Federation: investment and coverage channels. Demchenko S.A. 359
Development of an algorithm for business structure reorganization in the context of digitalization. Duykov D.S. 362
Development of a Mechanism for the Transition of a Regional Economic System to a Circular Economy. Zharov E.V. 366
Risks of the transition of the regional economic system to a circular economy. Zharov E.V. 368
Ensuring economic security for public healthcare institutions during medicine procurement: indicators, threshold values, and their criteria. Ilyin P.A. 371
Current methods for assessing the impact of digitalization on the development of regional tourism complexes. Kamennova V.V. 375
Development of a System of ESG Statistical Indicators as a Tool for Assessing the Sustainable Development of the Russian Economy. Kanunnikova A.M., Golubova A.A. 377
Sectoral differences in the digital transformation of the Russian manufacturing industry: evidence from Rosstat and hse data. Karapetyan D.A. 380
A vector map of drivers of structural change in regional industry. Lapaev D.N., Kataeva L.Yu. 383
Risks of structural disproportions in the Russian industry under conditions of digital transformation. Kovach V.A. 387
Digital transformation of Russian industry: state, limitations, and the need for new methodological approaches. Kovach V.A. 390
Methodology for assessing the efficiency of fixed capital renewal at railway engineering enterprises. Konovalov A.I. 392
Formation of a strategy for managing the renewal of fixed capital at railway engineering enterprises. Konovalov A.I. 395
Methodological foundations for assessing the competitiveness of e-commerce in light industry goods. Krai N.A. 399
An Economic-Mathematical Model for Realizing the Innovation Potential of a Regional System. Krasavin N.R. 402
Interfunctional and Interorganizational Coordination in Conflict Management in Logistics Systems and Supply Chains. Krivenkov D.V., Okhotnikov Il.V., Sverdlikova E.A. 406
Development of the Russian power industry amid growing energy consumption by data centres and artificial intelligence infrastructure. Kuzmin E.V. 410
The role of the research sector in the development of the national innovation systems of Russia and china: a comparative analysis. Lei Zhaopengbo 414
Characteristics and development trends in electronic wholesale and retail trade at the regional level. Mirabyan A.A. 417
Analysis of the chemical fertilizer market based on the structure-conduct-performance paradigm. Mitenkov A.V., Chupakhin V.V., Suzakova P.D. ..420
Basic approaches to developing mergers and acquisitions strategy. Morozov V.A., Gololobov A.A. 424
Regional factors for increasing the efficiency of management of volunteer organizations. Patyrykin K.G. 428
Features of forming corporate reporting for transport and forwarding companies. Voblaya I.N., Reus M.O. 431
Economic efficiency and prospects of a quadrangular route network: simulation results for the northwestern federal district. Semenov D.S. 434
Global trends in the transformation of innovation infrastructure: demography, development of the labor and consumption market. Skubriy E.V., Semenova V.V., Soppa I.V. 438
Vectors of domestic tourism development in Russia within the framework of the new ekonomics reali. Tatuev A.A., Popoy G.M., Kasaev A.A. 442
State regulation of innovation activity as a dynamic system: a theoretical aspect. Teslenko I.B., Korshunov D.I. 445
Organizational and economic mechanism for implementing innovation policy in the Vladimir region. Fomin N.A., Lapygin Yu.N. 449
Digitalization in healthcare organizations: process transformation and new management practices. Tsalikova A.A., Tomaev M.V., Tomaeva L.M. 452
Monitoring and control system for technology projects in the context of digital transformation. Shamie R.Z. 456
The institute of social partnership as a factor in the development of the regional economy and its balance in Russia: monitoring and prospects. Sharifov R.V. 459
Monitoring and prospects for improving the balance of Russia's regional economy through the development of social partnership. Sharifov R.V. 463
Institutional Duplication in the Public Administration System: Nature, Economic Costs, and Platform-Based Mechanisms for Reduction. Eksterovich R. 467
Factors and Directions of Audiovisual Industry Transformation in the Context of the Development of Artificial Intelligence Technologies. Arakelyan A.M., Petrosyan A.M. 471

MODERN TECHNOLOGIES

Assessment of pump energy consumption as the thickness of the deposits in water supply pipes changes. Balashov S.S. 475
Analysis of the Adequacy of Traditional Methods for Recalculating the Characteristics of Submersible Electric Centrifugal Pumps Operating in High-Viscosity Fluids. Verbitsky V.S., Gizzatov A.Yu., Valeev D.I., Andreeva E.E., Baranova A.G. 478
The Effect of Nanofiller Concentrations on the Mechanical Properties of Polyethylene Pipes: Results of a Full Factorial Design Experiment. Voronov A.S. 480
A multi-criteria approach to the selection of conductors and the construction of distribution electrical networks in the design of power transmission systems. Golovnya I.I. 485
Refinement of the methodology for calculating elastic systems with unilateral constraints and friction based on a stepbystep analysis. Golyh O.V. 489
ACTIVE INDUCTIVE BALANCING CONTROLLER FOR A LiFePO4 BATTERY BASED ON ETA3000 ICs. Dandarov V.D., Sukhorukov M.P., Apasov V.I., Gebgardt V.A., Yudintsev A.G. 494
Simulation model of a two-phase synchronous buck converter for a battery charger. Dandarov V.D. 498
On functional spaces with partial Hölder property. Degtyarev S.P. 503
On some properties of Hölder spaces. Degtyarev S.P. 506
Potential Use of Open-Source Software for Preliminary Testing of Multisensor Device Circuits. Epifantsev K.V. 509
Cluster models of methods for the utilization of associated petroleum gas. Krenyov A.S. 513
Automating Meeting Minutes Generation Using Speech Recognition and Morphological Analysis. Berezkin D.A., Mikhailova O.V., Shabatura L.N. 517
Experimental determination of the temperature correction for an inclined surface. Moiseeva I.S. 519
A mathematical model of movement of standard vehicle. Myasnikov E.A. 522
A research of a cross-ability of standard vehicle. Myasnikov E.A. 525
Modulator for the Digital Control System of a Power Converter in the Power Conversion Unit of a Small Spacecraft. Poddubny M.M. 529

Practical aspects of modeling information security maturity assessment processes. Stepanenko D.S., Krylova S.L., Ivliev S.N. 532
Integral competency profile of workers in the main machine tool professions (icp-12) of a machining shop at a defense industry enterprise: substantiation and empirical verification. Suravtsova A.A. 536

FINANCE. TAXATION. INSURANCE

Assessment of the effectiveness of budget expenditures as a factor in stimulating the innovative potential of regional economic systems (using the example of the Irkutsk Region). Antipina O.V., Antipin A.D. 539
Organizational and digital mechanism for implementing a model accounting policy in budget organizations. Bulbulov F.K. 543
Risk-Based Assessment of the Reliability of Legal Entities: From Banking Compliance to the Selection and Monitoring of Concessionaires in the Transport Sector. Eremin A.M., Matosov E.A. 546
The role and importance of information security in the context of the introduction of digital technologies in the russian banking sector. Zinovyeva E.A. 550
The effect of r&d expenditure super-deduction on firms' innovation activity in Russia. Kiseleva E.V. 553
Food security: assessing the effectiveness of financial mechanisms to support the agro-industrial complex under budget constraints. Loktionova A.V. 556
Industry-specific conditions shaping operating working capital requirements in food manufacturing: a component-based financial management model. Petrov D.A., Petrova N.P. 560
Financial market in the era of digitalization: new models of interaction and regulatory challenges. Sezganov A.V. 564
Volatility of World Grain Prices and Its Transmission to the Domestic Market of the PRC: Hedging Mechanisms. Zhang Yibo 567
Impact of the digital transformation of the banking sector on the operational risk profile of credit institutions. Yakovlev N.A. 570

MATHEMATICAL, STATISTICAL AND INSTRUMENTAL MODELING

Scenario modeling of digital transformation trajectories of the transport and logistics infrastructure of the passenger complex. Bronnikov S.A. 574
The use of large language models to automate the accounting of scientific achievements of students in educational organizations. Groshev A.A., Firsova E.D., Naurusova G.A. 577
Construction of a Fuzzy Rule Base for Evaluating Research Projects Under Multifactor Uncertainty. Grushkin S.V. 581
The system of correction coefficients for quantitative accounting of industry risks in engineering forecasting the effectiveness of the implementation technical solutions in the Russian shipbuilding industry. Kokh L.Vy., Teplyashina A.M. 586
Blockchain Technologies in the Digital Economy. Kurkin A.V. 590
Instrumental Methods of Predictive Analysis in Managing Business Operational Efficiency Based on Statistical Time Series Modeling. Lavrukhin V.S., Stepenko M.V., Korolev O.G. 594
The role of predictive analytics in the management decision support system: an enterprise business architecture-based approach. Lavrukhin V.S., Stepenko M.V., Pestunova G.B. 598
A method for assessing the economic risks of an enterprise and threats to the security of an enterprise in modern conditions. Mazyambo K.A. 602
Product metrics for evaluating the effectiveness of generative Ai in B2B SaaS systems. Miloserdov A.I. 606
Hierarchical bayesian modeling of payment-integration performance under market heterogeneity and limited data. Mishukova R.A. 610
Intelligent tools for warehouse record-keeping automation as a development of the digitalization concept for small fulfillment businesses (based on wms implementation recommendations). Pauk N.A. 613
Economic efficiency of implementing graph neural network-based artificial intelligence systems in mri diagnostics practice. Sitnikova S.E., Mikheeva T.S., Maksakov A.A. 617
Some Aspects of Implementing AI-Based Solutions in Integrated Security Systems for Civil Facilities. Kosarev V.E., Smirnov M.V. 621
A comparison of traditional and fuzzy methods for assessing the effectiveness of digitalization in industrial enterprises. Smirnov E.A. 624
Applied decision-making models in management: composition versus configuration of the toolkit. Suslenkov D.A. 628
The mechanism of end-to-end selection of managerial instruments: functional ordering of methods by decision phases. Suslenkov D.A. 632
Development of a graph data model for managing digital counterparts of industrial infrastructure facilities. Trapeznikov M.A. 636
Big data analysis in construction project management. Trubnikov M.A., Ivanov M.S., Mustafaev B.E. 639
Development of a methodology for multi-criteria assessment and selection of a multimodal strategy for supplying industrial enterprises in conditions of climate uncertainty. Uskornikov I.A., Pechurkin V.E., Sokolitsyna N.A., Fadeev A.M. 643
Mathematical Software Packages in Scientific and Educational Computing: Functional Differences and Selection Criteria. Filimonova E.G., Titov V.E. 647
A Game-Theoretic Model for Choosing Students' Communicative Strategies under Conditions of Uncertainty and Conflict Potential in the Educational Environment. Kondrashova E.V., Kazak N.Yu. 651

CONSTRUCTION. ARCHITECTURE

Criteria-based analysis of modern facade insulation systems for construction in regions with severe climatic conditions. Aliullov Il.R., Abdullazyanov E.Yu., Sabitov L.S., Berezhnoy D.V. 655
Determination of Normal Stresses in Beams under Pure Bending: A Comparison of Navier's Formula and the Finite Element Method. Alferov I.V., Eiduk A.B. 658
The Evolution of Architectural and Compositional Approaches to Multi-Story Residential Development in the Extreme Climatic Conditions of Saudi Arabia: From Traditional Solutions to Modern Technologies. Al-Hayani Mohammed Jamal Mohammed, Khalil I. 661
Development and optimization of a computer model of textile reinforcement for building structures using artificial intelligence for energy-efficient reconstruction and improving strength and performance. Anchakov R.V. ...664
Research and improvement of methods for intelligent modeling of textile reinforcing layers with the goal of multicriteria improvement of the operational, strength, and energy characteristics of building structures during their reconstruction. Anchakov R.V. 667
Petrovsky Island as a Sports and Recreational Complex: Historical and Urban Planning Analysis and Prospects for the Reconstruction of the V. I. Lenin Stadium. Baikov A.A., Fedotova G.O. 671
Analysis of microbiological and enzymatic activity of urbanized soils on the example of Khabarovsk. Barkhatova O.A., Mayorova L.P. 675
The Architectural and Acoustic Evolution of Music Halls. Glukhova A.V. 679
Architectural Concept of a Hybrid Hall Based on the Musical-Acoustic Analysis of Symphonies. Glukhova A.V. 682
Optimization of the process of developing scientific and design documentation as a factor of increasing the economic efficiency of restoration and reconstruction of construction projects. Grechishkin A.V., Nabiullina K.R., Stashevskaya N.A., Kunitsyna M.L. 685
Quality of life in airport areas: social risks and urban planning solutions. Dedkov A.G. 687
Use of Lightweight Reinforced Concrete Slabs Incorporating Void Formers in Seismic Construction Zones. Efimenko E.A. 690
Critical hazards of ecological pollution of water resources to the health of humans, animal biodiversity, and the environment due to increasing population consumption, necessary solutions and technologies to reduce emissions and pollution of water resources. Zharkov I.V. 694
Modeling Organic Waste Digestion Processes under Conditions Similar to those of MSW Landfill Operation. Afonin K.V., Zhilina T.S., Zagorskaya A.A. 698
Innovative development of nutrient removal technologies from municipal wastewater based on predictive modeling. Zhilnikova N.A. 702
Universal design in the architecture of modern schools in Belarus: innovative solutions. Ilvitskaya S.V., Koroteeva T.Yu., Kasper N.V., Barsukov N.S. ..705
Research of the technological properties of plaster mixtures by mathematical modeling. Kidakoev M.M., Kidakoev A.M., Kidakoev B.M., Kidakoeva M.M. 709
The typology of architectural objects created using additive technologies and current trends in their application. Kim Ya.A. 712
Evaluation of the efficiency of the supply and exhaust ventilation system of the power plant turbine hall using CFD modeling methods. Korotkov A.D., Yakovlev V.A. 716
The city as adventure: emotional design of metal-and-light small architectural forms for overcoming non-places. Kruglova M.G., Tikhonov A.Yu. 721
Calculation of the critical support moment and analysis of critical inclined sections in a notched reinforced concrete beam. Kuznetsov G.A. 724
Principles for Developing the Residential Function of Multifunctional Complexes in the Arctic Based on a 6x6 m Modular Cell. Kutishenko N.A. 728
Regional Specifics of Regulating Urban Development in Member and Partner Cities of the Hanseatic League: Relevance of the Study. Monastyrskaya M.E., Lyavdansky D.V. 731
Comparative analysis of modern thermal insulation materials for civil engineering. Miftakhov I.Il'., Kuchin E.E., Obosyan A.B. 735
Avant-garde architecture. The search for new constructive expressiveness. Musatova A.A. 738
Causes of rut formation at weight in motion control points. Pekin N.A., Klekovkina M.P., Evtyukov S.S. 742
Modular-descriptive method of modernization and repair of construction facilities in conditions of technogenic pollution. Rudenko A.A. 745
Monitoring concrete structures of buildings and structures based on artificial intelligence methods. Savchenko N.S. 749
The place of archaeological heritage in the concept of development of the museum-reserve "Island-town of Sviyazhsk". Sevrugin M.A., Polyantsev E.V. 752
The Urban Planning Aspect of Defining Territorial Boundaries: Using QGIS to Analyze Urban Development Models (Based on S. Wheeler's Methodology). Khannanova E.A., Gumerov A.R. 756
Improving the methodological framework for determining the low-temperature characteristics of bituminous binders: a comprehensive analysis of the bbr, abcd, and tsrst methods and pathways for updating the regulatory framework. Kharpaev A.V., Simchuk E.N., Rozhkov I.M. 759
Consistory building, 1740–1774" as a part of the Vologda bishops' house complex – architectural and historical research". Shapiro G.E. 764
The symbiosis of modern technologies and national traditions in North Caucasus architecture. Balikoeva A.A., Bekuzarov M.Kh., Gudtseva A.A., Ryashentsev S.M., Alborova D.J. 769
Transforming the Music Museum within the Artificial Intelligence Paradigm: From Static to Cybernetic. Grin I.Y., Shabani S. 772
Methods and techniques for preserving cultural heritage buildings in the North Caucasus. Dzhusoev D.A., Dzhioev Kh.R., Dzhanaity A.S., Tedeeva A.V., Pshikhachev A.I. 776
An analysis of domestic and international experience in the design of inclusive schools for children with visual impairments. Kosta A.A., Danilova D.O. ..779
A comprehensive design code as a modern mechanism for preserving and developing the identity of cities. Kosta A.A., Chentsova A.D. 783
On the issue of the development of disputed regions. Marincev L.S. 787
An algorithm for the bioclimatic design of multifunctional buildings in post-Soviet cities. Abdurakhmanov A.A., Kalinina N.S. 790