

Víctor Yepes – Curriculum Vitae

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Víctor Yepes

MSc MEng BEng (Hons) Civil & Structural Engineer, Ph.D.



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EDUCATION

Universitat Politècnica de València, Spain

Doctor of Philosophy, Civil Engineering, Department of Transportation Engineering, Sep 2002
Specialist Degree in Quality Control Management, Department of Applied Statistics and Operational Research, and Quality, June 2000

Bachelor of Science and Master of Science (Honours), Civil Engineering, School of Civil Engineering, June 1988, achieving rank 1 in his class.

Academic Excellence Award Social Council of the Universitat Politècnica de València.

Excellent Research Career Award granted by the Universitat Politècnica de València.

Excellent Research Impact Award granted by the Universitat Politècnica de València.

EXPERIENCE AT THE UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Deputy Director, Department of Construction Engineering: July 2010 - July 2012, July 2014 - present

Academic Head, M.Sc. in Concrete Engineering: June 2008 - February 2017. This Master of Science degree is focused on construction-engineering and fully supported by the Department of Construction Engineering. It aims to provide a comprehensive understanding of concrete as a building material, as well as the necessary skills for analyzing and designing concrete structures. Learn more at

<http://victoryepes.blogs.upv.es/2015/08/26/presentacion-del-master-universitario-en-ingenieria-del-hormigon/>

Full Professor, Department of Construction Engineering: November 2017 - present

Associate Professor, Department of Construction Engineering: April 2008 - November 2017

Part-Time Professor, Department of Construction Engineering: October 1994 - April 2008

Part-Time Professor, Department of Construction Engineering: October 1989 - September 1990

Research Assistant, Department of Transportation Engineering: September 1987 – 1988.

VISITING SCHOLAR

Department of Engineering and Construction Management
Pontificia Universidad Católica de Chile, 2013

PROFESSIONAL ENGINEERING EXPERIENCE

Iberdrola, S.A. (Energy company) Assistant Engineer. 1987.

Dragados y Construcciones, S.A. (Construction company) Civil Engineer and Site Manager. 1989-1992.

Generalitat Valenciana. (Regional government) Director of Infrastructure Engineering and R+D+I. 1992-2008.

Member of the General Council of the Association of Civil Engineers of Spain (2020 - present).

JOURNAL PUBLICATIONS (SCI)

1. GUAYGUA, B.; SÁNCHEZ-GARRIDO, A.; YEPES, V. (2024). **A systematic review of seismic-resistant precast concrete buildings.** *Structures*, (accepted, in press)
2. ZHOU, Z.; ZHOU, J.; ALCALÁ, J.; YEPES, V. (2024). **Thermal coupling optimization of bridge environmental impact under natural conditions.** *Environmental Impact Assessment Review*, 104:107316. DOI:10.1016/j.eiar.2023.107316
3. GARCÍA, J.; LEIVA-ARAOS, A.; DÍAZ-SAAVEDRA, E.; MORAGA, P.; PINTO, H.; YEPES, V. (2023). **Relevance of Machine Learning Techniques in Water Infrastructure Integrity and Quality: A Review Powered by Natural Language Processing.** *Applied Sciences*, (accepted, in press).
4. YEPES-BELLVER, L.; BRUN-IZQUIERDO, A.; ALCALÁ, J.; YEPES, V. (2023). **Embodied energy optimization of prestressed concrete road flyovers by a two-phase Kriging surrogate model.** *Materials*, 16(20); 6767. DOI:10.3390/ma16206767
5. MARTÍNEZ-MUÑOZ, D.; GARCÍA, J.; MARTÍ, J.V.; YEPES, V. (2023). **Deep learning classifier for life cycle optimization of steel-concrete composite bridges.** *Structures*, 57:105347. DOI:10.1016/j.istruc.2023.105347
6. NEGRÍN, I.; KRIPKA, M.; YEPES, V. (2023). **Multi-criteria optimization for sustainability-based design of reinforced concrete frame buildings.** *Journal of Cleaner Production*, 425:139115. DOI:10.1016/j.jclepro.2023.139115
7. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2023). **Carbon impact assessment of bridge construction based on resilience theory.** *Journal of Civil Engineering and Management*, 29(6):561-576. DOI:10.3846/JCEM.2023.19565.
8. HADIZADEH-BAZAZ, M.; NAVARRO, I.J.; YEPES, V. (2023). **Life Cycle Assessment of a Coastal Concrete Bridge Aided by Non-Destructive Damage Detection Methods.** *Journal of Marine Science and Engineering*, 11(9):1656. DOI:10.3390/jmse11091656
9. NEGRÍN, I.; KRIPKA, M.; YEPES, V. (2023). **Metamodel-assisted meta-heuristic design optimization of reinforced concrete frame structures considering soil-structure interaction.** *Engineering Structures*, 293:116657. DOI:10.1016/j.engstruct.2023.116657
10. NEGRÍN, I.; KRIPKA, M.; YEPES, V. (2023). **Design optimization of welded steel plate girders configured as a hybrid structure.** *Journal of Constructional Steel Research*, 211:108131. DOI:10.1016/j.jcsr.2023.108131.
11. NAVARRO, I.J.; MARTÍ, J.V.; YEPES, V. (2023). **Enhancing sustainability assessment of bridges in aggressive environments through multi-criteria group decision-making.** *DYNA*, 98(5):477-483. DOI:10.6036/10816.
12. SÁNCHEZ-GARRIDO, A.J.; NAVARRO, I.J.; GARCÍA, J.; YEPES, V. (2023). **A systematic literature review on Modern Methods of Construction in building: an integrated approach using machine learning.** *Journal of Building Engineering*, 73:106725. DOI:10.1016/j.jobe.2023.106725.
13. TERREROS-BEDOYA, A.; NEGRÍN, I.; PAYÁ-ZAFORTEZA, I.; YEPES, V. (2023). **Hybrid steel girders: review, advantages and new horizons in research and applications.** *Journal of Constructional Steel Research*, 207:107976. DOI:10.1016/j.jcsr.2023.107976.
14. LEMUS-ROMANI, J.; OSSANDÓN, D.; SEPÚLVEDA, R.; CARRASCO-ASTUDILLO, N.; YEPES, V.; GARCÍA, J. (2023). **Optimizing Retaining Walls through Reinforcement Learning Approaches and Metaheuristic Techniques.** *Mathematics*, 11(9): 2104. DOI:10.3390/math11092104
15. NAVARRO, I.J.; MARTÍ, J.V.; YEPES, V. (2023). **Evaluation of Higher Education Students' Critical Thinking Skills on Sustainability.** *International Journal of Engineering Education*, 39(3):592-603.

16. NEGRÍN, I.; KRIPKA, M.; YEPES, V. (2023). [Metamodel-assisted design optimization in the field of structural engineering: a literature review](#). *Structures*, 52:609-631. DOI:10.1016/j.istruc.2023.04.006
17. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2023). [Experimental Research on Diseases of Emulsified Asphalt Mortar Board for Ballastless Tracks](#). *Journal of Materials in Civil Engineering*, 35(6):04023156. DOI:10.1061/JMCEE7.MTENG-15149
18. HADIZADEH-BAZAZ, M.; NAVARRO, I.J.; YEPES, V. (2023). [Life-cycle cost assessment using the power spectral density function in a coastal concrete bridge](#). *Journal of Marine Science and Engineering*, 11(2):433. DOI:10.3390/jmse11020433
19. MARÍN, R.; YEPES, V. (2023). [Landscape values in a marina in Granada \(Spain\): Enhancing landscape management through public participation](#). *Land*, 12(2):492. DOI:10.3390/land12020492
20. TRES JUNIOR, F.L.; YEPES, V.; MEDEIROS, G.F.; KRIPKA, M. (2023). [Multi-objective Optimization Applied to the Design of Sustainable Pedestrian Bridges](#). *International Journal of Environmental Research and Public Health*, 20(4), 3190. DOI:10.3390/ijerph20043190
21. HADIZADEH-BAZAZ, M.; NAVARRO, I.J.; YEPES, V. (2023). [Power Spectral Density method performance in detecting damages by chloride attack on coastal RC bridge](#). *Structural Engineering and Mechanics*, 85(2):197-206. DOI:10.12989/sem.2023.85.2.197.
22. RUIZ-VÉLEZ, A.; ALCALÁ, J.; YEPES, V. (2023). [A parametric study of optimum road modular hinged frames by hybrid metaheuristics](#). *Materials*, 16(3):931. DOI:10.3390/ma16030931
23. YEPES, V.; LOPEZ, S. (2023). [The Knowledge sharing capability in innovative behavior: A SEM approach from graduate students' insights](#). *International Journal of Environmental Research and Public Health*, 20(2):1284. DOI:10.3390/ijerph20021284
24. MARTÍNEZ-MUÑOZ, D.; GARCÍA, J.; MARTÍ, J.V.; YEPES, V. (2023). [Hybrid swarm intelligence optimization methods for low-embodied energy steel-concrete composite bridges](#). *Mathematics*, 11(1):140. DOI: 10.3390/math11010140
25. RUIZ-VÉLEZ, A.; ALCALÁ, J.; YEPES, V. (2023). [Optimal design of sustainable reinforced concrete precast hinged frames](#). *Materials*, 16(1):204. DOI:10.3390/ma16010204.
26. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2022). [Research on Sustainable Development of the Regional Construction Industry Based on Entropy Theory](#). *Sustainability*, 14(24): 16645. DOI:10.3390/su142416645
27. PARTSKHALADZE, G.; ALCALÁ, J.; MEDZMARIASHVILI, E.; CHAVLESHVILI, G.; SURGULADZE, B., I.; YEPES, V. (2022). [Heuristic Optimization of a New Type Prestressed Arched Truss](#). *Materials*, 15(22): 8144. DOI:10.3390/ma15228144
28. MARTÍNEZ-MUÑOZ, D.; GARCÍA, J.; MARTÍ, J.V.; YEPES, V. (2022). [Optimal design of steel-concrete composite bridge based on a transfer function discrete swarm intelligence algorithm](#). *Structural and Multidisciplinary Optimization*, 65:312. DOI:10.1007/s00158-022-03393-9
29. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2022). [Research on the optimized environment of large bridges based on multi-constraint coupling](#). *Environmental Impact Assessment Review*, 97:106914. DOI:10.1016/j.eiar.2022.106914.
30. SALAS, J.; YEPES, V. (2022). [Improved delivery of social benefits through the maintenance planning of public assets](#). *Structure and Infrastructure Engineering*, DOI:10.1080/15732479.2022.2121844
31. HADIZADEH-BAZAZ, M.; NAVARRO, I.J.; YEPES, V. (2022). [Performance comparison of structural damage detection methods based on Frequency Response Function and Power Spectral Density](#). *DYNA*, 97(5):493-500. DOI:10.6036/10504

32. NAVARRO, I.J.; MARTÍ, J.V.; YEPES, V. (2022). [Analytic Network Process-based sustainability life cycle assessment of concrete bridges in coastal regions.](#) *Sustainability*, 14(17):10688. DOI:10.3390/su141710688
33. MARTÍN, R., YEPES, V. (2022). [Economic valuation of landscape in marinas: Application to a marina in Spanish Southern Mediterranean coast \(Granada, Spain\).](#) *Land*, 11(9):1400. DOI:10.3390/land11091400
34. GARCÍA, J.; VILLAVICENCIO, G.; ALTIMIRAS, F.; CRAWFORD, B.; SOTO, R.; MINTATOGAWA, V.; FRANCO, M.; MARTÍNEZ-MUÑOZ, D.; YEPES, V. (2022). [Machine learning techniques applied to construction: A hybrid bibliometric analysis of advances and future directions.](#) *Automation in Construction*, 142:104532. DOI:10.1016/j.autcon.2022.104532
35. YEPES-BELLVER, L.; BRUN-IZQUIERDO, A.; ALCALÁ, J.; YEPES, V. (2022). [CO₂-optimization of post-tensioned concrete slab-bridge decks using surrogate modeling.](#) *Materials*, 15(14):4776. DOI:10.3390/ma15144776
36. MARTÍNEZ-MUÑOZ, D.; GARCÍA, J.; MARTÍ, J.V.; YEPES, V. (2022). [Discrete swarm intelligence optimization algorithms applied to steel-concrete composite bridges.](#) *Engineering Structures*, 266:114607. DOI:10.1016/j.engstruct.2022.114607
37. MARTÍN, R., YEPES, V. (2022). [Assessing the relationship between landscape and management within marinas: The managers' perception.](#) *Land*, 11(7):961. DOI:10.3390/land11070961
38. SÁNCHEZ-GARRIDO, A.J.; NAVARRO, I.J.; GARCÍA, J.; YEPES, V. (2022). [An Adaptive ANP & ELECTRE IS-based MCDM Model Using Quantitative Variables.](#) *Mathematics*, 10(12):2009. DOI:10.3390/math10122009
39. MARTÍNEZ-MARTÍN, F.J.; YEPES, V.; GONZÁLEZ-VIDOSA, F.; HOSPITALER, A.; ALCALÁ, J. (2022). [Optimization design of RC elevated water tanks under seismic loads.](#) *Applied Sciences*, 12(11):5635. DOI:10.3390/app12115635
40. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2022). [Regional sustainable development impact through sustainable bridge optimization.](#) *Structures*, 41, 1061-1076. DOI:10.1016/j.istruc.2022.05.047
41. VITORIO, P.C., Jr.; YEPES, V.; KRIPKA, M. (2022). [Comparison of Brazilian Social Interest Housing Projects considering Sustainability.](#) *International Journal of Environmental Research and Public Health*, 19(10):6213. DOI:10.3390/ijerph19106213.
42. FERNÁNDEZ-MORA, V.; NAVARRO, I.J.; YEPES, V. (2022). [Integration of the structural project into the BIM paradigm: a literature review.](#) *Journal of Building Engineering*, 53:104318. DOI:10.1016/j.jobe.2022.104318.
43. MARTÍNEZ-MUÑOZ, D.; MARTÍ, J.V.; YEPES, V. (2022). [Social Impact Assessment Comparison of Composite and Concrete Bridge Alternatives.](#) *Sustainability*, 14(9):5186. DOI:10.3390/su14095186..
44. MARTÍNEZ FERNÁNDEZ, P.; VILLALBA SANCHIS, I.; INSA FRANCO, R.; YEPES, V. (2022). [Slab track optimisation using metamodels to improve rail construction sustainability.](#) *Journal of Construction Engineering and Management*, 148(7):04022053. DOI:10.1061/(ASCE)CO.1943-7862.0002288.
45. SÁNCHEZ-GARRIDO, A.J.; NAVARRO, I.J.; YEPES, V. (2022). [Evaluating the sustainability of soil improvement techniques in foundation substructures.](#) *Journal of Cleaner Production*, 351: 131463. DOI:10.1016/j.jclepro.2022.131463.
46. MATHERN, A.; PENADÉS-PLÀ, V.; ARMESTO BARROS, J.; YEPES, V. (2022). [Practical metamodel-assisted multi-objective design optimization for improved sustainability and buildability of wind turbine foundations.](#) *Structural and Multidisciplinary Optimization*, 65:46. DOI:10.1007/s00158-021-03154-0
47. SÁNCHEZ-GARRIDO, A.J.; NAVARRO, I.J.; YEPES, V. (2022). [Multi-criteria decision-making applied to the sustainability of building structures based on Modern](#)

- Methods of Construction. *Journal of Cleaner Production*, 330:129724. DOI:10.1016/j.jclepro.2021.129724
48. YEPES, V.; LOPEZ, S. (2021). Knowledge management in the construction industry: Current state of knowledge and future research. *Journal of Civil Engineering and Management*, 27(8):671-680. DOI:10.3846/jcem.2021.16006
49. SIERRA, L.; ARAYA, F.; YEPES, V. (2021). Consideration of uncertainty and multiple disciplines in the determination of sustainable criteria for rural roads using neutrosophic logic. *Sustainability*, 13(17):9854. DOI:10.3390/su13179854
50. ATA-ALI, N.; PENADÉS-PLÀ, V.; MARTÍNEZ-MUÑOZ, D.; YEPES, V. (2021). Recycled versus non-recycled insulation alternatives LCA analysis for different climatic conditions in Spain. *Resources, Conservation and Recycling*, 175, 105838. DOI:10.1016/j.resconrec.2021.105838
51. HOOSE, A.; YEPES, V.; KRIPKA, M. (2021). Selection of Production Mix in the Agricultural Machinery Industry considering Sustainability in Decision Making. *Sustainability*, 13(16), 9110. DOI:10.3390/su13169110
52. MAUREIRA, C.; PINTO, H.; YEPES, V.; GARCÍA, J. (2021). Towards an AEC-AI industry optimization algorithmic knowledge mapping. *IEEE Access*, 9:110842-110879. DOI:10.1109/ACCESS.2021.3102215
53. MARTÍN, R.; YEPES, V. (2021). Bridging the gap between landscape and management within marinas: A review. *Land*, 10(8), 821; <https://doi.org/10.3390/land10080821>
54. MARTÍNEZ-MUÑOZ, D.; MARTÍ, J.V.; YEPES, V. (2021). Comparative life cycle analysis of concrete and composite bridges varying steel recycling ratio. *Materials*, 14(15):4218. DOI:10.3390/ma14154218
55. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2021). Optimized application of sustainable development strategy in international engineering project management. *Mathematics*, 9(14):1633. DOI:10.3390/math9141633
56. ZHOU, Z.; ALCALÁ, J.; KRIPKA, M.; YEPES, V. (2021). Life cycle assessment of bridges using Bayesian Networks and Fuzzy Mathematics. *Applied Sciences*, 11(11):4916. DOI:10.3390/app11114916.
57. BIANCHI, P.F.; YEPES, V.; VITORIO, P.C., Jr.; KRIPKA, M. (2021). Study of alternatives for the design of sustainable low-income housing in Brazil. *Sustainability*, 13(9):4757. DOI:10.3390/su13094757
58. SÁNCHEZ-GARRIDO, A.J.; NAVARRO, I.J.; YEPES, V. (2021). Neutrosophic multi-criteria evaluation of sustainable alternatives for the structure of single-family homes. *Environmental Impact Assessment Review*, 89:106572. DOI:10.1016/j.eiar.2021.106572
59. NAVARRO, I.J.; MARTÍ, J.V.; YEPES, V. (2021). Neutrosophic completion technique for incomplete higher-order AHP comparison matrices. *Mathematics*, 9(5):496. DOI:10.3390/math9050496
60. TANG, M.; LIAO, H.; YEPES, V.; LAURINAVICIUS, A.; TUPENAITE, L. (2021). Quantifying and mapping the evolution of a leader journal in the field of civil engineering. *Journal of Civil Engineering and Management*, 27(2):100-116. DOI:10.3846/jcem.2021.14365
61. MARTÍNEZ-MUÑOZ, D.; MARTÍ, J.V.; GARCÍA, J.; YEPES, V. (2021). Embodied energy optimization of buttressed earth-retaining walls with hybrid simulated annealing. *Applied Sciences*, 11(4):1800. DOI:10.3390/app11041800
62. GARCÍA, J.; ASTORGA, G.; YEPES, V. (2021). An analysis of a KNN perturbation operator: an application to the binarization of continuous metaheuristics. *Mathematics*, 9(3):225. DOI:10.3390/math9030225.
63. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2021). Environmental, economic and social impact assessment: study of bridges in China's five major economic regions. *International*

- Journal of Environmental Research and Public Health*, 18(1):122. DOI:10.3390/ijerph18010122
64. NAVARRO, I.J.; PENADÉS-PLÀ, V.; MARTÍNEZ-MUÑOZ, D.; REMPLING, R.; YEPES, V. (2020). [Life cycle sustainability assessment for multi-criteria decision making in bridge design: A review](#). *Journal of Civil Engineering and Management*, 26(7):690-704. DOI:10.3846/jcem.2020.13598
65. ZHOU, Z.; ALCALÁ, J.; YEPES, V. (2020). [Bridge Carbon Emissions and Driving Factors Based on a Life-Cycle Assessment Case Study: Cable-Stayed Bridge over Hun He River in Liaoning, China](#). *International Journal of Environmental Research and Public Health*, 17(16):5953. DOI:10.3390/ijerph17165953
66. LÓPEZ, S.; YEPES, V. (2020). [Impact of the R&D&I on the performance of Spanish construction companies](#). *Advances in Civil Engineering*, 2020: 7835231. DOI:10.1155/2020/7835231
67. PONS, J.J.; VILLALBA SANCHIS, I.; INSA FRANCO R.; YEPES, V. (2020). [Life cycle assessment of a railway tracks substructures: comparison of ballast and ballastless rail tracks](#). *Environmental Impact Assessment Review* 85:106444. DOI:10.1016/j.eiar.2020.106444
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69. MARTÍNEZ-MUÑOZ, D.; MARTÍ, J.V.; YEPES, V. (2020). [Steel-concrete composite bridges: design, life cycle assessment, maintenance and decision making](#). *Advances in Civil Engineering*, 2020:8823370. DOI:10.1155/2020/8823370
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71. PENADÉS-PLÀ, V.; MARTÍNEZ-MUÑOZ, D.; GARCÍA-SEGURA, T.; NAVARRO, I.J.; YEPES, V. (2020). [Environmental and social impact assessment of optimized post-tensioned concrete road bridges](#). *Sustainability*, 12(10), 4265. DOI:10.3390/su12104265
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74. PENADÉS-PLÀ, V.; YEPES, V.; GARCÍA-SEGURA, T. (2020). [Robust decision-making design for sustainable pedestrian concrete bridges](#). *Engineering Structures*, 209: 109968. DOI:10.1016/j.engstruct.2019.109968
75. PENADÉS-PLÀ, V.; GARCÍA-SEGURA, T.; YEPES, V. (2020). [Robust design optimization for low-cost concrete box-girder bridge](#). *Mathematics*, 8(3): 398; DOI:10.3390/math8030398
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77. SALAS, J.; YEPES, V. (2020). [Enhancing sustainability and resilience through multi-level infrastructure planning](#). *International Journal of Environmental Research and Public Health*, 17(3):962; DOI:10.3390/ijerph17030962
78. NAVARRO, I.J.; YEPES, V.; MARTÍ, J.V. (2020). [Sustainability assessment of concrete bridge deck designs in coastal environments using neutrosophic criteria weights](#). *Structure and Infrastructure Engineering*, 16(7): 949-967. DOI:10.1080/15732479.2019.1676791

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80. NAVARRO, I.J.; YEPES, V.; MARTÍ, J.V. (2019). [A review of multi-criteria assessment techniques applied to sustainable infrastructures design.](#) *Advances in Civil Engineering*, 2019: 6134803. DOI:10.1155/2019/6134803
81. MARTÍN, R.; YEPES, V. (2019). **The concept of landscape within marinas: Basis for consideration in the management.** *Ocean & Coastal Management*, 179: 104815. DOI:10.1016/j.ocecoaman.2019.104815.
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83. BOSCARDIN, J.T.; YEPES, V.; KRIPKA, M. (2019). **Optimization of reinforced concrete building frames with automated grouping of columns.** *Automation in Construction*, 104: 331-340. DOI:10.1016/j.autcon.2019.04.024
84. SALAS, J.; YEPES, V. (2019). [VisualUVAM: A Decision Support System Addressing the Curse of Dimensionality for the Multi-Scale Assessment of Urban Vulnerability in Spain.](#) *Sustainability*, 11(8): 2191. DOI:10.3390/su11082191
85. MARTÍNEZ FERNÁNDEZ, P.; VILLALBA SANCHÍS, I.; YEPES, V.; INSA FRANCO, R. (2019). **A review of modelling and optimisation methods applied to railways energy consumption.** *Journal of Cleaner Production*, 222:153-162. DOI: 10.1016/j.jclepro.2019.03.037
86. KRIPKA, M.; YEPES, V.; MILANI, C.J. (2019). [Selection of sustainable short-span bridge design in Brazil.](#) *Sustainability*, 11(5):1307. DOI: 10.3390/su11051307
87. SALAS, J.; YEPES, V. (2019). **MS-ReRO and D-ROSE methods: assessing relational uncertainty and evaluating scenarios' risks and opportunities on multi-scale infrastructure systems.** *Journal of Cleaner Production*, 216:607-623. DOI:10.1016/j.jclepro.2018.12.083
88. PENADÉS-PLÀ, V.; GARCÍA-SEGURA, T.; YEPES, V. (2019). [Accelerated optimization method for low-embodied energy concrete box-girder bridge design.](#) *Engineering Structures*, 179:556-565. DOI:10.1016/j.engstruct.2018.11.015
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