



**CELIO FRANCISCO FILHO AND THE IMPLEMENTATION OF DYNA'S
PRODUCTION LINE IN PARANÁ: A STRATEGIC CASE IN INDUSTRIAL
ENGINEERING AND SUPPLY CHAIN OPTIMIZATION**

**CELIO FRANCISCO FILHO E A IMPLEMENTAÇÃO DA LINHA DE PRODUÇÃO
DA DYNA NO PARANÁ: UM CASO ESTRATÉGICO EM ENGENHARIA
INDUSTRIAL E OTIMIZAÇÃO DA CADEIA DE SUPRIMENTOS**

**CELIO FRANCISCO FILHO Y LA IMPLEMENTACIÓN DE LA LÍNEA DE
PRODUCCIÓN DE DYNA EN PARANÁ: UN CASO ESTRATÉGICO EN
INGENIERÍA INDUSTRIAL Y OPTIMIZACIÓN DE LA CADENA DE SUMINISTRO**

 <https://doi.org/10.56238/levv13n31-018>

Date of submission: 02/05/2023

Date of publication: 03/05/2023

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ABSTRACT

This article examines the strategic implementation of a new automotive components production line by the Brazilian company Dyna in Paraná, led by mechatronic engineer Celio Francisco Filho. The project was designed to enhance supply chain efficiency and integrate closely with the Just-In-Time (JIT) manufacturing systems of Volkswagen and Renault in São José dos Pinhais. Through the application of lean manufacturing principles, advanced automation technologies, and logistics synchronization, the initiative significantly reduced delivery times and improved quality performance. The case demonstrates how industrial engineering, when combined with strategic project management and regional development planning, can generate measurable outcomes in productivity, reliability, and competitiveness. The study also highlights the importance of human capital and Industry 4.0 tools in enabling agile, high-performance manufacturing operations in the global automotive supply chain.

Keywords: Industrial engineering. Supply chain. Lean manufacturing. Automation. Industry 4.0.

RESUMO

Este artigo examina a implementação estratégica de uma nova linha de produção de componentes automotivos pela empresa brasileira Dyna, no Paraná, liderada pelo engenheiro mecatrônico Celio Francisco Filho. O projeto foi concebido para aumentar a eficiência da cadeia de suprimentos e integrar-se estreitamente aos sistemas de produção Just-In-Time (JIT) da Volkswagen e da Renault em São José dos Pinhais. Através da aplicação de princípios de produção enxuta, tecnologias avançadas de automação e sincronização logística, a iniciativa reduziu significativamente os prazos de entrega e melhorou o desempenho em termos de qualidade. O caso demonstra como a engenharia

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industrial, quando combinada com o gerenciamento estratégico de projetos e o planejamento de desenvolvimento regional, pode gerar resultados mensuráveis em produtividade, confiabilidade e competitividade. O estudo também destaca a importância do capital humano e das ferramentas da Indústria 4.0 para possibilitar operações de manufatura ágeis e de alto desempenho na cadeia de suprimentos automotiva global.

Palavras-chave: Engenharia industrial. Cadeia de suprimentos. Manufatura enxuta. Automação. Indústria 4.0.

RESUMEN

Este artículo examina la implementación estratégica de una nueva línea de producción de componentes automotrices por parte de la empresa brasileña Dyna en Paraná, dirigida por el ingeniero mecánico Celio Francisco Filho. El proyecto fue diseñado para mejorar la eficiencia de la cadena de suministro e integrarse estrechamente con los sistemas de fabricación Just-In-Time (JIT) de Volkswagen y Renault en São José dos Pinhais. Mediante la aplicación de principios de fabricación ajustada, tecnologías de automatización avanzadas y sincronización logística, la iniciativa redujo significativamente los plazos de entrega y mejoró el rendimiento de la calidad. El caso demuestra cómo la ingeniería industrial, cuando se combina con la gestión estratégica de proyectos y la planificación del desarrollo regional, puede generar resultados medibles en términos de productividad, fiabilidad y competitividad. El estudio también destaca la importancia del capital humano y las herramientas de la Industria 4.0 para permitir operaciones de fabricación ágiles y de alto rendimiento en la cadena de suministro automotriz global.

Palabras clave: Ingeniería industrial. Cadena de suministro. Fabricación ajustada. Automatización. Industria 4.0.

INTRODUCTION

The implementation of a new production line by the Brazilian automotive components company Dyna in the state of Paraná marked a significant development in the company's strategic expansion and operational capabilities. Spearheaded by mechatronic engineer Celio Francisco Filho, the initiative aimed to establish a manufacturing structure capable of meeting the high logistical and quality demands of two major automotive manufacturers in the region—Volkswagen and Renault. The project encompassed the full cycle of industrial deployment, from feasibility assessments to the operational start-up, and was designed to align with modern supply chain paradigms, notably the Just-In-Time (JIT) manufacturing model.

Celio Francisco Filho's leadership in this initiative was critical not only for the technical aspects but also for the broader industrial strategy. By locating the new production line in São José dos Pinhais—close to the assembly plants of Volkswagen and Renault—the company drastically reduced lead times and logistics costs, an objective consistent with the principles outlined by Ohno (1988), the architect of the Toyota Production System. The JIT system requires precise synchronization of production and delivery, leaving minimal room for error. This level of efficiency necessitates integrated logistics, advanced automation, and robust quality assurance systems.

The deployment of the Paraná plant involved several crucial steps. These included the rapid selection and setup of the manufacturing site, installation of automated machinery for metal cutting, bending, and assembly, and the development of a continuous flow production layout. Celio also implemented sophisticated quality and traceability systems aimed at achieving a zero-defect target—aligning with modern Total Quality Management (TQM) principles as articulated by Juran (1999) and Deming (1986). Logistics interfaces were carefully designed to enable real-time communication and coordination with client plants, using Electronic Data Interchange (EDI) and Radio Frequency Identification (RFID) technologies, tools which are widely recognized in supply chain literature for enhancing visibility and responsiveness (Christopher, 2016).

The impact of the new production line was immediately evident. The facility began with a capacity of 25,000 components per month and achieved a 35% reduction in average delivery time to automakers. Quality metrics were similarly impressive, with a 98.9% approval rate in audits conducted by Volkswagen and Renault within the first six months of operation. These results underscore the effectiveness of lean manufacturing methodologies when applied with technical rigor and strategic foresight.

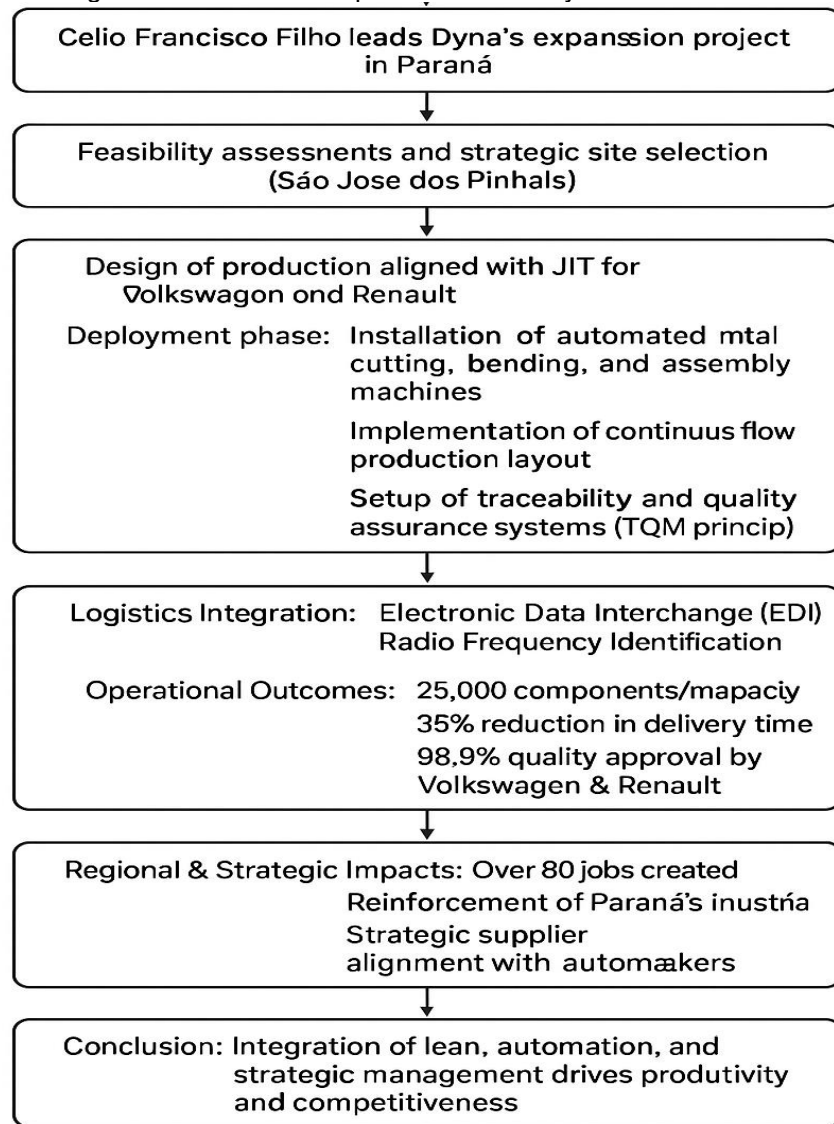
Beyond operational performance, the implementation also contributed to regional industrial development. Over 80 direct jobs were created during the first year of operation, stimulating local supply chains and reinforcing the status of Paraná as a key automotive hub in southern Brazil. Such localized manufacturing initiatives are increasingly regarded as essential in enhancing regional economic resilience and industrial diversification (Porter, 1990).

Celio Francisco Filho's role exemplifies the integration of engineering acumen and managerial competence. With a background in mechatronics and extensive experience in automation projects, his approach blended technical innovation with disciplined project management and strategic alignment. His leadership not only ensured the technical viability of the project but also cultivated a culture of excellence and reliability, aligning with the best practices in industrial engineering and operations management (Slack et al., 2020).

The adoption of automation technologies in the Dyna Paraná plant also reflects broader trends in Industry 4.0, particularly the emphasis on smart manufacturing, cyber-physical systems, and real-time data analytics. As described by Kagermann et al. (2013), these technologies enable more agile and responsive production environments, which are critical for maintaining competitiveness in global supply chains. By integrating automated machinery with digital control systems and RFID, Dyna positioned itself at the frontier of modern manufacturing practices.

The flowchart illustrates the strategic steps taken by engineer Celio Francisco Filho in leading Dyna's production expansion in Paraná, Brazil. Beginning with feasibility assessments and site selection near Volkswagen and Renault, the project focused on aligning production with Just-In-Time (JIT) systems. This included installing automated machinery, creating a continuous flow layout, and implementing quality assurance systems. Logistics integration followed through EDI and RFID technologies, resulting in significant improvements in capacity, delivery time, and quality approval rates. The initiative also fostered regional economic development, job creation, and reinforced Dyna's strategic alignment with major automakers, showcasing a successful model of lean, automated, and high-performance industrial engineering.

Figure 1. Strategic Flowchart of the Implementation of Dyna's Production Line in Paraná.



Source: Created by author.

In addition to technology, the project highlighted the importance of human capital in successful industrial transformation. The creation of multidisciplinary teams and investment in workforce training were fundamental components of the plant's operational readiness. According to Baines et al. (2015), workforce adaptability and upskilling are key enablers of lean and digital manufacturing systems, as they ensure that human resources can effectively collaborate with intelligent machines in high-performance production settings.

Finally, the successful integration of Dyna's operations into the supply chains of Volkswagen and Renault demonstrates the value of strategic supplier relationships and collaborative planning. The use of synchronized logistics, predictive demand planning, and shared quality standards aligns with the principles of Supply Chain Integration (SCI), which has been shown to significantly enhance performance and customer satisfaction in manufacturing industries (Frohlich & Westbrook, 2001). By embedding itself deeply into the



operational fabric of its clients, Dyna ensured not only compliance but strategic alignment, building long-term trust and mutual value.



REFERENCES

1. Baines T, Lightfoot H, Smart P, Fletcher S (2015) Servitization of manufacture: Exploring the deployment and skills of people critical to the delivery of advanced services. *Journal of Manufacturing Technology Management*, 26(1), 113–136.
2. Christopher M (2016) *Logistics & Supply Chain Management* (5th ed). Pearson Education.
3. Deming WE (1986) *Out of the Crisis*. MIT Press.
4. Frohlich MT, Westbrook R (2001) Arcs of integration: An international study of supply chain strategies. *Journal of Operations Management*, 19(2), 185–200.
5. Juran JM (1999) *Juran's Quality Handbook*. McGraw-Hill.
6. Kagermann H, Wahlster W, Helbig J (2013) Recommendations for implementing the strategic initiative INDUSTRIE 4.0. Final report of the Industrie 4.0 Working Group.
7. Ohno T (1988) *Toyota Production System: Beyond Large-Scale Production*. Productivity Press.
8. Porter ME (1990) *The Competitive Advantage of Nations*. Free Press.
9. Slack N, Brandon-Jones A, Burgess N (2020) *Operations Management* (9th ed). Pearson.
10. Silva, J. F. (2024). SENSORY-FOCUSED FOOTWEAR DESIGN: MERGING ART AND WELL-BEING FOR INDIVIDUALS WITH AUTISM. *International Seven Journal of Multidisciplinary*, 1(1). <https://doi.org/10.56238/isevmjv1n1-016>
11. Silva, J. F. (2024). Enhancing cybersecurity: A comprehensive approach to addressing the growing threat of cybercrime. *Revista Sistemática*, 14(5), 1199–1203. <https://doi.org/10.56238/rcsv14n5-009>
12. Venturini, R. E. (2025). Technological innovations in agriculture: the application of Blockchain and Artificial Intelligence for grain traceability and protection. *Brazilian Journal of Development*, 11(3), e78100. <https://doi.org/10.34117/bjdv11n3-007>
13. Turatti, R. C. (2025). Application of artificial intelligence in forecasting consumer behavior and trends in E-commerce. *Brazilian Journal of Development*, 11(3), e78442. <https://doi.org/10.34117/bjdv11n3-039>
14. Garcia, A. G. (2025). The impact of sustainable practices on employee well-being and organizational success. *Brazilian Journal of Development*, 11(3), e78599. <https://doi.org/10.34117/bjdv11n3-054>
15. Filho, W. L. R. (2025). The Role of Zero Trust Architecture in Modern Cybersecurity: Integration with IAM and Emerging Technologies. *Brazilian Journal of Development*, 11(1), e76836. <https://doi.org/10.34117/bjdv11n1-060>
16. Antonio, S. L. (2025). Technological innovations and geomechanical challenges in Midland Basin Drilling. *Brazilian Journal of Development*, 11(3), e78097.

<https://doi.org/10.34117/bjdv11n3-005>

17. Moreira, C. A. (2025). Digital monitoring of heavy equipment: advancing cost optimization and operational efficiency. *Brazilian Journal of Development*, 11(2), e77294. <https://doi.org/10.34117/bjdv11n2-011>
18. Delci, C. A. M. (2025). THE EFFECTIVENESS OF LAST PLANNER SYSTEM (LPS) IN INFRASTRUCTURE PROJECT MANAGEMENT. *Revista Sistemática*, 15(2), 133–139. <https://doi.org/10.56238/rcsv15n2-009>
19. SANTOS, Hugo; PESSOA, Eliomar Gotardi. Impact of digitalization on the efficiency and quality of public services: A comprehensive analysis. *LUMEN ET VIRTUS*, [S.l.], v. 15, n. 40, p. 440-94414, 2024. DOI: 10.56238/levv15n40024. Disponível em: <https://periodicos.newsciencepubl.com/LEV/article/view/452>. Acesso em: 25 jan. 2025.
20. Freitas, G. B., Rabelo, E. M., & Pessoa, E. G. (2023). Projeto modular com reaproveitamento de container marítimo. *Brazilian Journal of Development*, 9(10), 28303-28339. <https://doi.org/10.34117/bjdv9n10057>
21. Pessoa, E. G., Feitosa, L. M., e Padua, V. P., & Pereira, A. G. (2023). Estudo dos recalques primários em uma obra executada sobre argila mole do Sarapuí. *Brazilian Journal of Development*, 9(10), 28352–28375. <https://doi.org/10.34117/bjdv9n10059>
22. PESSOA, E. G.; FEITOSA, L. M.; PEREIRA, A. G.; EPADUA, V. P. Efeitos de espécies de alna eficiência de coagulação, Al residual e propriedade dos flocos no tratamento de águas superficiais. *Brazilian Journal of Health Review*, [S.l.], v. 6, n. 5, p. 2481424826, 2023. DOI: 10.34119/bjhrv6n5523. Disponível em: <https://ojs.brazilianjournals.com.br/ojs/index.php/BJHR/article/view/63890>. Acesso em: 25 jan. 2025.
23. SANTOS, Hugo; PESSOA, Eliomar Gotardi. Impact of digitalization on the efficiency and quality of public services: A comprehensive analysis. *LUMEN ET VIRTUS*, [S.l.], v. 15, n. 40, p. 440-94414, 2024. DOI: 10.56238/levv15n40024. Disponível em: <https://periodicos.newsciencepubl.com/LEV/article/view/452>. Acesso em: 25 jan. 2025.
24. Filho, W. L. R. (2025). The Role of Zero Trust Architecture in Modern Cybersecurity: Integration with IAM and Emerging Technologies. *Brazilian Journal of Development*, 11(1), e76836. <https://doi.org/10.34117/bjdv11n1-060>
25. Oliveira, C. E. C. de. (2025). Gentrification, urban revitalization, and social equity: challenges and solutions. *Brazilian Journal of Development*, 11(2), e77293. <https://doi.org/10.34117/bjdv11n2-010>
26. Pessoa, E. G. (2024). Pavimentos permeáveis uma solução sustentável. *Revista Sistemática*, 14(3), 594–599. <https://doi.org/10.56238/rcsv14n3-012>
27. Filho, W. L. R. (2025). THE ROLE OF AI IN ENHANCING IDENTITY AND ACCESS MANAGEMENT SYSTEMS. *International Seven Journal of Multidisciplinary*, 1(2). <https://doi.org/10.56238/isevmjv1n2-011>
28. Antonio, S. L. (2025). Technological innovations and geomechanical challenges in Midland Basin Drilling. *Brazilian Journal of Development*, 11(3), e78097. <https://doi.org/10.34117/bjdv11n3-005>

29. Pessoa, E. G. (2024). Pavimentos permeáveis uma solução sustentável. *Revista Sistemática*, 14(3), 594–599. <https://doi.org/10.56238/rcsv14n3-012>
30. Eliomar Gotardi Pessoa, & Coautora: Glaucia Brandão Freitas. (2022). ANÁLISE DE CUSTO DE PAVIMENTOS PERMEÁVEIS EM BLOCO DE CONCRETO UTILIZANDO BIM (BUILDING INFORMATION MODELING). *Revistaft*, 26(111), 86. <https://doi.org/10.5281/zenodo.10022486>
31. Eliomar Gotardi Pessoa, Gabriel Seixas Pinto Azevedo Benittez, Nathalia Pizzol de Oliveira, & Vitor Borges Ferreira Leite. (2022). ANÁLISE COMPARATIVA ENTRE RESULTADOS EXPERIMENTAIS E TEÓRICOS DE UMA ESTACA COM CARGA HORIZONTAL APLICADA NO TOPO. *Revistaft*, 27(119), 67. <https://doi.org/10.5281/zenodo.7626667>
32. Eliomar Gotardi Pessoa, & Coautora: Glaucia Brandão Freitas. (2022). ANÁLISE COMPARATIVA ENTRE RESULTADOS TEÓRICOS DA DEFLEXÃO DE UMA LAJE PLANA COM CARGA DISTRIBUÍDA PELO MÉTODO DE EQUAÇÃO DE DIFERENCIAL DE LAGRANGE POR SÉRIE DE FOURIER DUPLA E MODELAGEM NUMÉRICA PELO SOFTWARE SAP2000. *Revistaft*, 26(111), 43. <https://doi.org/10.5281/zenodo.10019943>
33. Pessoa, E. G. (2025). Optimizing helical pile foundations: a comprehensive study on displaced soil volume and group behavior. *Brazilian Journal of Development*, 11(4), e79278. <https://doi.org/10.34117/bjdv11n4-047>
34. Pessoa, E. G. (2025). Utilizing recycled construction and demolition waste in permeable pavements for sustainable urban infrastructure. *Brazilian Journal of Development*, 11(4), e79277. <https://doi.org/10.34117/bjdv11n4-046>
35. Testoni, F. O. (2025). Niche accounting firms and the brazilian immigrant community in the U.S.: a study of cultural specialization and inclusive growth. *Brazilian Journal of Development*, 11(5), e79627. <https://doi.org/10.34117/bjdv11n5-034>
36. Silva, J. F. (2025). Desafios e barreiras jurídicas para o acesso à inclusão de crianças autistas em ambientes educacionais e comerciais. *Brazilian Journal of Development*, 11(5), e79489. <https://doi.org/10.34117/bjdv11n5-011>
37. POURRE, Carlla Brito Furlan. (2020). **Indicadores de Resultados Finalísticos como Instrumento de Diagnóstico do Transporte Urbano: Um Estudo de Caso do Distrito Federal**. Dissertação de Mestrado em Arquitetura e Urbanismo, Programa de Pós-Graduação em Arquitetura e Urbanismo, Faculdade de Arquitetura e Urbanismo, Universidade de Brasília, Brasília, DF, 167p. Disponível em: <https://repositorio.unb.br/handle/10482/38743>.
38. FURLAN, Carlla Brito; SANTOS, Gleys lally Ramos dos. 2016. **A qualidade do transporte público urbano em cidades médias: estudo de caso em Palmas-Tocantins**. Revista em Gestão, Inovação e Sustentabilidade. Disponível em: <chrome-extension://efaidnbmnnnibpcajpcgclefindmkaj/https://editora.iabs.org.br/site/wp-content/uploads/2018/01/ReGis-Dez-16-1.pdf>.
39. POURRE, Carlla Brito Furlan. MAGALHÃES, Marcos Thadeu Queiroz; ROCHA Marecilda; Mello, Cristina de. 2022. **Desempenho Urbano em uma Cidade Planejada (Palmas-To): Uma Leitura pela Sintaxe Espacial**. Conference: Anais do Encontro

Nacional da Associação Nacional de Pós Graduação e Pesquisa em Planejamento Urbano e Regional - XIX ENCONTRO NACIONAL DA ANPUR. Blumenau- SC. Disponível em: <http://repositorio2.unb.br/jspui/handle/10482/47875>.

40. MOYSÉS, David de Almeida; FERNANDES, Jorge Henrique Cabral; HOSOUME, Juliana Mayuni; PIÑA, Ana Beatriz Souza; BERNARDES, Mariele Berger; BAUCHSPIESS, Adolfo; POURRE, Carlla Brito Furlan; CARVALHO, Michele Tereza Marques; GARCIA, Luís Paulo Faina; BORGES, Geovany Araújo. 2022. **Iniciativas experimentais**. CESUs: Centros de Eficiência em Sustentabilidade Urbana (Livro) – Volume II: Aplicações. Editora Ecos. Disponível em: <https://repositorio.ecos.unb.br/exhibits/show/editoraecos/item/554#?c=&m=&s=&cv=>.
41. POURRE, Carlla Brito Furlan, MOYSÉS, David de Almeida, MAGALHÃES, Marcos Thadeu Queiroz, FERNANDES, Jorge Henrique Cabral Fernandes. 2022. **Processos finalísticos de um CESU**. CESUs: Centros de Eficiência em Sustentabilidade Urbana (Livro) Volume III: Proposições e Perspectivas. Editora Ecos. Disponível em: <https://repositorio.ecos.unb.br/exhibits/show/editoraecos/item/563#?c=&m=&s=&cv=>.
42. MAGALHÃES, Marcos Thadeu Queiroz; POURRE, Carlla Brito Furlan. 2022. **Planejamento e smart cities**. In: CESUs: Centros de Eficiência em Sustentabilidade Urbana (Livro) – Volume I: Fundamentos. Editora Ecos. Disponível em: <https://repositorio.ecos.unb.br/exhibits/show/editoraecos/item/562#?c=&m=&s=&cv=>.
43. Poure, C. B. F. (2024). UMA ANÁLISE BIBLIOMÉTRICA DA PESQUISA DE FRAMEWORK DE CIDADES INTELIGENTES. *Revista Sistemática*, 14(8), 591–605. <https://doi.org/10.56238/rcsv14n8-009>
44. Brito Furlan, C. ., & lally Ramos dos Santos, G. . (2019). A Qualidade do Transporte Público Urbano em Cidades Médias: Estudo de Caso em Palmas – Tocantins. *arq.Urb*, (17), 75–88. Recuperado de <https://revistaarqurb.com.br/arqurb/article/view/177>
45. MELLO, Cristina Maria Correia de et al.. LOCALIZAÇÃO, ENCONTROS E ESQUIVANÇAS NOS CONJUNTOS HABITACIONAIS DO PMCMV: UM OLHAR SOBRE UMA EXPERIÊNCIA NO DISTRITO FEDERAL.. In: Anais do 5º Fórum HABITAR 2019: Habitação e Desenvolvimento Sustentável. Anais...Belo Horizonte(MG) UFMG, 2019. Disponível em: <https://www.even3.com.br/anais/forumhabitar2019/197679-LOCALIZACAO-ENCONTROS-E-ESQUIVANCAS-NOS-CONJUNTOS-HABITACIONAIS-DO-PMCMV--UM-OLHAR-SOBRE-UMA-EXPERIENCIA-NO-DIST>. Acesso em: 26/05/2025
46. Silva, J. F. (2024). SENSORY-FOCUSED FOOTWEAR DESIGN: MERGING ART AND WELL-BEING FOR INDIVIDUALS WITH AUTISM. *International Seven Journal of Multidisciplinary*, 1(1). <https://doi.org/10.56238/isevmjv1n1-016>