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RESEARCH NOTE

The Superego of the City: Integrating Psychoanalytic Theory with Sustainable Urbanization in the Age of Industry 4.0

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Abstract

Purpose – This article introduces the concept of the "superego of the city" by drawing on Freudian psychoanalytic theory to explore the ethical and moral dimensions of contemporary urbanization. It examines how cities preserve cultural identity, foster social cohesion, and promote environmental sustainability amid rapid transformations driven by metropolization, digitalization, and environmental challenges.

Design/Methodology/Approach – The study applies the "superego of the city" framework to analyze smart city initiatives, particularly focusing on healthcare waste management. It explores how the integration of Circular Economy (CE) principles with Industry 4.0 technologies aligns technological advancements with the ethical imperatives of urban development.

Findings – The application of the "superego of the city" framework demonstrates how urban spaces can effectively integrate technological advancements with ethical and moral imperatives. This alignment helps cities maintain their cultural identity, enhance social cohesion, and achieve environmental sustainability.

Practical Implications – The findings offer valuable insights for urban planners and policymakers on utilizing the "superego of the city" as a holistic framework to guide sustainable, inclusive, and culturally resonant urban development. It highlights the importance of ethical considerations in planning and implementing smart city technologies.

KEYWORDS

Superego of the city, Urbanization, Smart cities, Circular Economy (CE), Industry 4.0, Metropolization, Digitalization, Environmental sustainability, Psychoanalytic theory, Cultural identity, Social cohesion.

1 | INTRODUCTION

Urbanization in the 21st century is unfolding within a complex matrix of rapid growth (Calabro 2012, García-Ayllón 2016, Hammarberg et al. 2022), technological advancements (Appio et al. 2019), and socio-economic shifts (Wu and He 2005), challenging traditional models of urban analysis. As cities evolve into sprawling metropolises, these changes require new conceptual frameworks to understand the intricate dynamics at play. One such framework is the concept of the "superego of the city," a theoretical tool that draws upon Sigmund Freud's psychoanalytic model of the psyche—comprising the id, ego, and superego—to analyze the moral and ethical dimensions of urban development.

The "superego of the city" functions as the collective moral consciousness of urban spaces and guides their development in ways that reflect the aspirations, values, and cultural heritage of their inhabitants. This concept is particularly relevant in the context of contemporary urbanization, where the pressures of modernization, globalization, and technological integration often lead to the erosion of cultural identity, social cohesion, and environmental sustainability (Norberg-Hodge 2014, Lévy and Rasoloniaina 2019). By framing the city's development through the lens of its superego, we can better understand the symbolic and psychological dimensions of urban life and work toward ensuring that cities remain spaces of meaning and belonging amid the forces of change.

Simultaneously, the emergence and rise of Industry 4.0 and the Circular Economy (CE) present transformative opportunities for addressing urban challenges, particularly in the realm of waste management. The integration of smart technologies (Lea 2017)—such as IoT, AI, and big data—with CE principles promises to revolutionize urban infrastructure and make cities more sustainable and more efficient (Chauhan et al. 2021, Razmjoo et al. 2022). However, despite the importance of these technological advancements, they must also be aligned with the cultural and ethical frameworks represented by the "superego of the city." This alignment will ensure that technological progress supports, rather than undermines, the city's historical continuity, cultural identity, and social fabric.

The necessity of this ethical framework becomes more apparent when considering the challenges of modern urbanization (Asadzadeh et al. 2022). Rapid urban growth often leads to fragmented spaces dominated by economic interests and technological imperatives, which threatens the loss of the city's inherent cultural and historical identity (Lefebvre 1991, Li et al. 2023). The "superego of the city" acts as a counterbalance, as it strives to preserve the integrity of the urban fabric and ensure that development remains aligned with the broader values of sustainability (Hepburn et al. 2021), equity, and social justice (Stahel 2013).

In line with emerging issues related to digitization and sustainability (Bonet and Lissillour 2023), this article seeks to explore how the "superego of the city" operates within the context of contemporary urbanization, with a particular focus on the challenges posed by metropolization (Rozenblat and Pumain 2018, Cardoso and Meijers 2020), digitalization (D'Amico et al. 2022), and environmental degradation (Kumar 2021). By examining the interplay between the symbolic (Amen and NIA 2021) and psychoanalytic aspects of urban spaces, this study aims to provide a nuanced understanding of the forces shaping cities today. Specifically, we apply the concept of the "superego of the city" to the analysis of healthcare waste management, as discussed by Chauhan et al. (2021), to illustrate how this framework can enhance the integration of CE principles with Industry 4.0 technologies in smart cities.

In doing so, we propose that the "superego of the city" contributes to the theoretical understanding of urban development and offers practical insights for creating sustainable, inclusive, and culturally resonant urban environments. This approach contributes to the existing literature on smart cities (Eremia et al. 2017, Lai et al. 2020, Halegoua 2020, Singh et al. 2022) by integrating ethical and psychological considerations into the technological and economic frameworks that currently dominate urban planning and governance.

2 | THEORETICAL FRAMEWORK: THE "SUPEREGO OF THE CITY"

Urbanization in the 21st century is characterized by unprecedented growth, technological advancements, and complex socio-economic transformations. As cities evolve into vast metropolitan spaces, traditional models of urban analysis have become insufficient to fully grasp the dynamics at play. It is within this context that the concept of the "superego of the city" emerges as a key analytical tool. In their study, Lévy and Rasoloniaina (2019) examined the ecological rehabilitation of Chong Ming Island within the territory of Shanghai, proposing that this island could be seen as the paradoxical superego of the Shanghai metropolis. The preservation of Chong Ming's natural landscapes, despite significant urban encroachment, highlights a tension between urban development and ecological preservation that is becoming increasingly common, especially in China (Zhai et al. 2020, Yang et al. 2021, Kang et al. 2021). This tension exemplifies the role of the city's superego in resisting the forces of urbanization that threaten to erode the natural and cultural heritage of the city.

This concept draws on Sigmund Freud's psychoanalytic theory, specifically his model of the psyche, which comprises the id, ego, and superego. In Freudian terms, the superego represents internalized societal norms and moral standards that regulate the ego's interactions with the world, acting as a mediator between primal desires and ethical constraints. When extended to the urban sphere, the "superego of the city" serves as a metaphor for the collective moral and ethical consciousness that governs the development and functioning of urban spaces. It embodies the aspirations, values, and cultural heritage that cities strive to preserve amid the pressures of modernization and globalization.

The importance of this concept becomes apparent when considering the challenges contemporary cities face. The rapid pace of urbanization, driven by economic forces and technological innovations, often leads to the erosion of cultural identity, social cohesion, and environmental sustainability. Cities, which were once centers of civilization that nurtured art, culture, and community, are increasingly becoming fragmented spaces dominated by economic interests and technological imperatives. In this environment, the "superego of the city" can be understood as the symbolic force that seeks to maintain the integrity of the urban fabric against these fragmenting forces.

The "superego of the city" is essential for understanding the psychological and symbolic dimensions of urban life. Cities are not merely physical spaces; they are also repositories of collective memory, identity, and aspirations (Bourli et al. 2019). The city's superego embodies these intangible elements, guiding urban development in ways that reflect the shared values and ideals of its inhabitants. As cities expand and evolve, this collective superego plays a major role in shaping their character and ensuring they remain places of meaning and belonging (Zhu and Du 2024).

However, the application of psychoanalytic concepts to urban analysis is not without certain challenges. One such risk is the phenomenon of "double barbarism," referring to the chronological misapplication of historical, spatial, and temporal contexts, as well as the anthropological and psychological dangers of extending a concept rooted in individual psychology to the broader societal sphere. Despite these risks, the playful yet critical approach adopted in this study allows for a

deeper exploration of the symbolic and psychological dimensions of urbanization.

This article aims to explore how the "superego of the city" operates within contemporary urbanization, particularly in response to challenges such as metropolization, digitalization, and environmental degradation. By examining the symbolic and psychoanalytic dimensions of urban spaces, this study seeks to provide a nuanced understanding of the forces shaping our cities today and their implications for future development.

2.1 | The City in Space: Historical and Contemporary Perspectives

The concept of the city has long been central to analyses of the "production" of space, encompassing various forms of human settlement, from villages to large urban centers (Lefebvre 1991). However, the advent of unprecedented globalization has fundamentally transformed the nature of urban spaces. The traditional city, once primarily defined by its geographical, political, and commercial characteristics, is now evolving beyond its original model, as evidenced by novel ideas such as the "15-minute city," which has gained increasing attention from urban planners since the COVID-19 pandemic (Pozoukidou and Chatziyiannaki 2021).

This evolution is driven by the physical materiality of urbanization, compounded by radical digital transformations and the escalating challenges of climate change. The density and complexity of contemporary urbanization challenge the foundational concept of the city, prompting a reevaluation of its relevance within the context of a global, abstract space. The phenomenon of metropolization—a spatial and socio-economic process driven by financial, monetary, and administrative forces—further complicates our understanding of the city's form and function.

2.2 | Metropolization and the Fragmentation of Urban Space

Henri Lefebvre's analysis of the "production" of space highlighted the crisis of the contemporary city, particularly the role of land rent in the fragmentation and valorization of space (Lefebvre 1991). In the 21st century, the proliferation of the global urban system empirically validates Lefebvre's insights. The rapid expansion of urban areas, coupled with demographic growth and industrial expansion, has fragmented the traditional hierarchy of cities, towns, and villages. An excellent example of this is given by Rustiadi et al. (2021), who studied the growth of the Jakarta megacity, which has expanded to cover large sections of rice fields in the surrounding region. The conversion of these areas has led to significant changes in the local population's traditional way of life as their towns and villages are swallowed up by the ever-expanding megacity.

This fragmentation has contributed to the rise of the cyber-city and a disjointed global urban system characterized by chaotic spatial configurations. As a spatial phenomenon, metropolization has significant implications for urban planning, real estate, and the lived experiences of urban inhabitants. The increasing volatility of urban real estate, which is exacerbated by digital technology and global financial flows, has created a market increasingly detached from the needs and desires of citizens.
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2.3 | The Superego of the City: Symbolic and Psychoanalytic Considerations

Drawing on Freud's psychoanalytic theory, this article proposes that the city can be symbolically represented as a character with its own superego. Though symbolic, this superego exerts real operational power within the urban space and influences the behavior and identity of its inhabitants. The city, as a non-living artifact, embodies the intelligence and labor of its residents. However, much like Freud's conception of the human superego, the city's superego operates as an authoritarian force, conditioning opportunities for existence within the urban environment.

In this context, we explore the notion of the city as a historical personality, which is shaped by both its objective materiality and its subjective representations. As a symbolic entity, the city's superego exerts moral and operational influence on urban life, particularly in moments of economic, ecological, and social crises.

Given the implications of metropolization, digitalization, and environmental degradation for the future of urban spaces, the traditional concept of the city is increasingly challenged by the forces of globalization and technological change. In response, this framework advocates for a new urban consciousness that recognizes the symbolic and operational power of the city's superego in shaping the future of urban life.

This new consciousness must account for the complex interplay between the physical, social, and symbolic dimensions of urban space. It must also address the ecological (Ahmed et al. 2020) and social (Pakniany and Rakuasa 2023) challenges posed by contemporary urbanization, promoting a more sustainable and equitable approach to urban development. We suggest that the "superego of the city" can be analyzed according to the following dimensions:

3 | CASE STUDY

This analytical framework is applied to the case presented by **?**, which examines the challenges and opportunities associated with healthcare waste disposal during the COVID-19 pandemic. Their study emphasizes the importance of integrating Circular Economy (CE) principles with Industry 4.0 technologies to develop smart city infrastructures, specifically focusing on smart healthcare waste disposal systems. **?** identify

† Authors own elaboration

TABLE 1 Relevance of the "Superego of the City" Across Various Urban Dimensions

Dimension	Description	Relevance to "Superego of the City"
Cultural Identity	The collective memory, values, and traditions that define the unique character of a city.	Reflects how the city's superego preserves cultural heritage against the homogenizing forces of globalization.
Urban Governance	The policies, regulations, and governance structures that manage urban development and public spaces.	Represents the city's moral and ethical standards as enacted through laws, planning, and regulation.
Social Cohesion	The degree of social integration and the strength of community ties within the urban population.	The superego mediates between individual desires and the collective good. It promotes social harmony and cohesion.
Environmental Sustainability	The city's approach to balancing development with ecological preservation, including green spaces, pollution control, and resource management.	Demonstrates how the superego protects the natural environment from the excesses of urbanization and industrialization.
Spatial Organization	The physical layout and design of urban spaces, including the distribution of residential, commercial, and public areas.	The superego influences spatial planning, ensuring urban design aligns with cultural and ethical considerations.
Economic Practices	The economic activities and practices within the city, including the balance between commercial development and social equity.	Examines how the superego guides economic development to prevent exploitation and promote equitable distribution of resources.
Symbolic Representation	The use of symbols, monuments, and public art that embody the city's identity and values.	The superego reinforces the city's identity through symbolic representations that reflect its history, values, and aspirations.
Technological Integration	The incorporation of technology into urban life, including smart city initiatives and digital infrastructure.	The superego regulates the integration of technology to ensure it enhances, rather than diminishes, the quality of urban life.
Psychological Well-being	The mental health and overall well-being of the city's inhabitants, influenced by urban design, social policies, and public services.	Reflects how the superego maintains balance between the pressures of urban life and the psychological well-being of its residents.
Historical Continuity	The preservation and integration of historical sites and narratives within the modern urban environment.	The superego ensures that the city's development respects and incorporates its historical legacy.

seven critical criteria for developing such a system, including the use of Radio Frequency Identification (RFID) technology for waste tracking, GPS for monitoring waste collection vehicles, and digital connectivity between healthcare centers, waste disposal firms, and pollution control boards. The authors employ a Decision-Making Trial and Evaluation Laboratory (DEMATEL) method to analyze the interactions among these criteria and prioritize those that are most influential in establishing an effective and sustainable waste disposal system.

Cultural Identity

The integration of Circular Economy (CE) principles into waste management systems reflects a broader cultural shift toward sustainability. However, it is crucial to address how this approach connects with local cultural identities, such as traditional waste management practices in different regions of India. The "superego of the city" ensures that new technologies and practices align with local cultural values of sustainability and resourcefulness.

Urban Governance

The digital connectivity established between healthcare centers, waste disposal firms, and pollution control boards is a critical aspect of urban governance. This connectivity reflects the superego's role in establishing and enforcing ethical standards for waste management, ensuring compliance, and promoting transparency in the disposal of hazardous materials. Such governance is essential for maintaining public trust and safeguarding environmental and public health standards.

Social Cohesion

The emphasis on providing the public with access to a pollution control board feedback app suggests an attempt to engage citizens in the waste management process. This engagement fosters a sense of shared responsibility and accountability, enhancing social cohesion by balancing individual and collective interests.

Environmental Sustainability

At the core of the focus is environmental sustainability, primarily driven by the CE model. The superego's role here is to protect the environment by promoting sustainable practices, minimizing waste, and ensuring that healthcare waste is disposed of with minimal ecological impact. The integration of smart technologies enhances the efficiency and effectiveness of these practices.

Spatial Organization

The implementation of GPS and GIS tracking for use in waste collection vehicles highlights the importance of spatial organization in managing urban waste effectively. The superego's influence is seen in the careful planning and coordination of waste management activities to ensure they are integrated into the broader urban infrastructure, maintaining cleanliness and order without disrupting city life.

Economic Practices

The CE model aims to maximize resource use and minimize waste, carrying significant economic implications. By reducing reliance on virgin materials and promoting recycling, the superego guides economic practices toward sustainability, ensuring that economic activities related to waste management do not compromise environmental and social well-being.

Symbolic Representation

The digital and physical infrastructures for waste management, such as RFID labels and GPS tracking, symbolize the city's commitment to modernity, efficiency, and sustainability. These elements represent the city's superego, demonstrating its dedication to protecting public health and environmental protection through technological innovation.

Technological Integration

The focus on Industry 4.0 technologies—such as IoT, AI, and big data—reflects the superego's role in regulating and guiding the integration of technology into urban life. The objective is to ensure that technological advancements enhance the quality of life in the city, particularly in waste management, providing significant benefits in terms of efficiency, transparency, and environmental protection.

Psychological Well-being

Effective healthcare waste management, particularly during a pandemic, directly impacts the psychological well-being of urban residents. By ensuring safe and efficient waste disposal, the superego helps to alleviate public concerns about health risks, contributing to a broader sense of security and well-being.

Historical Continuity

Although not explicitly addressed in the article, the superego would work to ensure that new waste management practices do not erase or disregard traditional methods that may still hold value. Instead, it seeks to combine these practices with newer methods in a way that honors the past while embracing future advancements, aiming to maintain a sense of continuity in the city's approach to waste and resource management.

4 | DISCUSSION

This analysis illustrates how the ”superego of the city” manifests in the planning and implementation of smart healthcare waste disposal systems. By prioritizing sustainability, technological integration, and public engagement, the city's superego ensures that waste management systems align with broader ethical, social, and environmental goals, thereby contributing to the overall well-being of the urban population. The concept of the ”superego of the city” contributes significantly to the literature on urban development, waste management, and smart city planning by incorporating an ethical, cultural, and psychological analysis into the technological and economic frameworks that currently dominate the discourse.

Ethical and Psychological Framework for Smart Cities

The concept of the “superego of the city” introduces an ethical and psychological dimension to smart city planning, which more often focuses on technological and economic efficiency (Nam and Pardo 2011, Mohanty et al. 2016). By considering the superego, urban planners and policymakers are encouraged to reflect on the moral imperatives that should guide the development and implementation of technologies like Industry 4.0 in urban environments (Cocchia 2014). This perspective ensures that the deployment of these technologies aligns with efficiency goals and also with broader societal values, including equity, sustainability, and social justice.

Integrating Circular Economy and Industry 4.0 with Cultural Identity

The article by Chauhan et al. (2021) underscores the importance of integrating Circular Economy (CE) principles with Industry 4.0 technologies to create sustainable urban waste management systems. The “superego of the city” builds on this by emphasizing the need to align these technological and economic strategies with the cultural identity and historical continuity of urban environments (Ghisellini et al. 2016). This integration helps ensure that the transition to smart cities does not alienate communities or disrupt cultural practices but instead enhances and preserves local identities through sustainable practices.

Enhancing Social Cohesion through Technological and Environmental Ethics

The “superego of the city” plays a significant role in promoting social cohesion by ensuring that the benefits of smart city technologies are equitably distributed among all citizens. In the context of healthcare waste management, this means that digital connectivity and smart technologies, as discussed by Chauhan et al. (2021), should be implemented in ways that foster community participation and accountability (Campion et al. 2015, Hens et al. 2018). The superego ensures that the social and environmental impacts of waste management practices are considered alongside economic and technological factors, which contributes to a more holistic approach to urban governance (Luttenberger 2020).

Environmental Sustainability as a Moral Imperative

The literature on Circular Economy and Industry 4.0 often focuses on the technical and economic benefits of these approaches, such as resource efficiency and cost savings (Esmaeilian et al. 2018). However, the

concept of the "superego of the city" reframes environmental sustainability as a moral imperative rather than merely an economic or technical challenge. This perspective aligns with the argument made by Chauhan et al. (2021), who state that achieving a sustainable healthcare waste disposal system requires a strong commitment to CE principles, supported by smart technologies that monitor and optimize waste management processes (Geng et al. 2014, Birat 2015).

Long-Term Urban Planning and Historical Continuity

The "superego of the city" encourages urban planners to consider the long-term impacts of their decisions, including how future generations will view current practices (Stahel 2013). This approach complements the emphasis in Chauhan et al. (2021) on the need for sustainable and smart solutions to healthcare waste management, ensuring that today's practices contribute positively to the future identity and functionality of cities (Ness 2008). By integrating historical continuity into the planning process, the superego helps to preserve the legacy and cultural heritage of urban environments while embracing modern technological advancements.

The concept of the "superego of the city" contributes to the literature by adding a critical ethical and psychological dimension to the study of smart cities, Circular Economy, and Industry 4.0. It challenges researchers and practitioners to consider the broader societal, cultural, and environmental implications of urban planning decisions to ensure that the development of smart cities is guided by principles that promote efficiency and innovation, as well as justice, sustainability, and cultural preservation. This approach enriches the existing literature by providing a more comprehensive framework for understanding the complex interplay between technology, economy, and society in the context of urban development.

5 | CONCLUSION

The concept of the "superego of the city" offers a profound and innovative lens through which to analyze the complexities of contemporary urbanization. As cities navigate the challenges of rapid growth, technological innovation, and socio-economic transformation, this framework underscores the importance of aligning urban development with the collective moral and ethical values that constitute the cultural and symbolic identity of urban spaces (Lefebvre 1991, Lévy and Rasoloniaina 2019). By viewing cities not merely as physical entities but as embodiments of shared aspirations and historical continuity, the "superego of the city" serves as a counterbalance to the fragmenting forces of modernization and globalization (Freud 1930, Lefebvre 1991).

In the context of smart city initiatives—particularly in areas such as healthcare waste management—the integration of Circular Economy (CE) principles with Industry 4.0 technologies marks a significant step toward sustainability and efficiency (Ghisellini et al. 2016, Chauhan et al. 2021). However, as this study has shown, these technological advancements must be guided by the ethical imperatives embodied in the city's superego (Cocchia 2014). This ensures that the implementation of smart technologies enhances urban functionality while preserving the cultural heritage, social cohesion, and environmental integrity that are essential to the well-being of urban populations (Mohanty et al. 2016, Nam and Pardo 2011). Consequently, future studies could look at the role of cultural heritage, social cohesion, and environmental integrity in the adoption of smart technologies, thus avoiding eventual resistance (Lissillour and Rodríguez-Escobar 2020, Lissillour 2021).

The case study on healthcare waste management during the COVID-19 pandemic, as discussed by Chauhan et al. (2021), shows the potential for smart technologies to address pressing urban challenges. Yet, it also reveals the need for a more holistic approach that considers the ethical and psychological dimensions of urban life (Esmaeilian et al. 2018), including the emerging issue of artificial intelligence (Sahut et al. 2023, Lissillour and Monod 2024). By applying the concept of the "superego of the city" to this analysis, we can better understand how to create urban environments that are technologically advanced while also being socially just, culturally rich, and environmentally sustainable (Luttenberger 2020, Geng et al. 2014).

As cities continue to evolve, the "superego of the city" will play an increasingly critical role in shaping their future. This concept challenges urban planners, policymakers, and researchers to think beyond economic efficiency and technological innovation, urging them to consider the broader societal impacts of their decisions (Stahel 2013, Birat 2015). This paves the way for collective research design (Beaulieu et al. 2024) in which researchers act as boundary spanners between urban planners and policymakers to find ways to integrate ethical, cultural, and psychological dimensions of urban development into the planning and governance of smart cities to help ensure that our urban spaces remain places of meaning, belonging, and shared humanity (Lefebvre 1991, Freud 1930).

In conclusion, the "superego of the city" provides a valuable addition to the literature on urban development, offering a comprehensive framework that bridges the gap between technology, culture, and ethics. As we move forward in the age of smart cities, this concept will be essential in guiding the creation of urban environments that reflect the highest aspirations of their inhabitants, fostering sustainable, equitable, and resilient cities for generations to come (Chauhan et al. 2021, Ghisellini et al. 2016).

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CONFLICT OF INTEREST

The authors declare no potential conflict of interests.

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SUPPORTING INFORMATION

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