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“The symbolic value of Madrid Nuevo Norte Project (MNNP)”

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Abstract:

Madrid Nuevo Norte (MNNP) is an urban redevelopment project applied in the city of Madrid in Spain. It will occupy an area of 3.3 million square meters and will modify a large part of the northern area of the city. New public spaces, office buildings, commercial areas, homes, infrastructure, and green areas will be created. In relation to this, the aim of this paper was to examine the expected symbolic value of MNNP for the community of Madrid. For that purpose, questionnaires were handed out to 147 professionals relevant to the urban development of the Spanish capital (urban planners, architects, engineers, academics, project managers, sustainability consultants, real estate managers, etc.). Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) techniques were applied to analyze data. The results firstly indicated that the symbolic value of MNNP is reflected in the overall success and performance of the Mega project as well as in its acceptance from the citizens of Madrid. Critical aspects in this context are affordable housing for potential residents, satisfaction of the community from the establishment of the project, public approval, deliverables in line with expected targets, ability of local authorities to effectively manage MNNP and project completion within budget. MNNP incorporates considerable symbolic value for the citizens of Madrid. Its value is reflected mainly in economic and social terms. However, the overall value of the project will be significantly enhanced if environmental concerns are considered. Then, the sustainable character of the project will be underscored, revealing the necessity of Mega projects to be aligned with the principles of sustainable development. The findings of the study are expected to help local agencies and actors to assess the symbolic value of Mega projects, such as MNNP, in creating sustainable city schemes, contributing to the fair and equitable development of European metropolises.

Key words: Madrid Nuevo Norte (MNNP), Urban development, Madrid, Symbolic value, Sustainability, Mega Projects.

1. Introduction

The turn of the 21st century has seen the growth of mega projects across the globe, serving not only as keystones of infrastructural development but also as emblematic representations of economic vitality, and technological prowess. Among these transformative endeavors, the Madrid Nuevo Norte project (MNNP) emerges as a paramount exemplar, encapsulating the multifaceted dimensions of urban regeneration, economic revitalization, and the symbolization of a new era in sustainable development (Metaxas et al., 2021; Metaxas, 2024; Baron and Fernandez 2019; Abril 2020; Perez et al. 2021). In particular, MNNP is an urban redevelopment program applied in the city of Madrid in Spain. It will occupy an area of 3.3 million square meters and will modify a large part of the northern area of Madrid. New public spaces, office buildings, commercial areas, homes, infrastructure, and green areas will be created. It is expected that 76% of the total space will be designed for public use (Metaxas et al., 2021; Metaxas, 2024). In relation to this, the purpose of this paper is to examine the expected symbolic value of MNNP for the community of Madrid, aiming to identify the environmental, social, and economic significances embodied in this project.

Mega projects are often heralded for their sheer scale and complexity, yet their symbolic value extends far beyond the tangible realms of constructed landscapes. They are incubators of innovation, platforms for international collaboration, and harbingers of social transformation (Flyvbjerg, 2017; Syn & Ramaprasad, 2019). In the context of Madrid Nuevo Norte, the project transcends its physical manifestation as a mixed-use development, symbolizing Spain's commitment to forward-thinking urban planning, and sustainability, redefining, in a way, the term of metropolitan living (Metaxas et al., 2021; Metaxas, 2024). Therefore, this study positions the MNNP within the broader discourse of mega projects as agents of symbolic capital, examining how such endeavors encapsulate aspirations of progress, sustainability, and social cohesion.

The current study aims to provide a comprehensive understanding of the symbolic value embedded in mega projects, with Madrid Nuevo Norte serving as a focal point

for discussion. By examining the interplay between symbolism and sustainability, the research seeks to contribute to the academic and practical understanding of how mega projects can embody the ideals of a sustainable future. In doing so, it invites a reevaluation of the role of such projects in shaping urban landscapes. In this context, the results of the current study are expected to help local agencies and actors to assess the symbolic value of Mega projects, such as MNNP, in creating sustainable city schemes, contributing to the fair and equitable development of European metropolises.

2. MNNP in brief

As noted earlier, MNNP stands as the most significant urban redevelopment initiative within a European capital. Spanning over 3.3 million square meters, it aims to revitalize a substantial portion of Madrid's northern sector. The project plans to introduce new public spaces, offices, retail outlets, residential areas, infrastructure, and parks. An anticipated 76% of the entire area is designated for public utility. Its approval garnered wide support and agreement from all relevant public entities and the majority of local community associations (Metaxas et al., 2021; Metaxas, 2024). The project's development and urban planning stages involved public engagement processes, which led to adjustments in some initial plans. Castellana Norte District (DCN) is spearheading the project's advancement.

At the heart of this initiative is the transformation of the Chamartín train station into the central hub of Spain's high-speed rail network. This redevelopment will not only modernize the station but also establish a business district in its vicinity. Furthermore, the project will bring about significant changes to the Malmea, San Roque, and Tres Olivos areas, as well as the western part of Las Tablas. The revamped Chamartín station is set to feature an extensive transport interchange that will accommodate city and regional buses, local and long-distance trains, high-speed rail services, and provide connections to the Madrid Barajas Airport, which will be reachable in just 15 minutes (Metaxas et al., 2021; Metaxas, 2024).

The designated green spaces within the project will span 400,000 square meters. Near Chamartín, a novel park will emerge, designed to overlay the railway lines leading

to the station. This park will connect with other green spaces, forming a continuous green corridor from south to north, extending to Monte de El Pardo, a region of significant ecological importance in the Madrid Community. The project envisages the construction of 10,000 residential units, 20% of which will be allocated as social housing. Similar to other planned structures, these residences will be built to achieve high levels of energy efficiency, from their construction through to their daily use. The forthcoming business hub is projected to provide employment for around 130,000 individuals. Plans include the creation of three towering office buildings, each surpassing 200 meters in height, which will be harmoniously integrated with the surrounding green and commercial areas (Metaxas et al., 2021; Metaxas, 2024). Figure 1 illustrates the MNNP's location and its connectivity to major transportation networks.

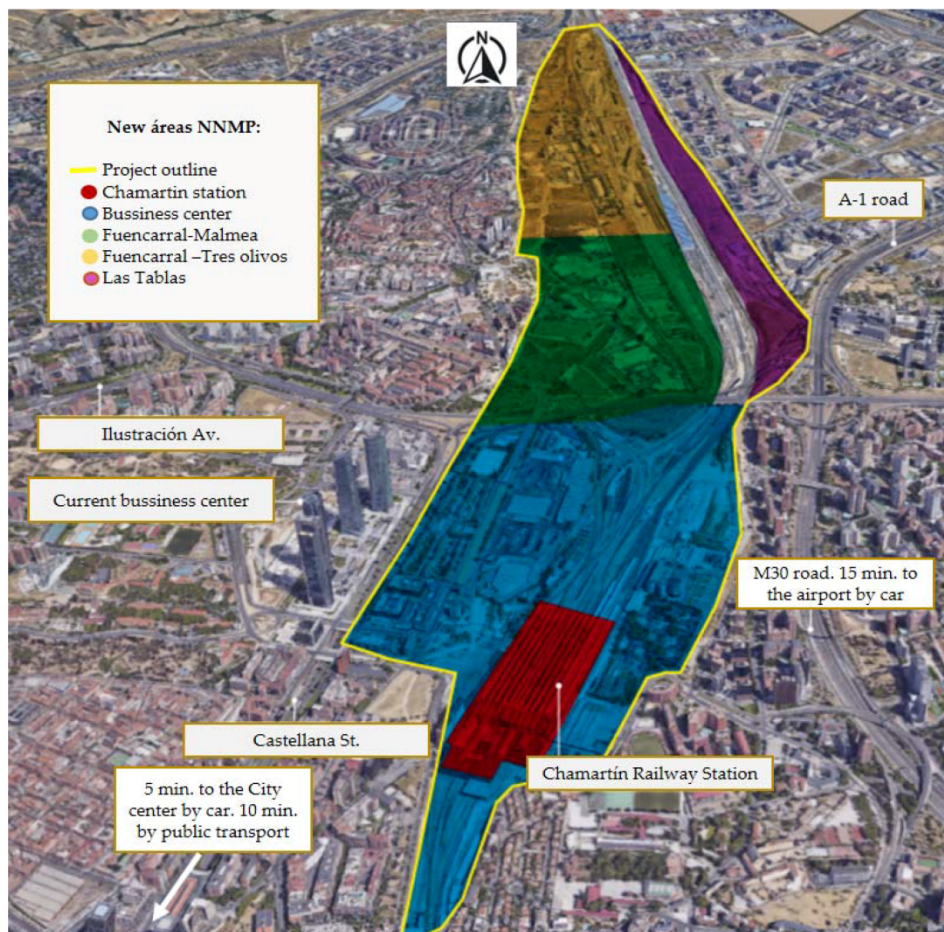


Figure 1. Madrid Nuevo Norte Project (MNNP) map. Location and connections to the main transport networks, *Source: Metaxas et al. (2021)*

3. Symbolic Value of Mega projects

3.1 Performance and Success

Mega projects shape the economic and social landscape of regions (Söderlund et al., 2017). Given their extensive scope and profound implications, the performance of these projects is a subject of considerable interest for stakeholders, including governments, investors, and the public. For example, the success of mega infrastructure projects heavily relies on the expertise and efficiency of the engineering and technical team involved (Wu et al., 2020). The proficiency of these professionals in leveraging cutting-edge technologies and innovative solutions significantly influences the project's ability to meet its technical and quality specifications. Local authorities also play a pivotal role in the planning, approval, and oversight of mega infrastructure projects (Li et al., 2018; Wu et al., 2020). The capacity of local governments and regulatory bodies to manage these projects effectively is critical. The collaboration between project teams and local authorities, along with their shared commitment to project goals, is identified as a key determinant of successful project implementation (Li et al., 2018; Wu et al., 2020).

Besides, authors such as Wu et al., (2020), Song et al. (2018) and Boateng et al. (2015) consider timely completion as a critical indicator of a mega infrastructure project's performance. Challenges such as unforeseen site conditions, regulatory delays, and coordination issues among stakeholders should be effectively addressed. In the same length, financial management is paramount due to their significant investment requirements and economic implications (He et al., 2019; Wu et al., 2020). Factors such as cost estimation accuracy, risk management, financial planning, including the allocation of contingencies and the efficient use of resources, are regarded as critical components of successful project budget management. Lastly, a critical measure of a mega project's success is the extent to which its deliverables align with the intended objectives (Wu et al., 2020). The importance of flexibility in responding to changes without compromising on the project's strategic vision is essential.

In conclusion, the performance of mega projects is influenced by a complex interplay of technical, managerial, financial, and regulatory factors. This section outlined the importance of skilled professionals, effective local governance, disciplined project management, financial control, and goal-oriented project delivery in achieving successful project outcomes. As mega projects continue to play a crucial role in global development, the insights provided above can guide future projects towards more efficient execution and enhanced performance.

3.2 Public Acceptance of Mega projects

While the economic and physical impacts of Mega projects are often highlighted, the social dimensions of such projects require equal attention. Acceptance by the local community, satisfaction among citizens, and the provision of affordable housing emerge as critical factors determining the success of MPs (Banihashemi et al. 2017; Nair & Nayar, 2020; Song et al. 2018; Li et al., 2018; Xing et al., 2009; Wang et al., 2021). Initially, local community acceptance of MPs is influenced by multiple factors, including perceived benefits (e.g., employment opportunities, improved infrastructure), environmental and social impacts (e.g., displacement, ecological degradation), and the process of stakeholder engagement (Banihashemi et al. 2017; Nair & Nayar, 2020; Song et al. 2018; Wang et al. 2021). Early and continuous engagement, along with addressing specific community concerns, can mitigate opposition and foster support towards MPs. Furthermore, citizens' satisfaction with MPs is closely tied to their direct and indirect impacts on individuals' daily lives. This encompasses improvements in accessibility, environmental quality, and economic opportunities (Song et al. 2018; Li et al., 2018). Satisfaction is also influenced by the alignment of projects with public expectations and needs. Song et al. (2018) and Li et al. (2018) add that community involvement is crucial. Involving local communities from the outset not only fosters acceptance but also enriches the project with valuable local knowledge, ensuring that outcomes are socially equitable and environmentally sustainable. It is worth noting that effective participation is facilitated through a variety of mechanisms, including public consultations, participatory planning workshops, stakeholder advisory committees, and the use of digital platforms for broader engagement. Lastly, MPs can significantly affect local housing markets, sometimes leading to increased property

values and rents, which may negatively impact housing affordability. However, strategic planning and policies, such as inclusionary zoning and housing subsidies, can leverage MPs to enhance affordable housing stock (Nair & Nayar, 2020; Xing et al., 2009).

To conclude, Mega projects hold immense potential for societal transformation. However, their long-term success and sustainability hinge on their social acceptance, the satisfaction of the citizenry, and their impact on affordable housing.

Considering what has been mentioned in the above sections, the following research hypothesis can be formulated:

H1: MNNP's success is associated with its public acceptance by the community of Madrid.

4. Mega projects and Sustainability

4.1. Economic Benefits of Mega Projects

Mega projects, defined as large-scale investments into physical infrastructure with significant costs and impact areas, have become pivotal in shaping regional economic landscapes (Söderlund et al., 2017; Flyvbjerg, 2017). The allure of these projects lies in their potential to stimulate economic activity, enhance connectivity, and improve living standards. Overall, in the literature, Mega projects are associated with several benefits on the sectors of employment, tourism, local business, local economic development, investment attraction, and governmental benefits. First and foremost, Mega Projects are labor-intensive endeavors, requiring a diverse range of skills and manpower. The initiation and ongoing operations of these projects serve as a key advantage to local employment, driving down unemployment rates and fostering skill development. Evidence shows that these projects not only generate direct employment opportunities but also indirect jobs through multiplier effects in related industries and services (Ugwu & Haupt, 2007; Nair & Nayar, 2020; Song et al., 2018; Xing et al., 2009; Li et al., 2018; Karji et al., 2019). Moreover, infrastructure improvements significantly enhance a region's tourism appeal by facilitating access, improving amenities, and enriching the visitor experience. As it is stated by Ugwu & Haupt (2007), strategic Mega

projects can transform locales into prominent tourist destinations, thereby augmenting revenue streams from tourism-related activities.

Additionally, the construction and operational phases of mega projects provide a plethora of opportunities for local businesses. In particular, the dynamics of supply chain benefits, subcontracting opportunities, and the expansion of market access for local enterprises, underpinning the vital role of infrastructure in business ecosystem development (Song et al., 2018; Karji et al., 2019). Beyond immediate economic stimulation, mega projects lay the groundwork for sustained local economic development. Indicatively, Xing et al., (2009) elucidate the role of such projects in enhancing productivity, improving competitiveness, and stimulating innovation within the local economy. Furthermore, Mega projects act as a “magnet” for both domestic and foreign investments. It seems that enhanced infrastructure lowers transaction costs, mitigates risks, and improves the overall investment climate, thereby attracting a wider array of investment into the region (Karji et al., 2019). Finally, Mega projects provide economic benefits for local government. Increased tax revenues, improved public services, and the ability to leverage infrastructure for further developmental initiatives are among the key benefits highlighted (Li et al., 2018). Moreover, the role of public-private partnerships in facilitating these projects, thereby spreading risk and enhancing efficiency, is also crucial.

In sum, Mega infrastructure projects stand at the confluence of economic development and societal progress. As evidenced through various dimensions explored before, the economic benefits of these projects are profound and multifaceted, encompassing direct and indirect impacts across employment, tourism, local business, economic development, investment attraction, and governmental advantages. For policymakers and stakeholders, understanding these benefits is crucial for strategic planning and sustainable economic growth. Considering the above and focusing in case of MNNP in Madrid the following hypothesis can be formulated:

H2: MNNP's success is associated with the achievement of economic benefits for the community of Madrid.

4.2 Environmental Benefits of Mega projects

In the context of growing environmental concerns and the urgent need for sustainable development, Mega projects are increasingly being designed with a focus on environmental benefits. These large-scale projects have the capacity to transform not only economic landscapes but also environmental dynamics. This is strongly underlined in the literature. For example, efficient urban and land use is pivotal in reducing the ecological footprint of cities and communities. Mega infrastructure projects have the ability to promote densification, mixed-use development, and transit-oriented development, thereby minimizing sprawl and preserving natural habitats (Song et al., 2018; Xing et al., 2009). Besides, Mega projects offer opportunities to mitigate the risks associated with climate change (Song et al., 2018; Xing et al., 2009). For example, infrastructure developments in coastal defense, water management, and urban greening contribute to resilience against climate-induced disasters. Additionally, the adoption of sustainable construction materials and methods that reduce carbon emissions during the construction phase is also critical. In the same length, the potential for Mega projects to drive energy savings is significant (Nair & Nayar, 2020; Xing et al., 2009). In particular, energy-efficient design in buildings, transportation systems, and other infrastructure components, highlight how these projects can lead to substantial reductions in energy consumption. The impact of such savings on reducing overall greenhouse gas emissions and contributing to national and global energy efficiency targets should be taken under consideration. Nair & Nayar (2020) add that integrating green energy sources (solar, wind, hydro, etc.) into mega infrastructure projects is essential for transitioning to sustainable energy systems.

Moreover, public open spaces are vital for environmental health and human well-being. Mega projects can incorporate and enhance these spaces, providing benefits such as improved air quality, enhanced biodiversity, and increased opportunities for recreation and social interaction (Ugwu & Haupt, 2007; Song et al., 2018; Li et al., 2018). Likewise, green spaces within urban environments play a crucial role in enhancing biodiversity, providing recreational areas for communities. Mega projects can incorporate green spaces, including parks, green roofs, and urban forests, thereby contributing to ecological balance and enhancing the quality of life for residents (Nair

& Nayar, 2020; Song et al., 2018; Xing et al., 2009; Li et al., 2018; Karji et al., 2019). What is more, the adoption of green building practices is essential for reducing the environmental footprint of mega projects (Li et al., 2018; Karji et al., 2019). Sustainable design principles, such as energy efficiency, water conservation, use of sustainable materials, that can be integrated into the construction of buildings and other infrastructure components are issues of vital importance. Also, preserving the natural landscape and resources during the construction is critical for maintaining ecological integrity (Song et al., 2018; Karji et al., 2019). The importance of conducting thorough environmental impact assessments and implementing mitigation measures to ensure that the construction and operation of these projects do not degrade natural habitats or deplete natural resources is indispensable. Finally, Ugwu & Haupt (2007) and Li et al. (2018) highlight the concept of ecological design, which seeks to create infrastructure that is not only functional but also aesthetically and ecologically integrated with the natural landscape. Projects that have successfully achieved this integration, provide benefits such as enhanced ecosystem services, improved resilience to natural disasters, and increased recreational and aesthetic value.

In conclusion, Mega projects, when carefully planned and executed with a focus on environmental sustainability, offer a unique opportunity to enhance the ecological health of urban and rural areas alike. By incorporating sufficient green spaces, adhering to green building practices, preserving natural landscapes and resources, and harmonizing with the local natural setting, these projects can contribute significantly to the environmental well-being and resilience of communities. Similarly, by promoting efficient land use, mitigating climate change risks, saving energy, utilizing green energy, and providing public open spaces, these projects can lead the way towards a more sustainable and environmentally friendly future. Moving forward, it is imperative for stakeholders involved in the planning, design, and implementation of mega projects to prioritize these environmental considerations, thereby ensuring that such projects serve as catalysts for sustainable development. Therefore, considering the environmental benefits mentioned in the literature, the third hypothesis can be formulated as follows:

H3: MNNP's success is associated with the achievement of environmental benefits for the community of Madrid.

4.3 Social Benefits of Mega projects

Mega infrastructure projects represent substantial investments in the built environment, aiming not only to meet the immediate needs of urbanization but also to address long-term societal challenges. These projects, ranging from transportation networks to urban redevelopment initiatives, play a pivotal role in shaping the social and economic contours of cities. Firstly, Mega projects provide unique opportunities to integrate local cultural and historical heritage. By incorporating design elements that reflect traditional aesthetics and values, these projects help preserve the cultural identity of a place while adapting to contemporary needs (Ugwu & Haupt, 2007; King et al., 2009; Li et al., 2018; Karji et al., 2019). Examples include the restoration of historic sites and the integration of local art into public spaces, enhancing community pride and social cohesion. Besides, one of the most tangible benefits of mega infrastructure projects is their capacity to alleviate traffic congestion (Song et al., 2018; Karji et al., 2019). Through the development of efficient public transportation systems and road networks, these projects can significantly reduce travel times, lower vehicle emissions, and improve overall urban mobility. This not only contributes to environmental sustainability but also enhances the daily lives of residents by providing more time for personal and community activities. Mega projects can also improve the quality of life for urban dwellers by providing access to improved amenities and services. These include green spaces, recreational facilities, and enhanced public services, which contribute to physical and mental well-being (Nair & Nayar, 2020; King et al., 2009; Wu et al., 2020). Moreover, the development of efficient utility infrastructures ensures reliable access to clean water, electricity, and sanitation, fundamental to a healthy urban living environment.

Another key social benefit of Mega projects is that they offer a platform for resilient urban planning (Karji et al., 2019). By incorporating climate-adaptive and disaster-resilient features, these projects prepare cities to withstand and recover from adverse

events, ensuring the safety and security of urban populations. Resilient infrastructure is key to minimizing the impact of natural disasters and climate change on vulnerable communities. Karji et al. (2019) also note that the expansion of mobility and transportation networks is a cornerstone of mega infrastructure projects. By improving connectivity through the development of roads, bridges, public transit systems, and airports, these projects facilitate economic growth and social integration. Enhanced transportation networks enable individuals to access a wider range of employment, education, and healthcare services, bridging the gap between different parts of the city and surrounding regions. Likewise, access to basic services and urban facilities, such as banks, hospitals, and parks, is significantly improved through mega projects (Karji et al., 2019). These facilities not only serve the functional needs of the community but also act as social hubs, fostering interactions and strengthening community bonds. The strategic placement of such amenities can lead to more equitable urban development (Nair & Nayar, 2020; Xing et al., 2009; Karji et al., 2019), ensuring that all residents have access to essential services. Furthermore, by strategically locating infrastructure projects, cities can enhance the proximity of residential areas to employment centers. This reduces commute times, lowers transportation costs, and contributes to a better work-life balance for citizens. Moreover, it can stimulate local economies by increasing accessibility to job opportunities, thus reducing unemployment and underemployment rates (Karji et al., 2019). Finally, promoting sustainable modes of transportation, such as walking and cycling, is another critical advantage (Karji et al., 2019). By designing pedestrian-friendly streetscapes and dedicated bike lanes, Mega projects encourage active transportation, reducing reliance on motor vehicles and contributing to public health and environmental sustainability.

To conclude, Mega projects offer several social benefits that contribute to the overall well-being of urban populations. By fostering cultural preservation, enhancing mobility, improving access to services, and promoting sustainable living practices, these projects play a crucial role in shaping resilient and inclusive cities. Therefore, adjusting the academic theory in the case of MNNP, the fourth research hypothesis is formulated as follows:

H4: MNNP's success is associated with the achievement of social benefits for the community of Madrid.

Based on the previous analysis the conceptual framework of the study is illustrated in figure 2.

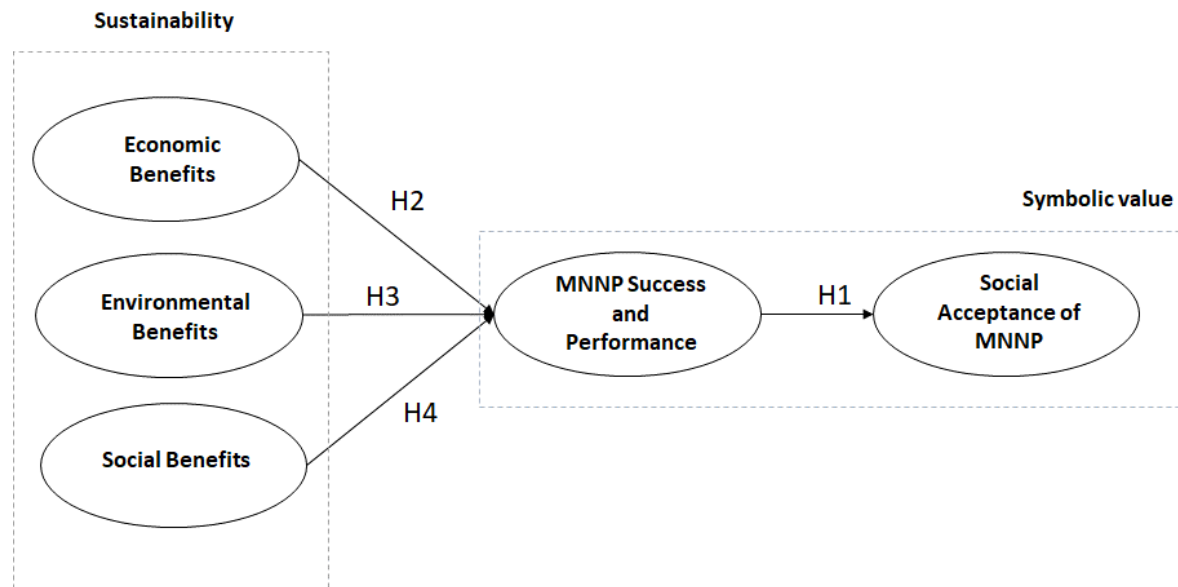


Figure 2. Conceptual Framework of the study

5. Methods

5.1 Research process

To meet the study's research goals, a quantitative methodology was employed. Questionnaires were distributed online to 147 professionals involved in Madrid's urban development sector. The respondents comprised urban planners, architects, engineers, scholars, project managers, sustainability advisors, real estate executives, etc., all based in Madrid. Convenience sampling approach was used that is defined as a non-probability sampling method where the sample is taken from a group of people easy to contact or to reach (Malhotra & Bricks, 2003; 2006). It involves selecting participants because they are available or easy to find based mainly in the judgement of researchers (Saunders et al., 2016; Malhotra & Bricks, 2006). Research instruments

were primarily shared via social media, accompanied by a letter detailing the study's nature and objectives. Initially, 250 questionnaires were sent and 147 valid responses were gathered, achieving a response rate of 58 %. The demographic features of the sample are illustrated in the table below.

Table 1. Sample Demographics

Gender		
	N	%
Male	100	68,0
Female	47	32,0
Age		
18-29	12	8,2
30-39	42	28,6
40-49	55	37,4
50-59	30	20,4
60+	8	5,4
Education level		
University/College	17	11,6
Master	92	62,6
PhD	38	25,9
Total	147	100,0

5.2 Research instrument

A short version of the questionnaire developed by Metaxas et al. (2021) was used. In particular, the research instrument included 35 items derived from previous empirical studies adjusted in the case of MNNP. These items were classified in four sections, namely Economic Benefits, Environmental Benefits, Social Benefits, MNNP success and Public acceptance. In all questions respondents denoted their level of agreement/disagreement by using a 7-point Likert rating scale (1=strongly disagree, 7=strongly agree). The internal consistency of each section was measured by Cronbach's A, which in all cases was greater than 0.8 (Malhotra & Bricks 2003; 2006).

5.3 Methods of analysis

Data analysis was performed using SPSS version 25, JASP, and the Lavaan package in R, a well-regarded statistical analysis toolkit known for its structural equation modeling (SEM) and associated methods. Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) techniques were used. CFA is a statistical technique used to test whether the data fit a hypothesized measurement model. It is used to confirm or reject the theoretical structure of a set of variables (Kline, 2010). CFA is a sophisticated tool for testing theoretical models about the structure of relationships between observed and latent variables. It allows researchers to confirm hypotheses about these structures in a quantitative manner, providing insights into the validity of constructs and the measurement instruments used (Bollen, 1989). In the next stage of the analysis SEM was applied. As stated by Hair et al. (2017), SEM is a powerful tool for examining theoretical models and relationships between variables, offering insights into complex phenomena that are difficult to capture with simpler statistical techniques. Covariance-based SEM was employed, using the maximum likelihood method (ML) for parameter estimation. Missing data were handled by excluding cases listwise.

6. Analysis

6.1 Confirmatory Factor Analysis (CFA)

CFA was used to validate the results of the Exploratory Factor Analysis (EFA) from the study of Metaxas et al. (2021), who had also created the research tool. The measurement model is illustrated in table 2. Several factors were removed to enhance the overall validity of the model. Almost all factor loadings were larger than 0.7. In particular, the model included five latent variables, namely: Economic Benefits (5 constructs), Public acceptance (3 constructs), Environmental Benefits (5 constructs), Social Benefits (5 constructs) and MNNP success and Performance (3 constructs). Data had good fit in the model since the criteria mentioned by Hair et al. (2017) were met: CFI = 0.917, TLI = 0.903, NNFI = 0.903, GFI = 0.943. Moreover, Standardized Root Mean Square Residual (SRMR) was less than 0.08 (0.058), following the criteria mentioned by Hooper et al. (2008). Fornier and Larker (1981) also note that Composite Reliability

(CR) should be greater than 0.60 and Average Variance Extracted (AVE) greater than 0.5. These criteria were also met in the current study, ensuring convergent validity. Finally, discriminant validity was also ensured since the roots of AVE were greater than the correlations among dimensions (see table 3).

Table 2. CFA results

Factor	Factor Loadings	AVE	CR
Economic Benefits (EB)			
Nuevo Norte will have a positive impact on local employment.	0.853	0.631	0.895
Nuevo Norte will have a positive impact on tourism development of Madrid.	0.757		
Nuevo Norte will provide opportunities to local businesses.	0.760		
Nuevo Norte will contribute in the local economic development of Madrid.	0.863		
Nuevo Norte will encourage businesses to make investments in the area.	0.730		
Public Acceptance (PA)			
Overall, the community of Madrid will be satisfied from the establishment of Nuevo Norte.	0.883	0.502	0.733
There is public acceptance towards the project of Nuevo Norte in Madrid.	0.758		
The prices of the houses and residents in Nuevo Norte will be affordable.	0.387		
Environmental Benefits (ENB)			
Nuevo Norte will provide sufficient public open spaces.	0.864	0.673	0.911
Nuevo Norte will provide sufficient green spaces (trees, flora, and fauna in neighborhood).	0.887		
In Nuevo Norte project, green building practices throughout the design and construction processes will be applied.	0.751		

Nuevo Norte will preserve the local character (such as natural landscape) and natural resources during construction.	0.773		
Nuevo Norte is harmonized with the local natural setting and with surrounding.	0.818		
Social Benefits (SB)			
Nuevo Norte will reduce traffic problems in Madrid.	0.735	0.666	0.908
Nuevo Norte will have a positive impact on the quality of living of the citizens of Madrid.	0.886		
Nuevo Norte is aligned with resilient planning enabling future expansions due to population growth.	0.837		
Nuevo Norte will improve proximity to jobs for the residents.	0.839		
Nuevo Norte will enable walking and biking.	0.774		
NN Success and Performance (NNS)			
Local authorities in Madrid have the ability to effectively manage Nuevo Norte.	0.702	0.571	0.798
Nuevo Norte will be completed on budget	0.689		
The results or deliverables of Nuevo Norte will meet the expected objectives.	0.863		

CFI = 0.917, TLI = 0.903, NNFI = 0.903, GFI = 0.943, SRMR = 0.058

Table 3. Discriminant validity

Construct	CR	AVE	EB	PA	ENB	SB	NNS
EB	0.895	0.631	0.794				
PA	0.733	0.502	0.565	0.708			
ENB	0.911	0.673	0.550	0.669	0.820		
SB	0.908	0.666	0.594	0.695	0.800	0.816	
NNS	0.798	0.571	0.503	0.588	0.632	0.624	0.755

* The square root values of AVE are shown on the diagonal

6.2 Structural Equation Modeling (SEM)

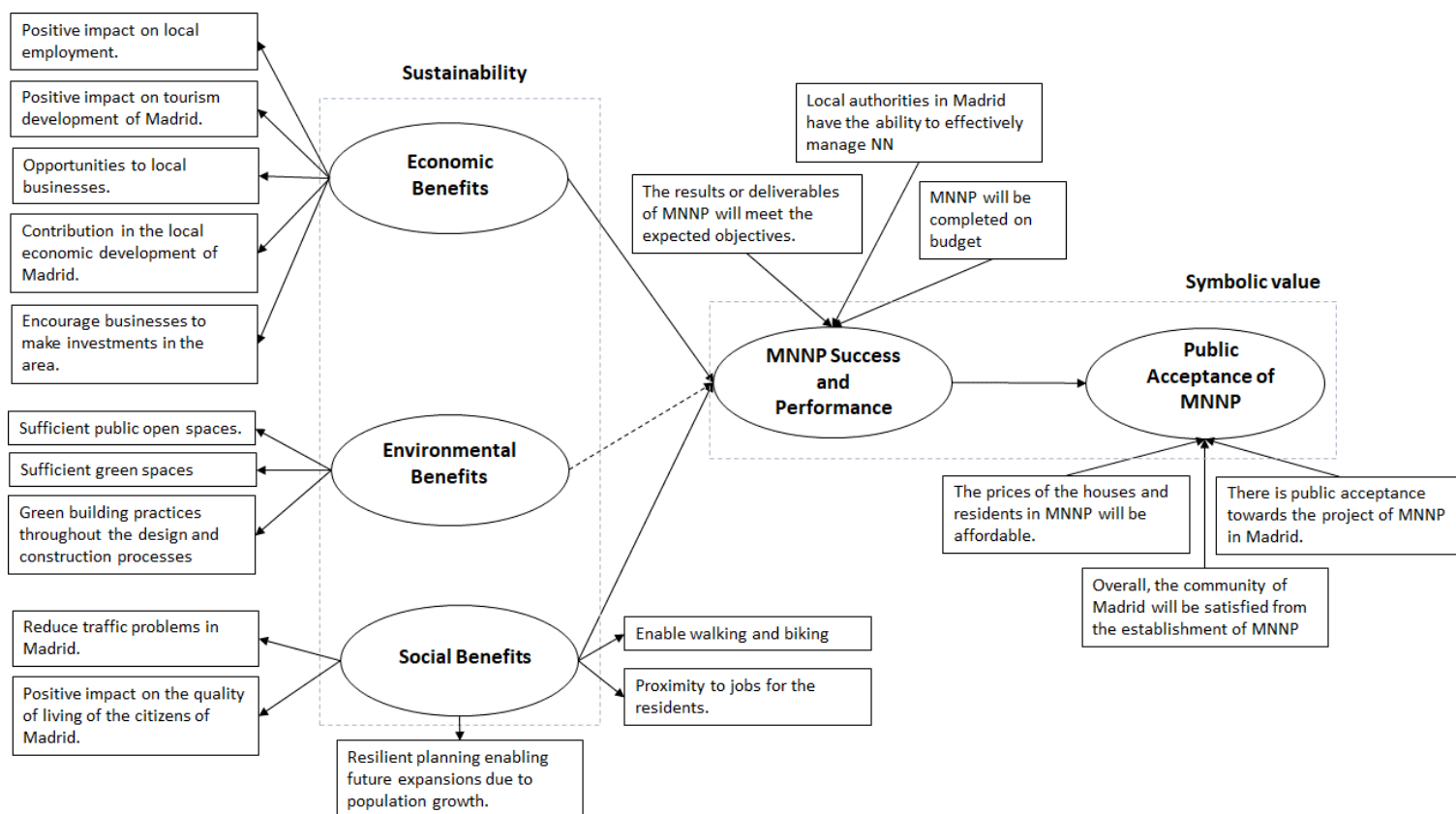
The final structural model is illustrated in figure 3. Several modifications were made to achieve a better model fit. Overall, the final model had a good fit in the data, where: CFI = 0.940, TLI=0.929, NNFI = 0.929, GFI = 0.961, RMSEA= 0.074 and SRMR=0.060. Structural relationships are presented in table 4. As shown below, MNNP's success is associated with its public acceptance by the community of Madrid ($p < 0.001$). Furthermore, economic benefits ($p < 0.05$) and social benefits ($p < 0.001$) are interrelated with the performance and success of MNNP respectively. In contrast, no direct association was found between environmental benefits and MNNP success ($p = 0.535$), revealing the shortcomings of the mega project.

Table 4: Hypothesis testing – SEM results

Hypotheses	Structural Coefficient	P value	Status
H1: MNNP's success is associated with its public acceptance by the community of Madrid	1.016	< .001**	Accepted
H2: MNNP's success is associated with the achievement of economic benefits for the community of Madrid.	0.203	<0.031*	Accepted
H3: MNNP's success is associated with the achievement of environmental benefits for the community of Madrid.	0.061	0.535	Rejected
H4: MNNP's success is associated with the achievement of social benefits for the community of Madrid.	0.570	< .001**	Accepted

Structural coefficients marked with ** represent relationships that are significant at $p < 0.001$.

Structural coefficients marked with * represent relationships that are significant at $p < 0.05$.



CFI = 0.940, TLI=0.929, NNFI = 0.929, GFI = 0.961, RMSEA= 0.074 and SRMR=0.060.

Statistically significant association ———>

No significance - - - - ->

Figure 3. Structural Model - Results

7. Discussion

First of all, the current paper highlighted the importance of the symbolic value of Mega projects. In our work, symbolic value was reflected in the overall success and performance of the Mega project as well as in its acceptance from the members of the community. In particular, and following the paradigms of Wu et al. (2020), Li et al. 2018 and He et al. (2019), MNNP's success and performance is mirrored in three factors: deliverables meet the expected objectives, capacity of local authorities to effectively manage MNNP and project completion within budget. It seems that these three factors are essential in determining the overall effectiveness of Mega projects. Public acceptance of MNNP is also formulated by three aspects: affordable housing for

potential residents, overall satisfaction of the community from the establishment of the project and public approval. These aspects were also mentioned in the studies of Nair & Nayar, (2020), Xing et al. (2009), Song et al. (2018) and Banihashemi et al. (2017). The necessity of mega infrastructure projects to address issues of affordable housing emerges from the multifaceted challenges urban areas face, including rapid urbanization, population growth, and the subsequent strain on housing markets. These large-scale projects have the potential to fundamentally alter the landscape of urban housing, offering solutions that can simultaneously increase housing supply, improve affordability, and enhance living standards for a broad section of the population. Besides, Mega projects such as MNNP hold immense potential to enhance community satisfaction by improving the quality of urban life, fostering social cohesion, promoting a more sustainable way of living.

Moreover, in the case of MNNP it was found that perceived Economic and Social Benefits are directly associated with its success. Economic benefits include positive impact on local employment and tourism development, opportunities to local businesses, contribution in the economic development of Madrid, and investment attraction. These dynamics were also mentioned in previous studies as such of Ugwu & Haupt (2007), Nair & Nayar (2020), Song et al. (2018), Xing et al. (2009), Li et al., (2018) and Karji et al. (2019). Therefore, MNNP is expected to boost local economic growth in Madrid, revealing the critical role that Mega projects can play in terms of development.

Additionally, expected social benefits of MNNP that are associated with its success include improved quality of life for the citizens of Madrid, reduced traffic problems, resilient planning that enables future expansions due to population growth, better proximity to jobs and more walking and biking opportunities. As a result, MNNP incorporates several benefits at the social level, mainly through the upgraded urban and spatial planning of the city. It should be noted that these benefits were also highlighted in the studies of Nair & Nayar (2020), Xing et al. (2009), Wu et al. (2020), Song et al. (2018), and Karji et al. (2019).

In contrast, MNNP lacks in terms of environmental benefits. In other words, the project is not expected to contribute to the environmental enhancement of the

Spanish capital, causing considerations towards its overall success. One of the primary criticisms is the lack of sufficient green and open spaces. While mega projects have the power to transform urban environments, their success should not be measured solely by their scale or economic impact. A truly transformative project is one that balances development with the preservation and enhancement of green and open spaces, recognizing their indispensable role in fostering ecological resilience, promoting health and well-being, and enhancing the quality of urban life. Therefore, the integration of green open spaces is not just desirable but essential for improving the symbolic value of MNNP.

Another concern is the insufficient use of green building practices. Green building practices are environmentally responsible and resource-efficient methods that span from a building's design, construction, operation, maintenance, renovation, and deconstruction stages. These practices aim to reduce the environmental impact of buildings, which are significant consumers of natural resources and major contributors to greenhouse gas emissions (Ying et al., 2012; Shan & Hwang, 2018; Marker et al., 2014). By focusing on sustainability, use of green building practices in the case of MNNP seek not only to minimize environmental damage but also to create healthier and more energy-efficient construction outcomes. Generally, MNNP design and construction should give more emphasis in providing environmental benefits in the community of Madrid, aiming to contribute more to the sustainable function of the city.

In sum, the MNNP incorporates considerable symbolic value for the citizens of Madrid. Its value is mainly reflected in economic and social terms. However, the overall value of the project will be significantly enhanced if environmental concerns are considered. To address these concerns MNNP Nuevo Norte Project could incorporate several strategies such as integrating more green and open spaces within the development plan to support biodiversity, recreational areas, and ecological benefits, utilizing sustainable materials and construction techniques to minimize environmental impacts during the building phase, and implementing high standards of energy efficiency in buildings and infrastructure to reduce carbon emissions and operational costs.

8. Theoretical contributions & Implications

MNNP stands as a theoretical and practical testament to the power of integrated urban development. It illustrates how combining economic vitality with social inclusivity can create spaces that are not only physically revitalized but also symbolically charged. Expected MNNP's success and public acceptance underscore the importance of aligning urban development initiatives with the broader aspirations and values of the community, showcasing how such projects can become symbols of progress, innovation, and collective urban identity. Through the examination of MNNP case, the academic community can gain valuable insights into the potential for urban development projects to shape the future of cities and the lives of those who inhabit them if environmental concerns are taken also into account.

However, the examination of the MNNP, focusing on its symbolic value alongside its economic and social benefits, yields several critical implications for urban development projects, policy formulation, and the broader field of urban studies. These implications extend across the realms of urban planning, economic policy, social integration, and environmental sustainability, offering valuable insights for stakeholders involved in similar large-scale urban development endeavors. First, urban planners and designers are encouraged to integrate both symbolic and functional aspects into the development projects. MNNP illustrates how a project's symbolic value can complement its practical benefits, thereby enhancing public acceptance and success. Secondly, the project highlights the importance of community-centric planning processes that prioritize the needs and aspirations of local populations. Urban developments that offer substantial social benefits, including improved housing, accessibility, and green spaces, are more likely to gain public support and contribute positively to community identity and cohesion.

Additionally, the case of MNNP underlines the necessity of balancing commercial interests with public benefits in urban development projects. By fostering an environment conducive to business while also investing in public infrastructure and amenities, projects can stimulate local economies and attract both investment and public approval. What is more, the current study provides a model for addressing

urban inequality through targeted social and infrastructural investments. By offering affordable housing options within the development, cities can mitigate the risk of gentrification and ensure that the benefits of urban development are equitably distributed.

However, the overall symbolic value of MNNP will be improved if environmental sustainability issues are considered. Green building practices, energy efficiency, and the provision of green and open spaces are essential for reducing the ecological footprint of new developments and promoting sustainable urban living. Lastly, the success and public acceptance of Madrid Nuevo Norte set a precedent for future urban development projects. It highlights the potential for such projects to act as catalysts for comprehensive urban transformation, provided they are thoughtfully designed to balance economic growth, social equity, and hopefully environmental sustainability.

In conclusion, the examination of MNNP symbolic value and its attendant economic and social benefits offers a multidimensional understanding of what contributes to the success and acceptance of urban development projects. These implications serve as valuable lessons for policymakers, urban planners, developers, and communities engaged in or affected by similar projects worldwide.

9. Research limitations

As it is for every study, the current project has several limitations. First, the size of the sample was relatively low, limiting the generalizability of the findings to larger populations. Second, the reliance on quantitative methods, while useful for identifying patterns and testing hypotheses, may not fully capture the nuanced opinions, emotions, and cultural significance that individuals associate with the MNNP. In this context, qualitative data could provide deeper insights into the symbolic value of the project that quantitative measures might overlook. Third, participants' answers may be influenced by social desirability bias, where they provide answers, they believe are socially acceptable or favorable, rather than their true opinions. Furthermore, the cross-sectional approach of the study does not measure the changing perceptions and attitudes towards MNNP over time, especially as the project progresses and more

information becomes available to the public. Finally, the findings from this study may be specific to MNNP and its unique context, limiting the applicability of the results to other urban development projects or contexts without careful consideration of the differences.

10. Suggestions for future research

In relation to research limitations mentioned before, suggestions for future research include the following. To complement the quantitative findings and provide a more nuanced understanding of the symbolic value, future research could incorporate also qualitative methods such as interviews, focus groups, and content analysis. This approach would allow for the exploration of individual narratives, cultural meanings, and the diverse interpretations of the MNNP's symbolic value. Further research could delve into the specific components or dimensions of symbolic value identified in the current study. This would involve exploring aspects such as historical significance, architectural design, environmental impact, and social implications in greater detail to understand their contribution to the overall symbolic value. Furthermore, future studies can use larger samples which represent a broader cross-section of the population, including different socioeconomic backgrounds, ages, genders, and stakeholders directly and indirectly impacted by the project. This research design would enhance the generalizability of the findings and provide a more comprehensive view of the symbolic value attributed to the project. Finally, future papers can conduct longitudinal research that tracks changes in the symbolic value of the MNNP over time, particularly as the project progresses and after its completion, would offer insights into how perceptions evolve and what factors contribute to these changes (Mandic et al. 2023).

11. Conclusions

The aim of this paper was to examine the expected symbolic value of MNNP for the community of Madrid. Results firstly indicated that the symbolic value of MNNP is

reflected in the overall success and performance of the Mega project as well as in its acceptance from the citizens of Madrid. Critical aspects in this context are affordable housing for potential residents, satisfaction of the community from the establishment of the project, public approval, deliverables in line with expected targets, ability of local authorities to effectively manage MNNP and project completion within budget. MNNP incorporates considerable symbolic value for the citizens of Madrid. Its value is reflected mainly in economic and social terms. However, the overall value of the project will be significantly enhanced if environmental concerns are also considered. Then, the sustainable character of the project will be underscored, revealing the necessity of Mega projects to be aligned with the principles of sustainable development. The findings of the study are expected to help local agencies and actors to assess the symbolic value of Mega projects, such as MNNP, in creating sustainable city schemes, contributing to the fair and equitable development of European metropolises.

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Appendixes

Questionnaire

Economic Benefits		Source:
1.	Nuevo Norte will have a positive impact on local employment.	Ugwu & Haupt, 2007; Nair & Nayar, 2020; Song et al., 2018; Xing et al., 2009; Li et al., 2018; Karji et al., 2019
2.	Nuevo Norte will have a positive impact on tourism development of Madrid.	Ugwu & Haupt, 2007
3.	Nuevo Norte will provide opportunities to local businesses.	Song et al., 2018; Karji et al., 2019
4.	The prices of the houses for residents in Nuevo Norte will be affordable.	Nair & Nayar, 2020; Xing et al., 2009
5.	Nuevo Norte will contribute to the local economic development of Madrid.	Xing et al., 2009
6.	Nuevo Norte will contribute to the fair distribution of wealth for the citizens of Madrid.	Xing et al., 2009; Karji et al., 2019
7.	Nuevo Norte will have economic benefits for local government.	Li et al., 2018
8.	Nuevo Norte will encourage businesses to make investments in the area.	Karji et al., 2019
Environmental Benefits		
9.	Nuevo Norte promotes efficient urban land usage.	Song et al., 2018; Xing et al., 2009
10.	Nuevo Norte, as a mega project, addresses climate change problems.	Song et al., 2018; Xing et al., 2009
11.	Nuevo Norte will contribute to energy saving.	Nair & Nayar, 2020; Xing et al., 2009
12.	Nuevo Norte promotes usage of green energy.	Nair & Nayar, 2020;
13.	Nuevo Norte will provide sufficient public open spaces.	Ugwu & Haupt, 2007; Song et al., 2018; Li et al., 2018
14.	Nuevo Norte will provide sufficient green spaces (trees, flora, and fauna in neighborhood).	Nair & Nayar, 2020; Song et al., 2018; Xing et al., 2009; Li et al., 2018; Karji et al., 2019

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| 15. | In the Nuevo Norte project, green building practices throughout the design and construction processes will be applied. | Li et al., 2018; Karji et al., 2019 |
| 16. | Nuevo Norte will preserve the local character (such as natural landscape) and natural resources during construction. | Song et al., 2018; Karji et al., 2019 |
| 17. | Nuevo Norte is harmonized with the local natural setting and with the surroundings. | Ugwu & Haupt, 2007; Li et al., 2018 |

Social factors

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| 18. | Nuevo Norte is designed in a way that represents the local cultural and historical heritage of Madrid. | Ugwu & Haupt, 200; Xing et al., 2009; Li et al., 2018; Karji et al., 2019 |
| 19. | Nuevo Norte will ensure safety for pedestrian and public transport users. | Gills & Morgan, 2020; Pardo & Del Prado, 2020 |
| 20. | The aesthetic quality (visual impact) of Nuevo Norte will be high. | Song et al., 2018; Li et al., 2018; Karji et al., 2019 |
| 21. | Nuevo Norte will reduce traffic problems in Madrid. | Song et al., 2018; Karji et al., 2019 |
| 22. | Nuevo Norte will have a positive impact on the quality of living of the citizens of Madrid. | Nair & Nayar, 2020; Xing et al., 2009; Wu et al. (2020) |
| 23. | Nuevo Norte will reduce social inequity by enabling residents from a wide range of economic levels to live in one community. | Nair & Nayar, 2020 Xing et al., 2009; Karji et al., 2019 |
| 24. | Nuevo Norte is aligned with resilient planning, enabling future expansions due to population growth. | Karji et al., 2019 |
| 25. | Nuevo Norte will expand mobility and transportation. | Karji et al., 2019 |
| 26. | Nuevo Norte will provide basic services and civic facilities (banks, hospitals, parks). | Karji et al., 2019 |
| 27. | Nuevo Norte will improve proximity to jobs for the residents. | Karji et al., 2019 |
| 28. | Nuevo Norte will enable walking and biking. | Karji et al., 2019 |

NN success & Performance

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| 29. | Project engineers and technical professionals have the ability to effectively execute Nuevo Norte. | Wu et al., 2020 |
| 30. | Local authorities in Madrid have the ability to effectively manage Nuevo Norte. | Li et al. 2018; Wu et al. 2020 |
| 31. | Nuevo Norte will be completed on schedule. | Wu et al. 2020 |
| 32. | Nuevo Norte will be completed within budget. | He et al. 2019; Wu et al. 2020 |
| 33. | The results or deliverables of Nuevo Norte will meet the expected objectives. | Wu et al. 2020 |

34. Overall, the Community of Madrid will be satisfied from the establishment of Nuevo Norte. Song et al., 2018; Li et al. 2018
 35. There is public acceptance of the project of Nuevo Norte in Madrid. Banihashemi et al.,2017
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