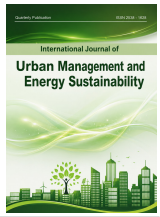
International Journal of Urban Management and Energy Sustainability (IJUMES)

Homepage: http://www.ijumes.com



CASE STUDY RESEARCH PAPER

Spatial Configuration Analysis and Identification of Blind Spots in Large-Scale Shopping Centres Using Space Syntax (Case Study: Floor G2 of Iran Mall, Tehran, Iran)

Shahla Naderi Delpak, Azadeh Shahcheraghi*, Zahra Sadat Saeideh Zarabadi

Department of Architecture, SR.C, Islamic Azad University, Tehran, Iran

ARTICLE INFO

Article History:
Received 2026-07-02
Revised 2026-10-01
Accepted 2026-10-22

Keywords:
Blind spots; DepthmapX; Iran Mall; reverse engineering; Space syntax

ABSTRACT

The marked decline of footfall on the upper floors of large-scale shopping centres is a fundamental challenge of contemporary architectural design. Despite advances in space-syntax theory for analysing spatial behaviour, the systematic use of this toolset to diagnose configurational weaknesses in multi-purpose commercial complexes has received limited attention. This study quantitatively analyses the spatial configuration of Floor G2 of Iran Mall in Tehran and identifies its blind spots using three complementary analytical toolsets axial analysis, visibility graph analysis, and network analysis and, through reverse engineering, derives design rules from five leading global projects to remedy the identified weaknesses. VGA over more than 3,000 points yielded a mean connectivity of 1.00, a mean isovist area of 35 m², and a visual permeability of 0.28. In the network analysis of 166 nodes and 250 edges, 55% of nodes had zero betweenness centrality and only 6 nodes played a strategic role. Integrating the three analyses identified 28 blind spots with a cumulative area of about 450 m², mainly on the eastern, western, and northern fronts, and four spatial categories: strategic cores, latent central spaces, low-access through-paths, and blind spots. On this basis, six soft design rules were derived. A deep tree-like structure, the absence of movement loops, and visual isolation are the main causes of reduced footfall. Combining the three spatial-analysis tools enables precise diagnosis of configurational weaknesses, and the design rules derived by reverse-engineering global exemplars provide an objective basis for redesign and can serve as input to optimization in future research.

DOI: 10.22034/ijumes.2026.2107623.1412

Running Title: Spatial Configuration Analysis and Identification of Blind Spots in Large-Scale Shopping Centres

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
40	08	07

*Corresponding Author:
Email: *shahcheraghi@iau.ac.ir*
Phone: 00989123290241
ORCID: https://orcid.org/0000-0003-1947-2772

INTRODUCTION

Background and problem statement

The architecture, engineering, construction, and operations (AECO) industry has long been recognized as a sector with low productivity and slow adoption of new technologies (El-Ghandour & Al-Huss, 2004; Loyola, 2018). In large-scale, multi-purpose commercial complexes, one of the most consequential expressions of this problem is the sharp decline of footfall on upper floors a phenomenon rooted in unbalanced spatial configuration and in the presence of accessibility "blind spots" that undermines the economic viability of the development. Although space syntax has been widely applied to the analysis of commercial space (van Nes, 2021; Lian & Li, 2023; Zhang et al., 2023), a combined methodological framework that integrates axial, visibility, and network analyses to diagnose configurational weaknesses in a single large-scale complex, and that couples this diagnosis with an explicit, evidence-based redesign logic, remains under-developed.

Space-syntax theory and network analysis

Space-syntax theory rests on the premise that spatial configuration as the primary substrate, independent of secondary variables such as decoration is a predictor of natural movement (Hillier & Hanson, 1984; Hillier, 1996). The theory of natural movement holds that the configuration of the spatial network is itself the main determinant of movement patterns, prior to the attraction of individual destinations (Hillier et al., 1993; Penn et al., 1998). Its core measures integration, spatial depth, choice, and connectivity have been applied extensively to commercial and urban environments (Penn, 2003; Hillier & Iida, 2005), including bazaars, shopping streets, and malls (Jalalian-Hoseini, 2022; Sajadzadeh et al., 2023; Hosseini et al., 2024). Alongside the classic tools of space syntax, spatial network analysis grounded in graph theory and centrality measures provides a more comprehensive picture of the structure of spatial access (Freeman, 1977, 1978). Betweenness centrality captures the extent to which a space lies on the shortest paths between other spaces (its through-movement role), while closeness centrality captures its topological proximity to all other spaces (Altafini & Cutini, 2020; Zaleckis et al., 2022). Applied to buildings, these measures reveal the strategic role of each space within the overall access network (Altuwaijri et al., 2025; Zhou et al., 2024). Reverse engineering is a systematic approach to analysing an existing product or process in order to extract its design logic, structural components, and hidden relationships (Davis, 2013; Li & Bian, 2024; Khachouch et al., 2023). In a data-driven design paradigm (Deutsch, 2015; Carpo, 2017; Bier & Knight, 2024), reverse engineering of exemplary projects can surface transferable rules that link spatial indicators to physical parameters, providing an evidence base for redesign (Gath-Morad et al., 2023).

Research gap, aim, and questions

A systematic review of the literature shows that, although space syntax has been widely used to analyse commercial spaces, a combined methodological framework integrating axial, visibility-graph, and network analyses and linking the resulting diagnosis to a reverse-engineered redesign logic has not been established for a large-scale, multi-purpose complex. Accordingly, the aim of this study is to quantitatively analyse the spatial configuration of Floor G2 of Iran Mall, identify its blind spots through the integration of three complementary analyses, and derive hard and soft design rules by reverse-engineering five leading global projects. The research questions are:

- What is the current state of Floor G2 of Iran Mall in terms of the key space-syntax indicators (integration, spatial depth, choice, connectivity, isovist area, and visual permeability)?
- How many blind spots exist on Floor G2, with what distribution, and with what characteristics?
- What is the structure of the access network of Floor G2 in terms of centrality measures (be-

tweenness and closeness)?

•What rules in two classes, hard and soft can be extracted through reverse engineering of leading global projects to remedy the blind spots and improve the circulation of Floor G2?

The Case Study

The selected case is Floor G2 of the vast Iran Mall project in Tehran. With a built area exceeding 1.4 million square metres, Iran Mall is one of the largest construction projects in the Middle East and one of the most complex contemporary commercial–cultural developments, making it a demanding and representative setting for diagnosing the configurational causes of footfall decline on upper floors.

MATERIALS AND METHODS

Analytical tools

Three complementary categories of analytical tool were used, as summarized in (Tab. 1).

Table 1: Analytical tools used in the study.

Tool	Application	Source
DepthmapX	Axial analysis (integration, spatial depth, choice) and visibility graph analysis (connectivity, isovist area, visual permeability)	Turner, 2001; Varoudis, 2020
Gephi / AGraph	Network analysis, drawing of spatial graphs, and centrality measures (betweenness, closeness)	Freeman, 1977; Manum et al., 2005
Excel	Integration, descriptive statistical analysis, and charting of outputs	Microsoft Corporation

Research procedure

The analysis was conducted in six sequential stages, summarized in (Fig. 1).

•Stage 1: Plan preparation and re-drawing: based on the available architectural drawings, the plan of Floor G2 (including access routes, retail units, voids, escalators, lifts, public spaces, and emergency exits) was re-drawn with high precision in AutoCAD, preserving the main dimensional proportions (scale, space dimensions, column positions, and wall thicknesses) to millimetre accuracy, and exported in DXF format for import into DepthmapX.

•Stage 2: Axial analysis: the prepared plan was imported into DepthmapX (version 10) and axial analysis was performed, reducing the architectural spaces to a set of axial lines (representing straight movement paths) and computing the key indicators of integration, spatial depth, and choice at local and global radii; in total, 1,499 axial lines were extracted.

•Stage 3: Visibility graph analysis (VGA): space was divided into a network of visual nodes on a 0.5 × 0.5 m grid (matching the ergonomic dimension of the human step), and for each cell the visual field was computed, producing the connectivity, isovist-area, and visual-permeability indicators over more than 3,000 points (Turner, 2001; Varoudis, 2020).

•Stage 4: Network analysis with Gephi and AGraph: to obtain a more precise understanding of the spatial hierarchy and the strategic role of each space, the spatial graph of Floor G2 was implemented in Gephi, with each architectural space (shop, corridor, entrance, escalator) represented as a node and each direct connection (door, connected corridor) as an edge, and betweenness and closeness centralities were computed; AGraph was used to draw the justified hierarchy graph (Manum et al., 2005; Manum, 2009).

•Stage 5: Integration and visualization: the outputs of the three analyses were integrated as colour heat-maps (red = highest value, blue = lowest value), spatial-hierarchy diagrams, and numerical tables.

•Stage 6: Reverse engineering and compilation of the rule matrix: by analysing the algo-

rithms and spatial structure of leading global exemplars, redesign rules were extracted in two classes “hard” (physical/structural changes) and “soft” (layout/functional changes) and compiled in a rule matrix.

Design-rule extraction by reverse engineering

After analysing the current state, the design process and spatial structure of five leading global projects (Tab. 2) were examined structurally using reverse engineering. Based on a reverse-engineering checklist (comprising three main components: data inputs, processing engine, and design output), design rules were extracted in two general classes. Hard rules are non-negotiable constraints arising from legal requirements, safety standards, and structural requirements (including mandatory setbacks, height limits, main structural spans, fire-safety requirements, and accessibility standards). Soft rules are optimizable constraints extracted from the behavioural patterns identified in successful projects, which specify causal relationships between spatial indicators and physical parameters.

Table 2: The five leading global projects reverse-engineered in the study.

No.	Project	Laboratory / office	Use
1	Galaxy Soho	ZHA CODE (Zaha Hadid office)	Commercial–cultural
2	Broadgate redesign	Space Syntax Lab (UCL)	Commercial–office
3	Broadgate Arena	Space Syntax Lab (UCL)	Commercial
4	AU Las Vegas Exhibit Hall	The Living (Autodesk)	Exhibition–commercial
5	Amazon Go stores	Amazon R&D	Retail

FINDINGS AND DISCUSSION

Axial analysis: integration and choice heat-maps

Axial analysis of the 1,499 axial lines extracted from the plan of Floor G2 provides a quantitative picture of the accessibility structure (Tab. 3). The unbalanced distribution of integration shows that accessibility is concentrated in a limited number of nodes (near entrances and escalators), while large parts of the floor are deprived of this advantage; low-integration spaces (below 12), located mainly in the terminal and peripheral parts of the floor, act as blind spots. As Figure 1 shows, high-integration (red) lines are concentrated in the central core and near the escalators, while wide eastern and western areas (blue) act as blind spots.

Table 3: Key indicators of the axial analysis of the current state.

Indicator	Mean	SD	Min	Max	Interpretation
Integration	16.77	3.2	9	23	The 9–23 range indicates marked inequality of accessibility across the floor
Spatial depth	6.06 steps	0.9	4	9	Mean depth above the optimum; long topological paths to many spaces
Choice (raw)	3,850	12,450	0	263,704	Extreme dispersion; >70% of lines with choice <500 and only 2% >10,000

The mean depth of 6.06 steps indicates that, to reach many spaces, users must traverse longer topological paths; spatial depth in the eastern and western ends exceeds 9 steps, turning these spaces into blind spots. The severe dispersion of choice shows that only a very limited number of paths play a strategic through-movement role, concentrating flow in a few routes and leaving the rest empty (Fig. 2).

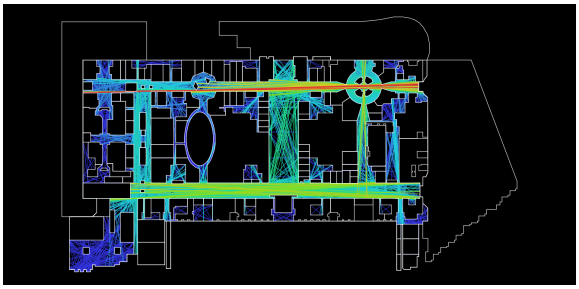


Figure 1: Integration heat-map of the current state; concentration of red lines (high integration) in the central core and dominance of blue (blind spots) on the eastern and western flanks (Source: DepthmapX output).

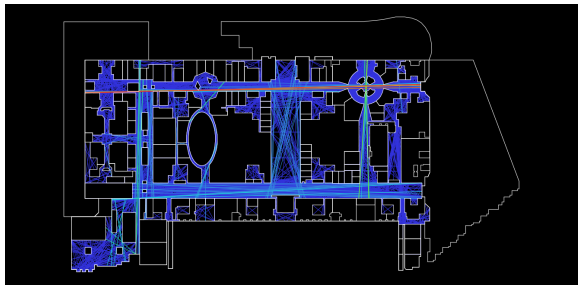


Figure 2: Choice heat-map; severe polarization of through-flow in only 2% of the network's axial lines (Source: DepthmapX output).

Visibility graph analysis: connectivity and visual permeability

Visibility graph analysis (VGA) on a 0.5 × 0.5 m grid over more than 3,000 points provides a precise picture of the visual quality and legibility of the spaces of Floor G2 (Tab. 4). The low mean connectivity and the high share of isolated nodes are the most important cause of the uneven distribution of population and the decline of footfall in peripheral areas (Fig. 3).

Table 4: Key indicators of the visibility graph analysis of the current state.

Indicator	Mean	Range / note	Analytical interpretation
Connectivity	1.00	85% of nodes with connectivity 0–1	Severe visual isolation of peripheral nodes
Isovist area	35 m²	< 20 m² at corridor ends	"Visual islands" and severe limits on spatial legibility
Visual permeability	0.28	low across wide areas	Inadequate visual access to other spaces in large parts of the floor

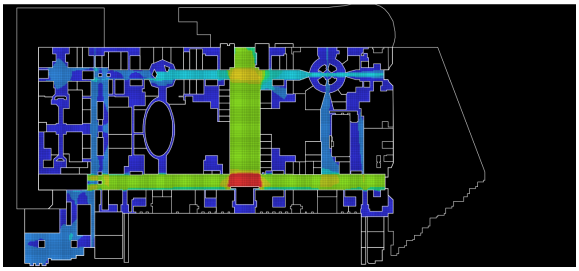


Figure 3: Connectivity heat-map of the current state (source: DepthmapX output).

The mean isovist area of 35 m², falling below 20 m² at corridor ends, indicates the presence of "visual islands" and severe limits on spatial legibility, sharply reducing users' ability to orient and to discover retail spaces. The low visual permeability (0.28) shows that, over wide parts of the floor, users lack sufficient visibility to other spaces; spaces near the central void and the main entrances enjoy high visual integration, while the ends of corridors and dead corners are in complete visual isolation (Fig. 4).

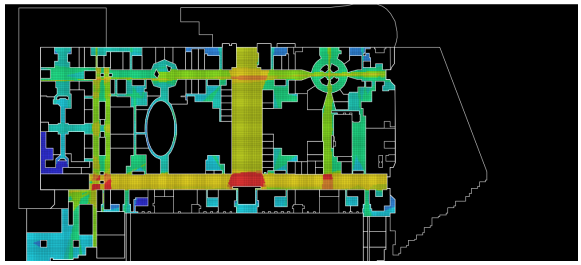


Figure 4: Visual permeability heat-map of the current state; visual isolation shown by the extensive blue areas (Source: DepthmapX output).

Network analysis

Network analysis of the spatial graph of Floor G2 (comprising 166 nodes and 250 edges) reveals the hierarchical structure and the strategic role of each space (Tab. 5). That 55% of nodes have zero betweenness centrality proves that large parts of the floor serve only as destinations, with no flow passing through them; only 6 main nodes have betweenness above 1,500, indicating severe concentration of movement flow in a limited number of routes.

Table 5: Key indicators of the network analysis of the current state (166 nodes, 250 edges).

Indicator	Key statistic	Analytical interpretation
Betweenness centrality	55% of nodes = 0; only 6 nodes > 1,500	Most spaces are destinations only; through-flow concentrated in a few routes
Closeness centrality	High topological distance (depth up to 9 steps)	Deep, tree-like access structure without movement loops

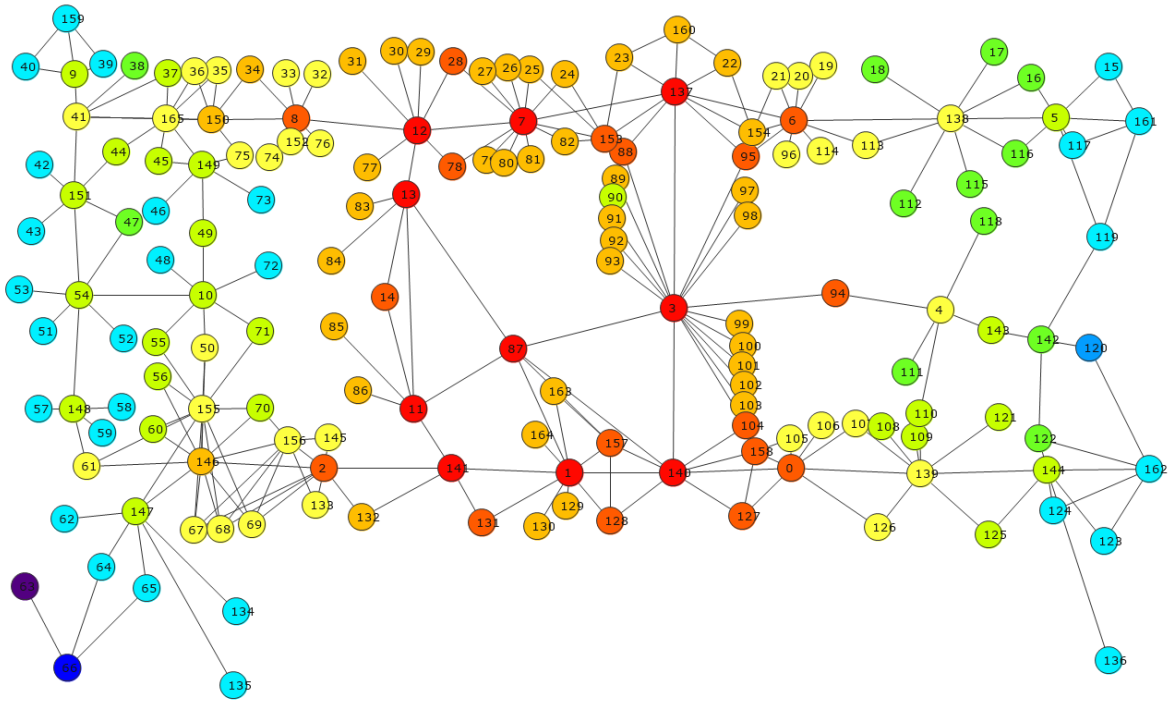


Figure 5: Justified visual graph of Floor G2; the tree-like, deep network structure without movement loops. The root node is at the bottom, and increasing node height denotes increasing topological depth (up to 9 steps) from the entrance (Source: AGraph output).

Integration of findings and identification of key spaces

By synthesizing the results of the three analyses (axial, VGA, and network), the spatial structure of Floor G2 was divided into four distinct categories with different functional behaviours (Fig. 6 and Fig. 7 and Tab. 6).



Figure 6: Spatial graph of Floor G2 overlaid on the plan, with nodes coloured by closeness centrality; red nodes denote the shortest topological distance (access cores) and blue nodes denote high spatial depth and tree-like dead-ends (Source: Gephi output).

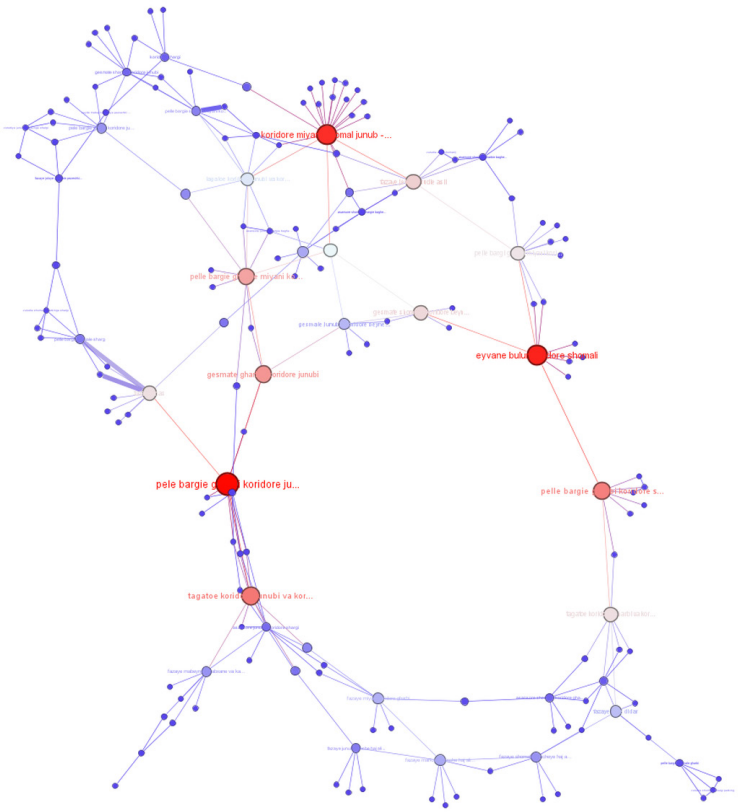


Figure 7: Spatial graph of Floor G2 coloured by closeness centrality (source: Gephi output).

Table 6: Four-category classification of the spaces of Floor G2 based on combined indicators.

Spatial category	Functional characteristics	Indicative nodes	Intervention priority
Strategic cores	Highest through-movement role and highest accessibility	1, 2, 3, 8, 146	Protect and reinforce movement flow
Latent central (non-through) spaces	Good visual and topological access but off the main flow	12, 13, 87, 94, 128, 144	Change of use or attractor layout
Low-access through-paths	A through-role in the network structure but isolated	61, 95, 149, 155	Improve spatial linkage and connection
Blind spots	Lowest footfall potential and severe commercial stagnation	> 90 nodes (incl. 39, 40, 55–58, 62–66)	Full physical / functional redesign

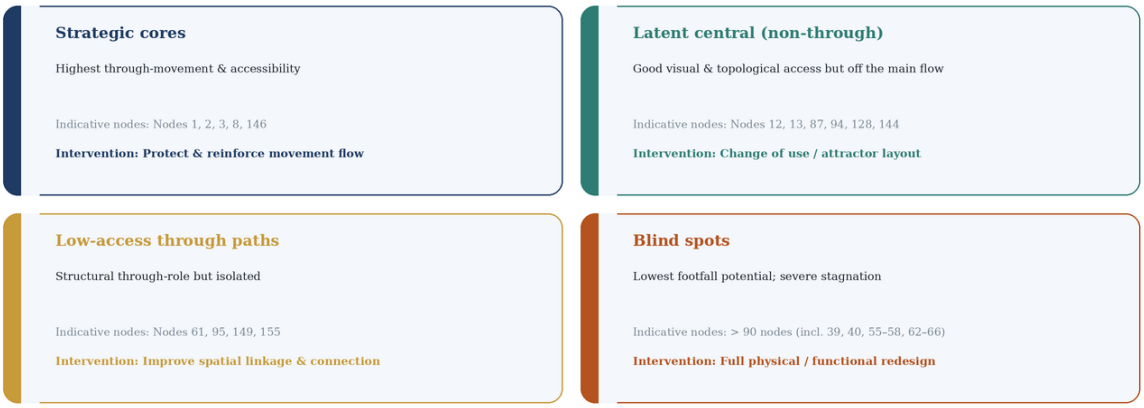


Figure 8: The four-category spatial classification of Floor G2 and the corresponding intervention priorities.

Area and distribution of blind spots and Design rules by reverse engineering

In total, 28 critical zones were identified as blind spots on Floor G2. Their cumulative area is estimated at about 450 m² (equivalent to 3.75% of the floor area), located mainly on the eastern terminal fronts (nodes 62–66), western fronts (nodes 39, 40, and 45–46), and northern fronts (nodes 55–58). Based on the comparative analysis of the five leading global projects, six key soft rules were derived for the redesign of Floor G2 of Iran Mall, clarifying the causal relationships between the analytical indicators and physical parameters (Tab. 7).

Table 7: Soft design rules derived from reverse engineering of leading global projects.

No.	Rule	Related indicator	Physical parameter	Range of change	Source
1	Assign economic value by integration	Integration	Placement of anchor brands and high-traffic units	Relocation up to 30 m	Broadgate & Broadgate Arena
2	Widen corridors by choice	Choice	Width of main corridors and circulation arteries	20–50% width increase	Broadgate Arena
3	Place interactive spaces in wide isovists	Isovist area	Siting of public spaces, cafés and meeting points	Relocation up to 15 m	Galaxy Soho & Broadgate Arena
4	Direct flow to latent central spaces	Closeness	Position of anchor and key retail brands	Relocation up to 30 m	Gephi + Broadgatelayout

5	Reduce spatial depth by creating movement loops	Spatial depth	Shortcuts and modification of network topology	Add 2–4 new paths	Broadgate redesign
6	Develop voids to improve visual permeability	Visual permeability	Size, position and openings of central voids	10–30% increase in void area	Galaxy Soho & Amazon Go R&D

RESULTS AND CONCLUSION

The findings demonstrate that Floor G2 of Iran Mall suffers from an unbalanced, fragmented, and deep spatial structure. The formation of 28 commercial blind spots with a cumulative area of about 450 m² (3.75% of the floor) is a direct consequence of the dominance of a deep tree-like structure (mean depth > 6 steps, reaching > 9 at the ends) and the absence of movement loops. The causal chain is clear: a tree-like structure with dead-ends produces high spatial depth, which in turn produces commercial blind spots. Visual isolation and low permeability: the mean visual permeability of 0.28 and the mean connectivity of 1.00 confirm the physical opacity of the floor. In secondary corridors, users lack visual predictability and, failing to find environmental cues, avoid venturing into the depth of the corridors an observation consistent with the findings of Yurtseven (2024) on the role of visual permeability in attracting footfall, and with recent VGA-based retail studies (Lian & Li, 2023; Hosseini et al., 2024). Inequitable distribution of through-roles: the concentration of high betweenness in only 6 main nodes wastes the potential of the other commercial areas. Compared with the Broadgate redesign, which had only 12 blind spots, Iran Mall owing to its supranational scale and the absence of early circulation analysis requires more serious structural interventions (Space Syntax, 2018; Altafini et al., 2024). Economic justification of redesign: the 450 m² of blind spots, assuming a base rent of 200,000 toman per square metre per month, implies more than 1.08 billion toman of forgone annual revenue for the complex. This concrete figure fully establishes the necessity of investing in physical/functional redesign on the basis of the six derived rules. By integrating axial analysis, visibility graph analysis (VGA), and network analysis (Gephi/AGraph), this study provided a quantitative, evaluable instrument for the spatial diagnosis of Floor G2 of Iran Mall. In answer to the research questions: the current configuration of Floor G2 with a mean integration of 16.77, a mean spatial depth of 6.06 steps, a mean connectivity of 1.00, and a visual permeability of 0.28 has a deep, fragmented structure with severe visual isolation; 28 critical blind zones (about 450 m², 3.75% of the floor) were identified, located mainly on the eastern, western, and northern margins; 55% of nodes lack any through-role, and the network follows a tree-like pattern without movement loops; and six operational soft rules (including corridor widening, brand relocation, void development, and loop creation) were compiled in a rule matrix. The study's contribution is twofold: methodologically, it shows that the combined use of three spatial-analysis tools enables precise diagnosis of configurational weaknesses that any single tool would miss; and practically, the reverse-engineered rules translate that diagnosis into an objective, transferable basis for redesign. A deep tree-like structure, the absence of movement loops, and visual isolation are confirmed as the principal causes of footfall decline on Floor G2, and the derived rules can serve as input to the optimization stage of future work.

REFERENCES

Altafini, D., Salardi-Jost, M., & Cutini, V. (2024). Decoding small-worlds networks in a regional context: Unveiling local-local and local-global centrality logics with space syntax. In Proceedings of the 14th Space Syntax Symposium (pp. 1625–1656). Tab Edizioni.

Altafini, D., & Cutini, V. (2020). Homothetic behavior of betweenness centralities: A multiscale alternative approach to relate cities and large

regional structures. Sustainability, 12(19), 7925. https://doi.org/10.3390/su12197925

Altuwaijri, H. A., Hossain, S. T., Al-Ramadan, B., & Bilal, M. (2025). Enhancing accessibility in public spaces: A computational study of Hatirjheel lakefront using space syntax. ISPRS International Journal of Geo-Information, 14(1), 29. https://doi.org/10.3390/ijgi14010029

Bier, H., & Knight, T. (2024). Data-driven design in architecture: A systematic review. Journal of Architectural Computing, 22(1), 15–38.

Carpo, M. (2017). The second digital turn: Design beyond intelligence. MIT Press.

Chen, Y., Wang, L., & Zhao, M. (2023). Amazon Go: The future of retail space design. Journal of Retailing, 99(2), 189–204.

Davis, M. (2013). Reverse engineering in architecture. Architectural Design, 83(4), 88–95.

Deutsch, R. (2015). Data-driven design and construction. John Wiley & Sons.

El-Ghandour, W., & Al-Huss, M. (2004). Productivity in the construction industry: A review. Journal of Construction Engineering and Management, 130(5), 718–727. https://doi.org/10.1061/(ASCE)0733-9364(2004)130:5(718)

Freeman, L. C. (1977). A set of measures of centrality based on betweenness. Sociometry, 40(1), 35–41. https://doi.org/10.2307/3033543

Freeman, L. C. (1978). Centrality in social networks: Conceptual clarification. Social Networks, 1(3), 215–239. https://doi.org/10.1016/0378-8733(78)90021-7

Gath-Morad, M., Thrash, T., Schöninger, C., Hölscher, C., & Granić, A. (2023). The DesignMind toolkit: Integrating empirical evidence into architectural design. In Proceedings of CAADRIA 2023.

Hillier, B. (1996). Space is the machine. Cambridge University Press.

Hillier, B., & Hanson, J. (1984). The social logic of space. Cambridge University Press.

Hillier, B., & Iida, S. (2005). Network and psychological effects in urban movement. In Spatial information theory (COSIT 2005), Lecture Notes in Computer Science (Vol. 3693, pp. 475–490). Springer. https://doi.org/10.1007/11556114_30

Hillier, B., Penn, A., Hanson, J., Grajewski, T., & Xu, J. (1993). Natural movement: Or, configuration and attraction in urban pedestrian movement. Environment and Planning B: Planning and Design, 20(1), 29–66. https://doi.org/10.1068/b200029

Hosseini, Z., Yeganeh, M., & Jalali, S. (2024). Exploring the impact of vertical access elements on visual richness and space quality within shopping mall atriums. Buildings, 14(9), 2724. https://doi.org/10.3390/buildings14092724

Jalalian-Hoseini, S. (2020). Space syntax in architectural design. University of Tehran Press. [in Persian]

Jalalian-Hoseini, S. (2022). Analysis of bazaars and shopping centers as urban spaces via space-syntax software (Case studies: Iranian bazaars and Tehran shopping centers). Journal of Iranian Architecture Studies. [in Persian]

Khachouch, M. K., Korchi, A., & Lakhrissi, Y. (2023). Architecture-driven modernization: A review on reverse-engineering techniques based on models' approach. WSEAS Transactions on Information Science and Applications, 20, 293–302.

Li, J., & Bian, K. (2024). Construction of an urban spatial intelligent planning and design system under the background of big data. International Journal of Information Technology and Systems, 17(1).

Lian, H., & Li, G. (2023). Correlation analysis of retail space and shopping behavior in a commercial street based on space syntax: A case of Shijiazhuang, China. Buildings, 13(11), 2674. https://doi.org/10.3390/buildings13112674

Loyola, M. (2018). The productivity gap in the AECO industry. Building Research & Information, 46(5), 489–504.

Manum, B. (2009). AGraph: A tool for spatial analysis. In Proceedings of the 7th International Space Syntax Symposium.

Manum, B., Rusten, E., & Benze, P. (2005). AGraph: A tool for spatial analysis. In Proceedings of the 5th International Space Syntax Symposium.

Najafpour, I., & Haghlesan, M. (2023). Optimizing the spatial design of urban metro stations using the space-syntax method. Journal of Architect, Urban Design & Urban Planning, 16(44), 49–67. [in Persian]

Penn, A. (2003). Space syntax and spatial cognition: Or why the axial line? Environment and Behavior, 35(1), 30–65. https://doi.

org/10.1177/0013916502238864
Penn, A., Hillier, B., Banister, D., & Xu, J. (1998). Configurational modelling of urban movement networks. Environment and Planning B: Planning and Design, 25(1), 59–84. https://doi.org/10.1068/b250059
Sajadzadeh, H., Arianpour, S., & Talischi, G. (2023). A comparative study of behavioral camps in the traditional bazaar and the Diplomat shopping center of Boroujerd based on spatial-configuration analysis. Journal of Researches in Islamic Architecture, 11(1). [in Persian]
Space Syntax. (2018). Broadgate Arena: Post-occupancy evaluation report. UCL Space Syntax Lab.
Turner, A. (2001). Depthmap: A program to perform visibility graph analysis. In Proceedings of the 3rd International Space Syntax Symposium.
Turner, A. (2007). From axial to road-centre lines: A new representation for space syntax and a new model of route choice for transport-network analysis. Environment and Planning B: Planning and Design, 34(3), 539–555. https://doi.org/10.1068/b32067
van Nes, A. (2021). The impact of the ring roads on the location pattern of shops in town and city centres: A space-syntax approach. Sustainability, 13(7), 3927. https://doi.org/10.3390/su13073927
Varoudis, T. (2020). DepthmapX: A cross-platform software for space-syntax analysis. Journal of Space Syntax, 11(1), 45–62.
Varoudis, T., & Hanna, S. (2024). Beyond axial lines: High-resolution geometric analysis of London's urban fabric using LIDAR scans. UCL Discovery.
Wang, Y. (2024). Research on urban traffic congestion using a dual-modal model of space syntax based on big data. In Proceedings of ICAICE '24 (pp. 1–6). ACM.
Yurtseven, M. (2024). The verticality challenge in shopping malls. Journal of Urban Design, 29(3), 301–318.
Zaleckis, K., Chmielewski, S., Kamičaitytė, J., Grazuleviciute-Vileniske, I., & Lipińska, H. (2022). Walkability compass: A space-syntax solution for comparative studies. Sustainability, 14(4), 2033. https://doi.org/10.3390/su14042033
Zhang, J., Song, J., & Fan, Z. (2023). The study of historical progression in the distribution of urban commercial space locations—Example of Paris. Sustainability, 15(19), 14499. https://doi.org/10.3390/su151914499
Zhou, W., Guo, H., Hou, X., Lai, W., & Yao, L. (2024). A statistical study of the pedestrian distribution in a commercial wholesale centre based on the traffic spatial structure. Buildings, 14(6), 1782. https://doi.org/10.3390/buildings14061782

COPYRIGHTS
©2023 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.

HOW TO CITE THIS ARTICLE
Naderi Delpak, S., Shahcheraghi, A. & Saeideh Zarabadi, Z. S. (2026). Spatial Configuration Analysis and Identification of Blind Spots in Large-Scale Shopping Centres Using Space Syntax (Case Study: Floor G2 of Iran Mall, Tehran, Iran). (e743124). International Journal of Urban Management and Energy Sustainability, (), e743124
DOI:10.22034/ijumes.2026.2107623.1412