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**RECOMMENDATIONS FOR SPATIAL PLANNING NORMS OF
STREET VENDING PLAN: A CASE OF BHOPAL**

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PLANNING NORMS OF STREET VENDING
PLAN: A CASE OF BHOPAL**

**MASTER OF PLANNING
URBAN AND REGIONAL PLANNING**

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2021MURP001



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RECOMMENDATIONS FOR SPATIAL PLANNING NORMS OF STREET VENDING PLAN: A CASE OF BHOPAL

Thesis submitted in partial fulfillment of the requirements for the award of the degree of

MASTER OF PLANNING Urban And Regional Planning

by

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2021MURP001

Under the Guidance of

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May 2023

DECLARATION

I, **Pranay Karmakar**, Scholar No. **2021MURP001**, hereby declare that the thesis entitled **Recommendations for spatial planning norms of street vending plan: a case of Bhopal**, submitted by me in partial fulfilment for the award of **Master of Planning (Urban and Regional Planning)**, at **School of Planning and Architecture, Bhopal, India**, is a record of bonafide work carried out by me. The matter/result embodied in this thesis has not been submitted to any other University or Institute for the award of any degree or diploma.

Signature of the Student

Date: _____

CERTIFICATE

This is to certify that the declaration of **Pranay Karmakar**, Scholar no. **2021MURP001** is true to the best of my knowledge and that the student has worked under my guidance for one semester in preparing this thesis.

RECOMMENDED

Prof. Vibhore Bakshi, Professor
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ACCEPTED

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May 2023, Bhopal

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This journey of the master's thesis is relatable to the line from the Hotel California song.

"You can check out anytime you want, but you can never leave".

Learnings from this thesis and never-ending research are something I won't be able to leave any day.

This thesis would not have been possible without the insightful counterquestions posed by my professors, batchmates, and even relatives. Their questions helped me to dismantle the topic and explore it from new angles. Constant support was there from my guide, Prof. Vibhore Bakshi. I would like to extend my gratitude to SPA Bhopal faculties from every discipline, as somehow, they all had some advice on my work at some phase of my research. I would like to specially thank Dr. Premjeet Dasgupta, Dr. Nikhil Ranjan Mandal, Dr. Anuradha Chakraborty, Dr. Binayak Chowdhury, Prof. Anurag Bagade, Paulose N.K., Gaurav Vaidya, Aparna Soni, Vikram Kohli, and Kiranjit for their valuable inputs.

The inception of the research stemmed from one long night of discussion with my uncle, Uttam Kumar Roy, about how, as planners, we cannot predict the occurrence of vendors while we are all very familiar with this phenomenon. He advised me to work on such a common observation but unique research question and make the thesis like Satyajit Ray's movie: simple and unique. Hence, I extend my gratitude to him and my parents, Tapan Karmakar and Swapna Karmakar. Living on a campus like SPA Bhopal and researching felt like leaving every second, but one can never leave. In such challenging, monotonous phases, with all my doubts, lack of energy, enthusiasm, money, and time, Anjana Varma has helped me finish this thesis.

ABSTRACT

The need for inclusion of street vendors in the urban planning process has been acknowledged through the Street Vendor's Act of 2014, which directs responsibilities to urban local bodies to prepare street vending plans at the ward and zonal level every five years. Even though the Act introduces much-needed basis for the planning of street vendors through 'no vending zone', 'restriction-free zone', 'restricted vending zone,' and 'holding capacity' in terminology; it does not provide any basis for the "determination of spatial planning norms' for street vending plans. As per the Act, pedestrian, traffic count, and road width are considered the only quantifiable basis for zoning, which excludes the effect of spatial configuration on street vending. Existing literature talks about policy measures to include vendors, the socioeconomic scenario of vendors, and the location choice of vendors, but fails to provide any basis for determining spatial planning norms. If planners knew how to predict occurrence of street vendors based on the spatial configuration of one area, it would be possible for them to develop planning strategies for Street Vending Plan. This thesis dwells on the research question of how spatial configuration impacts street vending locations, considering Old Bhopal as a case example. Spatial configuration parameters like street network, land use, and built form have been considered as these are related to the concept of space utilization by vendors and movement. To understand how such aspects impact vending, microscale urban analysis has been done using the space syntax method for street networks, urban porosity for built form, and land use diversity. A Poisson regression analysis has been done with the mentioned parameters as independent variables and the no of stationary street vendors as a dependent variable. Analysis reveals that a percentage of residential land use has a negative impact, while degree of permeability, i.e., the percentage of openings on the ground floor facing the street has a positive and significant impact on the no of stationary vendors. The integration measure of space syntax has a positive but very less significant impact on street vending. With the help of this regression equation, it is possible to predict the no of stationary street vendors in any area based on spatial configuration. This thesis contributes to the methodology of preparing street vending plans, adds knowledge to the concept of the economic value of streets, and contributes to the literature on the effect of spatial configuration on socio-economic aspects. Recommendations were given for the Old Bhopal Street Vending Plan, which can be followed and implemented by the Bhopal Municipal Corporation through stakeholder meetings with Bhopal Town Vending Committee and police.

Keywords – Street vending, Spatial configuration, Space syntax, Street design, Poisson regression

सारांश

शहरी नियोजन प्रक्रिया में स्ट्रीट वेंडर्स को शामिल करने की आवश्यकता को 2014 के स्ट्रीट वेंडर्स एक्ट के माध्यम से स्वीकार किया गया है, जो शहरी स्थानीय निकायों को वार्ड और जोनल स्तर पर हर पांच साल में स्ट्रीट वेंडिंग प्लान तैयार करने के लिए जिम्मेदारियां देता है। भले ही यह अधिनियम 'नो वेंडिंग जोन', 'प्रतिबंध मुक्त जोन', 'प्रतिबंधित वेंडिंग जोन' और 'धारण क्षमता' शब्दावली के माध्यम से स्ट्रीट वेंडर्स की योजना के लिए बहुत जरूरी आधार पेश करता है, लेकिन यह इसके लिए कोई आधार प्रदान नहीं करता है स्ट्रीट वेंडिंग योजनाओं के लिए "स्थानिक नियोजन मानदंडों का निर्धारण"। अधिनियम के अनुसार, पैदल यात्री, यातायात गणना और सड़क की चौड़ाई को ज़ोनिंग के लिए एकमात्र मात्रात्मक आधार माना जाता है, जिसमें स्ट्रीट वेंडिंग पर स्थानिक विन्यास के प्रभाव को शामिल नहीं किया गया है। मौजूदा साहित्य विक्रेताओं को शामिल करने के लिए नीतिगत उपायों, विक्रेताओं के सामाजिक आर्थिक परिदृश्य और विक्रेताओं की स्थान पसंद के बारे में बात करता है, लेकिन स्थानिक योजना मानदंडों को निर्धारित करने के लिए कोई आधार प्रदान करने में विफल रहता है। यदि योजनाकारों को पता था कि एक क्षेत्र के स्थानिक विन्यास के आधार पर स्ट्रीट वेंडर्स की घटना की भविष्यवाणी कैसे की जाती है, तो उनके लिए स्ट्रीट वेंडिंग योजना के लिए योजना रणनीति विकसित करना संभव होगा। पुराने भोपाल को एक उदाहरण के रूप में देखते हुए यह थीसिस इस शोध प्रश्न पर आधारित है कि कैसे स्थानिक विन्यास स्ट्रीट वेंडिंग स्थानों को प्रभावित करता है। स्थानिक विन्यास पैरामीटर जैसे स्ट्रीट नेटवर्क, भूमि उपयोग और निर्मित रूप पर विचार किया गया है क्योंकि ये विक्रेताओं और आंदोलन द्वारा अंतरिक्ष उपयोग की अवधारणा से संबंधित हैं। विचार किया गया है क्योंकि ये विक्रेताओं और आंदोलन द्वारा अंतरिक्ष उपयोग की अवधारणा से संबंधित हैं। यह समझने के लिए कि इस तरह के पहलू वेंडिंग को कैसे प्रभावित करते हैं, स्ट्रीट नेटवर्क के लिए स्पेस सिंटेक्स विधि, निर्मित रूप के लिए शहरी सरंध्रता और भूमि उपयोग विविधता का उपयोग करके सूक्ष्म शहरी विश्लेषण किया गया है। स्वतंत्र चर के रूप में उल्लिखित मापदंडों और आश्रित चर के रूप में स्थिर सड़क विक्रेताओं की संख्या के साथ एक पोइसन प्रतिगमन विश्लेषण किया गया है। विश्लेषण से पता चलता है कि आवासीय भूमि उपयोग का एक प्रतिशत नकारात्मक प्रभाव डालता है, जबकि शहरी सरंध्रता, यानी सड़क के सामने भूतल पर खुलने का प्रतिशत स्थिर विक्रेताओं की संख्या पर सकारात्मक और महत्वपूर्ण प्रभाव डालता है। स्पेस सिंटेक्स के एकीकरण माप का स्ट्रीट वेंडिंग पर सकारात्मक लेकिन बहुत कम महत्वपूर्ण प्रभाव पड़ता है। इस प्रतिगमन समीकरण की सहायता से, स्थानिक विन्यास के आधार पर किसी भी क्षेत्र में स्थिर पथ विक्रेताओं की संख्या का अनुमान लगाना संभव है। यह थीसिस स्ट्रीट वेंडिंग योजना तैयार करने की पद्धति में योगदान देती है, सड़कों के आर्थिक मूल्य की अवधारणा के लिए ज्ञान जोड़ती है, और सामाजिक-आर्थिक पहलुओं पर स्थानिक विन्यास के प्रभाव पर साहित्य में योगदान देती है। ओल्ड भोपाल स्ट्रीट वेंडिंग प्लान के लिए सिफारिशें दी गईं, जिसका अनुपालन और कार्यान्वयन भोपाल टाउन वेंडिंग कमेटी और पुलिस के साथ हितधारक बैठकों के माध्यम से भोपाल नगर निगम द्वारा किया जा सकता है।

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1. Introduction

“Every layer of the society benefits from the products that are offered on the street.” – S.K.Bhowmik (street vending in Asia, 2005)

1.1 Background

Street vendors act 2014 - It is a regulation that would safeguard the rights of urban street vendors, regulate the operations, and address other problems that are linked to or incidental to the street vending in India. Urban street vendor legislation has long been required. Street vending is an informal, unrecognized trade, according to the Bellagio International Declaration of Street Vendors, which was published in 1995. A task force for the creation of a law banning street vendors in cities was made. Members of SEWA participated in this task force. Two national policies, as well as a bill, were created ten years later. The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 was passed in February 2014 as a result of the bill (Sankrit, no date). Key features of this Act are following –

- **Registration:** Street vending permits, which must be obtained after registration, are required. Identity cards will be given out based on the vending certificate.
- **Town Vending committee:** A Municipal Commissioner, representatives of street vendors, local government officials, planners, traffic police, resident welfare organizations, CBO banks, and trader groups should make up the TVC. A charter governing the TVC's issuing of vending certificates, activity audits, and registration of vendors should be made public.
- **Eviction and Relocation:** If the street vendors are causing a public nuisance, impeding traffic, or any other public purpose, the local authorities have the right to evict them. The street seller is entitled to a new location for their business. The local administration must provide the street vendors with seven days' notice prior relocating or evicting them.
- **Penalties:** If a street vendor: (a) sells goods without a vending certificate, outside of the designated area, or during prohibited hours; or (b) violates the terms of the vending

certificate or any other restrictions, a maximum fine of Rs. 2,000 may be levied. In accordance with the street vending scheme, the vendors' wares may also be seized.

- **Dispute Resolution:** Street vendors who are unhappy may file a complaint with a local government-established commission for dispute resolution. One sub-judge/judicial magistrate, one executive magistrate, and additional members with experience in street vending and natural markets shall make up the committee. The local government will hear appeals against the committee or TVC's decision.
- **Civic Facilities:** the provision of public services such as order, lighting, running water, cover, and solid waste disposal.

Chapter VI of this street vendors act 2014 mentions plan for street vending operations. Every local government must make a plan to promote street vending every five years. This plan must be made in conversation with the authority concerned and based on the suggestions of the Town Vending Committee. The topics in the First Schedule must be covered by this plan. The Town Vending Committee must agree with the plan. The local consultant is responsible for developing a plan for street vending, which must then be presented to the relevant government for approval. Prior to releasing the plan to the public, the appropriate government must first define the norms that apply to street sellers.

What street vending act 2014 says about street vending in first schedule -

Objective of street vending plan –

- The Street Vending Plan should be set up so that all street vendors, up to a maximum of 2.5 percent of the local population, must be taken into account.
- The plan should be created with the least amount of interference to the flow of traffic and foot traffic in the already built-up area.
- It claims that existing natural markets or other zones in the area are "reasonable and consistent" with the provisions for design of space/area of the new zones.
- Public restrooms, water supply, and sanitation must all be considered when drafting the plan or given when it is officially implemented.
- The local government must promote the efficient and practical distribution of products and services.

Comments on the objectives - The law supports street selling as a convenient and affordable method of distributing goods and services to the general population. Regrettably, while creating plans for street vending, the local administration frequently ignores the area's commercial potential when designating a zone. As a result, traders leave bustling market

locations for places with lower foot traffic and traffic volume, losing the income they were accustomed to.

What constitutes a street vending plan –

To encourage vending, the local authority must create a street vending plan after consulting with the planning authority and acting on the TVC's advice. Every five years, it must be prepared.

The following guidelines are included in the street vending plan:

the fundamentals of vending

Allocating “vending zone”, “restricted vending zone”, and “no vending zone”.

‘Determination of spatial planning norms’

calculating the area's 'holding capacity'

Comments on the constituents - The planning process for street vending should be inclusive, involving a range of stakeholders from the very beginning. The town planning department, the NULM department, the welfare standing committee, the public, street sellers, and their unions are all included in this. It is also crucial to be aware of the road widening ideas put out by the Department of Town Planning so that the proposal can be offered in a fashion that is consistent with the road widening proposal when distributing zones in a region. An easier implementation of these initiatives and the incorporation of vending areas around the tourist attractions depends on your grasp of the fact that vending is commonplace close to tourist and archaeological sites. The Street Vending Act 2014 does not address how to handle circumstances of natural calamities, and sellers must be heavily involved in the implementation of street vending strategies. There is no discussion of what resilience would be used to ensure that vendors and their goods would be secure during such crises. Vendors frequently use inadequate infrastructures to sell their goods. Poor roadway planning and inadequate stormwater drainage are also common in Indian cities, which is one of the leading causes of floods in urban areas. The law does not mention any parameters for “determination of spatial planning norms”.

Principles to follow while making street vending plan according to law –

- While creating a street vending plan, it is crucial to consider the volume of foot traffic, the width of the road, and the density of both automobile and pedestrian traffic.
- To guarantee that the area designated for street vending is suitable and in keeping with current natural markets, as well as to encourage the efficient, practical, and affordable provision of goods and services.

- To guarantee that all currently operating street sellers identified in the survey, according to a norm of 2.5% of the population of the ward, zone, town, or city, are considered in the street vending plan.
- The Planning Authority must conduct the analysis to ascertain the ward's carrying capacity, taking into account municipal amenities for the proper use of designated locations or areas as vending zones.
- When the TVC defines restricted or no vending zones, the following criteria must be taken into consideration.
- No vending zones must be free from limitations, and their no should be kept to a minimum.
- The amount of street vendors who will relocate to the area will ultimately depend on the zone's capacity to accommodate them.

Comments on the principles -

Each state may have a prioritized list of the principles for street vending depending on the peculiarities of its roads. In Alappuzha and Kochi, it was discovered by CPPR during fieldwork and interactions with the Municipality that the zones recommended for vending did not focus the footfall in an area. The suggested locations were inside gated complexes and behind bus stops, far from pedestrian traffic and in a quiet area with little foot traffic. When providing a zone, foot traffic is a key decision factor, and merchants want to sell solely in high foot traffic regions. They would sit in places not covered by the vending zone if they weren't given such zones.

It is also past due to review the 2.5% criteria for street sellers in each of the following categories: towns, zones, and wards. With a bigger population, metropolitan areas like Delhi, Mumbai, and Bangalore will find this barrier insufficient to accommodate all sellers. When creating the street plan, it is also necessary to take modifications to the master plan, development plan, zonal plan, layout plan, and any other plans into account. There may be instances where master plans overlap, such as when city master plans and AMRUT master plans do.

How to do zoning as per Law –

A "vending zone" is defined by the Act as any area, place, or location identified as such by the local authority, on the suggestions of the Town Vending Committee, for the particular use of street vendors for street vending. This includes footpaths, sidewalks, pavements,

embankments, portions of streets, public waiting areas, or any other location deemed appropriate for vending activities and offering services to the public.

The following categories apply to vending zones:

- To avoid or minimize any annoyance to the public utilizing the street, as well as to street inhabitants and merchants conducting business from their private property, the vending zones, restricted vending zones, and no vending zones shall be indicated.
- The Town Vending Committee must divide the zones into vending zones, limited zones, and no vending zones within six months after the scheme's publication.
- Also, display the information on the local authority's notice board and in special vending zones.

Based on the following criteria, the zones are divided into three categories: 1) Potentials for the street area. 2) The volume of footfall. 3) Road Width. 4) Traffic volume. 5) Other considerations, such as the volume of pedestrian traffic, may be important in determining the said zones. 6) Zero or minimal inconvenience to the public was experienced.

Without a formal permit from the relevant TVC, private locations under the control of the town vending committee are not permitted to be used as vending zones. If the TVC determines that such zones are necessary, it may permit private locations to serve as vending zones. The welfare of the area's street vendors ought to be given priority. According to Kerala state regulations, the designation of vending zones must be done in conjunction with the Traffic Police or Police controlling the region. Police officers might provide recommendations for a vending area. In accordance with its discretion, the local authority may adopt, modify, or reject the suggestions and designate a location or area as a vending zone.

There cannot be any vending zones without restrictions or any zones with a minimum size. Restrictive vending zones will be determined by the local vending committee and linked to road width. According to the road widths, the restricted vending is displayed in the table above. In addition, the following factors should be taken into account when categorizing street vending zones: By taking into account the holding capacity of every specified vending space on such a road, the no of street vendors is to be determined.

After receiving the traffic police's approval on the efficient movement of both vehicles and pedestrians, this type of stationary vending may be permitted. Roadside parking may be prohibited in locations wherever street vending is permitted, if necessary. Following examination of the traffic and pedestrian flow, mobile vending may be permitted on such roads.

- The town vending committee can decide the distance to be kept free from vending near important institutions such as the Secretariat, the District Collectorate, the offices of the District Panchayat, the Municipal Corporation, the Municipality, the Nagar Panchayat, the Courts, the Cantonment Board, and the Archeological Survey of India and State archaeological monuments.
- No area identified by the survey as an existing or natural market shall be prohibited from selling anything.
- No vending zones must be declared while displacing as few street vendors as possible.
- No location may be designated as a no-vendor zone solely based on its level of crowdedness.
- Sanitary issues should not be the basis for designating a location as a no-vending zone unless the local administration cannot fix them through civic action.
- No one can be designated as a no vending zone until the study required by the street vending law has been completed and a street vending plan has been created.
- Every three years, TVC is required to evaluate the street vending plan.
- During holiday seasons, TVC may designate specific areas as special vending zones for a predetermined amount of time, taking into account the significance and relevance of the festival.

Comments based on zoning –

There are 2.4 km of vending zones in the Alappuzha town, although there are only a few sellers there (about 7-10). So, the justification for designating such areas as a vending zone is called into doubt. There are only a few merchants along some of these segments because of the lower foot traffic on some of these sections. Basic amenities like appropriate infrastructure, sanitary conditions, garbage disposal, access to water, electricity, and storage areas are lacking in some areas. Also, it is unclear what a "limited vending zone" is and how it differs from a "vending zone." Since there is no definition given, it is unclear whether these regulations include time-based restrictions, restrictions on automobile traffic, or vending that is only permitted once a week. A one-size-fits-all method for designating limited vending zones in municipalities is not optimal due to the unevenness of the road width in the majority of Indian cities. For instance, the Kerala State Plan restricts two-sided stationary selling to roads wider than 30 meters. Kerala allows stationary vending on one side if the road width is between 12m and 24m. However, if the number of vendors in a particular zone is too many,

this could lead to clustering and congestion. To address this issue, a zigzag or diagonal pattern of vending should be followed on roads with a width of 12 to 24 meters. This would allow vendors to be accommodated on both sides without any congestion.

The limitations of street vending plan mentioned in the act - There was no consideration of retail potential of an area, no suggestions for how to include stakeholders in the participatory process of making the plan. As per the act, the plan does not consider the influence of tourist & heritage area on street vending. It does not take into account the measures needed to be taken for natural calamities. There was no basis or parameters given to determine spatial planning norms. As we have seen in Alappuzha case road stretch, width and footfall is not enough as a basis of making vending zone. Intrinsic properties of an urban area like street networks, land use, built form has effect on pedestrian movement as well as space appropriation of vendors. This was not considered at all on a zoning basis. As per the act the plan does not consider time-based restrictions, restrictions of traffic during zoning. These inconsistencies in the proposed structure of street vending plan call for further research.

Current Status of Street vending plan - Street vending act 2014 covers all such requirements of street vending plan but little research has been done or no street vending plan has been produced yet which showed the determinants of street vending plan. All India Institute of Local Self Governance has been in charge of preparing 30 street vending plans in Gujarat. CPPR has published a handbook on street vending plan and worked with Kochi municipality. In the annual report of NASVI 2019 -20 ranking of states has been given on the basis of progress as per act. It was done by Centre for Civil Societies (CCS) who considered factors including the publication of rules and programs, the survey of street vendors, the formation of TVCs, the issuance of identity cards, the creation of vending zones, the preparation of city vending plans, the formation of TVCs, etc. In that list Madhya Pradesh comes in 7th rank. There are only a few cities which have constituted town vending committee and there are no sanctioned street vending plan. Bhopal capital of Madhya Pradesh has formulated TVC, but no street vending plan preparation is in process. There are more than nine thousand street vendors who are registered in BMC. The approximate number of vendors are forty-five thousand (2.5% of 2011 census Bhopal population) which involves a major share of illegal vendors i.e., without any license.

1.2 Need of the study

Inconsistencies of street vending plan as per the act as discussed in background, calls for more understanding of the relationship between spatial configuration and street vending locations. According to the act just pedestrian, traffic footfall and road width is not enough to provide spatial logic behind vending distribution because these in turn are related to the built form, land use, street network or in other words spatial configuration. Often, we observe street vendors appropriate spaces or locate themselves based on few spatial advantages like a blank wall as enclosure, next to footpath, next to junction, below footbridges etc. Hence analyzing the effect of spatial configuration on such socio-economic activity will help us make a robust basis of spatial planning determinants for street vending plan. Existing literature talks about policy level changes to include street vendors, provision more infrastructure, socio economic condition of vendors. Few other studies mentioned in the literature review explain the relationship between street networks and land use on street vending but no study has been carried away to analyze the effect of spatial configuration parameters on street vending. This thesis will try to analyze the effect of intrinsic properties of an urban area like street networks, land use, built form on street vending to provide a basis for determining spatial planning norms of street vending. Also, no consideration of temporal aspect of street vending has been considered as part of the analysis to show how zoning could be done in temporal manner.

1.3 Conceptualization of Research

The city is a conglomeration of numerous interests that cause conflict and unpredictability, particularly the issue of the city's informal sector. Throughout the city, issues frequently result from unofficial trade activity and street vendor activities. They typically sell on the streets and at the margins of the stores, and their presence is highly obvious in the city, particularly in the town square and close to downtown. Street vending activity is deep rooted throughout a person's lifestyle in Urban India. Most of the kids remember their ice-cream or chocolate from a vendor when they return from school. Eateries, clothing, fruits to specific items all are available to street vendors in urban India. There are seasonal street vendors to sell certain commodities in festivals and occasions. We can see them on busy roads, near junctions, offices, hospitals, traffic stops, residential areas, tourists' spots. study done on Tembalang education center shows street vendors space utilization is based on the strategic location,

accessibility, main activity, and space comfort (Widjajanti, 2016). Pedestrian as well as two wheelers are the major customers of street vendors in Indian cities. Vendors will locate themselves where pedestrian movement is more, through traffic is less. Hence movement of pedestrian and traffic is related to the distribution of street vending.

The sense of density and diversity that defines urban life is characterized by movement. So, the fundamental goal of urban planning and design is to create, distribute, modulate, or accommodate movement. In terms of urban planning and design, the layout of the space initially encourages movement, after which land that is seeking movement migrates to lines with abundant movement, producing multiplier effects on movement that then draw more retail and other uses, which then causes the local grid to be adjusted to accommodate the higher density and variety of uses. This 'Movement economy' shows the relationship between distribution of amenities and movement of people. Street sellers frequently congregate in areas with a lot of potential for commerce. Agglomeration in a few locations increases revenue because (a) concentrations of vendors attract more customers and gain recognition; (b) more on-street establishments may impede and hinder easy access to nearby off-street establishments; and (c) more street vendors increase pedestrian and vehicular congestion, slowing all down and allowing consumers to spend more time looking through merchandise and hearing sales pitches. In a typical bazaar economy, vendor and buyer daily interactions are strong as each tries to negotiate the best price (Recio and Gomez, 2013). Hence street vending and distribution of amenities are related.

Urban informal markets such as street vending also depend on the formal uses of economy. They are prominent near retail markets, transport junctions, public buildings, festivals and events. This observation can make us draw an arrow representing a relationship between street vendors' location and distribution of amenities.

Spatial structure of urban areas has major role to play in the distribution of pedestrian movement on a street-by-street basis. (Ozbil, Peponis and Stone, 2011). Street network distribution has effect on land use distribution too. (Yaxing, Bojie and Jingjie, 2022). Also land use and built form has effect on pedestrian movement and traffic characteristics (gehrke, 2000)

Hence this thesis hypothesizes that there is an impact of street network pattern and land use on street vending distribution pattern. Answer to this hypothesis will be analyzed under objective 2 which is to analyze the effect of street network, land use and built form on street vending.

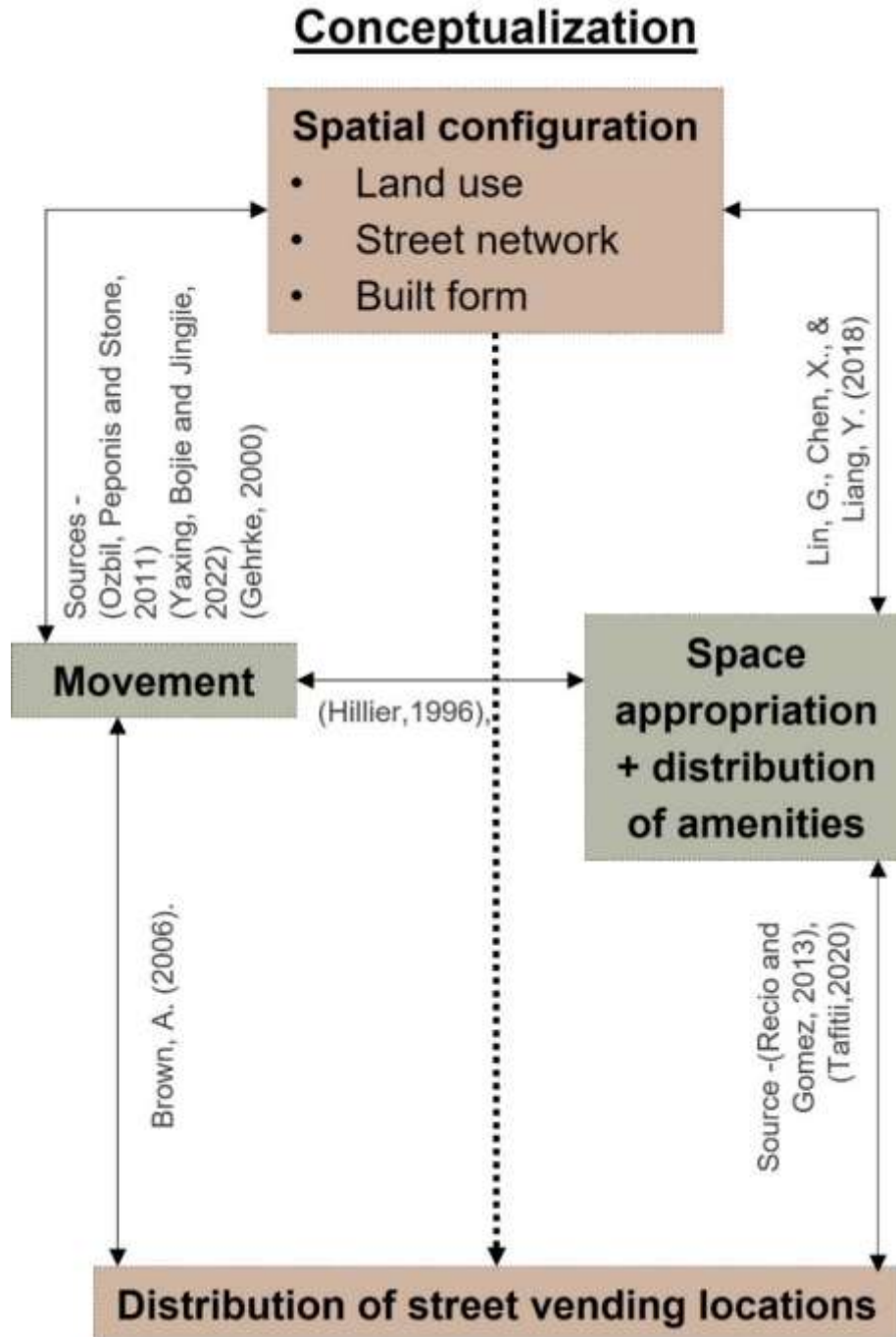


Figure 1 Conceptualization of research

1.4 Research question

How spatial configuration impacts street vending?

1.5 Study area selection

Street vending activities occur where street vendors have most access to pedestrian flows, commercial areas, junctions, next to monuments and residential areas where street vendors are major contributors to urban food supply. This thesis takes a case example approach by selecting Old Bhopal ward no 20 and 21 as case. Primary survey of all street vending locations is needed in this research which is suitable for this site. Chowkbazar area of this site has major historical monuments of Bhopal, more than 50% is covered by commercial areas with high mixed-use areas, narrow as well as major arterial roads, old and dynamic built fabric. The site area is 0.73 sq kilometer which has more than 400 informal street vending activities of 8 major different types of commodities. This scale of site is suitable for detailed primary analysis considering the limited time of this thesis.

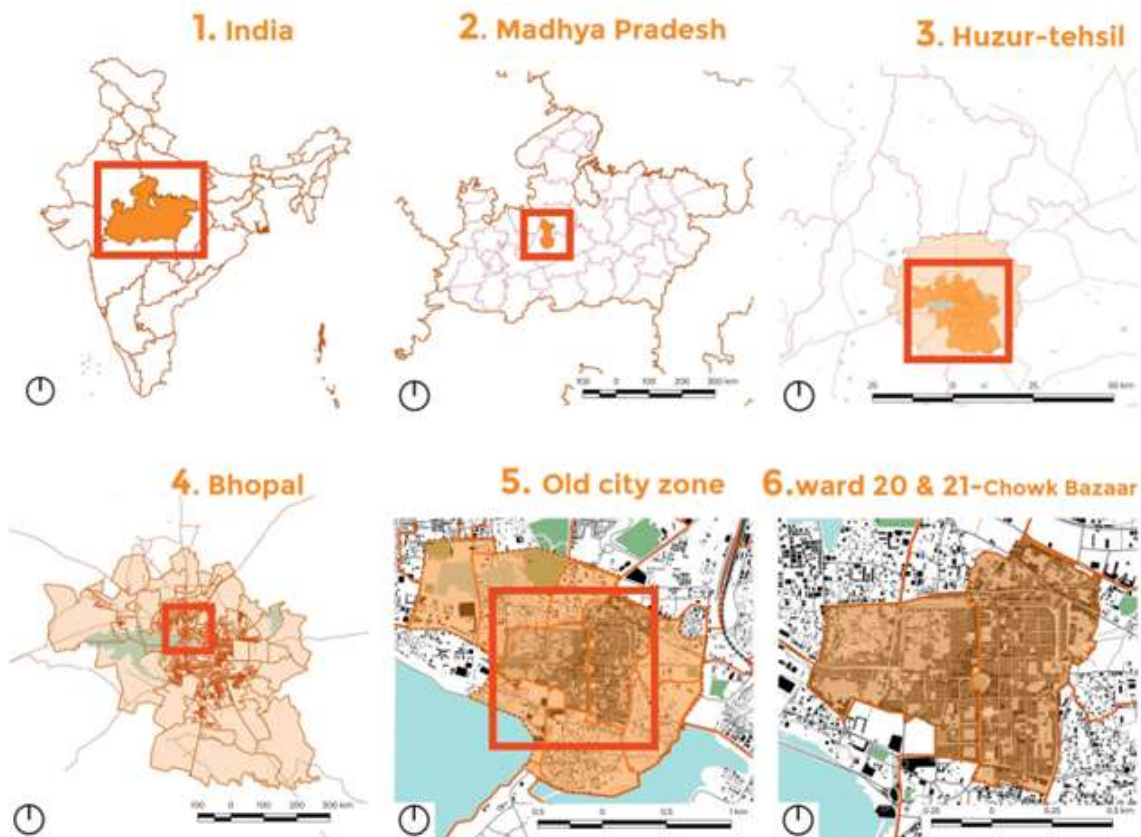


Figure 2 Study area location

1.6 Aim

The aim of this thesis is to provide spatial planning recommendations for Street Vending Plan.

1.7 Objectives

As the thesis aims to find answer to the question whether spatial configuration has impact on street vending and what could be the spatial planning strategies for street vending plan, it is needed to survey and map in detail the distribution pattern of street vendors in the selected site. Hence the first objective is -

- 1 To study temporal distribution of street vendors of different commodities to understand space utilization by vendors.

Survey and mapping of street vendors will give point location data which can be analyzed with other spatial configuration layers to answer the research question. This mapping is to be done for different commodities sold by vendors. This mapping will give how much space is getting used by vendors and what is the composition in terms of nos for different vendors. Following that the second objective is

- 2 To analyze the impact of spatial configuration on street vending locations.

Detailed mapping and space utilization will give us the data set to analyze with spatial configuration parameters like land use, street network, built form. Relation with street network pattern, land use adjacency, impact of built form analysis will achieve this objective and answer the research question. Final objective is –

- 3 To propose spatial planning recommendations for Street Vending Plan of Old Bhopal.

1.8 Scope

1. Spatial configuration of an urban area covers many parameters which can be related with street vending distribution. For this thesis street network, land use and built form has been considered as these are already discussed in conceptualization having effect on movement of pedestrian which is the primary customers of street vendors.
2. Commodity-wise temporal mapping of street vendors has been considered as this will give more detailed understanding of space utilization by vendors.

3. Studying relationship with spatial configuration parameters and regression analysis to predict no of street vendors.
4. The street vending plan as per act should be done in ward or zonal level and that is why administrative boundary of ward 20 and 21 has been considered.

1.9 Limitations

1. Street vending locations are also affected by encroachment, parking, eviction threats by local authorities. These are considered as externalities and beyond the scope for this study.
2. Seasonal variations can be considered while preparing a street vending plan as per act which asks for special vending zone demarcation. The selected site in old Bhopal has a very unique character during the month of Ramadan when entire market is open for night. This thesis does not consider such seasonal variations in street vending distribution.
3. There are factors like vehicular movement, distance from important landmarks or public building to keep free as no vending zone, seasonal variation, vending space occupancy in private developments are dependent on stakeholders' engagement like town vending committee, police, municipality. These factors are not considered in the study as a result this analysis will only deliver spatial planning determinants which does depend on such participatory process.
4. The study focuses on predictability, probability, correlation, and control of occurrence of street vendors based on spatial configuration, hence perception of street vendors, a qualitative approach has not been taken. The qualitative approach of vending location choice has been discussed in existing literature which is complex, context-dependent, and subjective and deals with understandings and meanings.
5. Vendors are surveyed based on stationary and mobile as per the act. For point location and spatial configuration analysis mobile vendors are not considered.

1.10 Expected Outcome

Analysis of Spatial distribution of street market in the city will inform planners & economist what spatial factors attracts street vendors & thereby shaping the informal economic structure of the city in many ways. Approach to analyze the impact of spatial configuration on street

vending would be a methodological contribution in how to predict no of street vendors based on spatial configuration. This will give an idea about the street vending potential of an urban area. This thesis will recommend spatial planning strategies to prepare street vending plan for the selected area. One road stretch of the site will be detailed out for street vending plan proposal. A framework of preparing street vending plan has also been recommended which can be followed by ULBs. Findings and outcome of the research will add valuable insight to the research area of *economic value of streets* and effect of spatial configuration on socio-economic activities. The study will give a prediction approach for location of street vending potential zone.

2. Literature Review

2.1 Street vending in India

In urban India as well as mostly in developing countries street vending has been seen as proof of poverty, unorganized way of making planning cities. Open markets, corner markets, and weekly *haats* are all ingrained in Indian culture and stretch back many centuries. One needs stories of wandering merchants who peddled their wares door to door in towns in all ancient and mediaeval civilizations. Moreover, marketplaces that were held on specific days of the week, month, etc. In these markets, vendors would set up their stalls. They conducted business just like any other retailers or store owners. The primary distinction was that contrary to what their names implied, street vendors did not have set locations for their trade, unlike retailers and other merchants who did. (Bhowmik, 2005).

Academicians and policymakers are quite concerned about the massive increase in the no of street vendors in recent years. Several sectors started to decline due to competition from both domestic and foreign businesses, as well as a lack of resources such as materials, power, money, and markets. For their survival, entrepreneurs adopted labor-saving technologies. On the contrary hand, the state's involvement in creating jobs is inadequate when considering fiscal responsibility. According to research done in Ahmedabad by the Self-Employed Women's Association (SEWA), the largest trade organization in Gujarat at the moment, half of the textile workers who lost their jobs have turned to street hawking. (Seepana Prakasam, 2016)

In recent years, a new group of street vendors has emerged. Some of the vendors are employed by other people, and they offer a variety of goods including leather goods, pricey electronic goods, household goods, and literature. Some sellers work as commission-based agents for official businesses. Street vendors aren't always as free as they seem. The same supplier from whom they buy or rent the products they sell may also give them products in exchange for payment that is roughly similar to a salary. Nonetheless, because they are all

informal workers, street vendors face the same issues(Seepana Prakasam, 2016). How street vending policy in India has evolved and made it into an act has been discussed in existing literature.

2.2 Effect of spatial attributes on street vending

Spatial attributes encompass many but majorly street network, land use, built form can be considered for a neighborhood scale analysis. Finer detail scale analysis can include road section, parking, encroachment locations, footpath conditions which can influence location of vending. In this section the effect of land use, built form, street network on vending has been discussed from existing literature. There are studies which discussed the inclusion of street vendors in planning but through policy measures, not how we can plan or formulate spatial planning norms for street vending plan.

Street vending and land use have a complicated and nuanced interaction. One study indicated that the type of sellers and three physical planning factors—land use, road type, and road width—are related when street vending is analysed spatially at the city level. (Chakraborty and Koley, no date). Street vending is a key activity connected to the informal sector in metropolitan areas and is widespread around the world, especially in developing countries. (M.Sc in Urban Planning, Institute of Engineering, Pulchowk Campus, Tribhuvan University and Karna, 2019) Street vending offers benefits such as enlivening urban public spaces, increasing public safety, generating employment, and creating vitality and comity in the city. However, street vending has been losing space, both culturally and materially, and falling prey to urbanization. (Bromley, 2000) The impact of urban culture on street vending has also been studied, with findings suggesting that it has a weak effect on street vending (Al-Jundi *et al.*, 2022) Overall, the relationship between land use and street vending is complex and context-dependent.

Table -1 explains the existing literature on relationship between spatial properties and street vending locations. (Next page)

Table -1 Existing literature on relationship between spatial attributes & street vending

Author & year	Publication	Key findings	study area	Research Question
(Chia Yang Weng, 2013)	(Doctoral dissertation, Massachusetts Institute of Technology).	The procedure of repositioning a street vendor is actually an evolving multi-player game.	Hsinchu City, Taiwan	How can we create a compassionate relocation procedure that better accommodates the requirements of street vendors during conflicts involving urban public spaces?
(Liu and Liu, 2022)	Cities	1. According to the kernel density estimation, they gathered in the city in a multi-core cluster pattern. 2. Due to the NIMBY phenomenon, street vendors avoid the inner-city business districts and high-rent areas in favour of locations close to lower levels of the road and areas of higher population density.	Shenzhen, China	
(Sun <i>et al.</i> , 2022)	Remote Sensing	examines the connections between spatial organisation and the distribution of street vendors, reveals how these two ideas relate to pedestrian mobility, and considers the cultural peculiarities of this in Chinese cities.	Yuncheng, China	What are the complex effects of the street network on the growth of street sellers and pedestrians? the complex interactions among shoppers, sellers, and pedestrians, as well as the spatial network layout

Author & year	Publication	Key findings	study area	Research Question
(Baroni, 2014)	(Doctoral dissertation, Massachusetts Institute of Technology).	<p>1. Street sellers in less accessible locations might have better working conditions and financial success than those in more accessible locations.</p> <p>2. The potential for expanding their business and the lack of competition for available space serve as incentives to grow their network of suppliers to low-cost middlemen, in this case with middlemen engaged in smuggling, and to create street vendor organisations that support their product specialisation.</p>	Downtown Mexico City	
(Santos <i>et al.</i> , no date)	American International Journal of Business Management	The street merchants' physical preferences in terms of logistics and market draw are both exceptional	Muñoz, Nueva Ecija, Philippines	
(Recio and Gomez, 2013)	Environment and Urbanization Asia	Although the Monumento region has long been a centre for transportation, the area's great location for economic operations also has a lot to do with the continual, round-the-clock foot and vehicle activity, which raises the site's liveliness on a per-square-meter basis.	Caloócan City, Manila	
(Deore and Lathia, 2019)	Urban Planning	The bustle on the streets is increased by street vendors, who also make the streets safer by ensuring that people arrive and depart and truly inclusive by allowing individuals from all backgrounds to join in the exchange of goods and services. Additionally, it argues that market sellers are necessary elements of more inclusive and entertaining streets and public areas.	Ahmedabad, India.	

Author & year	Publication	Key findings	study area	Research Question
(Farouk, no date)	JOURNAL OF ENGINEERING AND APPLIED SCIENCE	<p>1. Compared to places that are isolated from the urban setting, locations that are integrated with a strong general urban backdrop are better able to develop small commercial business prospects like street sellers.</p> <p>2. Locally accessible streets enable the creation of unique locations that street merchants take use of to satisfy the everyday demands of onlookers.</p>	Cairo	<p>1. Is the placement of street vendors at terminal stations affected by the layout of the building or by how people travel through it?</p> <p>2. What additional factors influence the distribution of vendors?</p>
(Dovey, Recio and Pafka, 2022)	Space and Polity,	the importance of the micro-spatialities of urban design in establishing opportunities for street vending, which requires leftover spaces, small alcoves, wide sidewalks and underutilised car space next to pedestrian flows where trading can occur without completely obstructing the pedestrian flows that are the trade's lifeblood. Unintentional vending spaces, which can be as small as one square metre, are occasionally produced by both urban planning decisions and other unauthorised activities.	Manila	
(Rodrigo Mora, Francisco Bosch, Carlos Rothmann, 2013)	In Proceedings of the Ninth International Space Syntax Symposium, Seoul, Korea	Street markets typically lie along the axes of streets that are significant in terms of layout.	Chile	

3. Methodology

The detailed methodology diagram Figure 3 explains the structure of the thesis.

1. A literature review about street vending in India, how street vending policy has led to action, and how to include street vendors in the planning process has led to the need of the study.
2. As explained in the conceptualization of the research, a literature review was done on the relationship between street vending distribution, movement of people and traffic, and distribution of amenities. How these are related to the spatial configuration led to the research question.
3. The research question 'How does spatial configuration impact street vending?' has been answered by taking a case example in Old Bhopal.
4. The aim of the thesis has been to recommend spatial planning strategies for the street vending plan of Old Bhopal. Objectives are determined to achieve the aim through a primary survey, data collection, data aggregation, data analysis, and proposals.
5. The first objective is to conduct a primary survey of vending locations, get point location data, and map the same. Street vendor data is collected as per the commodity they sell, whether they are stationary or mobile, for morning and evening peak hours. This has been explained in Detailed mapping of Vending distribution.
6. The second objective is to analyze the collected location point data set with the spatial configuration parameters. The impacts of land use, street network, and built form on street vending are analyzed. Methods like space syntax is used to analyze the street network, and the degree of permeability of the street building interface is used to analyze the built form. The theoretical basis of the methods used has been explained in 3.1 Epistemology. Analysis of the impact of spatial configuration parameters leads to Poisson regression analysis to predict the number of stationary street vendors and answer the research question (4.3 Regression Analysis).
7. Results from the analysis are used to recommend spatial planning strategies for street vending plan in proposals. The conclusion of the study and future research opportunities are mentioned in last chapter 6

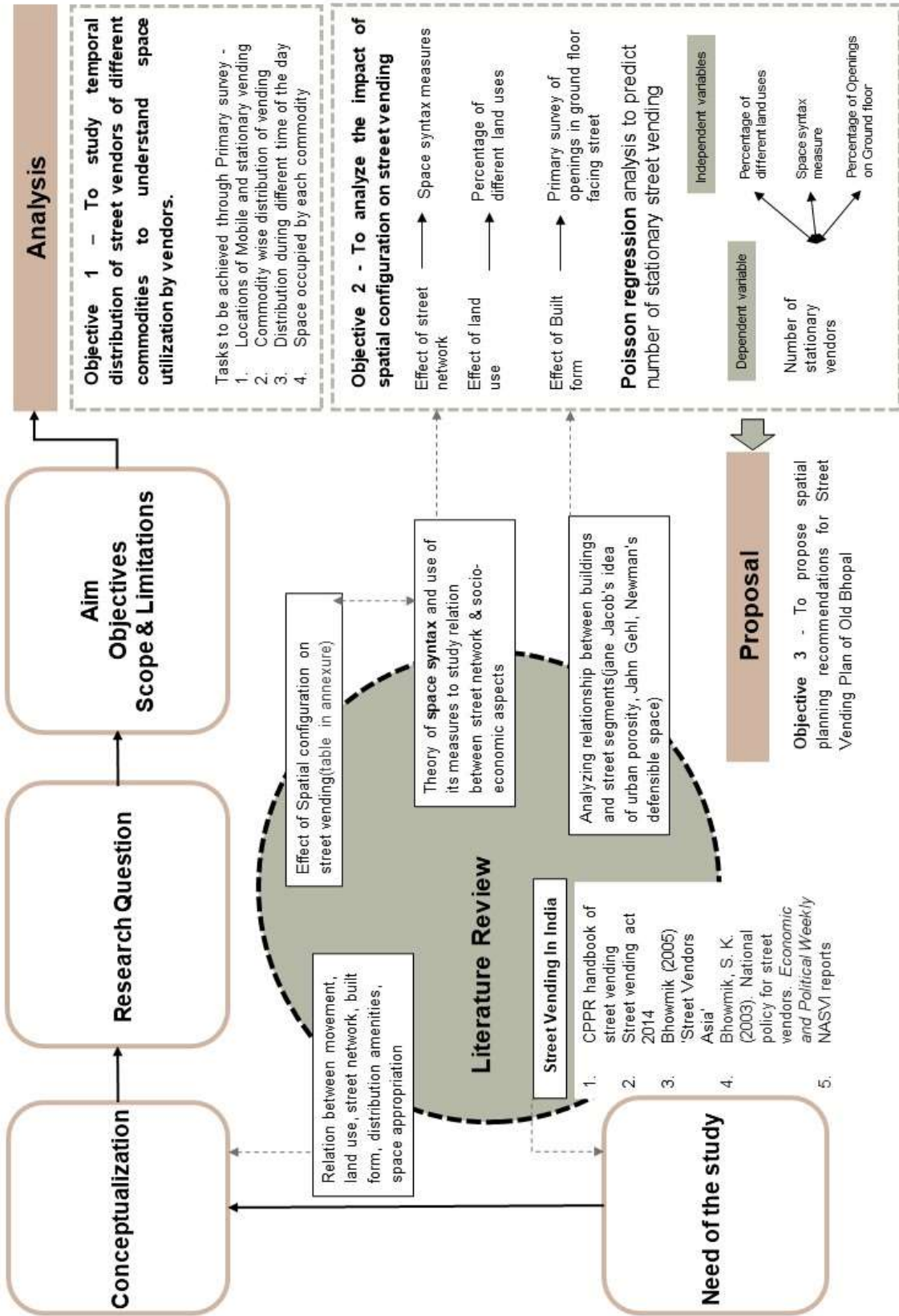


Figure 3 Methodology

3.1 Epistemology

The epistemological basis of the methods used in this research are explained in this section. As shown in the detailed methodology to achieve the second objective and in turn answer the research question, space syntax measures have been used along with land use adjacency, openness of street building interface.

3.1.1 Space syntax to analyze street networks

The space syntax method examines the topological spatial interactions of settlements and mostly uses extrinsic features. The extrinsic characteristics of space are difficult to put into words. For instance, if a tourist in a city asks a local for directions to the train station, the local will describe the route using phrases like "here," "there," "this way," and "that way." The local can also point out where the train station is on a map to the guest. Simple spatial relationships can be described using terms like "here" and "there" or "inside" and "outside." Therefore, it becomes quite difficult to sum up a whole structure or city using only the aforementioned terms. Language sometimes struggles to express intricate spatial relationships in a clear and understandable way. As a result, such intricate spatial systems are frequently represented and understood using abstract models or maps. These models are required to describe spatial relationships since they can encompass a sizable portion of our reality.(van Nes and Yamu, 2021). In terms of how we identify things, urban space is thought to be mostly linear and is viewed as a continuous constellation of places. Alleys, streets, roads, boulevards, roadways paths, sidewalks, subways, bridges, and stairs are some of the names for the connecting spaces between squares. These various urban settings create a grid or network that could serve as a potential pathway for people to migrate from one place to another. The square's location in the linear mobility network determines how it is to be used. As a result, linear objects can be used to depict metropolitan space.(van Nes and Yamu, 2021) The urban street and road network is defined as the "pattern of public spaces linking the building of a settlement, regardless of its degree of geometric regularity". The street system serves as a city's framework and aids in orientation and navigation. The ability to travel throughout the city is provided by these urban public areas. The possibilities for spatially locating functions are shaped by the network of public spaces in response to the various designs of the urban street and road network.(van Nes and Yamu, 2021).Hence space syntax is a tool which helps us understand effect of street network pattern on other socio economic aspects in an urban area. The findings of space syntactic analysis can be linked to both quantitative and qualitative data.

The correlation of place-bounded quantitative data with space syntax numerical values is an example of a quantitative method. In existing literature space syntax has been used to analyze location of retail markets, street markets, commercial potential of an urban area. Sun *et al.*, (2022) showed how different scale of integration and choice measure of space syntax is related to the street market locations in a Chinese city. Street markets are located in significant part of the network ((Rodrigo Mora, Francisco Bosch, Carlos Rothmann, 2013) which explains the relation between street network and location of markets in global scale of space syntax analysis.

Since this research considers every point location data of vendors in an area close to 1 square kilometer, the local scale of analysis is required. Location point data and street segment's space syntax properties are analyzed to understand which measure the best is to predict occurrence of vendors.

3.1.2 Street – building interface.

Activities in street scape are influenced by the nature of the space formed by street building interface. How the street interacts with the surrounding buildings forming it creates spaces which are more interactive or passive. This relation between urban liveliness and street building interface has been established in existing literature (Mehta, 2009). Liveliness or degree of social interaction in urban spaces depends on degree of permeability(Mehta, 2009; Mehta and Bosson, 2021; Mundus Urbano, 2021). How well interior activities may be seen, interacted from a public area determines the degree of permeability (Mehta and Bosson, 2021). The degree of permeability affects the ease of movement and flow of people, which encourages social interactions and contributes to street liveliness. Jacobs and Gehl's strategy for promoting urban life calls for numerous entrances and windows to face a street (Gehl, 2001). The degree of permeability of public space can also be affected by the arrangement of the entrances in an architectural design. Because they maintain a certain level of privacy and security, structures that enhance the geographical depth between street (public) and private area, such as front gardens, tall fences, stoops, high balconies, and barbed wire, might be viewed as beneficial(Habraken and Teicher, 2000; Beirão and Koltsova, 2015). Beirão and Koltsov (2015) demonstrates that residential streets had lower permeability values than streets with more openly visible private doors. However, by isolating the inside spaces from the public, too much territorial depth might have a negative impact on the street space. According to Jane Jacobs (1961), when the possibility of commercial activity facing the streets

(shops) is gone and the street is hidden from the inhabitant's sight, the natural street surveillance will be damaged.

This thesis follows the hypothesis from the existing literature on urban liveliness that the more degree of permeability, more interactive the space is, more social interaction. Street vendors would like to conduct their business activities in areas which are livelier, in other words where more social interactions are occurring. This hypothesis leads to the methodology of mapping percentage of openings in ground floors facing the street. More openings on the ground floor or more degree of permeability will facilitate more interaction.

3.1.3 Impact of land use

As a spatial configuration parameter land use has also been considered. (Zaflis Zaim, Kiki Nurjanah, 2016) analyzed the influence factors in choosing a trade location by street vendors, including land use change processes. (Ogunkan, 2019) examines the spatial pattern and environmental implications of street vending, including the impact on land use functions. Previous studies has mentioned the impact of land use on socio economic activities (Baffour Awuah *et al.*, 2014). As discussed in conceptualization of the research, how land use adjacency of street vendors needed to be studied. Street vendors selling which commodity and what is the adjacent land use they are preferring will give us understanding of how they are preferring different land uses.

3.2 Site Details

Although Bhopal is known as city of lakes, it also has built forms, especially in the Old city, which have heritage status. These monuments represent Bhopal city's historic legacy. Most famous among these monuments are Taj-ul Masjid, Moti Masjid, Sadar Manzil, Gauhar Mahal. Some of the monuments were old palaces which now serve as a tourist visiting spots; there are few mosques which are still serving as both religious and cultural spaces. Under Smart City Programmes there have been conservation and restoration work conducted to revive and rejuvenate these monuments. Wards coming under the old city zone were selected to find out the potential of heritage as well as areas which require intervention in context of infrastructure development. The task led us to find out that the Chowk-bazaar area require the most intervention and it has the potential to be heritage zone with existence of heritage precincts around the Jama Masjid Mosque and street to Unani Shafakhana. But due to poor

maintenance the area has been oblivious to people living in there. Chowk-bazaar comes in 2 wards- 20 &21.

Because of such historical importance it has been a thriving chowk for centuries. Chowk-bazaar is primarily known for its commercial shops with variety therefore It has been observed that The 44.6% area is covered by mixed use pattern having both commercial and residential zone and total 65.7 % is covered by commercial area. The old city's key features are narrow roads and streets with dense built form, limited open spaces, and traffic congestion and on street parking which is increasing the encroachment on narrow lanes across commercial area.

The Study Area comprises of Ward 20 & 21 which has total area of 0.73 sqkm / 73 hectare having population of 45,835 and 9,142 household. The population density is 627 person/ hectare which is more than net density of Bhopal Municipal Corporation which is 62 person/ hectare. The sex ratio is 950 females/1000 males. The literacy rate is 72.9% which less than rate of Bhopal, which is 83.47 %. (The above data are obtained from CENSUS 2011). The average plot size is 159 sqm. The household density is 125 household per hectare with dwelling unit 26 units per hectare.

The road network comprises of main arterial road in west, collector road around the study area and the narrow lanes inside the study area in which Chowk Bazaar-lanes are in rectilinear network (i.e., grid iron pattern). There are 2m Wide Street going through the dense built form connecting inner buildings.



Figure 4 Jama Masjid area of Old Bhopal

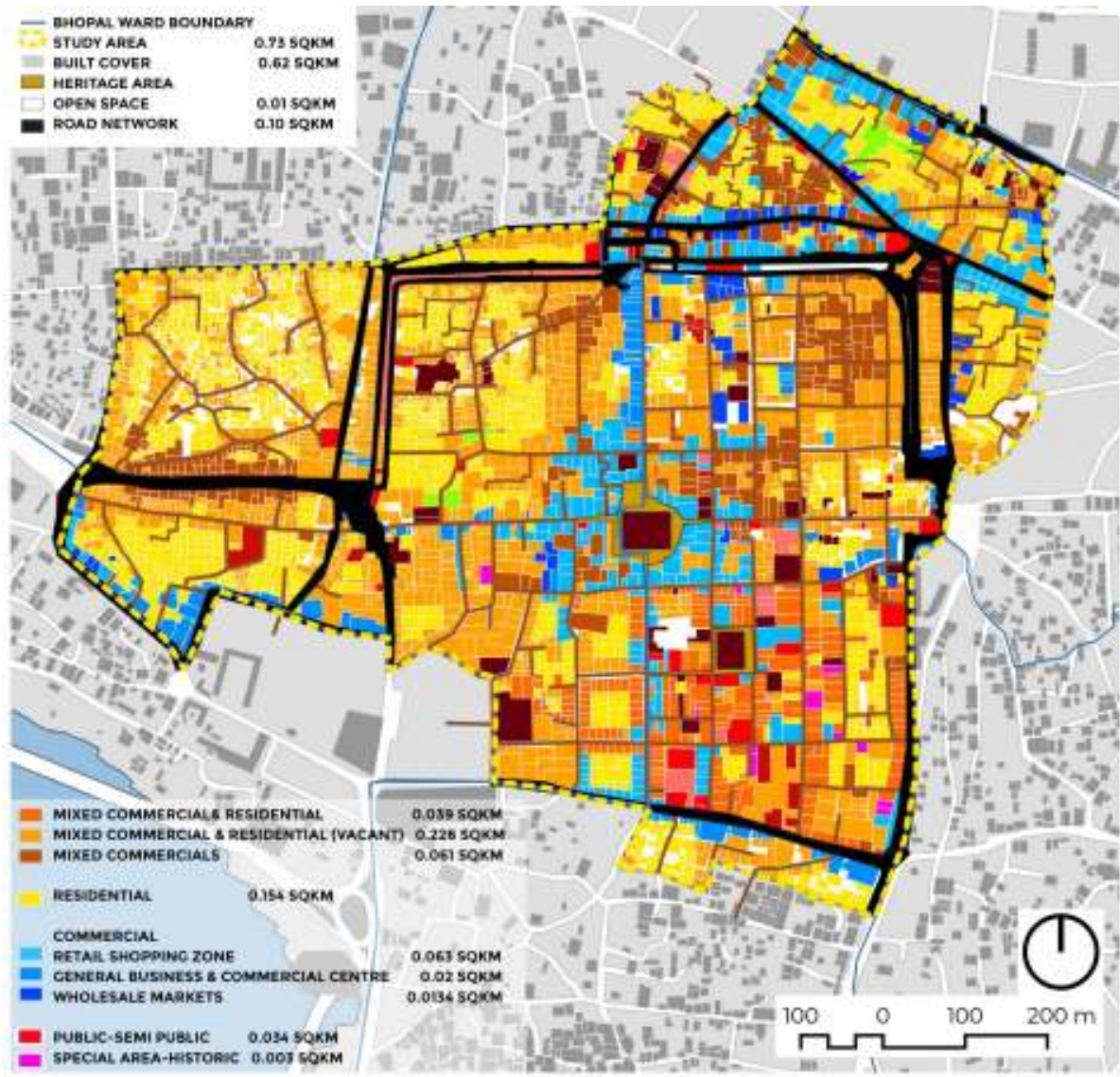


Figure 5 Study area land use pattern

3.3 Data collection strategy

To achieve the objectives and to answer the research question data collection has been done through primary survey and also secondary survey. Below are the overarching verticals under which specific data set has been surveyed and collected during continuous primary survey of 2 weeks.

To achieve the objective of analyzing the distribution pattern of street vendors detailed mapping of street vendors was needed. As per the act 2014, the category of mobile and stationary street vendors has been considered -

“street vendor means a person engaged in vending of articles, goods, wares, food items or merchandise of everyday use or offering services to the general public, in a street, lane, side walk, footpath, pavement, public park or any other public place or private area, from a temporary built up structure or by moving from place to place and includes hawker, peddler, squatter and all other synonymous terms which may be local or region specific; and the words “street vending” with their grammatical variations and cognate expressions, shall be construed accordingly”;(street vendors act ‘Street Vendors Act, 2014_English.pdf’,)

“Stationary vendors mean street vendors who carry out vending activities on regular basis at a specific location.”

“Mobile vendors mean street vendors who carry out vending activities in designated area by moving from one place to another place vending their goods and services.”

For each of the categories their locations were mapped along with the commodity they sell, and space occupied by them. After a reconnaissance survey it has been observed that the category of commodities is diverse over here as there old iron market, market for spices, fruits, vegetables and food joints.

Street vending distribution data further surveyed in terms of morning and evening. During reconnaissance survey video recording of pedestrian flows was done to determine the peak hours of pedestrian movement. Major roads in the site like Jama Masjid Road, Jumrati road, Neem Road, Chintaman road was considered for pedestrian volume count. From the pedestrian volume count (PVC), the pedestrian flow was found to find the busiest street with footfall like the Jama Masjid road has a PVC of 1242 persons/hour (Peak hour- 01.30PM to 02.30PM), the Jumerati road with PVC of 1530 persons/hour (Peak hour- 06:00PM to 07:00PM), the Neem road with PVC of 4669 persons/ hour (Peak hour- 05:00PM to 06:00PM) and the Chintaman road with PVC of 987 persons/hour (Peak hour- 11:00PM to 01:00PM). Also, from the questionnaire survey of street vendors average time span of vending activities are from 11am to 8pm. Hence for morning street vending distribution pattern 10 am to 1pm was considered and for evening street vending distribution pattern 5pm to 8pm has been considered as peak hours. Street vendors are that unique part of informal economy who do not miss out a single day of business opportunity. From the reconnaissance survey it was observed that there has not been any major difference in distribution pattern of street vending on weekdays and weekends.

To analyze spatial configuration properties of the site three parameters have been selected, Land use, street network configuration and public private interface.

- Data for land use has been collected from the local planning of Bhopal and ground truthing has been done through primary survey.
- Street Network configuration data was extracted from OSM using python OSMNx package. This network data has been analyzed through space syntax analysis.
- **Degree of permeability** mapping has been done through primary survey. The parameter was determined by percentage of openings in ground floor which is facing the street. The type of interfaces is diverse since this site has buildings more than 100 years old as well as newer constructions. There are interfaces in mixed use typology where ground floor has been kept as garage or store. There are residences which has blocked windows or blank walls. Mostly there are commercial establishments in ground floor with 100 percent of openings. For example, A1 picture shows busy commercial lane of chowk bazar next to Jama masjid. The openings percentage is 100 %. Below are the suggestive interface types and their openings percentage as they have been mapped.



Figure 6 Openings on ground floor facing st

4. Analysis

4.1 Detailed mapping of Vending distribution

As it has been described in data collection strategy part the data collected from surveyed has been mapped according to Morning and evening mobile and stationary street vending distribution.

Mobile Street vending distribution pattern at evening

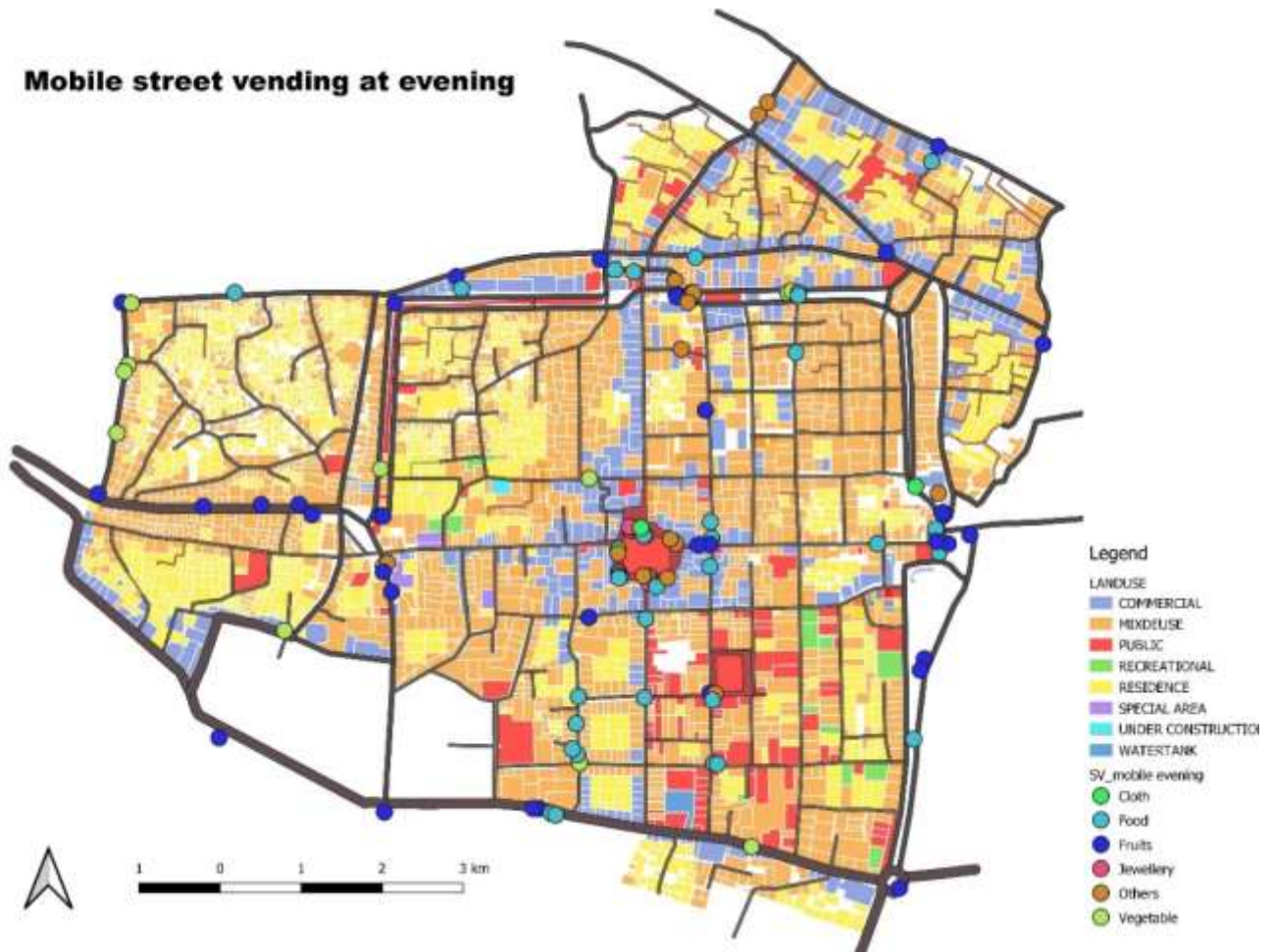


Figure 7 Mobile Street vending at evening

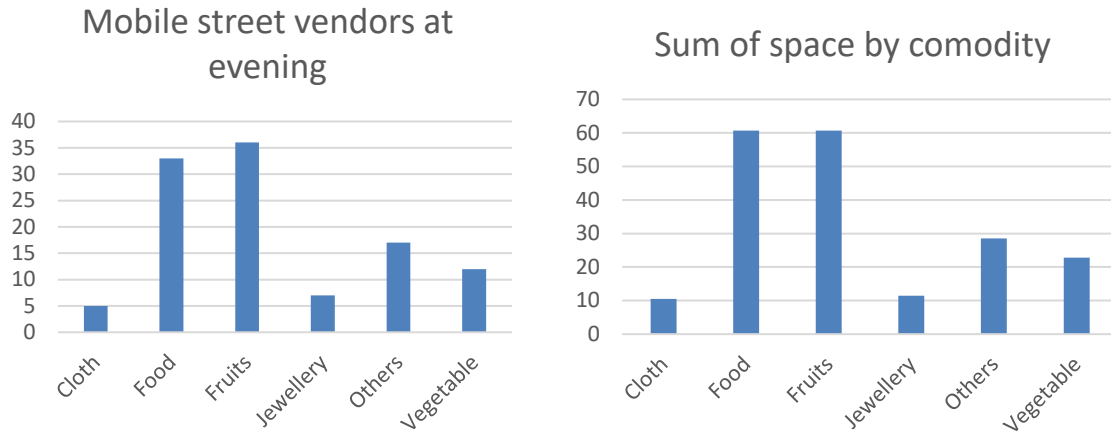


Chart 1. Space occupied by Mobile vendors at evening . Chart 2 No of Mobile Street vendors at evening

The evening survey of vendors distribution was done from 5 to 8 pm. There is a total of 110 Mobile Street vendors during that time. Fruit and Food vendors consumes 60 square meters of space respectively. Vendors who sell Jewelry can be seen next to Jama masjid sarafa market. There are 7 Jewelry vendors with vendors who sell cloths and other miscellaneous household products. These jewelers set up their space on the ground with their jewelry box in and around sarafa market.

Stationary Street vending distribution pattern at Evening

Stationary street vending patterns have more types of commodities compared to mobile vending in the evening. The types and their distribution in the site have been shown in Figure 8

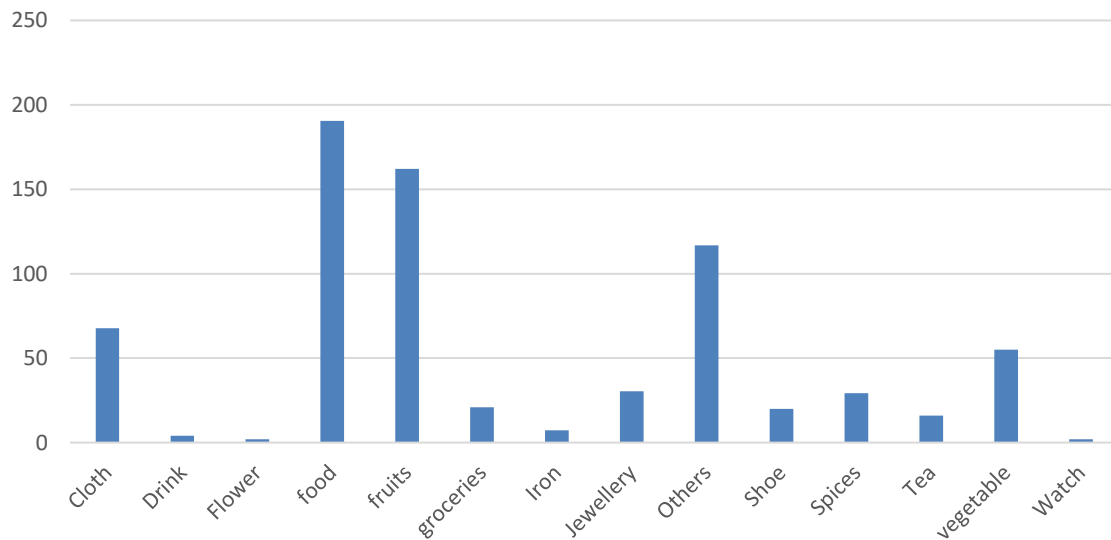


Chart 3 Space occupied by street vendors

Stationary Vending Pattern at Evening & Morning

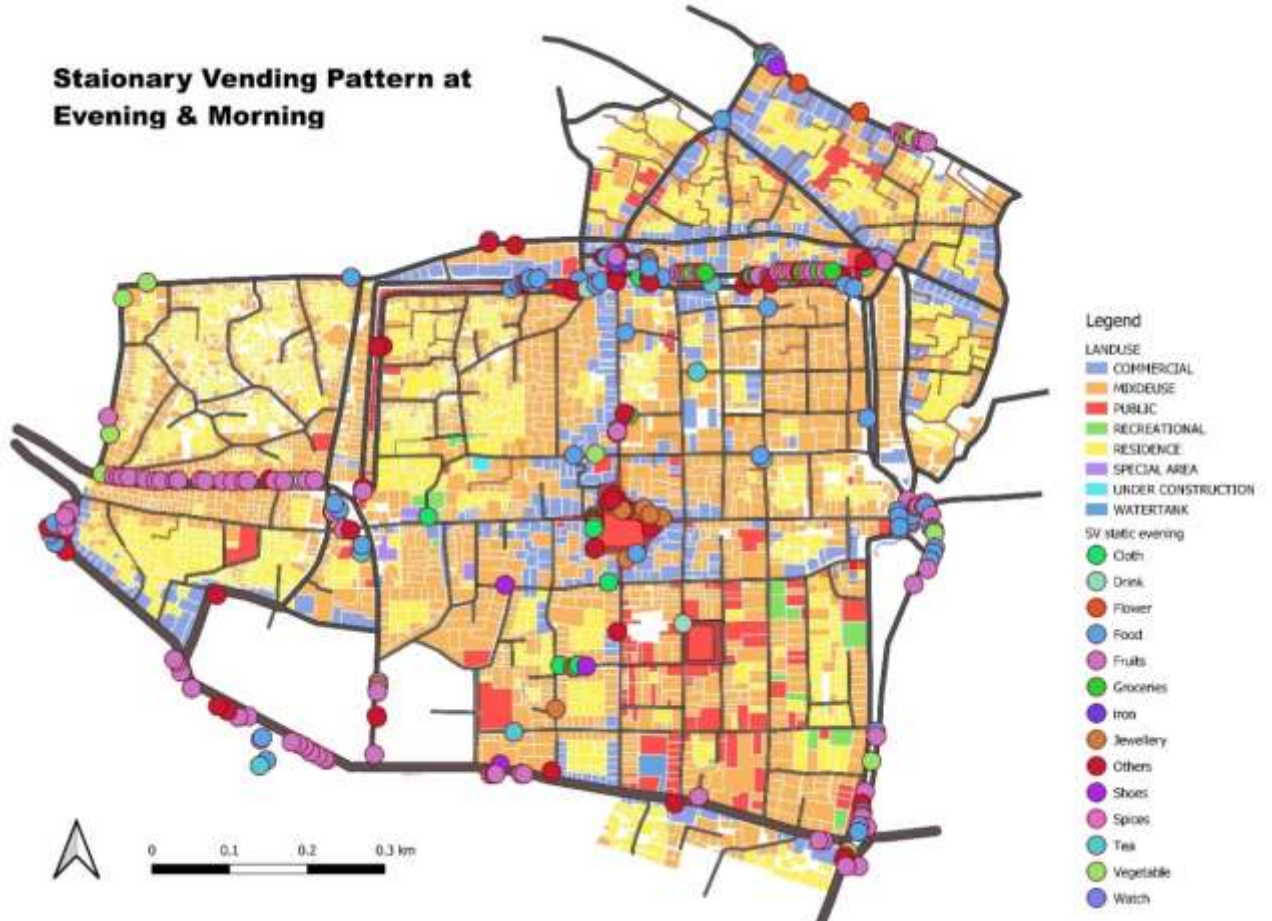


Figure 8 Stationary vending locations

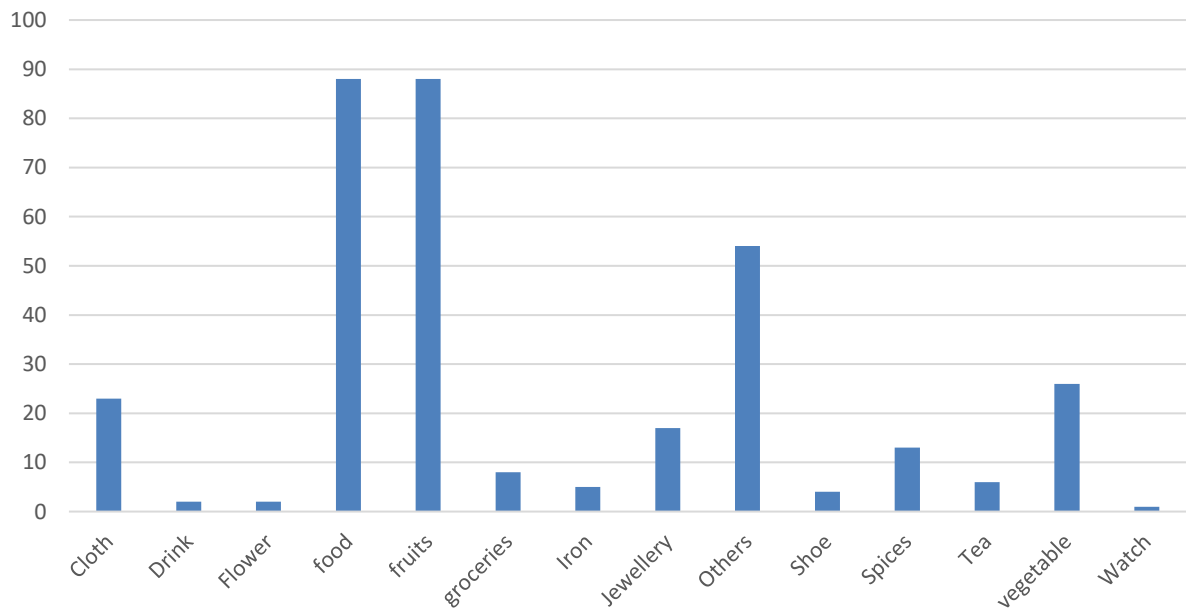


Chart 4 No of street vendors for different commodities

Mobile and stationary vendors space occupancy at evening have been given in below table

comodity	Sum of space for stationary	Sum of space for Mobile
Cloth	67.8	10.5
Drink	4	
Flower	2	
food	190.5	60.7
fruits	162.1	60.7
groceries	21	
Iron	7.25	
Jewellery	30.4	11.5
Others	116.7	
Shoe	20	
Spices	29.3	
Tea	16	
vegetable	55	22.8
Watch	2	

Chart 5 Space occupancy of Mobile and stationary at evening

Stationary street vendors on average sell from 11 am to 9pm at night. Hence In morning stationary street vending pattern is not very much different. Time use analysis of streetscape by stationary street vendors is necessary to determine pattern and space usage.

Mobile Street vending distribution pattern at Morning

Mobile street vending was observed more in residential and mixed-use areas in the morning. There are 84 mobile vendors in the morning, among them most sell vegetables.

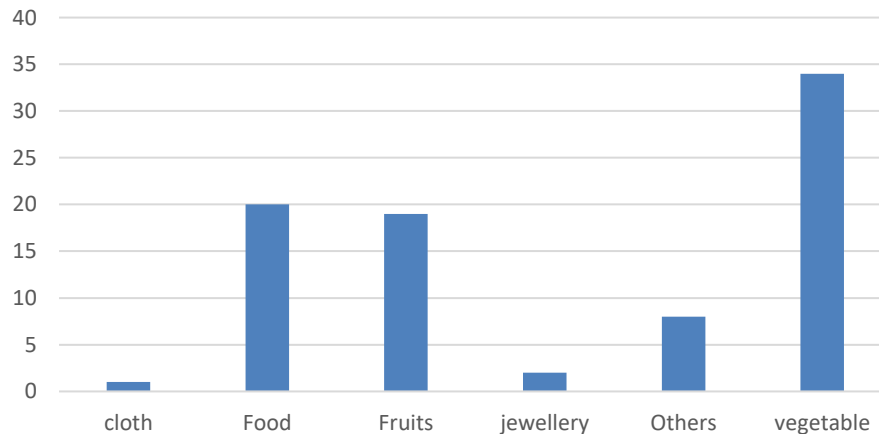


Chart 6 No of Mobile Street vendors

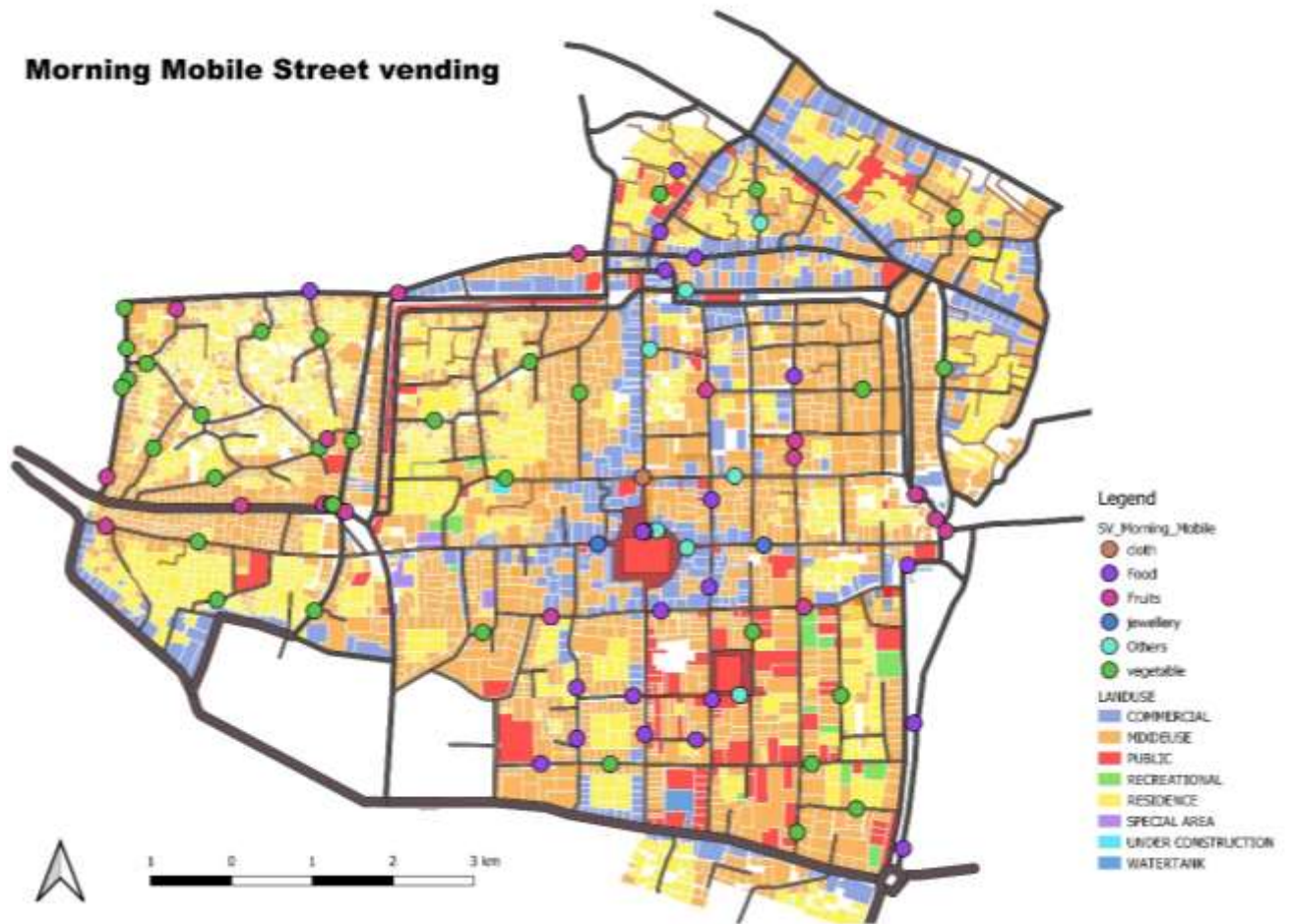


Figure 9 Mobile street vendors location points in Morning

4.2 Relationship with Spatial configuration

To achieve the second objective, which is **to study space appropriation of street vendors and their location choice through spatial configuration parameters**, it is needed to explain the parameters to be considered and scope of the study. Spatial configuration involves built form, street network pattern, building use and other morphological factors. It has been known from the existing literature that these factors affect the pedestrian movement. Street vendors' business depends on pedestrian movement and also functionality of buildings. It is a general observation that we can see street vendors agglomerating most next to a traffic junction, next to important public buildings with high footfall, next to a busy road with more pedestrian movement, they meander through residential neighborhood as well as commercial and mixed used ones. These observations intrigue one to question what is the effect of such buildings in terms of use, in terms of design interface, pattern of street network on street

vending distribution? How do they appropriate space in terms of these spatial parameters are analyzed over here.

4.2.1 Impact of street network Pattern

Mapping street vendors from the previous objective was another way of subjectively understanding behavior of pedestrian and street vending location choice which can be compared with objective and quantitative approach of space syntax.

Syntactic Measures –

The specific analysis used in this study for space syntax is the angular segment analysis, which offers two crucial metrics: angular Integration and angular Choice. Turner's Formulas (1) and (2), each, can be used to calculate the angular integration and choice.

Equation 1 Angular Integration $(i,r) = (N_i - 1) \sum_{j=1}^J \text{Dep}(i,j) , \{ \text{dis}(i,j) \leq r \}$

where $\text{Dep}(i,j)$ is the mean angular depth from a given street segment i to all other street segments within the radius r in the segment map.

Equation 2 Angular Choice $(i,r) = \sum_{k=1}^K n_{jk} , \{ \text{dis}(i,j) \leq r; \text{dis}(i,k) \leq r \}$

where n_{jk} is the no of times that a given street segment i has been passed through on the angularly shortest paths from segment j to k within the radius r in the segment map.

Angular integration suggests more 'to movement' and choice of street segments suggests more 'through movement'. Analysis of street network syntactic properties and their correlation with street vending location will help us understand which measure is best to predict location choice of street vendors.

Location point data set of street vendors are overlaid on the space syntax syntactic measure integration and choice map in Figure 10Figure 11 . The warmer color represents more value of such measures and cold patches shows the least value of choice, integration, and centrality. If we look into the pattern of different commodities their distribution is particular to different measures of space syntax. In integration map jewelry vendors are located on the street segments which has most integration value. Most of the stationary street vendors are located on streets with red and yellow segments suggesting they benefit from the "to movement" potential of such street segments. Distribution of vendors on choice map shows there are more vendors located in warmer street segments. Also, there are agglomeration of vendors in not the most choice value of street segments. This shows effect of street network on vending distribution is twofold. Street vendors finds location is best where they can take advantage of less traffic and nearby retail shops.as in case of jewelry vendors their location

is more justifiable with integration rather than choice as those segments has most integration value but not most choice value. People go to those sarafa/jewelry retail shops which actually prefers to movement since it is a destination shop for customers. Next to this sarafa market jewelry vendors locate themselves to enjoy the benefits of agglomeration of economies. Similarly other commodities have their unique relation with the space syntax measures.

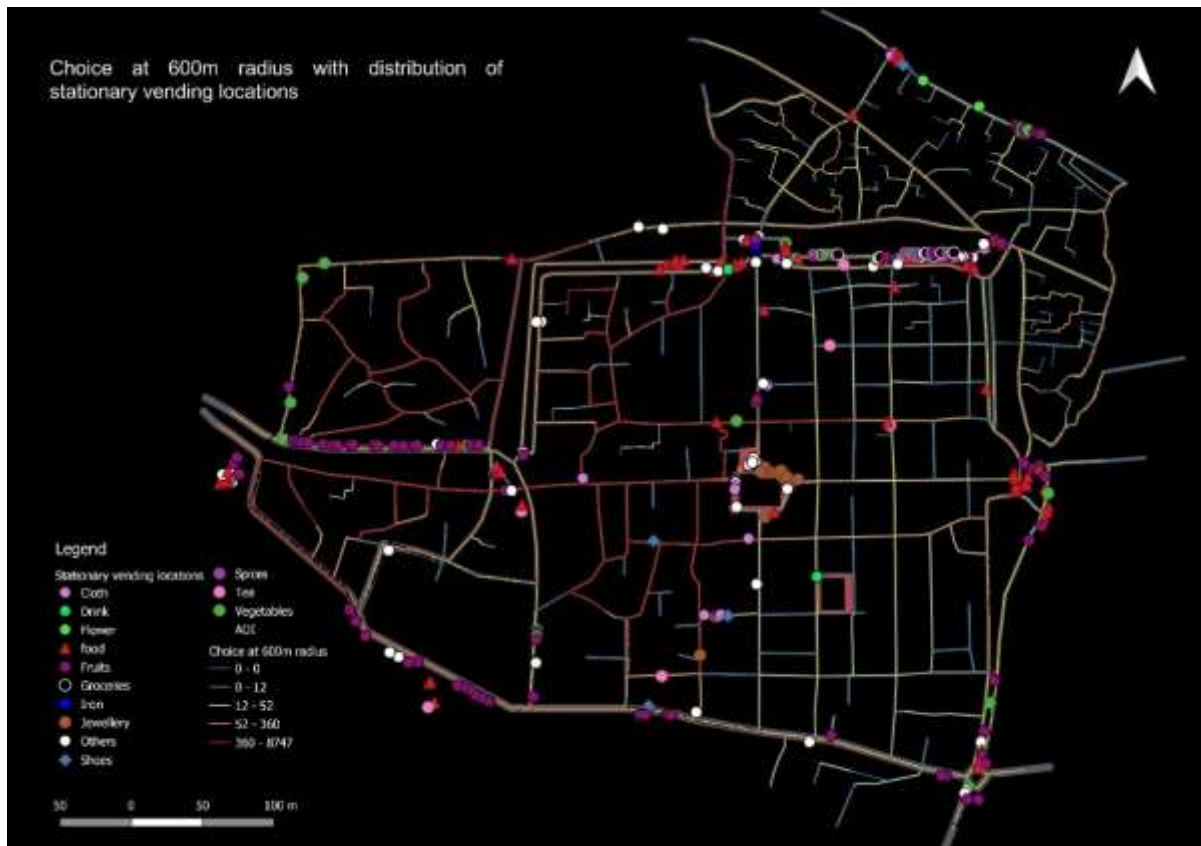


Figure 10 Choice at 600m radius

Overlay analysis of vending and space syntax measures for evening and morning has multifold implications. Hence statistical analysis was needed to test how these three space syntax measures are related to overall distribution of street vending patterns. Also, different radius of space syntax analysis was needed to see which scale of analysis has the most correlation. Pedestrian survey at the initial stage says the average walking time for shoppers and pedestrians is 5 to 10 minutes. For this purpose, a walking radius of 600m, 1000m, 2000m has been taken which is more than 10-minute walking radius(600m). As well as global radius, n has been considered. These different scales of syntactic measure and no of street vendors in each segment were correlated for morning as well as evening. shows r square values of different syntactic measures. The r square value is less than 0.5 which shows very low correlation between street network syntactic properties and no of street vendors. This is

because there are other spatial configuration parameters like land use and public private interface has effect on street vending. These factors works as confounding factors for effect on street vending.



Figure 11 Integration at 1000m radius

Table 2 Correlation values of no of street vendors and street segments Integration & choice values

Syntactic measure	R ² value
Choice at n	0.0021
Choice at 1000m	0.0104
Choice at 2000m	0.0024
Choice at 600m	0.0126
Integration at n	0.014
Integration at 1000m	0.0153
Integration at 2000m	0.0139
Integration at 600m	0.0126

We can see from Table 2 Table 2 Correlation values of no of street vendors and street segments Integration & choice values the most value of r square is for choice at 600m radius and integration at 1000m radius. Now integration at 1000m radius has the most correlation and thereby at this scale choice measure is the best to predict street vending locations.

4.2.2 Land use adjacency

Land use has been considered as one of the spatial configuration parameters to study the relationship with street vending distribution patterns. This analysis will try to find answers to the questions like how street vending distribution pattern changes according to land use during different time of the day? How commodity wise street vending is distributed among commercial, residential, mixed use and residential? Whether food sellers are more in commercial or mixed used areas? These findings will help us understand commodity wise land use preference of street vendors. How much area is needed for specific commodity next to that land use.

As previous objective wise detailed street vending mapping is already there according to morning and evening peak hours, the data set has been updated in more detail. The building footprint layer in GIS has attributes like commodity wise no of street vendors in front of a building. For example, in Figure 12 in front of building A there are two fruit sellers and one jewelry vendor. In front of building E there is one food vendor. Accordingly in the shapefile attribute table 2 fruit vendor and one jewelry vendor was added to the building A row which is commercial land use. Similarly, the entire study area street vending and building footprint data has been updated. We get one building footprint updated file which has a no of different types of street vendors in front of every building. This too has been considered as temporal data as Morning and evening street vending distribution was considered for street vending location data set. This resulted in two sets of building use layers with a no of street vendors in front of a plot for morning and evening. These layers have been exported to excel for further analysis.



Figure 12 Street vending in front of building

Morning distribution of street vendors chart shows residential land use is most preferred by vegetable sellers. Vegetable sellers in the morning are 54 in nos among which 30 are mobile vendors. They roam around inside the residential areas or *Mahallas* from 10 am to 4 pm on average. This is a very common practice of the residents over there to buy daily necessary vegetables from the vendors instead of going to *sabji* mandi each day. This site has a Sabji mandi next to it towards northeast corner. Many vendors keep their selling cart in nearby parking areas at night, they come to mandi in morning, pack their cart with vegetables and sets out to selling for the entire day. Land use is mostly dominated by mixed-use areas. Mixed-use residential areas have one shop or garage on the ground floor and apartments above it. Below are a few morning pictures of vegetable vending in residential areas.



Figure 13 Vegetable vendors(mobile) in residential areas in morning

There are 20 vegetable vendors who are stationary. They are located next mostly next to junction, close to sabji mandi, on the median of two way roads, next to mosques. Their space occupancy is more than the mobile vendors. Mobile vendors use carts of mostly 2 square meter of area, while many stationary vendors use carts as well as set up their temporary space with wooden racks, table, plastic sheets. The later takes more than 3 to 4 square meters of area.



Figure 14 example of vegetable vendor who uses cart but stationary.

Food and fruits vendors are also there next to residential areas but only 4 in nos. Others category of vending considers shoes, spices, tea, drinks, watch, flower. Public land uses like mosques and temples, hospitals, public toilets have mostly preferred by food and fruits as well as other vendors. Jewelry vendors was seen next to Jama Masjid sarafa market area. There is total 16 jewelry vendors in morning among which only two of them are mobile. Most of them finds space on the street next to shop entrance with their jewelry box.



Figure 15 Stationary Jewelry vendor

Cloth, groceries, Iron products are sold in commercial areas most and to some extent in front of mixed-use buildings. Fruits vendors are more in commercial areas than food vendors.

Morning distribution of street vendors according to land use

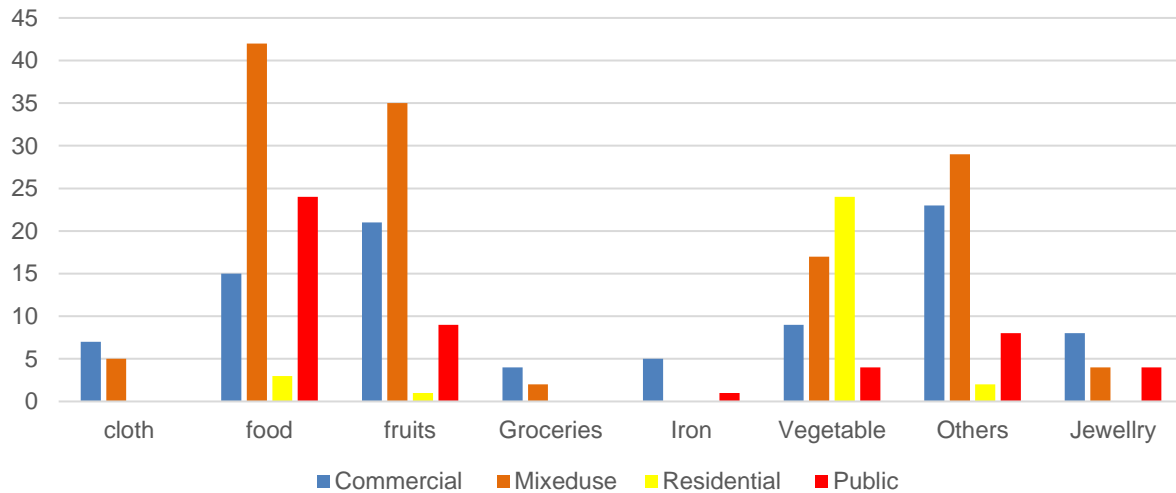


Chart 7 Land use preference of morning vending

Evening Distribution of street vendors according to land use

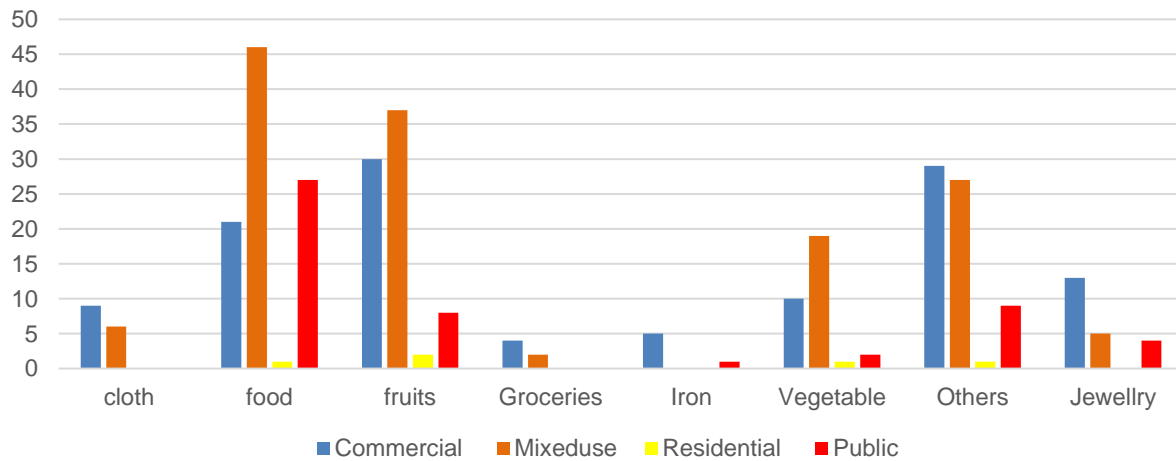


Chart 8 Land use preference of evening vending distribution

The evening scenario of street vending considers more than 320 street vendors and their locational attributes. In morning and evening Food and fruits vendors are highest in nos. A significant difference is in the vegetable vending category as it is very less in residential areas in the evening. Vegetable vendors in the evening are mostly stationary located in front of mixed use or commercial buildings and in the middle of the road using the median space. Others category of street vending is more in evening next to commercial uses compared to morning scenario where mixed-use buildings has most others category of vendors. There is an increase in the no of food and fruits vendors next to commercial, mixed use, public land uses while decrease next to residential land use. The overall distribution of street vendors as per land use in morning and evening is shown in below charts.

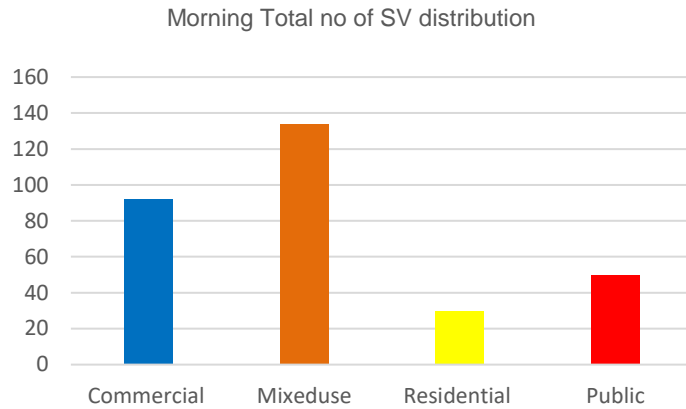


Chart 9 Total no of street vendors in Morning to different land use

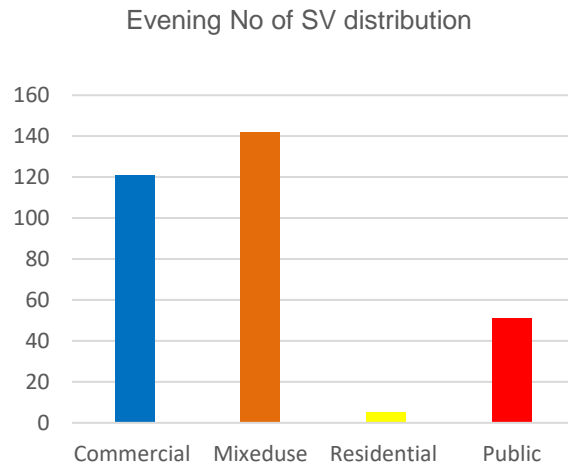


Chart 10 Total no of street vendors in evening next to different land use

The above analysis gives us the understanding of how in morning and evening different land uses have street vending next to it. Space occupied by different street vendors next to specific land use can also be calculated from this data set. It has been observed that the average size of vending cart is 2 square meters to 2.5 sqmeter. Considering average size of vending cart as 2.5 square meters the occupied area has been calculated.

Table 3 Space occupied by street vendors

Land use	Street vending space in square meters	
	Evening	Morning
Commercial	302.5	230
Mixeduse	355	335
Residential	12.5	75
Public	127.5	125
Total =	797.5	765

Total vending space in evening is 797.5 square meters and 765 square meters in morning. This space occupancy quantitative data will help to allocate zoning for street vending plan.

4.2.3 Relationship with Built form

The percentage of openings in ground floor facing streets has been considered as the parameter. Mostly in commercial areas the ground floor has 100 percent openings, mixed use has 60 -100 percent openings. For mixeduse buildings there are shops as well as garages, or entry to the upper floor apartment. Public buildings like mosques and temples have boundary walls or ground floor with one or two access and very minimal openings. These buildings come under 0 to 20 percent of openings. Residential areas have 10 to 60 percent of openings. As there is interface at ground floor with one access door also there are ground floors with 3/4 active windows which constitute half of the façade having opening. Based on these observations public private interface map has been prepared and street vending location points has been overlaid on that (Figure 16 Percentage of Openings on ground floor).

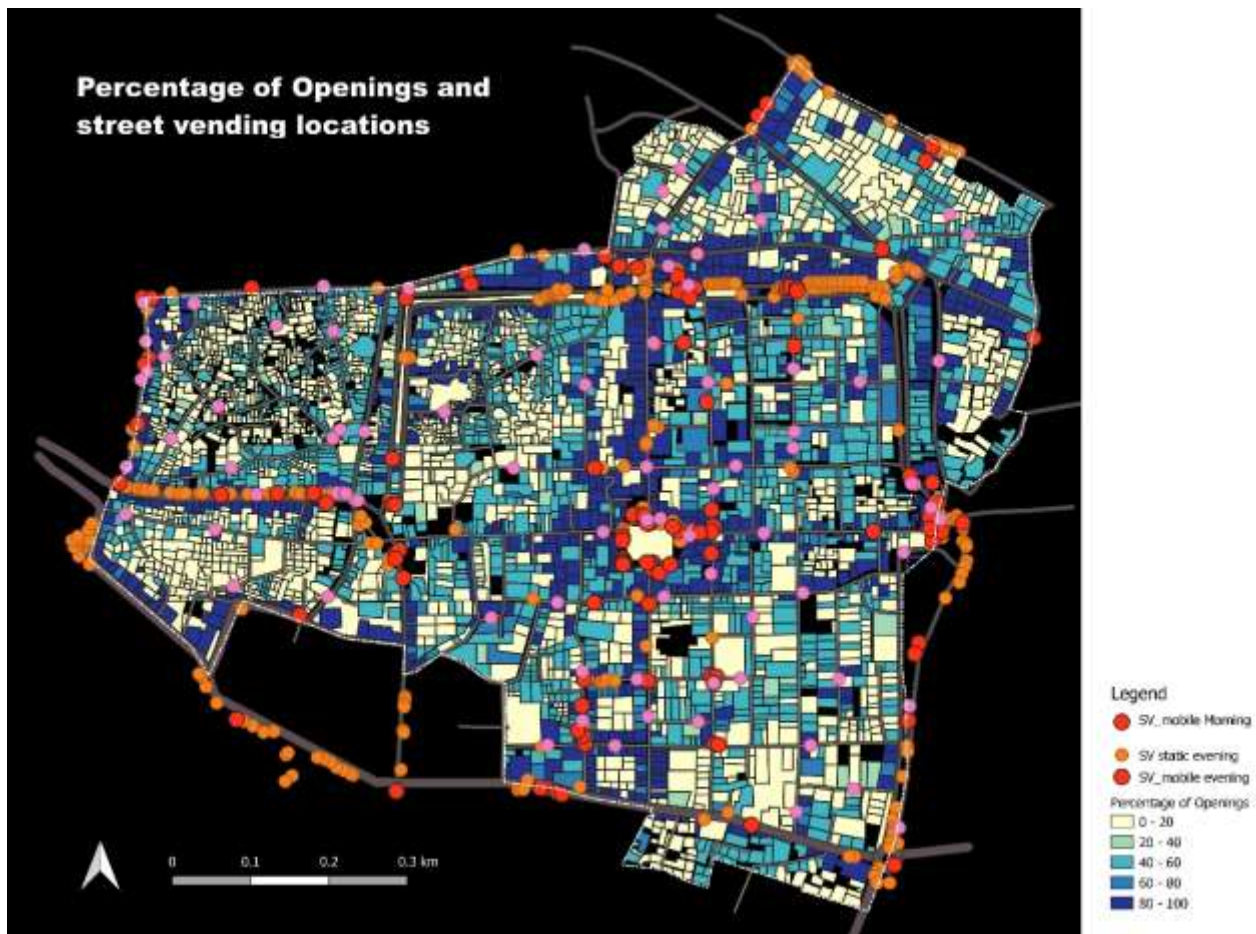


Figure 16 Percentage of Openings on ground floor

Gradient of intense blue hue to yellow gradient shows the percentage of openings at ground floor. Mobile and stationary vending locations are shown in points. Most of the street vending points are located at next to the zones with blue. This data set has been exported to excel for further analysis. The following table shows the no of street vendors in each percentage of opening class.

Percentage of Openings	No of street vendors
80 - 100	198
60 - 80	15
40 - 60	23
20 - 40	5
0 -20	64

Table 4 No of street vendors in each openings class

There are 198 vendors who are located next to buildings which has 80 -100 percentage of openings at ground floor. This is mostly next to commercial and mixed-use areas where more pedestrian footfall occurs. This follows the assumption of more the percentage of openings at ground floor i.e more publicness of a space, more interactive space more the business activity or street vending activity. This establishes the relationship between spatial property of the space with the distribution of street vending locations. But the relationship is twofold, as there are 64 no of street vendors located next to buildings which has 0 to 20 percentage of openings in ground floor. There are two ways to analyze this aspect.

Firstly, data collection has been done considering legal cadastral boundary as interface. The space appropriation by retailers and encroachers plays a major role over here. Below picture shows street vending activity next to a vacant building and a building with ground floors with abandoned ground floor shops. In the left image the abandoned shops at ground floor gives street vendors the opportunity to locate themselves over there. This abandoned shop façade is providing an enclosure which is getting appropriated by street vendors. In the right image the boundary of the vacant building has been covered with temporary tin sheets which is acting as enclosure to the street vendors.



Figure 17 Street vendors next to abandoned site

Secondly, street vendors locate themselves next to blank façades of public buildings, residential buildings. Below images show street vendors next to public toilets, Mandir, mosque, blank wall of a building. Hence the percentage of openings at ground floor has impact on street vending.



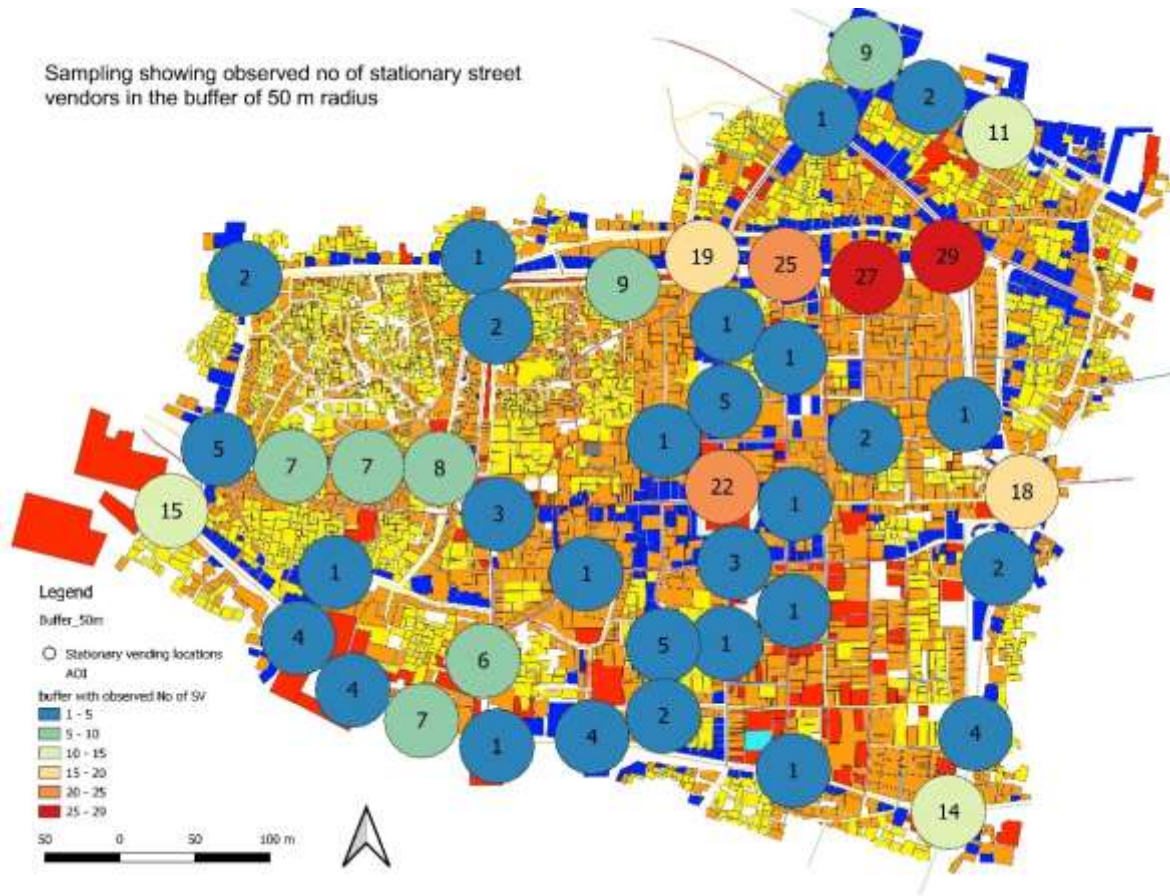
Figure 18 Street vendors using blank spaces with zero openings on ground floor

4.3 Regression Analysis

Understanding of three previously discussed spatial configuration parameters and their relationship with street vending distribution helps to prepare a model which can predict street vending potential of an area. Analyzing through regression in this section only considers stationary street vendors. Mobile nature of vending can not be modelled with a definitive influence area, also zoning for them implies to convert them to stationary. Hence from the existing distribution of vending stationary vending points are considered for regression analysis. The nature of our dependent variable is count data of no of stationary street vendors is not normally distributed and non-negative integer. As suggested by the existing literature (Dale Willits *et al.*, 2011; Zhang *et al.*, 2018) there are Poisson and negative binomial linear models to analyze our data set. Since the difference between mean and standard deviation of this data set is not significant, modeling has been done with Poisson regression.

Sampling for the regression has been done with a buffer of 50-meter radius on street segments having stationary vendors. Firstly, I have drawn buffers at every major intersection.

Dropped buffers at street mid points and 50 meters away from junctions having stationary street vending location points. In Map 1 no of observed stationary vendors are shown in 50 m buffers.



Map 1 Sampling of observed stationary vendors.

Independent variables derived from the previous analysis of spatial configuration parameters and their relationship to vending distribution. The integration measure of space syntax of each street segments at 1000-meter scale has positive correlation with no of vendors in that same segment. Hence as an independent variable street network has been measured with median value of all the street segments inside that buffer. The effect of built form has been analyzed with urban porosity idea; openings on ground floor facing the street. In one buffer the openings percentage value differs from building to building. The idea is to capture how openings on ground floor facing the street influences vending activities on street. Hence the median value of all the openings value inside one buffer has been considered to measure impact of built form. In Chart 7 Land use preference of morning vending and Chart 8 Land use preference

of evening vending distribution shows how different land uses has street vendors next to it. This shows public, residential, commercial, mixed use has influenced the area next to it for street vending purposes. Now the question arises which land use impacts the no of vending to which extent. If all the land uses impacts the same, land use mix indices could have been considered which measures the diversity. The diversity index is not justified as in one buffer land use diversity could be very less but there are many street vendors because of mixed use and commercial land use preference. Hence, percentage of public, residential, commercial, mixed use in one buffer has been considered as other dependent variables for regression.

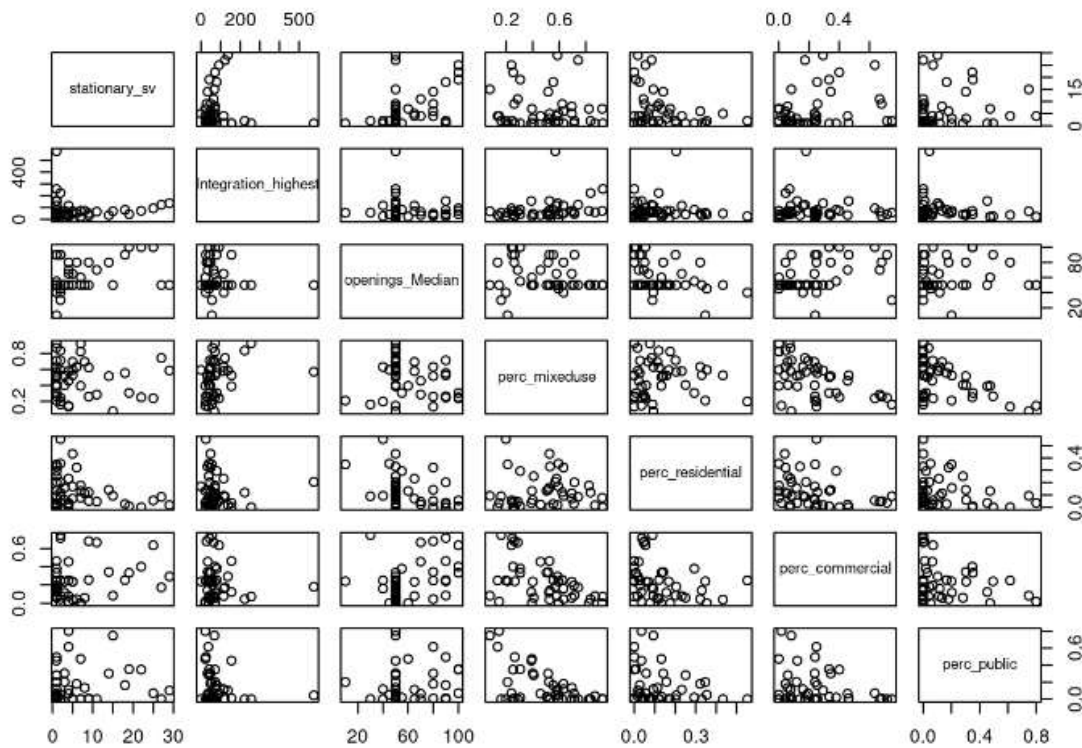


Figure 19 Collinearity Plot between variables

In the data set of 44 buffer samples land use percentage values are very strongly correlated to each other which can be seen from the plot (Figure 19). This influences the regression result of predicted no of vending values and not coming as significant parameters. Commercial and mixed use are influencing the most. Modeling with percentage of residential use, integration value of street segments and openings on ground floor facing the street shows the result in Chart 11. P value is less than 0.05 in case of percentage of residential use and openings on ground floor. These two indicators are most significant to predict no of street vendors in that buffer. Street network integration value has very less significant value but positive impact on no of street vending. From the analysis we know residential land use in an

area impacts negatively on vending activities by 15 percent. Openings on the ground floor facing the street impacts positively on vending activities. Depending on the analysis results, the no of stationary vendors are predicted in each buffer and plotted against observed ones (Figure 20). Blue curve shows the relation is positive and grey band shows the probability zone of predicted nos to fall within.

Indicators	Coefficients	P value
(Intercept)	0.88598558	
s(perc_residential, 3)	-1.5045909	0.02031
s(openings_Median, 3)	0.01795556	0.01065
s(Integration_highest, 3)	0.00117491	0.65584

Chart 11 Poisson regression result

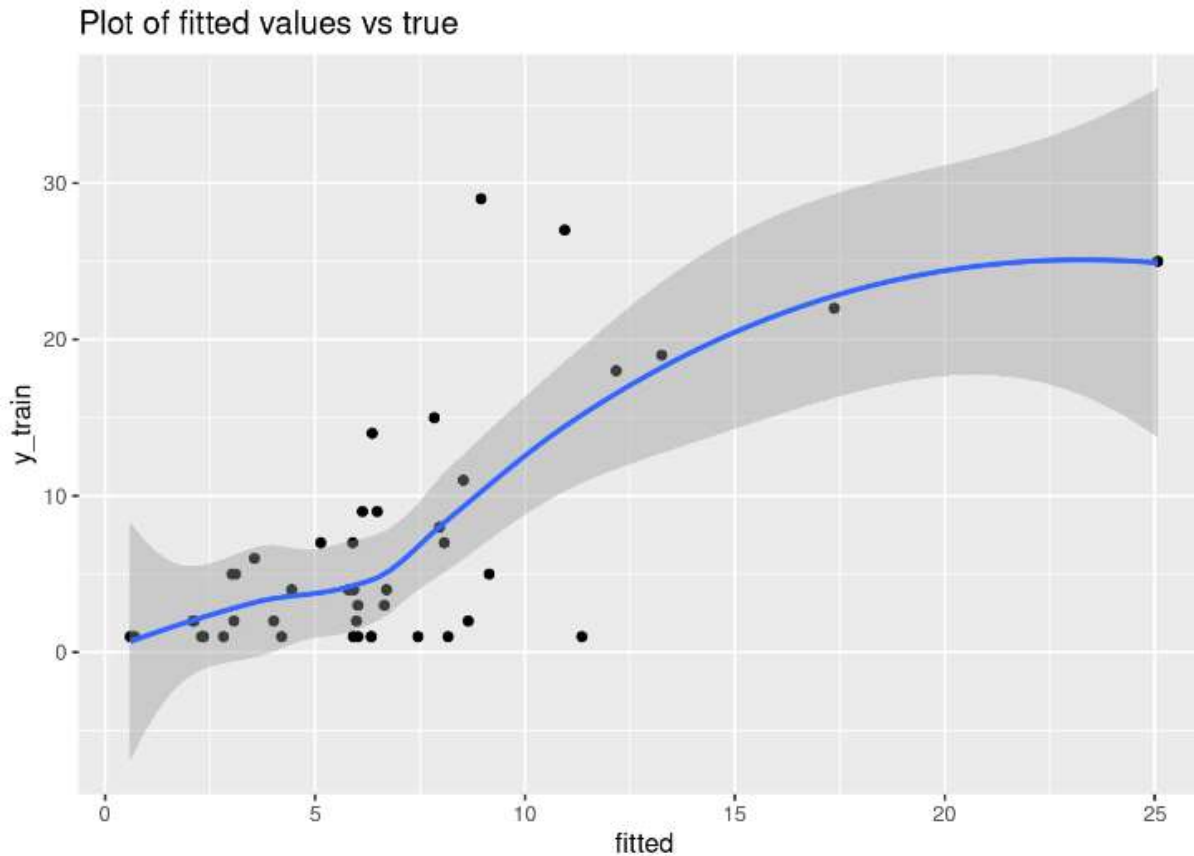


Figure 20 Plot between observed and predicted no of vendors

Sampling showing Predicted no of stationary street vendors in the buffer of 50 m radius

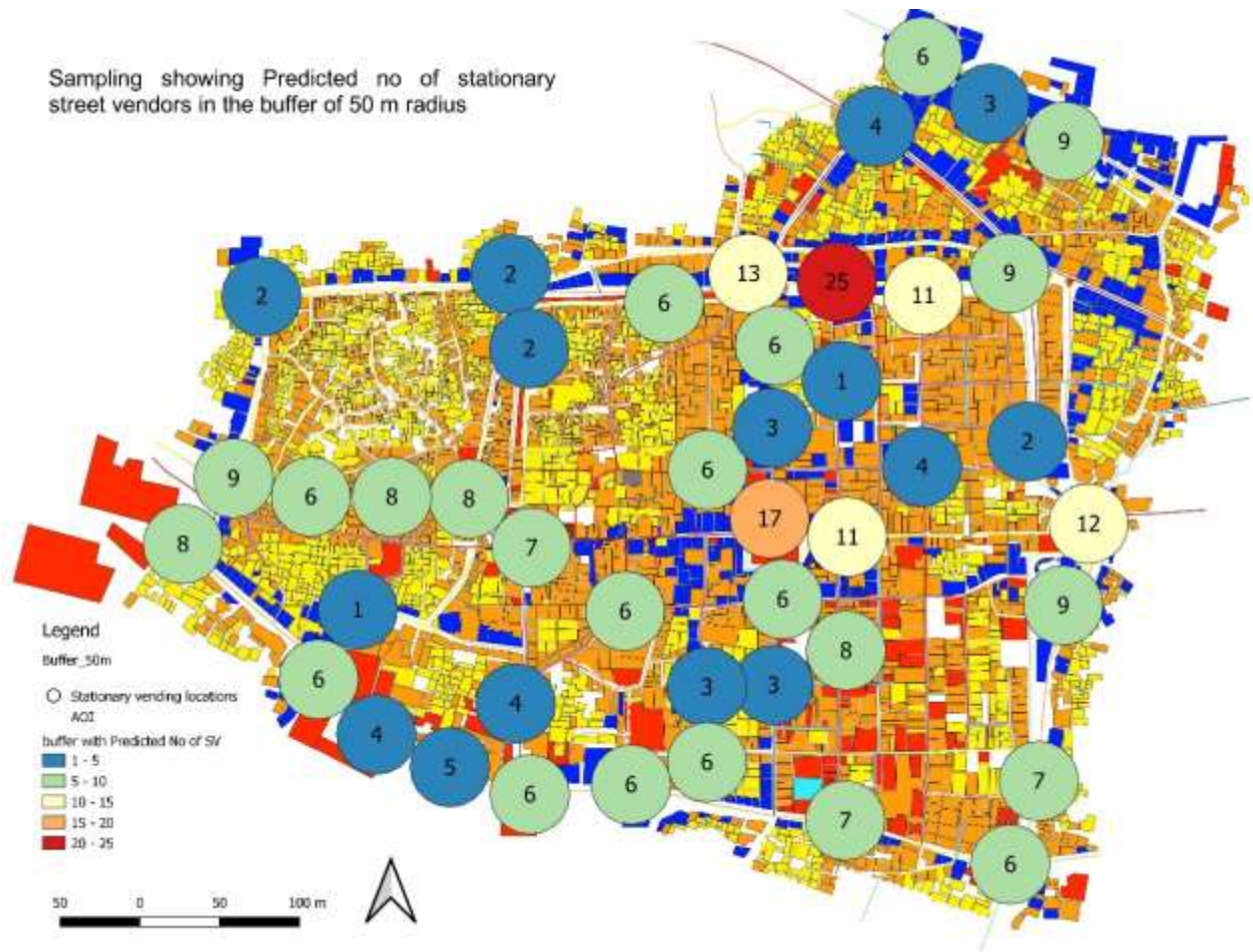


Figure 21 Predicted no of vendors

Predicted no of stationary vendors are shown in Figure 21. Prediction based on this regression analysis is close, can be compared with the existing no of vendors from Map 1 Sampling of observed stationary vendors.

5. Proposals

Based on the findings from the analysis it is possible to predict no of vendors and understanding from space utilization of vendors spatial planning recommendations are given for street vending plan. Recommendation for framework of street vending plan has been given with the case example of the selected study area of Old Bhopal.

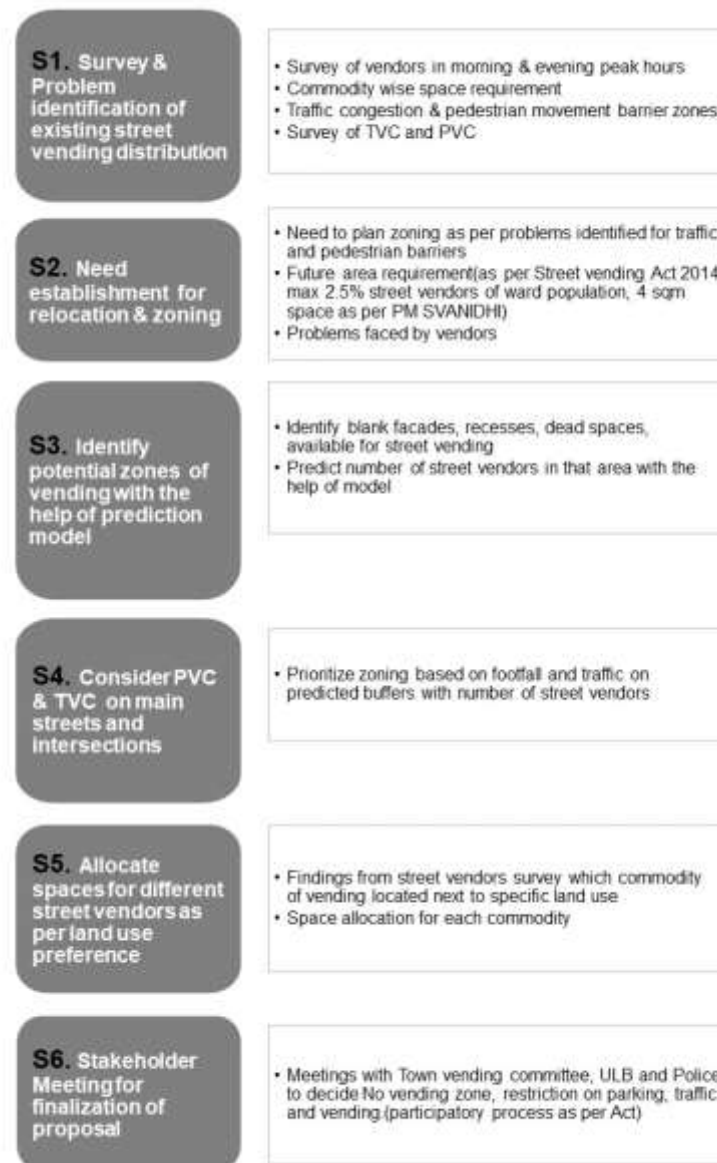
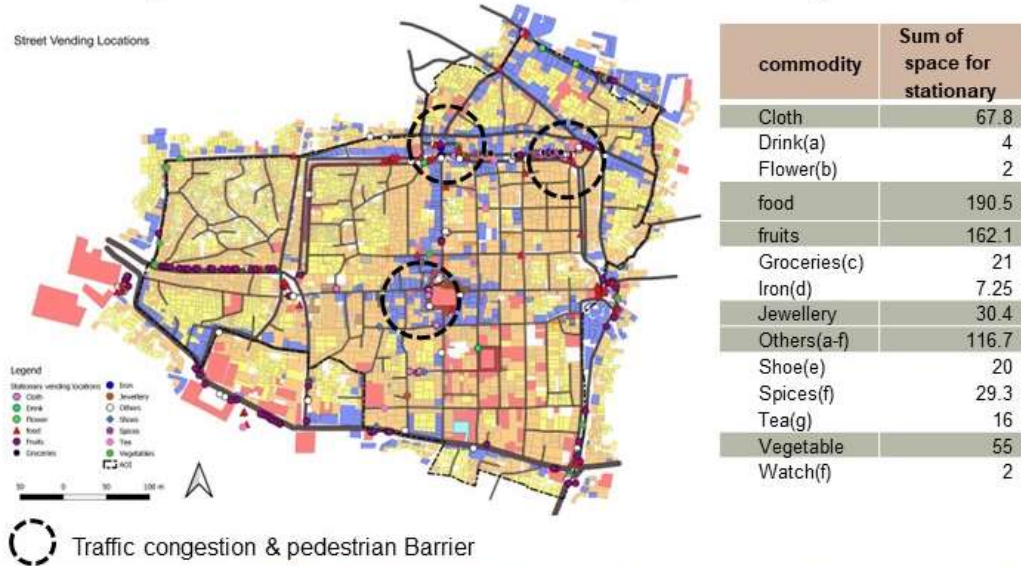


Figure 22 Proposed Framework for preparing street vending plan.

As per the proposed Framework this thesis recommends spatial planning strategies for ward no 20 and 21 of Old Bhopal.

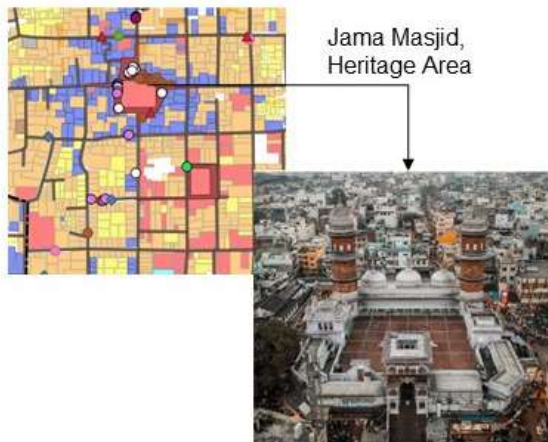
S1. Survey & Problem identification of existing street vending distribution



Street vending on main road reducing existing carriageway, No proper designated space for vendors, dead spaces and space occupied by abandoned cart, disposal of waste, traffic congestion, barrier for pedestrians are most prominent problems that needs to be dealt with.

S2. Need establishment for relocation & zoning

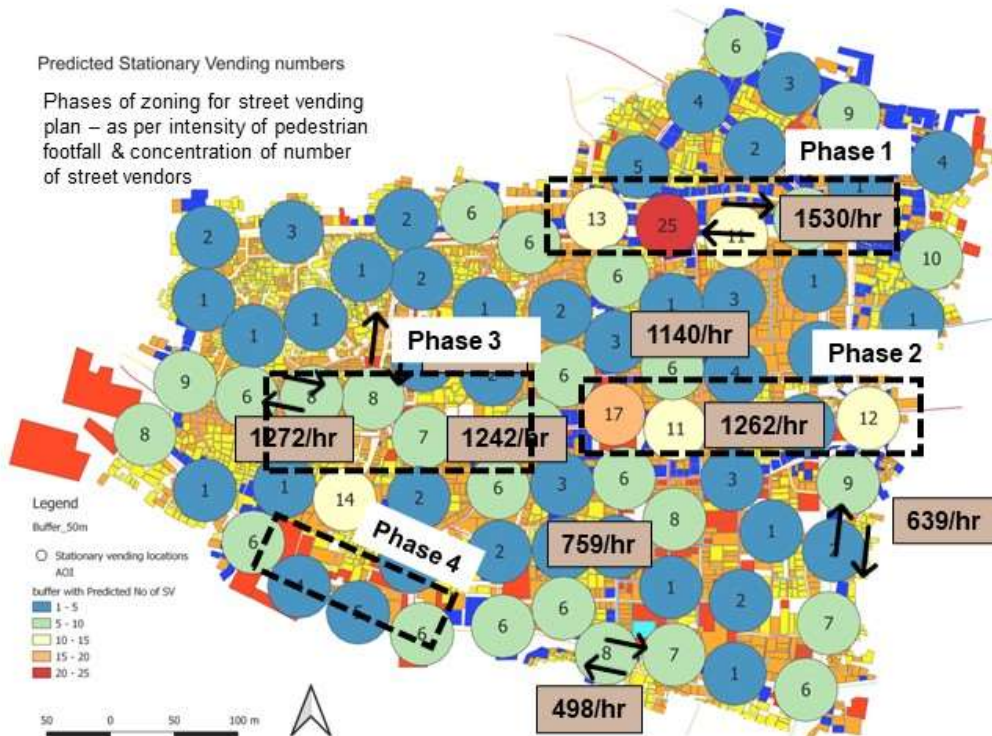
- Relocation of Vendors from vicinity of Heritage areas, Jumerati Road intersection because of traffic congestion
- The projected population of wards 20 and 21 for the year 2031 is 53,460. For the projected population, the area occupied by 2.5 percent ward population would be 0.018 sq.km. Considering a growth rate of 7.25 percent for street vending as per NASVI, the area occupied by street vendors would be **0.019 sq.km.**



S3. Identify potential zones of vending with the help of prediction model



S4. Consider PVC & TVC on main streets and intersections



Market in phase 1



Chowk in Phase 2



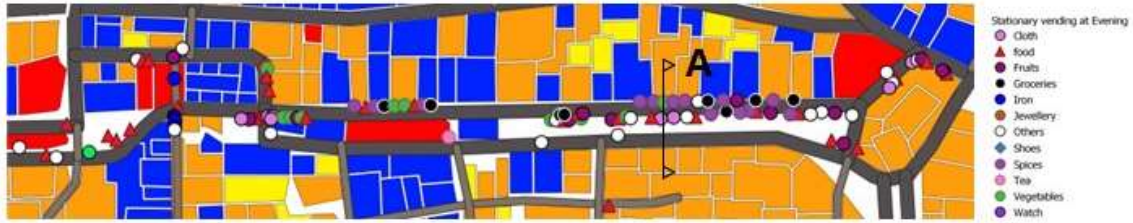
Chowk in Phase 2 next to JAMA Masjid



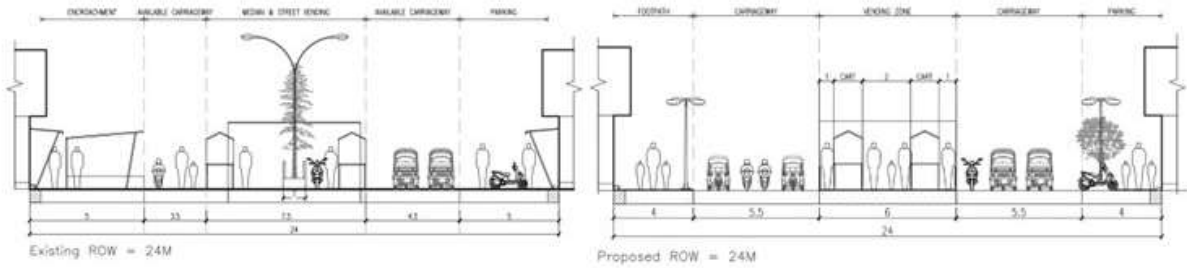
S5. Allocate spaces for different street vendors as per land use preference

S6. Stakeholder Meeting for finalization of proposal

Recommendation for Phase 1



Existing Plan of Phase 1 Area (not to scale)



SECTION A (Existing)

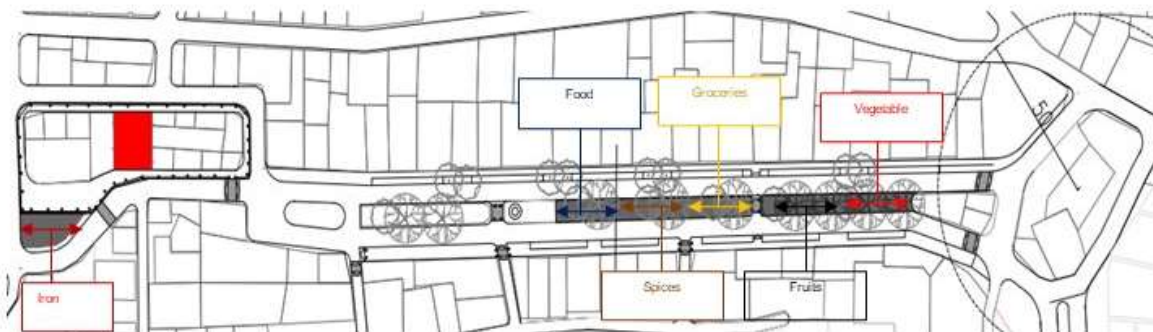
SECTION A (Proposed)

Commodity	Existing No	Proposed No of Vendors in Phase 1
Cloth	9	0
food	23	15
fruits	12	12
Groceries	10	10
Iron	7	7
Others	15	0
Spices(f)	14	14
Tea(g)	1	1
Vegetable	11	11
Total No of vendors		70

• Space Available in proposed plan of Phase 1 according to the proposed section A is 160 sq meter > **70X2.2(max area as per MoHUA guideline) =154 sqmeters**

• **No of vendors to be relocated from phase 1 =23**

Commodity	Area
Vegetable	24.2
Fruits	26.4
Groceries	22
Spices	33
Food	36
Iron	13



Proposed Plan of Phase 1 (not to scale)

Where & How to relocate?

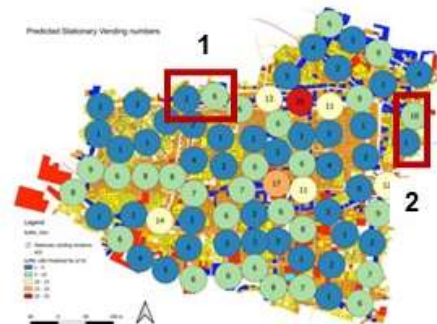
Strategies –

- Traffic management
- Discovering alcoves, niches, corners for available spaces
- Predict no of vendors with the regression model
- Consider ROW and footfall.
- Allocate space according to prediction and requirement

Potential space for vending



Predicted no of vendors in location 1 & 2 is 19. hence relocate from Phase 1



6. Conclusion & Way forward

While we plan for formal land use, decide on development control rules, road network, informal sector as large as street vending gets ignored by planners and decision makers. Street vending zones are now emerging in smart cities proposals but that too with little knowledge of how many vending activities will occur and also after deciding on formal zoning a little corner next to a square. This thesis contributes to the aforementioned problem by showing how spatial configuration impacts street vending and how based on spatial parameters we can predict occurrence of street vendors in an area. Result shows residential land use impacts negatively on vending. Openings on ground floor facing street influences more vending which suggests DCR should develop a strategy which increases more porous surface between street and buildings. In other words, DCR shall propose strategies to make built fabric in ground floor more porous to promote socio economic activities. Factors like road width, pedestrian and traffic count influences street vending which were not considered as per the scope. Hence further research shall consider multiple such factors to determine zoning basis of street vending. Effect of spatial configuration should be considered while planning for vendors. Outcome of the analysis explains zones with varying degree of spatial attraction of vendors. Space occupancy of vendors in front of each land use category can be used while zoning. ULB and TVC can decide use of private property with the help of TDR, FAR relaxations to meet such space requirement as per land use. Further research shall include temporal factor and commodity wise analysis of vendors. As this thesis shows the distribution pattern is different in morning and evening peak hours, future research for zoning can be temporal following the same methodology adopted. Participatory process of street vending plan making shall be followed by demarcation of zones with degree of street vending potential as per spatial parameters. Results and methodology adopted in this thesis to analyze effect spatial configuration on socio economic factor like street vending can be considered while determining ***Economic value of streets*** (Y Shen, Karimi, 2017). Future Master plan and Local area plan should consider zoning for street vending and implement DCR, Land use to promote more vending. Consideration & mentioning of such spatial planning parameters should be included while making Policy for street vending or Policy for urban reforms.

7. References

1. Al-Jundi, S.A. *et al.* (2022) 'The Impact of Urban Culture on Street Vending: A Path Model Analysis of the General Public's Perspective', *Frontiers in Psychology*, 12, p. 831014. Available at: <https://doi.org/10.3389/fpsyg.2021.831014>.
2. Baffour Awuah, K.G. *et al.* (2014) 'Benefits of urban land use planning in Ghana', *Geoforum*, 51, pp. 37–46. Available at: <https://doi.org/10.1016/j.geoforum.2013.09.019>.
3. Baroni, B.N. (no date) 'Spatial Stratification of Street Vendors in Downtown Mexico City'.
4. Beirão, J.N. and Koltsova, A. (2015) 'The Effects of Territorial Depth on the Liveliness of Streets', *Nexus Network Journal*, 17(1), pp. 73–102. Available at: <https://doi.org/10.1007/s00004-014-0233-5>.
5. Bhowmik (2005) 'Street Vendors Asia'.
6. Bromley, R. (2000) 'Street vending and public policy: a global review', *International Journal of Sociology and Social Policy*, 20(1/2), pp. 1–28. Available at: <https://doi.org/10.1108/01443330010789052>.
7. Chakraborty, P. and Koley, S. (no date) 'Socio-Economic View on Street Vendors: A Study of a Daily Market at Jamshedpur'.
8. Chia Yang Weng (2013) 'Accommodate Street Vendors during the Urban Development Process: With Two Empirical Cases of Zhu Lian (ZL), and Guan Dong (GD) Public Markets in Hsinchu City, Taiwan'. Master in City Planning at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY.
9. Dale Willits *et al.* (2011) 'place-and-neighborhood-crime--schools-churches-alcohol.pdf'. Justice Research Statistics Association. Available at: <https://isr.unm.edu/reports/2011/place-and-neighborhood-crime--schools-churches-alcohol.pdf>.

10. Deore, P. and Lathia, S. (2019) 'Streets as Public Spaces: Lessons from Street Vending in Ahmedabad, India', *Urban Planning*, 4(2), pp. 138–153. Available at: <https://doi.org/10.17645/up.v4i2.2058>.
11. Dovey, K., Recio, R.B. and Pafka, E. (2022) 'The spatial logic of informal street vending in Manila: an assemblage approach', *Space and Polity*, pp. 1–24. Available at: <https://doi.org/10.1080/13562576.2022.2153224>.
12. Farouk, H. (no date) 'THE IMPACT OF SPATIAL CONFIGURATION ON STREET VENDORS' DISTRIBUTION AT TERMINALS'.
13. Gehl, J. (2001) *Life between buildings: using public space*. 5. ed. Copenhagen: Arkitektens Forlag.
14. Gehrke, S. (2000) Land Use Mix and Pedestrian Travel Behavior: Advancements in Conceptualization and Measurement. Available at: <https://doi.org/10.15760/etd.5361>.
15. Habraken, N.J. and Teicher, J. (2000) *The structure of the ordinary: form and control in the built environment*. 1. paperback ed. Cambridge, Mass.: MIT Press.
16. Jane Jacobs (1961) *The Death and Life of Great American Cities*. New York: Random House.
17. Liu, Yilun and Liu, Yuchen (2022) 'Detecting the city-scale spatial pattern of the urban informal sector by using the street view images: A street vendor massive investigation case', *Cities*, 131, p. 103959. Available at: <https://doi.org/10.1016/j.cities.2022.103959>.
18. Mehta, V. (2009) 'Look Closely and You Will See, Listen Carefully and You Will Hear: Urban Design and Social Interaction on Streets', *Journal of Urban Design*, 14(1), pp. 29–64. Available at: <https://doi.org/10.1080/13574800802452658>.
19. Mehta, V. and Bosson, J.K. (2021) 'Revisiting Lively Streets: Social Interactions in Public Space', *Journal of Planning Education and Research*, 41(2), pp. 160–172. Available at: <https://doi.org/10.1177/0739456X18781453>.
20. M.Sc in Urban Planning, Institute of Engineering, Pulchowk Campus, Tribhuvan University and Karna, M. (2019) 'Effects of Street Vending on the Lives of Vendors and on Urban Space', *Journal of Advanced Research in Construction and Urban Architecture*, 04(01), pp. 8–16. Available at: <https://doi.org/10.24321/2456.9925.201902>.
21. Mundus Urbano (2021) 'What Makes a Public Space Lively?' Available at: <https://mundusurbano.medium.com/what-makes-a-public-space-lively-96cb0af9f1c6>.

22. van Nes, A. and Yamu, C. (2021) *Introduction to Space Syntax in Urban Studies*. Cham: Springer International Publishing. Available at: <https://doi.org/10.1007/978-3-030-59140-3>.
23. Ogunkan, D. (2019) 'Physical Planning Implications of Street Vending in Ogbomosho, Nigeria', *SSRN Electronic Journal* [Preprint]. Available at: <https://doi.org/10.2139/ssrn.3810165>.
24. Ozbil, A., Peponis, J. and Stone, B. (2011) 'Understanding the link between street connectivity, land use and pedestrian flows', *URBAN DESIGN International*, 16(2), pp. 125–141. Available at: <https://doi.org/10.1057/udi.2011.2>.
25. Recio, R.B. and Gomez, J.E.A. (2013) 'Street Vendors, their Contested Spaces, and the Policy Environment: A View from Caloócan, Metro Manila', *Environment and Urbanization ASIA*, 4(1), pp. 173–190. Available at: <https://doi.org/10.1177/0975425313477760>.
26. Rodrigo Mora, Francisco Bosch, Carlos Rothmann (2013) 'The spatial logic of street markets: An analysis of Santiago, Chile.' Proceedings of the Ninth International Space Syntax Symposium Edited by Y O Kim, H T Park and K W Seo, Seoul: Sejong University, 2013. Available at: http://sss9sejong.or.kr/paperpdf/ussecp/SSS9_2013_REF115_P.pdf.
27. Sankrit, R. (no date) 'SEWA Bharat and Street Vendors in Delhi'.
28. Santos, M.D. *et al.* (no date) 'STREET VENDING LOCATIONS: THE DETERMINANTS AFFECTING THE CHOICE OF LOCATION OF STREET VENDORS AT SCIENCE CITY OF MUÑOZ, NUEVA ECIJA'.
29. Seepana Prakasam (2016) 'Urban street vendors in India.pdf'.
30. 'Street Vendors Act, 2014_English.pdf' (no date).
31. Sun, Z. *et al.* (2022) 'Exploring Dynamic Street Vendors and Pedestrians through the Lens of Static Spatial Configuration in Yuncheng, China', *Remote Sensing*, 14(9), p. 2065. Available at: <https://doi.org/10.3390/rs14092065>.
32. Widjajanti, R. (2016) 'The Space Utilization by Street Vendors Based on the Location Characteristics in the Education Area of Tembalang, Semarang', *Procedia - Social and Behavioral Sciences*, 227, pp. 186–193. Available at: <https://doi.org/10.1016/j.sbspro.2016.06.061>.
33. Yaxing, L., Bojie, Y. and Jingjie, Y. (2022) 'Correlation between Road Network Accessibility and Urban Land Use: A Case Study of Fuzhou City', *Polish Journal of*

- Environmental Studies*, 31(3), pp. 2915–2922. Available at: <https://doi.org/10.15244/pjoes/144913>.
34. Zafliis Zaim, Kiki Nurjanah (2016) 'The Connection between Land Use Change Process Street vendor.docx'.
35. Zhang, Y. *et al.* (2018) 'Public transport use among the urban and rural elderly in China: Effects of personal, attitudinal, household, social-environment and built-environment factors', *Journal of Transport and Land Use*, 11(1). Available at: <https://doi.org/10.5198/jtlu.2018.978>.

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