Chapter 12

Space Syntax Beyond Cairo Street Markets: An Application of a Theory on Socio-Spatial Contemporary Practices

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ABSTRACT

Street vending is a growing controversial phenomenon in urban environments. It is a survival strategy and an economic opportunity for countless numbers of marginalized vendors. However, the temporal presence of vendors is portrayed as the source of substantial urban issues, which detract from the quality of the urban public space and the public life of individuals. This chapter aims to propose a practical approach to understand the impact of vendors’ temporal presence on the quality of urban space and social life. By space syntax theory, this study utilizes pragmatic methods in the fields of social and human sciences; to analyze the socio-spatial and temporal attributes of the vending phenomenon in relation to urban users’ movement in a case study street market at Cairo. The findings introduce a syntactic methodology that highlights the profound relationship between users and informal urban markets to be applied in diverse contexts.

INTRODUCTION

Cairo Street Markets are a day-to-day reality in all countries especially the developing countries (Brown, 2006). It is a common occupation of selling or retailing merchandise and services in urban spaces including streets, alleyways, avenues, boulevards, parking lots, street intersections, sidewalks, and public parks (Bromley, 2000; Yatmo, 2008).

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The public trading phenomenon is a representative of an activity mostly initiated by unemployment, rapid urbanization, disproportionate resource allocation, and lack of sustainable development (Kafafy, 2016; Li et al., 2018; Sarpong & Nabubie, 2015). It is the most effective opportunity for income generation in cities for countless numbers of marginalized vendors, who encounter limited chances for getting a formal work (Bhowmik, 2005; Donovan, 2008; Forkuor et al., 2017; Roever & Skinner, 2016). This income generation has positioned trading in urban environments as a survival strategy and a mean for a fair livelihood against the gross inequality and exploitation of the socioeconomic system in cities of hardship (Abusaada & Elshater, 2019).

Moreover, street vendors are the bedrock of the urban economy where each successive layer above utilizes vendors’ presence to their advantage (Brown, 2006; Rajagopal, 2010a). In the sense that, vendors adapt their trading activities to meet the urban users’ socio-economic needs (Bhowmik, 2005; Rajagopal, 2010b). Vending operations varies depending on the events in the space, the weather, and time of the day (Bromley, 2000), as well as potential customers’ flow (Reid et al., 2010; Wongtada, 2014). Thus, vending activity is a practical approach to cater for seasonal, sporadic, and unusual demands of customers (Sarpong & Nabubie, 2015).

The street vending practice constitutes a crucial component of the informal economy (Roever & Skinner, 2016). This economic informality implies that even though vendors are associated with the offer of legitimate or socially acceptable merchandise and services, they lack the presence of any formal registration, taxation or licensing (Bouhali, 2018; Kafafy, 2017). In this specific situation, the term ‘informal’ seems, by all accounts, to be depicted as ‘illegal’ (Cross, 2000; Graaff & Ha, 2015). Missing the fact that the vendors’ utilization of urban environments for their own livelihoods is a grassroots initiative that represents a remarkable case of self-improvement for those confronting hardship to comply with the unreasonable bureaucracy through their meager personal assets (De Soto, 1989).

Furthermore, vending operations take place on public or private property that is not legitimately assigned for trading activities, and at least in part outside business regulation, planning codes, or other regulatory requirements (Brown et al., 2010). Yet, not only the constraints of having no formal access to a trading space that constitutes an urban issue, but also the concentration of vendors in a particular location creating a market-place that is called ‘urban market’ is the source of substantial urban problems (Bromley, 2000; Hays-Mitchell, 1994; Recio & Gomez, 2013). For instance, city image degradation, traffic congestion, pedestrian movement blockage, urban space deterioration, disorder, low levels of cleanliness, vandalism, and so on (Anjaria, 2006; Bromley & Mackie, 2009; Crossa, 2009; Donovan, 2008), this has positioned street vending as an urban threat to the quality of the urban public space and the social life of individuals.

A street vendor is conceptualized as an individual who offers merchandise accessible to be purchased by the public without having a permanent built-up structure or entity (Bhowmik, 2005). Therefore, street trading operations could be stationary or may be mobile (Bhowmik, 2005; Bromley, 2000).

In this manner, vendors are a temporal urban feature that could appear and vanish at any time and location beyond the initially intended planning, so detracting from the city form and its image (Yatmo, 2008). This situation is caused by the vendor physical and visual appearance in the urban environment (Yatmo, 2009). This temporal presence may turn into a violation of the functional zoning code and public order, creating conflicts between the temporary and the fixed activities as the temporal dimension of the urban experience is usually slighted in urban planning and design. Consequently, public trading is revealed as a contested activity between various social groups over the utilization of urban environments.
The above overview illustrates the contradiction and dualism in views towards this contemporary urban practice; which has negatively overshadowed the potentials of the vending phenomenon. Public trading is not necessarily a problem, but rather a functional and resilient component of cities. In the sense that, vendors adapt the spatial urban environment to meet the users’ socio-economic needs; which increase the vendor income level in return. Although the capacity of adaptation of this activity induces a process of transformations in urban environments. Yet, the relation between the sociological and locational potential of the vending activity is slightly neglected in the existing literature. The problem presented in this research is that the transformation of the urban space into a temporal informal trading organization changes the socio-spatial relations in the area; which impacts the vitality of urban and social contexts.

Rather than merely contributing to the overwhelming debate on the vendors’ role in urban spaces. The following research seeks to acknowledge street vending not as an economic practice or a mechanism to cope with the socio-economic or political injustices, but as a socio-spatial activity to produce a vital urban space. The authors of the current work argue that applying the principles of contemporary digital technology to the field of street vending could bring a fresh perspective to understand the complex attributes of the informal urban marketplace.

The objective of this chapter is to propose a practical approach to understand the impact of vendors’ temporal presence on the quality of urban public space and social life. To achieve these, this study analyzes an urban public space that is utilized as a temporal market by ‘space syntax theory’ in a case study at Cairo, where vendors have become an essential aspect of the Egyptian urban scenario.

Space syntax—as a theory, approach, and method—is concerned with associating the physical aspects of urban environments with its functional, social, and behavioral attributes (Hillier, 2008; Koohej et al., 2014; Penn, 2008). Over the past two decades, this discipline has been adequately contributing to various issues in cities (Lerman & Lebendiger, 2017; Marcus et al., 2010); such as vehicular movement planning and public transportation (De Koning et al., 2017; Lerman et al., 2014; Penn et al., 1998), urban sustainability and resilience for hazards (Maureira & Karimi, 2017), environmental and spatial cognition (Conroy-Dalton, 2003; Marcus et al., 2016; Osman & Suliman, 1994), land uses and urban economic development (Bolton et al., 2017; Penn & Turner, 2004), sprawl and slum upgrading (Karimi & Parham, 2012), in addition to crime and social segregation (Hillier, 2002; Vaughan, 2007).

Besides, space syntax software ‘Depthmap’ as an open source makes it easy to provide computational support for the development of urban morphological studies (Turner, 2011; Varoudis, 2012). Accordingly, ‘space syntax’ is ready to hit the mainstream as one of the significant fields that can enhance the dialogue between urban design theory, method, and empirical research (Griffiths, 2014; Karimi, 2018), even in the face of growing challenges for cities (e.g. Chen, 2017; Karimi, 2016; Serra & Pinho, 2013).

The uniqueness of this research is that it breaks new grounds by analyzing the socio-spatial and temporal attributes of street vending activity, utilizing a syntactical approach. This contribution could be a step in linking this practical application with informal street markets field in Egypt; which in return will enhance public space utilization, users’ social life, and vendors’ economic performance.

The next section discusses the role of public trading as a socio-spatial activity and the vitality of marketplaces as temporal public spaces. Followed by an interpretation of ‘space syntax’ concepts and measures, and the potentialities of this analytical approach from previous studies and real-life projects. The section afterward proposes a syntactic research methodology that highlights the profound relationship between users and informal urban markets to be applied in future urban design projects and regulation policies. The final section discusses the vending phenomenon in the Egyptian context, presenting a selected street market as an analytical case study.
URBAN MARKETS: A SOCIO-SPATIAL CONTEMPORARY PRACTICE

The marketplace is considered an essential part of urban traditions and cultural life throughout history (Tangires, 2003). Historical scholars have described marketplaces as the fundamental feature and the central constituency of the city (e.g., Al-Maqrizi, 1908; Braudel, 1979; Ibn-Khaldun, 1967; Mumford, 1961; Raymond, 2007; Wiet, 1964). Marketplace trading is the earliest and most dominant form of public activity in cities (Unlu-Yucesoy, 2013), as the first free enterprise zone (McMillian, 2002).

Ostensibly, the marketplace or street vending area represents spaces where consumers and vendors meet for commercial purposes; either at daily or periodic markets (Morales, 2011). It has a variety of names, such as public markets, traditional markets, farmers markets, craft markets, urban markets, and square or street markets (Bromley & Mackie, 2009; Unlu-Yucesoy, 2013). Marketplaces are owned and operated by various types of official or unofficial organizations, not just city governments. Yet, they are distinguished by the kind of merchandise and services offered - whether general or specialist, regardless of where and when transactions take place and whether the market’s operations are formal or informal (Bromley, 1998).

Predominately, the presence of the urban marketplace relies upon its function within the city trading hierarchy, as shown in Figure 1. Cities and urban markets are inherently associated and reliant on one another (Schappo & Van Melik, 2017). Cities provide social demand, and location for urban markets, while urban markets create sustenance, profit, and culture to urban communities (Hiebert et al., 2015; PPS, 2003). Like this, urban markets are multifaceted places serving a variety of purposes; which are appropriate to their specific context and participants (Morales, 2009), and depend on the spatial, demographic, social, economic, and political structure of the city.

Regardless of the different names, functions, governance, and settings for marketplaces; dealing with the market as an economic event, and the marketplace as a mere container of commercial transactions

Figure 1. The main types of urban markets or street vending areas
Source: The authors

City Market:
usually at the center of the city, constituting the main trading zone which sells general and specialist merchandise.

Neighborhood Market:
usually serving each neighborhood in the district separately within the convenient walking distance of consumers, selling day-to-day goods.

Street Market:
serving the passing consumers, its operations could be daily or temporarily on specific times of day/week/year, type of merchandise sold varies according to times of operation.

Hub Markets:
serving busy pedestrian locations such as: a public transportation node, an administrative building, a touristic spot, a public leisure garden, or at street intersection.
underestimates the role of marketplaces as a place-producing, recreational facility, and community development tool in regional and urban scope (Aliyah et al., 2017; Al-Maimani et al., 2014).

Marketplaces have a long history in integrating communities: economically, socially, culturally, and politically (Hiebert et al., 2015), as well as enhancing the health of marginalized populaces (Morales, 2011). At the macro level in the urban scope, urban trading activities are a link in the international/local merchandise supply chain; through providing a cheap sales outlet for local and regional products (Rajagopal, 2010a). Urban markets are long-term investments as an essential part of food distribution infrastructure; which stabilizes the regional food systems and achieves local sustainability (Hedden, 1929). At the same time, the existence of any urban market impacts other regional land use planning, buildings utilization, street pattern, movement pattern, and will in the long run influence the urban development (Aliyah et al., 2017).

On the other hand, at the micro level, marketplaces are destinations of informal associations in which they unite disparate groups, reconstituting public spaces by producing fluid places that promote interaction, upward social mobility, encourage experimentation, and renew community spirit (PPS, 2003; Watson, 2009). More precisely, marketplaces are a conviviality addition to urban life as bright and inclusive public spaces creating a unique character to the city (Rajagopal, 2010a). Urban markets are adaptable spatial and temporal organizations that could be key drivers of progress as an avenue for economic improvement, regeneration, and sustainable living (Schappo & Van Melik, 2017). Given this context, marketplaces can be tools for diversifying business activity and creating multi-use and multi-scaled socio-economic environments which integrate activities, individuals, and spaces (Morales, 2011).

Contested Contemporary Practice

In the contemporary scene, with the enormous expansion of the urban region, the relationship between the city and the urban trading territory has altered (Unlu-Yucesoy, 2013). The rapid demographic growth of city populaces, rapid urbanization and migration, shrinkage of formal appropriate employment opportunities, and political restructuring, over and above that the adoption of economic liberal, and globalized policies since the 1980s and 1990s have forced increasing numbers of individuals into the informal sector, especially urban trading (Bhowmik, 2003; Sarpong & Nabubie, 2015). Indeed, The situation increase the competition for utilizing the urban space for livelihoods of countless numbers of marginalized vendors, causing problems with vehicular traffic, complicating the public life of urban residents, and placing considerable strain on the urban space physical infrastructure (Crossa, 2009).

Correspondingly, a principal challenge for the New Urban Agenda is to recognize the contributions of marginalized individuals to urban economies prosperity by promoting their access or progression transition to legal and more productive livelihood opportunities, side by side to spatial development strategies. These strategies promote the inclusivity, accessibility, and quality of urban public spaces as pillars on which sustainable urbanization could occur (UN General Assembly, 2016). Given the expanding number of individuals entering this occupation, few cities adequately balance the need to support livelihoods with the need to manage urban environments (Brown et al., 2010; Lyons & Snoxell, 2005). Consequently, the lack of economic and regulatory formal recognition anticipated a negative image towards vending operations as a non-urban and deviant pattern of behavior and attitude.

The majority of arguments that are marshaled against the urban vending activity are founded on vendors’ utilization of urban public spaces, which are initially unintended for trading purposes (Onyango et al., 2012; Roever & Skinner, 2016). This issue has positioned their presence as a violation of functional
zones that have been determined by urban planners and regulators. More precisely, vendors are a potential threat to existing socio-spatial order that is desired by hegemonic social groups.

Although urban public space is widely recognized as a common property resource to which all individuals have equal and free rights to access and use (Abd El-Moneim & Galal, 2017; Harvey, 2008, 2012; Lefebvre, 2003; Lynch, 1960). With regards to public trading, this is not the situation, as vendors’ utilization of urban space is invariably contested including many competing and mutually contradicted interests (Boonjubun, 2017; Graaff & Ha, 2015; Maneepong & Walsh, 2013).

In the new millennium, urban public space is a commodity in which cities use to compete and promote themselves and their power (Graaff & Ha, 2015; Low & Smith, 2005). More precisely, cities’ image is defined by the spatial attributes of the public space and by the social activities it accommodates, reflecting many aspects of the urbanizing world. Subsequently, the existence of traditional unregulated livelihoods practices in urban environments is a symbol of disorder, backwardness, chaotic, sinful (Reyes, 2013); which is contrasted against the modern urban agenda, whose main aspects are aesthetics and public order (Setsabi & Leduka, 2008). Vendors are considered, in this manner, a hindrance to drawing in both domestic and international investors and tourists (Crossa, 2009; Oz & Eder, 2012).

This chapter departs from the mainstream negative assumptions underlying past research on public trading activity. Provisionally speaking, vendors occurrences and the urban issues or conflicts that may pursue can be tended by revisiting the vending phenomenon from a fresh perspective that appreciates their role in the vibrancy of urban spaces. This highlights the need to explore informal urban marketplaces through the manifestation of three main issues: public spaces, public life, and vitality of urban or social contexts.

**Street Markets as Public Spaces**

Urban public space is portrayed as the physical space and spatial configurations which could impact individuals’ movement, experience, and activities, moreover, the social relations that determine the creation, utilization, and control of that space within the city public realm (Brown, 2006; Carmona et al., 2003). It includes all the spaces that have accepted communal access or use rights, which could be formal parks, squares, streets, and vacant lands, also the areas between buildings and on pavements edge (Drummond, 2000; Gehl, 2011). Jacobs (1961) mentioned that *streets and their sidewalks are the principal public places of cities, as the most essential organs. Think about a city and what comes to mind? It is the street. If the city’s streets look fascinating, the city looks interesting; if streets look dull, the city looks dull.*

Unlike any other urban space, streets are the foundation of cities which determine its spatial and visual characteristics with two primary functions: mobility and place (Tandon & Sehgal, 2017; Von Schonfeld & Bertolini, 2017), as shown in Figure 2. Regarding mobility function, streets host an essential role of transportation in terms of movement, flow, and accessibility of individuals and vehicular. While, regarding place function, these urban avenues retain a remarkable identity by creating a sense of place and offer social or recreational activities, that are functional and psychological importance to individual’s lives (Gehl, 2010; Jacobs, 1993). More precisely, streets are quintessential social public spaces of cities (Mehta, 2013). Also, streets can be vibrant with a variety of economic attractions, therefore, keep the city alive through supporting the urban economy, as well as urban sociability (Garvin, 2016).

On the set of public trading, street markets epitomize the inconveniences and opportunities that accompany the utilization of urban environments for informal vending. Focusing on the positive potentials
of this phenomenon, the presence and the configuration of street vendors in urban streets contribute to
the quality of life and enhance the public safety as 'eyes on the street' (Abd El-Moneim & Galal, 2017;
describe the presence of vending activities in urban streets as a vibrant third place, which can revitalize
the life of dull streets and flourish a lively social life. In the meantime, regulated and ordered vendors
upgrade the visual image of streets with their colorful stalls, costumes, and merchandise, and serve as
living signs to indicate where economic and social activity occurs (Yatmo, 2009).

In the street market context, there is a functional relationship between vending pattern, social pattern,
and urban economy (Aliyah et al., 2017). Referring to urban space definition, informal markets can be
vital public spaces when it integrates both the spatial dimension of the urban area, the temporal dimen-
sion of the urban experience, the social dimension of vendors and urban users, and the vending opera-
tions pattern (Schappo & Van Melik, 2017; Unlu-Yucesoy, 2013; Watson, 2009), as shown in Figure 3.

Socio-Spatial Attributes of Street Vending Activity

Leading to the next aspect of the chapter; urban markets represent a lively everyday arena in the city,
constituting a crucial part of public social life (Efroymson, 2015; Rajagopal, 2010b). This life is consist-
tent with the argument of departure in this section, that street vending is a resilient occupation, where
a social system of norms governs urban spatial transformation process. Consequently, users’ affinity
or animosity relationship with informal street markets depends on an intricate socio-spatial and socio-
economic attributes. Yet, there is a significant variation in the attributes that could influence the vendors’
adaptation; which varies considerably according to the economic, social, regulatory, political structures,
or even the degree of the official control within a specific spatial context (Forkuor et al., 2017).
Space Syntax Beyond Cairo Street Markets

Figure 3. The four dimensions of informal street markets as vital urban public spaces
Source: The authors

On the spatial level, the viability of informal street markets is featuring two main spatial levels, as shown in Figure 4. First, the street market as an ‘urban entity’; which is connected to more extensive geographical areas that influence the vehicular traffic, pedestrian movement, buildings utilization, and regional land use planning, as well as business development (Aliyah et al., 2017; Schappo & Van Melik, 2017). In this context, the street market location and its proximity to other territories impact the urban development and enhances the locational utility for users. The convenience of the market location to urban consumers is a crucial determinant to predict its accessibility (Wongtada, 2014). For instance, the existence of street markets in a contested place within the proper walking distance that is compatible with the shopping process; can be tolerated as it reduces the miles traveled by inhabitants to fulfill their necessities (Bromley, 2000). Moreover, the proximity to surrounding regional and urban spaces which draw in or create a flow of pedestrian movement, e.g., residential regions, institutional zones, commercial centers, public transportation services. These issues are a vital determinant factor for vendors.

Second, the street market as a ‘place-setting,’ in terms of users’ movement within the urban space and their accessibility to the building entrances. In this context, movement factors are related to the street physical features in terms of street width and type (e.g. shared street, pedestrian-only, and vehicular-lane), street network hierarchy (e.g. primary, secondary, and service), and streetscape elements (e.g. potential seating locations, shaded or not, and nearby activities). Moreover, the spatial configuration and distribution pattern, are essential determinants of the vending activity that either complicate or upgrade
the vitality of public life for urban users (Hays-Mitchell, 1994; Rajagopal, 2010b). Both are considered a product of a series of social agreements and negotiations between street vendors and urban residents living or working in urban space (Efroymson, 2015). In this situation, contemporary vending activities are stimulated through interactions with prospecting customers to achieve the economic advantage of the vendor (Reid et al., 2010; Wongtada, 2014). So, the number and flow of potential urban consumers are other crucial factors that determine the locational preference of vendors (Hays-Mitchell, 1994).

On the social level, street vendors adapt their public trading activities regarding the scale of operation, location, time, number of vendors, terms of workforce, gender percentage, prices, and types of merchandise that sometimes are not available in off-street commercial stores; according to the needs of urban communities (Bhowmik, 2005; Bromley, 2000; Hays-Mitchell, 1994; Rajagopal, 2010b). This adaptation is a versatility that contributes to vending activity survival and prosperity. Moreover, the interaction between the various urban users (e.g. local residents, visitors, and passerby) and vendors, as well as the communication between vendors themselves; are essential factors to determine the user’s reactions to the marketplace (e.g. feeling of safety, feeling of comfort, rate of visiting, land level of interest).
Regarding the vending activity pattern, vendors adjust the market processes and non-trading opera-
tions according to the socio-spatial attributes of urban users and urban space, in terms of on-site storage
facilities, garbage collection, solid waste disposal, vendors’ public toilets and sanitation services, as well
as electricity, gas, and water supply networks, and so on. Vendors manage the informal marketplace and
non-trading operations by their own, creating conflicts or coexistences between the various social groups
over the utilization of the urban space. Similar to the pattern of customers flow, the market process pat-
tern changes the rhythm of the existing socio-spatial relations in the street market.

**Temporality Versus Vitality**

The temporal dimension of the urban experience is an essential attribute; which could contribute to the
livability and vitality of urban spaces. Vitality is one of the performance measurements of urban design;
which deals with the socio-spatial success of urban environments (Lynch, 1960). It is a result of both
the visual and physical quality of the urban space and the diversity of activities (Jalaladdini & Oktay,
2012), as well as the extent to which a place adapts to the temporal attributes.

In the context of informal street markets, one of the most crucial determinants of vitality is the tem-
poral patterns of the vending activity (Hays-Mitchell, 1994; Li et al., 2018; Yatmo, 2009). This issue
refers to timing and duration of vending operations, some vendors, the density of distribution, and the
flow of pedestrians or vehicles across the day-night and during peak hours, as well as the presence of
various activities. In this level, authors of the present work suggest four axial criteria interrelating socio-
economic and tempo-spatial attributes of this phenomenon, to investigate the impact of informal vendors
presence on the vitality of urban space and public life, as illustrated in Figure 5.

**Space Syntax Theory**

In the early seventies, a team led by Professor Bill Hiller developed ‘Space Syntax’ as an overarching
paradigm that investigates society-space relation in the field of urban planning and architecture design
(Hillier & Hanson, 1984), through a set of theoretical approaches that examine movement, visual per-
ception, and human occupation. For instance, the theory of order and structure (Hanson, 1989), natural
movement theory (Hillier et al., 1993), and movement economy theory (Hillier & Penn, 1996), as well
as the theory of centrality as a process (Hillier, 2001). Furthermore, a set of analytical methods to in-
vestigate the spatial configuration influence on urban communities and vice versa (Hillier et al., 1983;
Hillier & Hanson, 1998), such as axial analysis, visual graph analysis, and segment-angular analysis
(Hillier & Hanson, 1984; Turner, 2003).

*Space syntax is an arrangement of techniques for the representation, quantification, and analyzing any
spatial configuration in buildings or urban settlements. Configuration is characterized as, at least, the
relation between two spaces considering a third, and, at most, as the relations among spaces in a complex
considering every single space in the complex. (Hillier et al., 1987)*

The critical point for ‘space syntax’ development is that any social structure is inherently spatial, and
contrarily that the configuration of any occupied space has on the basic level a social logic (Bafna, 2003;
Hillier et al., 1993; Hillier, 2008). This ‘configuration-function’ or ‘space-society’ paradigm qualifies
any physical structure utilizing a set of spatial descriptors, such as ‘axial maps,’ or ‘convex maps,’ or ‘isovist maps,’ as shown in Figure 6.

Syntactic maps are used to create a pattern of spatial relationships in a graph representation utilizing ‘AGRAPH’ software application, to be quantified mathematically by an analytical computer software ‘Depthmap’ (Turner, 2011; Varoudis, 2012), based on some syntactic measures, as summarized in Table 1.
Space Syntax Beyond Cairo Street Markets

Figure 6. Types of syntactic maps
Source: The authors

Table 1. Syntactic measures

<table>
<thead>
<tr>
<th>Syntactic Measures</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graph</td>
<td>A figure that represents the relationship between all the linear ‘axial lines’ or nodal ‘convex spaces’ in the spatial layout.</td>
</tr>
<tr>
<td>Syntactic Step</td>
<td>The direct connection between one step and its immediate neighborhoods, or the change of direction from one axial line to another.</td>
</tr>
<tr>
<td>Justified Graph</td>
<td>A restructured graph with the goal that particular space is set at the base called ‘the root space,’ at that point all spaces that are one syntactical step far from it are placed on the first level above, spaces that are two syntactic steps far on the second level, and so on.</td>
</tr>
<tr>
<td>Degree of Depth</td>
<td>The essential measure extracted from a justified graph, which speaks to the relationship of a node to the graph that contains it, through estimating the sum of the connections (steps) that it could be passed by to move from space (node) to another on the spatial layout.</td>
</tr>
<tr>
<td>Connectivity</td>
<td>This variable estimates the number of immediate spaces that are one step away from each convex space or axial line. It is a local measure to count the number of connections that each space has to its neighborhood spaces.</td>
</tr>
<tr>
<td>Control Value</td>
<td>A dynamic local value to express the extent to which a specific space controls access to its immediate neighborhoods, considering alternative connections that each space has.</td>
</tr>
<tr>
<td>Local &amp; Global Integration</td>
<td>A static local or global value that estimates the average depth of a particular space to all other spaces in the layout. Spaces can be positioned from the most integrated to the most isolated.</td>
</tr>
</tbody>
</table>

Source: The authors

Syntactic measures can be identified with social attributes, to test socio-spatial hypotheses or comprehend the social effect of spatial layouts or configurations (Al-Sayed, 2012; Hillier et al., 1993; Penn, 2008).

The Axial Analysis

The most fundamental syntactic approach for urban studies is ‘axial maps’; which is an uncomplicated model of the spatial network. Axial maps depict the longest and the least number of ‘axial lines’ that connect all the spaces in a network layout with each other by links (Hillier & Hanson, 1984). Axial lines are the visibility lines (perception) or the movement lines (navigation) of the individuals and vehicles. Axial lines are ‘scale-free’ objects (Griffiths, 2014), which could be treated as continuous entities or segments to calculate metric distances (how far to travel), topological distances (how many changes in
direction), and angular distances (what degree of angular shift). In the case of axial analysis, the spatial network is translated into a topological graph, where straight lines are represented as nodes and their intersections as edges.

**Potentialities of Space Syntax About Vending Activity**

Referring to the vending dilemma mentioned earlier, authorities and urban regulators guide their undertakings to eliminate or relocate the vending activities in urban spaces, which is usually portrayed as a phase towards enhancing the quality and visual image of the urban space. Taking into consideration that the location is a crucial determinant for vendors’ income, eviction or relocation campaigns deprive vendors of their main livelihood (Roever & Skinner, 2016; Setsabi & Leduka, 2008). Subsequently, relocated vendors abandon the formalized markets and return to the same or alternative unplanned public trading locations (Boonjubun, 2017; Bromley & Mackie, 2009; Crossa, 2009; Donovan, 2008; Taylor & Song, 2016).

However, the existing literature on public trading has utilized diverse research methods (e.g., on-site observations, interviews, and questionnaires). Unfortunately, these conventional methods have been inconvenient to reveal that these elimination campaigns comprise an exclusionary socio-economic process, yet, improve vendors working conditions. Except for John et al. (2016) who utilized space syntax methods, revealing that vendors relocation from public spaces in downtown in Porto Alegre, Brazil to a formalized market building does not compile with the vendors’ trading performance or customers’ movement. ‘Space syntax’ can propose a practical approach to understand the impact of informal street markets location and spatial configuration on potential customers; which could enhance the activity pattern, individuals’ social life, and vendors economic performance, with minimum negative impacts on the urban spatial experience, and surrounding street network.

**A SYNTACTIC METHODOLOGY**

A syntactic methodology is conducted to understand the impact of the transformation of urban streets into informal markets, as illustrated in Figure 7. In so doing, the study analyzes a street that is utilized as a temporal market; comparing pre, and during the vending operations. This chapter deals with the first spatial level of urban markets, as an ‘urban entity.’ Taking into consideration that ‘space syntax’ is a method to explore cities, not to assign universal meanings to particular syntactic measures (Griffiths, 2014). In this chapter, by the criteria mentioned earlier, the syntactic measures interrelate the socio-spatial and temporal attributes; to investigate the impact of the market presence on a wider network of urban streets and the users’ movement in the urban environment.

**STREET VENDING PHENOMENON IN THE EGYPTIAN CONTEXT**

Cairo city the capital of Egypt, the largest city in Africa and the Middle East, is considered a standout political and cultural focal point in the region (Sims, 2012). This cosmopolitan city has experienced various intervals that rolled out radical changes in its social and economic life, which is reflected in its urban fabric (Abd El-Moneim & Galal, 2017; Nagati & Stryker, 2013). It is a mega-city, inhabited with
millions of individuals, with an increase in the demographic growth and urban agglomeration rate day by day (Abd Elrahman, 2016). With a high unemployment rate that is estimated to be 12.5% by the end of 2016 (CAPMAS, 2018), Cairo urban spaces are swallowed by the growing number of marginalized vendors as a necessary survival strategy (Kafafy, 2016).

![Flowchart](image)

**Data Collection & Field Study**
On-site observations to gather information about the market socio and spatial aspects as type of users, vending operations’ timing, types of street network and surrounding land uses, etc.

**Data Input**
Prepare the syntactic data based on the first spatial level of informal street markets ‘urban entity’, that is discussed in the literature review of this chapter.

**Axial Maps & Graphs Formation**
Construct two qualified axial maps for the selected street market; pre and during trading operations, to generate two topological syntactic graphs.

**Choice of Syntactic Measurements**
Develop a syntactic measurements that interrelate the attributes of informal street markets based on the four axial criteria proposed in this chapter.

**Space Syntax Axial Analysis**
Quantify the generated graphs in terms of topological relationships based on the syntactic measures developed from the literature.

**Comparative Syntactic Analysis**
Compare between the maps and graphs of the street market (pre and during trading operations), in terms of qualitative and quantitative outcome data.

**Analytic Outputs**
Present the analytic outcome data to address the impact of the informal street market on the vitality of the urban space and public life.
With regards to that, Cairo is a city that holds an extensive variety of informality in housing and working urban environments that may influence the livability for its individuals (Stryker & Nagati, 2016). This image has situated as a ‘city of hardship’ with an abnormal level of difficulty that causes inhabitants to suffer in their daily lives from the absence of order (Abusaada & Elshater, 2019). Although Cairo meets the requirements of urbanization in its integrated environments, however, lack the knowledge to manage the attributes of vital public life. Consequently, many urban public spaces are not doing their essential role in consolidating the cultural, economic, and political significance of public spaces of the city (El Fayoumi, 2017). In the meantime, the social production of public space is regularly neglected by Egyptian urban design and regulation policies.

After the January 25 revolution, informal vending activities has known a dramatic spatial expansion in Cairo city centers (Brown et al., 2017; Kafafy, 2017). Correspondingly, urban environments for Cairo city become contested with diverse, conflicting activities, leading to a prevalent decline in the use of urban public spaces. Although vendors’ presence is portrayed as an urban disaster in the Egyptian context, it represents an economical solution for several unemployed citizens (Bouhali, 2018; Kafafy, 2016). However, these spontaneous, unplanned practices participate in making sense of place in the Egyptian urban context (Elshater, 2014). In the sense that the misallocations of urban uses and activities generate the vendors’ role in Cairo urban fabric (El Fayoumi, 2017). In this manner, vendors are actors who have an essential role in enhancing and upgrading the city functioning (Elshater, 2014), creating a system of sustainable living for urban communities.

**The Analytical Case Study**

Ismail Abaza Street Market is situated in Khairat, El-Sayed Zainab District in Cairo, within an overcrowded district of residential and administration buildings. This strategic location offers an advantage that draws in many vendors, creating a marketplace called ‘Souq El-Mowazafen’ or ‘Souq El-Wezarat.’ Therefore, the scope of the analytical study is within walking distance from main streets and public transportation facilities (300 m), as shown in Figure 8.

The preliminary on-site observations reveal that Ismail Abaza is a morning market only, as shown in Figure 9, where vendors transform the public street into a pedestrian market as a response to the employees’ demand for affordable products at a convenient distance from their workplace as well as their work rhythm. Therefore, the vending activity pattern is adaptable to one social group of urban users.

**FINDINGS**

Based on the syntactic investigation, the chapter aims to explore the impact of the transformation of Ismail Abaza Street to an informal morning market. This section presents comparatively the results of the socio-spatial and temporal analysis; pre and during the vending operations.

**Axial Representation of a Spatial Urban Entity**

The initial step is to construct two axial maps for the selected market; pre and during the vending operations. Formally speaking, this spatial representation reveals that Ismail Abaza St. as an urban marketplace segregates the urban fabric and the surrounding street network in the selected layout.
Ismail Abaza St. (segment 6), Magles Al Shaeb St. (segment 2), and Mohamed Ezz El Arab St. (segment 8); are three direct connection axes between Al Kasr Al Aini Street and Omar Khayrat Street. However, the location of segment (2) and (8) as the border lines for the selected urban area, has situated segment (6) as the only continuous movement path cutting through the whole spatial layout. Hence, the presence of the morning urban market at Ismail Abaza St. has not only sectioned the street network into two discrete urban environments but also increased the number of street segments (represent the change...
The connections between axial lines are represented through the formation of syntactic graphs. In Figure 11, (a) shows that segment (6) is connected with another six urban streets (1, 9, 11, 13, 14, and 28). While, (b) shows that the presence of the morning market divided this continuous segment into two sporadic segments (6, 19), where segment (6) is still connected with three urban streets (1, 9, and 11), and segment (19) is combined with (14, and 29). While the immediate connection between segment (6) and (13) is blocked due to the presence of the vending activities.

**Syntactic Measures of a Socio-spatial Contemporary Urban Practice**

The second step of this analysis is to quantify the socio-spatial and temporal attributes of Ismail Abaza Market through the syntactic measures.

**Connectivity**

This local variable shows the immediate connections between urban spaces or the change of direction, to explore the impact of linking or unlinking specific streets from the whole spatial layout. Predominantly, the presence of the morning market does not impact the connectivity of any of the other streets in the spatial layout directly, except for segment (6), as shown in Figure 12. Consequently, Ismail Abaza St. Market is considered an additional syntactic step, influencing the users’ movement in and around the urban space. In the sense that the blockage of this part of the street shifts the traffic flow towards other streets in the spatial layout, and increases the distance traveled by the inhabitants or employees to reach their destinations, as well as decreases the permeability of surrounding buildings and urban spaces.

**The Degree of Depth**

Depth is a primary measure to investigate movement and accessibility within an urban space that is extracted from justified graphs, to represent the degree to which individuals must traverse to go from the root space to all the other spaces in the spatial layout. Accordingly, depth is useful to investigate the
locational utility of the market for various users. Considering the morning market as the destination, it impeded the urban inhabitants’ direct-access to their buildings as segment (6) is the only direct pathway to the residential area. While, for temporal employees and market visitors, the market is situated two steps away from the administration area and one step away from the metro station, as shown in Figure 13.
On the contrary to segment (1), the justified graph from segment (2) as the root space shows a more integrated and accessible spatial relationship towards all the other urban spaces in the layout, as shown in Figure 14. Even when the morning market is operating, urban inhabitants, employees, and market visitors can reach their destinations efficiently.
Similarly, the justified graph from segment (8) shows a high level of integration and accessibility for the various users, as shown in Figure 15. From segment (8) urban inhabitants can reach their residential buildings without passing by the urban market from segment (14), and urban customers can enter the street market from segment (11).

Predominately, the presence of the morning market increases the degree of depth of the spatial layout for the permanent urban inhabitants, while at the same time decreases the degree of depth for the temporal employees and potential customers, as shown in Figure 16. In this manner, the temporal presence of Ismail Abaza vendors is considered a response to the social demand of particular type of users at a convenient topological distance and specific times.

Control Value

The control value is the sum of the inverse values of the connectivity parameter of all alternative connections. Table 2 reveals that the market decreases the extent to which the surrounding streets control direct access to the residential area. Subsequently, inhabitants are experiencing a kind of hardship that is different from those visiting this urban space for work or services.
Similarly, the integration value is the inverse of the mean depth of each street in the layout. Hence, streets with less depth are more integrated into the whole spatial layout, while streets with more depth are the most segregated, as shown in Table 3.

DISCUSSION

After analyzing and comparing the axial maps and syntactic measures of Ismail Abaza St. Market; pre and during the vending operations, it is clear that the social demand of customers and the economic advantage of vendors play a vital role in the proximity of the market location to the administration zone and the metro station.

On the one hand, the social attributes determine the vending activity spatial properties. On the other hand, even when the urban layout lies within the same metric distance, the accessibility of the market and the residential area is influenced by different topological distances. This reveals that the spatial properties of the urban space determine how individuals utilize it in return.
Referring to the main crux of urban planning to create vital urban space, the presence of the market as a response to the temporal and social dimension of employees needs regarding scheduling and location, reveals that Ismail Abaza St. Market is a vital urban public space for temporal users, while creates a kind of hardship for permanent inhabitants. However, this chapter agrees with Bromley (2000) and Gehl (2010) that there is difficulty in closing off public streets and utilizing it as marketplaces, which needs to be managed and appropriately regulated on various spatial and social levels.

Taking into consideration the diversity of users, where each social group is experiencing a different urban experience in terms of physical movement or social activities. However, digital research methods could not successfully address the social aspect of the urban experience. In this manner, a complementary traditional research tool of observing public life is needed in mapping the behavior and needs of various individuals within and around the informal street market. The key, therefore, is to interrelate socio-economic and tempo-spatial attributes in the area of informal street markets in Egypt, through utilizing traditional and digital research methods.

**FUTURE RESEARCH DIRECTIONS**

Space syntax can offer several significant advantages to understand the complexity of public trading, through investigating the market as an ‘urban-entity’ that is connected to a wider urban spatial network,
or as a ‘place-setting’ that is related with configuration and social behavior. Utilizing this analytic method in various social and urban contexts (historical areas, new urban settlements, and rural areas) could be an opportunity to tackle the negative implications of these contemporary practices on the urban experience. Furthermore, the authors of the current work are conducting follow-up research using traditional methods to reveal the informal street markets vitality and show how traditional and digital techniques can be complementary.

**CONCLUSION**

This study acknowledged the street market as an urban setting, which could be a vital public space when fulfilling the social needs of permanent and temporal users. This chapter extracted criteria that interrelate socio-economic and tempo-spatial attributes of vending activity as a step towards developing a practical approach for managing public trading in public spaces and upgrading the vitality of public life. Besides, the syntactic methodology conducted in this investigation can be valuable in the field of informal street markets as a practical research method; which clarifies the impact of the spatial properties of a particular space in determining how inhabitants utilize it and vice-versa, although it needs to be used side-by-side with traditional research tools for a more effective outcome.
Table 3. Integration value

<table>
<thead>
<tr>
<th>Axial Line</th>
<th>Local Depth (steps=3)</th>
<th>Global Depth</th>
<th>Mean Depth</th>
<th>Integration</th>
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<tr>
<td><strong>Surrounding Streets and the Market Pre Vending Operations</strong></td>
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Source: The authors

REFERENCES


Nagati, O., & Stryker, B. (2013). *Archiving the City in Flux: Cairo Shifting Landscape since the January 25th Revolution*. Cairo: Cluster.


Space Syntax Beyond Cairo Street Markets


ADDITIONAL READING


