

An Investigation to Physical Aspects of Middle Area in Squares as a Useful Indicator for Designing Community-Oriented Urban Plazas (Case Study: Italian Piazzas of Campidoglio in Rome, Del Campo in Siena and San Marco in Venice)

¹Yasamin Douzouzani, ²Iraj Etessam, ³Mohammad Naghizadeh

¹Ph.D. Candidate, Department of Art and Architecture, Science and Research Branch, Islamic Azad University, Tehran, Iran.

²Professor, Department of Art and Architecture, Science and Research Branch, Islamic Azad University, Tehran, Iran.

³Assistant Professor, Department of Art and Architecture, Science and Research Branch, Islamic Azad University, Tehran, Iran.

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ABSTRACT: Middle of squares, one of the components of physical aspect is considered as an appropriate indicator in designing successful urban squares, which consequently promotes visual quality. The present study aims to determine how the above mentioned aspect was presented in the Middle-Ages and Renaissance within Italian squares. Considering the aim of the investigation, library studies as well as visual documentations, with a historical-descriptive approach were applied in studying Italian community-oriented squares, Campo located in Siena, Del Campidoglio in Rome and San Marco in Venice. Results showed that, urban designers have employed some indicators, including physical aspect and its factors such as proportions, shape, surface design, materials, colors and topography in order to promote aesthetic-visual qualities, as well as human scale and unity of space to successfully design attractive middles in squares. These all, efficiently influence users' presence, pause, movement type and trend, direction, speed and even their behavior. Accordingly, considering the mentioned aspect is of great importance in designing future squares.

Keywords: Middle of square; Shape; Proportion; Topography; Pavement.

INTRODUCTION

Squares as urban spaces have been spaces for interactions and developing social integration in the form of opportunity-providing for people of a community to meet, coming together, walking around, enjoying and spending leisure time, but they have undergone many changes by urban transport systems and growing the scale of cities. These changes have not been in alliance with improvement of spatial quality of squares and have declined visual and aesthetic quality and social interactions, leading to citizens' dissatisfaction. Nowadays, squares have lost their former significant role as a live urban space in fulfillment of citizens' social needs, joy and presence, participation and contribution have been reduced, ignoring remarkable physical properties; lack of sufficient attention to aesthetic-visual issues caused disproportions in these squares. Very important factor in designing desirable urban squares worldwide is their physical aspect (the squares in countries with different cultures are shaped

in their certain ways). Present study aims to investigate physical aspect in three squares, Italian plazas of Campidoglio in Rome, Del Campo in Siena and San Marco in Venice, considering how their cultural, local, and environmental factors have been manifested, so that in future attempts to design squares, the physical aspect could be applied to promote the setting's quality in order to be attractive to citizens and lead to their satisfaction and presence.

MATERIALS AND METHODS

This study is conceptually a qualitative one, in which a historical investigation is also done, but the study relies on historical-descriptive method and its approach (theoretical framework) is based on effectiveness of physical and formal factors.

Middle (Floor, Space, Court, and Surface)

"Middle" of square, one of the components of physical¹ aspect, is the principal part of squares, which define its identity. Middle of square can be assumed as the space between the walls and includes the central area even without the side walls of the

*Corresponding Author Email: i.etessam@srbiau.ac.ir

square can be defined. In other words, middle of square refers to the main space of square, defined by notions, function occurrence and impression or by physical elements at middle or setting. Naghizadeh (2010), named “middle” by different titles, including, “surface”, “space”, “court” or “floor”. Here, “surface” refers to horizontal surface or space expansion, which plays a crucial role as physical component of urban square, limiting element of subspaces, and connecting and linking factor in total identity of structure. Overall, throughout planning for urban architecture for middle square, indices such as “floor surface”, “floor material”, “topography”, “shape”, “dimensions” and “proportions” are used (Fig.1).

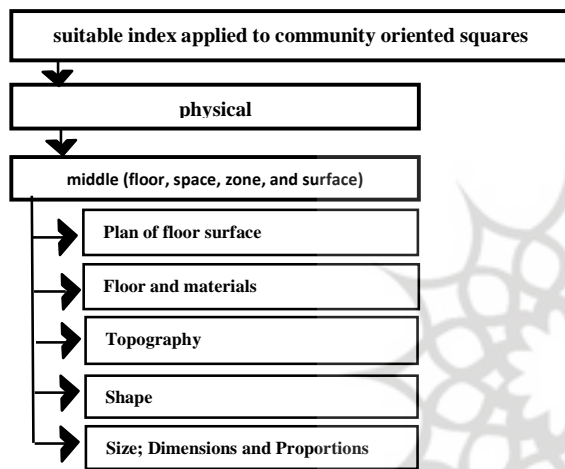


Fig. 1: components of middle square

Plan of Floor Surface

Attributes and patterns of local design are now the indicators of sustainability in more of societies and places (Tafahomi & lamit, 2011). Flooring pattern affect aesthetically on the space. Using flooring pattern in squares, static state is dominated at the space, where induced resting and pause sense to the users. According Carmona playing with divers floor plans, present qualities such as rhythm and scale to urban area. In addition to movement and pause. Indeed, floor shape, could be applied to improve the beauty throughout the space by means of different methods, including “creating human or total scale at the space”, “space modulation by augmentation of dominated personality” and “organization of unity at the space” as well. Moreover, according to the authors, used materials and creation of the plan on the floor, give scale to the space. In fact, adding details and modulation, space become smaller; adversely, the effectiveness becomes more impressing. It’s worth to mention that, making connection between Centre and sides of the space, cause to harmony between space and organization of the system, as a result; So that, lack of pavement make buildings seems dispersed at the space. Meanwhile, Carmona represented that in case of

better plan connection between unit buildings, a simple floor is paid enough attention to. However; lack of harmony between buildings; or being a big gap in platform could be recompensed by strong geometric shapes such as rectangular; circle or ellipse. In other words, space Centre is reorganized, and irregularity of the environ buildings is connected to the edge (Carmona et al., 2009).

Floor and Materials

Floor surface have to be stronger, sensible visually and represent divers texture and colors, with less need to be cleaned. Platforms carpeted with wooden lattice are going to be improved. Attractiveness, along with welfare of such aims is imagined to dedicate a beautiful and desired coexistence to the space. Therefore, using materials; pause area; roads territory, as well as movement spaces properties are determined. Nowadays; ecologically and regarding technical properties of buildings, surface water disposal facilities is of high importance in plan of floor pavement, as well as selection of materials used (Knirsch, 2004).

Topography

Of the principal components of urban area floor and squares spaces, is land topography. To this aim, primary idea for playing with divers surface are remarkable visually; psychologically and functional, which affectively impress plan process of urban landscape. Floor surface is usually horizontal. Applying terracing, corrugate to floor surface, downhill, uphill, impression and space connection is achieved successfully. To dominate feeling at the space, inclined surface, more perceptible than horizontal surface, is applied. Indeed, downhill and uphill vitalize plaza space. It means that 4-10 degree slope, encourage the movement. “Concave bulge” causes to promotion, grandeur, and gravity, whereas “dents convex” inversely, creates limitation and as a result, closeness, security, and confidence is achieved (Knirsch, 2004). Cullen (1961)declared that, height is a score in urban landscapes; whereas depth descript confidence, and so surface changes in a square, prepare space for both moods based on psychological requires of individuals. Normally traditional and historical cities have respected to their topography as a context and it is evident that topography of earth have been well respected among the various ethnics and culture (Tafahomi & lamit, 2011). Throughout both squares, visual access and light lines have to be paid attention; and connections between surfaces have to be also preserved, so that users, be able to profit. Hence, an “attractive” factor is required. Moreover, during plan and performance of surface changes, disabled users are to be considered (Whyte, 2012; Marcus & Francis, 1998).

Shape

Of the impressive factors in centre square is shape, form and morphology, remarkably applied to physical concept of square/plaza. CamilloSitte (1965), in a study entitled “urban plan based on art principles”, presented “coherence sense” regarding plaza’

form. Moreover, author believed that “exactly such a room, a plaza requires to be surrounded” Rob Krier (1979) determined square, circle and triangle shapes for squares, which need to be reformed and modulated using Angle Classification, Segmentation, add, merge, overlap, and the crooked way. As a result, regular or irregular forms are achieved which are to be opened (towards area) or closed (separated from surrounding streets by walls, pass ways, or columns). Location of entrance point to the square, as well as number of streets reaches to the square; well determine “closed” or “opened” property of that square(Fig.2).

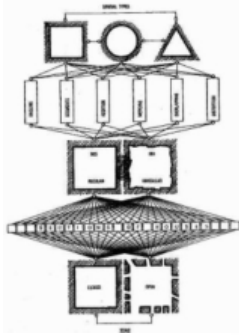


Fig. 2: Robert Carrier typology of urban squares (Krier, 1979)

Based on Shaftoe (2008), “curves and bends at public space offer charm and attractiveness at plaza corners”. On this basis; some researchers, pretended that “straight lines” as well as “rectangular shapes” are strange and unnatural to human beings. (Shaftoe, 2008) Knirsch (2004) believed that geometrically, plazas could be shaped like as circle, square, or triangle, which is of regular shapes family. However, irregular shapes, which well analyzed to geometrical regular shapes and could be connected to each other based on “vicinity principle” are also useful.

Size; Dimensions and Proportions

Hereby, size is exactly related to plaza' location. Dimensions represents plaza properties, such as friendly or imitate or unfriendly. In this regard, Shaftoe (2008) declared that, too large and too small spaces may induce unfriendly or confinement feeling, respectively. Optimal dimensions are suggested at a successful urban plaza plan. Urbanism is greatly affected by determination of surface dimensions as a key factor in decoration. So that, length-width ratio of spaces is applied to determination of squares or streets. To this aim, more the mentioned above ratio closer to 1 (one), more principal geometric shapes (square, circle and triangle) are obvious at plaza shape. Adversely, bigger the length-width ratio, oriented shapes would be more presented. Therefore, divers feeling value could be defined for each angle. Along longer sides, shape inner tension is more than two other sides. However, regarding “size” category, nowadays, there reported no particular criteria. Some researchers offered

suggestions regarding dimensions and proportions for an ideal plaza. Vitruvius, architect and theorist of ancient age at his book, entitled “De Architecture” determined 3:2 proportion for ideal squares. In addition, Vitruvius believed that “such a plaza shape would be longitudinal (Knirsch, 2004). In other side, Leon Alberti, at renaissance age, thru a paper entitled “de reaedificatoria”, suggested that at a square, length is to be 2 times more than width, in order to be realized a good proportion and coordination. Kavin Lynch (1971) also represented that 12 m- 24m size at length, offer comfortable and friendly scale and ideal human scale, respectively. For big plaza, this scales becomes larger up to 100 m. Average dimensions for ancient age plazas, were computed 57*140 m. Jan Gehl (1987) discussed that “maximum distance for concept of outside appearance is about 25m”. Christopher Alexander also believed that “length of a small plaza needs to be 22m at most (Marcus & Franciss, 1998; Shaftoe, 2008; Childs, 2004). Hedman & Jaszewski (1984) believed that “bigger the plaza, stronger the impression. Therefore, related experts suggested maximum plaza size as 67*170 m (200*500 feet).

Piazza Del Campidoglio -Rome

Piazza Del Campidoglio, constructed in a trapezoidal form, surrounded by three “municipality and Sena Castle” buildings, Music conservatory Palace (Palazzo Dei Conservatori) at right side; “Capitol Museum (Palazzo Nuovo) at left side, whereas forth edge was left opened along the hill, was connected towards the town by means of “Scala Del Cordonata” eye-catching slope stairs (Ramp). In fact, such a construction, opened the arms to the town, is look like an invitation for visitors from suspended staircase towards piazza. A twelve-pointed star filled piazza ellipse surface, where black and white marble arms, are emitted from bottom of “Marco Aurelio” statue” like finger type radiation, which represent an exciting show of contrast shapes. In continue, Thiis-Evensen (2010), describe “such an ellipse shape along with surrounded buildings altogether decorated in a trapezoidal form created a great tense at the area.” Domical shape surface of the Del Campidoglio Plaza was determined as symbol of floor arcuate structure”. Ellipse shape part was placed two stairs lower than the building floor (Thiis-Evensen, 2010). According to Knirsch (2004), “such a surface difference created by low ramp between inner surfaces of ellipse rather than sculpture, attract high attention towards square. Michel Ange left no plans of his plans. De Prack's engravings, appropriately represented Ange' ideas (Cooper 2002) (Fig.3).

Williams (1997) analyzed the geometry of Piazza Del Campidoglio' pavement as below (Fig.4): Rosette of Del Campidoglio was deformed, in order to be conformed to ellipse frame, which caused a compression in the total frame. More the plan developed into outside, more the shape looked like an ellipse (Williams, 1997).

Trancik (1986) declared “ellipse shape of Del Campidoglio' pavement, caused an inertia at the piazza, which as a result terminate linear tensions created by buildings corners.” Also

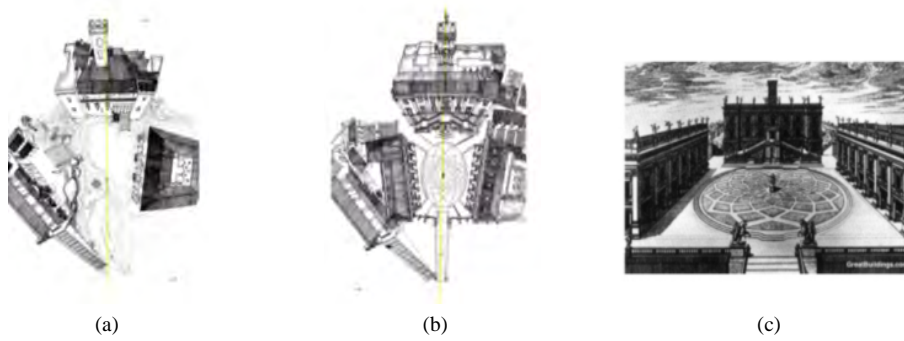


Fig. 3: (a) Pavement engraved by De Prack (1569), (b) Flooring of square, (c) piazza image before floor plan (Giedion, 2003)

Carmona et al. (2009) believed that “in Del Campidoglio, plan is constantly connecting centre to edge to coordinate the inner elements and space”. Thiis-Evensen (2010) continued that star shape, equipped with Empire Sculpture at heart, is mostly interpreted as expansion of curve to outside; in other side; the plan could be considered as a net, limited strongly all expansion from inner, which represent well, nature dominant against human beings. The studied piazza, computed as the smallest piazza of Rome, were coordinated based on Vitruvian ideal proportion, 2:3, as well as piazza surface size ratio (76*38-54)(Knirsch, 2004) where dedicated an “architectural winner power” to the visitors. Cooper (2002), has mapped people motions at Del Campidoglio piazza during an afternoon, and understood that they mostly preferred to pause at Cordonota, round to right, sit on the stairs, or climb up the Senatore Palace stairs. Similarly, the author found such behaviors, particularly; people trended for arcuate movement to traverse piazza width, or tendency for following

white lines at pavement.

Piazza Del Campo-Siena

According to a map left from 1218, principal shape of the monument was, semicircular, looked like an open shell. A trapezoidal located at 150*100m, about 1.5 ha area, extremely conformed to Vitruvian. However, a 15 feet north-south height difference and slope floor was observable at the piazza (Broadbent, 1990); which well displayed it restricted. Some researchers believed that shell shape of the piazza equipped with narrow strip of gray stone, along with nine strips of brick, symbolically describe Holly Mary’ robe and nine radiations at pavement showed nine councils “ Good government of nine councils”. Based on Mayernik (2003), it seemed that ancient age architecture were extremely competent at line exact geometry and constructed all the pieces exactly like as equal rectangular. (Fig.5 -6)

It worth to mention that, because of triangular shape of flooring;

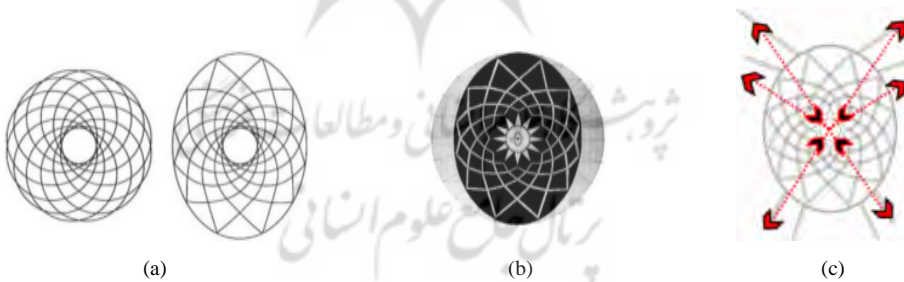


Fig.4: Pavement Rosette plan: (a) standard composition for a 12 arms Rosette (Author); (b) the same plan deformed to some extent and conformed on the shape (Author) (c) present plan of Del Campidoglio; covered by a grey circle to mathematical analysis (Williams, 1997).

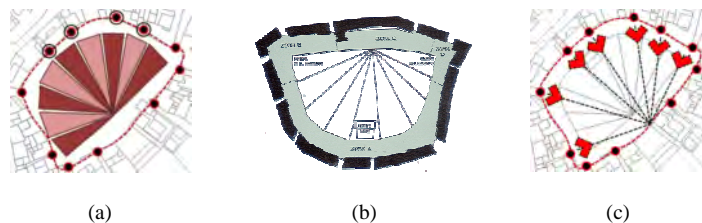


Fig.5:(a)shell shape piazza a carpeted with gray stone strip and nine narrow brick strips in radius form.(b)Puppi (2002) declared “visually, the lines, augmented floor slope at Piazza Del Campo, closely related it to Siena topography. (c)In addition, pavement gray stone strip (likely Trochete rocks) defined space identity, which were commonly used at Italian streets.

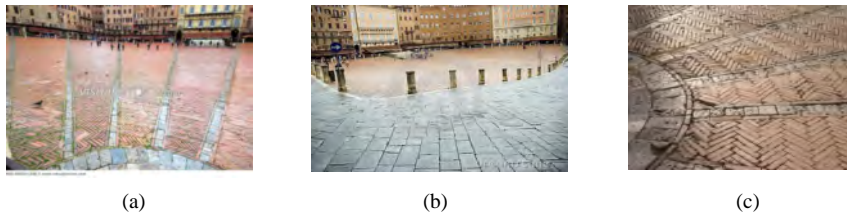


Fig. 6: (a) (b) (c) description of plan, color and materials of pavement applied at Piazza Del Campo

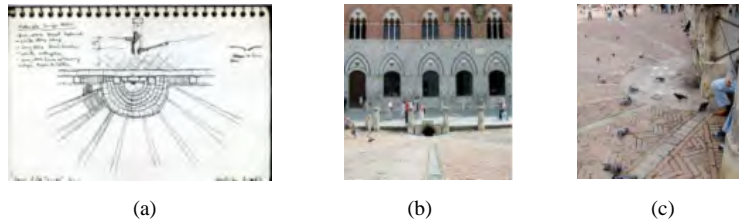


Fig.7: (a) (b) (c) pavement lines of Del Campo arrived to water conduit (Broadbent, 1990)

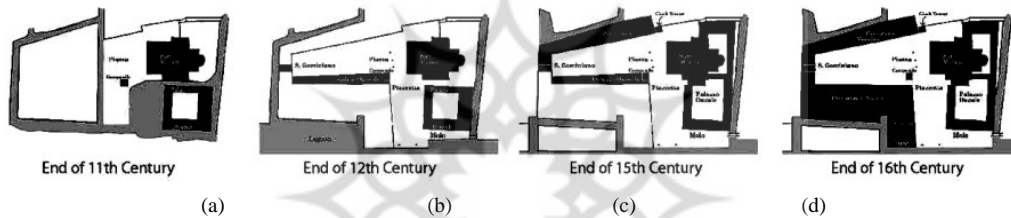


Fig. 8: (a)(b)(c)(d) transformation procedure of the piazza (Zimmerman, 1999)

flooring slope, pay attention to central space, as well as creation of negative centre, palazzo Pubblico and Torre Del Mangia, were attracted by people for resting and pause (Fig.7).

So that, indigenous people and visitors preferred to pass time around the piazza to talk or rest on the pavement to enjoy palace and tower shades.

Piazza San Marc (San Marco) – Venice

Composed of two principal parts includes Main Square (larger space) and Piazzetta (small piazza) and located almost perpendicular to the piazza, connects it to the lake. (Webb, 1990)

wrote that piazza (larger square) had a length of 570 feet from the western side to its domed Basilica. Construction of the piazza started in 9th century AD, expanded to its two fold area at 1176, in doing so, a fruit garden was occupied and a canal was filled (Webb, 1990) total complex was completed during 15th and 16th century. As showed in two last paintings (Fig.8), piazza width, north to south, was extended by demolishing a building in 16th century. Campanile Tower or (bell tower) was preserved, being separated from its adjacent structures.

According to Puppi (2002): “San Marco piazza was paved zigzag by brick at 13th century AD in parallel to the piazza, and crossed

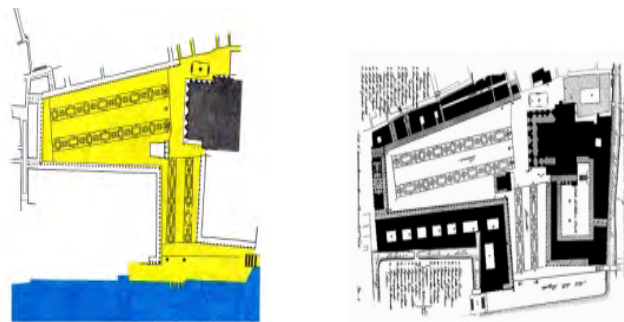


Fig. 9: Pavement plan designed by Tirali at 1723 (Trancik, 1986)

Fig. 10: Current pavement of San Marco piazza (Bacon, 1967)

it for once at least. Brick pavement, more resistant against abrasion rather than Trochyte rocks (a kind of Igneous rocks) and Sytryn stone, similar to Travertine stone, were replaced at 1723 (Puppi, 2002). Andrea Tirali, Venetian architecture, planed the pavement composed of square, rectangular, and ellipse shapes very similar to the current pavement plan. Performing the pavement, the whole piazza' height 1m augmented to be preserved from repeated flooding effects (Sammartini, 1999). At 1890, the last plan was renewed by a similar one. However, there reported some differences between two plans (Fig.9-10). For pavements, dark gray stones were vertically placed at strips frame, whereas into squares, rectangular and outside bands, they were diagonally positioned. Squares and rectangular were probably applied to determine market stall at the century. A gravure carried out inside piazza stones at 1625 (Fig.11) has shown a written "for shoemaker". Shoemakers were of rich inhabitants of Vatican (Mack, 2002), and gravure was likely revealed that shoemakers provided financial cost of the piazza, or shoemakers stall were positioned there.

RESULTS AND DISCUSSION

Squares, with their aesthetic roles, affect intelligence and senses of people, leading to a positive or negative impacts on them. An architecture devoid of feeling, makes people cranky, grumpy, unhappy, primarily emotionally unsatisfied and then physically patient. It is noteworthy that the visual elements are essentially aesthetic and visual impacts of such spaces are formed through aesthetic criteria like form, geometry, proportion, range, size, order, harmony, avoiding ugliness, and pavement. By investigating physical indicator of "middles" of square, its components and studying this indicator at three famous squares in Italy, it can be deduced that pavement pattern in squares can have aesthetic impact and in addition to creation motion and inertia, brings qualities such as rhythm, scale, and unity to the urban space. The more simple and orderly shape of square, it would be easier to observe and perceive and the image is readily formed, but in the case of too much complexity and chaos and lack of order and simplicity, the observer would be confused and the total imagination of the space form every



Fig. 11: gravure "for shoemaker" at 1625

As above mentioned, Basilica has been placed angled against Piazza and Piazzetta. Hereby, pavement play key role to conduct space diagonally towards Basilica of San Marco. Linear strips at pavement showed Basilica' importance and balanced space scale. (Fig. 12)

It is noted that due to enlarger length rather than width, as well as longitudinal pavement, the piazza seems oriented, which encouraged people more to move than pause and rest and following square and rectangular plans parallel to long axe of the piazza.

point would be impossible and lead his moving in the setting. But it should be remembered that the bigger plaza is, it will becomes more difficult to create a sense of space. Topography sets up a stressful relationship between the observer and the environment, causing movement and liveliness of people and making square court dynamic and eventually by the use of materials, zones of pause and stop, domains of paths and features of spaces of mobility and pause is formed and defined. Having studied afore mentioned squares, can be found by examining the shape, surface design, surface materials, colors that are all in

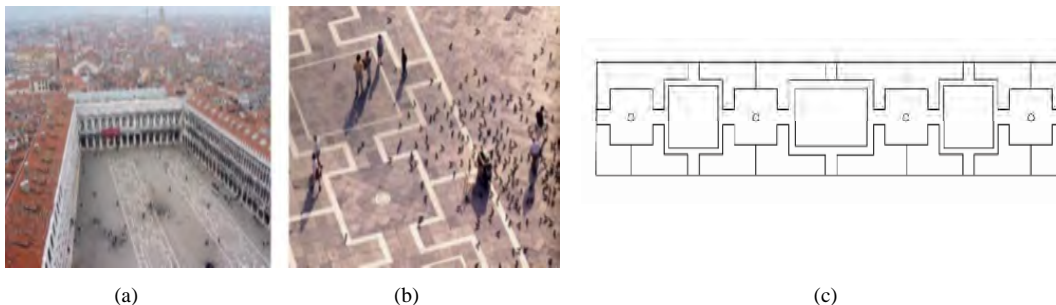


Fig.12: Pavement of San Marco piazza: (a); a view of piazza was shown from top of the Campanile tower towards west (Williams, 1997). (b); a closer view of pavement was represented (Sammartini, 1999). (c): Pavement of San Marco piazza

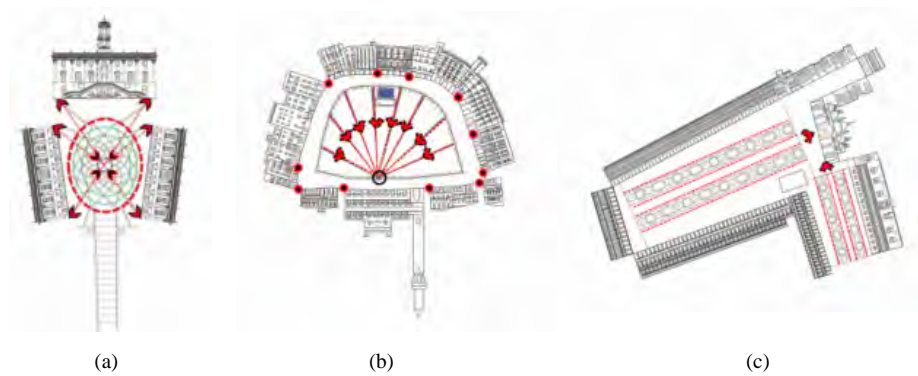


Fig.13.Physical study of center squares, (a) Del Campidoglio, (b) Del Campo, (c) San Marco, Italy (As suitable index applied to communicable squares)

Table 1: Comparison of three studied piazzas middle (Author)

	Samples	San Marco	Del Campo	Del Campidoglio
Centre (floor, space, zone, and surface)	Plan of floor surface	•	•	•
	Floor and materials	•	•	•
	Topography	-	•	•
	Shape	•	•	•
	Size; Dimensions and Proportions	•	•	•

the same order and continuation and interdependency of each component with other components and the whole set with any of its components is perfected and forms the unified overall scheme and coherent shape. Moreover, in general we can say that the middle component can be of a powerful effect on presence, beauty, unity, space, pause, type, direction and trend of users' movement and even on their behavior (Fig. 13) (Table.1).

CONCLUSION

By examining the physical (framework) aspect of "middle" plaza and its indicators in 3 famous plazas in Italy, it can be realized that indicators such as the physical aspect of middle plaza are needed for creating public and socializing plazas for citizens to attend and get attracted to them and to ultimately find comfort, pleasure and satisfaction in these places. By considering aesthetic and visual elements and developing a proportionate face according to the middle plaza indicators such as proportions, shape, surface design, materials, selected colors and creating topography, urban designers can improve aesthetic and visual qualities of the plaza space. It should be noted that in addition to making motion and inertia in space and bringing other qualities such as rhythm, scale and unity to the urban space, flooring patterns for squares and plazas can

have aesthetic value. When the figure of plaza is simpler and more regular, it is observed and perceived more easily and will readily take place in imagination. But if it is overly complex and far from being simple and regular, the viewer is confused and visualizing the totality of space from any viewpoint is not possible and is subject to the viewer's relocation in the environment. We should keep in mind that the bigger the size of the plaza, the harder it is to build a strong 3d effect and actually very difficult to create a spatial concept. Topography establishes intense relationships between the viewer and the environment. It brings liveliness to the plaza scene and causes motion and vitality in people. Ultimately, topography defines pause and stop ranges, path domains and properties of mobility and pause spaces using materials. By examining the mentioned middle of plazas, it can be understood that shape, surface design, materials, color,... have a unit order and the relationship and cohesion between each component with the other one or the whole set with each of its components reaches perfection and has formed a unified outline. Also we can conclude that generally the indicators of middle plaza can have a strong influence on the presence, pause, type, the procedure of movement for users, and even their type of behavior, in addition to having aesthetics and unity of space.

Endnotes

1. Components of physical quality of a square includes wall, center, and visual complexity of square (visual-aesthetic elements).

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