

Iranian garden, the manifestation of sustainable green space

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Abstract— In investigating or designing urban public green spaces, the first step is paying critical attention to historic background, cultural values, ideological principles and aesthetics criteria of the society. In different cultures people may have different perceptions of and feelings to some natural phenomenon such as wind, water, fire, trees, sun, moon and examples of these sorts. Respect and reverence for water and trees have been institutionalized in many ancient civilizations due to their different socio-cultural traditions, values and beliefs. In this research work we try to investigate on the art of ancient Iranian gardening and at the same time different elements of Iranian old gardens are considered.

Keywords—Gardening Art, Traditional Iranian Garden, Paradise

I. INTRODUCTION

IN studying or designing urban public green spaces, the first step is paying serious attention to cultural values, historic background, ideological principles, aesthetics criteria and environmental conditions of the society. In different cultures people may have different perceptions of and attitudes to some natural phenomena such as wind, water, fire, trees, sun, moon and examples of these sorts. Respect and reverence for water and trees have been institutionalized in many ancient civilizations due to their various socio-cultural traditions, values and beliefs. The eastern people have always had a special attention toward green sites. Among them, Persian people have a very long history in the art of gardening and designing open-air spaces. In Iranian people's view, garden is a manifestation of paradise. There are many verses and quotations describing the paradise, thereby it is visualized full of flowers and trees and it is said that there are streams of drinking sweeter than honey and more useful than milk within, as well as water springs and high palaces. In the Holy Koran verses, paradise has been called with the names of Ferdos, Jannat, and Eram; Iranian gardens have been named with most of these names or some combinations of them.

Garden has always been the best space pattern to live as well as a desired and dream environment for the human beings residence. Perhaps, it is for the very reason and based on some of the religious sources that Adam and Eve, before getting

departed to the earth, lived in the paradise which has been an immortal garden. In addition, based on the religious beliefs in divine religions, the pious and right doing humans will eventually enter the paradise garden in the resurrection. In studying or designing urban public green spaces, the first step is paying serious attention to cultural values, historic background, ideological principles, aesthetics criteria and environmental conditions of the society. These factors are so important that neglecting even one can reduce quality of design and alter the unity and wholeness of the design as a desired identity for a specific society with its own culture and ideas.

The architectural concept of the garden reflects the feeling of place or locality. It is because the garden is considered as an attractive space which frames inside the whole picture of the universe. This concept which is the foundation of order and harmony can be sensed through number, geometry, color, and material. At the same time, it can turn the reason to the nature which is the inner aspect hidden in the positive atmosphere. Garden is a manifestation of the centrifugal face of the macrocosm [2]. Iranian garden is not only a safe and comfortable place, but also a place for calm thinking or philosophical negotiations, for deliberation and investigation, a place where the human's tired soul can be pepped up, relaxed, and opened to novel scenes.

Chardin had noticed that Iranians are relaxed in their gardens and are not satisfied merely with breathing, but they smell greedily the odor of certain flowers [5]. However, it was sometimes possible that the garden is used for happy and enchanting ceremony of the sunset, that is, for the music and dance in the mild light of lamps or torches. Each city and palace had great gardens many of them were public. All of them were opened during Nowruz ceremonies. The beautiful paths were beautiful wide areas with large junctions having fountains in the Middle to drink water from. Also there was large square with a large park surrounded with long Tabrizian trees with the bowers covered with jasmines and red flowers. A park in Tabriz had 1000 fountains, 1000 streams, and also 1000 rivulets [5].

There were legendary gardens in Isfahan, not only the famous Chahar-bagh which was in fact a park-like resort with the length of 1.5 kilometers, but also numerous gardens which had surrounded it from all sides. These gardens had bowers of red flowers and covered with the Jasmines hung on the water-views, as well as pools and magnificent places as bright as jewelry.

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II. CONSIDERATION THE TERM OF GARDEN

Dehkhoda described the meaning of the term “paradise” as follows [6]: “Paradise is a word derived from the mother tongue (Parade’za) meaning garden. The Persian autumn and Ferdos (Arabic) have been derived from the very word too”. This term which has been applied twice in Avesta (the Zoroaster’s religious book, Iranian prophet of the ancient era), is made up of two parts, one “Pairi” meaning around and the other “Daeza” meaning accumulating and fencing, which on the whole mean planting trees and flowers around the building.

This term has become autumn in Pahavi era and has been also used in Dari Farsi (an ancient Persian dialect).

In the period of Achaemenian and thereafter there have been many large and magnificent gardens across Iran that Gazanfoon has also mentioned them several times. Such gardens which didn’t exist in Greece of that time drew the attention of the people of that land as well as the other countries, and they applied the very Persian term too. Nowadays, this term is used in Greek, French, and English languages as “paradises” and “Paradise” meaning garden and paradise, respectively. According to Gazanfoon, there has been a large and beautiful garden in Lydia called paradise four and a half centuries BC. Babel suspended gardens (one of the seven world’s strangest) which have also been established by Bakhtolnash for his Iranian wife, Mad governor’s daughter, have been made based on the very principles of paradise design, in such a way that they enjoyed a special order and proper pattern and had also been remained to the time of Alexander. The other name of this green and attractive space is “Bagh” which showed in some ancient artistic works as shown in fig.1 [3].



Fig1. Eden Garden

III. THE HISTORY OF GARDEN MAKING ART IN IRAN AND THE WORLD

In Farsnameh, Ibn Balkhi claims that Manoochehr, the son of Mishkhoriar, the seventh king of Pishdadi dynasty (Iranian dynasties pre-Islam are: Pishdadian, Kianian, Ashkanian, and Sassanid) was the first one who built the garden [7]. It has also been quoted that according to Gazanfoon the first one who made attempts to establish gardens was Cyrus, the Great, he himself even used to plant trees.

Perhaps, observing the gardens of Babel while gaining victory over it had interested him to plant trees. It is also necessary to say that Cyrus’ grave in Pasargadae and Persepolis before being attacked and burnt by Alexander, have been areas full of trees, water canals, and rivulets.

In the history of civilization (Belief period), Will Durant writes: “Iranian style garden has been also imitated by the other countries, got common among the Muslims, Arabs, and Indians, and has also inspired Europeans in the Middle Ages [9]. It has been found out through working on the writings of Greek historians that most of the Iranians’ houses had been surrounded by the gardens about three thousand years ago, and so those gardens have been also called “paradise”. The construction of gardens has been also imitated by other countries this Persian term has been sent to the farm lands. The very term is nowadays used exactly or with some changes in Greek, French, Sami, and the other languages across the world [3].

IV. THE PLAN OF ANCIENT GARDEN IN IRAN

Maps and plans were considered worthy of attention in ancient Iran, so square and rectangle shapes were highlighted (Fig.2). We know that the Achaemenian kingdom gardens had exact rectangular designs with symmetric streets and trees [10].

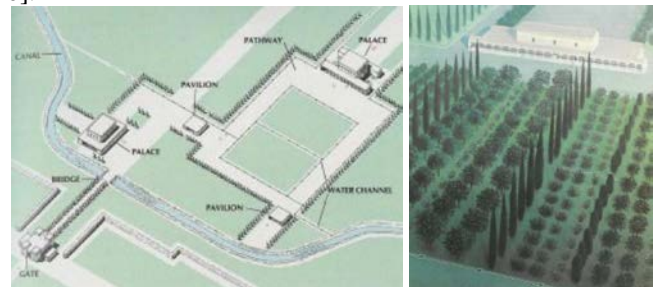


Fig.2: Achaemenian kingdom gardens

In the era of Sassanid kingdom, gardens were very wide and parks which were carefully designed and kept, had sometimes areas of about 25 square kilometers. One of them was Khosroparviz’ garden, its construction lasted for about seven years. One of the other gardens which still exist, is “Delgosha Garden” one of historical gardens in Shiraz, located near Sadi’s tomb, and its history of prosperity and flourishing has been attributed to the pre-Islamic and Sassanid period [8].

V. SYMBOLIC FEATURES OF THE GARDEN

The architectural concept of the garden reflects the sense and feeling of location or locality, because the garden space is considered as a respectable place which frames in itself the whole picture of the universe this concept which is the foundation of order and harmony and is sensed through number, geometry, color, and substance, and at the same time attracts the reason towards nature which is the inward aspect situated in the positive atmosphere [2].

Iran's architecture art has been enjoying a remarkable continuation in the course of history. This art expresses the manner of thinking, ideology, religious beliefs, and traditions of this land's people. A glance over the development and progress of Iran's architecture art shows that the architectures of this land, along with the simple purposes like solving dwelling problem and being safe against cold and heat, have also paid so much attention to such other issues as dividing the spaces based on different physical and mental requirements [8].

Gardens had special buildings which conform to the interiority principles of Iranian architecture. Garden is surrounded by a wall, which causes one to see something very different than the outside atmosphere at the time of entering the garden from the outside warm space. Besides limiting it causes more works to be done on it. Garden walls are generally high and made of raw sun-dried brick, clay, or brick.

Inside the gardens and along with the trees, flowers, and water-views, sometimes a palace has been made in the main side of the garden which is placed at the center or above it. This palace is placed almost in the middle and also on the above in Shiraz Delgosa garden as well as Golshan and Eram ones, respectively. The plots at the two sides of the garden streets were decorated and arranged in four-part forms.

Garden making activity has existed since long in our country and the carvings of ponds and woods found on the tiles in Shoosh as well as the other signs are altogether indicative of the importance of garden in livings of the people adapted to the desert drought as well as the role of sun in our ancient land. Iranian had since long learnt the best methods of garden making [3].

VI. CHAHAR-BAGH (FOUR GARDEN)

It can be said that Chahar-bagh design was considered as the most comprehensive and common design in terms of garden designing in Iran, and it was frequently used differently based on the environmental properties and the kind of garden application. In one of the common states the palace complex was commonly built in the garden and sometimes at its center, along with a pond or water – view established in front of the main front of the complex. Most of gardens in Iran are square formed. Square is one of the complete and specially important and holy figures in the culture of architectural and urban designing in Iran. Imitating Chahar-bagh design as one of the most important patterns of Iranian garden designing, the garden, space has been made too.

Chahar-bagh design was considered in two ways in Iranian gardens. In one way, the large, important, and designed street, or side way which was to be prepared through planting different shaded trees and flowers, whether decorative or fruitful for passing the pedestrians and spending the leisure times, was often made possible by Chahar-bagh design. In this case, the sideway or lane width was usually divided into four parts. Lots of these streets were called "Chahar-bagh" ago. Isfahan's Chahar-bagh is one of the remnant instances of these streets kinds.

In the second way which was considered as the best and most complete Chahar-bagh design, a square or rectangle shaped area was divided into four square (or rectangle) shaped parts by four lanes or streets (or two prolonged and crossed lanes in the form of a cross (+)). According to the architecture's desire and the manner of dividing the garden space, each one, of the four obtained square-shaped areas were in turn divided again into four sub-parts, and this procedure continues as far as possible.

In the cases where the designs of eight paradises or four lines were used to design and build the palace complex and a porch was made in the middle of each of the four fronts of the complex which enjoyed the same conditions in terms of their physical and applicative standing and importance, a pond was built like the complex of Isfahan eight paradises in front of each one of the four porches [11].

Chahar-bagh design was not always implemented in square shaped gardens or even with a kind of completely ordered and symmetric design, but also some chess-board-like designs whose organizing principles had been derived from chahar-bagh design were generally applied in rectangular or even unsymmetrical shaped lands. This property, that is the application of Chahar-bagh design or a kind of chess-network organizing, can be mentioned as one of the basic features of designing Iranian gardens.

Across in Chahar-bagh design divides the square shaped setting of the garden into four sub-squares, and some streams can also divide each of these squares into four other smaller ones [1]. In addition, there is a pond at the junction point of this cross shaped figure as can be seen in fig3.



Fig3. The example of square division in Isfahan

VI. Symbolic features of Iranian Chahar-bagh

As it was said before, the public and general designs of Iranian gardens is of Chahar-bagh; choosing this design is not irrelevant to its symbolic concepts. Iran's art is basically meaning-oriented, but it chooses a beautiful and appropriate face for each meaning. Therefore, choosing a crossed plan for Chahar-bagh should be deemed as the most beautiful and suitable one because in one hand it follows the plans of fire-temples and temples which are related to the holy art, and on the other hand it is scientifically considered the most suitable plan, because the palace or main complex is placed at the center and the junction point of the four arms, and streams and rivulets run along with the arms.

A. Number “four” and figuring square

As it has been found out, figures and geometrical numbers don't have just quantitative senses and faces, but they have also a qualitative and symbolic face which is not only real, but also like the quantitative face forms part of their realities. Each number and figure, seen in its own symbolic concept, is a reflection of unity and quality which is hidden in the main inner nature of that unity, higher than any separation and quality, and at the same time includes all of them in a correct way [2].

Throughout the traditional architecture, geometrical figures are some things beyond the mere figurative facilities, while they have always had a puzzling performance. However, they have another performance which has a higher significance beyond their material performance, which is always the reminder of spiritual principles to the mankind through their symbolic face; the principles of a building, garden, or a traditional sightseeing reflects at its own reality and matches the mankind's inner states at the same time. In traditional architecture like all of the other traditional arts, nothing is separated from the meaning, and the meaning by itself is nothing but the spirituality [2].

In Iran's culture, everything has a variety of meanings within itself. Among them, figures and numbers can be cited to name just a few; figure “square” and number “four” belong to them too. Number “four” is of the holy ones. It shows four cardinal points (North, south, East, and west), mankind's special body features (front, back, left, and right), four basic existence elements (water, wind, soil, and fire), the year seasons (spring, summer, autumn, and winter), as well as the number of square sides and angles.

Square is also one of certain geometrical figures, which has four equal sides and angles. These features bring forth by themselves many geometrical features as being inscribed on and in the circle, etc. Square is also a figure having symmetry, balance, and equilibrium. This number and figure has been very much in consideration in designing a lot of holy places. Dividing the gardens into four parts by cross like streams, which has been done in most Iranian gardens, has progressed to the point where it has turned into a spiritual quality and common thing. According to one of the very old thoughts in Asia, the existence universe is in imagination divided into four areas, which four large rivers usually separate them from each other.

B. Constructional features of Chahar-bagh in Iran:

Common features of Iranian gardens are as follows:

- 1) Establishing the garden in a sloping land: Most of the Iranian gardens are made in sloping lands, in such a way that either a staircase is built in its middle for the water crossing through makes a pleasurable sound or if it is a little sloping as shown in Fig4., the irrigating system of Chaharbagh is used in its making where water comes again from the upper level to the lower one and gardener irrigates respectively each one of the four pieces by building temporary dams. This method of garden irrigation and specially the style of Chaharbagh which is more intended in this paper is the very public and standard design “the Iranians

have applied it since the time of Cirus to fore” [3]. Since most of Iran's land is situated in warm and dry areas and also there is a little rainfall, irrigating the trees is done by brooks and regular streams which this prevents water to be wasted. Because of this, most of Iranian gardens are of the same shape including a square in which some streams in the form of crosses have been put through them the activity of garden irrigation is done by making branches there in. As mentioned by Arianpoor, Bacon believes that garden should be four sided; fountain gives much beauty and attraction to the gardens [3]. And this shows that the best plan for making garden is the very quadrangle the Iranians have applied in all of their gardens.



Fig4. The view of Kerman king's garden

- 2) Enclosing the garden yard by fencing walls: Iranian garden is always surrounded by a wall usually made of sun dried brick or tile. Depending on the amount of its builder's wealth, the walls can be simple or carved and decorated. This wall makes a private place for relaxation and also serves as a safety protection. Wall in itself gives out a mystery and symbol of the third dimension of the space, a lofty open space in which the longitudinal direction matches the existence pivot. Like the mankind himself, wall is considered as an alive spacial thing. This arched alive thing should represent the surface features, i.e. the stylish and total movement ones, which are in contrast with the quantitative necessity of transferring the gravitational forces to the earth. Accordingly, the complementary favor related to a kind of facial longitudinal ascension to obtain the gravity or a descending gravitational force, becomes a principle to wall designing and also makes the longitudinal ascension of the soul towards the immortal great soul possible [2]. At the level of place, space is “the hidden repository” in an enclosed form, as in mankind the essence which includes the soul is enclosed in the body. Walls are the necessities of this holy place to be characterized and separated; it is the place in which soul is felt and its spiritual demand is fulfilled. There should make a pure and

relax atmosphere , as well as depleted from any tensions and malice , between the interaction of figure and the surface such a stable figure and be found in the cube which is a complete shape whose symbolic essence is made up of stability , humanity , and terrestrial paradise . Embedding a traditional pond in this calm space brings forth a center like a positive direction for the creativity imagination. As a result, the terrestrial creation of the mankind is joined to the heavenly causes and the paradise reconstruction is ended [2].

- 3) A close relationship between the nature of flower and tree planting: Planting flowers in Iranian gardens has its own certain procedure and they are more grown naturally near each other, except the red flower or a rose which requires more sunlight. This method can be seen in Iranian paintings. At the contemporary time, sometimes divisions for planting flowers are taken into consideration which may originally be similar to Iran's tradition geometric designs. Some gardens of Zandieh period with flower beds made in the middle of their main streets as well as many other contemporary gardens having such rose- gardens, are influenced by European flower planting methods [3]. Fred Richards, English tourist, quoted in his diary the idea of Francis Bacon, the well known philosopher and statesman of England's seventh century, about the gardens as follows: "Francis Bacon had fixed ideas about the garden which some of them indicate that he had traveled to Iran, while he had only traveled to Paris. About three hundred years ago, he wrote some things about gardening. In the garden, human being and nature were completely in the same route. Here, the wild and barren land reached its determined accomplishment and it was no more hostile and indifferent to the mankind's needs, but it provided relaxations, convenience, and happiness." The plants are placed in gardens in the way that they can adopt with their context and needs. Selection of the trees is referred to provide medicine, food or any product that can be useful for them, not only esthetic aspects of the people are concerned [4].
- 4) Existing a pond or pool to provide water and beauty of water-view and pool: (There was certainly a big pond in the middle of each garden which had also at least a fountain in the middle). The procedure of conducting water to the whole garden follows a certain map. If you visualize the map of a garden from the above where the main sloping stream begins, it runs in the middle of the complex into a large pond with water-view or at least a fountain, so that the garden residents and rest beside on summer's warm days. Afterwards, a small fountain is made and water follows its path through ponders whose floors have been more covered with white stones (sometimes carved to make the attractive noise of water movement possible), or glazed turquoise tiles. In

Iran, designing the gardens was often done in such a way the natural slope of the land was used to run water in the streams and rivulets. Lots of these gardens were designed and made with a deliberate program, and so their lands were often in an ordered and geometric shape. "Fine garden" in Kashan and "Eram garden" in Shiraz and be considered as the kinds of gardens located in the flat areas having the regular geometrical figures. In addition to the issue of water transferring from faraway places and digging out the aqueducts, water, conveying to the whole garden is by itself another issue the garden makers have considered and has even had a main role in designing the garden. Water has been placed in a main canal and through the ordered and regular brooks and streams, like a vessel carrying the blood to the body, has been reached to the whole garden. Whether at the large or small scale, in other words whether in the nature universe (world) or the character universe (mankind), the nature is intermingled with the rhythm. Escaping the prison of time is just possible through rhythm. Nature is a continuous repetition and impresses the mankind to imitate it in its performance manner and as a continuous and open ended movement system [2]. Making divisions in the designs of the gardens can be done based on passing water, dividing flower-beds, and brought primary and secondary pivots. The main pivot is the same in Golshan and Eram gardens, and the secondary pivots are either parallel or orthogonal to it. In Delgosha garden, the main pivot is also placed at its center and there are some pivots parallel to it too. In Kashan Fin garden, the garden design has a map similar to the tower and its main pivot is placed in front of the arrival door. Water is divided into three branches from the above of the garden, in such a way that one run in the main pivot and the two others run orthogonally on the main pivot. There are two secondary pivots as well as another one at the left side of the main pivot and also at its right side, respectively these four parallel branches are joined together by another orthogonal one and so the garden has found a chess-like texture. Along with designing the water transferring system, it has also been attempted to beautify water visually and audibly. Kerman king's garden, Kashan Fin garden (fountain), as well as making fountains like Isfahan Hasht Behesht (in which water has been running from the roof of the building on the tiles of the ground floor) can be mentioned to name just a few. There is a fountain in the middle of each pond which includes in it the meanings of beauty. Fountain is the generator of water circles with increasing and exciting radiuses, as well as the initiator a conscious expansion and contraction circularity. Similar cases about this are abundant, each of which is representative of and intelligent development from the issue of mankind's ultimate reconnecting to the origin through its confrontation with the nature [2].

- 5) Dividing the garden area into almost always four parts.
- 6) Using the straight lines in designing the garden
- 7) Existing a building at the center or the highest part of the garden space
- 8) Using a main stream
- 9) Having a close relationship with the nature and not existing any distances between the garden and building.
- 10) Using many shady trees as well as narrow lanes.

VII. CONCLUSION

Iranian Garden is a caption to the most internal levels of thinking ideologies and Iranian imagination, art and mind, are expression of the denotation of life, extremity of human, eternity, paradise and life and earthen concepts of spiritual world from Iranians' vision. Historical cities of Iran has always welcomed gardens inside of themselves in different shapes and types and the existence way of garden in cities has different dimensions and depending on weather condition, environment and culture they have got different artistry forms.

Since the extent of Iranian Garden existence is not limited to solitary gardens and several dimensions of its presence can be found in private and public life of Iranians and since the size of Iranian Garden shows up from a very little yard of houses to bigger sizes of cities such a Isfahan and Shiraz. The place of garden in Iranian cities is of special importance.

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An Enhanced Method of Segmenting the Retail Market Based on Store Images Using Artificial Neural Networks

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Abstract— This paper focuses on the segmentation of the shoppers based on their behavioral pattern towards the retail store images. The shoppers have been segmented by the use of ‘Back Propagation’ in ‘Artificial Neural Networks’ based on the various store attributes. The resulted segments are Pre-Decided, Variety-Seekers, Economy, and Familiar. Each of these segments place importance on the various store image attributes.

Keywords— Artificial Neural Networks, Market Segmentation, Shoppers Behavior, Store Images,

I. INTRODUCTION

This paper is on the same lines of the work [1]. and focuses on the segmentation of the shoppers based on their behavioral pattern towards the retail store images.

Indian market has high complexities in terms of a wide geographic spread and distinct consumer preferences varying by each region necessitating a need for localization even within the geographic zones. India has highest number of outlets per person (7 per thousand), Indian retail space per capita at 2 sq. ft. (0.19 m²)/ person is lowest in the world, while Indian retail density of 6 percent is highest in the world.1.8 million Households in India have an annual income of over ₹45 lakh.

With the influence of visual media, urban consumer trends have spread across the rural areas also. The shopping spree of the young Indians for clothing, favourable income demographics, increasing population of young people joining the workforce with considerably higher disposable income, has unleashed new possibilities for retail growth even in the rural areas. Thus, 85% of the retail boom which was focused only in the metros has started to infiltrate towards smaller cities and towns. Tier-II cities are already receiving focused attention of retailers and the other smaller towns

and even villages are likely to join in the coming years. This is a positive trend, and the contribution of these tier-II cities to total organized retailing sales is expected to grow to 20-25%.

Segmentation, an essential tool for effective marketing in the organized retail sector, involves identifying groups of target customers who are similar in buying habits, demographic characteristics or psychographics. In this paper we focus on segmenting the market through a technique called ‘Back Propagation’ in ‘Artificial Neural Networks’. We use MATLAB to implement this algorithm. A questionnaire was circulated across various stores in Trichy and the response was obtained through a 7-point Likert type Scale. Using this data, we segment the respondents into 4 categories viz. Pre-decided, Variety Seekers, Economy and Familiar.

II. REVIEW OF LITERATURE

Store Images, Segmentation and Various Approaches: Store image may be defined as the overall attitude towards the store based upon the perceptions of relevant store attributes [2], [3], [4], [5] Image considerations are important aspects in the development of an integrated marketing strategy for individual stores, store chains and shopping centers. Different consumers might place different weightage on the various store image attributes. Store may pursue different image attributes as their marketing strategy, and ideally, the important attribute emphasized by the store should be in accordance with those of the target audience. Store segmentation image provides guidelines for a retail firm’s marketing strategy and can increase profitability [6], [7], [8]. The importance of segmenting retail markets on the basis of store image attributes and the development of an image that conforms to the needs of the retailer’s target group of consumers have been repeatedly stressed in the literature [3], [8], [9]. Several approaches have been used in store image segmentation research. One stream of research has examined the important differences in store image attribute for a priori defined segmentation variables [2], [9], [10], [11]. A further approach is to cluster individuals on consumer characteristics and subsequently to estimate the importance of the various image attributes in each segment [12]. Further, there are studies that have clustered the subject on the self-stated importance of store image attributes [13], [14], [15], [16]. [16]

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