International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Impact of Building Regulations on Architectural Spaces -A Case Study of Apartments in Delhi

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Abstract:
Housing is a vital element of the urban fabric; it is the most basic infrastructure of any city. The Design of housing components is governed by regulations and policy frameworks which are prescribed keeping in view the building structure and overall space needs of the inhabitants. With the change in family structure and daily routine of people, there is a change in the requirement for space, however, building regulations have not yet responded to the new way of living and are considered outdated. With the changing role of government from provider to facilitator, most of the housing complexes in the city are provided by private players. The current provisions of housing and habitable spaces have loopholes that are being exploited towards maximising saleable space.As a consequenceusable psychological spaces are neglected. Byelaws were developed to set a minimum architecture standard and ensure the provision of such spaces. However, with the scarcity of spaces in the urban scenario, these byelaws are creating restrictions on the creativity & freedom of architects. Keeping these concerns in mind, this study was conducted to examine the contributions of byelaws to ensure basic usable spaces in apartment designs. Since regulations are territorial in nature, therefore, the study is based in Delhi adopting a case study approach prescribed by Robert Yin. An analysis of the designs is done to discover shortcomings andthe study attempts to provide recommendations towards effective building regulations.

Keywords: Housing, Byelaws, Space efficiency

Introduction

Housing is a very basic need that a human beingrequires to survive. It protects us from external and environmental phenomena allowing us to stay healthy. It also provides space for everyday activities thus ensuring inhabitants flourish. With the advancement in technology and aspirations for a better quality of life, the significance of housing has also evolved. Today's human needs housing to fulfil their biological, socio-cultural, security, and privacy requirements in addition to aesthetic desires. To achieve these expectations the byelaws have been set in place to provide minimum standards. The building byelaws are defined as the standards & specifications that are deliberated to mandate minimum insurance to the workers, the well-being and safety of the users and to provide a sense of security essentially to the masses(Model Building Bye-Laws, 2016; Pisu&Chiri, 2019). These regulations set out the indispensable

requirements to be provided in the design as well as the structure of buildings. New buildings, extensions of old buildings, or repurposing of old buildings are required to abide by these byelaws.

Regulations in construction, requirements, and planning principles have existed for a long time. The oldest civilizations showed awareness of some principles of planning. As human needs evolved even the principles evolved. The emergence of building byelaws is a phenomenon that has lasted through our human civilization and its progress. In ancient Indian architecture, the building byelaws were entrusted in the Iviansara. It specified locations for educational buildings and dharmshalas, rank-wise division of the number of allowed stories, and heights of buildings were defined. Silpasastra dealt with the responsibilities of master builders and technical matters pertaining to architecture. Till this point in time the three critical features of architecture, defined by these regulations regarded to be simply the measurements, styles and shapes. However, the accolade for the specific codification of building byelaws goes to King Hammurabi of the city of Babylon which thrived in the Euphrates Valley. In 2100 B.C., he collated the law to improve the land and the condition of architecture that was owned by the common people. This code stated the passable standards for various fields like workmanship, structure, construction etc. and the penal measures in case of failure of the buildings. Later, in the Greek civilization, the building byelaws became more precise and detailed in their structure. From the period of the Renaissance up until the Eighteenth century, city planning gained more importance. However, this marked the beginning of the Industrial Revolution and the priorities of the people shifted ecological and social concerns, all took a backseat. Efforts were made to improve the health and sanitary condition of the city but these were all ignored blinded by the advancements of the machine age(Murphy, 1979; Rao, 2012). The Public Health Act of 1875 brought about the required changes in the conditions of the cities of England. The laws at these times started to detail the sizes of rooms, road widths, setbacks etc. What followed was the Tenement House Act of 1901 which laid down and regulated the densities and plot coverage, following this gradually byelaws came into place(Murphy, 1979; Rao, 2012). In India, the National Building Code of India was formed in 1970 and later reviewed in 1983. Two revisions were issued in 1987. Later, when the Bhuj earthquake hit Gujarat in 2001, there was an emphasis on the revision of codes and new regulations came up in 2004 followed by a revision in 2016. However, the main focus of the regulations remained onthe structural safety of buildings(Model Building Bye-Laws, 2016; PHD Chamber & ZEUS, 2016).

Recent studies have identified shortcomings in the byelaws from the perspective of architectural spaces and their efficiency during everyday use. A review of building byelaws by the Diversity and equal opportunity centre in 2016 (PHD Chamber & ZEUS, 2016)highlights that it does not cover the barrier-free environment guidelines in context to other provisions of the law and it is based on the outdated NBC of 2005. Later new codes were published and MBBL were also revised. Later in 2016, PHD Chamber of Commerce noted that the primary concern addressed in MBBL were ease of doing business and an eco-friendly approach to construction. The need for architectural space and space efficiency never surfaced in the discussion process. There was mention of the Swatch Bharat Mission, Rain Water Harvesting, etc. Some new provisions were made with Additional F.A.R., Floating F.A.R., etc. (Hilber& Robert-Nicoud, 2013; Nallathiga& Manager, 2007), notice that local diversity and the need of the inhabitants are ignored and uniform building codes were framed. This system has failed in many places by trying one-size-fits-all approaches. Additionally, there are provisions for regularization of any violation of F.A.R., Heigh etc such provisions are exploited by builders for their commercial gains. It has been emphasized by UNESCAP in 1997 that developing countries should develop building

regulations in accordance socioeconomic needs of the majority of the population. A 2006 report on unauthorized construction and Misuse of premises in Delhi highlights that there are a number of F.A.R. and ground coverage violations in regularized residential colonies in Delhi, however, such violations are need-based to accommodate growing families. (Nallathiga& Manager, 2007) emphasized that with the changing role of government from provider to facilitator has shifted its policy from public provisions to market provisions however, the building regulations continue to remain inadequate in the new market system.The further sections of the article comprise Methodology, the case study of selected apartment complexes results, discussion and conclusions

Methodology

The problem of housing and planning is a 'wicked' one. Since it has a multitude of constraints like location, income, and services such as power, water, transportation etc,Samuel Aroni in 1975 argued that it is difficult to find a solution to the problem through science because of the nature of these problems. However, there are a lot of characteristics that can be controlled or are being caused by the byelaws. These issues can be categorized into a few main categories:

Inadequate provisions: Often minimum or maximum requirements of certain facilities or areas are given.

Outdated provisions: Due to a lack of flexibility in the byelaws they tend to become irrelevant faster as the technology is growing quicker and quicker

Lack of provisions: The absence of mention of detailed and optimum requirements of objectives like lighting, ventilation, and cross ventilation.

Since byelaws and regulations should be territorial and shall be formulated to respond to the socioeconomic condition of the majority of the populations, therefore, issues related to byelaws shall be best understood with a case study approach suggested by Robert Yin(Yin, 2002). The case study design and research method as prescribed by Robert Yin is the most adopted research method by studies in exploratory social science research.A total of 30 (15 from each type) apartments were surveyed and questionnaired based interviews were conducted with inhabitants to understand the space efficiency. Inferences were drawn on the bases of the inputs provided by the users. Each apart user comprises 5-6 family members having a couple around 30-40 years of age, children 5-10 years and grandparents 60-70 years. Interviews were conducted collectively with all the family members.

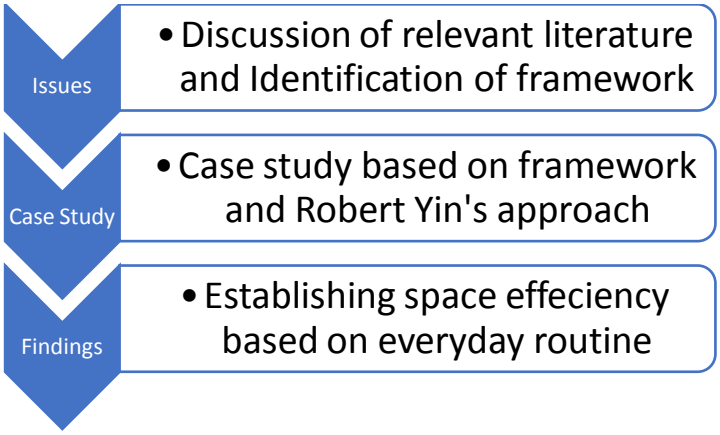


Figure-1: Methodology

Data and results:

Case study:Thebuildingtypesareclassified

Table 1

Building type	*Name*	*Area*	*Configuration*
Type-1	*Gokul Apartments*	*1650 sqft*	*3BHK*
Type-2	*Parijat Apartments*	*1200 sqft*	*3BHK*

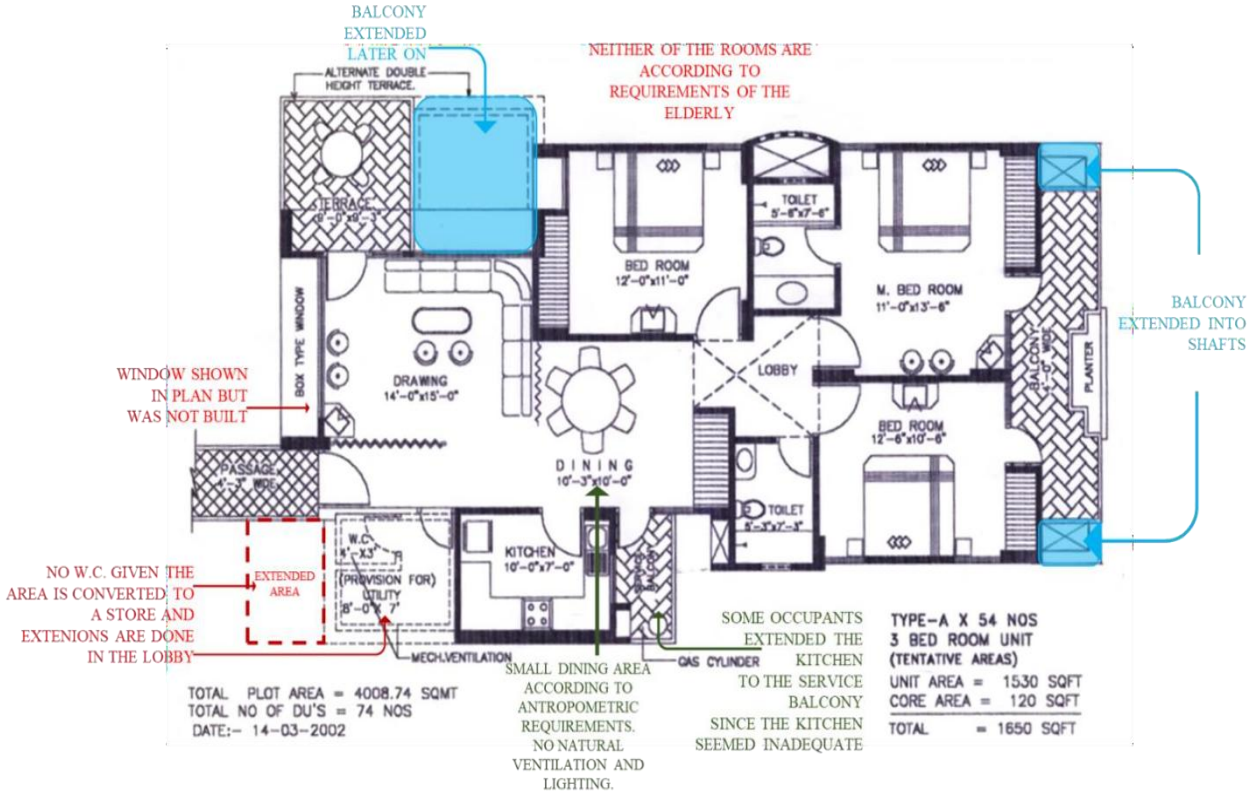


Figure 1 Layout Plan (source: Author)

Gokul Apartments

Parijat Apartments:

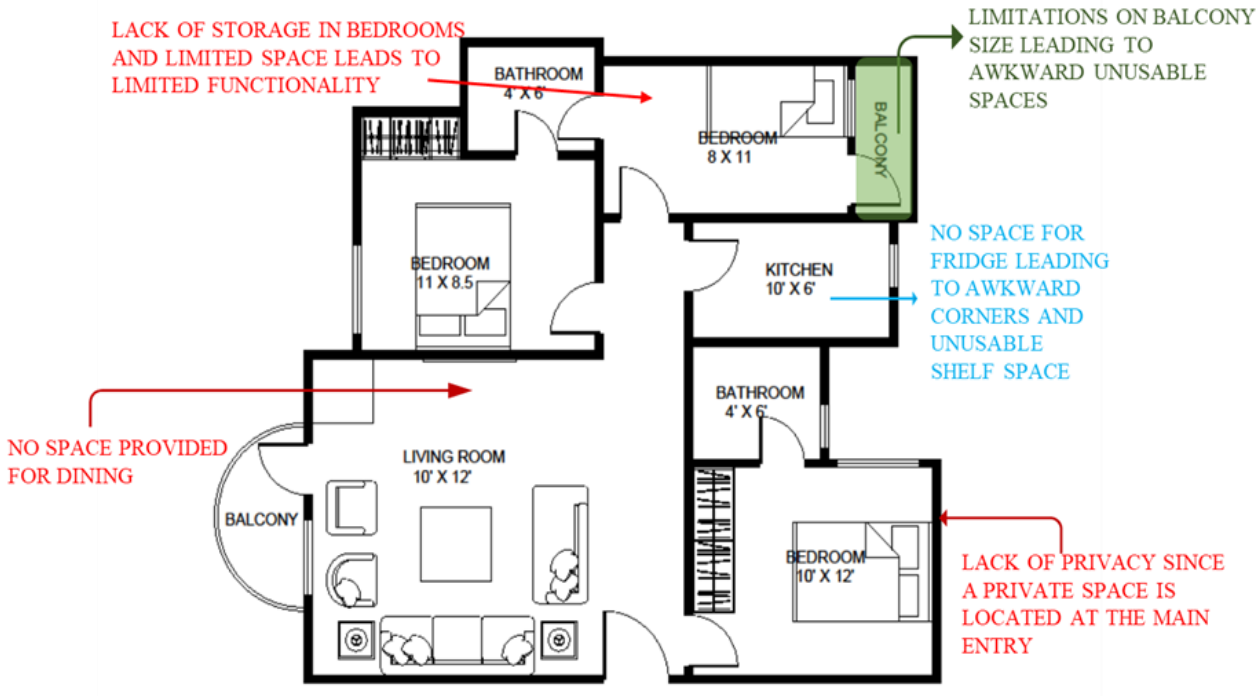
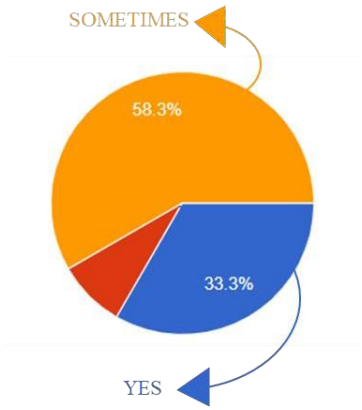


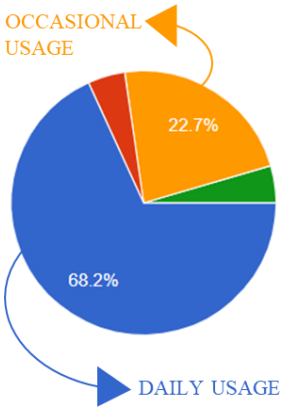
Figure 2 Layout Plan (source: Authors)

Occupancy Survey

Dining Activity: For building type 1, 90% of occupants do utilize the area, out of which 68.2% use itregularlyand 22.7%use it sometimes. The majorityfind it alrightto usewhilesome peopledo think that the space is small. The area is mostly used for dining activities as well as sometimesforcasualworkandinteractions.Forbuildingtype2,nodiningarea hasbeengivenand91.5%of thepeoplefeel theneed forit.

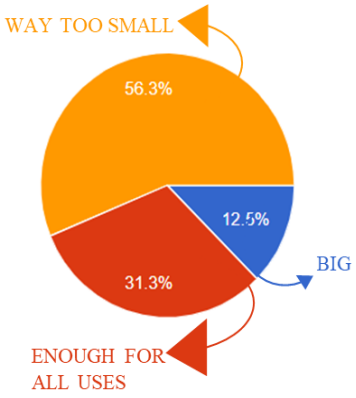


TYPE1

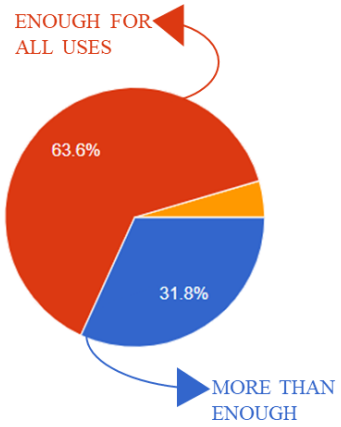


Type-2

Balcony Usage: Noneof theoccupants ofbuildingtype-1 feel the need to enclose thebalconysinceit isspaciousand is used daily foractivitieslikelounging, eveningteaetc.



TYPE1



Type-2

However, 94% of the people still feel the need for a utility balcony since most of the dryingactivityisdone on thebalconies.Further washingofclothesalso hastobe accommodatedin the larger balconies. In apartment type 2, most people feel that the balcony is toosmall. None of the occupants seem to use the balcony other than for activities such asdrying clothes and food, still, 75% of people feel the need for a utility balcony. Someoccupants have already enclosed it in their bedrooms as they felt that the bedrooms wereverysmall

Toilet Facilities: Out of the occupants surveyed in building type 1, 45% feel that the bathrooms are small, and 40% feel that they are just all right. However, they do feel the need for an additionalbathroom. For building type 2, none of the occupants find the bathrooms large. 53% findthemsmall and 47%find them decent in size.

Height of the ceiling: Over 95% of the occupants of type 1 find the height of the house sufficient. The rest find ithigh.Noneoftheoccupants inbuilding1findtheheighttobelowor cramped.Inbuildingtype2, 68.8% of peoplefind the height oftheceilingcomfortable, the rest find it somewhat low.

Open space: Openspaceinbuildingtype1isgivenhasasmallgardenareaonthefirstfloor.Mostpeopleseem to be satisfied with it in the type 1 housing however, some people do feel that it needstobedevelopedmoreandadedicatedareaneedstobeprovided.Buildingtype2hasmultiplesmall parks as well as a large park so most of the occupants find it ideal for manyactivities.

Discussions

Anthropometric studies are a good starting point to come to minimum requirements of spaces in a house since they are stipulated based on measurements and proportions of the human body, which can be generalized as well as quantified. The minimum dimensions provided by byelaws, in a lot of the scenarios, don't meet the requirements of these studies(Murphy, 1979; PHD Chamber & ZEUS, 2016; Pisu&Chiri, 2019). These studies have been considered while analyzing the layouts. Further, human needs are constantly evolving over the course of their lifetime as they cross different stages or events of their lifetime: founding stages, expanding stages, and contracting stages. All families are in different stages of their life, and this has different and ever-changing requirements(Patil & Ambre, 2021; Pisu&Chiri, 2019). The variation in requirements is also caused by the varying income level of the

occupants. Thus, with varying requirements, the areas of the rooms change and are difficult to be generalized. This either calls for exhaustive detailing out of the byelaws to these requirements or leaves such decisions up to the architects. From a cultural point of view, Indians use singular spaces for multiple activities, this also helps increase the efficiency of areas which is important because of the space shortage that prevails in Delhi(PHD Chamber & ZEUS, 2016; Sarkar et al., 2020). Dedicating rooms to singular activities reduces their interchangeability as well as causes restrictions in elements like layouts. Rather than dividing the house by individual functions, the functions can be subcategorized such as the family grooving area and kids' activity area.

These can further be designed with the interchangeability of functions in mind. The thought of the provision of a memorable home should be kept in mind rather than only catering to the provision of divided spaces. Besides cultural, even social and psychological requirements of occupants shall be kept in mind. It is argued(Ilgın, 2021; Patil & Ambre, 2021; Pisu&Chiri, 2019) that Housing should not be considered a problem of space that is to be solved by dividing the space while maintaining the lowest costs and swiftest construction. It is a socio-ecological problem that is to be solved while maintaining the quality of life.

Dining Areas: No specific guidelines for dining areas are stipulated leading them to be a neglected area even though 90% of occupants do utilize the area or feel the need for it. The dining area is a space for family activities and interactions. If apartments do have this area, it is mostly small according to anthropometric requirements or accommodated into the living or kitchen areas. Neither of which are allowing their minimum requirements sufficient for accommodating a dining area. Thus, there should be specific mention of such multi-use spaces in the byelaws. Dining areas of small dimensions reduce the usability of the space, many times dining tables are not usable from all sides because it needs to be pushed against a wall to maintain circulation space. These restrictions reduce the flexibility of space and reduce the quality of the environment. Dining areas are family areas and not an area to just feed. For such reasons, family rooms are more apt to the Indian context. Such rooms enable informal activity that is typically restricted in the living rooms.

Study Room: Like the servant accommodations, there is no guideline for study areas, however, the umbrella category of habitable rooms is too big for the provision of a small private space like a study. This again typically leads to manipulations or provisions of very small bedrooms of minimum standards that are too small for efficient bedroom usage but too large to only be used as a study. Provisions of guidelines for such areas would enable the establishment of a small private area, at a fraction of the cost. An important element of housing is also the establishment of space hierarchy and defining the line between public and private areas. The studies are also often situated along with social areas because they are provided by manipulating non-habitable rooms conforming to the byelaws. This reduces the purpose of the provision of a private area as well as the quality of the facilities being provided. Keeping this in mind the spatial organization of any flat must also follow the division of spaces into socio-petal and socio-fugal spaces (Osmond, 1957).

Neither of the rooms is according to the requirements of the elderly even though over 60% of people stay with their parents.

Light and ventilation: The minimum aggregate area of openings of habitable rooms and kitchens excluding doors shall not be less than 1/10 of the floor area. No portion of a room shall be assumed to be lighted if it is more than 7.50 m from the opening assumed for lighting that portion. Ventilation can be done through ventilation shafts, the size of which is proportional to the height of the building.

With the increasing sensitivity towards the environment, energy consumption should be maintained to the minimum possible. The lack of good lighting and ventilation can increase the energy load of the housing units. Thus, keeping in mind the elements of daylight factor, glare, and room layout to ensure efficient placement of windows etc, is necessary. Besides the light flow, airflow into the rooms is also important to keep the space comfortable and maintain optimum temperatures. This however should be prioritized to be achieved without mechanical options. None of the present byelaws holds the buildings to such standards. Natural elements like wind direction, and wind velocity are not incorporated. Thus, it is easier to fix apartments with mechanical ventilation systems (fans, ACs), which in turn increases the cost of living in such units.

Conclusions:

This article aimed to understand the shortcomings of building byelaws using the case study of two different apartment complexes in Delhi. The framework for the study was identified from relevant literature. 3BHK apartments in the newly developed area of Delhi were selected for the study. A questionnaire-based interviews were conducted to generate results. It was found that building byelaws help define the urban fabric of which housing is a very integral part. Thus, the users' needs should be at the forefront while framing these laws. The social, physical, and psychological elements should be encompassed in them. As an attempt to achieve flexibility of spaces and provision of spaces that are very specific to individual and unique needs, the byelaws should also be made more flexible and open-ended.However, these might not be adequate in terms of the personal standards of the users. This leads to illegal activities like expansions, unauthorized rooms, redefining the usage of spaces etc.This also hinders the capability of the architect to come up with good designs as the developers pressure them to follow the minimum standards.Since, byelaws were set in place to set standards for architecture and make sure that they are being implemented, not regulating these practices of energy savings, harvesting natural energy, climatic appropriateness, the hierarchy of spaces and the relationship in between them gives the developers free rein to do as they please.

A more coherent approach is needed to be adopted while defining the byelaws, one that suits the Indian context more appropriately. Newer concepts of defining spaces by non-physical elements like privacy or usage can be incorporated. The dwelling unit's construction cost could also be used to categorize requirements. As an attempt to sell maximum units and maintain low costs, the minimum requirements are adhered to. This prevents the availability of more area-liberal flats for those who can afford them. This reduces the efficiency of a unit for such residents. The byelaws should also be unassuming and concise, for example. Tabular representations of the data would make the interpretation much easier. Many spaces like dining areas, study areas, utility spaces, servant accommodations etc, shall be defined to prevent the manipulation of laws to ensure such provisions. Not all areas can be defined under an umbrella category of habitable rooms.

Provisions of lighting and ventilation should be much more defined, and efforts should be made to incentivize natural lighting and ventilation. A much more methodological approach is necessary to maintain such minimum standards of living.As the times progress faster and faster, the byelaws should too. The requirements and needs of the occupants are changing with time. The requirements of people ten years ago are very different to those of today. Studies should be organized regarding the byelaws at regular intervals which would ensure deep-seated changes.

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