ENVIRONMENT

JOURNAL OF THE FACULTY OF ARCHITECTURE AND PLANNING

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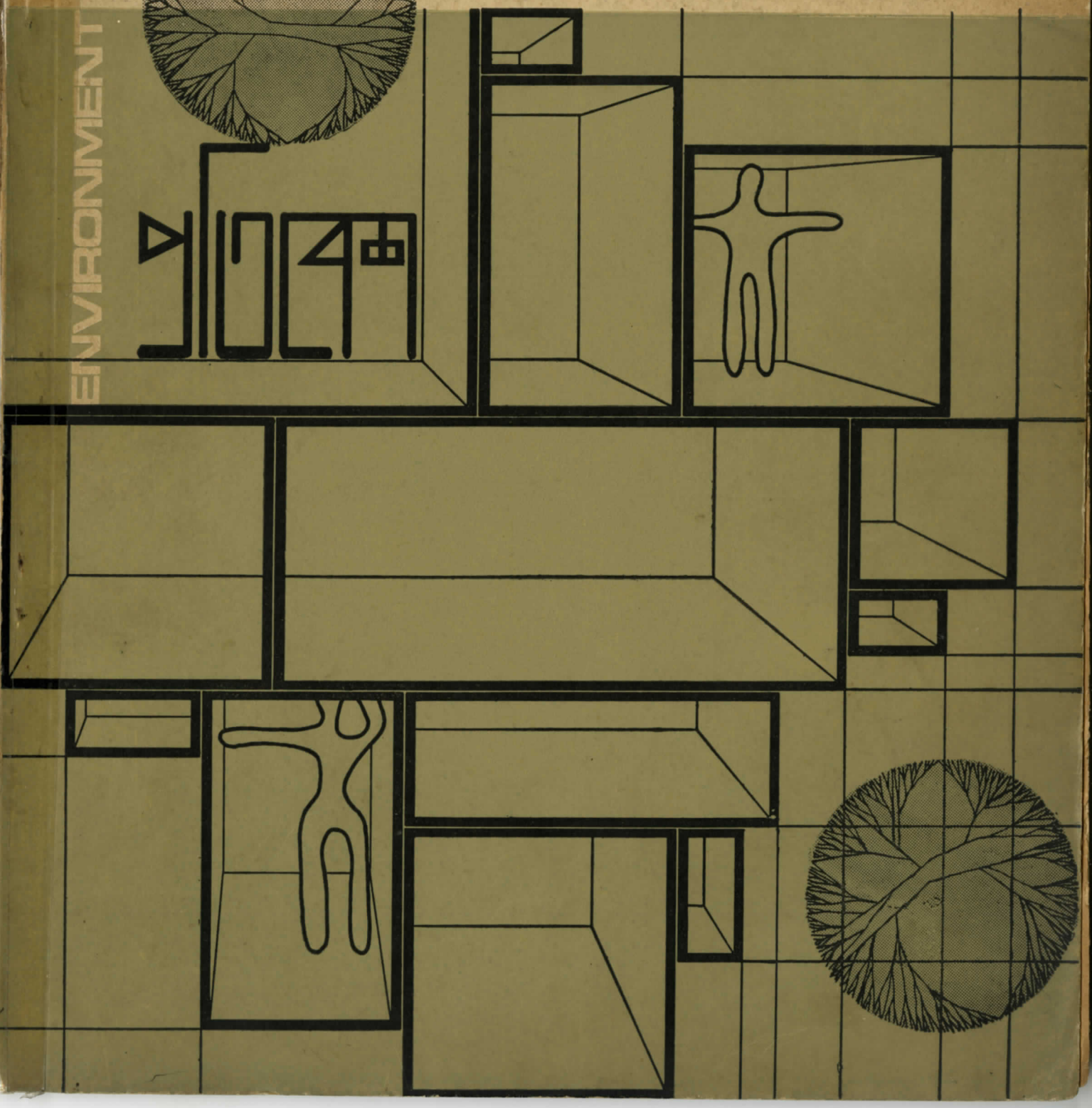

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FOREWARD :

It has been more than a decade since the Faculty of Architecture and Planning came into existence in the Bangladesh University of Engineering and Technology, Dacca. There had been a long felt need for a Journal of the Faculty for communication of information on the current thoughts, ideas and research activities of the Faculty, and for stimulating discussion and exchange of ideas. It is hoped that the 'ENVIRONMENT' will go a long way in fulfilling these objectives.

At this moment there is no fixed time table for the appearance of the next issue of the 'EINVIRONMENT' and the subsequent issues. It is hoped that the journal can be produced atleast twoice a year.

We wish to express our thanks to all those who have contributed to this issue of the 'ENVIRONMENT'. We hope that this issue will generate enough interest and interactions in the relevant quarters for the benefit of all concerned.

The Editors.

Contents

RESIDENTIAL DENSITY : A PLANNING DILEMMA

A.S.M. Mahbub-Un-Nabi*

The density standards for residential areas provide a very useful guide for various planning calculations, specially in housing. The importance of density standard as a planning consideration is reflected in the fact that the density standards are valuable planning tools for preliminary design schemes and for reflecting the important characteristics of site planning. Density measurements provide a uniform and objective method of estimating population loads and required areas of land for general openness, amenity and livability. They make it convenient to calculate the various possible combinations of dwelling types desired to make up a neighbourhood. Proper standards, carried out through competent design, have major value as controls in zoning ordinances, subdivision regulations and the like. The adequacy of city-wide utility systems, transits, education, recreation and other municipal services is affected by the density pattern, which, if unplanned, may cause serious spot over-loading.

It is very difficult to prescribe the right density for a residential area. The acceptable conditions can be created over a wide range of densities. The appropriate density for a particular case is determined by various factors like the location, family-type, consumers' preferences etc. Low density American suburbs, with house on generous lots, contain only 6 persons per acre. Typical American suburb has average densities of about 25 people to the acre. Chandigarh in India was planned for 56 people per acre. Ping Yuen, in San Fransisco's China town, has 365 persons per acre. Recent development in high-density residential design would

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make these densities possible. The proposed town of Hook, England, a landmark in design, would have had 100 people to the acre in the centre, a bordering area with 70 persons to the acre, and another area with 40 persons to the acre. The 1943 Forshaw Abercrombie report proposes for the country of London densities of 75, and 100 persons per acre maximum in parts immediately adjacent to the county boundary, followed by an extensive area, 'the suburban ring,' having a maximum of 50 persons per acre. For new sites, an overall net density of 30 was adopted combined with a maximum net density of 50 persons per acre.[1] The Federal Housing Administration (FHA) of U.S.A. has undertaken extensive studies on density and has emphasised the importance of considering basic amenity in relation to density. FHA standards operate within a range of from 12 persons per acre in small single family housing to 850 persons per acre in 24-story high rise apartments (tolerable to a very few people and ill-suited to children)[2]. 'Hens Blumenfeld in his brief address at the 1957 meeting of the American Society of Planning Officials (ASPO) prefaced his remarks by posing the question, "Does anybody know what the right density is ?" He answered his own question immediately by replying, "I do,—It is 12000 to 60,000 persons per square mile of residential area," (20 to 100 persons per acre). The range is broad and broad enough to accommodate a great variety of consumer preferences. Yet in giving this range Blumenfeld established that there is both a lower and a upper limit of acceptable density.[3]"

Residential areas of excessively low density development (with 4.5 houses per acre) have many disadvantages which can be summarised as follows : very large investments for roads and utilities to serve this extensive area; long travel distance from the outer areas to the commercial, civic and cultural facilities, and to work; the low density neighbourhoods have insufficient population within easy walking distance to support a primary school, a shopping centre or other facilities. "In low density areas, the accents and community focal points, which would give identity to the grouping, are missing. There is too loose a relationship between building forms and open spaces. Social contact is frustrated."[4] "The housewives at such areas of low densities lead isolated lives resulting in lack of participation in civic, school, church, social and cultural affairs."[5] On the other hand, very high density increases congestion, specially in transportation. High density forces high rise construction which are unsuitable for the children. "Like very low density development, very high density developments, too, tend to exclude the poor unless, of course, their housing is subsidised."[6]

The intensity of residential use can be expressed by different types of density calculations: population density, dwelling density, building coverage and building bulk, etc. The dwelling density i.e. the number of dwellings per acre of land have the limitation that they do not measure the exact population load on residential land. The number of persons will vary with dwelling sizes and with occupancy conditions. Population densities which measure the number of persons per acre of land should, under no circumstances, be so high that the out door residential space requirements cannot be met.

The building coverage bears an obvious relationship to population density; (building coverage is the proportion of net residential land area taken up by ground area of buildings). It is obvious that if the buildings cover too large a percentage of the land, insufficient outdoor space will remain for various uses conducive to health, and this lack of space may also result in inadequate arrangements for circulation. The intensity of land use should not be so great as to cause congestion of building or to preclude the amenities of good housing.

Specially, building densities should be limited to provide adequate daylight, sunlight, air and usable open space for all dwellings, adequate space for all community facilities and a general feeling of openness and privacy.

'The figures for building coverage are more tangible standards than those which it has described for light and air, and for other criteria that would affect buildings spacing, and therefore recognizes their usefulness in municipal regulation. At the present time, 20 to 30 per cent coverage of land within property lines appears to be practical and to permit conformity with standards for light, air and open spaces. Control which set maximum net coverage exceeding 35 percent may fail to provide sufficient open space and may lead to overcrowding of people on the land'.[7]

'Building bulk' in terms of 'floor area ratios' provide a very useful measurement as a density control, and it is being increasingly applied by the planners in many countries including the U.S.A. and U.K. 'Floor area ratio' is the total floor area of all stories used for residential purposes, divided by the area of residential land, and it establishes a mathematical relation between the land area, the floor area of the building and its height.

The mathematical relationship is expressed by the following formula :

$$F = \frac{G \times S}{A} = B \times S$$

Where, F=Floor area ratio
G=Ground area of building
S=Number of stores
A=Area of land
B=Building coverage.

The floor area ratio is considered as one of the most accurate indices for adequacy of light and air. This is apparent because floor area ratio is related to the spacing of building and their height. If, for example, parallel rows of four-story buildings are spaced two and a half times their height to permit proper sunlight admission, the floor area ratio must be approximately 1.20, assuming 10 ft. story height and 35 ft. building depth. In other words, if the floor area ratio in some residential district is set at 1.20, it means that it is equivalent to four-story buildings at 30 per cent land coverage, or five story buildings at 25 per cent coverage and so on.

It should be noted that the floor area ratio does accurately reflect the population density without the use of an additional index of 'floor area per person'. The floor area per person generally varies according to the standard of living, usually increasing as income increases. So it is possible to relate population density with floor area ratio if the floor area per person is determined.

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3. Ibid. P. 146
4. Ibid. P. 147
5. Blumenfeld, Hans, *The Modern Metropolis—Its Origin, Growth, Characteristics and Planning* (Selected Essays) Edited by Paul D. Spreiregen, (Massachusetts, The M.IT. Press Ltd.) P.177.
6. Spreiregen, Paul D., op. cit. P. 147.
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CRITERIA FOR LOCATION OF HIGH SCHOOLS IN DACCA CITY

Hemayet Hossain, Syed Abu Hasnath and Md. Mofazzal Hossain*

Introduction : The paper is a result of an investigation into the locational aspects of the high schools in the city of Dacca, the commutation pattern of the students and the cost implications, the attitudes and opinions of the students, teachers and the guardians in that locational and environmental context.

The admission problem in the city schools has reached a crisis point. This is primarily because of great shortage of schools in relation to the demand for places in them. Most schools are greatly overcrowded, from 50% to 200% over the capacity which may be considered ideal under the given circumstances.[1] Also it appears that a large number of the existing schools are not properly located which adds to the problem of schooling in the city. It is on this background that the investigation was undertaken. It is felt that as the capital of Bangladesh, the city of Dacca needs a fast expanding school systems and hopefully the results of the investigation will make useful contribution in the planning and development of new schools in the city.

Methodology of Investigation

Intensive field work involving reconnaissance of a cross section of the city schools was undertaken. This was supplimented by a detailed questionnaire survey. Three sets of questionnaires were used, one each for the students, their guardians and the teachers. In addition to relevant data concerning the family of the students, the questionnaires also gathered information on school distance, travel time, travel mode, surrounding environment and quality of the schools. The findings of the survey were analyzed in simple two way tables (Ap-I). A set of sixteen appropriate and relevant variables was chosen (Ap-II) and a corelation analysis between the variables was done to show the degree of association of some of the findings in the table. The correlation coeffecients (r) larger than $\pm$ 0.50 (this being significant at 1% level) were considered for the analysis. The indices of correlation coefficients had been worked out by IBM 1620 model computer using Pearson's Product Moment Correlation technique.

Distribution pattern of the High Schools

There are 129 high schools in Dacca City. The address of all high schools in the city were obtained and each of them was located on a map (scale 1.35"=1 mile) using different symbols for each kind of school (i.e., govt. boys/girls and private boys/girls high school; Ap-III).

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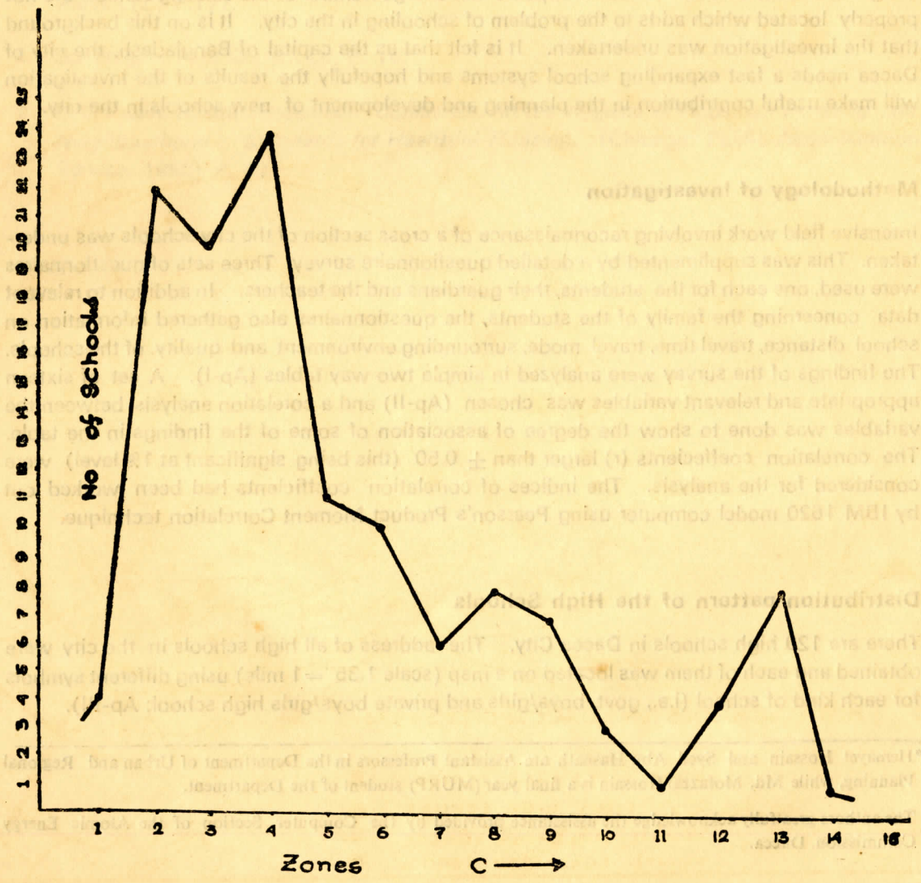
The authors greatfully acknowledge the assisstance provided by the Computer Section of the Atomic Energy Commission. Dacca.

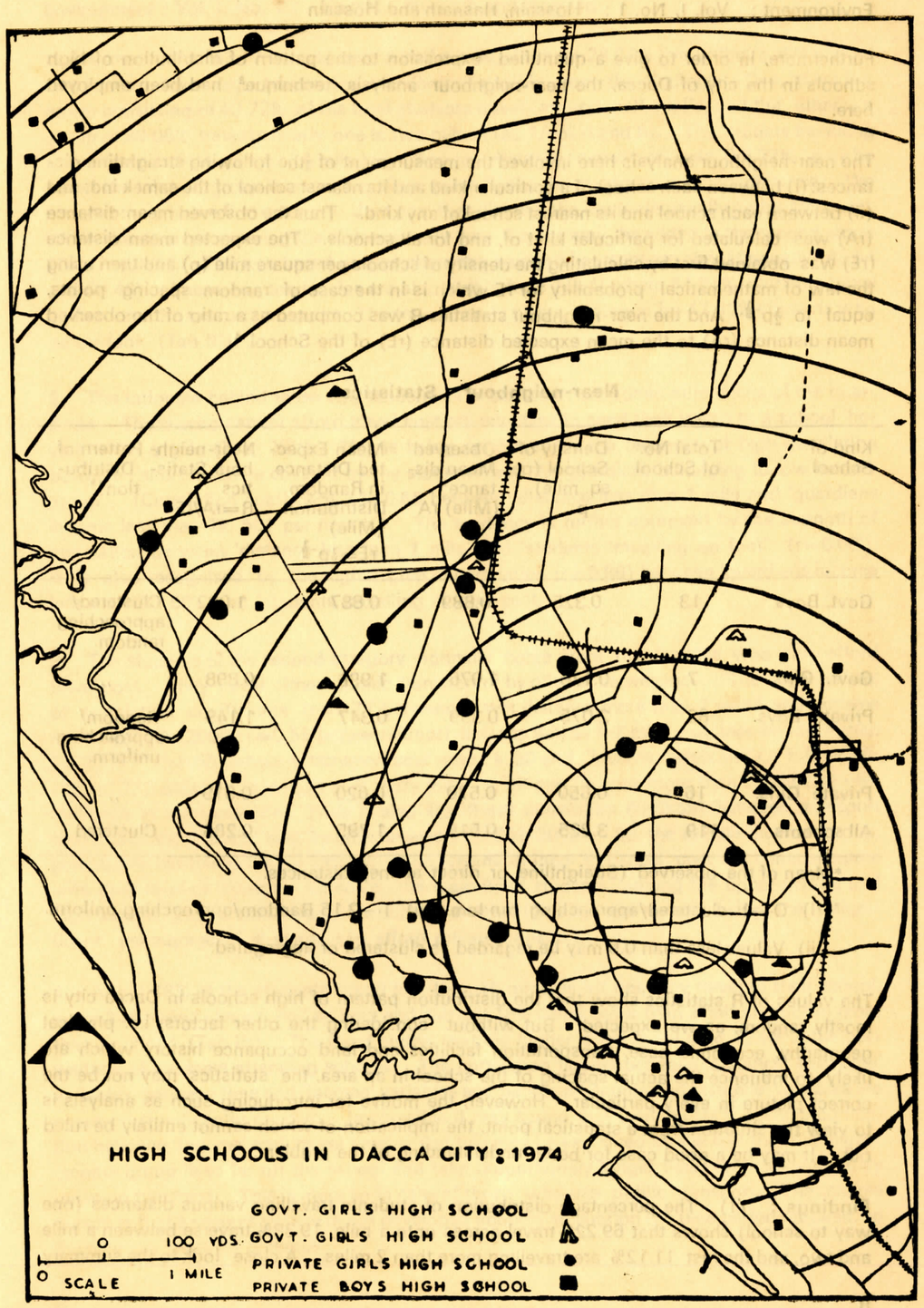
In order to find out the locational frequency of the schools in terms of the distances from the city centre, a series of (total 14) rings were drawn to cover the metropolitan limits of Dacca city.[2] The circles were drawn with the Dacca Stadium as the centre and the radius of successive circles inceasing by half a mile. The number of schools in each successive zones were determined as follows :

Zones	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}
No. of Schools	4	22	20	24	11	10	6	8	7	3	1	4	8	1

It is apparent from the above table that the locational pattern varies in magnitude from one area to another depending upon the variation of other related factors, including population base. The frequency curve shows a peak around the CBD sloping down towards periphery. However, the frequency graph rises slenderly in the 13th ring, possibility because of newly developed residential neighbourhood over there.

Fig. 1





Furthermore, in order to give a quantified expression to the pattern of distribution of high sdhools in the city of Dacca, the near-neighbour analysis technique[3] had been employed here.

The near-neighbour analysis here involved the measurement of the following straightline distances: (i) between each school of a particular kind and its nearest school of the samek ind; and (ii) between each school and its nearest school of any kind. Thus the observed mean distance (rA) was calculated for particular kind of, and for all schools. The expected mean distance (rE) was obtained first by calculating the density of schools per square mile (p) and then using the law of mathematical probability for rE which is in the case of random spacing points, equal to $\frac{1}{2}p^{-\frac{1}{2}}$. And the near-neighbour statistics R was computed as a ratio of the observed mean distance (rA) to the mean expected distance (rE) of the School.[4]

Near-neighbour Statistics

Kind of School	Total No. of School	Density of School (per sq. mile). p	Observed Mean distance* (Mile) rA	Mean Expected Distance in Random Distribution (Mile) $rE=\frac{1}{2}p^{-\frac{1}{2}}$	Near-neighbour Statistics R=rA/rE	Pattern of Distribution**
Govt. Boys	13	0.325	0.889	0.887	1.002	Clustered/ approaching random.
Govt. Girls	7	0.175	1.075	1.996	0.898	,,
Private Boys.	83	2.075	0.399	0.347	1.149	Random/ approaching uniform.
Private Girls.	16	0.650	0.570	0.620	0.919	,,
All schools	119	3.225	0.515	1.795	0.286	Clustered

*Mean of the observed (Straightline or direct airline) distances.

**(i) O—1 clustered/approaching random. (ii) 1—2.15 Random/approaching uniform.

(iii) Values less than 0.5 may be regarded as clustered or aggregated.

The values of R statistics show that the distribution pattern of high schools in Dacca city is mostly random, as we expected. But without considering the other factors; i.e. physical geography, economic base, transportation facilities and land occupance history which are likely to influence the actual spacing of the school in an area, the statistics may not be the correct picture in every particular. However, the motive for introducing such as analysis is to view the situation from a statistical point, the implication of which cannot entirely be ruled out. It may be a good case for better understanding of the problem.

Findings : (1) The percentage distribution of students travelling various distances (one way to school) shows that 69.22% travel across upto a mile, 19.38% traverse between a mile and two, and the rest 11.12% are travelling more than 2 miles. A close look to the summary

tables reveals that 43.77% travel upto a half a mile of whom 28.06% live within a distance of less $\frac{1}{4}$ mile. Two major tendencies are comprehensible from the findings. One, there is a group consisting of 43.77% of the total students travel around half a mile; and the other is a group of 39.06% traverse nearly one to two miles (Tab 1/col. 4 and 5). The studets travelling for an intermediate range ($\frac{1}{2}$ mile to $\frac{3}{4}$ mile) of distance constitute only 0.5.77%, may be called the take-off group who are crossing, most likely, the maximum walking distance. We may put them to the first category. Just past that distace, the students usually go by transport. While the students covering the distance more than 2 miles may be added to the second group (Tab. I. col. 6). The two broad groups share the students' percentage almost equally (49.54 and 50.46). These two tendencies are also visible from Tab II where 54.91% students travel on foot and the rest on transports. The travel time is also a minimum for 47.90% students who go on foot (Tab III).

2. The rationale behind these two tendencies is obvious : economic differences of the guardians. Those who cannot afford travel cost are reluctant to send their wards to a school beyond half a mile (Tab XIV). This is being confirmed by the tendency of high correlation between "short distance covered by the students' and the guardians belonging to low income group'. (Correlation coefficient, r is 0.65 between 'distance less than 1 mile and 'guardians income less than Tk. 501 per month'). The tendency is further approved by the strength of correlation between 'distance less than 1 mile' and 'students travelling on foot' (r=0.68'). It is also recognised by the high degree of correlation (r=0.86) between 'guardians income less than Tk. 501' and 'students travelling at zero cost.'

3. The students of the second category normally come from the families who can afford travel cost. They travel either public transport or by private conveyance. The high values of correlation coefficients (r=0.77 between 'travel distance more than 2 miles' and 'income more than Tk. 2000'; r=0.55 between 'travel distance within 1-2 mile' and 'income more than Tk. 2000', r=0.55 between 'transport cost upto Tk. 30 and 'income between Tk. 501-2000; and r=0.67 between 'transport cost more than Tk. 30' and 'income more than Tk. 2.000') give credence to the tendency. Their is also significant correlation (r=0.55) between 'transport cost more than Tk. 30' and 'income between Tk. 501-2000'. So, the middle income group, particularly the lower middle income group, seems to incur transport cost not commensurate with their level of income. However, the majority of students among the upper middle and high income groups bank largely on public transport (Tab II), the reason being the insignificant percentage of students can afford private transport.

4. About 48% of the students spend less than 15 minutes for one way travel to their school, while 34% spend almost half an hour and the rest 18% travel more than a half an hour to more than an hour (Tab III). The trend shows that the higher is the travel time, lower is the percentage of students attending schools. The correlation figures between 'distance' and 'time' variables, between time and 'income' variables and between 'income and distance' variables are observed significantly positive. Implausible it may sound that there exists a positive correlation between 'income' and 'travel time'. But this may be explained by the fact that the higher income group lives far off the school and take proportionaly longer time, even though they move on transport. This is more so in case of those who use public transport. The simple reason is that transport system is not developed enough to shorten the time period required to traverse the physical distance.

5. Certain factors have preponderant influence than other in case of the choice of school. Of those, quality of the school, nearness to residence, good transportation, and congenial surrounding environment are the predominant ones. While those factors may be mutually inclusive, quality of the school is favoured by 66.46% of the guardians, nearness to residence by 61.58%, pleasant surrounding environment by 53.24%, and good transportation system connecting the school by 52.38% as important criteria for selecting the school (Tab V). To note a few more findings in this regard, while selecting school about 33% of the guardians are influenced by the choiceof their wards, and 20% of them are constrained by the high tuition fees.

6. To half of the student population, the school seems to be distant from their residence. And another 50% of the students do not think their school that far off. About 50% of the students feel their journey to and from the school to be tedius. On being asked 89% of the students express their desire of seeing the introduction of school bussing soon (Tab XIII).

7. The guardians are of the opinions that transportation network, surrounding environment (more important in case of girls school) and distance from residence to the school to be the most important decisive variables in the choice of location of school (Tab XI). The same is the reaction while they are asked about the reasons of their disliking for a particular school. However, they are found to be almost unanimous in support of planned location of the school (Tab IX) and the introduction of school bussing (Tab VIII).

8. Another important finding is that about 70% of the guardians fall under lower-middle and middle income bracket (Tab XII, col. 1 to 4) who can ill-afford transport cost for schooling their wards. This is also reflected in their opinions about the desirable distance of the school (Tab VI). About 51% of them go in favour of a school-location within half a mile distance', 34% for within ½ to 1 mile' and the rest for 'within 1 to 2 miles'. The teachers of the schools are found to be equally alert in replying of 'the factors to be considered for new location of a school'. They also attach due importance to the transport netweork, distanc from residential area, and surrounding environment of the school (Tab XV. opinions are mutually inclusive). About 61% of the students favour that their school should be located within a half a mile distance from their residence, while 28.89% students do not mind to travel upto a mile distance to attend school. And those who can afford travel cost may be willing to travel a longer distance (Tab. XIV).

9. Lastly, an examination of factors related to the quality of the schools reveals interesting results. The significant correlations between the variables 'quality of school' and travel by car'; 'guardians income above Tk. 2000 p.m.' and 'maximum transportation cost' indicate that mostly the wards of high income families go to better quality school[5] and can afford to have a private car to transport them.

Conclusion : In summary we offer the following conclusions. Two potential locational criteria are identified :

a) Distance related criteria, and

b) Income related criteria.

The first one offers that the school should be located within half a mile distance so that students can walk down to the school. If the distance is around a mile, good transport should be provided. The most troublesome distance is ½ to ¾ mile, and that should be avoided as far as possible, because neither walking is pleasant to cover the distance, nor the introduction of bussing is economical for that.

Keeping in view of the resource gap and unequal capacity of the guardians, we can map out a strategy of providing two types of location for high school : (i) residential location, based on distance criteria; and (ii) central location based on income related criteria. The school for those who can afford transport cost should be located within the radius of 1 to 2 miles. These schools are expected to attract students from a greater area in a larger number which will make the management of the school less costly and the entry of the quality students possible.

It should be kept in mind that at the time of location of new schools, instead of one, we should employ both the criteria at micro and macro level region. The environmental quality as another important criterion is equally applicable to the first and the second.

Given the existing socio-economic environment, there is hardly any scope of checking the emergence of differential quality of schools. This may lead to the attainment of two types of optimum solution: (a) Lower level optima (residential location) and, (b) top level optima (centrally located schools). The overall question of uniform academic standard at both the level should be faced squarely by the relevant authorities to meet the ends of distributive justice.

However, in the absence of any well defined high school district, its size, the expected number of schools to be located and their enrolment capacities, which are the parameteres of interest, though not one of criteria, our conclusions are open to dispute. But this much we can say that these criteria seem to have some degree of validity and hence these are rational, as they are developed in a quantitative, rather than on a speculative basis as it is done at present.

Notes and References :

1. Bangladesh Times : April 1, 1976 and January 15, 1977.

2. Approximately 44 sqr. Miles.

3. The approach is based upon modern statistical theory and the notions of probability. Statistical analysis of the near-neighbour measure, which is, as the name suggests, a straightline measurement of the distance separating any phenomenon and its nearest neighbour in space. Near neighbour analysis indicates the *degree* to which any observed distribution of points deviates from what might be expected if the points were distributed in a random manner within the same area. From the laws of mathematical probability, it can be demonstrated that the mean expected distance (rE) between each point and its nearest neighbour which could be expected in such a random distribution is equal to $\frac{1}{2}p^{-\frac{1}{2}}$, where p is the observed density of points in the area under consideration. The ratio of the observed mean distance (rA) to this expected value (rE) is termed the 'near-neighbour statistics' (R). This ratio has a range in value from zero, when there is maximum aggregation (or cluster) of all points in one location, through 1, which represents

a random distribution, upto 2.15 which is expressive of a pattern of maximum spacing analogus (or uniform). The mean distance between nearest neighbour is maxized in a hexagonal distribution where each point has six equidistant nearest neighbours. In this case it can be shown that maximum value of R=2.15.

J.P. Clark and F.C. Evans : "Distance to Nearest Neighbour as a Measure of Spatial Relationships in Population," in *Ecology,* No. 35. (1954) pp. 445-53.

4. Leslie J. King : "A Quantitative Expression of the Pattern of Urban Settlement in Selected Areas of the United States", in *Spatial Analysis : A Reader in Statistical Geography*' ed. Brain J.L. Berry and Duane F. Marble; Prentice-Hall Inc.; New Jercy, 1968.

5. Quality of School is quantitatively defined as : Twice the No. of teachers having Masters Degree plus No. of teachers having Bachelors Degree/No. of students. (M.A./M.Sc./M.Ed.=2); /B.A./ B.Sc. B.Ed.=1).

$$\frac{(\text{Masters} \times 2) + (\text{Bachelor} \times 1)}{\text{No. of Students}}$$

APPENDIX I

Summary of Tables (Average Results in per cent) and the key to the Tables :

Table	1	2	3	4	5	6
I.	28.06	15.71	05.77	19.68	19.38	11.12
II.	54.91	01.00	25.63	04.44	13.67	—
III.	47.90	34.50	13.91	03.69	—	—
IV.	42.14	18.97	14.58	24.72	—	—
V.	61.58	52.38	11.46	66.46	54.34	20.50
VI.	18.97	31.95	13.54	20.60	07.83	—
VII.	23.16	18.11	24.61	05.12	26.38	—
VIII.	88.88	08.06	03.06	—	—	—
IX.	95.13	01.09	03.04	—	—	—
X	43.79	54.05	02.16	—	—	—
XI.	89.01	88.97	66.05	—	—	—
XII.	00.30	03.50	36.62	29.50	27.60	02.50
XIII.	52.50	47.50	46.90	53.10	89.32	07.26
XIV.	30.42	30.00	16.79	12.11	07.52	03.07
XV.	28.42	20.58	26.00	13.37	10.63	01.00

Key :

Table I : **Distances of schools from the residences of the students.**

Column 1 : Within $\frac{1}{4}$ mile.
2 : Within $\frac{1}{4}$ to $\frac{1}{2}$ mile
3 : Within $\frac{1}{2}$ to $\frac{3}{4}$ mile.
4 : Within $\frac{3}{4}$ to 1 mile.
5 : Within 1 to 2 miles.
6 : 2miles and above.

Table II : **Students' mode of transportation.**

Column 1 : On foot.
2 : By bi-cycle.
3 : By rickshaw.
4 : By car.
5 : By bus.

Table III : **Students' travel time (one way)**

Column 1 : Less than ¼ hour.
2 : Within ¼ to ½ hour.
3 : Within ½ to 1 hour.
4 : 1 hour and above.

Table IV : **Students' monthly transportation cost.**

Column 1 : No expense.
2 : Upto Tk. 30/-
3 : Tk. 31/- to Tk. 60/-
4 : Tk. 61/- and above.

Table V : **Reasons for a guardians' choice of a school.**

Column 1 : Near to residence.
2 : Good transportation system.
3 : School busing facility.
4 : Good education.
5 : Good environment.
6 : Minimum tuition fees.

Table VI : **Guardians' opinion about the desirable distance of the school.**

Column : Same as Table I.

Table VII : **Reasons for guardians' dislikings of particular school.**

Column 1 : Far away from home.
2 : Bad transportation.
3 : Bad environment (academic and physical)
4 : Other reasons.
5 : No. response.

Table VIII : **Guardians' opinion whether there should be school bussing.**

Column 1 : Yes.
2 : No.
3 : No response.

Table IX : **Guardians' opinion about the need for judicious planing of location of high schools.**

Columns: Same as Table VIII.

Table X : **Guardians' opinion about the location of the existing schools.**

Column 1 : Properly located/convenient.
2 : Not properly located/inconvenient.
3 : No response.

Table XI : **Guardians' opinion regarding factors to be considered for location of schools.**

Column 1 : Transportation network
2 : Environment (academic as well as physical)
3 : Distance from the residential area.

Table XII : **Guardians' annual income.**

Column 1 : Below Tk. 1000/-
2 : Between Tk. 1000/- and 2000/-
3 : Between Tk.3000/- and 6000/-
4 : Between Tk.6000/- and 12000/-
5 : Between Tk. 12000/- and 24000/-
6 : Tk.24000/- and above.

Table XIII: **Students feeling about the distance of schools, travel with/without trouble and travel by bus.**

Column 1 : Very far away.
2 : Reasonably near.
3 : Travel with trouble
4 : Travel without trouble.
5 : In favour of school bussing.
6 : Against school bussing.

Table XIV : **Students' opinion about the desirable distance of their school**

Column : Same as Table I.

Table XV : **Teachers' opinions regarding the factors to be considered for new location of schools.**

Column 1 : Transport network
2 : Environment.
3 : Distance from residential area.
4 : Sufficient space for future expansion play field etc.
5 : No response.

APPENDIX II

Correlation Coefficient Matrix

Sl.No.	Name of variable	Sl.No.	Name of variable	Sl.No.	Name of variable
1.	Travel Distance : Less than one mile	7.	Mode of Travel : By bus.	13.	Guardians, Monthly Income: Upto Tk.500
2.	Travel Distance : Within 1-2 miles.	8.	Monthly Transportation Cost : No cost.	14.	Guardians, Monthly Income: Between Tk. 501-20,00.
3.	Travel Distance : More than 2 miles.	9.	Monthly Transportation Cost : Upto Tk. 30		
4.	Mode of Travel : On foot.	10.	Monthly Transportation Cost :More than Tk. 30		
5.	Mode of Travel : By ickshaw.	11.	Travel Time : Upto ½hr.	15.	Guardians, Monthly Income:Above Tk.2000
6.	Mode of Travel : By car.	12.	Travel Time. : ½hr. and above.	16.	Quality of School.

	1	2	3	4	5	6	7	8	9	10	11	11	13	14	15	16
1.	1.00															
2.	.13	1.00														
3.	-.27	.17	1.00													
4.	.68	.29	-.12	1.00												
5.	.04	.41	.24	-.20	1.00											
6.	-.11	.52	.49	-.26	.44	1.00										
7.	.04	.01	.71	-.01	-.12	.13	1.00									
8.	.64	.19	-.20	.84	-.32	-.26	.03	1.00								
9.	.59	.11	.16	.12	.28	.26	.35	.09	1.00							
10.	-.10	.51	.76	.07	.54	.64	.42	.33	.11	1.00						
11.	.69	.42	.13	.71	-.09	.26	.28	.69	.52	.21	1.00					
12.	.02	.38	.58	-.05	.53	.30	.48	.19	.13	.77	.01	1.00				
13.	.65	.25	-.19	.89	-.33	-.29	.00	.86	.01	-.13	.70	-.13	1.00			
14.	.57	.55	.42	.35	.55	.36	.42	.21	.65	.55	.55	.66	.14	1.00		
15.	-.03	.44	.77	-.21	.50	.73	.48	.22	.43	.67	.29	.51	-.34	.51	1.00	
16.	-.44	.35	.44	.37	-.30	.52	.21	.35	.02	.42	-.12	.33	-.41	.09	.54	1.00

N=26 (No. of Sample Schools)

r larger than ± ·50 is significant at 1% level.

FLEXIBILITY AND SPACE STANDARDS

Iftekharuddin M. Choudhury*

Need for Flexibility

Change is the law of nature. The relative importance of each aspect of life changes with time even within the same society. The pattern of these changes cannot possibly be predicted with absolute accuracy. ".....every description of nature contains some essential and irremovable uncertainty. For example, the more accurately we try to measure the position of a fundamental particle of an electron, say, the less certain will be of its precise position. Therefore we can never predict the future of the particle with complete certainty; because, as a matter of fact we cannot be completely certain of its present. If we want to predict its future sensibly, then we must allow it to have some uncertainty; some range of alternatives, some slack—what the engineers call tolerance.....Once we have any uncertainty in prediction, in however small and distant corner of the world, then the future is essentially uncertain—although it may remain overwhelmingly probable".[1]

In view of the changes and the element of uncertainty in their accurate prediction, it is better to take a dialectic rather than positivist apporach. In housing, such an approach is demanded by the changing family needs affected by various factors, varying requirements of different families and individuals and their expectations. A need for flexibility has been amply demonstrated by Boudon in his analysis of Le Corbusier's housing project at Pessac.[2] The project generated considerable controversy at the time when it was built, and was almost universally

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rejected by the people who were obliged to live there. Boudon made a study of the housing in the early sixties and found that the original scheme had been altered almost beyond recognition. Houses had been modified to conform to the individual family needs and aspirations.

Flexible Approach towards Space Standards

Space standards for dwellings in the early days mostly in the European countries were prescribed as mandatory minimum. They .were spelt out in the form of number of rooms according to their functions, their sizes, minimum useful floor spaces and so on. With the change in circumstances and a growing awareness about the importance of other aspects of housing new types of standards are being formulated.

One of the important examples in Britain is the Parker-Morris Committee report on housing and space standards.[3] The committee reacted strongly against the rather rigid approaches towards standards and was in favour of attaining more flexibility which, the committee maintained, could be achieved if the idea of minimum room sizes was replaced by overall minimum space standards for the activities which are performed in the house. Emphasis on room sizes resulted in giving more attention on working out a pattern of room areas rather than catering to the user requirements properly. Labelling of rooms for specific uses tended to assume a conventional arrangement of the dwelling and the particular way the room was to be used. It inhibited the flexibility of both design and subsequent use of dwelling.

The Parker-Morris Committee report suggested to look at the user needs in their totality and then set minimum sizes for the dwelling as a whole as implied by the needs. The designer is thus given considerable freedom in determining how best to arrange space and equipment to meet the varying requirements of different household types.

Space standards in Denmark are also not precisely laid out. The designer is given maximum freedom to arrange the dwelling spaces best suited to the individual household needs within a given range of useful floor spaces. The designer, of course, has to indicate the arrangement of furniture on the plan to facilitate the approving authority to see at a glance whether the rooms are of right size and shape for the functions to be performed.[4]

The American Public Health Association Committee on the Hygiene of Housing emphasized on the concept that housing requirements stem from the needs of the occupants and maintained that it provides a sounder approach to the attainment of adequate dwelling space. It also observed that establishing minimum floor area for individual rooms based onspecific functions leads to the overlooking of the less obvious needs for the space. It has been suggested by the committee that the dwelling as a whole should incorporate the space necessary for all the family activities, and more flexibility in room size be permitted by overall space allowance.[5]

A recent study by Alexander and others for a housing competition in Peru calls for the formulation of certain 'patterns' for the design of housing.[6] Here specific space requirements for different activities have been found out from socio-cultural as well as functional points of view. Some general design principles have been formulated based on the socio-cultural attitude of

the people, their economic capability, family living patterns and technological aspects which the designers call 'patterns'. For example, based on the fact that street watching from an upper-story window is a favourite pastime of a young Peruvian girl, a 'pattern' has been devised to fullfill the requirement. These patterns, which are in fact translations of various user requirements, when combined together, generate a satisfactory living environment for whom they have been devised. Since they can be combined in a different number of ways to suit the various individual and family needs for the present and future, these patterns can generare an almost infinitely rich variety.

It will not be irrelevant in this context to look at the squatter settlements where no 'space standards' in the conventional sense of the term have been imposed. Flexibility in this case, is stretched almost to its limit. The most important thing for a squatter is to get a plot and a security of tenure. He then goes on to build in stages according to his priorities and budget. The important advantage of the squartter's procedure is that the spaces as well as structures are adaptable to the changing family needs and living patterns. Turner, writing about the Lima 'barriadas',[7] observes that a typical 'barriada' house is a shack or a group of shacks when it is first started, but it ends up as a two or even three-storied house after a period of time. The house is often subdivided into separate dwellings to be occupied by the children or rented out to provide the owners with an added income in their old age. The 'barriada' dweller has thus got complete freedom and flexibility to manipulate his own living space.

Relevance of the Different approaches to Bangladesh Situation

In Bangladesh, and for that matter in most of the tropical countries, majority of the household activities require no specific space for their pursuit.[8] The same space may accommodate different activities at different hours of the day and in different seasons of the year. As such, the idea of prescribing overall space requirements instead of making specific space recommendations for different rooms according to their functions may be adopted in principle to Bangladesh situation. The method for formulation of the space standards and their magnitude will of course be different.

The different activities performed in a Bangladesh house have to go considered in the context of socio-cultural attitude, prevailing climatic conditions and some other relevant factors. The resultant living environment may prove to be usnsatisfactory if the space requirements are determined by putting emphasis only on the functional aspect. The method adopted by Alexander et al goes a long way in meeting this demand by considering the socio-cultural and functional needs simultaneously.

The 'barriada' experience may serve as a fruitful example to meet the needs of those families who cannot afford any 'floor space' because of limited cash. Such a family may be provided with a plot to start with, and be allowed to build a dwelling to a standard lower than what is considered socio-culturally and functionally acceptable; the dwelling can be raised to the the acceptable standards with the improvement of the economic condition of the family. The user may also be allowed to choose from a range of different construction standards satisfying minimum health and safety requirements. It will thus provide the user with the freedom to budget his own resources, cater the space requirements at various stages of family life-cycle and a degree of freedom to shape his own environment.

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THERMAL COMFORT : A fundamental criterion in Building Design

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The primary objective of a building is to create an environment which is comfortable to live and work in. Proper knowledge of thermal comfort is essential to reach successful design solution of buildings. It is all the more necessary and should be carefully considered where mechanical methods are not available for the control of indoor environment. In the following paragraph factors affecting thermal comfort have been discussed. Some directions towards design solution have also been attempted.

Macfarlane and others defined comfort "As certain thermal conditions in which over 50 per cent of the people are unaware of their climatic environment-that is they do not feel the need to adjust to it."[1] It has also been defined as "That condition of mind which expresses satisfaction with the thermal condition."[2] Some indoor environment may not be equally pleasing to every one. The idea is to create optimal thermal comfort for the group, that.is to create an environment in which highest percentage of the group is in thermal comfort. Thermal comfort does not mean that thermal conditions should be kept at all times at a very precise level. On the contrary some fluctuations in indoor conditions such as temperature and air velocity, are rather helpful. It prevents monotony and stimulates the thermoregulatory system. Thermoregultory system can adjust to comfortable condition within a given set of condition known as comfort zone.

It is possible to determine with reasonable accuracy the conditions of pleasantness and comfort. However it is useful to asses the degree of severity of the thermal sensation. Bedford[2] gave a scale of warmth which may be numbered as

Much too cool-1, Too cool-2, Comfortably cool-3
Comfortable-4, Comfortably warm-5, Too warm-6 and

Much too warm-7, 3 and 5 in the scale indicates comfort zone, that is absence of discomfort due to warmth or to coolness.

Many factors are responsible for the feeling of comfort. These are both objective and subjective. The objective factors are air temperature and mean radiant temperature; relative humidity-vapour pressure in ambient air and precipitation; air velocity and air pollution; solar radiation and glare; metabolic heat production and activity level; and clothing. The subjective factors are national and geographic location; age; sex; body build; skin colour; food; circadian rythum; ethenic group; etc. Besides these there are various other environmental psychological factors that influence the comfort and pleasantness of the environment. B.S. Saini says "Factors such as the size, proportion, character and surroundihgs of rooms, the colour scheme and even the view from the window

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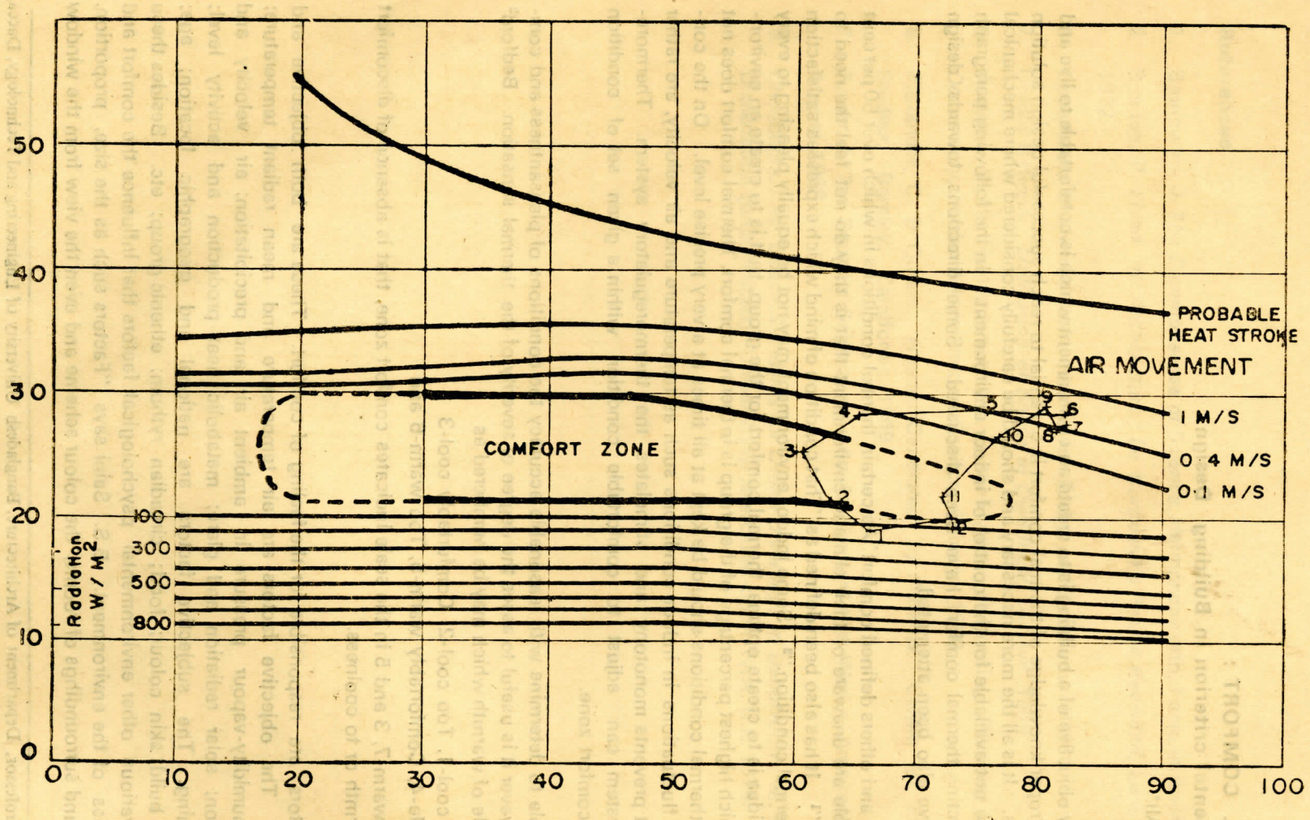
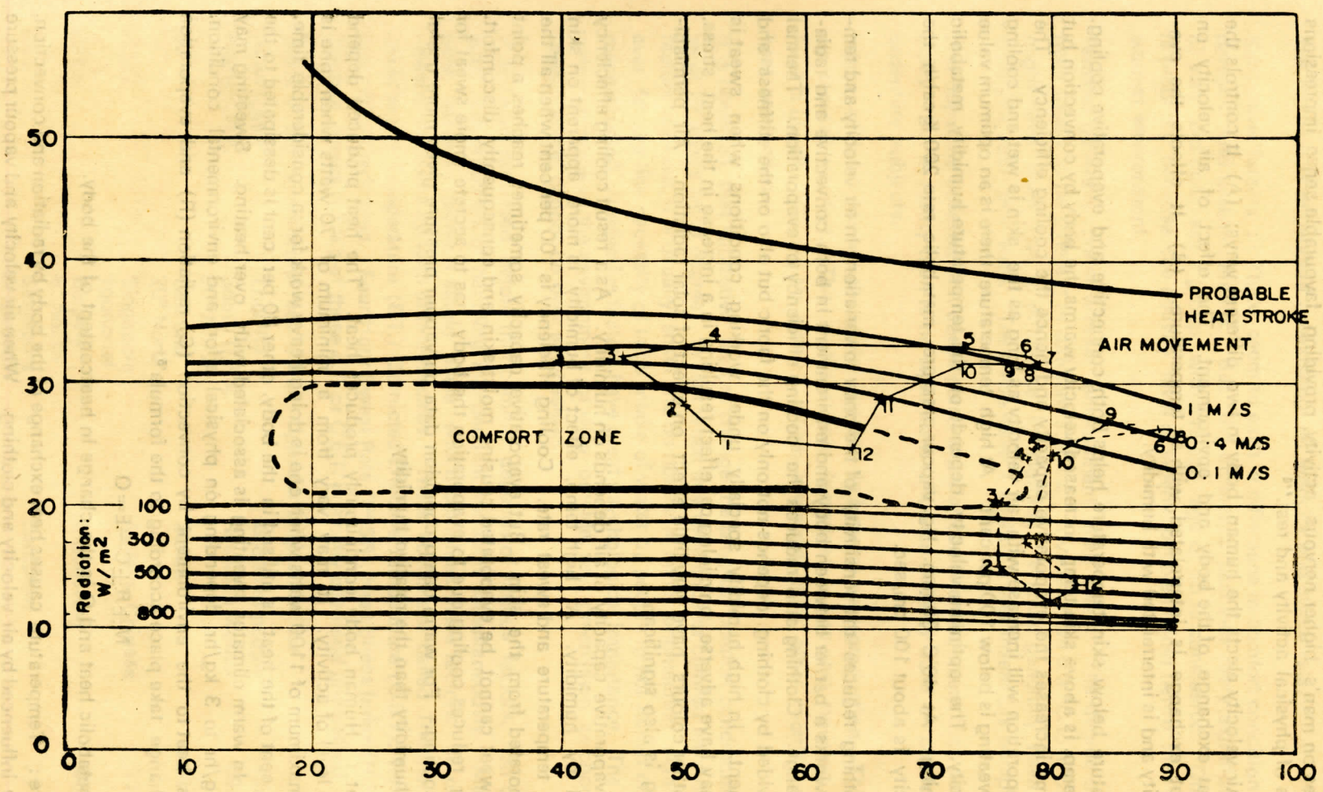


RH% NUMBERS IN THE GRAPH INDICATE MONTH OF THE YEAR
POINTS ARE PLOTTED WITH AVERAGE VALUES OF TEMP. & R.H.

FIG.1



RH : % NUMBERS IN THE GRAPH INDICATE MONTH OF THE YEAR
9 A.M. HUMIDITY (HIGH) & LOW TEMPERATURE, ASSUMED NIGHT CONDITION ------
6 P.M HUMIDITY (LOW) & HIGH TEMPERATURE, ASSUMED DAY CONDITION ——————

FIG. 2

have a great psychological effect. There is the combined effect of sun, fresh air and greenery which impinges on man's higher nervous activity, providing favourable sense impressions during periods of physical activity and rest."[4]

Air Velocity : Air velocity elects the human body in two different ways; (A) It controls the convective heat exchange of the body and environment. The effect of air velocity on convective heat exchange is interrelated with air temperature. (B) It effects the evaporative capacity and is interrelated with humidity.

An air temperature below skin temperature helps both connective and evaporative cooling. When the air temp. is above skin temp. increased velocity warms the body by convection but at the same time increases the evaporative capacity and hence the cooling efficiency. The cooling by evaporation will increase with air velocity as long as the skin is wet and cooling efficiency of sweating is below 100 per cent. At high temperature there is an optimum value of the air velocity. The optimum velocity depends on the temperature humidity, metabolic level and clothing. At 40'C 30 mm. Hg. vapour pressure, metabolic rate 200 K cal/h the optimum velocity is about 100 cm/sec.

Clothing : Clothing reduces the sensitivity of the body to variations in air velocity and temperature, also works a barrier between body and environment in both convective and radiative heat exchange. Clothing also reduces the cooling efficiency of evaporation. Thermal resistance provided by clothing depends not only on the fabric but also on the stiffness and fit of the garment. In high humidity specially under working conditions when sweat is increased, it may have adverse physiological effect resulting in a increase in the heat stress. Beside black other colours have very little effect on effect of solar radiation. Air permiability of clothing is also significant.

Humidity : Evaporative capacity of air depends on humidity. As a result cooling effeciency is determined by humidity. At high temp, effect of humidity is more apparent on skin wetness, skin temperature and sweat rate. Cooling effieiency is 100 per cent when all the sweat is evaporated from the skin. But evaporative capacity sometimes reaches a point when all the sweat cannot be evaporated causing moist skin and consequently discomfort. When clothing reduces cooling due to evaporation the body has to secrete more sweat for the required cooling. For warm damp condition data on vapour pressure gives more useful expression of humidity than the relative humidity.

Metabolic heat : Human body continuously produces heat. The heat produced depend greatly on the level of activity. It may vary from a minimum of 70 watts when one is sleeping to a maximum of 1100 watts when one is doing heavy work for a considerable time. Only 20 per cent of the heat is utilised in the body, other 80 per cent is dessipated to the environment. In warm climates sweating is associated with over heating. Sweating may vary from 2 g/hr to 3 kg/hr depending on physical effort and environmental condition. Body releases heat to the environment by convection (C) radiation (R) and evaporation (E). Heat exchange take place according to the formula'[5]

$$M \pm R \pm C - E = Q$$

Where M is metabolic heat and Q is the change in heatcontent of the body.

Air temperature : Temperature causes heat exchange of the body by radiation and convection. This is greatly influenced by air velocity and clothing. When air velocity and vapour pressure

is constant, rise in air temperature results in the increase of skin temperature and sweat rate. The increase is dependent on existing air velocity and sweat rate.

Subjective factors : There seem to exist a difference in comfort condition between young persons and elderly persons. But the difference becomes very significant when groups of very old age, say a group with average age of 65 is considered. One of the reasons is probably because the activity level of elderly people is low hence they prefer a slightly warmer environment.

Females generally prefer warmer environment than males. The degree of variation have been found to be different in different studies. It varies from 0.3 °C to 1°C. The difference might have been due to difference in clothing. Women generally have slightly slower metabolic rate than men. They also have a slightly lower insensible perspiration.

It is popularly believed that obese persons prefer cooler environment than persons of slighter build. But in reality than is no significant influence of body build on comfort conditions of sedentary subjects.

Intake of food causes a certain increase in internal heat production. This have influence on thermal comfort. This is all the more important in low cost housing situation where food is usually taken in the kitchen which is warmer than other rooms because of more heat production.

It is observed that subjective factors change the physical comfort conditions of the environment by a very small degree. In fact when any difference in comfort level due to subjective factors do exist, it is usually small and do not alarm much engineering significance. However factors like necessity of large intake of water by people in hot humid climate cannot be overestimated. Subjective factors have great psychological importance. The influence of the colour scheme of the environment or view outside, say, green lawn as opposed to the bare sandy patch, cannot be over emphasised.

It has been described before that comfort depends of various factors. So designer is faced with the problems of handling independent variables simultaneously. Many efforts have been made to devise a single scale which combines these factors. In doing so, various researchers came up with different scales. These scales are called Thermal Indices. These are Effective Temperature (E.T.) Corrected Effective Temperature (C.E.T), Resultant Temperature (R.T.) Predicated. Four Hour Sweat Rate (P^4 SR), Heat Stress Index (H.S.I.) and Index of Thermal Stress (I.T.S.) of these E.T. or C.E.T. is mostly used and understood.

Some of the experimental results from Lippseier is given below

Investigator	Locality	Group of people	Comfort Zone
A.S.H.R.A.E.	South U.S.A. 30° North	Research worker	69 to 70°F
Rao	Calcutta 20° North	Indian	68 to 76°F
Webb	Singapore Equitorial	Malays, Chinese	77 to 81°F
Mom	Batavia 6° South	Indonesian	68 to 79°F
Ellis	Singapore Equitorial	European	72 to 79°F

This is interesting to note that Webb and Ellis arrived at slightly different results under similar conditions. This however should not be attributed to difference of subjects as Asian and European.

It is observed that D.B.T. values correlate much better with subjective judgement than E.T. values. V. Olgyay argues that there is no point in going for complicated calculations in constructing a single figure Index as all the variables are controlable by different means. He developed the bioclimatic chart where the comfort zones are defined in terms of D.B.T. and Relative Humidity. He also charts the effects of air velocity and radiation. The former pushes the comfort zone upward and the latter draws it downward.

Climatic data of Dacca have been plotted on the chart to show the periods of comfort and discomfort and degree of deviation from the comfort condition. Fig. 2 is plotted with set of data indicating day and night time situation based on mean monthly values. Fig 1 is plotted with set of data based on average monthly data.

From these two charts a reasonably clear picture can be obtained about comfort condition in relation to climate. During summer months from April to October the prevailing conditions are well above the comfort zones. So continuous movement of air between 1 and 2 m/s. is necessary to attain reasonable comfort level. And also the effect of radiation should be less. From the chart it is observed that day times of December, January and February are within the comfort zone and are quite pleasant. Nights are cold and below comfort zone. In March and November nights are pleasant and days are a bit warm but not very un-pleasant. For winter months no comfort ventilation is necessary, infiltration of cold wind should be restricted specially at night. Sun rays should be allowed to enter the interior spaces and insolation of the walls should be more. In March and November some air flow during day time will bring in comfort condition.

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ON SOME ASPECTS OF THE QUESTION OF DEVELOPMENT IN BANGLADESH

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Meaning of development

In the popular concept 'development' means improvement of the standard of living for the masses meaning increased access to the conveniences of modern life through material prosperity and rapid social change. There is little or no concern for preservation and furtherance of human and social values or enrichment of the soul in the process although eminent philosophers in all times spoke for enrichment of the soul and expressed concern that human civilization will be exposed to great danger in the absence of a philosophical/spiritual approach to life. It is intriguing, however, that even with the state of knowledge and social consciousness of the present time societies can be forgetful of and remain passive to such an essential aspect of human existence.

The popular concept of development has led to the belief that economic emancipation and technological progress are the two most significant measures of development. Hence the emphasis on scientific and technological development, industrialization, creation of bigger urban centres and so on. Alongside, the concern for environmental pollution, ecological balance and quality of life grows inevitably. A curious aspect of these endeavours is that in the hullabaloo for mundane development and control, the need for the development of man himself remains forgotten.

The consequences of this basically materialistic approach to development have failed to satisfy the humanity in general and are defeating in many ways the very purpose of human existence. Thus we see that in the so-called developed societies human beings are engaged in a rat race for material possessions and in the process destroying some of the basic ingredients of good life such as the sense of belonging to the community, the sense of job satisfaction, cohesion in the family, consciousness of social responsibilities and so on. Also traditionally useful values of life are being progressively lost impoverishing the soul and furthering unhappiness and frustration in all walks of life as manifested in various forms of individual and social perversions.

Looking at the developing societies one can see similar trends with similar consequences although the pace is a little slower. The slower pace of the so-called development is really a blessing in disguise because many good aspects of life are still spared and in most other aspects disorganization is yet to reach a point of no return. However, the materialistic concept of development and the continued emphasis on fast socio-economic, cultural and environmental changes through bigger and spectacular approaches can cause, in no time, the damages one would like to avoid. The tendency for projecting the image of national development in spectacular ways, only too often, takes the attention away from the real issues which would otherwise call for modest approaches at local levels everywhere in the country. The result is anything but true social upliftment enhancing the disparities among sections of the society and increasing mass discontentment and social unrest.

What then is the real meaning of development? An answer to this query can perhaps be found in the domains of philosophy and religion. In fact philosophy and religion have common

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premise in that they both seek to establish the truth in its totality. The goal is the same although means differ. The modern philosophical and religious thoughts would appear to agree that development means progress of life towards 'completeness' meaning the stage at which the society will reflect all the attainable heavenly attributes. This gives a comprehensiveness to the concept of development incorporating the spiritual aspect of life with the material aspect and provides a strong philosophical base without which 'development' or 'progress' becomes meaningless in a metaphysical sense.

Approach to development

An agreement on the meaning of development as stated here does not make any easier the formulation of an appropriate approach to development. Rather it calls for a deeper understanding of man himself as an intelligent and social being. Man is motivated in this world by biological, psychological and social needs and these motives or drives direct him towards specific goals. The inborn biological needs arise out of homeostasis or the process of maintaining the physiological equilibrium whereas the social and psychological needs are products of experience. Although biological motives are fundamental yet psychological and social motives are, in many cases, more significant to man.

Man as an intelligent social being is ever engaged in a series of conflicts in life which directs his motivation to a large extent and keeps him going in this world. It has been said that these conflicts belong to three basic types—firstly, the conflict between man and his own self; secondly, the conflict between man and his fellow men and thirdly, the conflict between man and his environment. These three types of conflicts again have multiple dimensions in themselves. In order to formulate a sensible and effective approach to development, these basic conflicts of human life have to be taken into proper consideration.

In a country like Bangladesh where the overwhelming majority are very close to the mere subsistence level and where elaborate traditional institutions have still their roots in the society at large, the problems of development should not be found too difficult to deal with provided the right approach is there. For one thing, having been at such a level and having not experienced the complexities of life of a highly dynamic society, they are still simple at heart without complex inhibitions and crazy craving for material possessions and spectacular achievements in life. Although the need to achieve is a basic characteristic which distinguishes homosapiens from lower species, there is perhaps a need to restrain it, both for the good of an individual as well as for the good of the society. Developing societies are generally favourably poised on this count in that masses cherish a rather modest view of life and achievements. Under these circumstances it is possible to make new beginings for real developments through modest approaches at grass root levels and keep the spirit growing through genuine involvement of the masses even though the achievements are rather modest. It is also easier to conceive and work for a society which would judiciously set its own standard of living and level of satisfaction striking a balance between the possibilities for development and growth and the conflicts of life in the framework of the true meaning of development.

Creating a sensible society

In a country like Bangladesh development should begin with the first objective of creating a sensible society. Then comes the question of adopting an appropriate strategy for sustained development commensurate with the genius of the people and other major development constraints. It is necessary to examine these two objectives in some details in order to understand their implications and formulate an appropriate plan of action.

By a sensible society is meant a society which is capable of formulating collective goals and work for achieving these within a broader perspective of progress and prosperity for the human race. The problems of creating a sensible society must be dealt with in the light of the two basic conflicts of life mentioned earlier namely, the conflict of man with himself and the conflict of man with his fellow men. The first type of conflicts originates with a basic psychological need——the need to achieve. The idea that the main driving force in life is the avoidance of pain and the main goal is survival is no longer acceptable. It is felt that while such theories may explain the behaviour of lower species, they cannot be applied to human beings. The need to achieve is not essential for survival——sometimes, in fact, going contrary to the biological drives and yet it is almost an innate motivation in human life.

While the need to achieve is a fundamental motivation, inordinate need to achieve can cause endless array of frustrations because in the real world achievements are hard to come by. Moreover an indomitable need to achieve can lead to intense competition between individuals or groups and cause hostility and a tendency to impute bad faith and shady tactics. The need to achieve may become so strong as to be disruptive if the individual becomes anxious over possible failure to achieve. Fortunately, however, man has a natural tendency to protect himself from the bad effects of repeated failure in comepetitive situations by lowering his 'level of aspiration' and inverting his efforts in more promising directions. Another significant point is that the need to achieve can be profoundly influenced by training, specially in the early age.

The second type of conflicts namely, the conflicts between man and his fellow men originates in some basic psychological and social needs such as the need for security and social justice, the need to respond to others through the exchange of love and esteem, the need for newer experiences and greater knowledge and the need for approval and a degree of prestige. These needs are affected and controlled by the state of stability in which the society is in. For example, in a relatively slow-moving society as ours in Bangladesh, human behaviours and relationships with each other are controlled to a large extent by a culture of customs, moral codes, of manners and of respect for social sanctions. Consequently social conflicts are relatively less both in variety and in intensity. On the contrary when conditions are rapidly changing as in a highly dynamic society, standards, norms and values are also in a state of rapid change thereby failing to act as effective guiding factors for the society. Traditional institutions loose their power to give the individual security and in a big city society the average individual does not feel that he is an integral part of any important group. These cause psychological and social disorganization in the form of maladjustment, psychological depression, crime, family disorganization and so on.

Thus the task of creating a sensible society will require the practice of a degree of restraint on individual and social aspirations and this is to be learnt through education and training at all levels. Also the conflicts of interests between individuals and groups can be debased through promotion of collective thinking, planning and action at local levels for common goals under inspiring leadership. Moreover there must be genuine efforts towards reducing disparities of various nature in the society so that the sense of deprivation and the consequent sense of frustration among some sections of the community in relation to others is removed, thereby injecting new life and inspiration in the society at large. It is difficult to lower the prevailing standard of living of a social group without serious discontentment but it would not be so difficult to freeze the standard of living enjoyed by the previlaged groups for some years while all efforts are directed towards the upliftment of the less previlaged groups. In the context of Bangladesh one implication of this would be to stop any further investment in urban centres

in the form of new community facilities and services until such times as the rural Bangladesh where 90% of the total population live at a much lower standard comes upto a reasonable standard of living as compared to the urban society.

Strategy for development

Coming to the question of an appropriate strategy for development it is necessry to understand also the conflict between man and his environment along with the two other basic conflicts already discussed in some details. The story of man's conflicts with nature is as old as the existence of man himself. Through ages man learnt to live with nature in peaceful co-existence. It is only in recent times that man gave up the posture of tolerance and began senseless and merciless exploitation of nature. In his effort to conquer and enslave nature with the help of science and technology man excelled in spectacular ways but at the same time created many newer and more serius conflicts which sometimes make one wonder about the wisdom behind all these endeavours.

In a country like Bangladesh where material resources are scarce but human labour is plentiful, the strategy for development must be aimed at mobilizing the human resources for achieving the desired goals rather than depend on machines and borrowed technology. To do it effectively we must understand human nature as well as we must learn to think creatively.

A human being in his daily activities is constantly aware of making 'decisions' and 'choices' which contributes to the development of his 'self-concept'. This self-concept is fundamental to the sense of responsibility and is enhanced through participation in the decision making levels. Moreover satisfaction from work is also dependent on the sense of responsibility shared as well as on the feeling that the work has social value. Consequently an appropriate strategy for development will call for participation of the people in all phases of the development work—determination of the need, formulation of the plan of work and getting the work done. This total involvement is only possible when the development efforts are decentralised and left essentially to the people concerned to work freely and creatively within a centrally formulated broad development policy framework for the region or the country as a whole. The true spirits of self-help must, in all possible ways, be encouraged but necessary external supports must be made available to reinforce local initiatives.

Apart from the benefits of genuine local participation further importent aspects of this strategy for development will be that the selection of the projects will be most appropriate on priority basis and their execution will be much less likely to create ecological problems because of the fact that much more intimate knowledge and community devotion would be working behind the conception and execution of the projects.

Conclusions

This paper discusses some fundamental aspects of the question of development in Bangladesh. In the ultimate analysis development of a society is very much dependent on the character and strength of its socio-political institutions. It is the contention of the author that Bangladesh, being a nation of predominantly agricultural communities, is favourably poised for stabilization and strengthening of the traditional institutions through which truely effective and meaningful development is possible. Alien concepts, techniques and technology must not be imposed upon a society because this will injure the society's self-concept and destroy its spirit of self-reliance and creativity without which a society cannot really be free and prosperous. It is a highly opportune moment in the history of our people to pause for a while and think on our own what kind of a society is worth working for and what kind of progress is possible and desirable to achieve.

THE SQUATTER RESETTLEMENT PROGRAMME IN THE CITY OF DACCA : A Critical Analysis.*

Syed Abu Hasnath and Ziauddin Ahmed**

Introduction :

In January 1975, the then Government of Bangladesh launched a slum clearing operation in the capital city of Dacca whereby about 2,00,000 squatter dwellers of the city were forced either to return to their native village or to settle in one of the three camps: Mirpur, Demra and Tongi (Dattapara), the locus of which are within 5,10 and 15 miles respedtively from the heart of the city of Dacca. The conditions of the camps and the dwellers were appaling as sumed up by a responsible newspaper—'they had been slipped into hell with the Government's good intension'.[1] The authors of this paper undertook a case study of the resettlement schemes in order to understand more clearly the various aspects of the problem and devise, if possible, a set of guiding principles which would ensure better schemes in future.

The first impression derived out of the case study is that the schemes were prepared with no concern for the squatters' economic problems and social bonds. They were taken far away from their jobs without provisions for alternative employments or easy and cheap transport facilities. The entire squatter community was not moved as a unit which dismembered the common ties between people, organisations and the sense of community feeling. The rational procedure of any resettlement calls for a well-conceived 'pre-transfer, actual settlement and post-transfer' planning which was callously omitted all the way in this case.

It was not a humanistic approach towards the problem nor a comprehensive measure for a lasting solution. While the squatters were being removed, they were hostile towards the Government because they found themselves at a sea of uncertainty about the whole movement and their future. The result was a scene of misery, and many of them slowly tracted back to the city. The fallacy of the administrative measures helped to defeat its purpose. About 40,000 families were evicted, and yet provisions were made for and plots distributed to only 12,063 families. Nobody showed any real concern for the fate of the rest of 28,000 families.

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* The paper forms a section of the Monograph : *The Respuatting Problem in Dacca City—Some Policy Proposals for Resettlement* by Syed Abu Hasnath, published from Centre for Urban Studies, Dacca University, March, 1977.

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Hardly did they have any option for survival but to surrender to despair, starvation and ultimately to desperation. Many of these who even got the plots, fell ill, most of them underwent an extreme hardship as they lost employment and other regular source of income due to dislocation, and ultimately a significant number of the ill-fated destitutes succumed to death. Some other started deserting the camps in quest of old jobs in the city. Those who managed to hide themselves during the slum clearance operation, came out and joined them, in no time.

An Appraisal of the Resettlement Programme :

In these three camps about 12,063 plots, on average 14'0" x 25'-00" each had been allocated to the destitutes. Grid pattern layout and moduler units for shelter were used in the camp planning and designing. The shelters were repeated throughout the layout with twin and single units. The materials used in the camp housing were bamboo and straw for walls, and bamboo and polithylene for covering roofs. The floors were of clay and raised about one foot from the ground. Construction work was done by hired labours on payments, not on self-help basis. Site and services were given. Community latrines were provided but did not serve the purpose well. They were either filled up or destroyed by cyclone. In Dattapara and Mirpur the Community latrines were left unused and the dwellers made their own convenient arrangement, frequently out in the open. The situation in Demra gave a bit different picture. Community latrins were some how being used there. Sewage was collected in huge plastic bags. Latrines were taken care of by a paid latrine supervisotr. Still those were not clean enough to be hygienic. Water supply came from tubewells near-by which served the purpose fairly well. There were primary schools and dispensaries for the destitutes, one of each kind in each camp. These camp, were run by the Government with its own resources along with the contribution from and direct participation of international philanthropic organisations like "CONCERN", "WORLD VISION", "RED CROSS" "OXFAM" etc. Provision of other community facilities were in the process of development. Low-priced ration and doles were supplied to them at intervals.

As regards the tenure of land, however, Government has not yet decided whether destitutes will be rehabilitated in these camps permanently or any other suitable sites will be provided for. This uncerainty has resulted in a disincentive among the residents for taking proper care of their shelters. They do not feel those huts of their own, but simply holding possession of land with a hope that some day they might be granted a ownership gratis. However, in the .course of investigation, it is gathered that the settlers are now better off in terms of shelter, but worse off in terms of real income. Employment opportunities are very limited in scope and seasonal in nature. Commuting to and from place of work takes away lion's share of their earning and working hours. Children and women do not have any employment there. They cannot commute either. Shelter proves to be a very limited help because of its distant location from the place of employment. The case of Mirpur, however, depicts a different situation. The dwellers there are more or less content with the present condition, not that they do not want more, but they are in a less vulnerable position. Many deserters from the two other distant camps seek refuge in this camp.

The investigation offers us some more ideas of vital importance in dealing with squatters resettlement problem. For example : (i) there is a lack of clear understanding on the part of both:

the authorities and the welfare organisations operating there, about the needs, desire and aspirations of the camp dwellers, as well as the total resources that may be available at their disposal to meet the needs; (ii) some kind of arbitrary solutions are being imposed on the camps without having any regards even for the physical requirements ofthe inhabitants involved. To cite an example, the ten by sixten feet thatched huts for two families which have been built up there on a mass scale, seem to be inadequate for providing a minimum environment for life and living of the camp dwellers; (iii) the concept of voluntary labour mobilisation in low income housing process has no trace over there. It deprives a project of enjoiying some basic advantages to meet with success; (iv) it is observed that newly built-up huts are more vulnterable to the occassions of violent weather condition than their previous shelters of poorer quality. We wonder, whether fault lies with the geometry of design of the new huts; lastly, (v) the Government has drawn up an economico-physical plan for them, the layout of which is though a monolithic one, apparently looks quite ambitious, but nothing tangible, particularly with regard to employment has been achieved as yet. The welfare organisations have also certain programmes to bring an all round improvement of the camp-dwellers. With our all regards to their mission, we have a feeling that their efforts are purely temporary, and not oriented to the real crux of the problem. As regards shelter they have provided is uneconomic from durability point of view, and hence, in a sense, wastage of scarce resources too.

Conclusion : Some Policy Proposals :

As an aftermath of this ill-planned social experiment, there has been a continuous back flow of deserters towards the city which we term "resquatting". This problem of resquatting needs to be considered in three levels :

(a) resettling those who have already resquatted in Dacca City;

(b) putting an end to deserting camps by improving employment situation, ensuring better living environment and awarding permanent settling rights to the inhabitants over there; and,

(c) stopping new inflow of squatters, who are rendered destitutes by natural hazards and economic exploitation, through more extensive rural development projects, dispersal of footloose industries and thereby decentralization of urbanization. However, we will concentrate on the first level here for the purpose of the paper and attempt to develop a set of relevant policy-proposals and viable techniques designed to achieve a conceivable improvement of the existing harrowing living condition of the resquatters.

Despite their poverty, illetaracy and absence of skill, the squatters are self-selected enterprising group with high aspirations. They are generally hard working, depending almost entirely on themselves and are ready to bear economic risk and psychological cost of migration. These people play a critical role in the dynamics of urban growth and development. Most of them find a role for themselves in the urban economic milieu, do not pose so much a social liability. Therefore, the society must assist them to adjust and contribute their talents towards progress, rather than forcing them out of the city. A social tolerance and understanding is called for in establishing a good relationship between the citizens and the

so called floating population : squatters, which will ensure the latter a psychological rehabilitation and provide them with economic motivation. But this can hardly be achieved through social institutions alone or to quote Angle,[2] through the traditional 'paternalism' philosophy of squatter improvement, the idea of father-child relationship between the elites and the squatters. What is needed is the legal sanction from the authority in support of their right to stay in the city, and their representation in the local government while decisions relating to improving their lots are taken.

The fundamental issue is how to make available land for resettlement of the squatters at little or no cost because the squatters virtually cannot pay for land. So the crucial issue in the set of policy proposals for resttlements is the land policy—the location of the land, the availability of land, and the terms and conditions of providing land. The squatters cannot be settled in the central and middle zones of the city, because land econmics rules out the possibility of this sort of low-rise development, nor they can be removed far off the urban core since this will dislocate them from the proximity of their job. The only compromise left with us is to to settle them in the periphery of the city. Assuming that there will be government land available in the periphery, the question that comes to mind is what is the rational of providing the squatters with pieces of land. One reason may be that they are landless and poor. If this is to be the criterion, then the vast multitude of 37 per cent rural landless and unemployed,[3] may also claim this endowment. It does not require the stretching of imagination for that there may be a huge influx of the rural population into urban areas in order to avail themselves of this opportunity of having land gratis. Obviously the cure of a disease must not create fresh problems of higher magnitude. So it seems that a feasible solution would call for stringent conditions to be imposed on squatters for the bestowal of a piece of land as follows : (i) the squatters must be landless persons, (ii) he must have a geonuine and lucrative employment in the city, (iii) he must not be in possession of any plot in any other Camp (iv) the land must remain the property of the Government, he will be given a tenureship for many years, but not ownership right. This is to prevent speculation or other misuse. He must also undertake that no trade whatsoever shall be carried out there, and his family will keep the environment neat and clean. They should be on record of the local authority to ensure effecient administration.

Next, the local planning authority should concentrate on problem which the squatters cannot solve themselves such as, planning in relation to the city as a whole, and for the provision of service facilities like water supply, sewage disposal, roads, electricity and other elementary human needs including medicare, school and recreation. International agencies, we believe, may be interested in extending help of this sort. The UNIDO has already committed itself for such projects.

That the Ministry of Works and Urban and Developments should build high-density multi-storied low-income flats, provide civic amenities all around and distribute these to the squatters free of charge is obviously neither economically feasible nor socially justifiable. What we mean is the Urban Development Authority should provide them with a minimal guideline for a basic layout of their environment. Long before, Abrams[4] advised it, and John Turner[5] nourishes almost the same idea. We swould like that the authority should take note of this.

The size distribution of plots should be liberal so as to leave some space for cattle rearing, poultry farming and vegetable gardening which will ensure an additional source of income and employment as well as a regular flow of supply for kitchens. We suggest a free and active community living with (i) close connections between and among the settlement units, (ii) privacy and security from external threats and (iii) easy access to the nearby urban core. All community facilities should be centrally located. Communal privy did not serve the purpose well in the past. So the idea may be considered in favour of the family privy.

The resettlement programme faces a serious financial and material resource constraint which is quite challening. National resource is minimal, contribution of the resquatters is not significant either. The finding of a new "miracle" in cheap building materials and cheaper construction tehnology constitute a theoretical possiility without much practical content. The proportion of bourgeois technoloical revolution in low-cost housing has already been rightly discarded by many experts including Corea[6] and Angle[7], in the recent past. Traditional architectural and engineering penanceas are of no use to the poor squatters. Theoretical standards and illusive middle-class values which normally the technocrats conform to, have no place in solution for the present problem. The squatters ability to pay as down-payment plus monthly instalment is not sufficient enough to provide even a small corrugated shed on four pillars. Land-use trade offs between built-up core and open-to-sky space left around the sites is of limited avail. The only untapped resource is the physical labour of the resquatters which can be profitably utilised.

In the light of the foregoing analysis and above considerations, our conceptual framework is that existing urban housing process based on imported material, technolcgy and outlook should be put aside, at least for the time being, till the squatters econcmic condition improves enough to justify the process. Instead, they should be encouraged through some incentives from the Government to adopt their familiar rural housing methods with cheap, local and easily accessible building mateirals and with veracular tchnology. That will provide them at least a shed over their heads. If we look around the countryside, the original abode of the squatters, we find, people build up beautiful houses without the benefit of architects and engineers. We believe that given right kind of assistance and incentive the squatters themselves can become significant contributors in the solution of the squatting problem.

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PROBLEM OF ARCHITECTURE AS AN ESSENTIAL ART

Shamsul Wares*

Architecture is an art. This is the basic theme, the skeleton, around which an architect should build his own standard of work, thought and feeling.

Art is the work of man in contrast to the work of nature. A good architect concerns himself deeply with the understanding of man and nature. In this persuit he varifies and analyses all possible variables; rejects and chooses his work components. This never-ending process in which he is constantly involved to construct his perception, is his experience and through the richness of his experiences he builds certain standard. An architect through his work and experience explores himself to know himself, his extent and ability. And thereby he labours, suffers, and exerts his ability to establish new standard in his field of work; he in fact establishes new standard in the field of man's creative power.

Architect's creative activity is his art and art is only concerned with the result. To achieve this result he consciously arranges the components of his art object, recognises the human need that must be satisfied, chooses the techniques and materials most appropriate in the solution of the problem and sensitively organises the various elements into a satisfying whole. This elaborate process including the product is design. The drawing as the means of design is the abstraction of the reality. This reality is the result, the architecture, the art. The common man is concerned neither with art nor with the design process, he is usually concerned only with the function. Function involves an indication of efficiency achieved. But this particular aspect is not sufficient to complete architecture. A work of art consists of two other major aspects form and content. The duel between form and function is long over, Each has established its equal importance in architecture. Form refers to the physical components of man's environment, components which appeal to his senses and thereby are the basis for the perception of his physical environment. Content is the meaning, emotional or intellectual, conveyed by the artist. While the architect works with these aspects together, the client usually evaluates the design from the view point of the functional aspect only and as a result fails to understand the interactions of component design forces and the result as a whole.

Man's work, probably every work, requires logic and intuition in varied proportions. A bicycle demands more of logic in tits making and a piece of poetry calls for more of intuition in its composition. Architecture is probably the only branch of knowledge where logic and intuition work in equal proportion. By logic, architect makes his structure strong, protective from rain and sun and suitable for performing day-to-day activities and by intuition he makes the physical environment visually pleasing and effective to satisfy psychological and spiritual needs. Architect works in this manner in all his solutions. Logic is built by study, research and analysis; and intuitionery process springs from the perception of nature, understanding of human aspirations and from the unknown.

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Architect works from nothing. When he begins his project he begins from nothing and when he completes his project he ends in something. He creates something from nothing. Through this something created, he wants to tell the society something about the universe, about the nature, about the man or about himself. When the common man can understand some of the architect's original intents in the work, it becomes easier for him to appreciate the work and thereby the society gains in fruitful group interactions.

An architect broadly works for the society. But he is immediately concerned with his client. Next to client he is concerned with himself and other architects. When he concentrates all his efforts on the functional aspect only he can satisfy his client. With this apparent success he can gain popularity amongst the commons. But if he continues to do so, the built environment loses the quality to satisfy the psychological need of a society and as a result becomes lifeless. Probably with this fear for an eventual dead environment, Paul Rudolf declared "Any fool can design a functional building". Architect can satisfy his client without doing anything meaningful to a society. But this is not enough, he must be present in his work. He must satisfy himself and standardise his work for other architects. If individuals, society and the government is conscious of the pragmatic values of the physical environment of a nation, architects can work with greater freedom and choice for better life.

An architect's knowledge of the immediate past forms his contemporary mind. His cognition is based on knowledge of events and memories of personal experiences. The socio-economic and political changes, the technological innovations, scientific discoveries and changes in attitudes, ideas, thoughts and values—all these influence him and he in his turn makes his contribution in the social evolution for progress.

Architect like any other artist is lonely in his world. Though he usually works in a team, he has tremendous power to stay alone and to wait. He waits all his life for the the realization of something, something unknown and mysterious, something great and that is his art. Frank Lloyd wright had to wait for 12 years before he got a chance for creating a building like the Guggenheim Museum since he first conceived "Space in Motion" within a giant spiral interior. Infact, he could have waited for eternity for the realizatıcn of his visicn. Art is architect's aspiration, frustration and god.

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