Planning Strategies for the Development of Peri-Urban Area

The Case of Indore Peri urban Area

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***Abstract*— The intention of the study is to study the rapid physical development process operating in the rural-urban fringe area outside Indore Municipal Corporation in absence of a statutory Development Plan. The study is carried out for the peri urban area of Indore city looking to the pressure of physical development on the south-east area of Indore and variables changing like Demographic pattern, Land use and Infrastructure. So, it is significant to study the appropriate strategies of planning and management to solve the problems for future development.**

***Keywords*— Urban Agglomeration; Peri-Urban area; Urban Index; Rural-Urban Migration; Urban sprawl**

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I. INTRODUCTION

India's one of the largest urban systems in the world. The country is home to 53 million plus cities of India enumerated in the 2011 Census and nearly 31.2 % of its urban population resides in these cities [1]. In most Metropolitan cities in India, the urban population increases very rapidly because of socio-economic activities within the urban area, rural-urban migration for better job opportunities, education, transportation, housing, access to the basic needs and better quality of life. Nearest metropolitan city and major cities impacts the town, leading to its growth, expansion and change in their limits.

In the absence of any Urban Planning Policy, Indian cities grow in an unregulated and haphazard manner. As a result fringe's productive agricultural land gets converted to the urban uses in the response to the Spill-over Urbanization. Due to the unplanned and haphazard development in the peripheral areas of the city converts into a liability when it becomes part of the city so far as the provision of infrastructure facilities and basic social amenities are concerned. Whereas due to Institutional conflicts, development of these amenities becomes a dilemma, So there is lack of proper guidelines and monitoring systems at the institution level of Peri-Urban Area (Villages) unlike the urban areas, where there is comparatively strong Development Control Regulations, Planning Guidelines and Monitoring System attracts the people and developers to concentrate or to invest in these areas, particularly in the immediate peripheral area of the urban limit.

II. STUDY AREA AND LOCATION

The study is concerned with Indore city, a 2.0 million plus city today has transformed from a traditional commercial urban center into a modern dynamic commercial capital of Madhya Pradesh state [2] and one of the major logistics hubs in the country for all business activities. In 2001, Indore UA population was 1,506,062 (1.5 million) residents, whereas in 2011 it increased to 2,167,447 (2.1 million) [3]. With a population of more than 1 million, Indore UA qualifies as 15th among the 53 million plus cities of India enumerated in the 2011 Census [4]. It is rapidly urbanizing with a 2.8 percent annual growth rate over the 1990s. The city covers total area of 130.17 km^2 and has a population density of 9,718 / km^2 in 2011 and 166 (ppha) [5].

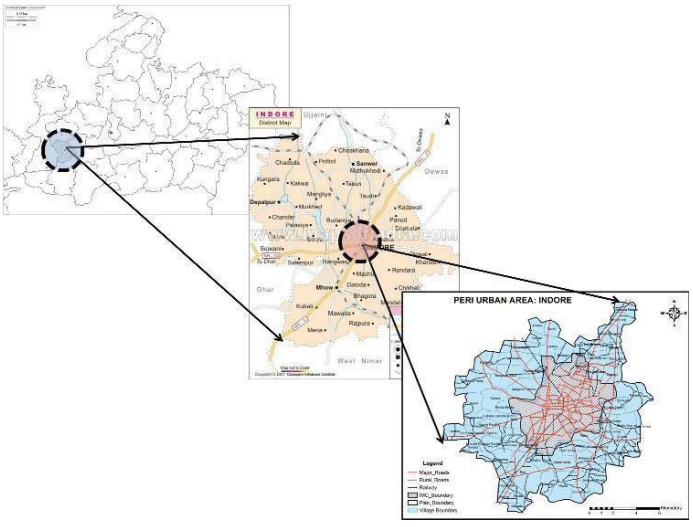


Fig 1. Study Area and Location

This Aim of the study is to understanding the planning strategies for development of the peri-urban area of Indore, with basic assumption that the process of peri -urban development. Also study some of variables of change in the peri urban area of town like Demographic pattern, Land use and Infrastructure. Therefore, it is significant to study the appropriate strategies of planning and management to solve the problems for future development.

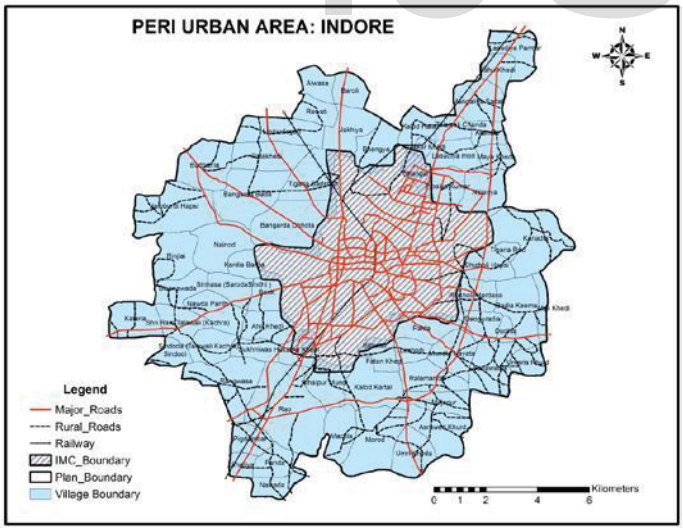
The study helps to understand the growth and development of fringe area, as follows;

- It helps in defining and demarcating peri urban areas.
- Study helped to understand the process of development of fringe area in various stages of development along with the land transactions processes.
- The study evolves the concept of the urbanization index, by which the villages in the fringe area of a metropolitan area can be checked for their behavior and the metropolitan region can be delineated on the basis of this.

III. STUDY AREA AND ITS GROWTH DYNAMICS

A. Delineation of Study Region and Peri Urban Areas:

Indore city is rapidly growing in all the direction and become an education, employment and service hub in the centre of India. The time to time spatial extension of the municipal boundary and up-gradation in the corporation indicate the rapid growth. In this situation Delineation of the study area is a complex process. The Bypass road around the Indore City is one of the major development nodes around the city and all the new development is takes place in that area. The growth direction of city is towards south-east periphery of Indore City.



*Source: IDA Indore

Fig 2 Peri Urban Area-Indore

The study area consists of Indore region:

• Focus on the suburbs of the new residential area of Indore.

• Study the predominantly touches the villages outside the IMC boundary.

• On the basis of secondary data, the present scenario of the fringes of Indore the Maximum extend of the urbanisable development is taken as 10 km from the city centre.

B. Demarcation of fringe zone and study area:

The fringe zone or the influence zone of the case study area is demarcated by calculating the Urbanization index and scaling it on urbanity scale. The different settlements or administrative units have their own influence zone which has their circle of influence which varies with the distance and parameter. After the fringe zone is demarcated for the Indore city, study area for the concern research is selected on the basis that it should represent the overall scenario of the region. So villages are selected on that basis. In all 7 villages are selected as the case study area.

C. Delineation Approach of Peri-Urban Area:

Patna: A Statistical Approach

For delineation of the fringe of Patna the method used follows these steps [6]:

- Calculate urban index for all villages Samples in fringe depending on 16 variables.
- Correlating the variables to find out the relation between any two variables.
- Determining the Scale of Urbanization.
- Determining the suitable methods (Mean, Median & Mode) to delineate Patna's fringe.

Grading of villages based on the index of urbanization which is to be calculated with the 16 variables using Sinha's method used for Patna. The variables are:

1 Density
2 Sex ratio
3 Literacy Rate
4 Decadal Growth
5 Percentage of Working Population
6 Percentage of Main Worker
7 Percentage of Marginal Worker
8 Percentage of Cultivators
9 Percentage of Agricultural Labour
10 Percentage of Other Worker
11 Number of House Hold
12 Size of House Hold
13 Distance from city centre in k.m.
14 Percentage of Agricultural Land
15 Average Land Value in Thousand/sq.m.
16 Number of BPL families

Urban Index (UI) Calculation:

Urban index of fringe village is calculated by index values of the town, village and fringe unit for which it is to calculate. For Factors which Decreases as we go close to the town the index value will decrease from town, fringe to the village. So the urban index will be:

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$$UI = (F-V)/(T-V) \times 100$$

For Factors which increases as we go close to the town the index value will increase from town, fringe to the village. So the urban index will be:

$$UI = (V-F)/(T-V) \times 100$$

Where, T, V & F are Index Value of Factor for sample Towns, Villages and Fringe respectively.
And is the weighted sum of the sub variables of that variable. Correlation among the variables is seen for sieving out the factors which do not exhibit any marked distributional pattern and have less degree of impact. K. Persons Product Momentum Correlation Coefficient for ungrouped data has been followed. The value of coefficient ranges from -1.00 TO +1.00. A correlation of +1 implies that one variable increases or decreases exactly with other. A correlation of - 1 denotes exact inverse relationship. Zero signifies no relation.

$$r = \frac{\Sigma XY}{N\sigma x\, \sigma y}$$

X = (m-x) & Y = (m-y)
Where, r = correlation coefficient, σ = SD or Standard Deviation, x & y = variables, m = mean of the variable concern.
The factors which show very less or no correlation are not considered wile calculating the scale of urbanity.

Scale of Urbanity (SU):

$$Scale\ of\ Urbanity = \sum_{n=1}^{n=13} UI$$

Where, n = no. of variables and UI +ve when Variable Decrease with Distance else –ve (see Table 1) [7].

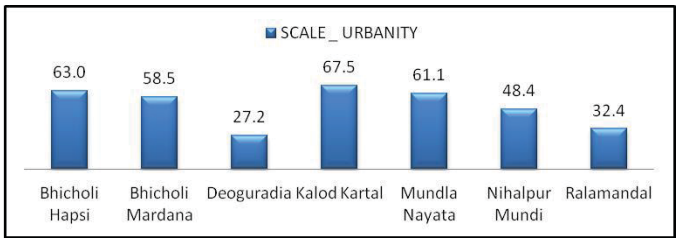

Fig 3Scale of Urbanity of the Selected Villages

D. Rural Urban Component

In the delineation of the study region, the Indore Planning Area consists of 67 rural areas. In these areas, 8 are in Sawar Taluka, 4 villages in Mhow Taluka and 55 of Indore Taluka. Out of these villages, 9 villages have Urban Component means these villages are already developed, and rests of 58 villages have rural component means these villages have not yet developed.

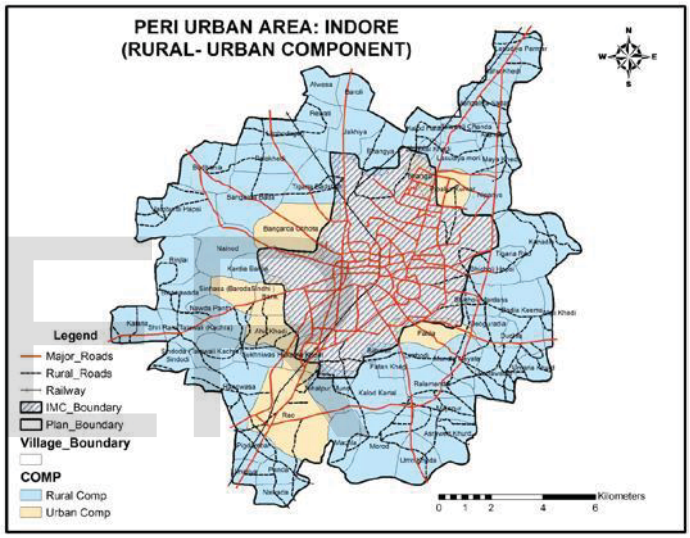

Fig 4 Rural Urban Component

Source: Census 1981, 1991, 2001

TABLE I. CALCULATION OF URBANITY INDEX AND SCALE OF URBANITY

Calculation of Urbanity Index and Scale of Urbanity

VILL_NAME	DENSITY	UI	SEX_RATIO	UI	LIT_RATE	UI	DECADAL_GROWTH	UI	%_WRKIN_POP	UI	%_MAIN_WORK	UI	%_MARG_WORK	UI	%_CULTIVATOR	UI	%_AGRI_LBR	UI	%_OTHR_WRK	UI	NO_HH	UI	SIZE_HH	UI	DIST_CITY_CENTER	UI	% AGRI_LAND	UI	AVG_LAND_VALUE (in sq.m.)	UI	No. of BPL Families	UI	NO_PARAMETER	SUM	SCALE _URBANITY
Bhicholi Hapsi	790	100	1206	93.3	57.1	87.3	116.4	100	18.2	82.6	18.9	88.7	15.3	38	15.3	16.8	4.4	0	79.7	100	899	95.8	5.3	12.1	7	0	11.7	30.1	8000	100	116	63.78	16	1008.4	63.0
Bhicholi Mardana	678	77.1	1236	100	51.2	65.6	89.0	70.4	12.8	51.6	14.5	62.7	5.5	8.3	20.9	28.9	10.5	21.3	68.4	83.5	631	59.1	6.0	80.2	8	25	11.7	30.3	7500	87.5	142	84.25	16	935.7	58.5
Deoguradia	303	0	1129	75.9	60.6	100	23.8	0	3.8	0	4.0	0	2.8	0	7.4	0	22.3	62.1	67.2	81.8	199	0	5.2	0	10	75	6.0	0	5000	25	54	14.96	16	434.8	27.2
Kalod Kartal	521	44.9	1055	59.2	54.4	77.1	60.9	40.1	21.0	98.4	17.5	80.2	35.6	100	27.8	43.8	17.5	45.5	49.1	55.3	930	100	5.3	10	11	100	25.0	100	5000	25	162	100	16	1079.5	67.5
Mundla Nayata	748	91.3	1134	77.2	33.3	0	70.0	49.9	21.3	100	20.8	100	23.1	62	20.5	28.1	10.1	19.8	67.8	82.6	806	83	6.2	100	9	50	16.6	55.5	5000	25	103	53.54	16	978.0	61.1
Nihalpur Mundi	387	17.2	1086	66.3	51.9	68.2	43.9	21.7	12.9	52.0	12.6	50.8	14.2	34.7	54.0	100	33.3	100	11.3	0	458	35.4	6.0	82.1	8	25	20.1	74.4	5000	25	62	21.26	16	774.1	48.4
Ralamandal	475	35.4	792	0	59.0	94.1	30.2	6.9	10.1	36.0	11.6	45.3	3.5	2.2	10.7	7.1	13.2	30.5	75.5	94.0	491	39.9	5.8	62.5	9	50	8.9	15.1	4000	0	35	0	16	519.1	32.4
TOWN	790		1236		60.6		116.4		21.3		20.8		35.6		54.0		33.3		79.7		930		6.2		11		25.0		8000		162		16	1079.5	67.5
VILLAGE	303		792		33.3		23.8		3.8		4.0		2.8		7.4		4.4		11.3		199		5.2		7		6.0		4000		35		16	434.8	27.2

Fig 5.

III. SELECTION AND DELINEATION OF STUDY AREA

Criteria for selecting the sample villages for the study:

- Proximity (Map), within a radius of 10-15 km
- Population Size
- Growth rate
- Density
- % of Non Agriculture Worker

All these variables were studied for 58 villages of three different Taluka (Sanwer, Mhow and Indore). On the basis of literature review and secondary analysis it has been found that the region covering these villages was urbanizing due to its connectivity, availability of land and vicinity to the core city.

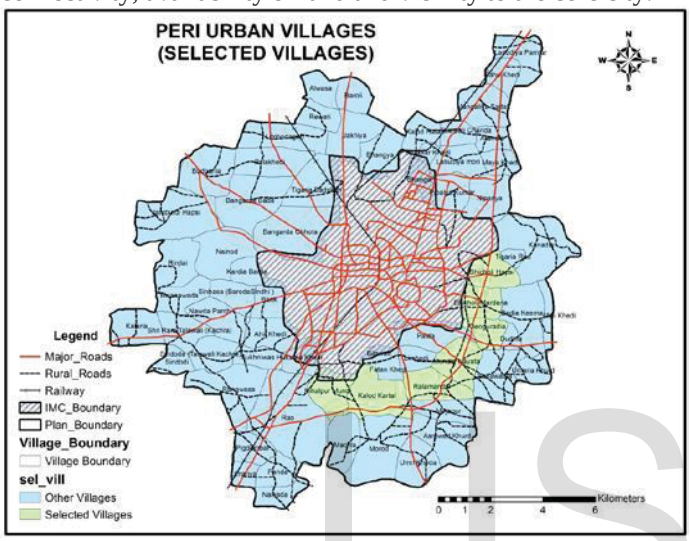

Fig 6. Selected Peri urban villages

So, as far as residential development is concern this urban corridor having highest potential of development and looking to the constraint of the study of the following villages has been selected as study areas. In the present study areas, 7 villages are selected on the sample 58 villages in the study. On the basis of Selection criteria, identified the top 30 villages in those 7 top priority villages or selected on the basis of selected criteria (see Table 2).

TABLE II. SELECTED VILLAGES

S.No	Name of Village	Proximity (KM)	POP 2001	Density	% of Non-Worker	GR 81-91	GR 91-01	DU Density
1	Bhicholi Hapsi	0-5	4809	790	65	67.07	116.43	5.3
2	Bhicholi Mardana	0-5	3796	678	69	40.81	89.04	6.0
3	Deoguradia	0-5	1041	303	67	34.56	23.78	5.2
4	Kalod Kartal	0-5	4956	521	61	54.08	60.91	5.3
5	Mundla Nayata	0-5	5005	748	61	56.60	70.01	6.2
6	Nihalpur Mundi	0-5	2764	387	57	60.48	43.88	6.0
7	Ralamandal	0-5	2869	475	68	34.72	30.17	5.8

All the villages are along the Bypass road and the city is growing towards north and northeast direction, which is one of the major corridor which connect the national highway No.3 (Agra-Bombay Road). Along this corridor, the growth was natural and majorly started in last five years. Mostly private developers' residential colonies and some housing board initiatives in these villages. These villages in the periphery area of Indore are along the bypass which connect to NH3 (Agra Bombay Highway) within 10-15 km Radius of Indore Planning Area Boundary.

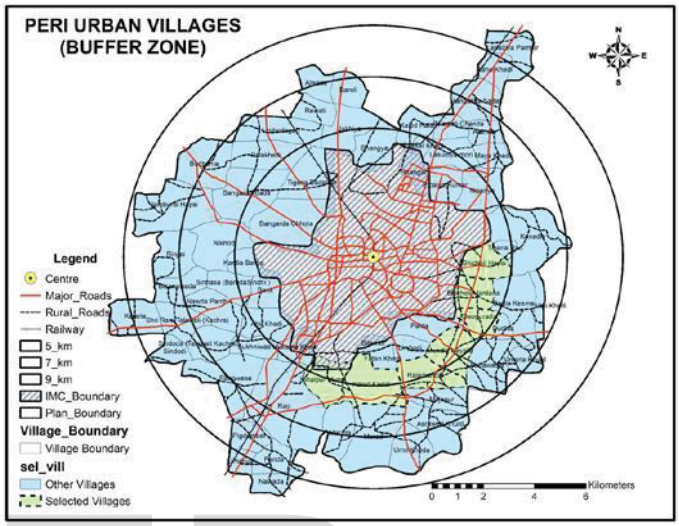

Fig 7. Location and Buffer zone

IV. PROFILE OF DEVELOPMENT

Urban development is permitted by taking permissions from town and country planning department in the planning area and the villages outside the planning area just have to take the permission from the concern gram Panchayat. And agriculture land has to be diverted by the NA Department for urban use. Following features for the existing development:

- The urban development in the study area continues without any guidelines in the absence of any master plan or development plan.
- As the region doesn't have any development plan, land use map, so haphazard and scattered development will takes place.
- Developments are taking place along the major roads, while the inner plots are also sold and vacant.
- The existing road network is not connected with the major road and no other roads are planned to cater the future and present traffic.
- The residential development is in progress at a rapid rate, however, implication of social facilities, civic amenities and infrastructure has not kept pace with it.

VI. MAIN FINDING AND OBSERVATION:

- Urban sprawl encroaching the agricultural areas, losing the agricultural interest

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- Land is sold but not yet developed, that means land speculators are working in market.
- Since there is no master plan/ development plan of the region, unplanned developments are taking place.
- There is lack of coordination among the administrative bodies.
- Though the villagers are selling off their land, but they are not selling off their residences, and preferring to travel to the city for basic needs. The social structure of the village is still rural because they are staying there.
- Construction of houses is taking place on agricultural land without taking proper permission from the collector (NA department), so productive agricultural land is lost.
- As such no higher government agency is looking after the development of the region it is inadequate in terms of provision of infrastructure facilities, amenities and local transport service is not available like AICTSL bus service.
- Dumping of solid waste and its partial processing in the existing landfill site is creating continued environmental pollution in the area.
- The area has ancient temple and wildlife sanctuary, but no attempt has been taken by the government to promote and maintained it.

VII. RECOMMENDATIONS:

Key policy areas for consideration with respect to peri-urban development include the following:

1. Prevention: i.e. to restrict the city from sprawling and creating fringes along the transportation corridors and city boundary. This can be done by levying conversion tax and development charges which will be progressive both in distance and time.
2. Price signals should be used in planning of the peri-urban areas.
3. Investment is likely to be highly localized within peri-urban areas, but this makes sense in that highly nucleated settlement patterns are more efficient (in economic, energy, and fiscal terms), conserve land, and provide better lifestyle opportunities. Public investment, not just for mega-projects such as airports and hi-tech zones, but also for civil infrastructure, can lead and guide peri-urban development, rather than just responding to it, encouraging development of relatively high density nodes.
4. Conserve the Agriculture land and rural livelihood by value added farming in the high Agricultural potential areas.

A. Planning framework for peri urban villages

In the context of the spatial planning, there is not any physical boundary or a limit that can define the two basic phenomena, one the developed area and another is undeveloped area. Boundaries on the ground and particularly in the context of urban area, it is mere an administrative boundary, which doesn't have any influence on the development forces, the market behavior, growth pattern and the pressure on land.

Urban and peri-Urban area are the confusion of the administrative boundary, in terms of administration it is very distinct and different but in terms of the growth pattern the difference cannot be clearly distinguished. There are appropriate framework and proper hierarchical institutional mechanism, for development in the urban area, in the city. But the other side is the development in the peri-Urban Villages; it is just an extension or expansion of the urban development. Proper Planning framework and institutional approach is also need for the peri-Urban Villages.

B. Development Control and Building Bye-Laws: Zoning Regulations

1. Present pattern of mixed land use have to be controlled and allocation of land for specific use.
2. Development of building and land for different purpose in different zones will be guided and controlled through appropriate regulation.
3. Non-conventional energy utilization and rain water harvesting would be encouraged and implemented.
4. Areas that are important from historical, architectural, environmental or ecological point of view will be indicated for preservation and conservation.

C. Appropriate approach for solving the issues in the peri-Urban Villages:

- Restricted Development Permission in the Peri-Urban Villages
  1. Villages located on the periphery of the urban area, should not be encouraged for the real estate development activities.
  2. Villages should be restricted for the rural land uses and activities, like agriculture, forestry etc.
  3. Land conversion from the agriculture to non agriculture should be very restricted and limited only for some specific Industrial, Institutional purposes and very low density residential purposes in terms of farmhouse development with 0.1 FSI.
  4. The development activities should be encouraged within an urban area, by giving benefits of extra FSI and Transfer of Development Rights.
- Extending the (Urban Development Authority) limit
- Village Development Plan

D. An appropriate strategy for the development of the peri-Urban Villages:

- Demarcation of Indore Region based on the *Economic Activities and Manageable* distance for daily commuting.
- *Planning and Designing* integrated infrastructure, regional transportation corridors and road networks.
- *Demarcation of different zoning*, based on the Land Suitability Analysis
- Preparation of *area level planning framework* for new Urban Areas, Suburban areas and Special Planning areas.
- Regulation for the Development Control, and monitoring by the VDA.

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VIII. CONCLUSION:

Metropolitan cities grow and expand, very rapidly change their limit. The villages located surrounding often come under the influence of urbanization and pressures, depends on the direction and intensity of growth of the city. Villages located today in the peri.-Urban Area, agglomerates in future within an urban area. The lack of proper guidelines and monitoring systems at the institution level in the situation of peri- Urban Area (Villages) than within the Urban areas where, there is comparatively strong Development Control Regulations, Planning Guidelines and Monitoring System; often attracts the people and developers to concentrate or to invest in these areas, particularly in the immediate peripheral area of the Urban limit. Gradually the area develops in absence totally absence of planning.

Acknowledgment

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