UNIT 11 PHYSICAL INFRASTRUCTURE AND DYNAMICS OF DISTRIBUTION

Objectives

After going through this Unit you should be able to

- Describe the variables involved in the process of physical distribution
- Explain the interactions among these variables as they affect the physical distribution outcome.
- Appreciate the scope and nature of the physical distribution activity in rural India
- Discuss the various indices and ratings of use to market planners in outlining their distribution strategy
- Describe the rural infrastructure for physical distribution in terms of road and transportation connectivity
- Comment upon the impact of seasonality of demand on the stocking patterns.

Structure

11.1 INTRODUCTION

Rural markets in India have presented a typical challenge of access, both in physical and communication terms to the marketers of goods and services. Although nearly three quarters of the country's population resides in the local areas, their dispersion is so wide and vast that is presents a unique challenge of access. Added to that is the poor infrastructure in terms of road connectivity and transport linkages which make the reach to these markets even more arduous. However the recognition that these markets represent untapped potential and that the first brands to capture the interiors would have a natural advantage has focussed corporate attention to solve the distribution rubric. This unit familiarses you with the challenges involve in the physical movement of goods in the rural context. Issues of warehousing, inventory control and transportation take unique dimensions in view of the physical infrastructure available and in terms of their implication for customer service. An attempt has been made to expose you to the road network available as well as the measures of market potential in a village cluster, to enable you to identify your physical distribution decision alternatives.

11.2 DYNAMICS OF PHYSICAL DISTRIBUTION

The physical distribution job involves a large number of independent variables. Stock and Lambert (1987) have identified the following:

- **Customer Service:** The customer service here relates to the effectiveness in creating time and place utility. The level of customer service provided by the supplier has direct impact on the cost, market share and profitability.
- **Order Processing:** Order processing triggers the logistics process and directs activities necessary to deliver products to the customer. Speed and accuracy of order processing affect costs and customer service levels.
- **Logistics Communication:** Information is exchanged in the distribution process in order to guide the activities of the system. It is a vital link between the firm's logistics system and its customers.
- **Transportation:** The physical movement of products from the source of supply and production to customers is the most significant cost area in logistics and it involves selecting modes and specific carriers as well as routing.

- **Warehousing:** Providing storage space serves as a buffer between production and use.Warehousing may be used to enhance service and to lower transportation costs.
- **Inventory Control:** Inventory is used to make products available to customers and to ensure the correct mix of products at the proper location at the right time.
- **Packaging:** The role of packaging is to provide protection to the products, to maintain product identity throughout logistics process and to create effective product density.
- **Material Handling:** Efficient materials handling increases the speed of, and reduces the cost of, picking orders in the warehouse and of moving products between storage and transportation carriers. It is a cost generating activity and that must be controlled.
- **Production Planning:** Utilised in conjunction with logistics planning, production planning ensures that products are available for inventory in the correct assortment and quantity.
- **Warehouse Locations:** Strategic placement of warehouses increases customer service and reduces cost of transportation.

The efficiency of an individual function, examined in isolation, may be quite different from the effectiveness of the same function considered as part of the total physical distribution process. Therefore, in order to achieve a better cost-efficiency balance of the system as a whole, it is imperative that compromises are made among the functions.

Cutting cost, while at the same time improving efficiency, is the primary aim in organising a physical distribution system. Costs have to be cut, but within the constraints of uncontrollable variables (rural environment). By cutting costs, the speed of delivery may be affected; the reliability and service may be affected. Costs will have to be reduced, but the process should not result in these undesirable consequences. It is necessary to evolve and implement a physical distribution system that is best suited to the rural environment, the object being minimization of distribution cost, as well as, guaranteeing at a minimum desired level of service.

Activity 1

From your exposure to the Indian rural markets through Units 1 and 2 , draw out a possible physical distribution scenario for a consumer durable product and an FMCG product in terms of what form the following variables would take

1. Transportation
2. warehousing
3. Inventory
4. Customer service7

you make like to talk to an organization which you are familiar with to have a first hand insight into these variables and then complete this activity.

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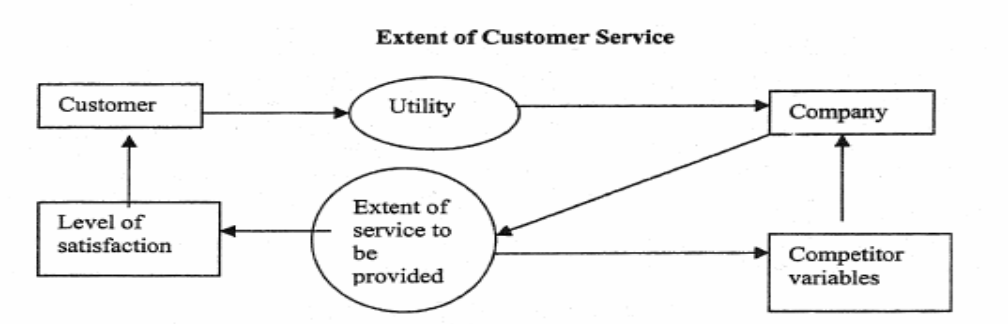
11.3 EXTENT OF CUSTOMER SERVICE

While it would be ideal for a company (manufacturer) to provide the most speedy delivery to the customers, it may not be cost effective for the company. There is therefore a need to decide-on the extent of service to be provided to the customers.

The extent of service to be provided would depend on three entities. They are the customers, the competitors and the company. While the customer would demand a certain level of utility, the company would wish to provide the least possible service as it would entail costs. However, the competitors would determine the minimum level of service that should be provided to the customers. The interaction between the three entities would therefore be as under:



The physical distribution system is thus measured by:

- The speed with which an item can be made available to a consumer
- The reliability of service.
- The extent of availability of the item.

The physical distribution system is, however, a function of many uncontrollable variables. For example, the poorly developed physical infrastructure is the major constraint at present. Many parts of rural India are still inaccessible through roadways. The problem gets aggravated during the monsoons. All these result in:

- Extension of lead time between production and consumption resulting in substantially higher level of stocks in the pipeline.
- Increase in inventory and inventory carrying costs.
- Increase in transportation and storage costs
- Risk of deterioration, damage, theft, pilferage.
- Increase in the number of middlemen, resulting in increased cost of distribution and selling.

The prime objective, therefore, will be to design and implement a system that is most suited to the patterns of the marketing activity as well as the physical distribution system of the rural markets. Developing an effective distribution system in the rural areas poses further problems and challenges on the side of the dealer organizations as well, since the right type of dealers and stockists are not readily available in the rural areas.

All these problems get further aggravated on account of the large size and the scattered nature of the market.

The importance of the different elements of rural marketing strategy have been highlighted by two studies undertaken on the subject of factors affecting success in rural markets. The findings are summarised below.

Element	Study 1		Study 2	
	Score in %	Rank	Score in %	Rank
Pricing factor	10	V	15.65	V
Sales factor	20	IV	23.15	II
Distribution factor	23	II	20.76	III
Product effort factor	22	III	23.59	I
Communication factor	25	I	16.85	IV

Activity 2

Get in touch with either an FMCG company office or a fertilizer/seed products company office. In respect of the problems mentioned above, discuss with the company, how they have sought solutions to these problems. Describe the solutions used

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11.4 SCOPE OF THE DISTRIBUTION TASK: DISPERSAL OF VILLAGES IN INDIA

As you have already seen through Unit 1 and 2 of Block one. India's rural market comprising of over 600,000 villages with a total population exceeding 700 million is characterized by its vast spread. Over a lakh (about 18%) of the total villages have population less than 200. Another 1,41,143 (24%) villages have population between 200 and 500. A total of 13, 376 villages have population over 5,000 (refer table 1). Of these nearly 10,000 villages (nearly 75%) are in the seven states of Uttar Pradesh, Bihar, West Bengal, Maharashtra, Andhra Pradesh, Kerala and Tamil Nadu.

Table 11.1 Distribution of Villages in India

Village Class	No. of villages	Percentage	Pop (in lakhs)	Percentage
Less than 200	103952	17.9	105.32	1.69
201-499	141143	24.3	484.62	7.78
500-999	144998	24.97	1043.57	16.76
1000-1999	114395	19.70	1602.94	25.74
2000-4999	62915	10.83	1855.73	29.8
5000-9999	10597	1.82	698.39	11.21
10000 & above	2779	0.48	437.57	7.03
Total	580779	100	6228.12	100

Source: RK Swamy/ BBDO (1999) Guide to Market Planning, RK Swamy/ BBDO

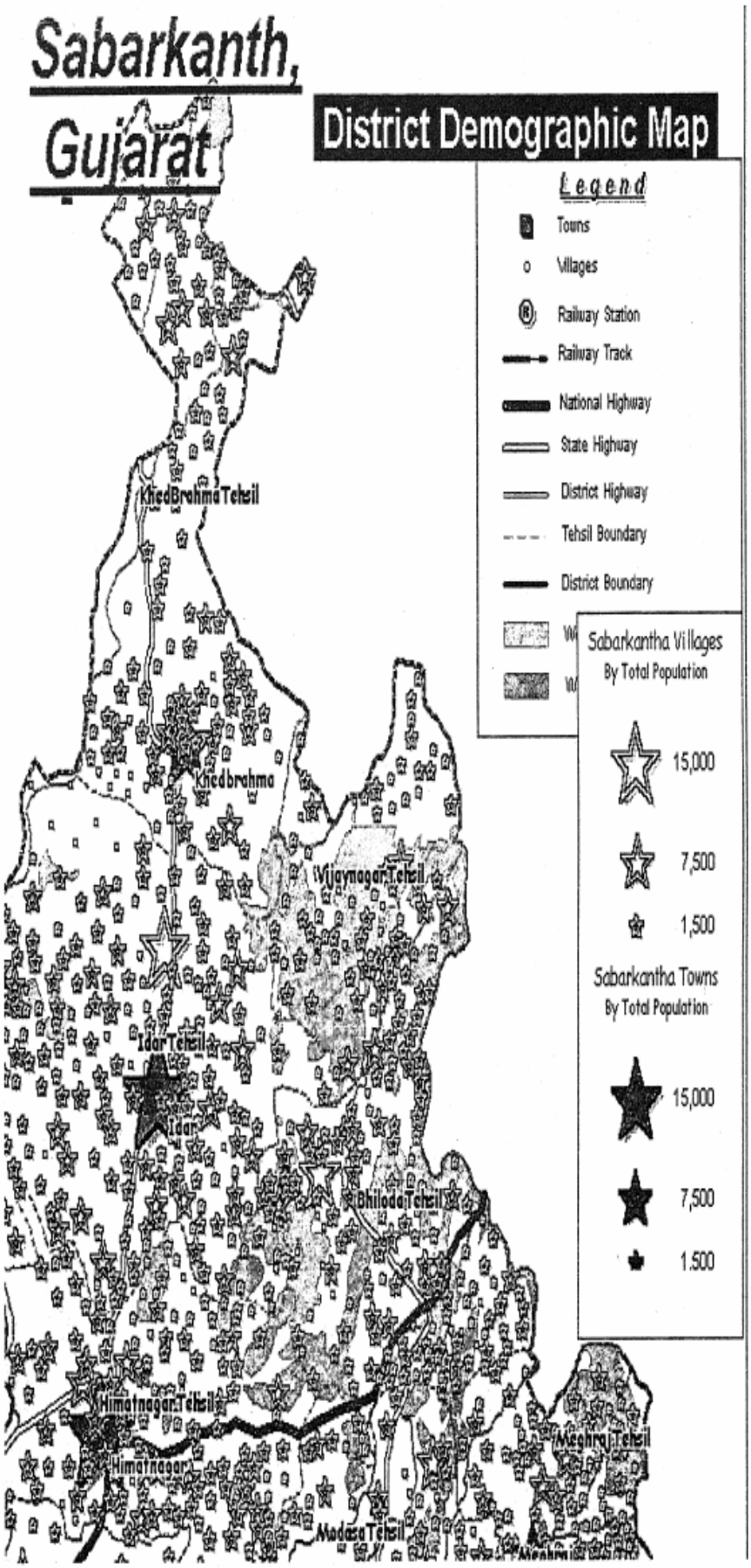
A number of measures have been developed by different agencies to help the rural marketer in conceptualizing the physical and infrastructure situations in rural India and help plan his marketing strategies specially the distribution function. Some of the important measures are discussed in the following section to help you get an idea about the type of information you would require for the distribution planning and implementation exercise.

Location of villages: MICA Rural Market Ratings (MRMR) provides digital maps of all the districts in the country including those of Jammu & Kashmir (J&K).

Digital Maps cover:

- Boundary of the district
- Location of tehsil headquarters
- National highways
- State highways
- Metalled roads
- Railway lines along with railway stations
- All the urban centres
- Names of all the 41,888 places where haats are held
- Days of the week when haats are held
- Distance from the nearest town

A sample map is provided in figure 1. We will read further about MRMR and the way it is being used in the next section.



http://www.mappls.com/mapstore/map_store_dataware_house/product_list.asp?page=ms&link=dm

Figure 11.1

11.5 MARKET SIZE ACROSS RURAL INDIA

A detailed analysis of poverty statistics suggest that during the reforms period not only was there no secular decline in poverty but actually there was an addition of 70 million people to the poverty category between 1989-90 and 1997. Importantly, during the 1980s, when between 1983 and 1990-1 the incidence of poverty declined by 3.1 per cent per annum, the GDP growth per annum was 5.6 per cent. Almost as a reversal of the situation, between 1990-1 and 1997 the incidence of poverty increased by 1 per cent annually, although the GDP growth had accelerated during the same period (table 11.2).

Table 11.2: Dimensions of Poverty and Inequality in Rural India, 1973-2000 (million) Index.

Year	Poverty Ratio	No. of Poor million	Poverty Gap	Lorenz Ratio Index	No. of Rural and Urban Poor (million)
1973-4	56.4	261.3	16.56	0.27581	321.3
1977-8	53.1	264.3	15.73	0.33861	328.9
1983	45.7	252.0	12.32	0.29759	322.9
1987-8	39.1	231.9	9.11	0.29826	307.1
1993-4	37.3	244.0	8.45	0.28190	320.3
1999-2000	27.1* 24.0**				

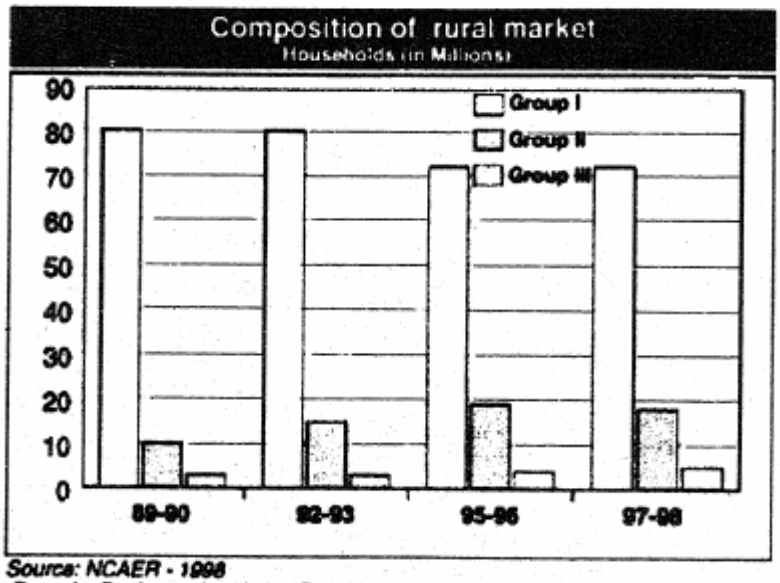
* Based on 30 day recall; ** Based on 7 day recall.

Source: Ninth Plan (1997-2002): Institutional Development at *http://planningcommission.nic.in* and Economic Survey 2000-2001 at

http://www.nic. in.

However, the market size for products priced over Rs. 1000 has been increasing. A study done by NCAER is given in figure 11.3. Tables 11.3 and 11.4 also provide a glimpse the market size.

Table 11.3



Source: NCAER - 1998
Group I = Products priced below Rs 1,000
Group II = Products priced between Rs 1,000 and Rs 10,000
Group III = Products priced above Rs 10,000

Table 11.4

Estimated households by annual income		Structure of the Indian consumer market (1995-96)				
Annual income (in Rupees) at 1994-95 prices	No. of households (in million)	Annual income (in Rupees) at 1994-95 prices	Classification	Number Households(in million)		
				Urban	Rural	Total
<25,000	80.7	<16,000	Destitutes	5.3		33.0
25,001-50,000	50.4	16,001-22,000	Aspirants	7.1	36.9	44.0
50,001-77,000	19.7	22,001-45,000	Climbers	16.8	37.3	54.1
77,001-106,000	8.2	45,001-215,000	Consumers	16.6	15.9	32.5
>106,000	5.8	>215,000	The Rich	0.8	0.4	1.2
Total no. of households: 164.9 million		Total no. of households		46.6	118.2	164.8
Source: National Council of Applied Economic Research (NCAER).						

While it is important to know the size of the market it is also important to know how to plan based on the market size of specific markets. Several agencies have been providing information about specific markets.

11.5.1 Thompson Rural Market Index

A successful attempt in the direction of assessing the potential of rural markets has been made by Hindustan Thompson Associates Limited. They have developed the `Thompson Rural Market Index' as a guide to the rural marketing effort. The first attempt was made by them in the year 1972. They collected the data available at district level for 334 districts. Then they identified 11 factors and assigned a weightage to each of them to assess the potential. This was not considered satisfactory and hence, another attempt was made. In the second 26 factors were considered for constructing the rural market index. This has been published under the name Thompson Rural Market Index in 1986. Herein HTA covered 383 of the 412 districts in the country, since data was available for only these districts and the Rural Market Index was ultimately worked out for 335 districts. The districts not taken into account either do not constitute rural areas or have very small rural population. The data on the following indicators was taken for constructing the Rural Market Index.

Indicators Considered for Rural Market Index

1. Area of the district in Sq. Kms.
   Demographics
2. Population: Rural No.
3. Males No.
4. Females No.
5. Density per sq km.
6. Percentage distribution of population by population strata.
7. Number of Villages.
8. Percentage distribution of villages by population strata.
9. Literate - Rural No.
10. Per cent of literacy.
11. Literate Males.
12. Literate Females.
    Occupation Pattern
13. Cultivators No.
14. Agricultural labourers.
15. Non-agricultural labourers.
    Agriculture Related Data
16. Gross cropped area in hectares.
17. Gross irrigated area in hectares.
18. Area under non-food crops in hectares.
19. Average size of operational holdings in hectares.
    Agricultural Inputs Data
20. Pump sets and tube wells No.

21. Fertilizer consumption in metric tones.
22. No. of tractors.

Rural Electrification Data

23. Percentage of villages electrified.

Commercial Banks Data

24. No. of rural branches.
25. Deposits in Rs. Lakh.
26. Advances in Rs. Lakh.

In addition, HTA also collected the value of agricultural output for each district from the Centre for Monitoring Indian Economy, which was to be the overall indicator of rural market potential, since the major occupation in rural areas is agriculture. To validate this assumption that the value of agricultural output is a holistic indicator of rural market potential, a statistical correlation analysis was conducted with 10 selected variables related to agriculture with the value of agricultural production. The selected ten agriculture-related variables were

- Agricultural labourers
- Gross cropped area
- Gross irrigated area
- Area under non-food crops
- Pump sets
- Fertilizer consumption
- Tractors
- Rural credit
- Rural deposits and
- Villages electrified.

It was found that these ten variables had a very high correlation with the value of agricultural output ranging from 0.52 to 0.79. The index also presents the data for each district on the 26 variables chosen. What is needed now is to update the data chosen to know the potential. Rural marketers intending to use the index apply updated information.

Based on the index number, the districts have been classified as A, B, C, D and E class markets. Table 11.5 summarises the classification of the districts and the proportion of rural market they account for.

Table 11.5: Classification of Markets.

Class of Markets	Index Range	No. of Districts	Percentage of Market
A	60.00 to 100.00	22	17.8
B	40.00 to 59.99	39	20.5
C	30.00 to 39.99	54	20.4
D	20.00 to 29.99	86	23.0
E	below 20.00	154	18.3
	Total	355	100.00

It is significant to note that the index relies on the ten factors related to agriculture, which have been chosen for the correlation analysis. Any change in these variables like, increase in irrigated area or increase in area under commercial crops will have a positive impact on the potential. In other words, any change in these factors on the positive side will increase the value of agricultural output, thus the income of the rural people.

One can probably add other factors like road length per sq km in the district, railway lines per sq km, number of post offices, number of Television sets, number of two wheelers, etc. to have further validation of the potential given by the index. To summarise, the rural demand has peculiar characteristics in terms of its spread, literacy rate, hierarchy of markets, per capita income, etc. which differentiate it from urban demand. Since nearly 70 to 75 per cent of income generation in rural areas is through agriculture and agriculture-related activities, the variables related to agriculture can be safely assumed to be the indicator of the potential of rural market. The Rural Market Index prepared by Hindustan Thompson Associates, has proved very useful in evaluating the potential of the rural markets.

Market Information Survey of Households (MISH) is another comprehensive primary data-base developed out of annual surveys conducted covering a massive sample size of 300,000 households drawn from each district of India. MISH tracks consumer demographics and consumption patterns across a wide variety of product categories by collecting data on manufactured goods.

Each MISH Product Category Report gives detailed information on both consumables and consumer durables according to:

- The number of households owning/using the product by income group.
- The income group, town size and the occupation of the household head's occupation (purchase data for the product is cross-tabulated against the above parameters).
- The key influencer of purchase, details on the mode of finance of purchase for durables. 0, Product purchase by price range across different income groups.
- The brand-wise penetration figures across income groups.
- Distribution of purchases by price range and by income class.
- Overall purchase broken down by type of purchase - first time, additional, replacement, gifting and second hand

Table 11.6: Classification of Districts based on MESH studies.

Class of Market	Ratings Range	No. of Districts	Ratings Score	% of all India
A	60.00-100.00	33	2418.67	19.13
B	40.00 59.99	75	3656.55	28.93
C	30.00-39.99	76	2656.91	21.02
D	20.00-29.99	89	2130.83	16.86
E	Below 20.00	172	1778.50	14.07
All India		445	12641.46	100.00

Mica Rural Market Rating (MRMR): MICA Rural Market Rating is a comprehensive guide which is designed to serve Industry's needs. Data has been collected based on the 1991 census is reports. All the 459 districts of the country have been covered. A total of 42 socioeconomic indicators have been included to cater to the diverse needs of a large number of conc. v lies. Districts have been taken as units and the rating denotes the relative market potential: f the respective districts (Table 11.7). MICA Rural Market Rating is presented in a comprehensive, interconnected and actionable database to provide better understanding of the rural, market. This study is presented on a CD-ROM. Using these databases it is possible for marketers to have a fairly comprehensive idea of the market potential and related infrastructural variables defining a rural market, so that the physical distribution effort can be suitably planned. The MRMR is a useful and comprehensive aid to rural marketing planning.

Table 11.7: Top 20 districts as per Mica Rural Market Rating (MRMR)

District	State	Market Ratings
Medinipur	West Bengal	100.00
South Arcot	Tamil Nadu	95.91
Ganganagar	Rajasthan	94.1
Sangrur	Punjab	91.33
Guntur	Andhra Pradesh	89.3
Firozpur	Punjab	86.15
Raipur	Madhya Pradesh	85.48
Faridkot	Punjab	81.69
Moradabad	Uttar Pradesh	80.98
Begaum	Kamataka	79.2
Deoria	Uttar Pradesh	74.96
Ludhiana	Punjab	74.9 1
Thanjavur	Tamil Nadu	71.07
Hisar	Haryana	70.24
Gonda	Uttar Pradesh	69.82
Tiruchirapalli	Tamil Nadu	69.09
Jalagaon	Maharashtra	68.99
West Godavari	Andhra Pradesh	68.91
Cuttack	Orissa	68.72
Bhatinda	Punjab	68.52

Activity 3

Based on your understanding of the rural market index, and the classification given in Table 11.5, assess the market potential for any one consumer product of your choice for your own district. How do you think this index can be applied by marketers to predict their inventory and warehousing positions in a given district.

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However, the widespread dispersal of rural markets and rural population creates significant problems in terms of logistics, transportation, and distribution of stocks and coverage of retailers. Let us look at some of the infrastructural variables that define the distribution situation in rural India.

Roads

A crucial pre-requisite for the development of rural markets is a network of roads, to connect the villages to towns, to transport products to the rural households. A good part of Kerala's development achievements must be attributed to well-developed road and transport links throughout the state, transforming the urban-rural divide into a continuum. Absence of all weather roads makes it impossible for lorries or vans to cover interior villages, to serve the retailers there.

- Just about 48 % of the villages are connected with all weather roads (Table 11.8).
- At an all India level 209,360 villages or 33% of total villages are connected by pucca roads. This proportion is maximum at 57% in south zone and minimum at 20% in east zone. Pucca roads connect almost all villages in Punjab, Kerala and Pondicherry.
- There are only 7,271 villages with railway stations. This forms 1.2% of total villages. Kerala is the best state in this regard with 8% of villages having a railway station.
- About 36% of the villages in the country do not have road connections. Inaccessibility of villages makes it difficult and uneconomical in serving the villages with goods.

Table 11.8: Road Coverage

Roads by type and characteristics	India
National (km) Municipality (km) Rural road length (km)	144 832 143 537 1 555 051
Total road length km	1 843 420
Percentage surfaced Percentage of rural to total road length	48 % 84 %

Source: http://www.partners.panasia.org.sg/nird/ind_market.htm

Recently, the Government of India launched a special programme known as "Pradhan Mantri Gram Sadak Vikas Yojana" (Prime Minister's Rural Road Project) to provide full connectivity to villages in the country. Under this scheme, all the villages having 1000 and above population will be connected by the year 2003 and settlements having 500 and above will be connected by the year 2007 by all -weather roads.

The road network can facilitate systemised product distribution to terminal village networks. In deciding the system of transportation, many factors like rural roads network and types of roads, modes of transport, nature of product, distance to be covered, speed with which the goods are transported, cost of transportation, etc. must be taken into account.

Where accessibility is a problem, companies have to rely on trickle down of stocks to the village-based buyer; then it is the village retailer who visits a bigger retailer in the nearest tehsil level town, who in turn obtains the product from district headquarters which is the terminal point of the company distribution channel. This has also been one of the reasons for some companies not shifting their sights to the rural market. “Our logic is that if we are well distributed up to the urban areas, surrounded by villages with a lot of untapped potential for

our products, the products will find their way into the rural areas also through the rural retailers," said an executive from Gillette.

Generally, retailers in remote villages buy their requirements from wholesalers in large feeder markets. They then carry the goods themselves, or on a bullock cart. Due to this, they are unable to buy the goods in large quantities to avail the bulk discounts. Moreover, they have to travel frequently to feeder markets to replenish their stocks. In case the retailer is unable to travel for some reason, then he will face stock out situations. And this is common during agricultural seasons when he could be busy with the work in his own fields. Retailers in small villages, which have a population up to 500 to 1000, do not carry a large range of consumer products. These village retailers cannot afford to visit feeder markets or small towns. Such villages are generally catered by the weekly shandies/ haats which we will discuss in the next unit.

Activity 4

In terms of available infrastructure, how does the availability of road network affect the other related physical distribution variables like transportation ,warehousing and customer service? Talking the example of products like detergent ,seeds and fertilizers , comment upon the interaction

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11.6 SEASONAL DEMAND AND DISTRIBUTION IMPLICATIONS

The distribution of any product in the rural areas, agricultural inputs, consumables or durables should necessarily follow a seasonal pattern. Since 75 per-cent of the rural income is generated through agricultural operation, which is seasonal, the demand pattern is also seasonal. A typical example is that of fertilizers. The demand for fertilizer is always high during the start of Kharif and Rabi seasons. The fertilizer manufacturers have evolved a distribution pattern, so that the seasonal demand can be met. Likewise, the demand for consumables and durables will be high during the peak crop harvesting and marketing seasons. This is the time at which the rural people have substantial cash inflows. Hence, the distribution should be fairly intensive during peak crop harvesting and marketing seasons. This arrangement would result in adequate sales realizations. During summer months, in places that lack irrigation facilities, the demand will be very minimal. Thus the distribution system has to gear itself to the seasonal pattern of demand. In addition, festival seasons like Sankaranthi or Pongal in Southern regions as opposed to Baisaki or Deepavali in North are also demand seasons. The festivals also coincide with the harvest seasons like Sankarnathi during Kharif harvest and Baisaki during Rabi harvest. So the distribution for rural areas should be more and frequent during harvest and festival seasons, as opposed to a fairly uniform demand pattern in urban areas.

You would appreciate that such seasonality would have important implication of or the inventory and transportation decisions. As the seasonality causes demand to fluctuate around predictable time lines, transient market structure like haats and melas, have typically been found to characterise the rural market situation. Melas or fairs often coincide with important harvest or festival seasons and enable the marketer to time his distribution patterns with surge in purchase behaviour of the rural customer. These structure are an important participant in the rural markets and will be the theme of the next unit.

11.7 SUMMARY

The physical distribution function, is one of the most complex marketing functions as it involves a lot of variables, quite a few of which the are result of extra corporate arrangements. Variables like physical infrastructure of roads, warehouses and transportation modes are important variable which affect the rural distribution decision. In this unit, an effort has been made to acquaint you with the variables that affect the rural distribution function, several measures developed to measure market potential and their utility to distribution decisions has been discussed. The road network as exits today has been outlined to enable you to get an idea of the constraints which the distribution function has to operate.

11.8 SELF ASSESSMENT QUESTIONS

1) How does physical infrastructure affect the distribution choices available to marketer?
2) It has been said that 3Ds impede the marketing function in rural India, these are distance dispersion and diversity. What are the ways in which some of these constraints can be overcome? Suggest solution for
   a) marketers of consumer goods
   b) marketers of life insurance
3) How would the Thomson Market Index enable a marketer to take appropriate marketing decisions? Critically comment upon the utility of the tool.
4) The MRMR combines a wealth of data and seeks to create an "almost alive" representation of a village cluster, do you agree? How would it be useful to marketers?
5) Are rural markets simply extensions of the urban market in more difficult terrain with consumers a little more spread out and transportation a little more 'dicey'? From a distribution perspective, clearly outline the key differences between urban and rural market scenario.

11.9 SUGGESTED READINGS

1. Dr. Y.R. S. Moorthy, "We're like this only, "April 10, 2002 www.indiatimes.com
2. Venkatesh Parthasarathy, "Does the rural market like it hot or cold "April 25,2002 www.blonnet.com
3. Lahari Chakravarthy Sanat, "A peek into the rural market, www.estralegicniarketing.com July,8,2002
4. Pradeep K, "Rural People look to Urbanities, Advertising and Marketing, January 15, 2000.