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INTRODUCTION
Chapter One

*[**Summary:** In this study we are assigned to work on a project about identifying the regional shopping behavior analysis. Our respected course teachers have given us the opportunities to select definite Unions of the Khulna. We have selected the Union Rangpur and are optimistic to get a better result about the shopping analysis of that Union.in this chapter the background of the union Rangpur is elaborated. Under the introduction chapter background of the study, objectives and aims, limitations and rationales are mainly described. This introduction chapter holds am Important view about our union.]*

1.1 Background of the study

The shopping analysis behavior analysis is constructed on the origin of gravity models and concept of human interaction. In our study area Rangpur Union, we have 5 markets and most used ones are katakhal bazar, sholua bazar, sharatola bazar. For the market analysis behavior, the main idea is to use the gravity concept of human interaction. Shopping development in one part of town might be well furnished and again in another part may be not so well furnished [1]. Sometimes it is seen that in some markets there are products available, but in other markets products are not available so people need to go to different markets to the need purpose. The basic assumption concerning many spatial interaction models is that owns are a function of the attributes of the locations of origin, the attributes of the locations of destination and the friction of distance between the concerned origins and the destinations [2]. Geographic information systems (GIS) have become fundamental tools to evaluate market areas, especially in retailing. The gravity model is the most common formulation of the spatial interaction method. It is named as such because it uses a similar formulation to Newton's law of gravity. Gravity- like representations have been applied in a wide variety of contexts, such as migration, commodity flows, traffic flows, commuting and evaluating boundaries between market areas [3] . Accordingly, the attraction between two objects is proportional to their mass and inversely proportional to their respective distance. With basic data, such as a list of customers and their addresses, it is relatively simple to evaluate market areas with a reasonable level of accuracy, a task that would have been much more complex beforehand [4]. With GIS, market area analysis left the realm of abstraction to become a practical tool used by

retailers and service providers in complex real world situations. In the spatial representation of a GIS, the market area is a polygon which can be measured and used to perform operations such as intersection or union. (Rodrigue, Comtois, & Slack)

1.2 Objective of the study

Objectives of the project are mainly objectified with the help of research questions which were given by our respected course teachers.

The given research questions were-

1. How much distance people travel to purchase?
2. How much people a certain shopping Centre serve?
3. How much sales a certain shopping Centre gain?

From the given research questions, we got two major objectives which were-

- To know the distance from and time that people use to travel from their home to market.
- To identify the service gap or sales gap in that market areas for further development.

1.3 Limitation of the study

- the market area need to be identified as linear form for our own comfort to analysis the shopping behavior
- the market boundary may not be found because of limited data set; in this case the boundary need to be drawn according to our comfort.
- According to the methodology of Reilly's law, the floor space has been converted to number of opportunities through calculating weight and score method which has brought about a huge change in data and result.
- In any critique of retail forecasting techniques, two aspects merit consideration. First, it is necessary briefly to address a number of the theoretical limitations of the gravity concept. Secondly, there is a consideration of some further important operational problems of shopping models not yet discussed.
- However, it should be noted that the models simply depict an empirical regularity for which it has been impossible to provide any theoretical justification.
- Due to pandemic situation it was really tough to bring enough data and analysis properly. We had our biggest limitation in data collection.

1.4 Rationale of the study

Rational means the importance of our project. The importance of our project is we can use this analysis for development criteria. If we know the distances and times of our market area from our residences and the distance between each market, we can easily analyze the gravity model to know about the development gap. The eventual success of the study depends on the proper data collection and if the data set is ready then it is easy to find out the given research question. The aim is to find out the distance of each market from the Centre and identify the development criteria.

1.5 Study Area

Our study area is Rangpur and it is a union under Dumuria Upazila of Khulna District with a total area of 34.716 square kilometers. The total population of the union is 15,919 among them 8,149 are male and 7,770 are female. It consists of 9 wards in which ward 1,2,3,4,5,6,7 are at Arangghata Upazila and ward no 8 & 9 are at Dumuria Upazila. In the union, there are 5 market place named 'ShraTola Bottola' , 'Katakhal Hat' 'Sholua bazar'. This union is mainly agricultural based. Major population about 98% are Hindu oriented people. Transport system is well developed but there is no connection between Khulna Bypass Road and Rangpur Union. Almost 99% household have fluent electric supply.

Figure 1. 1 Study area survey

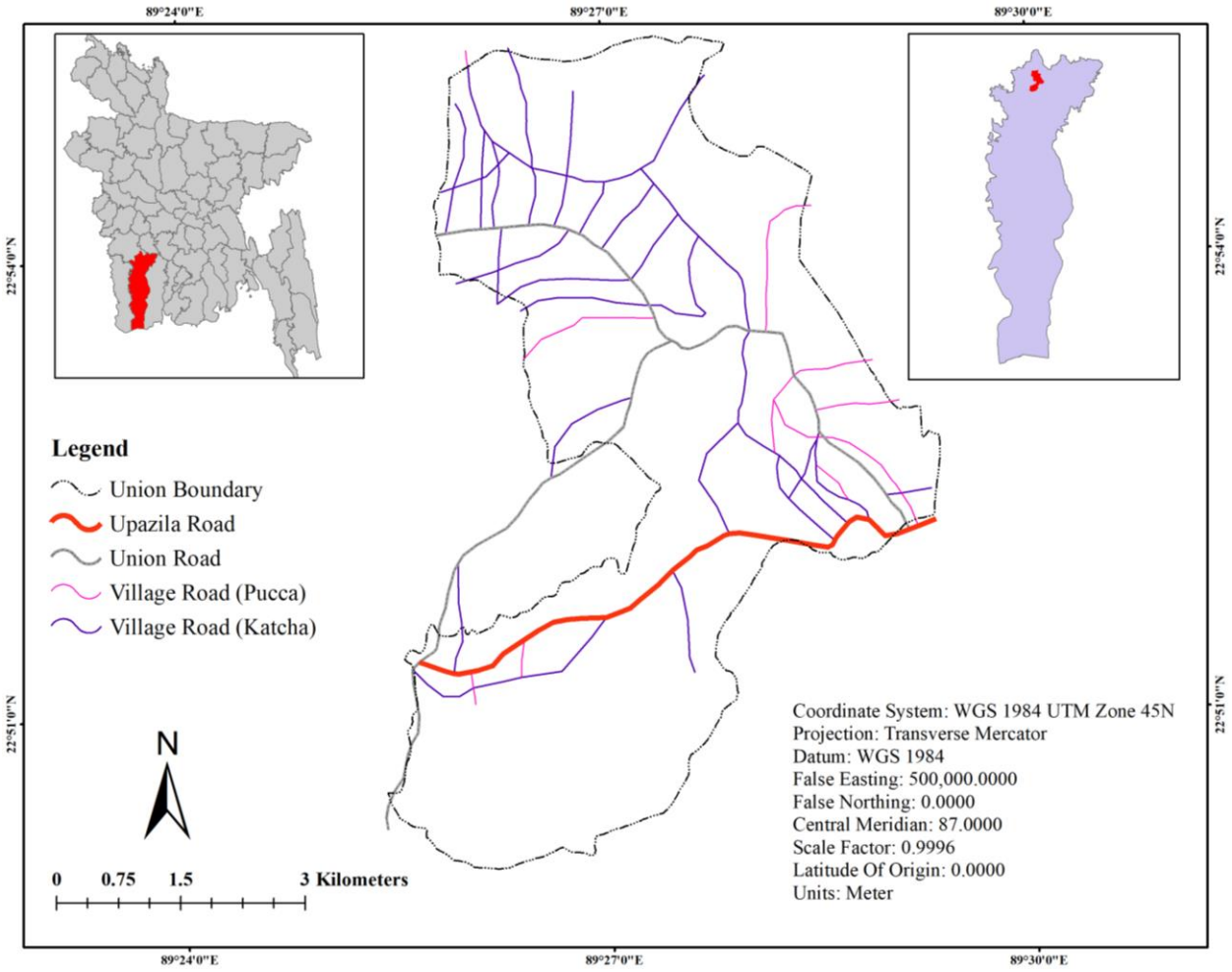

Figure 1. 2 Study Area Map

1.5.1 Facilities in Rangpur Union

Rangpur union is facilated with different things. It contains-

- College
- Education facilities
- Health centre
- Market
- Post office
- Animal breeding centre

- Primary school
- Religious place etc.

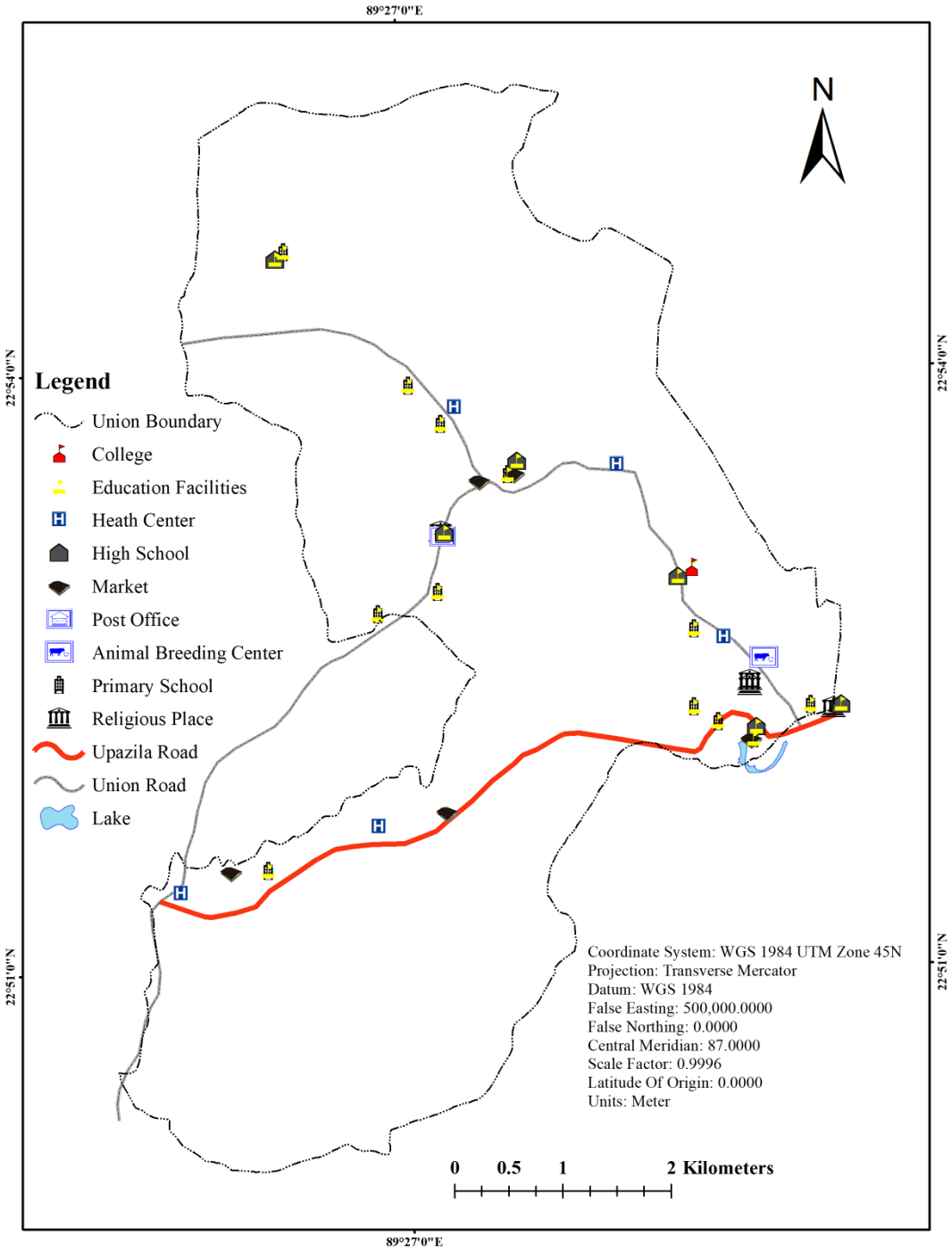

Figure 1. 3 Facility map of Rangpur Union

LITERATURE REVIEW
Chapter Two

Summary: *This chapter is concerned with the theoretical terms as well as the case studies on the market analysis and the human interaction. This chapter helps us to know about the basic terms and methods such as the gravity model, market threshold, market range, market coverage, range expansion, reillys law, huffs law. This chapter contains the basic concept about the rural development along with importance of rural service facilities. Service responsibility of union parishad and application of GIS software were also discussed. The standard of service influence radius was sorted out in this chapter. For adopting the measures some tools are also described. Then overall concept about this chapter was gathering information about the study*.

2.1 Shopping Behavior

Shopping behavior is referred as a systematic process by which individual or group select, purchase, obtain, use adopt or dispose of the products to satisfy certain needs. Shopping behavior is a dynamic approach to identify how much expense a group or an individual bear for their daily livelihood. Indicators like distance from home, cost differences from other shops, transport services, availability of products etc. Shopping behavior approach is implemented under samples. Shopping behavior can be a dynamic approach. It produces a lot of results regarding shopping like Demand Forecasting, Marketing Strategies, Human Behavior. It is important because it helps to understand the characteristics of human behavior towards shopping. It helps consumers to reach to a new and better product. There are a lot of aspects that can be achieved through this process.

2.1.1 Recognition

It is the first term that can be used along with shopping behavior. In this term, it is referred as when a consumer feels an unmet need of a certain product that must be fulfilled. Needs like food, shelter, transportation etc.

2.1.2 Search for Information

In this term, it is the process by which an individual or groups locate or retrieve specific information about a certain product. People get to know about various products through this process.

2.1.3 The pre-purchase evaluation of alternatives

In this process, products and alternatives of products are evaluated according to scale of attributes which has the specialty to acknowledge consumers about the products they are seeking

2.1.4 Consumption

Consumption is referred as a product which has been used after buying. Consumption is an important term used in shopping behavior. It is a great indication for shopping behavior.

2.1.5 Post Purchase Evaluation

Assessing options is an essential piece of the pre-buy period of the dynamic procedure. Assessment of the picked elective is a major piece of the post-buy phases of the dynamic procedure. During and after utilization, customers structure assessments of the item and the utilization experience. These post-utilization assessments may unequivocally look like those assessments held before buy, especially when the utilization experience is a wonderful one. At different occasions, in any case, they may have little similarity to the assessments held before utilization. A great pre-buy assessment may effectively break up away with a disillusioning or unacceptable utilization experience.

2.2 Spatial interaction and gravity model

It is actually the movement of people.it is mainly the information between an origin and destination. It is a transport demand/supply relationship expressed over a geographical space.

2.2.1 Complementarity

The interacting locations are mainly come from supply and demand. A residential zone is complimentary to an industrial zone. If location B produces/generates something that location A requires, then an interaction is possible because a supply/demand relationship has been established between those two locations; they have become complementary to one another. The same applies in the other direction (A to B), which creates a situation of reciprocity common in commuting or international trade.

2.2.2 Intervening Opportunity

alternative as a point of origin or as a point of destination. For instance, in order to have an interaction of a customer to a store, there must not be a closer store that offers a similar array of goods. If location C offers the same characteristics (namely complementarity) as location A and is also closer to location B, an interaction between B and A will not occur and will be replaced by an interaction between B and C.

2.2.3 Transferability

Freight, persons or information being transferred must be supported by transport infrastructures, implying that the origin and the destination must be linked. Costs to overcome distance must not be higher than the benefits of related interaction, even if there is complementarity and no alternative opportunity. Transport infrastructures (modes and terminals) must be present to support an interaction between B and A. Also, these infrastructures must have a capacity and availability which are compatible with the requirements of such an interaction.

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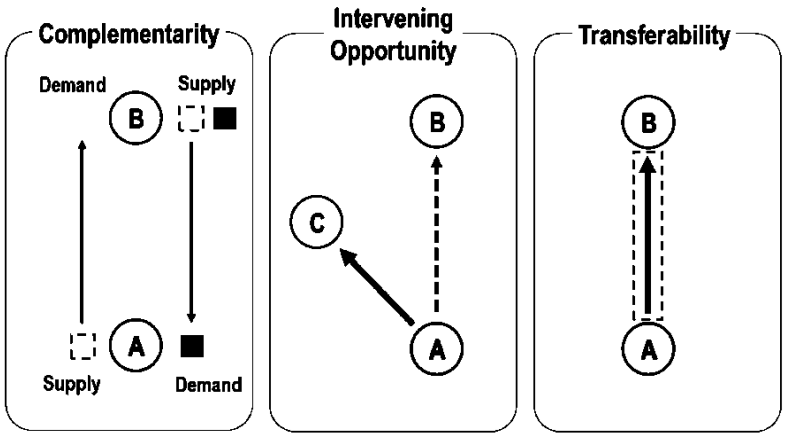


Figure 2. 1 graphical image of transferability

2.2.4 Gravity model

It measures the interaction between all the possible location by multiplying their values.

2.2.5 Potential model

It measures the interactions between one location and every other location by the summation of the values of each other location by their level of separation which is not reciprocal.

2.2.6 Retail model

It is Measures the boundary of the market areas between two locations competing over the same market. It assumes that the market boundary between two locations is a function of their separation pondered by the ratio of their respective weights. If two locations have the same importance, their market boundary would be halfway between.

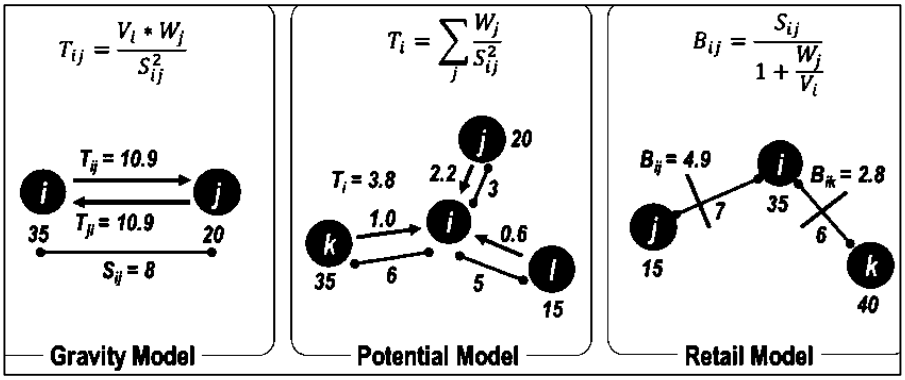


Figure 2. 2 equation of gravity model, potential model and retail model

2.2.7 Reilly's law of retail gravitation

Reilly was primarily interested with the relative appeal of two retail centers to those who lived in the vicinity of the shopping centers in question. To put it simply, he stated his law as follows: "... under normal conditions, two cities draw retail trade from a smaller intermediate city or town in direct proportion to some power of the population of these two larger cities and in an inverse proportion to some power of the distance of shopping each of these cities from the smaller intermediate city." Of course, the exponents used in connection with population or distance will differ from one situation to another, but Reilly discovered from his empirical work that: two cities draw trade from a smaller intermediate city or town approximately in direct proportion to the first power of the population of these two larger cities and in an inverse proportion to the square of the distance between each of these two larger cities.

Given, the situation of choice faced by shoppers living between two cities, A and B, we can now say that the attraction of the shopping Centre of city A, with population P_A, to individuals living at an intermediate location, distance d_A. from A, will be

$$G_A = \frac{P_A}{d_A^2}$$

where G_A = the force of attraction of A.

Similarly, the attraction of the shopping centre of city, B, with population P_B, to individuals living at an intermediate location, distance d_B from B, will be:

$$G_b = \frac{P_B}{d_B^2}$$

where G_B = the force of attraction of B.

If an individual shop in the city with the strongest overall attraction, a simple formula can be used to find the market boundary or breaking point between these two retail centres. This is the point to which one city exercises the dominating retail influence and beyond which the other city dominates. It is the equilibrium point between A and B where the attraction of A is equal to the attraction of B, i.e. where:

$$G_A = G_B$$

And so the final equation that has established-

$$d_B = \frac{d_{AB}}{\sqrt{\frac{P_A}{P_B}+1}}$$

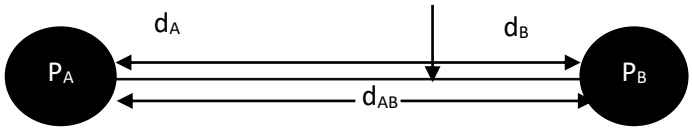


Figure 2. 3 A market boundary between two centres

2.2.8 A probabilistic approach to the gravity model

A more general or probabilistic approach to the gravity model might take the following form:

$$S_{i,j=} \frac{C_i \frac{F_j}{d_{ij}}}{\sum_j \frac{F_j}{d_{ij}}}$$

The probability that people from a residential zone (i) will spend their money in a particular shopping Centre (j) depends on the attractiveness of that shopping Centre (F_j/d_{ij}) compared with

the overall attractiveness of all the shopping centres in the sub region (F_j/d_{fj}). The application of the constraint has ensured that the sum of all expenditure flows between any particular origin i and all possible destination zones j sums to the known demand generated at that origin, i.e. C_i. Readers should also note that the constraint implies that the spatial system is regarded as closed in that a closed set of j exists and ensures that no consumer expenditure leaves the sub region.

2.3 Case study

2.3.1 Case study 01

Shopping on the Internet enables consumers to search for information on products or services and make purchases through direct interaction with online retailers. This study investigates consumer shopping behavior on the Internet based on four aspects, i.e. the Internet marketing environment, product characteristics, familiarity, and promotional offers. The impact of influencing factors was checked by questionnaire survey, which was then processed and evaluated. Two hundred randomly selected respondents (students and employees in a public higher learning institution in the Federal Territory of Labuan, Malaysia) participated in the survey. Multiple regression analysis was used as a statistical measure to determine the most influential relationship aspect among a series of independent variables of consumer shopping on the Internet. The results revealed that familiarity has a great influence on consumer shopping on the Internet, followed by promotional offers. The assimilation of these aspects, and the empirical examination of the factors that influence consumer shopping on the Internet, advanced understanding of these constructs and their link to dynamic technology deployment for shopping. The paper suggests managerially actionable implications, and future research directions. (Suki, 2013)

2.3.2 Case study 02

The spatial shopping behavior of the urban old has gotten expanding consideration from analysts in an assortment of orders including geology, promoting, city arranging, and social gerontology. Pertinent writing from these differing sources is evaluated inside an authoritative system dependent on two 'conduct' ways to deal with retail geology: 'experimental social' and 'intellectual social'. By and large, the examination discoveries propose that the old speak to a particular buyer portion with extraordinary issues and needs. Specifically, numerous more established customers are dependent upon a wide assortment of versatility imperatives which eventually confine their entrance to shopping openings. Be that as it may, some work has found significant contrasts in the spatial practices of subgroups of old purchasers characterized based on such qualities as wellbeing, age, family unit arrangement, conjugal status, salary level, and private area. It is recommended that further research needs to investigate all the more completely how these attributes may force variable individual and ecological limitations upon the shopping exercises of the urban old. (Smith, 1988).

METHODOLOGY
Chapter Three

3.1 Sampling Method

In this project the stratified random sampling method is used. Stratified sampling method is the sampling technique where the total population is divided into different subgroups or strata at last the different strata are randomly selected for the final survey. We know in this method the whole system is divided into categories. There are total 9 wards in our Union. But as we are assessing the shopping behavior analysis so we have divided our area into 5 zones. We have to take samples from 5 zones. As this is a stratified sampling method so the survey was done randomly. We have to calculate population zone wise and decide sample on the base of zone population ratio. Like, as our area is divided into 5 zones but every zone does not have same number of population. In this situation, we will use the ratio of population zone wise and decide the sample size.

Total number of population in our union is 9,825. Here is our zone wise population table:

Table 3. 1 Zone wise population data

Zone Number	Population
Zone 1	1719
Zone 2	2023
Zone 3	2371
Zone 4	2043
Zone 5	1669

3.3.1 Sample Size:

We can use the probabilistic sampling for finite population data. Then we can measure out the sample size for our area. For that we can use this formula,

$$Sample\ Size, n = \frac{\frac{Z^2 \times \mathrm{P}(1-\mathrm{P})}{e^2}}{1 + \frac{Z^2(1-P)}{e^2 N}}$$

Here,

N=17684 Z=1.96

P=0.05 e=2%

Total Sample Size, n= 236

Now, zone wise sample will be:

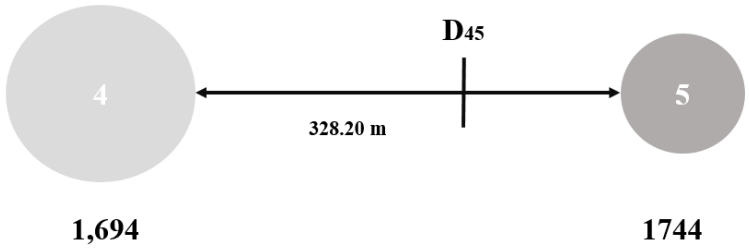
Table 3. 2 Zone number wise sample size

Zone Number	Sample Size
Zone 1	43
Zone 2	49
Zone 3	55
Zone 4	49
Zone 5	40

3.2 Reilly's Law

For markets in ward no 4 and 5:

Here, the two markets in ward no 4 and ward no 5 respectively are 238.20 m apart and have the population of 1694 and 1744 respectively, we can substitute these values into our final expressions to identify the market boundary.



$D_5 = D_{45}/ (1+ \sqrt{p_4/p_5})$

$= 328.20/ (1+(1744/1694))$

$= 162.91$ m

Here,

D_5 =market boundary for ward no. 5

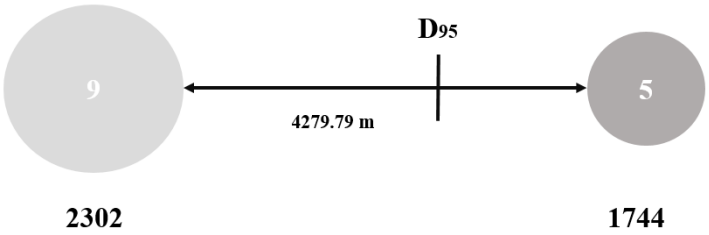
D_{45} =distance between ward 4 and 5 market

P_4 = population of ward no 4

P_5 = population of ward no 5

For markets in ward no 9 and 5:

Here, the two markets in ward no 9 and ward no 5 respectively are 4279.790 m apart and have the population of 2302 and 1744 respectively, we can substitute these values into our final expressions to identify the market boundary.



$D_9 = D_{95}/ (1+ \sqrt{p_5/p_9})$

$= 4279.79/ (1+(1744/2302))$

$= 1991.63$ m

Here,

D_9 =market boundary for ward no. 9

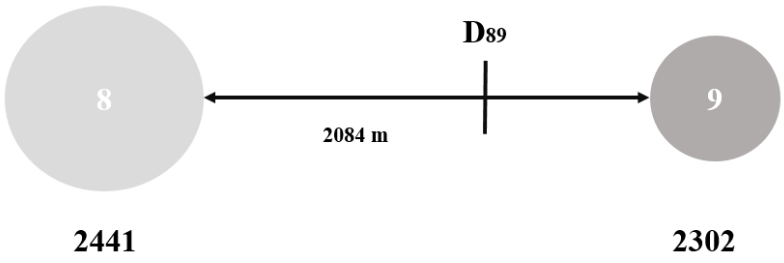
D_{95} =distance between ward 9 and 5 market

P_9 = population of ward no 9

P_5 = population of ward no 5

For markets in ward no 9 and 8:

Here, the two markets in ward no 9 and ward no 8 respectively are 2084.56 m apart and have the population of 2302 and 2441 respectively, we can substitute these values into our final expressions to identify the market boundary.



$D_{89} = D_{89}/ (1+ \sqrt{p_8/p_9})$

Here,

D_9 =market boundary for ward no. 9

D_{95} =distance between ward 9 and 8 market

P_9 = population of ward no 9

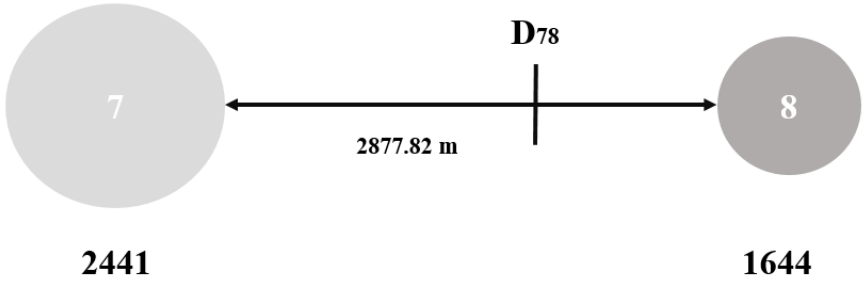
P_8 = population of ward no

= 2084.56/ (1+(2302/2441))

= 1057.56 m

For markets in ward no 8 and 7:

Here, the two markets in ward no 8 and ward no 7 respectively are 2877.82 m apart and have the population of 2441 and 1644 respectively, we can substitute these values into our final expressions to identify the market boundary.



$D_7 = D_{78}/ (1+ \sqrt{p_8/p_7})$

= 2877.82/ (1+(2441/1644))

= 1297.84 m

Here,

D_7 =market boundary for ward no. 7

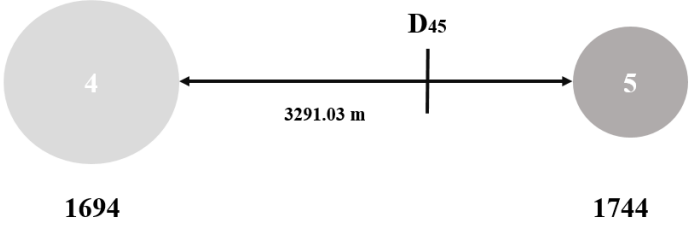
D_{78} =distance between ward 7 and 8 market

P_7 = population of ward no 7

P_8 = population of ward no 8

For markets in ward no 7 and 4:

Here, the two markets in ward no 7 and ward no 4 respectively are 3291.03 m apart and have the population of 1644 and 1694 respectively, we can substitute these values into our final expressions to identify the market boundary.



$D_4 = D_{45} / (1 + \sqrt{p_5/p_4})$

Here,

D_4 =market boundary for ward no. 4

D_{45} =distance between ward 4 and 5 market

P_4 = population of ward no 4

P_5 = population of ward no 5

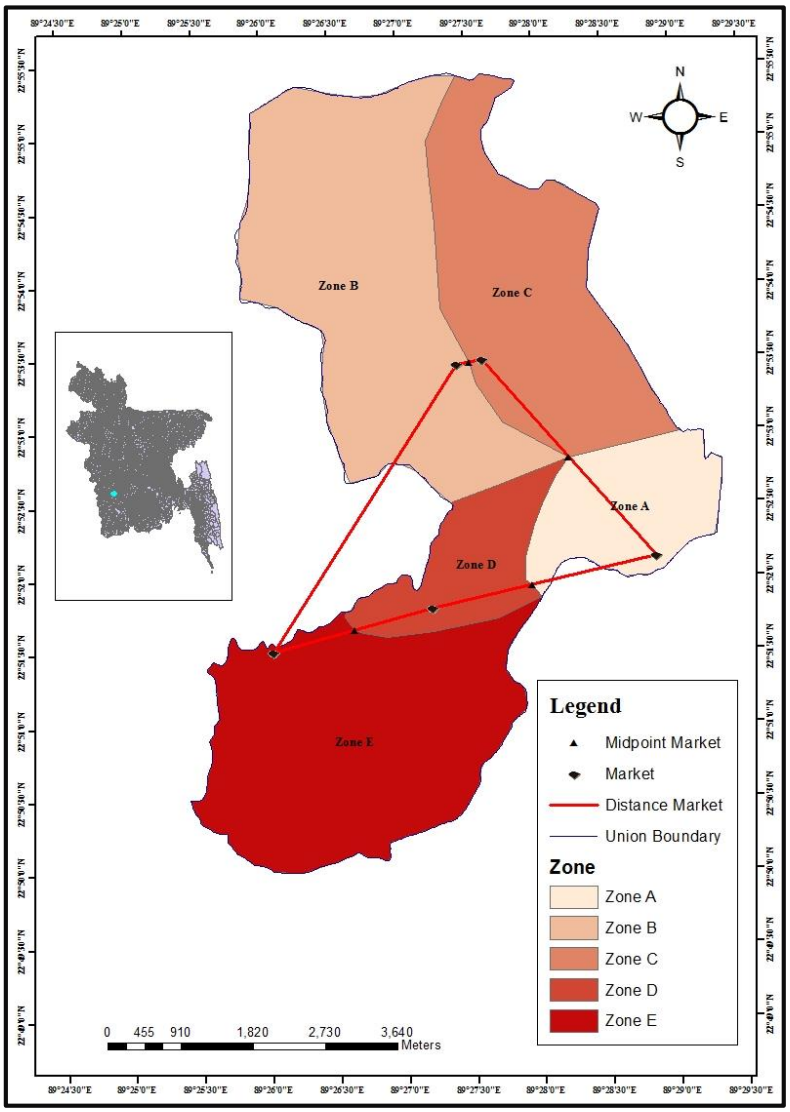


Figure 3. 1 Zone wise market boundary representation

3.3 Service gap identification

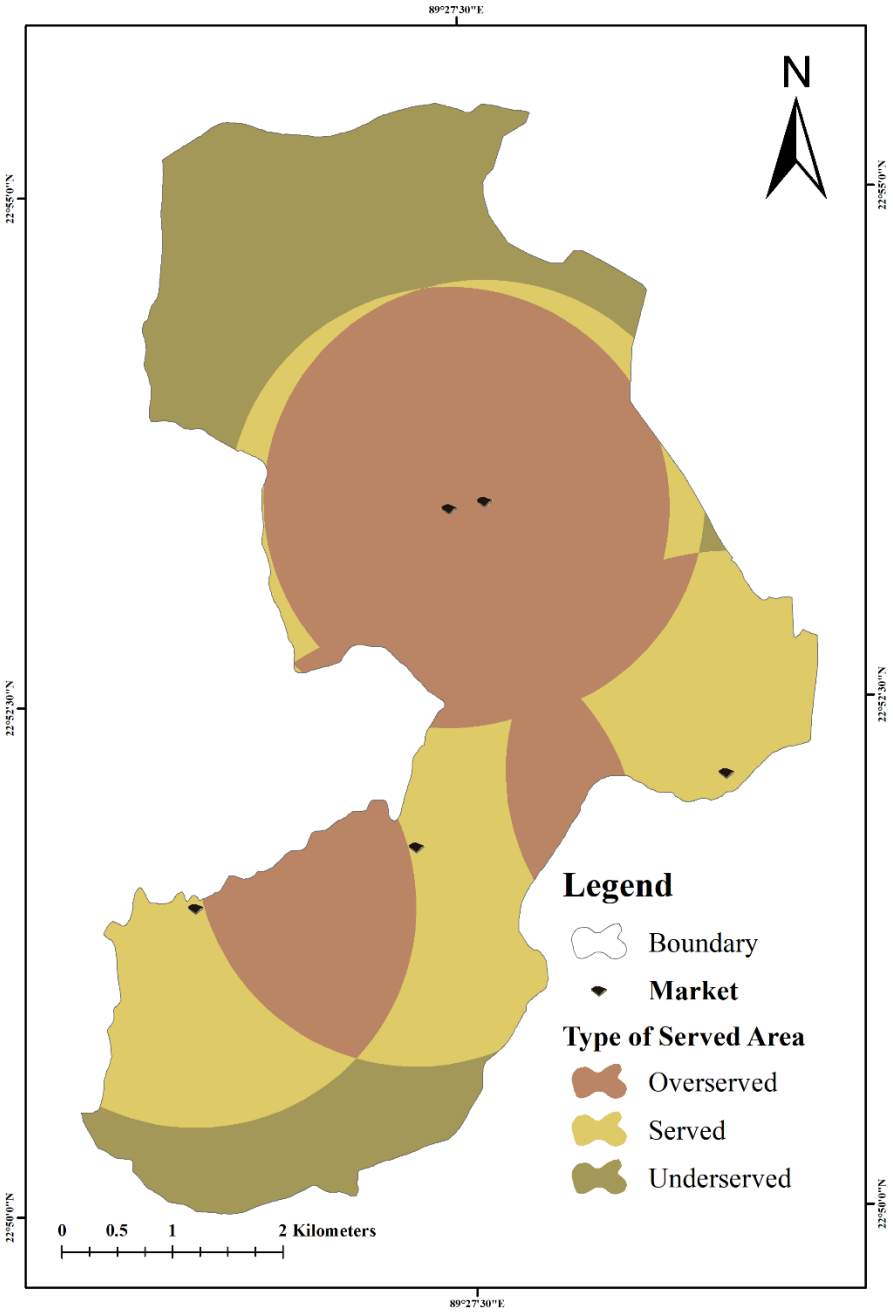


Figure 3. 2 service gap identification map

3.3 Applying the constrained gravity model:

We have considered a hypothetical study area which, for the purpose of this analysis, has been divided into five zones. At present there are five shopping centres, 1,2,3,4 and 5, located in zones 1,2,3,4 and 5 respectively [5]. Planners are interested not only in the economic feasibility of the proposed centre but also in its impact on existing centres. Appropriate use of the model can assist with answers to both questions. To simplify the arithmetic, it is assumed in this exercise that $\alpha = \beta = 1$ and $\lambda = 2$.

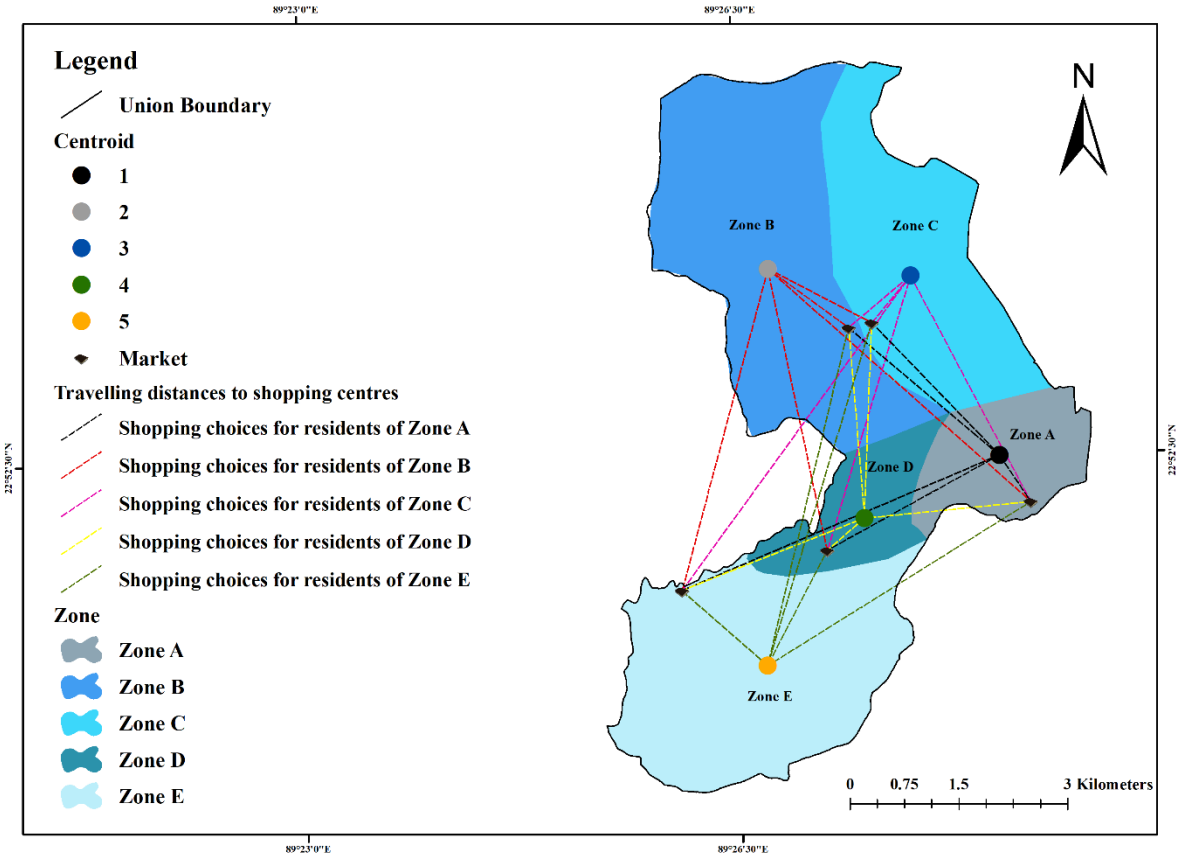


Figure 3. 3 Travelling distances to shopping centre

Table 3. 3 The distance matrix (miles) for the study areas

	Centre 1	Centre 2	Centre 3	Centre 4	Centre 5
Zone A	0.77	4.84	3.53	2.31	4.28
Zone B	2.72	1.37	1.12	2.63	4.79
Zone C	2.53	1.61	0.85	2.69	4.93
Zone D	2.72	3.96	3.96	0.68	1.79
Zone E	4.76	4.58	5.37	2.71	1.57

The second stage in the analysis is to collect information on the relative attractiveness of the various shopping centres [6]. A weighted scoring method is often used as an index of shopping centre attraction although actual studies have occasionally elaborated on this simple index by making allowances for other factors. Factors that has been used for the weight and score matrix are given below-

Table 3. 4 weight, rank and score of facilities

Service	weight	Rank	Score
Market share	5	1	5
Customer retention	5	2	10
Service quality (banking, retail, manufacturing)	4	2	8
Skilled workforce	4	2	8
Location of facilities	12	3	36
Customer satisfaction	5	2	10
Transportation cost	12	3	36
Availability of good	9	1	9
product quality	3	2	6
Product range	2	2	4
grocery market	4	2	8
Livestock market	9	3	27
health care	7	3	21
water supply	4	2	8

toilet facility	3	1	3
Drainage facility	3	1	3
adequate parking space	3	1	3
safe area for children	4	1	4
Fire outbreak mitigation facility	2	1	2
Total	100		211

The number of opportunities that has been found from zone 1, 2,3, 4 and 5 are 211, 208, 206, 205 and 223.

Table 3. 5 No of opportunities for shopping centers in the study area

Shopping Centre	No of opportunities
1	211
2	208
3	206
4	205
5	223

The data compiled thus far can now be used to produce a matrix calculating the attraction measures F_j/d_{ij} for each zone i and shopping centre j. For example, for zone A and shopping centre 1 the ratio is

$$\frac{F_A}{d_{1A}^2} = \frac{211}{0.77^2} = 356.83$$

These attraction measures are listed in Table where the total attraction that the five centres would have on each zone, $\sum_j \frac{F_j}{d_{ij}}$ has also been computed.

Table 3. 6 The Fj/dij2 matrix for the study area

	1	2	3	4	5	SUM
Zone A	356.84	9.02	16.96	39.67	11.54	434.03
Zone B	28.02	110.26	166.00	30.01	9.08	343.37
Zone C	32.08	79.14	287.28	28.47	8.47	435.44
Zone D	27.77	13.08	13.07	441.62	64.32	559.86
Zone E	9.84	10.61	7.74	30.42	90.51	149.12

The next stage in the analysis is to calculate the probabilities of residents in each zone shopping in each centre. Since the probability function is $\frac{\mathrm{Fj}/d_{ij}^2}{\sum_j \mathrm{Fj}/d_{ij}^2}$ this is done simply by dividing the attraction measure of a given row and column of Table 5 by the total overall attraction measure found in the same row's total column. For example, if, in the general form,

$$\Pr\left(\frac{\text{a resident of zone } i}{\text{shopping at centre } j}\right) = \frac{\mathrm{Fj}/d_{ij}^2}{\sum_j \mathrm{Fj}/d_{ij}^2}$$

$$\Pr\left(\frac{\text{a resident of zone } A}{\text{shopping at centre 1}}\right) = \frac{\frac{F_A}{d_{1A}^2}}{\frac{F_A}{d_{1A}^2}+\frac{F_B}{d_{1B}^2}+\frac{F_C}{d_{1C}^2}+\frac{F_D}{d_{1D}^2}+\frac{F_E}{d_{1E}^2}} = \frac{356.84}{356.84+9.02+16.96+39.67+11.54} = 0.82$$

These probabilities, which measure the relative attractiveness of the various centres, are listed in Table 5

Table 3. 7 The shopping probability (Fj/d_ij^2)/(∑_j(Fj/d_ij^2 〗) matrix for the study area

	1	2	3	4	5
Zone A	0.82	0.02	0.04	0.09	0.03
Zone B	0.08	0.32	0.48	0.09	0.03
Zone C	0.07	0.18	0.66	0.07	0.02
Zone D	0.05	0.02	0.02	0.79	0.11
Zone E	0.07	0.07	0.05	0.20	0.61

To complete the analysis, further data is required on the availability of retail expenditure within each residential zone [7]. This is usually compiled by multiplying the population or household population in each zone by an average figure for consumer retail expenditure per head or household, as appropriate. Data on existing population can be obtained from the Population survey.

Table 3. 8 Annual average calculation of different markets

	Vagetable Market	Grocery Market	Fish/Meat Market	Dairy Market	Cloth Market	Sum	Avg.	Annual Avg.
Zone A	1260.00	1360.00	1320.00	1090.00	1240.00	6270.00	1254.00	15048.00
Zone B	1192.86	1271.43	1400.00	1142.86	1135.71	6142.86	1228.57	14742.86

Zone C	1025.00	1075.00	1162.50	1337.50	1012.50	5612.50	1122.50	13470.00
Zone D	1188.89	1288.89	1366.67	1177.78	877.78	5900.00	1180.00	14160.00
Zone E	1433.33	1400.00	1255.56	1077.78	1222.22	6388.89	1277.78	15333.33

Table 3. 9 Consumer expenditure, C, for the zones in the study area

	Annual Avg.	**Population**	**Total Consumer**
Zone A	15048.00	1719.00	25867512.00
Zone B	14742.86	2023.00	29824800.00
Zone C	13470.00	2371.00	31937370.00
Zone D	14160.00	2043.00	28928880.00
Zone E	15333.33	1669.00	25591333.33

In exercising their shopping choices, the residents of each zone will distribute their expenditure between centres in the proportions previously calculated in the probability matrix. If the values in each row of the probability matrix are multiplied by the consumer expenditure available in each residential zone, this will give a new Sij matrix, where

$$S_{ij}=\frac{C_i \mathrm{Fj}/d_{ij}^2}{\sum_j \mathrm{Fj}/d_{ij}^2}$$

showing the predicted flow of retail expenditure from each zone i to each zone j. For example, for the flow of expenditure from zone A to centre 1:

$$S_{1A}=\frac{C_1\frac{F_A}{d_{1A}^2}}{\frac{F_A}{d_{1A}^2}+\frac{F_B}{d_{1B}^2}+\frac{F_C}{d_{1C}^2}+\frac{F_D}{d_{1D}^2}+\frac{F_E}{d_{1E}^2}}=\frac{25867512}{0.82}$$

The results are summarized in Table 5.6 (overleaf), which is the final output from the retail distribution gravity model — a matrix showing the flow of consumer expenditure from each residential zone to every shopping centre and the total sales in each centre.

Table 3. 10 The Sij matrix, expenditure flows and total sales for the study area

	1	2	3	4	5	Total
Zone A	21266977	537727	1010611	2364503	687693	25867512
Zone B	2433572	9576781	14418957	2606857	788633	29824800
Zone C	2352787	5804892	21070844	2087949	620898	31937370
Zone D	1435070	675711	675392	22819054	3323653	28928880
Zone E	1688605	1821056	1328642	5219949	15533081	25591333
Total	29177011	18416167	38504446	35098312	20953959	142149895

3.4 Flowchart of the process:

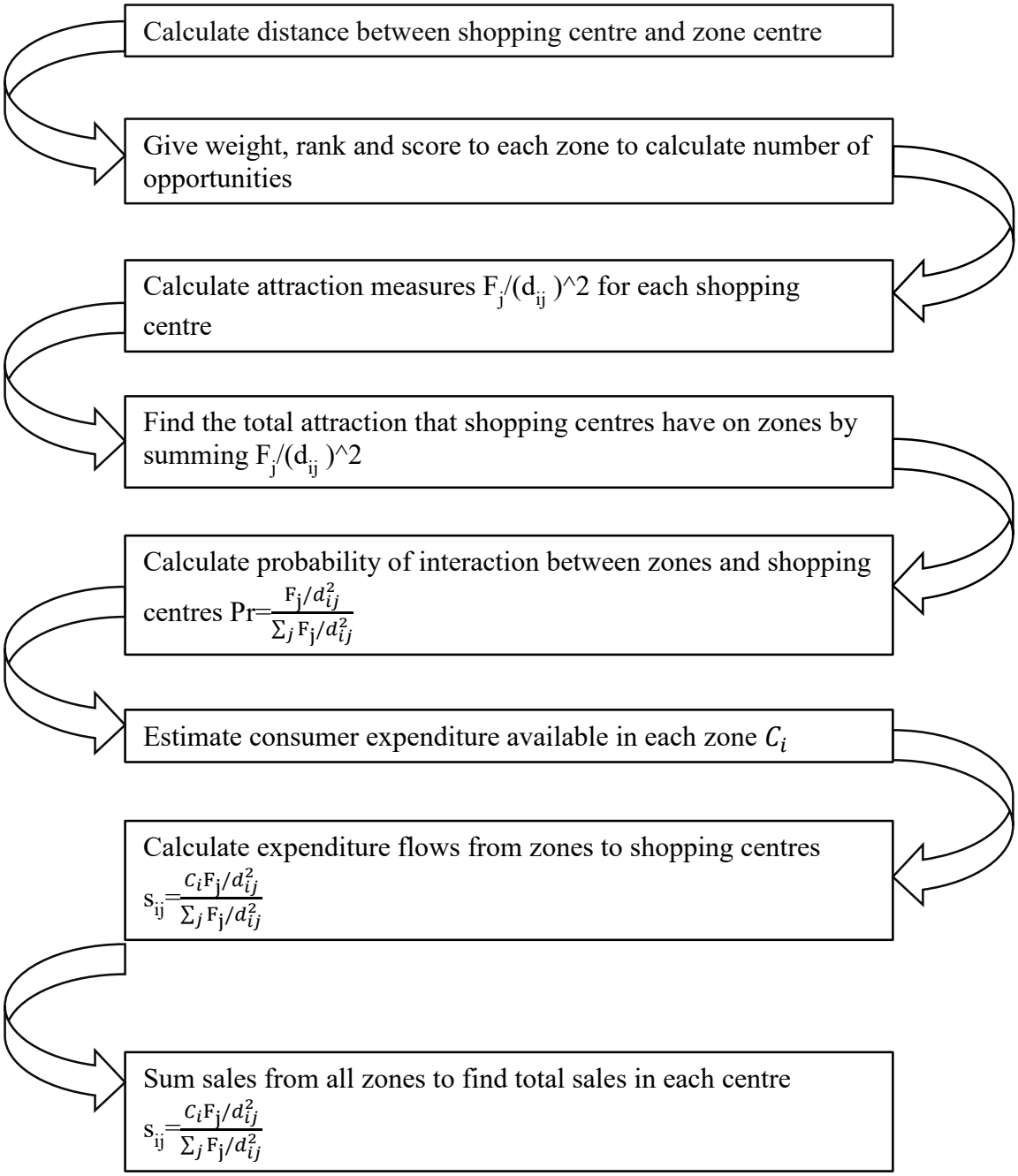


Figure 3. 4 Flowchart of the method

RESULT & ANALYSIS
Chapter Four

4.1 Age frequency of people in Rangpur Union

The majority of the population of Rangpur union is between the ages of 30 and 40, with a smaller proportion of persons between the ages of 50 and 60. The frequency vs age chart depicts the number of individuals of various ages who live in the Rangpur union district.

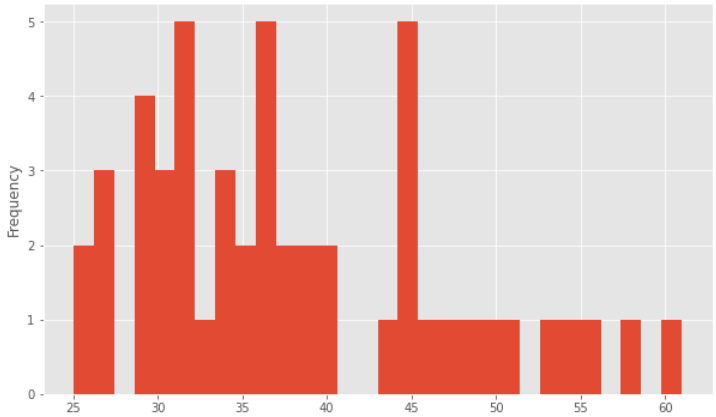


Figure 4. 1: Frequency v/s age of Rangpur Union

4.2 Income frequency of people in Rangpur Union

The majority of the population of Rangpur union has an income in between 5000-12500, with a smaller proportion of persons having income in between 17500-20000. The frequency vs income chart depicts the number of individuals of various income range who live in the Rangpur union district.

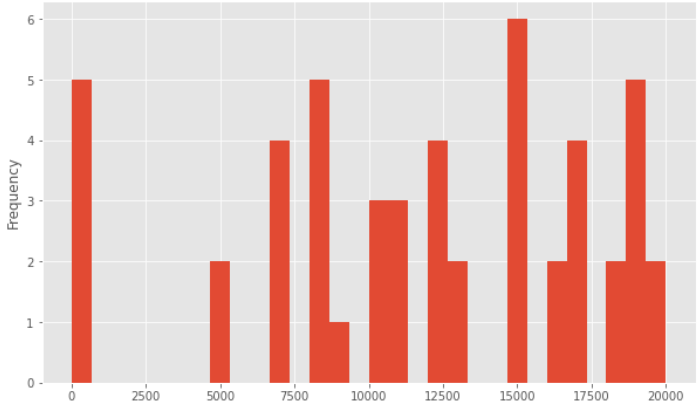


Figure 4. 2: Frequency v/s income of Rangpur Union

4.3 Time v/s Distance analysis of different markets in Rangpur Union

4.3.1 Grocery market time v/s Distance analysis in Rangpur Union

Different market has different state of grocery system. In village grocery markets people need to cross less distance than the national ones. Time needed 40 min, 65 min and 75 min for village, regional and national grocery market respectively. Regional and national market has the same mean value and people need to cross highest 6000m distance in national market. In village grocery market people of ward 1, 2, and 3 are mostly crossing 25 to 35 minutes to reach their destination place. Again, in regional grocery market ward no 8 and 9 are mostly crossing 40-45 minutes to reach the market. To buy from national grocery ward no 8 and 9 are crossing 6000 m to reach the destination. The mean value defines the average distance that a person is crossing.

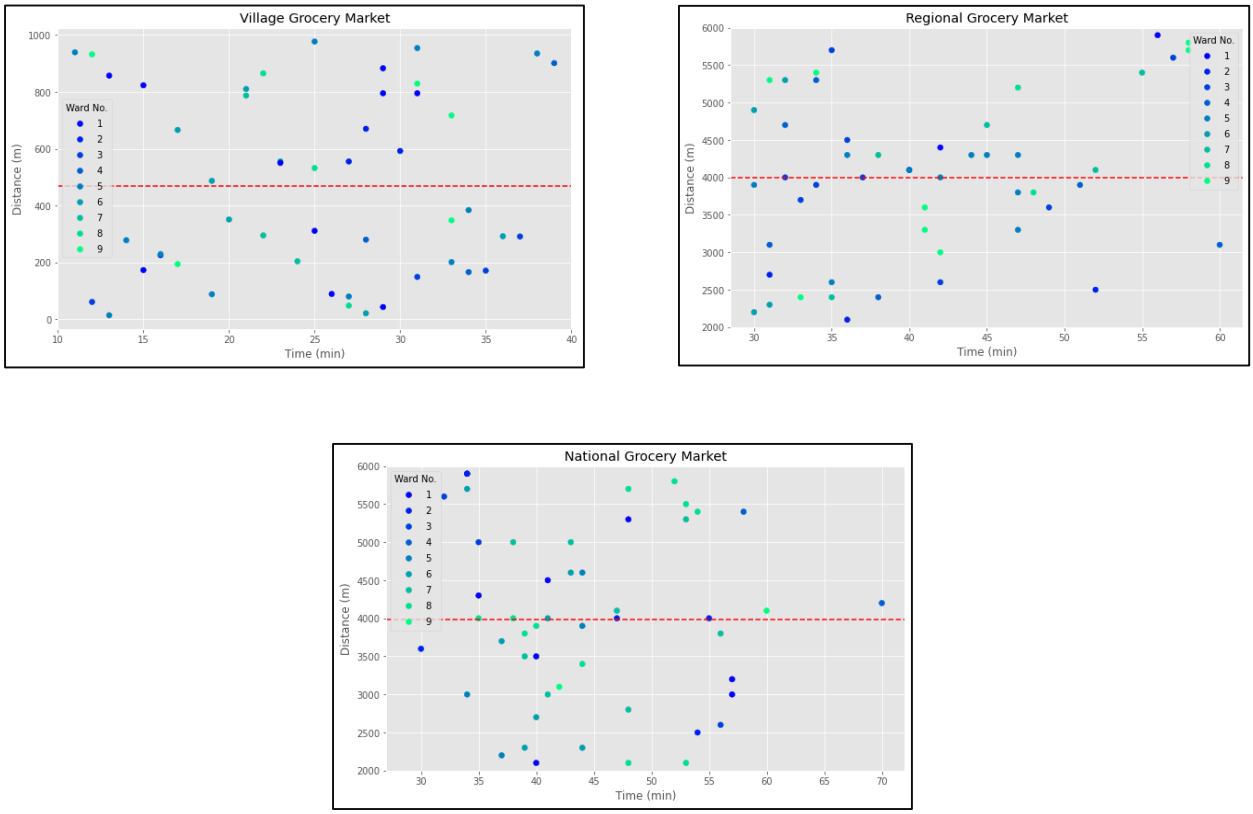


Figure 4. 3 Distance vs time graph of Village, regional and national grocery market in Rangpur union

4.3.2 Vegetable market time v/s Distance analysis in Rangpur Union

Different market has different state of vegetable selling system. In village vegetable markets people need to cross less distance than the national ones. Time needed 45 min, 63 min and 65 min for village, regional and national vegetable market respectively. Regional and national market has the same mean value and people need to cross highest 4000 m distance in national market. In village vegetable market people of ward 1, 2, and 3 are mostly crossing 10 to 25 minutes to reach their destination place. Again, in regional vegetable market ward no 8 and 9 are mostly crossing 30-40 minutes to reach the market. To buy from national vegetable market ward no 8 and 9 are crossing 5000 m to reach the destination. The mean value defines the average distance that a person is crossing.

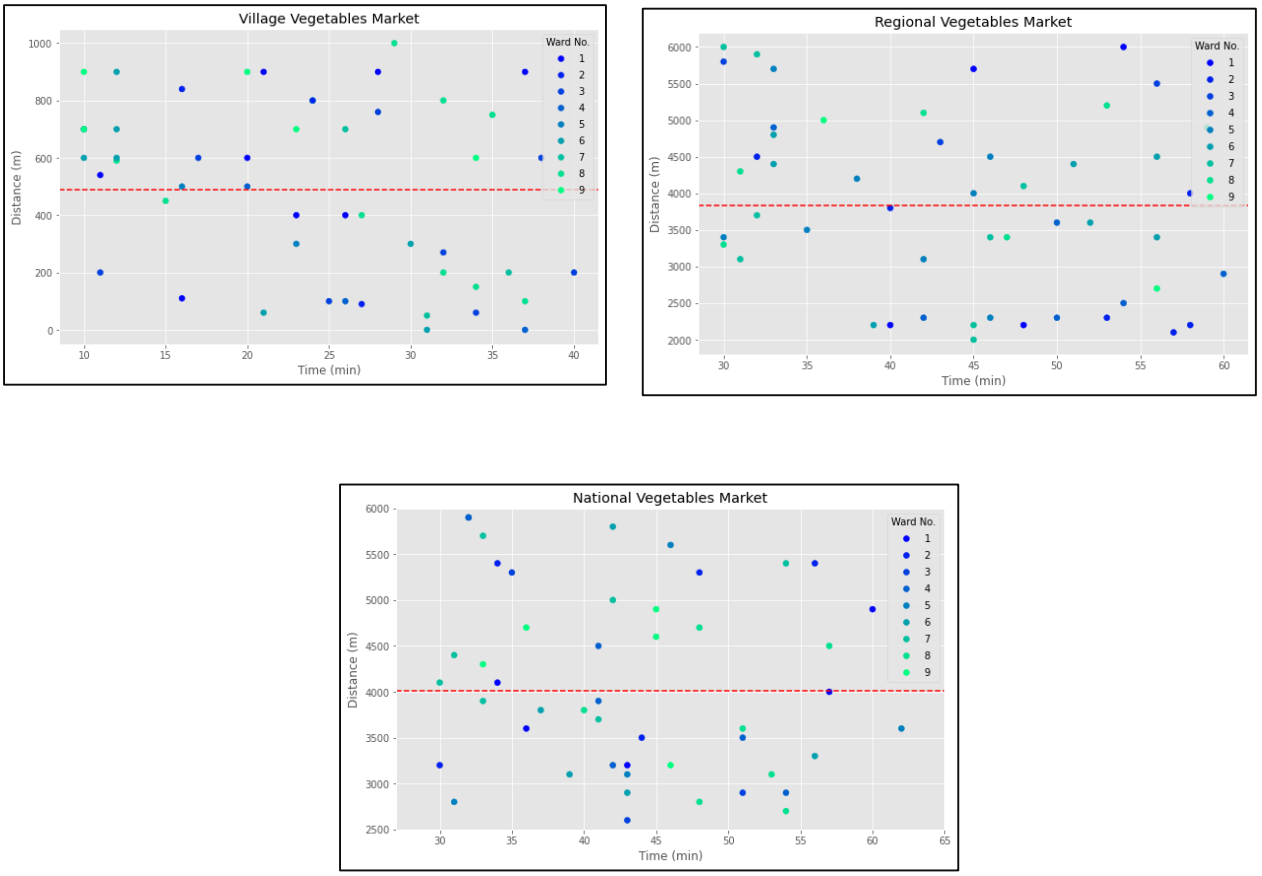


Figure 4. 4 Distance vs time graph of Village, regional and national vegetable market in Rangpur union

4.3.3 Clothing market time v/s Distance analysis in Rangpur Union

Different market has different state of cloth selling system. In village clothing markets people need to cross less distance than the national ones. Time needed 45 min, 60 min and 65 min for village, regional and national vegetable market respectively. Regional and national market has the same mean value and people need to cross highest 4000 m distance in national market. In village cloth market people of ward 1, 2, and 3 are mostly crossing 15 to 35 minutes to reach their destination place. Again, in regional clothing market ward no 8 and 9 are mostly crossing 40-50 minutes to reach the market. To buy from national cloth market ward no 8 and 9 are crossing 4500-6000 m to reach the destination. The mean value defines the average distance that a person is crossing.

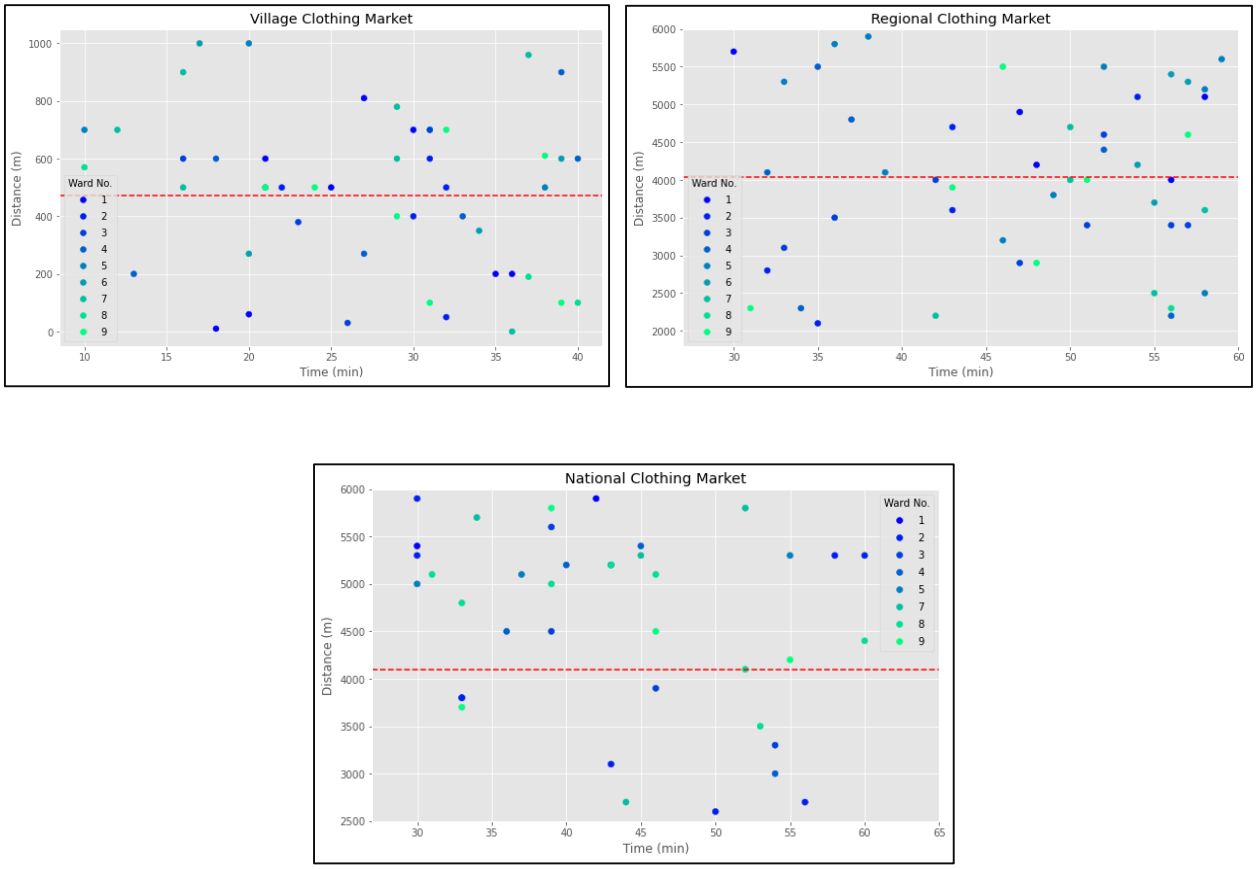


Figure 4. 5 Distance vs time graph of Village, regional and national clothing market in Rangpur union

4.3.4 Meat market time v/s Distance analysis in Rangpur Union

Different market has different state of meat selling system. In village meat markets people need to cross less distance than the national ones. Time needed 43 min, 63 min and 65 min for village, regional and national vegetable market respectively. Regional and national market has the same mean value and people need to cross highest 4000 m distance in national market. In village cloth market people of ward 1, 2, and 3 are mostly crossing 15 to 35 minutes to reach their destination place. Again, in regional clothing market ward no 8 and 9 are mostly crossing 3000 distance to reach the market. To buy from national cloth market ward no 8 and 9 are crossing 4000-4500 m to reach the destination. The mean value defines the average distance that a person is crossing.

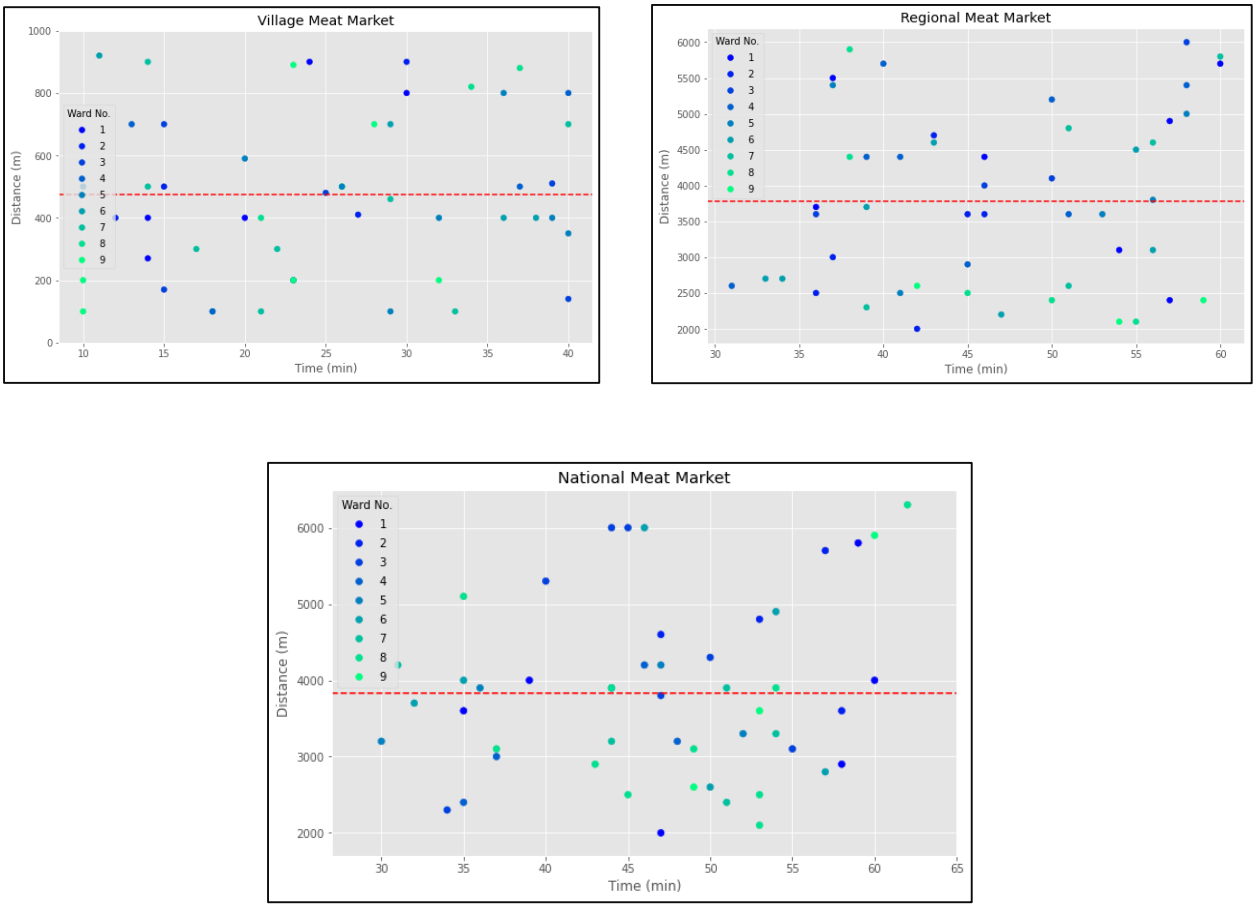


Figure 4. 6 Distance vs time graph of Village, regional and national meat market in Rangpur union

4.3.5 Fish market time v/s Distance analysis in Rangpur Union

Different market has different state of fish selling system. In village fish markets people need to cross less distance than the national ones. Time needed 41 min, 63 min and 65 min for village, regional and national fish market respectively. Regional and national market has the same mean value and people need to cross highest 4000 m distance in national market. In village fish market people of ward 1, 2, and 3 are mostly crossing 10 to 25 minutes to reach their destination place. Again, in regional fish market ward no 8 and 9 are mostly crossing 2100-5300 distance to reach the market. To buy from national fish market ward no 8 and 9 are crossing 4000-4500 m to reach the destination. The mean value defines the average distance that a person is crossing.

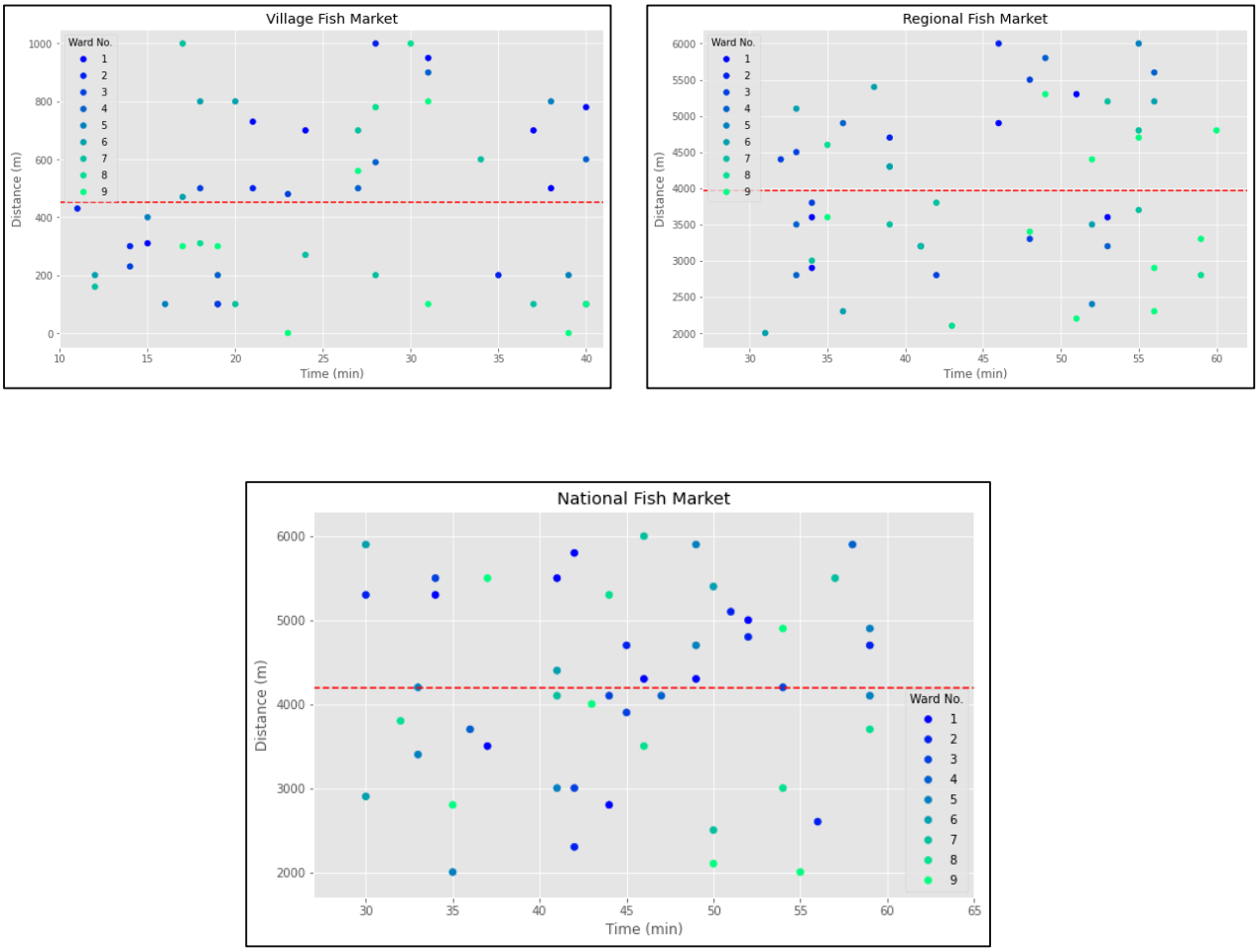


Figure 4. 7 Distance vs time graph of Village, regional and national fish market in Rangpur union

4.3.6 Dairy market time v/s Distance analysis in Rangpur Union

Different market has different state of dairy selling system. In village dairy markets people need to cross less distance than the national ones. Time needed 41 min, 62 min and 65 min for village, regional and national dairy market respectively. Regional and national market has the same mean value and people need to cross highest 4000 m distance in national market. In village dairy market people of ward 1, 2, and 3 are mostly crossing 10 to 40 minutes to reach their destination place. Again, in regional dairy market ward no 8 and 9 are mostly crossing 6000 distance to reach the market. To buy from national dairy market ward no 8 and 9 are crossing 4000-5000 m to reach the destination. The mean value defines the average distance that a person is crossing.

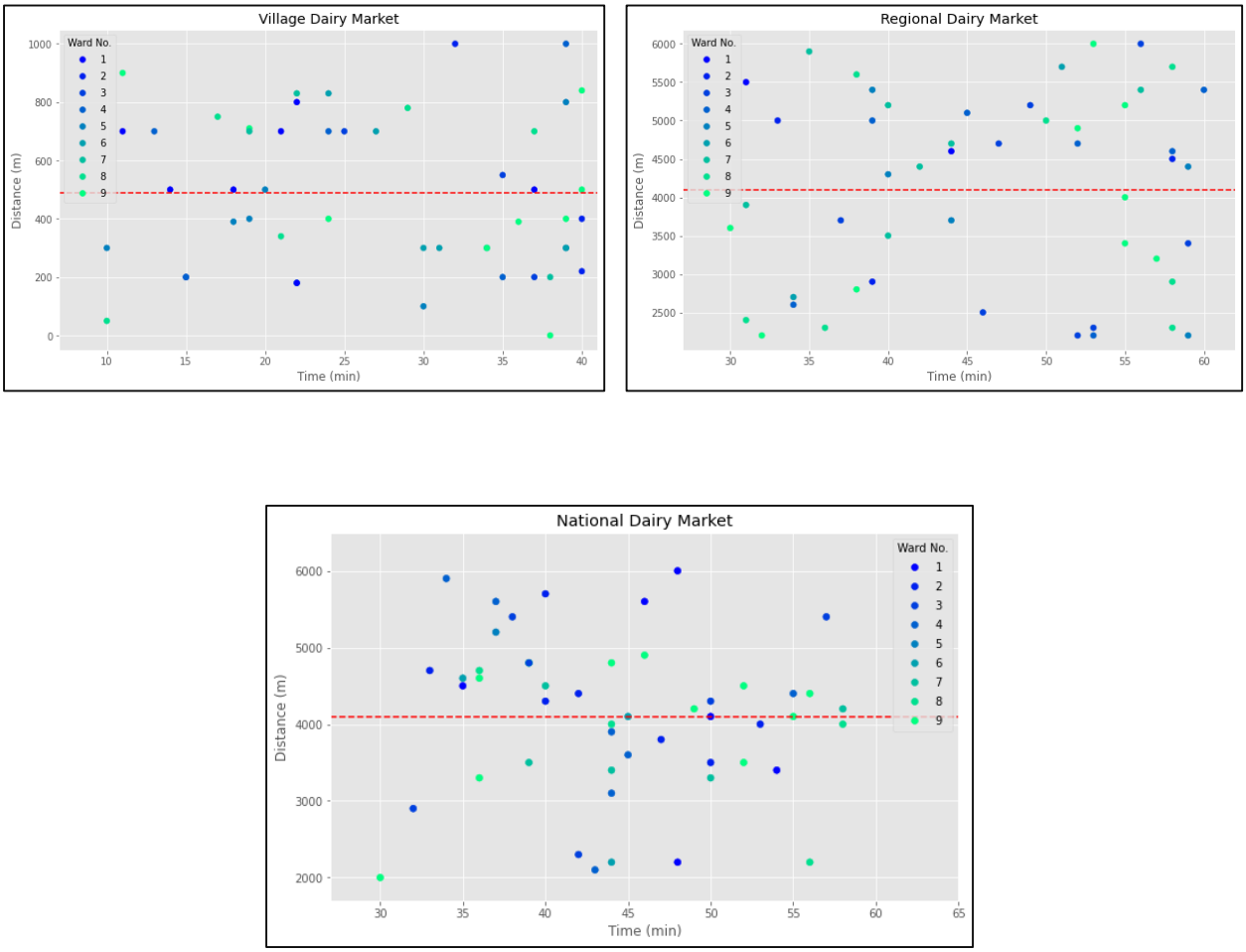


Figure 4. 8 Distance vs time graph of Village, regional and national Diary market in Rangpur union

4.3.7 EID market time v/s Distance analysis in Rangpur Union

People used to shop on EID day from different markets. Mean distance people usually cover to buy their EID utilities for village, regional, national market are 4000, 3200, 4500 respectively. people in ward no 1 and 2 usually cross 3000-6000 distance within 35-60 minutes for village EID market. Again in regional EID market people cross 30-60 mintues to buy their utensils. National markets are usually in long distance compared to other markets. People cross highest 6000 m distance to go to national market.

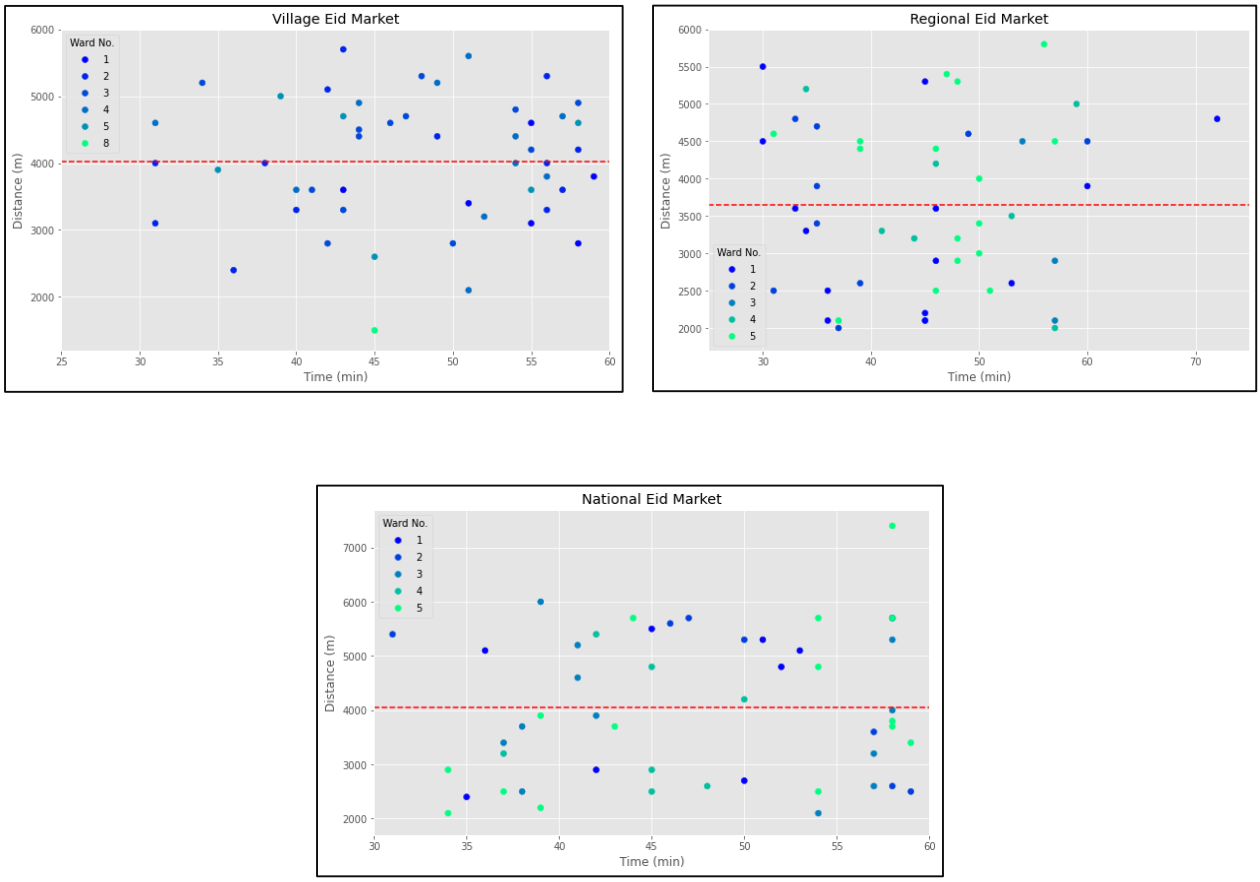


Figure 4. 9 Distance vs time graph of Village, regional and national EID market in Rangpur union

4.3.8 Puja market time v/s Distance analysis in Rangpur Union

People used to shop on puja day from different markets. Mean distance people usually cover to buy their puja utilities for village, regional, national market are 4000. people in ward no 1 and 2 usually cross 4000-6000 distance within 35-60 minutes for village puja market. Again in regional puja market people cross 30-50 minutes to buy their utensils. National markets are usually in long distance compared to other markets. People cross highest 6000 m distance to go to national market.

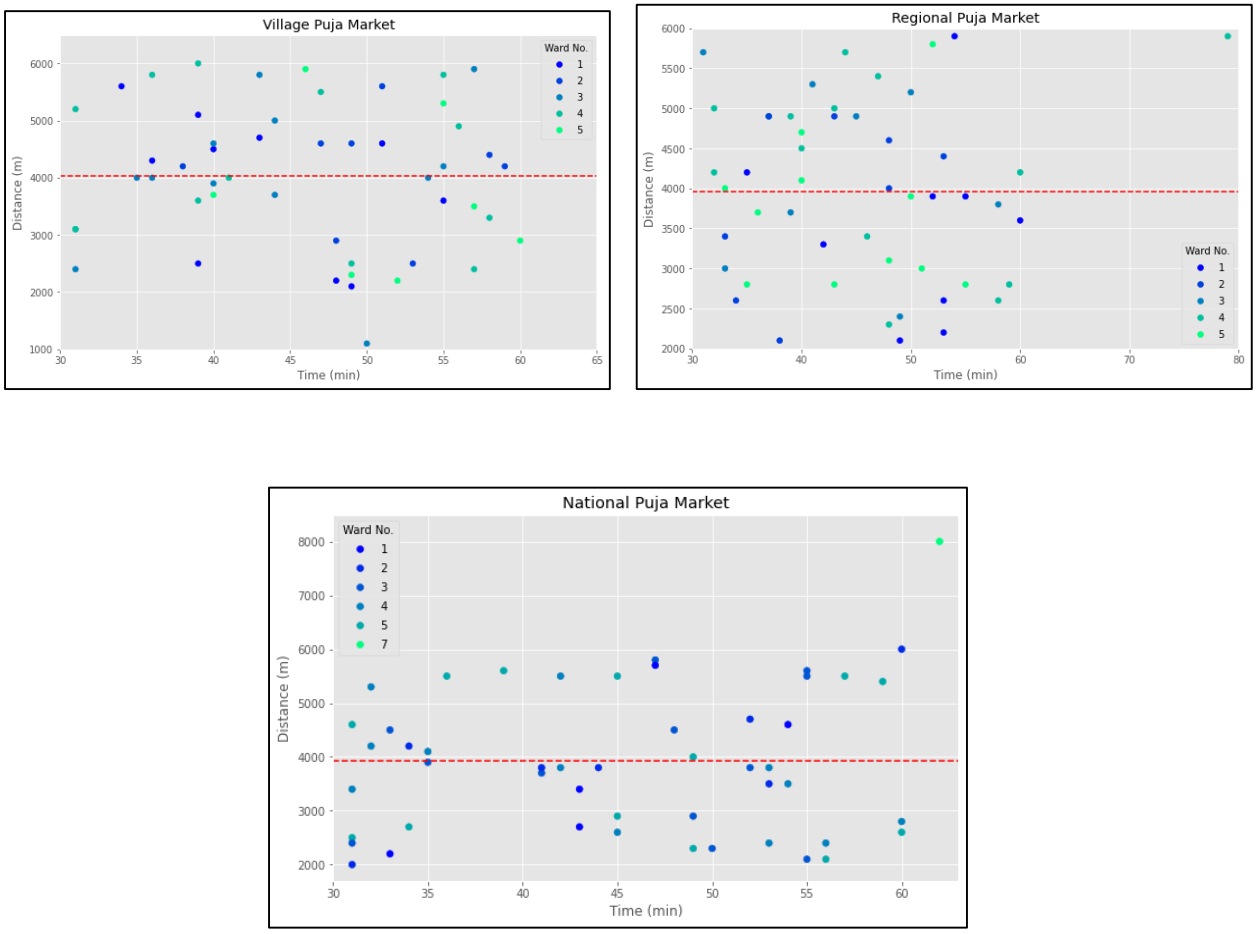


Figure 4. 10 Distance vs time graph of Village, regional and national Puja market in Rangpur union

4.4 Occupation diversity in Rangpur Union

Most of the people in Rangpur union are found to be rickshaw garage worker and vegetable seller with value of 16% and 12%. Besides that, there are also truck drivers, van drivers, private job holders and fisherman etc. job profession are found.

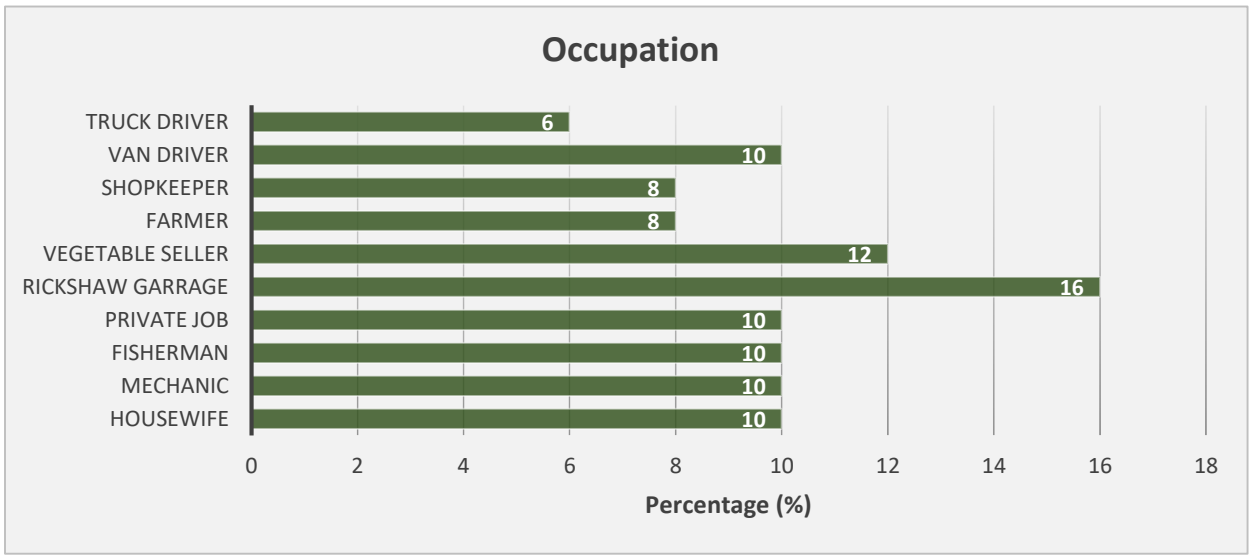


Figure 4. 11 Occupation percentage (%)

4.5 Education level diversity in Rangpur Union

Most of the people in Rangpur union are found to be have a primary degree value of 32%. 18% people are uneducated and defined as null in the graph.

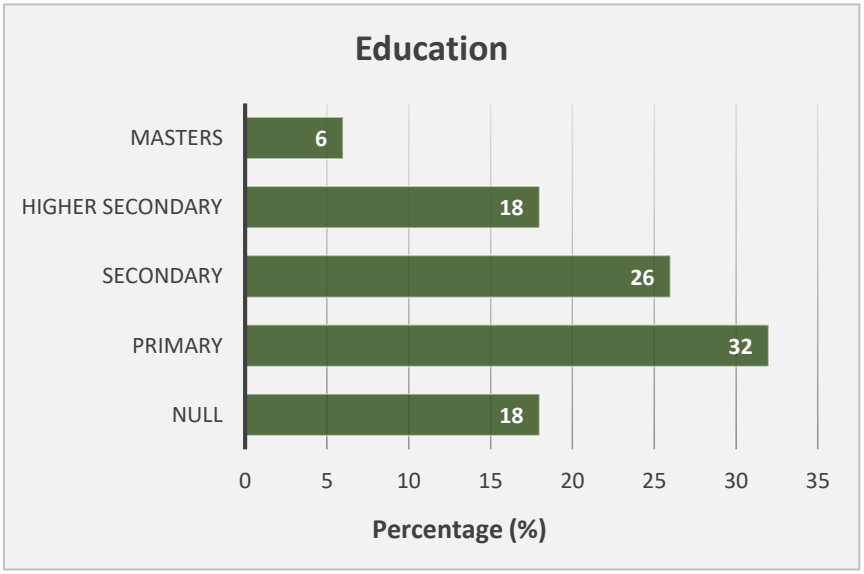


Figure 4. 12 Education level percentage(%)

4.6 Nearest market analysis

4.6.1 Nearest grocery market

Rangpur union people finds their rice, pulse and grains easily in the nearest grocery market. 14% of people need to go to collect oil sources from different market. Dairy, cheese and eggs are also available.

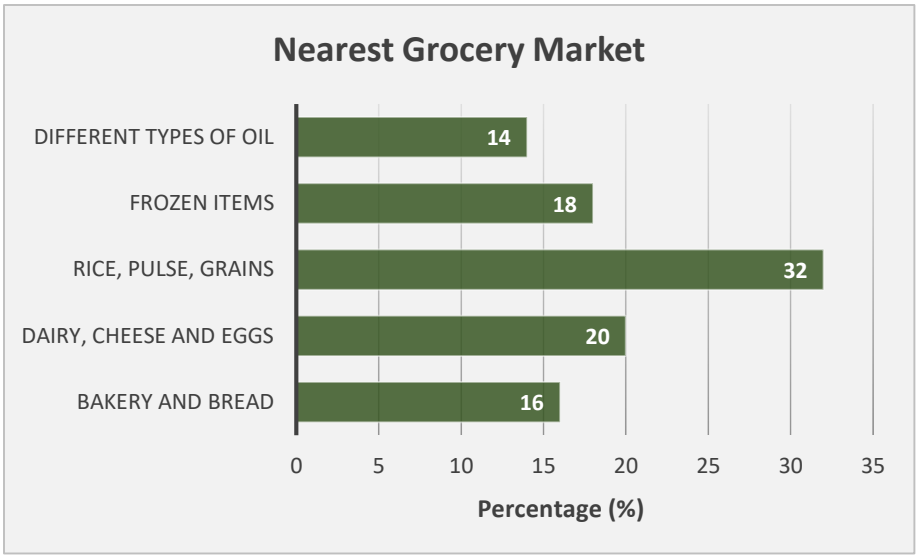


Figure 4. 13 Nearest grocery market percentage

4.6.2 Nearest vegetable market

30% of the frozen foods are found in the nearest vegetable market. But only 16% of the canned food are found in the village. Usually people like to eat fresh food there.

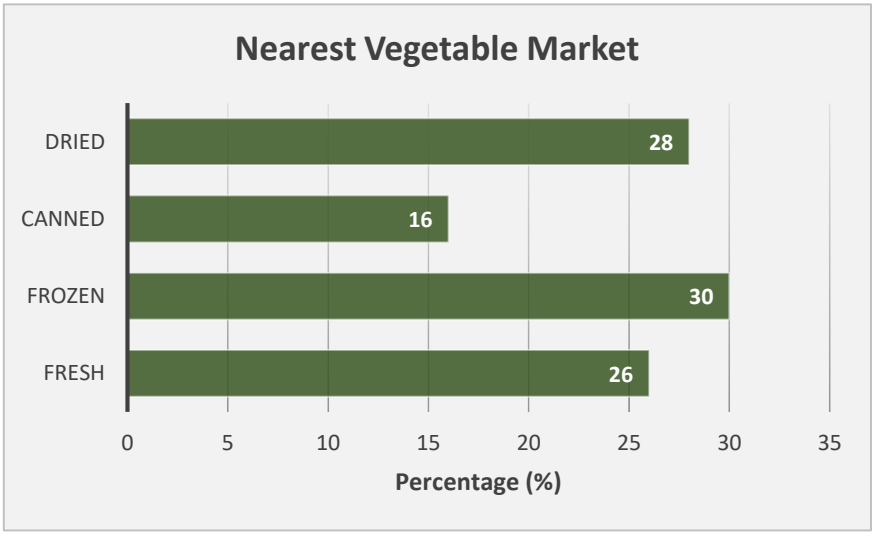


Figure 4. 14 Nearest vegetable market percentage

4.7 Important factor to buy

People mostly think about their comfort to buy any product. What they feel would give them comfort they used to buy that. 26% people always buy comfortable items.

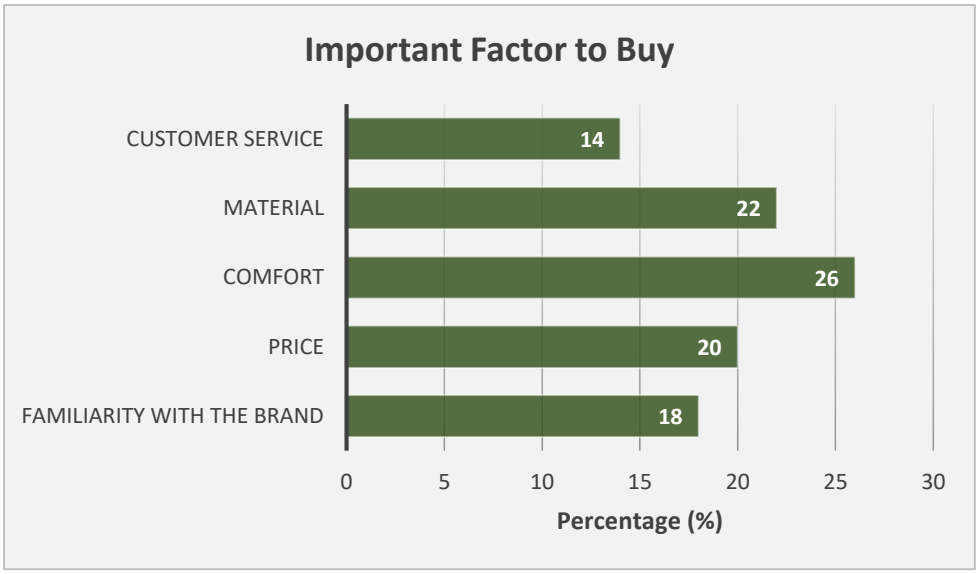


Figure 4. 15 Important factor to buy

4.8 Purchasing item

People usually buy products once a week around 28% of people.32% of people go to market once in a month. 18% people go to market several times a week to buy their daily necessary items.

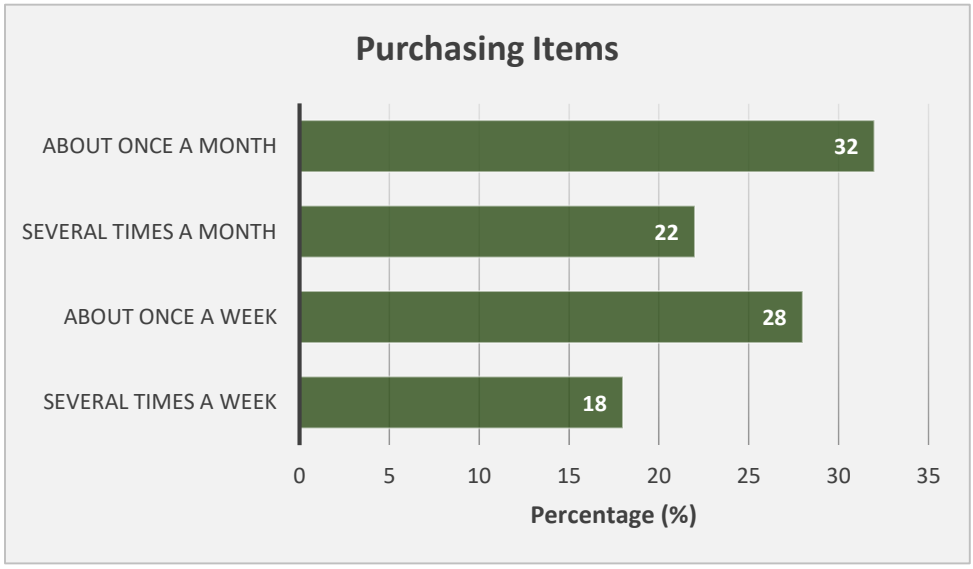


Figure 4. 16 purchasing item percentage(%)

4.9 Customer Satisfaction

24% people are really happy with the service that the market provides and 16% people are not satisfied with the service. As this markets are selling products from lower order to higher order they people might have different thinking and taste.

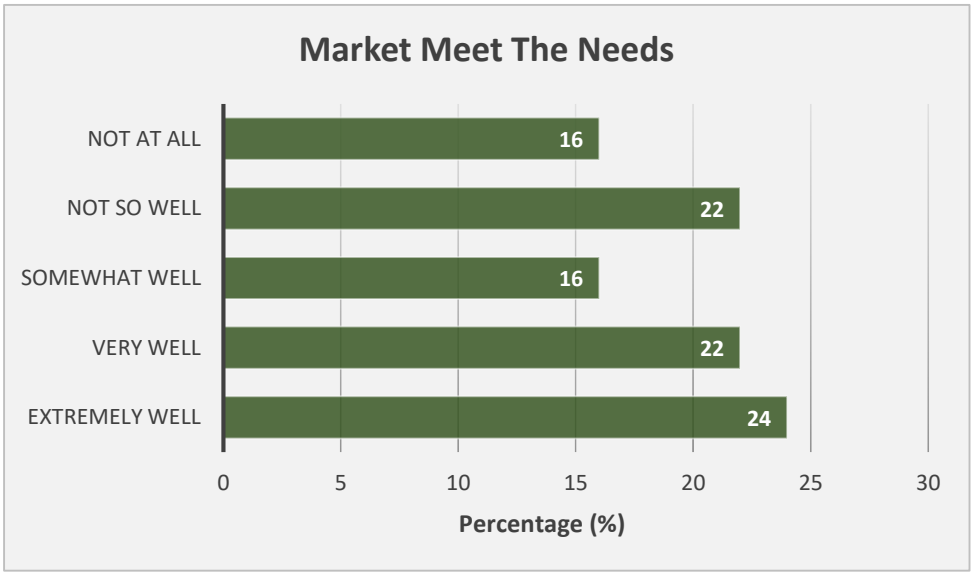


Figure 4. 17 Market meet the needs

4.10 SWOT analysis

Strength	Weakness
• A well-established community where most of the people live with each other consisting a great bonding. • Adequate amounts of water bodies and agricultural land.	• Number of health complex in this certain area is not adequate enough for people living there. • There are electricity in almost every household but the supply is not adequate enough for surviving. • Most of the roads are narrow and not well built
Opportunities	**Threats**
• There are lot of lands that are seen unused can be used to establish various important infrastructures. • As there are ample amount of water body consist, these water bodies can be utilized as farming of fishing which can create opportunities for local people.	• Natural Disaster like cyclones, floods are common in this certain area. • Salinity of Water

CONCLUSION & RECOMENDATION
Chapter Five

5.1 Conclusion

Models in shopping research are extensively utilized for a good reason; they are effective. Because they are simple and easy to use, they may be calibrated to a high degree of accuracy and give helpful and wide quantitative responses to policymakers in the process of developing a future strategy. However, the usage and implementation of such strategies must be seen in the context of a well-defined policy framework. The retail industry has experienced significant upheaval over the previous decade, and these developments have significant ramifications for the supply of shopping services. Despite the fact that the methodologies discussed in this chapter are demand models, they do not take into account what may be referred to as supply-side factors, which means they offer nothing about the real economics of retailing. Thus, qualitative evaluations of shopping facilities should be conducted in addition to quantitative evaluations in order to discover the commercial and other elements that influence the retail structure. One of the difficulties in this situation is evaluating and matching customer wants and requirements with business trends. The total expenditure of our zones are found 142149895 and zone C has a better expenditure report.

5.2 Recommendation

As our main objective or aim was to identify distance of each market from the center, we also have to identify how the development in this certain area are undergoing. Rural area like Rangpur Union needs to utilize its land and water bodies to accelerate development. Health Care and Hospitals are one of the most important aspect of a rural area. In Rangpur Union the number of health complexes are not adequate enough to serve the whole community. Local Government should emphasize more on health care for the betterment of the community. People living in this union can fulfill their day to day necessities from local markets but there are some other necessities that are not found in this union like electronic appliances, technological equipment. As there is supply of electricity people tend to buy electrical stuffs and they have to go a long way as city center is far from the community. There should be more shops regarding electrical appliances and supplies for people living in the community.

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